

Santa Susana Field Laboratory Former Worker Interviews

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Prepared for
The U.S. Department of Energy
Santa Susana Field Laboratory

Prepared by
P2 Solutions
Idaho Falls, ID



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Former Worker Interview Report

Introduction

In 2010 and 2011, the US Department of Energy (DOE) conducted interviews with individuals who had formerly worked at the Santa Susana Field Laboratory (SSFL) to learn more about historical operations at the site. A total of 132 interviews were conducted involving DOE and/or DOE contractor staff. Over approximately the same timeframe, the US Environmental Protection Agency (EPA) also conducted interviews with former employees. This report summarizes DOE's interview process and results; EPA's results are reported separately.

Rationale for Interviewing Former Workers

Two factors, one forward-looking and one historical, were prime contributors in DOE's decision to conduct the former worker interviews. In May 2008, the U.S. Department of Energy (DOE) issued a Notice of Intent to prepare an Environmental Impact Statement (EIS) for Remediation of Area IV of the Santa Susana Field Laboratory (SSFL Area IV EIS). Public scoping meetings were held on July 22, 2008 in Simi Valley, California; July 23, 2008 in Northridge, California; and July 24, 2008 in Sacramento, California.

Just prior to the scoping meetings, a comprehensive review of all previous Area IV sampling activity was conducted. The *Draft Gap Analysis Report* presented an evaluation of the existing chemical and radiological site characterization data to determine what additional data would be needed to prepare both a human health risk assessment and an ecological risk assessment. The assessment was to be used as part of the evaluation of alternatives in the SSFL Area IV EIS. Two public meetings concerning the *Draft Gap Analysis Report* were conducted in Simi Valley, California, on June 10 and 26, 2008.

Comments submitted during both sets of meetings addressed a wide range of community concerns about plans to prepare an EIS. Prominent among the comments were questions about DOE's knowledge of the nature and extent of contamination in Area IV. Commenters suggested that DOE:

- Develop a full understanding of site contamination issues based on the full history of operations and activities at the site
- Complete a thorough review of all available records, such as accident reports, log books, previous gamma walkover surveys, radionuclide monitoring, tracer studies, and air filters in buildings
- Conduct interviews with former employees to learn about any information that might not be well documented.

In addition, in 2008 P2 Solutions, on behalf of DOE, conducted a total of 50 interviews with 59 members of the general public around SSFL to evaluate DOE's relationship with the community and develop recommendations for conducting public participation activities to support development of the SSFL Area IV EIS.

One question asked during the community interviews was “Is there any information that you have or that you know about that you want to make sure DOE considers during development of the Environmental Impact Statement?” Numerous interviewees recommended that DOE talk with former employees. Reasons given for this recommendation included:

- The retirees know a lot and can remember where things were dumped and what existing facilities were used for before their most recent uses.
- They have first-hand institutional knowledge about what happened.
- Their knowledge has not been documented.

The results of the interviews were reported in a February 2009 report titled *Report on Community Interviews: Community Concerns and Preferences for Public Participation in Cleanup of Area IV Santa Susana Field Laboratory*.

In response to the comments received during the two comment periods and to the suggestions made during the community interviews, DOE decided to provide an opportunity for former employees to be interviewed.

Purpose of the Interviews

The primary purpose of the interviews was to seek information about any site contamination that should be addressed by site cleanup efforts, particularly any contamination that may not have been documented by existing records. In addition, the former worker interviews were designed to learn about the handling of radiological and hazardous materials and the history of site operations. It was presumed that the resulting information would help DOE and EPA plan and conduct investigations to determine the nature and extent of contamination.

Methodology

Determination of Who Would be Interviewed and By Which Agency, Round One

DOE does not have access to confidential contact information for former site workers as the vast majority of people who worked at SSFL over the years worked for site contractor organizations, not the federal agency. The first step in reaching out to former workers - to offer the opportunity to be interviewed - required cooperation from The Boeing Company (Boeing), the company which now maintains employee records for most former employees.

In July 2009, DOE was planning to conduct a workshop focused on the events that led up to a July 1959 partial meltdown in the Sodium Reactor Experiment (SRE) research reactor. To assist in getting word out about this workshop, Boeing agreed to send a letter printed on DOE letterhead to all former employees. The mailing included a postcard inviting former employees to communicate interest in a variety of activities. Individuals could indicate an interest in attending the workshop about the July 1959 accident, an interest in participating in a site tour, and/or an interest in being added to a

mailing list for ongoing communication about site cleanup in addition to an interest in being interviewed. A copy of that letter and postcard is included as Appendix A.

Approximately 475 former employees returned the postcard. Of those, 307 indicated on the postcard that they were interested in being interviewed.

As DOE began preparing to conduct the interviews with former employees, it was determined that additional information would be needed to assign the most appropriate team of interviewers for each individual wanting to be interviewed. Screening calls were attempted by telephone to the 307 people to confirm their willingness to participate in the former worker interviews. Each person was asked for information about his/her dates of employment, the area(s) of the site where he/she worked, his/her job title(s), and whether he/she handled radioactive or hazardous chemicals and/or wore a film badge or personal dosimeter. The script for the screening calls is attached as Appendix B.

A total of 33 out of the 307 were never reached for screening despite at least three attempts by telephone and/or two attempts by email depending on the information available for contacting each individual.

Of the 274 who were screened, 117 declined to be interviewed.¹ Another 32 indicated a desire to be interviewed but reported never having worked in Area IV; these individuals were referred to NASA, which performed work in the other three Areas of SSFL, for a similar but separate effort. The remaining 125 people confirmed that they had worked in Area IV and were interested in being interviewed.

Those who indicated an interest in being interviewed were invited to indicate a preference for being interviewed by DOE/DOE's contractor staff, by EPA/EPA's contractor staff, or by both DOE and EPA. Two people indicated a preference for being interviewed by EPA only; their contact information was provided directly to EPA for follow-up. Another 18 indicated a desire to be interviewed by both DOE and EPA. They were interviewed by teams including representatives of both agencies. The balance (105 people) indicated a preference for being interviewed by DOE/DOE contractor staff alone.

Determination of Who Would be Interviewed and By Which Agency, Round Two

One of the questions asked during the first round of interviews was for recommendations of other people who might have relevant information to share related to the purpose of the interviews. A total of 29 people were mentioned during the DOE-only interviews. DOE was able to obtain contact information for 10 of those individuals and make contact with them to offer the opportunity to be interviewed. Six declined to

¹ Some individuals had not understood what it meant when they checked the box on the postcard box and didn't actually want to be interviewed. Some individuals reported having no knowledge of site contamination. Others had changed their minds about wanting to participate. In some cases, the screeners talked with a relative and learned that the former employee had died since returning the postcard.

participate and the other four agreed to be interviewed. The remaining 19 people could not be found.

EPA asked a similar question during its independent interviews and received suggestions of 85 people for follow-up interviews (two of which had also been identified by the former employees interviewed by DOE).

The inter-agency interview team needed contact information for a total of 102 people recommended during the first round of interviews, including the 19 mentioned by the DOE's interviewees who had not been found and 85 suggested by EPA's interviewees; two of the names were mentioned by both sets of interviewees. The known information for the 102 people was provided to a private investigation firm. The investigators were not able to find good contact information for 50 of the 102 individuals, including nine of DOE's referrals and 41 of EPA's referrals. The investigators found death notices for another 17 people, including three of DOE's referrals and 14 of the EPA referrals.

The investigators were able to obtain contact information for 35 people and they conducted screening calls with those individuals. Of those individuals, 15 declined to participate, including three identified by DOE's interviewees and 12 by EPA's interviewees. The firm conducted screening calls using the approved screening call script with the remaining 20 people, including 16 referred by EPA's interviewees, two referred by DOE's interviewees, and the two who were referred by both sets of interviewees.

EPA gave DOE permission to proceed with interviews with the two individuals referred by both sets of interviewees as well as one additional person from their list.

As a result of these efforts, DOE was able to interview nine more people in Round Two.

How Interview Protocol was Established

DOE and its contractor staff developed an initial list of questions and then met with the EPA and its contractor staff via conference call. The inter-agency team met periodically over a period of three months to plan the approach for conducting the interviews.

It was noted that some of the individuals interested in being interviewed held technical positions (including researchers, reactor operators, scientists, and engineers). Others held less technical positions. It was decided that a team of interviewers be convened to include some folks with technical backgrounds and thus the ability to understand more technical information about historical site operations.

It was noted that some former employees might have concerns about their health related to possible workplace exposure to hazardous and/or radiological materials while employed at SSFL. Because the interviews were focused on site contamination and not health effects, it was decided that a fact sheet was needed to provide information about how to file health claims. A copy of the fact sheet was provided whenever interviewees mentioned concerns about their health. The Health Concerns fact sheet is attached as Appendix C.

It was also noted that former employees might express concern about the vulnerability of their pension plans if Boeing was unhappy about information provided during the interviews. Boeing assured the interview team that this concern was unfounded.

Boeing wrote a letter that could be provided to interviewees should this concern be expressed during an interview. The Boeing letter is attached as Appendix D.

Finally, it was noted that some former employees might be reticent to share information related to site contamination out of fear of criminal prosecution. DOE legal staff was consulted. For those interviews conducted by DOE, it was agreed that the results of the interviews would not be used to support a criminal investigation and that every assurance should be made to protect the confidentiality of the individuals interviewed.

The resulting Interview Protocol and Script describing the above and listing the questions asked during the interviews is attached as Appendix E.

Training of Interviewers

Between June 1 and 3, 2010, the interviewers (those who would be assigned DOE-only interviews as well as the team that was to conduct the joint DOE-EPA interviews) met face-to-face in Chatsworth, California. The purpose of the training was to develop a consistent approach among all interviewers. The first day consisted of discussions about the purpose of the interviews and the protocol for scheduling and conducting the interviews. The second day was free of meetings to allow all interviewers to conduct two interviews that had already been scheduled. The third day provided the opportunity to discuss those initial interviews, share lessons learned, and agree to adjustments to the overall approach if needed. It was agreed that the interview team would conduct interviews as consistently as possible.

At the end of the training, each interview team was provided with contact information for a set of interviewees. The more technically-oriented interview teams were assigned responsibility for interviewing individuals with more technical backgrounds and less technically-oriented interview teams were assigned the balance of the interview assignments.

The agenda for the interviewer training session is attached as Appendix F.

How Interviews were Conducted

Including both rounds of interviews, DOE interviewed a total of 114 people and teamed with EPA staff to conduct another 18 interviews. There was no difference between how the DOE-only and the joint DOE/EPA interviews were conducted; both types of interviews followed the established protocol.

A set of aerial photos was printed in large format, organized in chronological order from 1952 through 2005 and bound together. Each interview team was provided a set of the aerial photos as well as mylar sheets and permanent marker pens. It was agreed that the interviewers would provide interviewees an opportunity to mark the blank mylar sheets to indicate the location of known contamination releases, as appropriate. Maps that were marked were provided directly to EPA to assist in planning its investigations. Given this opportunity, none of those interviewed indicated the location of any contamination that was previously unknown to DOE staff.

Most interviews were conducted in person and a small number were conducted via telephone.

Protection of Confidentiality

Some interviewees mentioned other people who worked at SSFL, including supervisors, co-workers, and others. A total of 175 names were mentioned during interviews. In some cases, these names were familiar to the interview team; in most cases they were not. All names have been redacted to protect the confidentiality of those individuals. Names were replaced in the body of the reports with a unique 3-letter code, in capital letters.

In addition, the names of all individuals who were interviewed are not included in this report to protect their confidentiality.

Approval of Interview Reports

Interviewees were assured that the report on his/her interview would not be included in this document unless approved. Following each interview, the interview teams developed a document communicating the information that was shared during the interviews. The report was provided to the interviewees, in hard copy or electronic format depending on their preferences. Revisions were made as requested.

The reports present everything that was said, in approximately the order of the actual conversation. Some interviewees were willing to respond to the questions in the approved interview protocol. Others preferred to tell their stories on their own. The interview teams did not attempt to confirm any information shared by the interviewees. The reports, consequently, attempted to faithfully transcribe the recollections of those who were interviewed and, in many cases, reflect the interviewees' choice of words.

A total of 132 interviews was conducted involving DOE staff or DOE's contractor staff (114 by DOE only and 18 by DOE and EPA) during Round One (123 interviews) and Round Two (nine).

A total of 118 interview reports have been approved to date, including 15 conducted by DOE and EPA and 103 by DOE only. Of the approved interview reports, 111 interviews were conducted in Round One and seven during Round Two.

In some cases, subsequent reviews of the interview reports revealed incomplete information. Extensive attempts were made to re-contact the interviewees to fill in missing information; not all attempts were successful.

All approved interview reports are attached as Appendix G and Appendix H. Appendix G includes the approved interview reports for the 15 people interviewed jointly by DOE and EPA. Appendix H includes the reports for those folks interviewed by DOE only; only one interview report has been included that was never approved; one individual passed away before the interview team could obtain his approval.

Sharing of Interview Reports with EPA

Upon approval by the interviewees, all interview reports were posted in a share file that is accessible to the EPA staff and consultants. EPA was able to review the reports and use information to inform its ongoing investigations. In order to assure confidentiality, the names of individuals interviewed by DOE were not provided to EPA.

Results

This section summarizes information about the individuals who were interviewed.

During screening, all potential interviewees were asked for their start date and duration of employment at SSFL. Table 1 reports the starting date of employment for all individuals who were interviewed, including those interviewed jointly by DOE and EPA, and those interviewed by DOE alone.

| Table 1. Starting Date of Employment | | | | | |
|---------------------------------------------|-------------------------------|----------------------------|--------------------------------|----------------------------|--------------|
| Starting Date | Number of Interviewees | | | | Total |
| | Approved Interviews | | Not Approved Interviews | | |
| | DOE Only | Joint DOE & EPA | DOE Only | Joint DOE & EPA | |
| Between 1950 and 1959 | 51 | 9 | 4 | 0 | 64 |
| Between 1960 and 1969 | 24 | 3 | 2 | 1 | 30 |
| Between 1970 and 1979 | 13 | 3 | 3 | 1 | 20 |
| Between 1980 and 1989 | 13 | 0 | 1 | 1 | 15 |
| Between 1990 and 1999 | 2 | 0 | 1 | 0 | 3 |
| Total | 103 | 15 | 11 | 3 | 132 |

During screening, all potential interviewees were asked about the duration of their employment. Table 2 reports the length of time employed for the 132 people who were interviewed.

| Table 2. Duration of Employment | | | | | |
|----------------------------------------|-------------------------------|----------------------------|--------------------------------|----------------------------|--------------|
| Starting Date | Number of Interviewees | | | | Total |
| | Approved Interviews | | Not Approved Interviews | | |
| | DOE Only | Joint DOE & EPA | DOE Only | Joint DOE & EPA | |
| 0 to 5 years | 19 | 6 | 3 | 1 | 29 |
| 6 to 10 years | 14 | 4 | 1 | 0 | 19 |
| 11 to 15 years | 18 | 0 | 1 | 1 | 20 |
| 16 to 20 years | 9 | 2 | 0 | 0 | 11 |
| 21-25 years | 10 | 0 | 1 | 0 | 11 |
| 26 to 30 years | 6 | 0 | 1 | 0 | 7 |
| 31 to 35 years | 14 | 2 | 3 | 1 | 20 |
| 36 to 40 years | 11 | 0 | 0 | 0 | 11 |
| Over 40 years | 2 | 1 | 1 | 0 | 4 |
| Total | 103 | 15 | 11 | 3 | 132 |

During screening, all potential interviewees were asked what portion of the SSFL where they worked during their employment. Table 3 summarizes the responses to that question for the 132 people who were interviewed.

| Portion of the SSFL Where Worked | Number of Interviewees | | | | Total |
|--------------------------------------|------------------------|-----------------|-------------------------|-----------------|-------|
| | Approved Interviews | | Not Approved Interviews | | |
| | DOE Only | Joint DOE & EPA | DOE Only | Joint DOE & EPA | |
| All four administrative areas | 26 | 2 | 4 | 0 | 32 |
| Area IV only | 58 | 12 | 4 | 3 | 77 |
| Area IV plus one other area | 4 | 1 | 1 | 0 | 6 |
| Area IV plus 2 other areas | 10 | 0 | 0 | 0 | 10 |
| Never worked in Area IV ² | 5 | 0 | 2 | 0 | 7 |
| Total | 103 | 15 | 11 | 3 | 132 |

² While the intention was to refer all individuals who never worked in Area IV to NASA for interviewing, these seven individuals indicated that they had handled radioactive materials and/or had worn a film or dosimetry badge. Therefore it was believed that they might have knowledge of Area IV operations that would be helpful to the investigation.

During screening, all potential interviewees were asked whether they had ever handled hazardous or cleaning materials or radioactive materials and if they had ever worn a radiation detection (film or dosimetry) badge. Table 4 summarizes the responses for the individuals who were interviewed.

| Table 4. Handling of Hazardous or Radioactive Materials and Wearing of Radiation Detection Badges | | | | | |
|-----------------------------------------------------------------------------------------------------------------------------------|-------------------------------|----------------------------|--------------------------------|----------------------------|--------------|
| Response to questions about handling of hazardous or radioactive materials and about wearing of radiation detection badges | Number of Interviewees | | | | |
| | Approved Interviews | | Not Approved Interviews | | Total |
| | DOE Only | Joint DOE & EPA | DOE Only | Joint DOE & EPA | |
| Did not handle any hazardous materials or radioactive materials and did not wear a film or dosimetry badge | 13 | 1 | 0 | 0 | 14 |
| Handled hazardous or cleaning chemicals only (did not wear a film or dosimetry badge) | 14 | 0 | 2 | 0 | 16 |
| Handled radioactive materials but did not wear a film or dosimetry badge | 0 | 0 | 0 | 0 | 0 |
| Wore a film or dosimetry badge, but did not handle any hazardous materials, cleaning materials, or radioactive materials | 15 | 0 | 2 | 0 | 17 |
| Handled hazardous or cleaning chemicals and wore a film or dosimetry badge | 11 | 0 | 3 | 0 | 14 |
| Handled radioactive materials and wore a film or dosimetry badge | 12 | 1 | 0 | 2 | 15 |
| Handled hazardous or cleaning chemicals, handled radioactive materials, and wore a film or dosimetry badge | 38 | 13 | 4 | 1 | 56 |
| Total | 103 | 15 | 11 | 3 | 132 |

During screening, all potential interviewees were asked for their job title while employed at SSFL. In some cases, this question was difficult to answer, particularly for people who were employed for a long period of time. While many who worked at the site had

college degrees or even advanced degrees, many others started employment straight out of high school and were promoted based on skills and knowledge acquired on the job. Table 5 summarizes the primary category provided in response to that question as well as information shared during the interviews.

| Job Title | Number of Interviewees | | | | Total |
|------------------------------------------------------------------------------------------------|-------------------------------|----------------------------|--------------------------------|----------------------------|--------------|
| | Approved Interviews | | Not Approved Interviews | | |
| | DOE Only | Joint DOE & EPA | DOE Only | Joint DOE & EPA | |
| Clerical/Administrative Support | 5 | 0 | 1 | 0 | 6 |
| Construction/Construction Management/Building Trades | 3 | 0 | 0 | 0 | 3 |
| Designer | 3 | 0 | 0 | 0 | 3 |
| Engineer | 26 | 4 | 0 | 0 | 30 |
| Fire Engineer/Fireman | 2 | 0 | 0 | 0 | 2 |
| Health Physicist/Health Physics Technician | 4 | 0 | 0 | 0 | 4 |
| Inspector, X-ray Operator | 2 | 0 | 1 | 0 | 3 |
| Law Enforcement | 1 | 0 | 0 | 0 | 1 |
| Management/Senior Management | 11 | 1 | 2 | 0 | 14 |
| Mechanic/Technician | 8 | 6 | 4 | 0 | 18 |
| Mechanic/Technician, but promoted during tenure to other positions with greater responsibility | 12 | 2 | 0 | 1 | 15 |
| Photographer | 0 | 1 | 0 | 0 | 1 |
| Physician | 0 | 0 | 0 | 1 | 1 |
| Quality Assurance/Quality Control | 5 | 0 | 1 | 0 | 6 |
| Reactor Operator | 3 | 0 | 0 | 0 | 3 |
| Regulatory Compliance | 1 | 0 | 0 | 0 | 1 |
| Senior Engineer | 8 | 0 | 1 | 0 | 9 |

| Table 5. Job Title during Tenure at SSFL | | | | | |
|-------------------------------------------------|-------------------------------|----------------------------|--------------------------------|----------------------------|--------------|
| Job Title | Number of Interviewees | | | | Total |
| | Approved Interviews | | Not Approved Interviews | | |
| | DOE Only | Joint DOE & EPA | DOE Only | Joint DOE & EPA | |
| Systems Programmer | 1 | 0 | 0 | 0 | 1 |
| Technical Staff/Scientist/Researcher | 7 | 1 | 1 | 1 | 10 |
| Truck Driver/Bus Driver | 1 | 0 | 0 | 0 | 1 |
| Total | 103 | 15 | 11 | 3 | 132 |

Conclusions

The interview team reported that the experience of conducting the interviews was both rewarding and fascinating. A wide range of types of individuals were interviewed, including everything from senior managers to clerical staff and from senior scientists to mechanics. Most reported positive experiences and feeling grateful for the opportunity to do what they believed to be important work at SSFL. Almost all expressed appreciation for the opportunity to tell their stories.

Rather than trying to categorize the information in any manner that could detract from the richness and diversity of what was shared, the reader is invited to read the approved interview reports in Appendices G (interviews conducted by EPA and DOE jointly) and H (interviews conducted by DOE alone).

Appendix A
DOE Letter and Postcard



Department of Energy
Washington, DC 20585

July 21, 2009

The Department of Energy (DOE) has requested that Boeing forward this letter to you as part of DOE's outreach to former and current employees associated with the activities at the Santa Susana Field Laboratory Area IV. DOE is using this approach to protect your privacy and interests. DOE is especially interested in talking to former workers to improve our knowledge of the pioneering work that was done at the field laboratory over the years. Your work and memories form an important body of knowledge that will contribute to a more complete understanding of the history of SSFL. We are interested in permanently documenting the unique work and history of this site.

We are planning two activities we believe you may be interested in: an ETEC Historical Interviews Project, and a public workshop on the Sodium Reactor Experiment (SRE), the first reactor providing electrical power to a commercial grid.

Historical Interviews Project

We plan to conduct Historical Interviews this fall with hopes of learning about past practices and procedures that could help the DOE. If you would like to participate in these interviews – or even if you would just like to be kept informed, please sign up to be on a special mailing list to receive information about the Project. You can either call **Debbie Kramer** at (818 466-8898), or email her at ETEC-Energy@emcbc.doe.gov. We look forward to hearing from you.

Public Workshop

We plan to hold a public workshop on the SRE program. The SRE accident continues to be an important concern to Santa Susana stakeholders. Our goal is to provide the community with the opportunity to explore different perspectives regarding the purpose of the SRE, its valuable research, and what occurred in 1959. We are inviting the general public and former workers, particularly those who worked on the SRE, to attend a presentation by three scientists who will offer their perspectives on what happened before, during, and after the SRE accident. Although we haven't set a final date for the meeting, we are targeting a Saturday in late August.

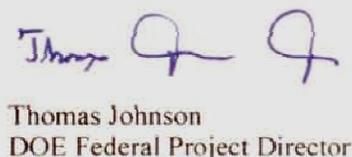
In addition, we are offering former workers the opportunity to tour Area IV on the Friday before the meeting. It will be very interesting to have you tell us your recollections and experience while we are actually on site and we hope that you will enjoy seeing what's left in Area IV today. This tour will include an informal reception; both will be for former employees only.

We have enclosed a self-addressed post-card if you would like to reply to us directly or feel free to contact **Debbie Kramer**, (818 466-8898), or ETEC-Energy@emcbc.doe.gov. Thank you and we look forward to hearing from you.

Sincerely,



Stephie Jennings
DOE NEPA Document Manager



Thomas Johnson
DOE Federal Project Director

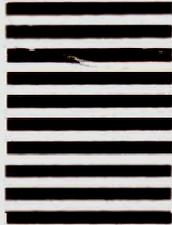




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ENERGY TECHNOLOGY ENGINEERING CTR
US DEPARTMENT OF ENERGY
PO BOX 10300
CANOGA PARK CA 91309-9908



Yes, I am interested in receiving more information about the following upcoming activities related to the Department of Energy's outreach to former employees at Area IV of the Santa Susana Field Laboratory. Please send me information about the following:

- Tour and informal reception at SSFL Area IV
- Public workshop on the Sodium Reactor Experiment accident
- Interviews with former SSFL Area IV workers
- The Environmental Impact Statement for Remediation of SSFL Area IV

Name

Street Address

City, State, Zip Code

E-mail address Phone number

Appendix B
Screening Call Script

Former Employee Screening Call Script

The Boeing Company sent out letters to approximately 10,000 former employees to notify them of an opportunity to participate in tours of SSFL and public meetings and asking if they were interested in being interviewed concerning their work at the site. Approximately 300 former employees have responded indicating a willingness to be interviewed. We will conduct screening telephone calls with these former employees to confirm the accuracy of their contact information and determine the time frame of their association with SSFL and the type(s) of work they performed at the site. The information gathered during the telephone screening calls will be used to plan and conduct face to face or extended telephone interviews.

The following list of questions has been developed to elicit brief, factual answers that can be used to evaluate the types of information that we might learn from each former employee and match them with appropriate interviewers or interview teams.

Telephone Screening Script

Hello, my name is _____. May I please speak to _____? Recently you were contacted because you formerly worked at the Santa Susana Field Laboratory and you indicated that you might be willing to be interviewed concerning your recollections of your time there. I'm calling on behalf of the US Department of Energy to follow up with you and find out a little more about your work at Santa Susana. Are you still interested in being interviewed? This is not the interview, but rather we are seeking to learn a little bit more about your employment so that we can schedule the appropriate type of interview later. Do you have a few minutes now to answer a few preliminary questions?

The purpose for our interviews will be to develop a fully-informed history of site operations and facilities for use in preparing environmental documentation that is being prepared to support final cleanup and closure of DOE's facilities at the SSFL.

1) When did you work at Santa Susana Field Laboratory?

[Record start year and end year, confirm total number of years calculated by spreadsheet.]

2) What company or organization(s) did you work for?

[Record "1" in column corresponding with the name of company. Record all responses.]

3) What was your job title or titles?

[Record titles. If multiple titles are given, record all. If only one mentioned, do not press.]

4) What areas of the complex did you work in? (If Areas IV, ask where)

[Record "1" in column corresponding with the administrative area of site. Record all responses. If Area IV is mentioned, ask where and record specific buildings and/or programs mentioned.]

5) The following questions will help us pair you with the most appropriate interview team.

- a) Did you work with or around, or manage any chemicals, or cleaning materials?
- b) Did you work with or around, or manage any radioactive materials or radioactive wastes?
- c) Did you ever wear a dosimetry or film badge?

[Record "1" for Yes, leave blank for No.]

Ask Question No. 6 only if former employee indicated that he/she worked in Area 4 (Question 4) or worked with radioactive materials/waste (Question 5).

- 6) The US Environmental Protection Agency is also interviewing former employees about Area 4 at SSFL. There are three options that you can choose from for your interview:
- You can be interviewed by the EPA alone,
 - By DOE alone
 - Or jointly by both EPA and DOE

Which would you prefer?

[Indicate one choice only, using "1" in the proper column to indicate their preference]

- 7) Based on your work or observations at the site do you have any specific concerns that you think we should learn about right away to help us focus our investigations over the next few months? We will use this information to determine who should be involved in your interview and how soon we will need to get your interview scheduled.

[Use "1" to indicate an affirmative response. Please avoid allowing caller to share their concern/observations during screening call by explaining that would like them to share that information with the interviewer instead.]

- 8) Many of the interviews will be conducted by telephone. Would that work for you?

[If not, record concern briefly]

- 9) Once we look at the results of all of these screening calls, we will be in touch again to schedule your interview. When is the best time to reach you?

[Record response capturing preferences about day of week, time of day, etc as well as upcoming plans they mention]

- 10) Finally, we want to confirm the contact information we have for you. Is this the best telephone number to reach you at?

[Read number aloud, record different number upon request]

Is this address correct?

[Read aloud, correct as appropriate]

Is this email address correct/Do you have an email address?

[Read aloud if we have one, confirm, record if we don't already have]

Thank you for your time in answering these questions. You have been very helpful and we appreciate your assistance. Once we have completed these screening calls, we will be back in touch to schedule the interview.

-- End of Script --

At the conclusion of the call, please record your notes in the spreadsheet about the following which should be considered during scheduling of interviews:

- a) Health status (frail, said they were sick, spouse reported recent stroke, etc.)
- b) Mental status (seemed clear, seemed confused)
- c) Hearing issues (difficult to communicate with on the telephone)
- d) Attitude (cooperative, fearful, angry, hesitant)
- e) Expressed desire to have family member (spouse or child) participate/present for interview

Appendix C
Health Concerns Fact Sheet

If you have health concerns related to your prior work at Santa Susana Field Laboratory, the US Department of Energy has compiled this information for you.

The **US Department of Energy (DOE) Former Worker Medical Screening Program (FWP)** was established following the issuance of the FY 1993 National Defense Authorization Act (PL 102-484, Section 3162), which called for DOE to provide medical screening services to former employees who may be at risk for health conditions as a result of exposure to hazardous or radioactive substances during their employment at DOE facilities.

External teams of health experts are funded to independently evaluate DOE site hazards and exposures, and to offer medical screening, at no cost, to former workers who may be at risk for occupational diseases. The medical screening exam is customized according to each individual's work history and likely exposures. The program serves **all** former Federal, contractor, and subcontractor workers from **all** DOE sites in locations close to their residences.

Medical screening tests include a physical exam, general blood and urine tests, hearing test, chest x-ray, lung function test, and other tests based on exposures (e.g., a beryllium lymphocyte proliferation test for individuals exposed to beryllium).

Participants with abnormal findings are referred to their personal physicians or specialists for any follow up medical exams and diagnoses. Individuals with findings consistent with a potential occupationally related disease are referred to the **Department of Labor** for possible compensation and medical benefits under the **Energy Employees Occupational Illness Compensation Program**.

Medical screening exams for former workers from Area IV of the Santa Susana Field Laboratory are currently available through the National Supplemental Screening Program (NSSP), a component of the FWP. Learn more about the NSSP by calling toll free at 866-812-6703 or visiting their website: <http://www.orau.org/nssp/>

For more information about FWP, please visit their website at: <http://www.hss.energy.gov/HealthSafety/FWSP/formerworkermed/>

The **Energy Employees Occupational Illness Compensation Program Act of 2000**, as amended, established a compensation program for the civilian men and women who performed duties related to the nuclear weapons production and testing programs of the US Department of Energy and its predecessor agencies over the past 50 years. The Act recognizes that these workers may have developed certain work-related illnesses as a result of exposure to radiation and toxic substances unique to nuclear weapons production and testing. Compensation and medical benefits are provided to eligible workers under The Act and, in some case, their survivors.

The **US Department of Labor** administers the Energy Employees Occupational Illness Compensation Program Act of 2000, which provides benefits to eligible employees and former employees of the Department of Energy and its contractors and subcontractors as well as certain survivors of such individuals as provided in The Act. Benefits are available for people made sick as a result of exposure to radiation (Part B) and exposure to hazardous contamination (Part E).

Part B is available to current and former employees of Department of Energy and Department of Energy contractors and subcontractors as well as certain family members of deceased workers. The program was recently expanded to include a new class of former employees who worked at Area IV of Santa Susana Field Laboratory at least 250 workdays within a specific period of time in the 1950s. More information on this class and the eligibility requirements can be found on the NIOSH website:

<http://www.cdc.gov/niosh/ocas/ocassec.html>; Or on the DOL website:

<http://www.dol.gov/owcp/energy/regs/compliance/law/SEC-Employees.htm>

Under Part B, individuals made sick as a result of exposure to radiation are eligible for:

- \$150,000 maximum compensation (radiogenic cancer, chronic beryllium disease, chronic silicosis) and
- Medical benefits are available in addition to compensation.

To be eligible for coverage under Part B, individuals must provide proof of

- employment at a qualifying facility
- exposure to radiation, beryllium or silica
- medical diagnosis, e.g. radiogenic cancer, chronic beryllium disease or sensitivity, or chronic silicosis.

Part E is available to contractor and subcontractor employees of covered Department of Energy facilities as well as certain family members of deceased workers. Workers made sick as a result of exposure to hazardous contamination are eligible for:

- \$250,000 maximum compensation and
- Medical bills for accepted illnesses.

To be eligible for coverage under Part E, individuals must provide proof of:

- employment at a qualifying Department of Energy facility
- exposure to toxic substance
- medical diagnosis, e.g. asbestosis, cancer, chronic beryllium disease, dermatitis, asthma, etc.

For both Part B and Part E, the Department of Labor will assist in collection of evidence, including employment & exposure records and medical documentation, but the ultimate responsibility for claim rests with claimants

For further information, contact the Energy Employees Occupational Illness Compensation Program Act Program by calling 1-866-888-3322 (TTY: 1-877-889-5627) or visiting their website at <http://www.dol.gov/owcp/energy/index.htm>

The **National Institute for Occupational Safety and Health** (under the auspices of the U.S. Department of Health and Human Services Centers for Disease Control and Prevention) operates the Division of Compensation Analysis and Support to support implementation of the Energy Employees Occupational Illness Compensation Program Act Program of 2000. They are responsible for assisting claimants under the Energy Employees Occupational Illness Compensation Program Act of 2000 and:

- Developing scientific guidelines for determining whether a worker's cancer is related to the worker's occupational exposure to radiation (probability of causation).
- Developing methods to estimate worker exposure to radiation (dose reconstruction).
- Using the dose reconstruction regulation to develop estimates of radiation dose for workers who have applied for compensation.
- Establishing a process by which classes of workers can be considered for inclusion in a Special Exposure Cohort.
- Providing staff support for an independent Advisory Board that will (1) advise on the methods, guidelines, and the program mentioned above, and (2) make recommendations to the Secretary of the Department of Health and Human Services on petitions by classes of workers to be designated as members of the Special Exposure Cohort.

Contact the Division of Compensation Analysis and Support via email to ocas@cdc.gov or telephone 1-877-222-7570 (toll-free). Learn more about the program by visiting their website at <http://www.cdc.gov/niosh/ocas>.

The Boeing Company
Santa Susana Field Laboratory
5800 Woolsey Canyon Road
Canoga Park, CA 91304-1148

October 22, 2009
In reply refer to: SHEA-109240



Mr. Richard Schassburger, Director
U.S. Department of Energy
Oakland Projects Office
1301 Clay Street, Suite N1660
Oakland, CA 94612

Re: Environmental Impact Study at Santa Susana Field Laboratory

Dear Mr. Schassburger:

We are writing in response to the Department of Energy's request that The Boeing Company ("Boeing") provide a letter to address possible concerns or fears that Boeing retirees may have or express in conjunction with their participation in the interview process of the DOE's Environmental Impact Study relating to Boeing's Santa Susana facility. The DOE has advised Boeing that some retirees are fearful their good faith, voluntary participation as interviewees in the study may adversely affect their retirement and/or medical benefits.

Please be advised that Boeing encourages its retirees to participate in the study fully and to respond to interview questions from the DOE with honesty and candor. Boeing does not intend to and will not take any actions regarding retirees' medical or pension benefits as a result of their good faith participation as interviewees in the study.

Sincerely,

Handwritten signature of Thomas D. Gallacher in black ink.

Thomas D. Gallacher, Director
Santa Susana Field Laboratory
Environmental Health and Safety
The Boeing Company

Handwritten signature of Peter Rosenbloom in black ink.

Peter Rosenbloom, Counsel
Labor & Employment
The Boeing Company

cc: Stephanie Jennings, DOE, SSFL

Appendix E
Interview Protocol and Script

Preparation for each Interview

Take the following to each interview

- A copy of the health concerns fact sheet (to be left with the individual if they express concerns about health issues they attribute to their employment at SSFL)
- A copy of the letter from Boeing (to be left with the individual as needed)
- A set of aerial photographs to help them remember what things looked like when they worked there
- Sheets of mylar and appropriate marking pens to record locations of facilities, buildings, release sites, disposal sites, storage sites, etc. that come up during the interview
- A set of fact sheets about the Area IV facilities (for use by the interviewer)
- Envelopes and/or boxes to transport materials provided by the former employee.

Questions and Answers

In response to questions/expressions of concern about the confidentiality of their responses to questions and/or the interview process:

“Once DOE finalizes the environmental documentation that they prepare to support decisions about how to clean-up the site, the information learned during the interviews will be made public, but that information will not include the names of the people that have been interviewed. DOE also expects to share that information provided by former employees with the Environmental Protection Agency and the California Department of Toxic Substances Control. However, if DOE is required to respond to an appropriate legal inquiry, such as a Freedom of Information Act request, for example, DOE may be required to disclose the names of people who have been interviewed. In other words, we will only disclose your name if we are required to under a properly filed legal inquiry.”

In response to expressions of concerns about whether providing the information requested in the interview could jeopardize a worker’s pension: “DOE has talked with Boeing and we would like to give you their assurance regarding the information you might share with us during this interview. We have a copy of a letter provided by Boeing that explains that nothing that is said will jeopardize any former employee’s pension or retirement plan. This letter also encourages retirees to participate in this interview with honesty and candor.”

In response to any mention of concerns about health effects associated with working at SSFL:

“Individuals, or their eligible survivors, who worked as an employee, contractor, or subcontractor at a Department of Energy (DOE) facility and have been diagnosed with an illness that may have been caused by that work may be eligible for benefits under the Energy Employees' Occupational Illness Compensation Program (EEOICPA). We have prepared a fact sheet with information about this program if you are interested.

Employees, or their survivors, whose claims are approved may receive a lump-sum payment up to \$150,000 and medical benefits for the covered illness. Other benefits may be possible. This fact sheet has addresses, telephone numbers, and email addresses for obtaining further information.”

Interview Script

Hello. My name is (name) and this is (name). Thank you for being willing to sit down with us today. As you know, we are interviewing former employees who worked at the Santa Susana Field Laboratory. DOE has decided that it no longer needs to conduct research activities at the SSFL and that it is time to remove all of the facilities and clean up the portion of the site where their operations occurred.

To support decisions about how to clean up the site, DOE needs to know the nature and extent of all environmental contamination that is attributable to Area IV activities. Before they can begin that process, site investigations will be done to identify the location of contamination at the site, including a radiological survey that will be completed by the US Environmental Protection Agency. What you tell us during this interview will help us know where to look during the site investigations.

In addition, this interview will help us:

- Develop a fully-informed history of site operations and facilities
- Learn about operational procedures that were used over the years for handling radioactive and chemical materials, as well as any unplanned or unusual events that occurred, so that DOE can develop a full understanding of radiological and hazardous chemical handling and any releases that may have occurred
- Identify what records exist and where those records might be located
- Identify additional people who might have relevant knowledge.

Before we get too far along, I would like to review a few points about these interviews and how we will use your answers to our questions.

During the interview, I will be asking the questions and (name) will be taking notes. We both may ask clarifying questions to make sure we understand what you are telling us. Once the interview is complete, we will type up our notes of this conversation and provide the draft to you for your approval. Once you have approved the notes from your interview, we will remove your personal information and submit the notes for inclusion in the report on all of the interviews.

When the interview process is completed, we will prepare a final report. As one of the individuals interviewed, we will provide you with a copy of that final document if you are interested. Would you like a copy of the final report on all of the interviews?

Yes No (circle one)

(Show them the aerial maps and explain how they will be used. Ask if they have any materials to share with us. If any appear to be particularly valuable, ask if we could have or make copies at the end of the interview. Put in an appropriate and labeled envelope/box. Make every effort to return materials that they want back.)

With that, we are ready to begin the interview. We have a number of topic areas that we would like to ask you about. We will try to complete the interview within (the estimated timeframe).

Before we get started, do you have any questions about this interview or what we will be doing with your responses?

Start of Interview

Interviewee Name and Affiliation: _____

Interview Date, Time, and Location: _____

1. Based on the screening call, we understand that you (review what we already know). What else can you tell us about what it was like to work at Santa Susana Field Laboratory?

(Prompting questions: Where did you work at the SSFL? What did you do? What were some of the projects you worked on? When did you work at the SSFL and what were your responsibilities over that timeframe? Describe your typical work activities at SSFL and where they occurred. How were you trained in these activities? Who supervised your work?)

2. What do you know about radiological materials that were generated and/or stored at the SSFL? What can you tell us about normal operations related to the handling of radiological materials? How were they handled? How and where were they stored? How were they dispositioned?

3. We recognize that much of the work at SSFL was primarily experimental and with experiments, sometimes things did not go as planned. What happened when something occurred that was out of the ordinary or unplanned?

(Prompting questions: How often did off-normal events involving radiological materials occur? How were those occasions documented? What happened in the event that a worker was exposed to radiation? What was the decontamination procedure? What happened to contaminated clothing and equipment?)

4. How was worker exposure to radiological materials monitored? Did you wear a radiation badge or dosimeter? Did you regularly use or work with someone who regularly used radiation monitoring equipment?

5. Was there any on-site disposal of radiological wastes? If so, where? Was there any temporary storage (either aboveground or underground) prior to disposal off-site? Where? Do you have any knowledge of spills, leaks, dumping, or other types of releases of radiological material to the land, air, or water?

6. What hazardous chemicals were generated and/or stored at the SSFL? A partial list of chemicals that we would be interested in would include: chlorinated solvents, metals, PCBs, asbestos, and fire retardants. What can you tell us about normal operations related to the handling of those hazardous chemicals? How were they handled? How and where were they stored? How were they dispositioned?

7. How often did off-normal events occur involving hazardous chemicals? What happened when something occurred that was out of the ordinary or unplanned? How were those occasions documented?

8. Was there any on-site disposal of hazardous chemicals? If so, where? Was there any temporary storage (either aboveground or underground) prior to disposal off-site? Where?
9. Do you have any knowledge of spills, leaks, dumping, or other types of releases of hazardous chemicals to the land, air, and water?
10. Were there company policies and procedures in place that dictated how to do your work? How closely were those policies and procedures followed? How often did they change? Was there a workplace culture that supported compliance with standard operating procedures, or was it common for workers to disregard those procedures? What happened if there was no specific procedure in place?
11. How were workers trained? How was performance monitored? We know it was standard practice at facilities like SSFL to bury waste materials. Do you know of any waste materials that were buried on site? Where?
12. We have records that show most of the radioactive and hazardous materials were hauled away and disposed of elsewhere. We do know that some of the rocket fuel materials used in Areas I and II was left behind in drainages. Are you familiar with anything similar happening in Area IV?
13. How did you document what you did?
(Prompting questions: Do you write in log-books, ledgers, or other records? Where were those kept and where did they go when you were done with them? What sorts of activities were documented? Do you know of anything that occurred that was not documented? Do you know of any documents, log books, records, or other documentation that may not be in the official records? Where are those located and how might we go about getting copies? Did you keep any records at home? Do you still have any of those records?)
14. Did anything ever happen that was not documented? We don't care who was responsible – we just want to understand how complete the existing documents are. Who managed the reports on incidents?
15. Were any liquid materials ever disposed of using toilets or floor drains to dispose of anything?
16. What can you tell me about the following facilities in Area IV:
 - a. The sodium burn pit
 - b. A surface disposal area at the western edge of Area IV
 - c. Any of the leach fields, septic tanks, or drainage discharge locations
 - d. The old conservation yard (junk yard)
 - e. Any storage tanks, gas holdup tanks, etc.?Tell us more about that.
17. Are you aware of any problems with underground pumps, sumps, storage tanks, piping, sewer, or drainage systems?

18. Is there anything else you would like to tell me today?
19. Can you think of any other individuals that could help us develop a full understanding about site contamination within Area IV at SSFL? Do you know how to get in touch with them?
20. May we contact you again in the future if we have any follow-up questions?

We want you to know how much we appreciate your time today. Can you make sure we have the correct contact information for you? Thank you so very much for talking with us today.

Appendix F
Agenda for Interviewer Training

Former SSFL Worker Interview Training

DAY ONE

Logistics: Radisson Hotel in Chatsworth, June 1, 2010 starting at 1:00 p.m.

Invited Participants: Stephanie Jennings, Bill Backous, Craig Cooper, Andrew Taylor, John Wondolleck, Wendy Lowe, Kim Clower, JD Smith, Lori Dotson, Larry Troxel, John Troxel, Peggy Bloisa, Bill Taylor, Merrilee Fellows, and Dave Golles

Objectives:

- Discuss procedures for conducting the interviews
 - The interview protocol and script
 - Responding to concerns about confidentiality
 - Responding to concerns about worker pensions
 - Responding to concerns about health effects related to employment at SSFL
 - Requesting the opportunity to look at any logbooks, records, diagrams, memorabilia, or photographs that they have kept over the years.
 - How to use the aerial photographs to help them remember what things looked like when they worked there and marking the sheets of mylar and appropriate marking pens to record locations of facilities, buildings, release sites, disposal sites, storage sites, etc. that come up during the interview
 - Recording notes from the interviews and getting them approved by the interviewee
- Discuss procedures for scheduling the interviews
 - Determining which questions to use
- Determine interview teams
 - Assignments
- The finer points of interviewing (all will share lessons learned from their experiences)
- Practice with the script in teams
- Discuss coordination for joint EPA/DOE interviews (only those that will be involved in the joint interviews will participate in this discussion).

DAY TWO

Each interview team will conduct two interviews

DAY THREE

The entire team will reconvene at the Radisson to share lessons learned and tweak the process as necessary

Appendix G

Approved Interview Reports – EPA/DOE Joint Interviews

Approved Interview Reports - DOE/USEPA Joint Interviews

A total of 18 interviews were conducted jointly by DOE and USEPA. The following fifteen interviews have been approved for inclusion in this report.

Interview 8

I never actually worked up on the hill at SSFL. I worked at the Van Owen facility and went up occasionally to the hill for visits. I worked with budgets, planning, project administration, acquisitions, and finally data processing.

I worked for Atomics International which was a division of North American Aviation. Projects that I was involved in included the Sodium Reactor Experiment, the Pyroprocessing Refabrication Experiment (PRE), and SNAP. I worked on another project for AI that was called Project Pluto – but that project was never up at SSFL to my knowledge. I handled the paperwork for all of those projects. I knew a fair amount about them. All of my work was documented in project reports. I do not know where those reports went once they were submitted.

I handled radioactive materials, but that was before my time at Atomics International. I worked for General Electric at Hanford, up in Washington State. I started there in 1951; I started with North American Aviation, Atomics International Division at the Van Owen facility on July 16, 1956. I never handled radioactive materials at SSFL. By 1955, handling radioactive materials was becoming routine. There was a way things were done and I doubt it was much different from what we did at Hanford. I am sure things were done the same way everywhere.

I also did not handle any chemicals in my position. I am not familiar with the location of where any radioactive or chemical materials were stored or disposed.

At SRE, things were by the book as long as they were working on the specified project objectives. However, they did not shut down once those project objectives had been completed. A project engineer who worked up there told me “things were getting pretty soggy in there.” I interpreted that to mean that they were getting near the safety limits of the materials they were testing, but that is just my interpretation, I have no firsthand knowledge of that.

Things were quite different back in those days. Atomics International was a cost plus operation, and the amount of money the company made depended a lot on how good the relationship was with the client. Once the work that was supposed to be done had been completed, the AEC was interested in learning about the safety parameters. In other words, they wanted to know how much the design could be passed beyond the operational guidelines and still operate safely.

It was my impression that AI had been given verbal instructions (never written down) from the AEC to test the reactor to destruction. It was common in the aerospace industry to test to destruction – that meant you ran conservatively until you had met all the project objectives and then tested beyond that to determine the safety limits for the particular object being tested, and see how consistent the actual results were with what the modeling predicted. They were pushing the limits on purpose.

I am not aware of any other situations at SSFL that were similar or that had similar results.

The Pyroprocessing Refabrication Experiment (PRE) was developed to re-process spent reactor fuel into new (metallic) fuel elements. This was accomplished through metallurgical processes that were conducted using remote handling equipment in a hot cell rather than via wet-chemical processing of the kind we used at Hanford in the "purex" facility to extract plutonium. Hanford reactors used metallic fuel which we discharged after relatively short exposure to fission because the weapons program wanted plutonium-239 but didn't want other isotopes of plutonium which would gradually accumulate after longer exposures. Work at other sites (not at AI) revealed that metallic fuel elements swelled after fissioning for a long time, so that metallic fuel could not be used in power reactors. This discovery resulted in a decision to terminate the PRE project. Work at other sites (not at AI) subsequently developed oxide fuels.

We had a lot of exotic materials up at SSFL. The SNAP reactors at SSFL used beryllium reflectors. I don't know that they ever had any problems with that, but beryllium is pretty toxic stuff.

I am confused why they think the tritium that they are finding up there now could possibly be attributable to operations on the hill from the 1950s. Tritium has a very short half-life. Even if tritium was released from a reactor at SSFL, it would be long gone by now.

Frankly, I think the tritium is there because someone screwed up their measurements. Tritium is what I call a "soft beta" – it is not energetic. When I worked with it before coming to AI, I had to put tritium in a counter to detect it. You cannot detect tritium with a hand-held detector due to its classification as a "soft beta."

I have no knowledge of any spills or leaks.

In reference to the SRE accident, radioactive iodine could not have been released. Iodine reacts strongly with sodium, so if it were released, it would have bonded with the sodium and it would not have gone anywhere. I would believe it if there were some noble gases (krypton, xenon, etc.) released in that accident. They would not have chemically combined with anything so they would have been sure to escape. If they were released, they would have begun decaying immediately. Radioactive isotopes of those elements could, after escaping, have decayed to radioactive isotopes of halogens.

I have no knowledge of any chemical or radioactive materials being disposed on site.

I was trained to do my job mostly through on-the-job training. We learned as we went. Things were changing under our feet. Everything was done manually when I first started up there. Things changed rapidly though and things were beginning to be computerized.

People with clearances were working right next to people without clearances. I had a "Q" clearance. It carried over from my prior work at Hanford. The numbers that I was working with might have been considered classified. The only real use I found for my clearance level down here was when it helped me buy a car.

I do not know anything about policies for handling chemical or radiological materials. I was involved in monitoring project costs. I am not saying that there were not policies; I just do not know what the policies were. Everything that was done related to SSFL was documented.

I do not know anything about any liquids being disposed of down any drains.

Beginning in 1951, I worked in the 100-B/D/DR/F reactor areas at Hanford. I was familiar with 100-H but didn't work there. 100-C was being built when I left. Reactor control was via horizontal control rods which could be moved in measured increments. Emergency shutdown ("scramming" a reactor) was via vertical control rods which were an all-or-nothing operation. When we shut a machine down, a decay chain that passed through a radioactive xenon isotope began to accumulate an inventory of that isotope, which had a very large neutron capture cross-section. If we didn't get back up before too much of that isotope had accumulated, we had to stay down for 12 hours or so, until that isotope had in its turn decayed away, after which we could start back up.

After an emergency "scram", which stressed components, (not after normal shutdown to re-fuel) we tended to experience random fuel element failures necessitating additional shutdowns. The galvanometer power level indicator measured in-core radiation. The integrating unit instead measured bulk coolant temperatures and flow. When we shut down to push fuel, or to clear out a tube which contained a failed fuel element, operators had to uncap the coolant pigtailed for the selected tube(s) on both the front face and the rear face of the reactor. Refueling was strictly a batch operation with the reactor shut down. Increasing or decreasing production levels was done when the machine was up, by adjusting horizontal rod(s) position. Increasing or decreasing production levels was instead done when the machine was up, by adjusting horizontal rod(s) position, not by feeding fuel elements in faster.

Hanford was a production facility. All the people who sat at the console were union people, paid by the hour. However, the operator, who was very interested in how much power the reactor was producing, wanted to maximize power production. Shutting the reactor down was something he was trying to avoid. Every once in awhile, a fuel element would get stuck in the pigtail. If that happened and it did not come out, we would have to shut the whole operation down. Well one operator in charge of the reactor figured out a way to handle it. He would take his film badge off, hand it to someone else, run to the back end, kick the pigtail and get the works flowing again, and then go back up and put his film badge back on. That kept the whole operation running. The B reactor was a production facility.

By contrast, AI was like a graduate school. SSFL had a completely different set of incentives. I experienced a bit of culture shock when I moved from Hanford to SSFL.

Unfortunately, in the end of the day, Atomics International's strategy was not successful. The consumers public power district (CPPD) sodium graphite reactor at Hallam, Nebraska was built but failed after operating for a while. I don't think the decision to go with (untested) stainless steel cans for the graphite moderator was an attempt to reduce cost. I think they thought they were being conservative in going from an exotic material, zirconium, to a more conservative material, stainless steel.

Atomics International then built the Organic Moderator Reactor in Piqua, Ohio. The design had been tested up in Idaho. What worked under lab conditions failed a short time after it began operating. When they went to replace the reactor fuel, the oxygen atmosphere got to the coolant and turned it into a tar causing blockage of the coolant channels and the reactor was damaged. The designs worked on a small scale but not at production scale. They were trying to scale things up by a factor of 100 and that is not realistic. They did not want to hear that. They were too conceited. They didn't know what they didn't know. They had PhDs but they did not really understand how to scale up the idea. They knew the science, but not the engineering.

Many of the designs that they looked at were good designs, they operated at low pressure and did not require containment domes. We thought we were being innovative here – everyone else was using designs using water as the coolant. We were using sodium. Humans have thousands of years experience using water; we do not know that much about sodium or organic coolants.

After the Three Mile Island accident happened, they had a hydrogen bubble as big as a boxcar, and it was under pressure, 100 times atmospheric pressure. That is a lot of hydrogen. The hydrogen was not caused by radiation. It came from the water. We knew they had a meltdown, although it was years before they admitted it. Atomics International sent them a hydrogen recombiner – an emergency shipment – to help them avoid having an explosion. The recombiner exposed the hydrogen bubble to oxygen using an oxidizer, which effectively turned a potentially explosive situation back into water. We knew the only way that could have been caused was by a meltdown. It took years for them to admit they had a meltdown.

As part of the SNAP program a critical assembly test facility was to be built at SSFL. A critical experiment is sort of a zero-power reactor used to measure reactivity. The SNAP reactors didn't use in-core control rods to control power levels but instead were reflector-controlled by varying the number of neutrons allowed to escape from the reactor versus the number of neutrons reflected back into the core. The reflector was beryllium metal. Neutrons didn't fuse into the bolts. The bolts were to hold the assembly together. The designers, seeking perfection, didn't want their measurements compromised by having anything other than Beryllium in the reflector. Hence the request for beryllium bolts, and the unexpected cost of outfitting them with screw threads.

As a junior member of the unit doing chemical process engineering for the designers of the "purex" reprocessing facility, I was responsible for maintaining a very large schematic drawing which indicated all vessels and piping, etc., and listed quantities, temperatures, compositions, etc., for every vessel, pump, pipe, etc., and was responsible for heat and material balance calculations for the design project.

One of the listed properties was viscosity. That line was blank because the chemical research people hadn't yet suggested any viscosities. A staff assistant for the guy in charge of the plant asked to use my drawing in a meeting (to which I wasn't invited). He noticed the blank viscosities row, and said he didn't dare take it to the meeting with any lines blank. After a certain amount of discussion I agreed to see what I could do, hit the books, fudged up some numbers, and filled in the row with one-significant-digit guesses.

I carefully erased those numbers when I got the vellum back. A year or so later, when I was on the road as a vendor inspector, while carrying out an inspection on large agitators at an automatic signal company division of Eastern Industries Incorporated, I was astonished to recognize my viscosities in the contract specifications.

I have no knowledge of the liquid materials being disposed of using toilets or floor drains; the sodium burn pit; the surface disposal area at the western edge of Area IV; any leach fields, septic tanks, or drainage discharge locations; the old conservation yard; any storage tanks, gas holdup tanks, etc.; nor any underground pumps, sumps, storage tanks, piping, sewer, or drainage systems.

I remember one time a guy wanted to develop new instrumentation to measure sodium flow. He needed a sodium tower so he could take advantage of gravity flow. He submitted a proposal requesting two kinds of funding, expense (wages, purchases, etc.) and capital (buildings, etc.). The expense portion was approved. The capital portion was rejected, leaving him with approval to proceed but no facility to proceed in. He got a guy in facilities engineering to design him a tower made up of a small variety of standardized components, submitted purchase requisitions each just under the amount which would have been routed to me for review, personally hijacked a cement truck intended for another project on the hill, had PhD's out working with wrenches and trowels constructing his tower, and got the job done - which made him a hero within the technical community, but not to me. Once the new building had been built, an AEC guy saw it on a new aerial photo and said, "What's this?" He obviously hadn't approved the construction. The scientists were forever trying to figure out a way to work around the administrators. The sodium tower was located in the AEC Triangle.

I think that a lot of people are over-reacting. There is not that much to worry about up there.

I enjoyed working there. All together, I worked for Atomics International and the companies that bought it from 1956 through 1997. I retired on January 31, 1997. Three days after I retired, I went back to work as a contractor. I was a contractor until 2007. The Rocketdyne Division was sold to Pratt & Whitney in 2005. They had a two-year rule. No contractor could stay on longer than two years. Therefore, I finally had to stop working in 2007.

I liked working here a lot better than I liked Hanford. I went to Harvard Business School after working at Hanford, and I wanted to get away from weapons and into energy research. I was single when I lived in Richland, but it was a company town with plenty of rules. All the housing was controlled. Single people had to live in dormitories. Even the waitresses in the local restaurants had to have clearances. If you lost your job, you had to leave town because there was nowhere to live.

I moved here and I am glad I did. The culture here was a lot more relaxed.

Interview 31

I worked for Atomics International as an electronic tech from 1959 to 1960 at the SRE and SNAP reactors in Area IV. I measured radioactivity on samples used in reactor tests. These tests involved placing the rods in different positions to expose samples to varying levels of radiation. The position of the rods had an effect on the output of the reactor. Sample material consisted of various metals, approximately 3 to 4 inches in diameter, and enclosed by a resin casing. Beryllium was one of the sample materials I specifically recall handling. I was in charge of taking the irradiated samples to the laboratory, measuring the amount of radioactivity, recording the measurements, and returning the samples to the physicist in charge of the experiment.

A photo multiplier tube and a scaler were used to count the radiation given off by a sample. Data from the sample analyses were recorded on data sheets and maintained with the samples. Duplicate copies of these data sheets were not generated by me. I can't remember if I used a logbook and do not know where one might have been kept. It is possible that sample numbers were recorded in a log book, but I can't verify that information. I likely initialed or signed the data sheets following sample analyses. I measured samples from the SRE and SNAP reactors. The testing and measurement data would be used to make improvements to the reactor.

Once the samples were analyzed I would place the samples and their corresponding data sheets on a work bench shelf. The samples would sit on the shelf until a physicist working on the experiment picked them up. Sometimes I would have to remind the physicists to pick up samples left on the shelf for long periods of time. Samples were not thrown in the trash. The samples were either in the laboratory or with the physicist.

Sometimes a sample result would show more radiation than expected, but this was not considered an accident or incident, as it was part of the experimental process. Sample results that were outside the expected "norm" were further evaluated to determine if there had been an error or if the results were valid.

I wore a dosimeter, but no protective clothing. My dosimeter was taken once a week by a "safety person," presumably for monitoring, and was given back to me.

I received on-the-job training. They told me what they wanted and showed me how to use the equipment. There were not really any written policies for the work. One other electronic tech worked the same shift, but his duties were different than mine. There was not much oversight and I was left alone to do my job for the most part. The culture was such that

the techs had a certain amount of camaraderie. During lunch or break time, We would talk, maybe have coffee, and sometimes watch the rocket engines firing.

The physicists talked about non-work a little, but most people were too busy to sit and gather for any long periods of time, except as it pertained to work. The work was standardized and there wasn't much variety in it, it wasn't that interesting or exotic. Everyone knew their jobs and did them. People stayed in the area they worked in and would not be moving between buildings or walking around the site.

I had Q clearance in progress while working at the site, but left before it was finalized.

Samples needed to be kept clean for accurate results. Pure alcohol, as opposed to denatured alcohol, was used to clean any resins, dust, dirt, fingerprints, or other deposits off of the samples. Special signatures were required from a Ph.D. physicist in order to obtain the pure alcohol. I think it came in a one pint size bottle, but it would not have been more than one quart. I think I used Kim wipes to clean the samples with pure alcohol.

Used wipes and/or rags were placed in a trash can, but I don't know if it was a controlled waste container or special depository for waste wipes. The alcohol evaporated quickly and was only used in the lab in small quantities. I don't recall any waste alcohol that had to be disposed of. There were no written procedures for cleaning samples that were given to me.

I would examine samples under a magnifier to ensure they were sufficiently clean before taking measurements.

I am not aware of liquids being dumped down drains or toilets. I don't know why anyone would do that. The toilets were kept very clean and nothing went down the toilets that I'm aware of. I am not aware of any liquids going down any drains. I have no recollection of any problems with pumps, storage tanks, pipes, sewers, or drainage systems.

One of the smaller reactors, possibly called the SNAP reactor, was for the Germans. The work was being done through Atomics International, but it was for German reactor development.

Interview 34

I worked at SSFL from 1953 to 1987 as an engineer in the Facilities department and Purchasing department. Initially, I was involved in building test stands. Over my 34 years, mostly at SSFL, I was employed by various entities including, North American Aviation, Atomics International, Rocketdyne, Rockwell, and Boeing. I worked at Area IV from 1969/1970 to 1981/1982. After that time period, I still went up to the hill but my office was at the DeSoto facility.

I am a graduate engineer and was the 330th employee hired on at SSFL/Rocketdyne when I started in 1953. I was in Test, but I was not a button pusher. Everyone on the hill was in Test, but I was in a support organization, which later became Facilities Engineering. In 1956, I became the youngest supervisor in North American Aviation Corporation history at 24 years of age.

Between 1953 and 1958, I was on the hill. After that, my office was no longer on the hill, but I would still make trips up there. We built 17 test stands. When I started on the hill there were two test stands. We went from 2 to 19 test stands while I was involved. Atomics International didn't really have a presence on the hill until about 1956. I had nothing to do with AI. I didn't know much about them in my early years.

I spent a lot of time interacting at corporate offices from 1958 onward, when I was in Facilities and Purchasing, because we were building and growing. I had a lot of knowledge of the site history because I was involved for so long.

I have testified on Boeing's behalf in court regarding contamination issues three or four times since 1987, but not recently. The lawyers involved in those cases cautioned me that it was alright "not to remember things" if they incriminated Boeing. I understand that you would like me to remember everything for this interview to support the investigation and the final cleanup. I will do my best to be candid and forthcoming. All the press coverage now on the rocket and reactor side is stretched beyond the truth and a lot of the history isn't told. I have experience over the entire SSFL site, the whole 2,500 acres.

Even after I left the company in 1987, I worked for Facility Design firms that did work for Rocketdyne and Atomics International. So I stayed involved for another 10 or 12 years and made many other trips up to the hill, but not as an employee.

I have a lot of information on chemical contamination in Area I, II, and III. Maybe you could pass my name along to NASA as I am sure they could use this information when they move forward with their cleanup efforts. I also know about some contamination in Area IV and at DeSoto having to do with Atomics International.

We used certain chemicals, including trichloroethylene, in monstrous amounts. At that time there was no concern over its environmental impact because we didn't know how "dangerous" it was. We used hundreds of thousands of gallons of solvent in Area I, II, and III.

Trichloroethylene was used in Area IV as well. Trichloroethylene was used to clean things. Other cleaning chemicals, such as toluenes and ketones, were used as well. We were experimenting with how clean we needed to be. Many solvents were used

experimentally. Trichloroethylene (Trichlor or Trike as we called it) was used in huge quantities over the whole site because it proved to be the best cleaning chemical we used.

Liquid sodium explodes if you introduce water to it, but it dissipates. It is not, in my opinion, a contaminant. There are claims today that it is a contaminant if other things get in it, but I don't believe that.

As far as radiation, I had offices throughout Area IV starting in 1969. The Big Reactor was shut down by then. I was in the Facilities section of LMEC, which later became ETEC. I had full access to everything all the time. I don't use those words lightly. There was no place I couldn't go. I had the top clearance, above top secret, this was called Q clearance. I wasn't denied access anywhere. This also includes my time in Purchasing. They wanted engineers in the Purchasing department that knew what was going on so that, for example, when we ordered a certain grade of stainless steel we knew why it had to be so certain. There are lots of varieties of stainless steel. The engineers knew the exact type of material that was required for each job and that's why they wanted us in Purchasing. I was one of the first engineers in Purchasing for both Rocketdyne and AI. I later brought some engineers in with me as well.

I had little or nothing to do with the nuclear side of the business. When I first came in, there were no nuclear facilities left to be built. The nuclear facilities had already been constructed when I joined. We were building liquid sodium test facilities. Liquid sodium was dangerous, but not a contaminant.

The radiation hazards from 1969 on only existed in small laboratory areas because the Big Reactor was shut down. It has since been demolished and the site filled in. The test runs over the years, which I was not involved in, reportedly showed that there was some residual radiation, but DOE, AI, North American, and Boeing revealed the level of contamination. They weren't trying to hide anything. I think the contamination at the site has been overstated.

I was involved as the Principal Construction/Facilities Engineer at North American's facilities in Nevada. We built test stands there. In 1960, concerns were rising in areas of SSFL regarding potential hazards and noise and the effects they had on the adjacent communities. The noise hazard was exclusive to rocket testing in Areas I, II, and III. We built the facility 40 miles north of Reno because Boeing/North American didn't want to subject the Southern California community to any "more" hazards from SSFL. Pentaborane was awful stuff, but it was a superb rocket engine propellant. It was only tested on a very small scale in Area I at SSFL. It was tested more thoroughly near Reno because that facility was a "safer" testing location; it didn't have people living nearby. Other "dangerous" propellants were also used there.

Many of the propellant chemicals did not get tested at SSFL because North American, Rockwell, Boeing, and NASA were always very concerned about hazards to the ground, community, and employees. But there are many things we did in the 1950s, 1960s, and 1970s that we did lawfully because there were no laws against them, such as using Trichlor. No one said we couldn't use it – it wasn't against any laws. Once it was made "illegal," they stopped using it. I used to wash my hands in Trichlor in the early years. We all did.

In 1971, when I went into Purchasing at SSFL Area IV, our office was in Building 30, which was 200 yards by air from the reactor, the big one that “over-reacted” and had the big incident. I was in charge of many things when I was in Purchasing, including packaging and warehousing, in AI. My Box Shop was in one of the buildings right next door to the reactor. We built crates, boxes, and shipping containers. I had a guy, ABC, who worked there full time for the entire time I was there. He lived to be 87. He had no history of radiation “poisoning.” People in Simi Valley are concerned about being subjected to radiation and ABC worked right across from the reactor and never had any problems. I don’t glow in the dark. I’m sure the radiation hazard was there. I’m sure there were people who had problems, mainly the guys and girls who worked down in the reactor itself before the incident happened in 1959. There are many things we did at Rocketdyne that, from a chemical hazard standpoint, were way worse than the radiation hazard. I mentioned pentaborane, a very hazardous chemical. We tested every chemical known to man in order to find the combination of oxidizers and fuels that would produce the greatest thrust (ISP).

Much experimentation was done in the early 1950s. That’s when we were so concerned with cleanliness, and Trichlor was the best cleaner. We tested all sorts of solvents, including some that would “burn your toes off.” Trichlor was a solvent we used when we worked with liquid oxygen because liquid oxygen (always the main oxidizer) would react with anything and things had to be exceptionally clean to prevent this from happening. Liquid oxygen was never used other than in “test-tube form” in Area IV. We did a lot of testing with liquid nitrogen in all areas where you needed extreme cold. But nitrogen is completely benign.

I mention liquid oxygen because in Areas I, II, and III not every test was successful. Many tests ended in explosions. We had a full time weather station at SSFL and had it for years and years. Explosions could have released clouds of hazardous chemicals that went over Area IV, but the fact that they went over Area IV hasn’t been in the news and should not be a concern. But it may come up if someone is claiming that Rocketdyne contaminated Area IV. I don’t think any of the explosions contaminated anything in Area IV.

As far as liquid sodium, there was an area called the Sodium Burn Pit in Area IV. I went by it many times over the years. That area was used to dispose of contaminated liquid sodium, so there are probably other “contaminants” in that area. So many things were used, there could be over hundreds of different chemical contaminants. West of the Sodium Burn Pit there were other buildings where I think spills may have occurred.

There were 13 active water wells at SSFL over the years. The wells were used for everything but drinking. The water was not potable. Some of the wells were near Area IV. The water had too much calcium for it to be safe to drink. It came from deep in the crevasses of the rock and it has been “proven” many times that the water can’t get out. Many of the contaminants that were used, kerosene for one, seeped down into the crevasses, but could not escape down into the valley because the crevasses were too tight. I think that has been proven by Boeing, North American, Rockwell, DOE, and NASA. As said, in some of these crevasses there was naturally occurring water, how it got there I don’t know, but that’s where we drilled the wells. Some of those wells have

been sealed off and they may have “contamination.” There were a few wells bordering Area IV.

I can identify the Big Reactor, Box Shop, Building 30 (where the Purchasing people were), a Warehouse, Clean/Unused Liquid Sodium Storage (storage was in barrels), Chemistry Lab, Machine Shop, and SPTF (Sodium Pump Test Facility) locations on the 1978 aerial photograph. There was a well just outside the aerial photograph’s view. I would look at the Chemistry Lab for contamination. There could also be chemical contamination in a deep hole/pond near Buildings 40 and 59. The warehouse stored valves and parts like that, never any chemicals.

The Sodium Burn Pit stayed in the same place. We had other disposal areas in Area I and in Area II near CTL-3. We would get a lot of our chemicals in gaseous form. Once you finished what was in a gas cylinder bottle (called a K bottle) you couldn’t just get rid of it and throw it away. We had a marksman from the police department/plant protection. He took his 30-06 and set up a K bottle 50 feet away and shot the valve off the K bottle to let the gas escape, but this has nothing to do with AI. The only disposal facility that I knew about at AI was the Sodium Burn Pit. I don’t know exactly what they put in the Burn Pit because I was not responsible out there. I knew they disposed liquid sodium, but I don’t know about any other chemicals poured into that pond.

The Area 1 disposal area could have had radium from instrument dials. Radium was then used to make instruments glow. I don’t think there was any other radiation per se in this area. I don’t think it had anything to do with AI, but I cannot say that as fact.

There were many things in the early 1950s that went on at SSFL that occurred before AI and the reactors were built. They did jet engine testing at the entrance to the facility. They brought jet engines up from the Los Angeles Division to test there. There was a “lot” of kerosene used. This had nothing to do with AI, but I wanted to make the point that a lot of things happened on the 2,500 acres of the entire SSFL site over the period 1947 to today that are not related to AI. AI was in a big corner that we “drove by” for years before LMEC. LMEC started in the mid 1960s.

I have the most experience at Rocketdyne in Areas I, II and III. We were pioneers, doing things that hadn’t been done before. Some people probably thought that the people in AI are nuclear oriented and don’t know what happened up here in 1947 or 1951, the early years. Although there wasn’t a physical fence separating the areas, there was a technical separation between the rocket and nuclear side. There wasn’t any technical interaction between the sides until the 1970s when some of us from the Rocketdyne side helped build test facilities for liquid sodium components. AI needed our experience from building rocket test facilities to help build the sodium test facilities. SPTF was a huge structure with a big derrick that we got from Peenemünde, Germany. That is when the relationship between Rocketdyne and AI warmed. A lot of guys came from Rocketdyne to AI with test experience that AI needed at the time. Many people at AI (in Area IV) were scientists and had little test experience. As engineers, we got our hands dirty. The scientists didn’t. They did things at AI that we didn’t need to know and we did things at Rocketdyne that they didn’t need to know. There was technical separation between the two sides because of the work each side was doing. That is my opinion.

Our Maintenance people got into everything all the time. We worked very closely with them. We wore green and yellow hard hats, they wore green hard hats. All the different departments had different colored hard hats. They wore whatever they wanted at AI – they didn't have just one color. That illustrates one of the basic differences in the divisions.

We had a lot of camaraderie on the rocket side. We were "brothers of the spear." We all knew what could happen if things went wrong because of our years of experience. Safety definitely was part of the reason we had a lot of camaraderie. But there are many incidents, explosions, and things that happen that there was no track record for and once something bad happened then we knew we couldn't do that again. The scientists were nuclear scientists and they knew what made a nuclear reactor, but we on the rocket side didn't know about that. When I moved over to AI, they put a "velvet" rug down because I carried with me all my years of experience on the rocket side. They were grateful to have the experience of the rocket people that crossed over. In 1969, I was at the Downey Division working on shuttle facilities, but AI needed people with hands-on experience and they asked me and others to come up to Area IV at SSFL. The supervisors at AI knew of our test experience and they wanted it, so we crossed over into AI to help build the sodium test facilities. Eventually, the divisions merged and became Rocketdyne/AI, but I think the "schism" was still there. I call it a schism; you call it a cultural difference in the two sides. It was a technical schism in my mind, not a cultural difference.

The scientists at AI were doing small scale experiments, while we were doing mostly full scale work. When AI needed large scale structures for the sodium test facilities, they called on our experience with large scale structures. By the 1970s, we had built 19 test stands. They wanted to marry test experience with science. Initially, in the 1940s we knew nothing about rocket engines, but the Germans did, so we later brought the Germans over. This is what AI was doing, bringing in the people with the experience and knowledge they needed.

A lot of people at AI knew of explosions. We had a guy killed from an explosion in the Area I Research area and another guy lost his arm from an explosion, but those were the only two serious incidents I can recall. The people in AI knew of the explosions and incidents and thought that Rocketdyne was unsafe. That's the reputation we had from AI's perception because of the "hidden fence" or schism between the rocket and nuclear sides. I had a friend who came from the AI culture and there was a technical schism between us, but we remained friends. We were learning as we went along, doing things that had never been done, even in the 1970s and 1980s.

I know very little about how radiological materials were handled in Area IV. I did wear a film badge when I went in certain places. Wearing the film badge was very strictly enforced. I had to show my badge, and often they would check my clearance before they would even let me in certain buildings.

I am not aware of any "off-normal" events that dealt with radiological materials. I don't know anything about the storage or disposal of radiological material. I knew radiological storage existed and that it was disposed, but I do not know anything specific.

Just about everything that came into Area IV went by the building I was in (Building 30). We could see trucks carrying barrels and cylinders coming into the site. There were a few buildings in the heart of the LMEC where the so-called "hazardous materials" were stored. They did little testing with hazardous chemicals. They tested valves and pumps that pumped liquid sodium. There were a couple of small buildings that stored the chemical gases, but I am not sure which buildings specifically.

The Sodium Burn Pit was used on a "daily" basis. I don't know if anything "off-normal" occurred at the Burn Pit. I had nothing to do with the Burn Pit per se. I knew where it was and I would sometimes hear the explosions when the sodium hit the water.

Company policies dictated how material was handled. We had a large Facilities Manual that dealt with that kind of stuff. People followed these policies. I don't think there were ever any intentionally unsafe practices. If we had a bad result from something we had never done before, then we knew that practice was unsafe. We were learning about and improving our knowledge on safety as we did tests. The policies and procedures evolved as we learned. The Facilities department included 130 engineers in my Design department and nine environmental engineers that reported to me. From 1980 to 1978, the nine environmental engineers were responsible for making sure that environmental hazards were monitored and controlled, such as disposal of chemicals. But by this time, there was no disposal of anything nuclear because the nuclear operations were shut down on the hill. There were some incidents in Building 103 at DeSoto, where there was a radiation lab doing some bench-type research. My nine environmental engineers were responsible across the entire site, Areas I, II, III and IV. They would disseminate any new rules in writing and ensure the people that needed to know received the information. There was wide dissemination in manual form.

I don't think anyone ever intentionally disregarded the procedures or rules to my knowledge. It would be sabotage or subversion if someone didn't follow the rules. We had accidents, but they didn't necessarily occur because a procedure was violated.

I don't know if any radiological or chemical material was ever left or disposed of in Area IV drainages. We had a big pond on the Rocketdyne side that residual kerosene would flow into in the 1950s and 1960s. We would sometimes burn it off at night, like they are doing in the Gulf now. When it would rain, there was nothing we could do and the kerosene would flow down South Canyon just south of Area III. A lot of chemicals left SSFL, but I don't know of any chemicals that left Area IV in quantity. There was a creek that flowed north of well 13. There were some chemicals I'm sure that left Area IV, but not in large quantities in my opinion. Although there are those who will say that's how Simi Valley became "contaminated."

Any incident, large or small, had to be documented. In the 1970s and 1980s, it was documented by my environmental people. Every test that was done was documented. I don't know where those records are or how they were kept. There were probably things that were not documented, but these would be routine things. Anything related to a test was documented. That's what we were there for, scientific history.

The Sodium Burn Pit was used pretty much all the time. I always felt it was used properly and with some level of guidance. There were always certain personnel involved and I saw them, they wore white uniforms and masks. They knew what they

were doing, and what they were doing was not illegal. They were not doing anything at night, like when we used to burn off the kerosene from the pond in Area I and II. We knew we weren't supposed to burn off the kerosene and that is why we did it at night, but it was a better alternative than letting it flow down the hill in a rain storm.

I am not aware of any surface disposal area on the western edge of Area IV. There was a pond in Area IV (noted on aerial photograph) that you might want to look at. I don't know if it is still there. I recall a leach field (noted on aerial photograph) in Area IV.

There were conservation yards/junkyards in Areas I, II, and IV. The junkyards contained steel, pipe, and other parts that were cut up. Eventually, things were hauled off and sold. We would recycle things from the junkyard, if possible. When the test stands were eventually torn down, a company came up and took the old steel. I wasn't there at the time, but I know about it.

I don't know of any liquid material being disposed down floor drains or toilets. We had toilets, but they went to septic tanks, we didn't have sewers. Maintenance people can tell you more about that than I can.

We sometimes had problems with our piping. We had a lot of "cross-country piping" in Area I where we transferred gases, (gaseous nitrogen and helium), water, and kerosene.

I look at my experience on the hill as one of the most wonderful experiences I could ever have as an engineer and as a person. To work up there for 34 years, doing things that had never been done before was something special for a lot of us. We didn't do anything that we knew was unsafe. Many incidents that occurred at Rocketdyne and AI occurred not because we were doing things that were unsafe, but because we were doing things that had never been done before.

Interview 57

I worked at the Santa Susana Field Laboratory from 1953 to 1956. I worked all over the site. It was a long time ago so it is hard to remember my experience there.

I did not work with any radiological material. I mostly worked with sodium. I worked with sodium, primarily in capsule form, in a glove box with remote handlers. The glove box had an inert atmosphere to allow us to work with the sodium safely. I felt pretty safe working in the glove box. I had to wear a protective apron and a dosimeter, but that was about it. I didn't have to wear any breathing protection.

When we were done with our work, we would throw old sodium capsules into the Burn Pit and let the sodium dissolve away. Anything that wasn't good was put in the Burn Pit. A guy worked up there and he would take care of stuff at the Burn Pit and make sure everything went as planned. He would help us out if we needed it.

I primarily worked with sodium, but I also worked with some associated cleaning chemicals. All the chemicals were stored in a location that was convenient for us to use. When we needed to dispose of anything, including the chemicals, it usually went to the Burn Pit. I do not recall any chemicals being dumped down the toilet or drain. I didn't see anyone dump any chemicals on the ground.

I received some training when I first started at the site. The lead men and other bosses would assign me jobs. They would tell me what they wanted done and how to do it.

We had rules and regulations that we had to follow. Sometimes the rules would change and I would have to read the new procedure to learn what had changed. Most everything happened as it was supposed to though and we followed the rules. Procedures were written down and we followed the procedures.

I also worked with asbestos. I would cut asbestos off of sodium tanks and piping.

I documented my work by filling out forms. I don't know how the forms were used or where they were stored after I turned them in to my boss. If anything went wrong it was noted in a report.

I was involved in an accident once on the hill, but I do not recall the details of it. My eye was burned by sodium and I had to go to the hospital for a while. On the way to the hospital, they flushed my eye with water to remove as much sodium as they could. It was painful, but my eye got better. A report was made to document the incident.

I heard about the "meltdown," but that was after I left the hill. I heard about it after the fact, but we didn't get involved in a lot of stuff that happened. It was a dangerous accident. Things were classified and secret, so if we didn't need to know about something, we didn't know about it.

We probably did things we shouldn't have done, but we shouldn't condemn the company for that. It was not the company's fault. It was our fault. I don't remember anything happening that was the fault of the company. I have no regrets or bad feelings about the company. We tried to always do things by the rules, but when the rules changed sometimes we could no longer do things the way we used to. Sometimes we made mistakes or had accidents, but no one ever did anything wrong on purpose. We

made sure everything was documented and we would correct any problems. In all the time I was on the hill, everything was done according to the rules.

I would look at the Burn Pit to make sure it is cleaned up.

I really enjoyed my job and liked working on the hill. We always had things to do. I was on the hill for three years and then I left to work for Rockwell at Canoga Park. I liked the people I worked with. The bosses were good guys and never did anything bad on purpose. I really want to stress that the company was not to blame for anything. If something went wrong, it was our fault and not the fault of the company.

Interview 58

I worked in a sodium building in 1978, it may have been called the Sodium Component Test Loop. We were running transient studies involving liquid sodium. Sodium melts at about 200°F. The sodium came in looking like Styrofoam. We would heat it up and pump it through various pipelines ranging from 1" to 12" in diameter. There were vertical and horizontal pumps. There were heaters along the lines. We would vary the temperatures from 250° to 1250° F. We would heat the pipes up, and then cool them down. The whole point was we were trying to see if we could break the line. It was a heat exchanger/heat transfer system. We were testing the pipelines to see if they could handle the changes in temperature. We were trying to see if we could break a pipeline, but we were not successful in that. I remember being told that they were running the tests to see if the pipes could be used in a breeder reactor. I don't know if that was correct, I don't honestly know. I am not an engineer. But that is what I was told.

Part of my job was to open the pipes to examine them. When we wanted to do that, we had to let them cool down so the sodium wouldn't be liquid any more. Then they would plug up the pipelines and I could open one up to examine the pipelines. Sometimes they would plug up a vertical pipe; sometimes it would be a horizontal pipe. If a pipe was still warm enough, the sodium would still flow down once the pipe was opened.

I don't know for sure what happened all the time, round the clock. I know what happened when I was on duty. I just worked one shift but the facility operated all the time.

One time they told me to cut one of the lines. They seemed to think the line was plugged up for some reason. I said it was a bad idea; that the pipeline was too warm and the sodium would flow out. They told me to do it anyway. They thought the pipeline was plugged up and that nothing bad would happen. I didn't want to lose my job, so I did what I was told. I cut the line, and liquid sodium started flowing out all over the place. A fire started immediately. We shut the pumps off, turned the heaters off, and used NAK to put the fire out. We called the fire department and they came. We had the fire out in about ten minutes. The engineers wouldn't even talk to me. I think they wouldn't talk to me because I had been right all along. We had to use NAK to clean the mess up. Once we got the mess cleaned up, it was back to business. That is the only time anything like that happened. It was frustrating to me because they didn't listen to me. We cut a horizontal pipe. The sodium was still liquid and a lot of it came out because the location of the cut was close to a vertical pipe and the liquid sodium flowed downhill. The only thing that went right was that I made the cut in the pipeline away from my body. This was smart because if I had cut it towards myself, I would have caught on fire. I told them it was a bad idea, they didn't listen, and I had to clean the mess up. They wouldn't talk to me after that happened. It was a frustrating experience. I think they were trying to see how I would react to the situation.

There was a pool of water outside the sodium facility. They used to throw things that were contaminated with liquid sodium in there. Then the water would blow up. The item that had been thrown in there would explode and burn.

I left my job on the hill shortly after that. My brother got sick. He lived in Las Vegas and I quit to go be nearer to him. Eventually, I went back and asked for my job back. They

hired me back, but from then on I worked at the Canoga facility. I didn't work on the hill again. I was only up there a year, or maybe even less.

The only time I ever handled radioactive material was one time when we were told to go out and pick up some pieces of equipment that were on the ground. Then the Health Physicists figured out that the equipment was contaminated with radioactivity and they told us to stop what we were doing. I had only been picking up the equipment for about one-half an hour.

I know they had a glove box that they used to examine items that were radioactive. I saw it done once, but I didn't do that ever.

I didn't handle any hazardous chemicals. The only thing I ever did that seemed hazardous was when I cut the sodium piping. That was the only problem that I was ever aware of. Things really ran pretty smoothly up there. I did handle the NAK. I don't know if it is considered a hazardous chemical. It was disposed in a dumpster right outside the building. After the explosion, I just swept it up and then we threw it in the dumpster. It wasn't a normal dumpster. I used the dumpster that I was supposed to use. The dumpsters were easily accessible.

I don't remember any written procedures. As a general rule, people did what they were supposed to do. They had procedures down at Canoga, but I was not aware of procedures when I was on the hill. Our supervisors told us what to do and we did it.

I was a janitor before I started working in the sodium facility. The only training I ever got was on-the-job training. I didn't handle any waste.

I didn't submit any documentation for what I did. The engineers in the sodium facility probably documented what we did there. I think the supervisor was probably responsible for the paperwork.

I never saw any liquids disposed of down any drains or in any toilets.

The Sodium Burn Pit may be the place I already told you about. We didn't call it that back then. I don't know how it was used. It was there. I saw someone throw something in it once. It was like a show-and-tell. It was probably when I first started working in the sodium facility. It was a good thing for me to see that, it was a good experience, a learning experience. I was glad to know what I was up against in handling the liquid sodium. It was very easy stuff to handle and it was surprising how dangerous it could be.

The only incident I know about was the time I cut the pipelines. They thought the pipelines were plugged up. I was the last one hired and that's probably why they asked me to do it. I told them I didn't want to do what they told me, but that I would if they told me to. I didn't want to get blamed if things went wrong.

I don't know anything about any surface disposal area or any leach fields. I don't recall anything about any conservation yard or junk yard. I didn't even know those things existed.

I was a janitor for the first 90 days after I was hired, during my probationary time. They wanted to see if I was okay.

One day they asked me to go work in another sodium building. The working conditions were not as good in that building. I filled in for a guy who wasn't there, just one shift. I didn't like the place. My intuition wasn't good about the place. In my normal building, the layout was clean. I could see everything I needed to see. I was not interested in finding out what was going on in the other building.

I was a janitor before I went to the sodium facility. I swept the floor. I emptied the garbage in the dumpsters. I washed floors. I worked all over the hill. I did what a janitor would do anywhere else. Occasionally, I would have to sweep up these chips off the floor and put them in a big drum. When the drum would get full, someone would come pick it up and haul it away. I don't know where it went. No one else was around while I worked except security. There was this one guard who would sneak up and watch what I was doing. He seemed to want to catch me doing something wrong. He wouldn't talk to me. I was minding my own business, busy doing my job and suddenly, I would feel someone watching me. I was all alone, but there were bobcats and mountain lions up there. It would startle me. I told him I would take his gun from him and use it on him if he kept doing that. He stopped after that. I was only a janitor for 90 days.

They were good to me and I have no complaints. I have no concerns about the site.

We did not have any leaks in the sodium building. There were not any containment trays under the pipes, but there weren't any leaks. Our pipelines were very tight. I never saw any leaking or spills. NAK is like a fog. When we sprayed it to put out the fire in the building, I couldn't see anything. I called out to my partner. He didn't answer. It was scary. He was okay. I think he didn't respond because he didn't want to say anything. He knew they should have listened to me. I wasn't sure I was happy about having to breathe the NAK. I am in hospice now. My doctor asked me once if I knew what caused my emphysema or COPD. I smoked for 35 or 40 years. I don't know if the NAK could have made things worse. I was exposed to other things. I worked for a while plating parts. That was a really dangerous place to work.

I retired from Rocketdyne. They were good to me. They took care of me. It was a good company. I enjoyed working there.

Interview 78

I worked full time on the hill from 1976 to 1982 or 1983 for both Rocketdyne and Atomics International. There just was not that much difference between the two parts of the company, we just went back and forth. After I left SSFL, I went to Canoga Park as a purchasing representative and my duties took me back up on the hill occasionally in the 1990s and 2000s. I had an office in Canoga Park and then later on in West Hills. Later on, I was also involved in a laser and electro-optical program.

I was there during the years that DEF was the general manager, after GHI was in that capacity.

I left under my own gumption when I finally decided, "I need to get out of this mess." I knew that if I had to suit up and wear a respirator to work with radioactive materials, it was not going to be good for me in the long run. I wanted a safer job with less health risk, so I found myself a job in production controls and moved on.

I worked with radioactive materials, handling "a little bit of everything." I worked in decontamination, including the Sodium Reactor Experiment, the Sodium Burn Pit, and Buildings 5, 6, and 59. All the buildings had a yellow stack – which meant that radiological materials were handled there.

When I worked at the SRE, we took the facility apart. I was there for 1½ or 2 years, working 30 feet below ground surface and using a jackhammer. We would take a radiation reading and when we found contamination, we would dig it up, box it up in special lined boxes, and they would ship it away. I do not know where it was shipped to, but everything went off-site. I think it went to Beatty, Nevada. I do not know where it was stored on-site before it was shipped away.

We wore film badges. No one seemed to think it was that all that hot. We also used dosimeters and collected urine samples in a bottle every 30 days. This was all pretty standard health monitoring, and no one seemed to be too concerned.

A lot of things did not go as planned.

Building 5 had a coal gasification system that we ran around the clock. Coal was converted to a low butane gas by putting the coal in a vessel of molten salt. One day the molten salt vessel blew up. The vessel was under pressure and a 36-inch blind flange malfunctioned. Molten salt was spewing all over the place and going into the drainage system. Building 5 and Building 59 had both been contaminated from previous experiments. I asked, "how come we are not wearing film badges?" I was told that the buildings did not have that much radiation left in it and we would all be adequately protected as long as they were monitoring the building. So I asked for the radiation records, specifically for Building 59, and I was told they could not find them. When I pushed hard, they came up with some kind of calculation of their best guess as to what I had been exposed to.

A lot of stuff seemed to disappear like that.

I was working in Building 59 – which had the yellow and black stacks. I asked why we were not wearing film badges. I was told that they were not necessary because they were monitoring the building. The SNAP reactor was still in the vault in that building.

JKL, the project manager, is dead. The shift manager, MNO, is dead. Another guy I worked with, PQR is dead. All cancer related deaths.

Going back to my story about Building 5, after the explosion following the flange blow out, nasty crap was coming out of there and running into the street in front of the building. We were putting sand bags out to keep it on the street. The stuff eventually froze up again. We got it shut down. I was one of the victims of that accident. I filed a workman's compensation case for hearing loss afterwards. I was wearing a respirator and a breathing apparatus – but no hearing protection. I went to an audiologist and found out I had tinnitus, damage to my hearing. Working all those years with a jackhammer inside an enclosed vessel, and around the rocket testing, took a toll on my hearing.

I almost got killed once in Building 59. I was working on a rotating shift and they were in testing mode. There was a big pressure vessel in the other vault (not the one that the SNAP reactor was in). They had a big mock-up of the Clinch River fast breeder reactor that was planned for Tennessee. It was never built due to politics after the Three Mile Island accident. A previous test had been run and the meters were reading like all the pressure had been bled off as required. I was removing a blind flange from the vessel with a crane and soon learned there was still pressure in the vessel. It blew and sodium oxide was all over the place. I couldn't breathe and I couldn't see. I do not know how, but I got out of there. STU was there too. He died eventually of leukemia. It sounded like a nuclear bomb going off in that vault. There was not any radioactivity in there. But I do not know how I got out!

When I was working in Building 5, we would cut out components, like some piping for example, and take it over to the Sodium Burn Pit to burn off the sodium with a hose. We would stand behind a blast shield at the Sodium Burn Pit because you know what happens when you add water to sodium. That is what we would do. I do not know what that pit was used for before then. I have seen photos of buried objects in the Burn Pit, and I know contaminated valves full of sodium have been buried out there for years.

I was licensed to drive a skip loader. One time, I was operating the skip loader in the Sodium Burn Pit digging up asbestos from old tanks. I had to be suited up in protective clothing for this work. I ran into something that was solid and shiny – it was not a rock. I got a pug and got a reading on it; it was radioactive. It pegged the dosimeter. I reported into my supervisor and he told me to cover it back up and go away. We boxed up the asbestos I had already removed and I did what my supervisor told me and covered whatever it was back up and left.

Later, when I was a program representative for purchasing, I remember seeing a purchase order for some big tarps they would use to cover the place up before it rained. I have heard that a lot of things were buried out there and that everything went there back in the old days. The thinking was, out of sight, out of mind. I ran into one thing with that skip loader. I know from that experience at least one thing was in there that was not supposed to be. How many more things are in there?

We used trichloroethylene when I worked for Rocketdyne. We used that stuff all over the site, at CTL5, CTL6, and on the test stands, including Coca, Alfa, and Bravo.

One thing I found somewhat strange is that they do not have good records of who worked where. We were all part of this general pool with a common job classification. I was low man on the totem pole when I hired out there. Everyone else had 30 years of seniority – they could have all been my dad, I was all over the place, working here and there, wherever they told me to go. Then things got slow and I went over to Atomics International. That is when I started working in Building 59.

We used cleaning solvents for everything. Trichloroethylene was the most common, but we used other things, like Freon. We would flush things out in the open, and it would run down the asphalt, eating away at the asphalt as it drained. There were no catch basins. We used a line to flush with the solvents and the grease and oil would wash off. We did this outside of buildings. The tanks were already outside. We also used Dilanol (alcohol and water combination) in a closed, pressurized system.

Where did the solvents go after we used them? I do not know. Hopefully into a 55-gallon drum with some other miscellaneous solvents, but I do not really know. They were all stored in large vessels or tanks with pumps. Every building on site had trichloroethylene available. I have no idea where it was disposed.

Part of the problem was that no one knew how to properly dispose of solvents like we know today.

Did we have policies and procedures? Well yes – we pretty much did what we were told.

Rocketdyne was a lot more safety-conscious than Atomics International. They had a higher standard. The rocket side had a book of procedures on safety and everything else. The AI side was looser, it was more experimental. We did what our bosses told us to. Everyone at Rocketdyne followed the procedures. No one wanted to get hurt. One time I got a metal chip in my eye. They got me in to see an eye doctor right away and took care of it. They were always after us to wear safety glasses, hard hats, etc. The NASA folks, a lot of them had Air Force experience, and they were strict.

AI was completely different. They were looser and using different kinds of standards. DOE was not nearly as visible as NASA was.

The training we got up at SSFL was mostly on-the-job training. We did get some training in how to work with liquid oxygen and liquid nitrogen. I had been trained in how to handle those while I was in the Air Force. I was smart enough to know what not to do.

I do not know of anything buried at SSFL except for perhaps in the Sodium Burn Pit. I am not aware of any liquids being dumped on the ground.

As for record keeping, I have my own radiation records around here somewhere. I do have some questions about what I may have been exposed to while I was working in those buildings without a film badge. They claimed they monitored the buildings, not the people. They told me not to worry – they could come up with an estimate of what I had been exposed to. However, they do not know where I worked or at what time. They cannot seem to find any of their records. Maybe they do not want to find them.

That whole attitude did not set well with me, so I left and went on. Now I am starting to worry about it, especially when I started realizing how many of the people I worked with have already died. I wonder if anyone has ever done any analysis on mortality rates by buildings.

Could there have been any hot spots in Building 59? The SNAP reactor was in there until very recently. They kept it behind a locked door, but it was still in there. Building 59 is now gone. The same is true for Building 5.

On a daily basis, the shift leader filled out a log. The logbook kept records round the clock, each shift filling in what had happened in the building during their shift. Where are those logbooks now? I do not know. Maybe in the same place as the radiation records for the buildings that they cannot find.

My concerns at the Santa Susana Field Lab are with the Burn Pit, Building 59, and Building 5. Who knows what went into the Sodium Burn Pit over the years. The nuclear experiments that they ran up there ended long before I started working up there. It is possible that all kinds of things are buried there. It could have all been taken to the Burn Pit. No one seemed to think that was a problem, it's just the way things were done. Building 59 still had the reactor in it when I worked there. They buried it in place, but this still concerned me. Building 5 had previous radioactive experiments before I worked there and it too concerned me.

Would I want to build a house up? No.

If you buy a house anywhere near SSFL now, there are all kinds of disclaimers that you have to sign during your purchase of a property. Based on what I know, I would not even want to live in Simi Valley. I do not know what went on in the 1950s, 1960s, or early 1970s before I worked at the site, but I would be concerned living in the area. Many people have gotten sick around there since the 1950s. At one time, there were 8,000 people working on the hill between AI and Rocketdyne. There were only 500 people employed up there by the time I was hired on.

I retired from Boeing. I think they are a good company. They are very safety conscious. They bought a real mess when they bought SSFL. They are not doing much now beyond cleanup. They are a good company and I do not think they would do anything sleazy. I feel sorry for them, getting stuck with that mess.

Interview 80

When I first started working at SSFL, there was nothing at Canoga or DeSoto yet. There was a facility (called Slauson) on Slauson Street in Los Angeles. Once the Canoga facility and the DeSoto facilities were built, they closed down the Slauson facility. I reported to the Slauson facility for the first two days I worked for the company, and then I went to Beverly Hills for a physical. I didn't start working up on the hill until Friday. My hire date was Monday June 13, 1955. There were no administrative services up on the hill at the time. In 1956, the Rocketdyne Division opened its own administrative services on the hill (Santa Susana)

When I started in 1955 there were no separate divisions within North American Aviation. It was one big company and the test site at Santa Susana was called the Propulsion Field Laboratory. In November of 1955, they divided the company into five divisions: 1) Autonetics, 2) Space, 3) Aircraft, 4) Atomics International, and 5) Rocketdyne. (We became subsequently became North American Rockwell when we merged with Rockwell International and then ultimately became Rockwell International. Subsequently we were sold to Boeing.

I worked for Rocketdyne from 1955 to 1992 and from 1996 to about 2004. I was in the Turbomachinery Development group at Santa Susana from 1955 to 1960. After 1960, I was based at Canoga but had management responsibility for one unit at SSFL. I was not up there full time after 1960. From 1955 to about 1958 I was located in the Area 1 engineering building which was a one-story wood-frame building on the road west toward CTL1. It was painted North American green, just like all the buildings up there. In 1958 my unit was moved to the engineering building in Area 2.

There was a Sodium Pump Facility just inside the front gate. They were learning how to pump liquid sodium.

I had only brief involvement with the atomic side of SSFL. There was a launch failure involving a rocket launched from Johnson Island, near Kwajalein Atoll in the South Pacific. The launch involved atomic warheads. It failed shortly after liftoff and the atomic warhead contaminated everything around it. They brought the engine back up to SSFL. Because the engine was one of my engines, I was asked to help see if we could figure out what went wrong.

My office was at the Canoga Park plant when the engine from the Johnson Island failure was brought up to the hill. I was managing turbomachinery engineering at the time and went to the hill specifically to look at the turbomachinery to see if I could detect any problems. I didn't find anything wrong with it. I think the Engine Systems people had already figured out what had gone wrong. We were just making certain that what they had not missed a problem in the turbomachinery. Based on what little experience I had up there when I was investigating the Johnson Island failure, I was under the impression that they were very cautious. I thought maybe they were being overly protective of me. I had to put on a white suit, booties, and gloves. I had a badge that you would pass in front of a Geiger counter to see if I had been exposed to radiation. You would check the badge going in and coming out to see if you had been exposed. It is my recollection that they had strict rules about how long you could be in the areas.

I have no knowledge of how radiological materials were handled, stored, or disposed. In fact, I never even heard about the accident involving the reactor until years later. Everything that happened up at Santa Susana was classified. If you didn't have a need to know something you didn't have access to the information. The rocket engine people didn't know what was happening on the nuclear side and the nuclear people didn't have access to the rocket engine information for that matter. I probably wouldn't have found out about a nuclear accident in real time unless a health emergency was declared. If there were any concerns about unsafe conditions, the area would have been cordoned off. In the late 1980s a computer tomography machine, which was an inspection tool, was installed in the area previously used by Atomics International. I made a few trips up there to observe the construction and installation. There was never any atomic testing going on during this period.

VWX was the Facilities person I dealt with on this project. She provided the Facilities support in setting up the computer tomography machine in the late 1980s. She did a great job.

I was involved in testing turbopumps at CTL1, CTL2, Bravo, and Delta test stands. I was so busy with turbopump stuff, I didn't even know about the other rocket engine testing. There was a lot going on. The military was pushing us. They needed the IBMs and the ICBMs. We were right in the middle of the Cold War.

Regarding chemical materials, I worked with a lot of trichloroethylene. It was a great cleaning solvent and a great degreaser. It didn't have an environmental stigma at the time. I wasn't afraid of it because I had a job in a machine shop during high school where I cleaned machine parts with trichloroethylene using my bare hands. I've always felt the furor over trichloroethylene was overblown. I know it did a good job at just about everything, including taking the skin off your hands. Parts used in LOX systems had to be cleaned thoroughly to remove any hydrocarbons left by the fabrication processes and 'trichlor' was the best cleaning agent available.

I really don't remember where we stored the stuff. I think it was stored in metal cans. I don't think it was stored in plastic containers. It may have been delivered to us in 55-gallon drums. I wasn't involved in transporting or storing it.

There were two groups on the hill: the development people and the test people. I was in Turbomachinery Development. The development people directed the test people regarding which tests to run. The test people then supplied the materials, operated the test stands, and did maintenance on the facilities. I wasn't involved in the management of chemicals. I wouldn't be surprised if someone just poured trichlor on the dirt when they finished cleaning something back in those days. It wasn't considered hazardous. It didn't even occur to me back then that we shouldn't do something like that. Maybe I lead a sheltered life.

I was aware of some off-normal events. I remember an accident investigation involving CTL-4 in the mid-60s. They were using UDMH and NTO as a propellant and a test stand blew up one morning. It killed a couple of guys. YZA was the chief engineer at the time and asked me to be his representative on the hill during the investigation.

I remember another incident that occurred at Delta 3 one night. They were testing fluorine, which is a great oxidizer but a miserable chemical to handle. You got more for your buck with it than with liquid oxygen. A fluorine leak occurred somewhere in the piping system. I was testing turbopumps at Delta 2 on second shift. Fluorine has a strong odor (they put fluorine in public water systems to help your teeth, but its smells bad). At any rate, I remember the Test manager, BCD, came roaring over in a jeep and told everyone to get out. To my knowledge, no one ever had any ill effects from that event. I don't remember what they did with the fluorine. They probably drained the tanks. I don't know where they drained the fluorine to, to the ground maybe or they could have brought in hazardous handling rigs, but I don't think so. I don't think they existed at the time.

There is a difference between getting a strong smell and suffering ill effects from it. For example, when I was a kid, my father's machine shop was in an ice plant that used ammonia as the refrigerant. That building was built in 1900. It was an old place that had lots of leaks. We smelled ammonia all the time and had no ill effects.

Kerosene, oxygen, and nitrogen were the highest consumption liquid materials used that I worked with at Santa Susana. Nitrogen was an inert gas used to pressurize tanks, but is not hazardous.

I do remember we had these big water cooled flame buckets that deflected the rocket flames away from the ground. The engine exhaust produced a lot of soot which flowed downstream with the flame bucket water. The soot from the Alpha and Bravo areas flowed into ponds. There were fish in the ponds but they weren't very appealing because they were all black from the soot. We didn't consider the soot to be toxic.

I didn't need (or get) a lot of training. We were all learning as we went along. Most of the training we did get was safety training for the test stands. Each test area had a system of lights. Red meant a test was underway, yellow meant a test was about to begin. Green meant you could enter. I didn't have any materials handling training because I wasn't doing that type of work.

They had a liquid oxygen plant up there for several years. It was between Area I and Area II. So we had our own, local source of liquid oxygen. Kerosene came up in tank trucks. We handled similar to the way gasoline is handled at a gas station. It didn't require anything special.

There were very few liquid oxygen accidents. One happened at Bravo 2 on a day with very low humidity. A layer of the liquid oxygen was floating as vapor close to the ground. It wasn't visible – it looked just like air. A guy came out with a cigarette and threw his cigarette butt on the ground. When it hit the liquid oxygen layer, the asphalt flared up. When he stepped on it to put out the fire it flared around his shoe. I heard the story, I didn't see it. The mechanic lost a pair of shoes but wasn't hurt and but there was no environmental damage.

There were company policies. There were a hundred rules and regulations. These were more focused on airplane plants than on rocket plants testing. It was against the rules to sleep in the airplanes. This didn't have much bearing on us in the rocket side, but because we were part of North American Aviation, it was one of the rules. They

could fire you if you racked up too many violations. A lot of the rules were more focused on what we weren't allowed to do. They didn't allow tardiness or insubordination. The rules were mostly related to personnel issues and didn't guide how we were supposed to do our work.

We documented a lot of our activities. We recorded what we did in log books. We generated a lot of reports. Later, briefing charts replaced reports. The briefing reports went to the government, our customer. The government was paying for everything we did and each program had its own special requirements for reporting. They reports and briefing charts were kept in files in the program office. We also had to do progress reports and monthly reports. A lot of the files got trashed after we moved them around too many times. I kept my own reports in my file cabinet through about 1965. Almost everything was classified up to about 1965. I had a secret clearance, but I still didn't see everything. Files were organized by department. We saw things on a need-to-know basis. When I was in the Army, I was in the security division.

I was involved in developing turbopumps for the rocket engines. I worked on the Navajo, Jupiter, Thor, Atlas, H1, and Shuttle rocket engines.

Their impression I had was that they were very careful with the nuclear stuff. The nuclear stuff was not very forgiving. There was a heavy emphasis on safety. They were conscious that they could hurt people and they didn't want that to happen. On the rocket side, we needed hardhats to go to a test stand. They were not designed for people as tall as me; I am 6 foot 4 inches.

We always documented what we did. In all of my years, Rocketdyne was a very open technical organization. There was very little political maneuvering. We could argue on a technical level, but that didn't carry over to the personal level. We got along like a team.

One of the wonderful things about working at the place is that we were all looking for the truth. We didn't want to do something wrong; it didn't make any sense to proceed with a test if we were going to do something wrong. We were interested in learning together. It was a fun place to work.

Trichloroethylene was no big deal. It was like how cocaine used to be in Coca Cola and doctors used to prescribe it; they thought it was good for you. We didn't know what was bad for us. We weren't afraid of it.

They worked more with chemicals in the research area. They developed solid propellants for armament rockets like NASTY, NAKA, and NALAR. The NA part always stood for North American. I don't know what the rest of the letters stood for. The solid propellant rockets had fins on the back to spin-stabilize the rocket. They had an explosive war head on the end.

I have a book about Rocketdyne, written by Robert S. Kraemer in 2006. It's called [Rocketdyne: Powering Humans into Space](#). It provides a lot of the history.

I am not familiar with the Area 4 Sodium Burn Pit. I do know that sodium burns when it comes into contact with oxygen. It would seem like that may have been a place to get rid of sodium. I don't know what the result of that would be. I don't recall hearing about a surface disposal area. I would have probably heard about that if it existed.

I was told there was an area west of the old Area 1 engineering building where old rocket engine parts were used as fill. (Some of the old engines had gold in them. We had a lot of failures over the years; we blew up a lot of hardware. The engine parts became junk once they failed. It wouldn't have paid to have them hauled off. There was a long old building that was used as an equipment lab on the left side of the road and the engineering building on the right side. Just past the engineering building, there used to be a canyon that isn't there anymore and I was told they used scrap rocket engine parts to fill it in.

Most of the test stands have been taken down. If we had a propellant tank, before we scrapped it out, I am sure we would have cleaned it out first.

Once we had a contract to build two tanks, one each for NTO and for UDMH for the upper stage engines on the USAF Manned Orbiting Laboratory (MOL) program. They were designed with bladders to be squeezed. The pressure outside the bladder pushed the propellants in the bladder into the engine. They were built at Canoga Park but I don't remember if they were ever tested at SSFL. If they were it was before I came on the program and the tests would have been conducted in Area 4. But nothing was ever thrown into the scrap heap until it was decontaminated first.

In my experience, Rocketdyne was always very careful. I have to believe that Atomics International was the same way. It was a culture that came down from North American Aviation.

I don't recall any problems with any tanks, where the tank itself was a problem... Most facility tanks had to be designed with a 10 to 1 safety factor. Flight weight tanks were lighter than what we had on the hill. They rely on the pressure provided by the propellants for structural integrity. They only had to last until they were emptied. We never tested any flight weight tanks up there. Our facility tanks were very beefy.

I loved working up there. I can't think of anything that would have been more interesting to me. The government wanted these ballistic missiles. The public wanted us to be successful. The engine testing would rattle the valley. They knew it would help keep the Russians from bombing us. Now, they are not doing any more rocket testing here.

During the Cold War, the government wanted missiles bad. The contracts were cost plus. We didn't worry too much about costs. There were incentives for us to build lots of test stands. In 1958 or 1959, there were 18 large engine test stands. They were firing all the time. It was a phenomenal time that will never be repeated.

I retired in 1992. I was out for about three years, and they asked me to come back. Boeing was developing a "flex force." There were not any benefits except you could add to your pension. I worked on the RX68 engine – a gas generator cycle engine they were planning to use on the next moon mission.

I was a nuts and bolts guy. The one thing I missed the most once I retired was the interface with the people. EFG was the president of the company when I hired in. He was much loved by everyone. Everyone felt he was looking out for them, personally.

I remember the DC electrical generator for CTL-1 came out of a Pacific Electric substation. The Pacific Electric streetcars were the early rapid transit system in Southern California. The valley line ended at Shoup and Victory. There were double

tracks running down Sherman Way. It was a magnificent system at one time. I rode it to school during junior high and senior high school.

Interview 107

I worked for Atomic International at Canoga Park, California from 1961 to 1973 as an engineer with the SNAP 2, SNAP 10/10A, S8ER, and STIR programs. Prior to my time at Canoga Park, I worked on the OMRE, SPERT, MTR, and SL-1 for Atomic International in Idaho Falls (1957-1961) and for General Electric in Hanford, Washington (1951-1957). I provided a brief chronology of my work history to the interview team. (I also showed the interview team a scram button that was removed during decommissioning of the STIR facility, a pneumatic tube for collecting samples, and my QA stamp, which was the first neutron radiography level 3 stamp ever produced.)

I worked on SNAP 2 and SNAP 10/10A in Building 24. The SNAP 10A program became SNAPSHOT, the first nuclear reactor in space. I was involved in calibrating the reactor instrumentation. The SNAPSHOT program ran for less than 30 days as the DOD collected all the information they wanted from the program and then shut it down. SNAPSHOT has a 300-year orbit and is still in space.

I worked on the S8ER in Building 10, which was much larger than the SNAP 10/10A reactors. But after 2 years, the S8ER was shut down. I was an alternate engineer in the Building 12 critical facility, where all of the free plutonium in the world was located at one point.

Most of my work at Canoga Park involved the Shield Test Facility and Shield Test and Irradiation Reactor (STIR) in Building 28. The Shield Test reactor was a 50 KW reactor. It was shut down and converted to a 1 MW reactor, which became the STIR. The STIR was used to conduct irradiation tests for the Jet Propulsion Laboratory. Samples for this testing were handled quickly as the half life of isotopes involved was just minutes. Under the STIR program, I conducted studies on shielding, neutron activation, and neutron radiography. Neutron radiography was my primary research in the early 1970s. I worked on neutron radiography of electronic explosive devices for the Saturn and Apollo space programs, including Apollo 7 through Apollo 17. An issue of the North American Rockwell Corporation journal *Skyline* shows examples of how neutron radiography can be used in non-destructive examination. The radiograph of a motorcycle was my son's motorcycle. The radiography left the motorcycle slightly irradiated and an AI health physicist noted I could not take the motorcycle home right away.

I was also involved in non-destructive ultrasonic and radiographic testing of reactor vessels. I was part of a team that built a skate to move around the pressure vessel of a reactor and electronically transmit information back to the engineers. This system was developed at Santa Susana and then applied to the testing of railroad cars in Louisiana.

In 1973, I was part of a team that went to Sandia National Laboratories in Albuquerque, New Mexico to conduct studies on weaponry, such as the thermonuclear B61 (Mk-61) Bomb. We were known as "black hatters" (bad guys that steal weapons) and our goal was to determine how dismantled weaponry could be reactivated. The lab had three dismantled nuclear devices that we worked on reactivating. We had some assistance in our efforts in the form of the operator's manual for the weaponry.

The only incident I am aware of during my time at Santa Susana is the use of approximately two parts per million of potassium dichromate in the STIR cooling tower. Potassium dichromate was used to minimize corrosion, but the state of California came in as the regulator and stated it could no longer be used. A phosphate compound was used to replace the dichromate compound.

In the late 1960s, AI underwent a big layoff period. When I was first at the site, there were approximately 300 employees, but by the time I left there were approximately 60 people. It seemed that every Friday we were having a going away party. A reduction in forces occurred at other labs as well, including Argonne National Laboratory and Oak Ridge National Laboratory.

I wrote the safety analysis report and worked on the engineering of fuel element removal and shipment from the STIR facility. When fuel elements had to be replaced, the used fuel elements were placed in a storage rack inside the reactor vessel. New, unused fuel elements were taken from the storage vault in the building and placed in the reactor.

STIR was owned by AEC (now DOE) and used for neutron radiography. When General Electric built its own neutron radiography facility, AI decided not to compete with them and abandon the STIR for the L-88 reactor. The L-88 reactor was also used for neutron radiography and was the first reactor of its kind.

Documentation from experiments and testing, including rolls from recorders, were packaged quarterly and sent to Rockwell International storage facilities that were originally in downtown Los Angeles, and moved later to Newport Beach. The Newport Beach facility also contained documents from the Nixon library. Nearly 10 years of records from the STIR facility would have been sent to one of these locations.

In the late 1960s, I recall one day at the STIR facility when we were told to “shut her down” because of what was interpreted as being air emissions from the building stack. We never asked questions when told to shut down a reactor, so we did what we were told to do. However, the instrumentation and records on the facility were all normal. The readings that had set off the alarms were consistent with a bomb, not with normal operations of the reactor. About a half hour later, it was discovered that the Chinese had detonated a nuclear weapon and fallout in the atmosphere had been mistakenly attributed to the STIR facility. Weapons testing fallout was not a big deal to us, but this instance got our attention because we had to shut down the STIR as a result.

We had a “safety first” attitude throughout AI and this dictated how operations were conducted.

I never went to the sodium pond, but I am aware of a pond in the western portion of Area IV used by AI and Rocketdyne to dump excess sodium or NaK³ used in the S8ER. It would snap, crackle, and pop like fireworks when exposed to water. When SNAP piping was steam cleaned, you could also hear the snap, crackle, and pop in the piping due to the sodium and water reaction.

³ Many former employees referred to NaK. It has been presumed they were referring to a sodium-potassium alloy.

Water from the STIR cooling tower would drain into a holding reservoir at the edge of the asphalt driveway leading into Building 28. The reservoir would accumulate cooling tower water as well as rainwater. A sump pump located at the northwest corner of the test vault access way was used to pump the water over to Rocketdyne. After the water was pumped to Rocketdyne, AI had no control over it. Rocketdyne conducted regular sampling of the water and then released it to the Los Angeles River. AI was essentially a guest of Rocketdyne's at the site and Rocketdyne could tell AI what to do. Presumably, if there were any issues with the water from AI, Rocketdyne would have discussed it with AI.

During a shielding study test, the intensity of the radiation was so great that a temporary perimeter, similar to the caution tape used by police, had to be established outside the regular building perimeter.

My last chore at AI was packaging up and shipping lithium hydride and tungsten slabs to Oak Ridge National Laboratory as part of an AEC consolidation effort. The slabs were approximately 8 square feet in size and ranged from 1 inch to 10 inches thick. They were used in shielding studies related to a project that aimed to send a person and reactor into space together. The AEC began centralizing operations and eliminating duplication. This involved moving operations to Oak Ridge, which had a reactor the same size as STIR.

Radiological material was handled very carefully. I was trained in both neutron radiography and explosive devices for my work at AI. The NRC developed "tech specs" for handling radiological material. These specifications were very comprehensive and almost made it difficult to build a nuclear power plant as some of the specifications were difficult to achieve. Work became more laborious after the tech specs were developed. Prior to the NRC tech specs we had operating limits that we had to work under. The operating limits provided more room to operate than the tech specs and allowed common sense to dictate how operations were conducted. (I provided the interview team with a document describing STIR operating limits.) But after Three Mile Island, the NRC developed the tech specs, which became the way of living for nuclear power plants.

There were no real reactor incidents during my work at AI. If reactor instrumentation showed unusual results we would scram the reactor and operate in safe mode. Procedures dictated that an incident report would have to be written up. The incident report would be distributed throughout the organization and used as a "lessons learned" tool. An outside team from DeSoto would come to critique operations and review the incident report to prevent similar incidents from occurring in the future and ensure issues are handled the same way across the site. The incident procedures demonstrate the attitude regarding safety at the site.

I received a lifetime exposure of 24 rem during my time at Hanford, WA, Idaho Nuclear Laboratory, and SSFL. Most of my SSFL exposure was from neutron radiography using indium plates that were 16 inches by 20 inches by 1/16 inch thick. The plates would become activated and because of how we held the plates, I received facial exposure. I wore safety glasses and a dosimeter that kept daily records of my exposure. During shielding studies, the reactor room would sometimes become so hot

we had to wait a few months for the radiation to subside so that acceptable exposure limits were met. This happened several times, but as a result, we never had any abnormal exposures. Objects used for shielding studies were 5 feet square of various thicknesses. Materials studied included lithium hydride, depleted uranium, lead, and tungsten

Radiological waste, including contaminated clothing, was disposed at the RMDU in 55-gallon drums. Initially, these drums were taken out to sea and dumped, but that practice fell out of favor and after that all waste from the RMDU was sent to Idaho for disposal. I am not aware of any Area IV waste disposal on site. When projects were shut down, uranium and plutonium were transported to Idaho for disposal. Beatty, Nevada was also considered as a disposal location.

The only hazardous chemical I recall working with at AI is lithium hydride, but it was encapsulated in aluminum and was pretty safe unless the lithium hydride was penetrated.

The Organic Moderated Reactor Experiment (OMRE) in Idaho Falls was an organic reactor that was cooled with an organic terphenyl. A by-product of this was biphenyl to which we were all exposed. Additionally, when we had organic spills, such as a spill on the floor, we would clean it up using trichloroethylene. These organics exposures were considered normal before we knew the materials were hazardous. I do know that UCLA did a safety study as a result of our exposure, but I never heard the final results.

Also, regarding hazards, I recall when I worked at the 100KE reactor at Hanford, I was associated with a technical group that performed coolant studies in a facility called the 1706 KE. The tests included high temperature coolant operations, which called for use of asbestos as an insulation material. We had a contractor that was good at his work, but sloppy in his cleanup, consequently we had lots of loose, airborne asbestos all over the place. This went on for two years at which time I left GE Hanford, and I went to work at Rockwell Idaho.

Lab activities at AI used radiological sources and chemicals handled under a hood. Radioisotopes for calibration units were stored in the floor vault and when the STIR facility was decommissioned the calibration sources were sent to DeSoto, but I am not sure how they were ultimately disposed.

I was trained by ordnance people at the Downey facility to conduct neutron radiography on ordnance devices. I received radiological training by peers at AI. I also received hoisting and rigging training from an outside contractor. The people in the AI training department were sticklers for training.

As I recall, everything I did at the SSFL was documented. We had sheets documenting start-up and shut-down procedures and kept log books documenting work. All documentation was retained at the storage facility in Los Angeles or Newport Beach.

I think the sodium burn pit is the same sodium pond I referred to earlier where excess sodium and NaK was sent for disposal. I am not familiar with the service disposal area or any leach field or septic systems. I am not aware of liquid material being disposed down floor drains. I don't recall any issues with drainage systems or tanks other than two Rocketdyne guys that were killed when they entered an underground vessel that

contained nitrogen gas. The Old Conservation Yard was a junkyard where lumber was deposited. One employee took lumber from the yard to build a house on the Colorado River in Nevada. People could bid on items in the junkyard in an auction.

Interview 125

I worked for Atomics International from 1962 to 1965 in the Building 20 hot cell, and the DeSoto facility. I also did some hot cell work in the SRE cleanup, removing some fuel rods.

I handled radioactive material all the time in the hot cell.

I was young when I started and didn't know what I was doing on my first day. There was a pretty rapid learning curve, but I was impressed with the operations of Atomics International. I was impressed from one end of the facility to the other and thought operations were very well thought out and facilitated. The key was safety in handling radioactive material. I was quickly indoctrinated into the hazards of what I was working with. I had some basic knowledge, but I did not come to my job with all the necessary knowledge. I think we had a unique operation in the hot cell. There was the potential for bad exposures if something went wrong. But I thought the design of the building was well thought out and engineered with safety in mind. Safety was pretty much the number one concern and everyone I knew took safety very seriously.

Anything that occurred that was not planned was very minimal. From my experience any non-planned events were easily handled and rectified. There was constant monitoring, and the health physicists (HPs) in our building were constantly monitoring everything, including keeping track of our doses, and various areas of the buildings. The building contained separate areas that required different safety protocols and levels of personal protection. Areas were temporarily marked off with ribbons or tape occasionally so you knew not to go into a certain area unless you had the proper protection. Even if a temporary area had to be set up, it would have been well marked with tape or roped off. When you crossed into a certain area you had to abide by its dosage rates, cleaning standards, or protective clothing requirements. It might have seemed like they were going overboard now and then if you didn't know what they were dealing with. They took it seriously.

I am all for the company. I had a positive experience at Atomics International. My wife worked for Rocketdyne for 27 years and my daughter has about 27 years with Rocketdyne as well. My family has had a very positive experience with AI and Rocketdyne.

I know there may have been things that weren't done correctly, but part of that is probably a lack of knowledge at the time. As science progressed we were better able to predict outcomes and hazards. I feel Atomics International was very responsible and encouraging toward safety. I can't fault them for anything.

I did live in Simi Valley for a while and I do know what is going on in the community. I think some members of the community are what I call "Green Weenies." I thoroughly believe in environmental protection, but I also believe in common sense. There are people that go overboard and they go overboard without the proper knowledge of the situation.

I would definitely disclose any information I had on potential contamination if I had it, but I just don't have any knowledge of this.

I was interested in the SSFL community activities as a citizen of the area, and as an employee of the Ventura County Fire Department. I was even involved in some local politics and I know what the people have been saying for many years. Honestly, I am surprised this is still going on. The site was cleaned up and I thought that would be the end of the community frustrations, but even that did not satisfy everyone. I don't know what is still up on the hill today.

I took my work and the hazards associated with it very seriously. I knew the risks and we took the appropriate precautions. I don't see with the knowledge we had at the time, and probably even now, how they could have done a better job. We had certain jobs to do and there was a small percentage of risk associated with those jobs, but you assumed that risk with the job.

I was in the Air Force as a jet mechanic and I took my job very seriously because I knew that other people's lives depended on me doing my job properly. I had that same mentality working for Atomics International. Sometimes things didn't go exactly as planned, but if there was a potential exposure it would have been seconds, maybe minutes, but you knew what the exposure would be and you had a dosimeter, a film badge, and a hand meter. In some cases, a health physicist may be right there behind you with his own meter. I felt very well covered and secure with regard to health and safety monitoring.

We dissected the fuels that came out of the reactors in the hot cell and would run tests on them. We would take the fuel out of its casing, cut it apart, and take various measurements as our work dictated. I also worked in fabricating the fuel down at the DeSoto facility. I worked at two buildings in DeSoto. I am not completely sure of the numbers, but I think I worked in Building 1, the main building facing DeSoto Avenue, and another building behind Building 1.

I didn't machine any fuel at DeSoto, but we would pick up fuel from the machine shop. I think the machine shop handled beryllium. Safety rules dictated that we report any movement of fuel from building to building. We had to have movement of fuel authorized and they had to keep track of how much fuel was in any one location to prevent potential danger. We knew we couldn't have more than a specified amount of fuel in any particular location at a time. We would have to make a phone call to get permission to move the fuel. I assume they checked the load in the area and then told us whether we could move the fuel.

Handling the fuel from the machine shop at that stage was not particularly hazardous. You had to wear gloves and prevent contact with the skin. Sometimes you would have the fuel installed in an air-controlled atmosphere. Although I didn't machine the fuel at DeSoto, I weighed and measured it. I can't remember for sure if we cleaned the fuel when we got it or when we finished working with it, probably when we finished working with it, but I am not positive. In retrospect, I think the cleaning process was the only part that could have been done better. We used trichloroethylene, a cleaning solvent used throughout industry. Current knowledge tells us that this wasn't the best chemical for the environment. But we were using the chemical in a little glove box, not in any huge machine. At DeSoto, we were just one line in the fuel machining and fabricating process. We ran tests and collected measurements on the fuel which had been cut into

various lengths before we received it. This was done to collect baseline data for comparison with fuel that came out of a reactor after use. There were records associated with each fuel rod and they were numbered on the end. We would take measurements on each segment of the fuel that would later be assembled to form the fuel rods.

The only time I ever had a problem that scared me I was working at DeSoto. We were putting fuel into the cladding and then a welder was going to seal the fuel in the cladding. We had to load the fuel inside a controlled atmosphere. I think it was a nitrogen atmosphere. We had to purge the atmosphere, get it under a vacuum, purge again, and then fill it with nitrogen gas. Once the fuel was loaded into the cladding, we filled the cladding with NaK and/or sodium and then the cladding could be sealed by the welder. The glove box I worked in had an access port that was also atmospherically controlled. Under an inert atmosphere, we would clean the glove box out. I think we did a dry clean of the glove box first, and then used acetone and damp Kim wipes for the final clean I think. I was at the last step of the process and loaded the damp Kim wipes into the glove box. I went to stick my hands in the glove box when a big explosion occurred.

The explosion occurred because there was still a speck of sodium or NaK in the glove box and it reacted with the moisture from the Kim wipe. There was also acetone vapor in the atmosphere and once that flashed it caused a big explosion. I was very lucky in that I had not closed the access port so the explosive gases had a place to vent. It looked like a rocket engine with flames shooting out of the access port. That is the only major incident that happened to me, but I wasn't exposed to any radiation. The use of acetone may have been the biggest safety factor involved in that incident, but not being a chemist, I wouldn't know what other chemical was available to do the same type of job.

I cannot think of any similar large incident that occurred at SSFL. There were probably a lot of little things that occurred at SSFL that were unusual, but nothing that wasn't at least anticipated at some point as being possible. For example, say you dropped a piece of fuel, you would have to stand back further maybe, reassess exposure issues, and clean it up. So if something that happened that was unplanned there were still procedures in place to deal with the situation. This was in the hot cell, so it was not in an open area. I did remote fabrication and machining of different parts at SSFL. So an unanticipated event in my work could have been dropping something from the remote manipulators onto the hot cell floor. The remedy for the situation may have involved something like moving things around and getting an overhead crane to pick up the dropped object. The remote handlers made things more complicated and clumsy, but we had procedures to deal with unplanned events.

You try your best to anticipate potential problems and avoid them, but things happen as they would at any job.

Worker health was protected differently depending on the area. You had cloth masks that went over the nose as one level of protection and then a more hazardous area may call for fully sealed air supply masks with face pieces. You may wear layered clothing depending on where you were working. You may wear a lot of layers in the most

hazardous area and then shed layers as you moved through sealed entryways into less hazardous areas. The clothes, such as coveralls, gloves, or boot covers would be bagged in each area and go into separate contaminated collection bins. I don't know if they had a hot laundry facility or not.

I don't know of any disposal of radiological material on site. Disposal occurred either in a metal drum for regular trash or a lead, steel, or concrete container built specifically for the contaminated waste. Radiological material would come into the facility in a protective container and go out in the same manner. Sometime we shipped fuel rods back out to an off-site storage facility, but I don't know where that would have been. Most of our fuel came originally from Hanford, Washington or a site in Idaho.

I don't have any knowledge of radiological spill, leaks, or dumping, certainly nothing illegal.

The only thing I was aware of was the disposal pond for sodium. I never saw anything first hand, but I knew of the location of a pond, also known as the Sodium Burn Pit. I heard that they would throw the sodium out there and "let it do its thing," that is, explode when it hit the water. I assumed it was uncontaminated sodium, but I don't know that as fact. I never saw sodium put in the pond when I was at SSFL. Later in my life, when I was working with the Ventura County Fire Department, I saw training demonstrations of sodium reactions and we worked closely with Rocketdyne's Fire Department. They would often instruct us because they worked with much more hazardous fuels on a daily basis than we did at the Ventura Fire Department.

I know we used trichloroethylene and acetone and probably some other chemicals at the hot cell. Chemicals were stored in metal, fire resistant containers. As far as disposal, they were all shipped out in plastic, metal, or glass containers depending on the chemical. I don't remember exactly how we disposed of chemicals. We took out whatever we had to take out and followed our established rules for that. You would monitor the waste for contamination levels and dispose as appropriate. In the hot cell, particulates would be swept up and put in the appropriate container. Damp wipes would be used as another level of cleaning, and finally you would go in with your cleaning chemicals. Contaminated solids would go into appropriate containers. Any contaminated liquid waste would go into the building's contaminated liquid waste collection system.

Building 20 had a liquid waste collection system and a gas filtration system. I don't think anything left the building immediately. Sanitary waste went to the sewer system, but everything else went into the building's own built-in disposal system. Everything was filtered. The basement of Building 20 contained the filtration system. The hot cell and the area outside the hot cell was kept at a negative atmosphere. Air would be sucked into the hot cell and then into the basement containment filtration system where eventually it was cleaned enough to be vented out.

I am not aware of any unusual occurrences relating to chemicals other than the incident at DeSoto I mentioned earlier. I am not aware of any on-site disposal of any hazardous chemicals.

As far as policies and procedures go, as a new employee I was told what my work would entail and the purpose of it. We had sessions with the HPs and they explained the types of radiation and effects of radiation. We watched training films. We learned how to avoid exposure, how to safeguard ourselves, and how to use and read the safety instruments properly. We also learned the limitations of the safety instruments. We had various training session on different things. I think the training may have changed over time to respond to issues that arose. I'm sure I read manuals as well. The company culture was such that we complied with the rules. We knew what we were dealing with. I was pretty low on the totem pole, but I worked with very intelligent people and had all the confidence in the world in them. I think safety was on the top of everyone's mind.

I also received on-the-job training. I had a good mechanical background before I came to AI, but working there around knowledgeable people and discovering how much I didn't know motivated me to go back to school. I took an algebra class through what is now Ventura College while I was still working at AI.

I never saw or heard of anything being buried on site as SSFL. Now, I have read some things on the site, but I don't know anything from personal experience.

We documented our work at SSFL through photographs and ledgers, maybe notebooks as well. Everything was documented. You pretty much did you job and wrote it down. I don't know what happened to these records after I turned them into the boss.

If there was any disposal down toilets or floor drains it went into the building's collection system.

I think a regular disposal team used the Sodium Burn Pit, but I was never there to see anything. I do not know anything about a surface disposal areas, leach fields, septic tanks, discharge locations, storage tanks, or gas holdup tanks. I vaguely recall the Old Conservation Yard as a disposal area. I can't really say anything for sure about it though. I remember a scrap yard on the west side of the road coming into the site.

I was not aware of any problems with underground pumps, sumps, storage tanks, piping, sewer, or drainage systems.

I was primarily up in Building 20 on the hill. As far as I know everything in this building went through air processing contained beneath the building. The building was self-contained, I can't remember but I think there may not have even been any windows in the building. If something needed processing it was processed internally before being discharged to the atmosphere or shipped off-site. There were a lot of below grade processing features at Building 20.

At one point I also got involved at SRE. As far as I remember we were down below in SRE's hot cell. I believe I was handling the fuel rods and getting them ready for off-site disposal. This was after the SRE was shut down. I also was probably involved in cleaning up the SRE hot cell afterward. I got sent over to SRE because of my skills and experience working with the remote manipulators.

I know I received some level of exposure while working at AI, but that was part of the small risk I assumed taking the job and I was not concerned about it. I remember having to scrub my head one time because some speck of radiation was found when they ran a meter over my head. You would have a final check before you could come

out from a hazardous area to a nonhazardous area. You would have to run a meter all over your body to confirm you were not bringing any radiation into a nonhazardous area. They wouldn't let you out of a building until you had no detections on the meter. Otherwise, you would have to go back and shower to remove any radiation. There must have been hot and clean showers too now that I think about it.

Overall, I had a wonderful and interesting time working for AI. I really enjoyed my job.

Interview 154

I worked at ETEC starting in about 1977. I had worked down at Canoga Park facility with a lead engineer that I was familiar with. He started up a new instrumentation group at SSFL and I requested a transfer to go up on the hill too. Later I transferred back to Rocketdyne. I think I worked at ETEC from 1977 to 1985 (about 7-8 years).

I was an instrumentation engineer. I tested the various sensors that were to be used in the sodium cooled reactors to evaluate their performance, dependability, and reliability. I tested level, temperature, and leak detection sensors, made mostly in the US, but some from Germany and possibly a few others countries as well. Before I went to work for Rocketdyne and Atomics International, I had worked for an electrical heating company in the Pittsburgh, PA area. Due to my electrical heater experience, I specified the types of heaters to be used, approved drawings, purchased heaters, and ensured the heaters were installed correctly on various tanks and lines. I was the resident expert on electrical, tubular heaters, but my primary responsibility was in testing sensors to evaluate how well they performed under different working conditions. I worked on small projects helping others with heaters or liquid level sensor devices. I also wrote reports on heaters and liquid level measuring systems and provided them to DOE.

I worked in an engineering building; really, it was a group of trailers across the street from the Instrumentation Lab. Later they built a more permanent engineering building adjacent to the trailers and I moved into that building. I also worked in Building 104, which is where I think most of my work was conducted; there were sodium tanks in that building for us to use for our testing.

I did not work with radiological materials, nor did I wear a film badge.

I did not handle any hazardous materials. I did not work around any hazardous materials unless you count sodium. I never handled sodium but I worked around it. I never had to wear any protective clothing for my work. I did not knowingly work around anything that I considered hazardous to me personally.

I know of an area where they had a reactor that had some sort of meltdown and they closed it and put asphalt over top of it, but that was prior to my time on the hill and was all gone by the time I worked up there. I was not aware of any radiological spills or leaks while I worked up there. I do not know of any chemical leaks or spills up there that would be hazardous to people either.

There was a chemical laboratory – but I rarely went in that building. I believe it was the general practice to put hazardous materials into 55-gallon drums that were eventually shipped off site. Since I did not do that myself, I am just telling you what I was aware of. They were very careful up there. They had very strict procedures as to how things were done, such as with the handling of liquid sodium. It was pretty rare circumstance that anything went wrong.

I did not need much training for what I did at ETEC as I had a lot of experience from prior positions. My supervisor did make sure I understood the correct procedures for everything, but I did not need any special training. We got on the job training for how to follow the procedures.

A typical experiment would involve putting liquid level sensors in a proper position in a tank. In Building 104 for example, we would raise and lower the level of sodium in the tank and see if the sensor responded properly. We would test the sensors under different temperatures to see if that affected performance. We would test the performance and reliability of the various sensors and then write a report of the test results.

We obtained a lot of data, and gave that data to DOE in the form of reports. The original report went into the DOE library that was north of the administrative building for ETEC. Three women worked there. One copy was in the library, one copy we kept in our building, and one copy went to DOE. The results were not sensitive, we were just reporting on how the instruments performed, so we did not control the distribution of the reports. I do not know what DOE did with the copies of the reports once we gave them to them.

Once or twice a year, someone from DOE-HQ in Washington, D.C. would come up to check on what and how we were doing. I would demonstrate how I tested the various sensors and heaters.

Virtually everything we did at ETEC had a purpose.

We tested the sensors to see if they operated properly. We tested to make sure they detected leaks. We created leaks on purpose to see if the sensors would detect the leaks. We wanted to know if the sensors were working properly. We detected leaks because we caused leaks – it was purposeful to test the sensors.

I would recommend that you talk to others that worked at ETEC during this same time period. The others may not have responded to the opportunity to be interviewed since it came in the form of a letter. It might be better to give these other workers a telephone call; it may result in a more positive response! (Names of a few other engineers were provided.)

There was one building at ETEC that had a fence around it and barbed wire on top. They reprocessed fuel rods or something, but I never went near that building I just saw it as I went on my daily noon time walks to the water tower to get some exercise. It was the only building considered to be dangerous that I knew of. I did walk by the sodium burn pit now and then. Occasionally, there would be a dead animal in the pond. The sodium burn pit was a pond –sodium ignites when it comes into contact with water. They would put items that had been contaminated with sodium in there to burn the sodium off. It was a controlled situation when they did it. I did not observe it; in fact, I think it happened pretty rarely. It was not a pretty place.

I worked in Building 104, the instrumentation lab, where my primary work occurred. I went into most of the buildings at ETEC because I had associations of various kinds with different experiments going on, but I was never in a place where hazardous chemicals were being handled that I knew of.

There had to be some leach fields or septic tanks on site. I do not know where water went. The water on site was not potable. We drank bottled water in all of the buildings.

I know about the old conservation yard. It had mostly metallic junk, stuff that was no longer needed. I would go there to see if there was anything I could use – like tanks or

pipng – to save money. They encouraged us to check there before we ordered anything new. There were occasional items that could be reused for other experiments.

There was a large fuel tank, I think it has been removed, that was full of oil that they used for experiments. An oil line connected the tank to one of the buildings.

There were various types of sodium tanks at ETEC. They were aboveground, as they had to be heated and insulated. They had trays under them to capture any leaks. Of course, there were sensors to detect any leaks as well. They had trays under them just in case. There were a lot of safeguards to prevent sodium leaks in place by the time I worked up there.

Air contaminates sodium. They did not want to contaminate the sodium. Leaks were not good.

Of course, we caused leaks so we could observe the results. We wanted to see if we could cause a fire or an explosion. The leaks were purposeful. We made them for experimental purposes. They were purposeful leaks.

You may be aware that there is a corner of the San Fernando Valley where an unusually high number of people have been diagnosed with cancer. My ex-wife claimed that she had cancer caused by exposures she received as a result of working up at SSFL. I was tested annually after I worked up there. Now that I am no longer working up there, I am not tested. I try to pay attention to what is going on at ETEC with the cancer cases so I can determine whether I should be concerned.

I am amazed at the reported costs of cleanup at SSFL. I am afraid it is a bit of over-kill. It is hard to believe there is sufficient contamination up there to require all the cleanup going on. I do not know how they can spend so much money to clean that place up.

I am concerned that they will never get it cleaned up to everyone's satisfaction. I pay taxes and the money being spent on this clean up does not seem justified.

To the best of my knowledge, no one purposefully caused any contamination. While I still worked up there, they would bring a trailer on site every so often and I participated in voluntary medical testing, with tests such as breathing into a tube to test our lung capacity or blood tests. We would only hear about results if the results were out of the normal range. I was told that I tested fine.

Interview 254

I worked for Atomics International (AI), Rocketdyne, and Boeing at the SSFL from 1957 to 1989 for a total of 32 years. I had worked in almost every building on the hill by the time I retired. I was a mechanic, an MTS3, and then the Engineer in Charge (EIC) at the RMDF.

I first handled radioactive material in about 1965 when I worked in Building 5. We had been doing heat transfer studies with loops using non-radioactive materials. Then we received radiologically-contaminated organic material for use in our loops in Building 5. That was my first encounter with radioactive material.

I received schooling and training on how to handle radioactive materials and what we were expected to do before we did anything. By that time, the AEC was coming up with all sorts of rules so we could protect ourselves and the company. I was under the impression that before 1965 safety had been much more lax. But by the time I was involved in handling radiological materials, the AEC had established some guidelines for safety. For my entire time at the site, I was always under the eyes of an HP (health physicist).

I worked for Rocketdyne from 1957 to 1960. In 1960, they laid off 10,000 people and I was one of them. I had worked for one of the Von Braun engineers who had come over from Germany. He and I were friends and he helped me get a job at AI in 1960. My initial years at AI were spent working on heat transfer studies with loops. At first we worked with organics and not radioactive material. We would go into a room full of pipes and cover them with asbestos. The asbestos would be thicker than all get out. We didn't know at the time that asbestos would later turn out to be a hazard. That was one of the health and safety changes that occurred during my time at SSFL.

During my days at Rocketdyne, we used lots of trichloroethylene and acetone to clean engine parts and didn't worry about where it went. We used every kind of chemical known to man at Rocketdyne. I was a crew chief in gas generation at CTL-2. We would stand on a grated platform about 10 feet from the ground and use chemicals to clean the rocket engines. All the chemicals would drain down from the test stand into a holding pool of water located below the grates we were working on. The pool would drain to holdup ponds outside the buildings. The fire department would then come along about once a month and set the ponds on fire to burn any chemicals off.

Over time the safety got more stringent and we had more training. We eventually started catching any chemical runoff and putting it in barrels. A group was created to handle waste at the site. There was an evolution of safety in my 30+ years at the site on both the Rocketdyne and AI side.

When I first started working with radiological material in Building 5 we had safety procedures to follow. We had to dress appropriately and we had to protect the area we were working in by controlling access. You had to clean the area when you were done and put radioactive waste in RA (radioactive) disposal containers. The door going into the lab had radioactive stickers to let everyone know that it was a radioactive lab.

Dressing appropriately for radioactive work in Building 5 included shoe covers, coveralls, a soft hat or head gear, and a couple of pairs of gloves. I didn't have to wear

a respirator in Building 5. I always wore a film badge and dosimeter my entire time at AI. Those were standard issue at AI even before I worked with radiological material. I was told that I got the most radiation of anyone who worked at Rocketdyne. We were supposed to wear the film badges at work, but it was like our company badge and we got so used to it we put it on all the time. A few times I even wore it home.

The level of radiation was so low in Building 5 that time limits for exposure were not in place yet. Most of the contamination in Building 5 was alpha contamination so it wouldn't penetrate very far. I did have blood and urine samples collected at least once a year while working in Building 5. When I later moved to the Hot Lab, I was monitored monthly because I was working with more radioactive material. There was a monitor at the entrance of the radioactive lab room and you were expected to monitor yourself entering and leaving the lab. I don't remember if there was a building alarm for Building 5. The radiation levels were low in Building 5 and there were no reactors in the building. I never received any exposures in Building 5.

There were 13 reactors on the hill over the time I worked there. I didn't work in any of the reactors when they were operating, and I didn't handle radioactive material until the coolant went to Building 5.

I moved to Building 20, the Hot Lab, after my time in Building 5. That became my primary place of work. That was a high radiation lab and Building 20 did have a building alarm. You had to sign in and out of the building near the entrance. The health physics office was near the entrance as well and you would go there to get a film badge or dosimeter before leaving the lobby if you didn't already have one on. Building 20 had all kinds of barriers because there were different levels of radiation in the building. If you were in the operating gallery you didn't have to wear any protective clothing, unless you were handling something that could penetrate the walls. If you were on what we called the backside of the building, or the service gallery on this floor plan I have, you had to be fully dressed with coveralls, gloves, and boot covers. If you were "in cell" you had to add another set of coveralls and a respirator. The hot cells had 4-foot thick walls and radiological glass to keep the radiation in the cell. You also had to wear a respirator if the hot cells were being opened or if you were transferring radioactive waste.

When you came out of the hot cells, the first thing you would do would be to take off one layer of clothing in the decontamination room right outside the hot cell. That top layer would go in a container for disposal as radioactive waste. Then you would step into the hot change room and take off the second layer of clothing. The hot laundry was packaged and sent to the loading dock area and off to the hot laundry facility where the clothes would be cleaned and could then be reused. So when you had two layers of coveralls on to work "in cell" you would remove one layer in the decontamination room and then you would remove the second layer in the hot change room. Masks were also laundered and a "cold guy" would help you take off the mask and place it in a bag for laundry.

Once you were naked, you would go into the shower to rinse off. There was a monitoring device between the hot shower and the cold change area and you would have to check yourself. If anything was picked up on the monitor you had to go back to

the hot shower for another rinse to get any remaining radioactivity off of you. You didn't leave the hot shower room until the monitor said you were clean.

The operators that had to set up equipment in the hot cells wore lots of protective equipment and multiple layers of clothing and gloves because the hot cells were really hot and dirty. You always wore a respirator with supplied air in the hot cells. Depending on what you were working with, you may even wear three layers of coveralls in the hot cell. Sometimes if you were going "in cell" to clean the cell you would even wear raingear.

Safety rules became more strict as time passed. I had the feeling that before I was there safety was less stringent. During my time there, we had monthly unit meetings to keep up to date on safety and training issues. We took it very seriously.

We were mostly company people and we were there to invent things. Two or three people were just there to get a paycheck, but the rest of us looked forward to going to work. We worked for engineers, inventing new things for the nuclear industry because it was a brand new field. The engineers often had an idea in their minds of what they wanted their experiment to do and we would talk to them to see how we could develop the tools and equipment they needed for their experiment. Many of the young engineers didn't know the difference between a wrench and a screwdriver. The engineers got the projects and the money, but we were the ones that had the practical experience to help them develop their experiments. We looked forward to accomplishing things at work.

The Hot Lab had a hot storage room behind the hot cell. The guy who ran the place, BDE, was a strange duck. He used to be a piano player from Las Vegas, but he made sure the backside of the Hot Lab was run properly. Before he got to the Hot Lab, there wasn't a "dedicated backside man" at the Hot Lab. This was a problem because we found things that were too hot in the backside of the Hot Lab and they shouldn't have been there. He fixed that situation though. I don't think enough money was spent on waste management in the early days. We didn't have dedicated waste handling like we had later. This was another example of the evolution of safety. In hindsight, things should have been cleaner and we should have gotten rid of waste faster.

We had a hot storage and equipment room in the Hot Lab that would store things like a milling machine, drill press, or tools that we needed for operations in the hot cell. The work would change so we would need different tools, but they were all stored in the hot storage. Casks would come in through a door at the north side of the building, through the mock-up and assembly areas. In the case of fuel elements, it was because they were too long to enter the building any other way. The size of the material dictated where it went in the Hot Lab. Metallurgical work was done in Cell 1 because this involved the smallest pieces of fuel. I had to modify and build a machine that would cut out small pieces of fuel and cladding from a fuel element so we could actually work with it. Cell 4 held the largest pieces of hot material, often a section of the fuel rod. As fuel rods were dissected and smaller pieces were removed for examination they were moved into different cells. I remember cutting out small sections of the fuel elements from the SNAP 10 reactor for study in Cell 2. We looked at very small pieces of fuel; it was too hot to work in large quantities. It could make the lens of a microscope go black

from high levels of radiation. So we had to invent a system that allowed us to look at very small portions of the fuel. You didn't need a big piece of something to examine it in the metallurgical room.

Waste from the Hot Lab went into casks, which were essentially lead-lined barrels that were sized based on the quantity of waste and the radiation level. Casks were sent to the RMDF, now called the RMHF. We held the casks there until we could complete all the paperwork necessary to ship the waste off-site for burial.

I worked at the Hot Lab for many years on and off. Every time we had a slow period I got farmed out because I was an instrumentation guy. I could work with anyone on the hill.

When the SRE was finally shut down, they ripped all the instrumentation out and got rid of a lot of stuff. In 1975, they found some residual sodium in the reactor vessel. They asked me to go over to the SRE and figure out where and how to hook up the existing thermocouples and heaters. That was a really fun time. I became the lead man on that project and worked on dismantlement of the SRE. We needed to heat up the reactor vessel to melt the sodium to a liquid so it could be removed. Because they had ripped the old instrumentation out of the control room, I had to go find and install the instruments and figure out the electrical wiring for heating elements located on the outside of the reactor vessel. I had to find the correct heating elements on the vessel and their corresponding switches on the electric box with thousands of wires and make sure everything was connected properly. Once this was done we could heat the vessel to 230°F to melt the sodium. Just to be clear, we did not run the reactor. We just reconnected the heating elements on the outside of the reactor vessel to heat the sodium to its melting point so we could remove it.

Before we could even get to the reactor vessel though, we had to dig out the dirt around it because the reactor was buried in the ground. We removed the 4-foot thick magnetite concrete, which was a concrete with steel shavings in it that surrounded the reactor vessel. When I was working on SRE dismantlement I also had to deal with the "dip-leg tube." The "dip-leg tube" was a tube that went down 20 or 30 feet into the ground. It was located in a separate pipe gallery beside the reactor vessel. We found radiation at the bottom of that hole and it "gave me terrible fits getting that cleaned up." In fact, a piece of concrete fell on my head when I was working in that area. It is a good thing I had a hard hat on.

I worked on the dismantling the SRE from 1975 to 1980. Then in 1980, I was sent to the RMDF as the EIC. We started getting rid of a lot of things at that point because there was stuff stored everywhere. I worked at the RMDF from 1980 to my retirement.

As far as spills go, I only have first-hand knowledge of one spill at the Hot Lab, but I have heard of others. A holdup tank was located in the basement of the Hot Lab (Building 20), under the operating gallery, and it had a line that came out at the north end of the building to a transfer tank. A tanker from the RMDF would pump the radioactive water from the holdup tank and take it to the RMDF where it would be put in an evaporator and reduced to sludge before being disposed. One day either the hose broke or the tank outside the Hot Lab overflowed, I can't remember which exactly, during the transfer process and contaminated water spilled onto the asphalt. The

asphalt on the north end of the building became contaminated with the radioactive water. We spent quite a bit of time cleaning that up. We had to invent a super vacuum that used HEPA filters to clean up the contamination. We also used foam to help clean up. We kept cleaning until we brought the radiation down to acceptable levels. That is another safety issue that has changed over time – the acceptable level of contamination. What was acceptable then may not be acceptable now. I'm sure that incident was written up in an incident report.

I also heard that the asphalt behind the loading dock on the west side of Hot Lab was a spill. I heard later that they dug down about 10 feet to make sure they removed all the contaminated dirt. That was after I had left though.

Additionally, there was a driveway along the east side of the Hot Lab. At the northeast corner there was a 10-foot high bank. Before the days of chemical containment, chemicals from the shop area of the Hot Lab, such as trichlor, acetone, or paint thinner, were dumped on the ground down this bank.

When I worked at the RMDF, everything that came in there was already packaged. Depending on exactly how it was packaged and what level of radiological contamination it had, we either had to repackage it, clean it further, or just complete the final necessary paperwork. Some waste at the RMDF came from DeSoto, but most of it was from SSFL. The level of radioactivity also dictated where the material was stored at the facility. There were different areas specified for each level of radioactivity. Highly radioactive fuel that came to the RMDF was stored in the RMDF Vault. The vault contained cells designed to hold fuel elements. A 50-ton crane would lower a cask that contained four or five fuel elements onto the vault floor. Another manipulator would then transfer one fuel rod and place it in one vault cell that was then topped with a plug. The cask would move to the next vault cell and lower the next fuel element in so that each fuel element was stored in its own cell. The RMDF stored waste, but it also stored items that were waiting examination in the Hot Cell. So some material was stored at RMDF until it could be examined at the Hot Lab, and then when it was done at the Hot Lab it would come back to the RMDF and await final off-site disposal.

We stored all kinds of chemicals at the RMDF and I don't think we did a good job managing the chemicals in the beginning. Eventually as safety regulations changed, they decided it wasn't a good idea to have all those chemicals sitting around so we started getting rid of the chemicals. We also started using chemicals much more sparingly. We also stored a lot of radioactive tools and equipment at the RMDF that had been used at other facilities.

At one time they washed towels at the RMDF. This was not hot laundry. The washing facility wasn't that good and by the time I got to the RMDF, they had gotten rid of it. But we still had 10-20 barrels of soap left over from the laundry facility. Eventually they asked us why we were keeping them around and we got rid of them.

The RMDF had some spills over the years. There was a spill into the leach field that happened before my time. I only learned about it because we had a big program, with a big budget, to clean up the leach field. It was going on while I was at the RMDF, but I wasn't directly involved in the clean up at the leach field itself. The people working on

the cleanup had to be fully dressed in protective clothing that was supplied by the RMDF.

If something occurred that was unplanned we would call RST first. He was the manager at Building 20 and then became the manager at SRE and RMDF. Everything went through RST no matter what it was. We would also call CEF or an HP if they hadn't been called first. After making the phone calls to the appropriate people, you would all work together to determine how to deal with the unplanned event.

The film badges measured your accumulated daily exposures and they had to be processed. Our film badges were given to HP once a month so they could be sent to Chicago for processing. HP would keep track of your lifetime exposure. A dosimeter measured your minute by minute exposure and could give you immediate feedback. We were only allowed to be exposed to 120 mR a week and 5 R a year when I was there. If one of your two dosimeters pegged for any reason (even if you suspected it was inaccurate) you had to leave the area immediately. The 5 R a year exposure limit was a North American limit. I think the government limit was 20 R, but North American set higher safety standards than the government.

Going back to the Hot Lab, anytime you worked in a hot cell you had to wear two new film badges. You would take off your monthly film badge and put it in your locker and then sign out two new film badges from HP. Then when you got to the backside of the Hot Lab you would put on your two new film badges and a dosimeter before going into the hot cell. The reason for this was that you knew you were going into a very hot area and they wanted to separate out that daily exposure in a hot area from the monthly exposure where you may be working in a variety of different areas. HP would add the hot cell exposures to the monthly exposures so they still kept track of lifetime exposures; they just kept the records separately.

There was absolutely no on-site disposal of radiological waste to my knowledge. I mentioned the spill at Building 20 from the transfer tank overflowing, the leach field spill at RMDF, and the "dip-leg tube" at SRE.

Originally we were supposed to save the SRE building. It was going to be used as a building for the Saturn rocket. We did a lot of work to clean up the SRE building over the years and it was really disappointing to me when the decision was made that the building would never be used again. It was sad to see it demolished. That happened to a number of buildings. We cleaned them up for reuse, but they were not used and eventually demolished.

As far as chemical handling went, we didn't contain anything when I worked at Rocketdyne in the late 1950s. It wasn't until the 1960s when I was at AI that I think we started looking at containment of chemical waste. I don't remember exactly when we initiated chemical containment at Building 20, but it came through training sessions from the Health and Safety Department.

I had a couple of jobs that involved searching through junk that was deposited in canyons. Debris, deemed to be clean at the time, had been disposed in the canyons and when we learned about the hazards of asbestos I had the job of searching through

the debris piles to get the asbestos out. This occurred when I worked at RMDF when I was heading up D&D teams.

At some point, Rocketdyne outlawed the use of Trichlor. I don't remember exactly when. When that happened, our chemical standards at AI changed as well. Where we used to have Trichlor delivered to us in 50 gallon drums, our delivery dropped down to 2-liter jugs. We still used it, but much more sparingly. The safety rules evolved, but so did the chemicals. New cleaning chemicals were being invented. The chemicals were just getting more volatile and more dangerous. At AI, we wanted anything associated with the reactors to be clean and dry. We didn't want there to be any oil that would hold contamination. But at Rocketdyne, cleaning involved making sure there was nothing left on equipment that would react to oxygen. So while cleaning was important to both sides, there were different purposes for cleaning.

After about 1980, I know that TCE was found in the groundwater under the reactor in Building 59. One of my jobs was to set up the sump pumps to capture the groundwater. Normally, there was an automatic pump that continuously pumped the groundwater from the reactor building. The water would go to a holdup pond where it would be monitored for radiation and if there was no radiation it would go to another pond before being released. Once TCE was found to be dangerous, we had a program to catch it. Early on, we pumped TCE-contaminated water into a tank and hooked an air compressor to the tank to help evaporate the TCE. After a week or two, chemists would test the water to see if it was safe to release. That doesn't seem like such a good idea, looking back on it now. Now, they filter the TCE-contaminated water instead of evaporating it. We didn't get rid of the TCE – we just released it into the air instead of onto the ground.

Every building had chemical storage lockers located outside of the building. They were fire safe lockers and were marked for the specific type of chemical that could be stored in them. There were special cabinets for each type of chemical. We also had catch barrels that stored the used chemical material. Rocketdyne eventually created a waste management unit that was responsible for picking up the used chemicals and take care of them properly. Since they were the bigger organization they had more capacity and they could pick up chemical waste throughout the entire site.

I don't recall any unplanned events or on-site disposal that dealt with chemicals. Chemicals weren't my focus though. I am not sure when the fire department stopped burning chemicals off the ponds.

We had a lot of company policies and procedures, including large books of information. We had monthly meetings where pertinent information to our operation was passed on. In Building 20, RST had a young engineer who was in charge of policies and procedures for his facilities. RST would make sure we were doing things properly. The policies changed continuously. Rockwell/Rocketdyne was adamant about keeping current because they had to bid on government contracts and the contracts had a lot of procedural requirements. People were generally good about following the rules. Some of us may have been reluctant to implement new rules, but generally, everyone followed the procedures. I'm sure CEF, our head HP, would cringe if he heard my name. He didn't always think I was doing everything I could. One of the toughest things for me

was to quit smoking. I finally was able to do it when they told me our health insurance premium would double if I kept smoking. That gave me the motivation I needed; it was hard though.

Training depended on the job. There were certain health and safety courses that everyone had to take, such as how to dress and wear masks properly, how to read and understand signs and sirens, or how to properly climb ladders with a SCUBA tank on. Everyone was indoctrinated. Then specific jobs may require specific additional training. Due to safety rules becoming more stringent, we had to be trained in the use of SCUBA gear. We had to demonstrate that we knew how to operate the gear properly and we even had to be able to climb a ladder wearing it. We had to be recertified every year in some of the required skills. We would also have health and safety meetings to be advised of new or changing rules or procedures. There were also some specific rules for radiation workers, such as men couldn't wear beards.

I don't recall any contamination being buried on the site. The debris disposed of in the canyons was deemed clean at the time. I think it was buried as landfill material. Once we learned about asbestos, we went back to dig any of the asbestos out of the debris. This was in the early to mid 1980s. I think the debris may have been disposed in the canyon near the Burn Pit.

We would document what we did in weekly highlight reports that we had to give to RST, our unit manager. It was a written report of what we did in the week. It would be published and he would send it to his manager, DFG. I didn't have to keep any log books for my work, but EGH kept the best log books. He kept them because he had a higher classification than I did and that was part of his job. In all my time at AI, everything was documented! It was part of the culture to document everything. It is possible that some people didn't document things before my time, but I don't know for sure.

I don't know of any liquids being disposed of in toilets. The drains in Building 20 all went to a holdup tank in the basement. The holdup tank drain was kept full of water to prevent backflow. The only things that weren't connected to the holdup tank were the bathroom drains and they were connected to the sewer system, but I don't recall any liquids being disposed in the toilets.

The Sodium Burn Pit was not the best place, in fact, it was a bad place. It was not supervised as it should have been. Everybody at AI used it for cleaning chemicals. It was a big pool and you would take sodium contaminated things to the pit. Generally people dropped stuff in the pond to clean the sodium out, then fished the items back out of the pond, and finally left the items outside the pond area on the ground. Eventually they authorized a salvage operator to come up and haul the material away. The Sodium Burn Pit was out in "left overshoe." The HPs monitored it constantly. There was a lot of stuff that was taken there. There was one strange incident I remember about the Sodium Burn Pit. One day there were a bunch of generals in the area and a guy had a bunch of glass balls full of sodium. He was standing on a rock and throwing the balls into the Burn Pit and letting them explode. He was suggesting to the generals they could be hand grenades for use at the rice paddies in Vietnam.

In 1984 or 1985, the Sodium Burn Pit was drained and radiation was found. They had to let the pond dry out for a while. FHI was working on cleaning and digging out the Burn Pit. He would know about cleanup there. We had worked together at the "fart factory." That's what we called Building 5 because there was sulfur dioxide (SO₂) involved in the coal gasification process. One interesting thing that was also done in Building 5 was the grinding up of old x-rays from World War II. The x-rays were ground up and reacted with salt to extract silver from the x-ray. They could get about 99.9% pure silver back from the x-rays.

I am not sure about a surface disposal area. This might have been an area where contractors took construction materials and debris from building demolition or it could be an area where asphalt and soil were piled up for monitoring. I don't have any other information about leach fields, septic tanks, or drainages other than what I have already told you. Everything went to holding ponds and the HPs would monitor the ponds.

In 1977 or 1978 we had a lot of rain and the holdup ponds were overflowing. I would get a phone call in the middle of the night that a pond alarm was going off. This meant the water level of the pond was getting too high. I would have to go up to the hill in the middle of the night and we had to catch any excess water from the holding pond. We would use whatever we had to catch and manage the excess water, including those plastic swimming pools for kids, 55-gallon drums, and pumps. We had to catch everything because the HPs had to monitor it to see if it was clean. Even though it was presumably clean, it was rain from the sky, the fact that it fell in areas where radiological or chemical material was used meant we had to monitor the water. If it was clean it could go to the Rocketdyne holdup pond.

A picture I have shows how careful we had to be at SRE when we were dismantling it. We had to set up tents in the building to seal off areas we were working in and contain any air contamination. The men working to jackhammer concrete or other material worked under the tents to keep any contamination from becoming airborne and they had to wear full respirators. We did not "jack the building up" and lay it back down. We dug under the building and systematically dismantled it.

There were three areas where water would pool at the bottom of the SRE when we were dismantling it and we had to put pumps in those pools to take the water to the SRE pond. We had alarms go off there when the pond got too full.

The RMDF had a 10,000 to 20,000 gallon holdup pond down to the west, past Building 75. That pond had alarms and radiation monitors on it. During the rains, we had to store all the excess water in 55-gallon drums so the HPs could monitor it. We had a lot of drums that had to be stored in an outdoor storage area at the RMDF complex so they could be verified as clean before being released. One whole parking lot was full of drums of rainwater.

The Old Conservation Yard was a favorite place to get recycled equipment. We would go there to get equipment or materials for building things. We could reuse parts left there and we were encouraged to do so.

I don't recall any gas holdup tanks. All radioactive facilities had HEPA filters that filtered the air and gases.

I can't think of any other issues with pumps, sumps, tanks, piping, or drainages other than what I have already told you. There was a sewer pump located north of the Box Shop that went bad one night and all the buildings on that line got backed up. Maintenance crews fixed it in the middle of the night.

I was told I received the most radiation of anyone working up there. In those days, we were allowed a lifetime exposure of 100 R and one HP told me I had been exposed to 85 R, the highest of any employee. The company doctor would always monitor us and document everything. When I left the company I had to get a family doctor and I made sure to tell the family doctor about my work history. I have never had any health problems that I attribute to my work on the hill. I did receive an extra large dose one time "in cell" at the Hot Lab and I couldn't go back in there for a while. I was in a lot of radiation fields with the kind of work I did and I would get high doses of radiation. Another thing that changed over time was they changed the dose rate to sieves or sieverts. When I retired, I got a document that told me I received a lifetime radiation dose of 38 sieves.

I had a wonderful time working at SSFL. Every day was new and exciting. I worked in every building up there. We had a lunchroom in the middle of the shop in Building 20 and we would play cards and ping pong during our lunch hour. There was a lunchroom in the RMDF as well. The lunchrooms were always isolated from any radioactivity. We would also see a lot of wildlife up on the hill, including mountain lions and bobcats. Mornings I was at the SRE we would see mountain lions on the rock outcropping above the building. I really had a fun time working there.

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I worked for Atomics International from 1967 to 1985 as an atomic reactor inspector and certified x-ray technician. I also conducted helium leak tests and magnaflux non-destructive tests. I worked in a number of buildings, but never went into a building unless I had a reason to be there. I have a few concerns about the Santa Susana Field Laboratory.

One of my concerns is with Building 4059, which was a reactor building. I know they took sand that was discovered to be contaminated out of the pit. I don't know what else they have done since then. I heard the building was torn down. Building 4059 was the last reactor that went in and the reason I know that is because I was the inspector when the fuel rods were placed in the vessel. That reactor ran about a year and then they took everything out.

I am also concerned about the large pit that had been dug out for another reactor or test site that was located between Building 4059 and Building 4626. The pit was out in the field a little ways from the road that comes down past Building 4059 and 4626. I have seen the overhead pictures of it. I think it has been filled. They were filling it when I left with miscellaneous dirt and concrete, but the fill material was not radioactive or anything like that.

I worked in Building 4005 and we made fuel rods for a reactor. That building has been cleaned up and used for other purposes since then. I don't think there were any problems in Building 4005. We didn't manufacture a lot of fuel up there.

Building 4022 was used to store radioactive material. It had a storage facility in the floor and you would take the cap off and put a fuel rod down there. They monitored that pretty close. I don't know how much fuel was stored in the building, because I only went to the building to magnaflux the hooks on the cranes. I don't know anything about 4022 other than it had a fuel rod storage area. I don't know exactly what Building 4021 contained, but I suspect it had some radioactive material also.

Building 4012 was a reactor building that had some radiation in it at one time. It was cleaned up and we used it for an x-ray lab in later years when I was an x-ray technician. The walls in Building 4012 were 3 feet thick. If I was going to be x-raying in Building 4012 with cobalt or a 350 KV x-ray machine, I had to call security first so they would adjust the radiation monitors that were across the road and down the hill. Even with 3-foot thick walls, without that adjustment, alarms would go off in nearby facilities when I was x-raying. They could adjust the monitors so that they were not as sensitive as they normally were for the duration of my x-ray work.

Building 4021 and 4022 had outside drainage systems, most likely for handling rainwater. They did not expect the water to have radioactivity, but they monitored those systems just in case.

I know that everything was removed from SRE, the building was jacked up and everything below ground level was removed. I never saw anything in the sublevel basement until they started tearing it out. Everything was removed, including surrounding dirt. The dirt was packaged in boxes and shipped to a radioactive disposal site in Idaho or Nevada. I used to sign the shipping forms when they shipped that stuff

out in the mid 1980s. I remember signing the form, but not where it was being shipped to,

The only time I handled any amount of radiological material was when I worked in Building 4005. Not a lot of us actually handled radiological materials. I didn't handle radiological fuel rods that went into reactor in Building 4059, but I was there and they were taking numbers off them and I was recording them.

There wasn't a lot of handling of radioactive materials as far as our group was concerned. I was in Building 4005 and working out of Building 4011 at that time for Atomics International, but there wasn't a lot of radioactive materials handling in those buildings. In ETEC, we didn't handle radioactive material other than a cobalt source and iridium source in the x-ray lab. There was another building up there that I was in one time that had a reactor in a vat of water. The building was used for neutron radiography, but I went in the building to magnaflux the hooks. I assume that building is long gone.

As I mentioned earlier, they took the reactor out of Building 4059 years ago and then they set that building up for other tests at that time. Even though Health & Safety said Building 4059 was a safe building to be in, I went in with my own equipment, including a Geiger counter, and walked that whole building to make sure it was safe. I did my own checking to verify that Health & Safety was right. When we were working in Building 4059, we wore rubber gloves, and in some cases booties and coveralls. When you come out of the work area you removed clothing or anything else that had become contaminated and put it into a separate container for disposal as radioactive material. So they took pretty good care up there.

Anything radiological was shipped off the site to a burial ground in either Idaho or Nevada. I am not aware of anything being buried on site.

I heard of something not going as planned at the SRE, but this was before I went to work on the hill. I heard that they had a holding tank for lightly radioactive liquids and it overflowed, drained into a gully, and Health & Safety was out there picking up radioactive material with table spoons. That's how little radioactivity was spilled; they could clean it up with spoons. It was a small spill that was removed with very small equipment. I was told that it was completely cleaned up.

I have had people in Simi Valley tell me that there has been radioactive material that has come down a wash from the hill and drained all the way to Royal Avenue, but I find that hard to believe. We were pretty safety conscious up there. By the time I started working on the hill in 1967 people were a lot more conscious of contamination than they had been years before. I can't vouch for anything that happened up there prior to the time I got up there, but I would not be afraid to go up there and set my motor home up and camp out.

The only incident I can tell you from SRE other than the minor spill from the overflowing holdup tank was when they cut the vessel out and removed it. They put it on a flatbed truck and were taking it off site, possibly to Idaho. They got down off the hill and before they got to Topanga Boulevard, the flat bed collapsed. I was not at the scene, but I was working on the hill at the time. They had a crane in there within minutes, loaded the

material on another flatbed, and took it back up on the hill. They strapped it down securely and left it in Building 4022 overnight, and then hauled the vessel off site again the following day. There was no radioactive spill from it, but in the vessel was radioactive material. There was no contamination down there that I am aware of because they had Health & Safety down there real quick.

I am familiar with the Burn Pit near the Building 4886 area and don't think this area was used as it should have been. It has been cleaned up. I was never out there, but I know they took piping out there with sodium in it. They had a pit of water and to clean the piping out they would dump the pipe into the water and of course water and sodium don't mix.

As far as monitoring worker exposure to radiological material, I understand from others that in areas like the SRE people could suit up and go into the heavily radioactive areas and work for about 20 minutes and then they had to come out and another crew would go in. This was the case when the SRE building was being modified after the reactor had run for a while. And that was the way it was handled when there were any highly radioactive areas. That was before I got up on the hill though. At this point it is all hearsay, but I feel there was some other place where cleanup of radiation occurred and people could only go in for a short time. They also wore badges, film badges and dosimeters.

When I went out in certain areas I wore a film badge, a dosimeter, and in some cases two dosimeters because occasionally one would go off scale. If one went off scale it was not always clear if it was accurate because badges could be defective or it was possible to bump one and set it off. If you wore two badges and one picked up something, but the other didn't you knew you were probably okay. The only time I went into areas where I had to wear the badges was when I was x-raying.

We had a couple of mishaps up there with an x-ray technician that wasn't paying attention. An example occurred in Building 4032. I was in Buildings 4036 and 4037, which served as office areas near Building 4032. A guy was x-raying in Building 4032 with a cobalt source and I was up there to make sure the people in the office were in a safe area because cobalt splatters all over and can go through 7 inches of steel and 1 inch of lead. I noticed the radioactivity went up as the x-ray technician was running the pill back into the "pig," as we called it. The pill went up and never came down. The technician tried to lock the source up in the pig, but it was still hanging out of the pig a little bit. So the technician got exposed to a little bit of radiation. That was what I called clean radiation. It didn't emit anything that would be harmful for you to breathe, but it sure could kill you if you got too close to it.

I am not really aware of any other spills or disposal, other than the SRE holdup tank overflowing.

The only other building I was in on occasion was Building 4020. That was the Hot Lab. I never heard of any spills in there, but when I was in there you had to wear a film badge and a dosimeter. They remotely handled radioactive equipment in the Hot Lab. The operators looked through windows that were essentially two panes of thick glass, separated 30 inches apart, filled with clear oil between the glass panes. I understand that they would pull some fuel rods in there and use remote handlers to put them in a

lathe, remove the cladding from the fuel rods, and reclaim the fuel. I wasn't in there for that purpose. I went in there to helium leak test some things they were making up, little radioactive materials they were making up for the space program. I remember running some helium leak tests on little bolts about 1/4 to 1/8 inch in diameter and 1.5 inches long that they had drilled holes in the end of and put a piece of radioactive wire into it before welding it closed. Those bolts went into something destined for outer space.

Building 4010 was a reactor building. The reactor was removed and everything was cleaned up before I left in 1986. We used the control room of Building 10 as an office for our department.

At one time in Building 10 there were caskets of fuel rods that were already made up to go into either the SRE or the Hallam, Nebraska reactor. We used to go check the inert gas in the caskets to make sure it was acceptable. I remember the fuel was removed, but I don't know where it disposed.

I am still concerned about Building 4059. It might be a good idea to put in some wells around it and close to it and make sure there is no contaminated groundwater around that building because the reactor was in the basement and they had a 5-foot diameter tube that went from the reactor vessel to a huge diffusion pump packed in dry sand. The pump was used to prevent water from filling the cavity. The pump went bad and the cavity filled up with water. The water may have become radioactive at that time. It wasn't what I called dirty radiation, but the water and/or cavity probably became radioactive. That's the place I'm concerned with. If it's been cleaned up and a report has been written on it then fine. You would have to go down at least 40 feet to see if there was any groundwater contamination because the basement was 32 foot deep and this was below that. The Building 4059 radioactive water could have possibly drained down into Simi Valley and could be the reason people are saying there is some contamination down as far as Royal Street in Simi Valley. It might be worth looking into.

As far as hazardous chemicals, I handled acetone and some alcohol, but I don't know how they were disposed. It wasn't dumped on the ground, I know that, but I think there was some kind of container that they were put into and then disposed of properly. When I worked with hazardous chemicals they were handled reasonably well. I don't remember anything with hazardous chemicals occurring in a way that it wasn't supposed to. I am not aware of any spills of hazardous chemicals. Going back to Building 59, anything we used with radioactive materials, like contaminated gloves, booties, or coveralls, was disposed of in separate containers, other than a wastepaper basket. It was handled differently. I am not aware of where it was ultimately taken or disposed.

When we were manufacturing fuel in Building 4005, there were two or three times we had to evacuate the building because some of the monitor alarms went off. In Building 4059 when we were getting that reactor core ready to go into the vessel we had to scam the building two or three times because alarms went off, but there was no contamination. Once we put the fuel in the container, one person could get within 2 feet of container, but if more than one person got in and around there, they say that the reactor would flash and it would set off the monitors. I don't know whether it ever did. I was in the building when we had to leave, but Health & Safety came in to check it out

and clear the building. We were back in the building in 3 or 4 minutes. So, the radiation alarm went off, but I am not exactly sure why. There are a two ways the radiation alarm would have gone off. It could have been defective or it could have picked up radiation from a reactor flash. I know my film badges didn't pick up anything so it wasn't a flash on the reactor.

I'm sure there were company policies that dictated how we worked. The policy that irritated me the most was that they wouldn't let me drive my motorcycle between buildings with equipment strapped on the back. I used to ride a motorcycle to work and a lot of time we had transport equipment between buildings. People who drove their own cars to work were allowed to use their cars to transport equipment, but if I wanted to carry something on my motorcycle and drive between buildings, but they would stop me and make me walk. It was strictly a health and safety issue, you were not going to go up there and do anything that was going to put your life or limbs in jeopardy.

I'm sure that at one time there were rules or regulations that we had to read. I don't really remember that much about it. I think for the most part everyone did what they were supposed to and looked out for their safety and the safety of everybody else. We were pretty cautious up there. We all wanted to get off that hill alive and in good health. We had lead men and supervisors who oversaw our work and provided training. We had procedures that told us how we were expected to conduct our work. There were instructions and we pretty much followed them to the letter.

We kept quite a few log books and I also documented a lot of stuff with a camera. I took a lot of pictures for use in reports. Many of my pictures went back to Washington, D.C. for reports by other people. I had a color darkroom and had the capability of making a 16" x 20" color print. So I put out a lot of information that way. I believe my negatives all went down to the Atomics International DeSoto facility. There was a photo lab down there and I think all my negatives went there. I didn't ask to keep any of my photos. One print I wished I had that I was called in to take a photo of was a result of a test article in a sodium tank. We put a test article in a tank of sodium, pulled it out, cleaned it and wrapped it in plastic in the evening, unwrapped it the next morning, and immediately placed it back in the tank. We didn't check it again until it was pulled out four or five months later. A spider had gotten in there and created a web on the baffles at the top of the unit. The sodium vapors created droplets on the spider web and I photographed it. That was a neat photo that I wish I still had. I had been called to take photos because a heater used to keep the sodium piping hot burned out. I went in and photographed that to show the extent of the damage. This all occurred in Building 4032.

There probably were things that went on that were not documented, but I can't think of anything. I am not personally aware of anything that was not documented. If there was something that happened at ETEC (also known as LMEC) I was out there with a camera to document it. We built big sodium pumps in Building 4463 and then transferred them into a pump case in Building 4462. I was out there shooting as many as 70 pictures while they were lifting that pump and transferring it over. I was continually shooting pictures.

The only liquids that I am aware of being disposed down a toilet were photochemicals from my darkroom. They were really not hazardous. I had my hands in those chemicals all the time.

Some tanks were removed from the outside of the Building 4024 years ago and I understand that the tanks were potentially holding radioactive gases at one time. The tanks were pulled out and everything around the tanks was removed. If it was contaminated it was hauled off. The tanks were located between Building 4024 and 4027, just outside and to the east of the Building 4024. The only reason I am aware of the Building 4024 tank is that at that time our department was headquartered at Building 4027 and they came in and took out the 4024 tank while we were nearby in 4027. I didn't know what Building 4024 was used for originally, although I think it was for a reactor that went out into space. It's still up there. They may have built that reactor in Building 4024 or there was also another reactor that was built up, but never had fuel placed in it, so that reactor could have been in Building 4024 as well, I'm not sure. So, there was the possibility of radioactive material in the basement pit of Building 4024, but I was never down there. Building 4019 also had a pit in it, but I don't know what was there. The pits were lined with reinforced cement.

The only disposal area I am aware of is the Sodium Burn Pit. I am not aware of any surface disposal areas at the western edge of Area IV or of any leach fields, septic tanks, or drainage discharge locations. I am familiar with the Old Conservation Yard. We got surrounded by wildfire in Simi Valley at one time and I came up to work after the fire had gone through the valley. I saw that the fire had come up the hill. It didn't do any damage at the edge of the hill, but it jumped to the salvage yard as the Old Conservation Yard was also known, and it got hot enough that it fused stainless steel piping together. It takes over 2,000 degrees Fahrenheit to fuse stainless steel together. There were also some lead acid batteries in there, glass cases that were melted down, and some puddles of aluminum.

I am aware of the following tanks at the Santa Susana Field Laboratory: Building 4059 had a liquid nitrogen tank. There was a big day use tank for diesel fuel between Building 4011 and SCTI (Buildings 4355 and 4356). There was a big tank farm in either area E, F, or G on the map. It contained a 1.5 million gallon tank for diesel fuel.

I remember one time we went down to Building 4356, where the steam generator was located in SCTI, and I was going down in the pit to do some inspection. I got down to the bottom grating and the whole bottom floor, about 10 feet down, was full of water. The sump pump had quit working. There was a steam generator down there. The other sump pump break down was in Building 4059. Those are the only issues I am aware of relating to sump pumps.

I feel as though everything was cleaned up at SRE. SRE as it was originally built is not there anymore. As I noted before, everything below the main building at SRE was removed. The building was jacked up, and everything was taken out and cleaned. Fill dirt was brought in and they put down a new foundation, filled it with cement and the building was used as a storage facility when I was there. I don't know where the fill dirt came from. I don't know if they had an area that they dug out up on the hill or if it was hauled on from some other location. I know it was clean fill dirt.

As far as specific radionuclide sources, we built uranium fuel rods in Building 4005 for an off-site reactor. The building was cleaned up completely and used for other tests afterward, but I wasn't involved then because I had moved to ETEC/LMEC. I had a cobalt source and an iridium source for x-raying only. The cobalt source was 100 curies of cobalt and the depleted pig that the cobalt was in weighed 500 pounds. It was transported on a unit with two large rubber tires and a dolly wheel. It would read about 20 mr (milliroentgens) at the outside of the case, but it was not contaminating anything. It could kill you if you received a big enough exposure.

I can't say that the Santa Susana Field Lab was a bad place to work. If it had been, I wouldn't have stayed that long. I enjoyed what I was doing. I was privileged in some ways because I did a lot of photography for reports and spent a lot of time in the large darkroom I had in Building 4027. Even though I was self trained in color printing I managed to get it done. I think my specialty was helium leak testing for various areas. I was also an x-ray technician and we x-rayed welds of various things. I think the worst job I had was x-raying inside a gas-fired heater at SCTI. That was hard work. You had to go in and set up your equipment and your film, crawl out through a burner opening, run the iridium pill out, x-ray it, crawl back into the heater and make another set up to do it all over again. The worst of it was when I had to go underneath the heater and I'm a little claustrophobic. There was just room enough to squeeze through. It was a bit scary when thinking about what could happen if we had an earthquake and the unit collapsed.

I don't think it is necessary to re-evaluate SRE and spend a lot of time and money on it. The only thing I think might need to be done, and might already have been done, is put a test well down around Building 4059 and other than that I don't know of any problems up there. I don't have an ax to grind and am not trying to make trouble for anyone. I don't think it is necessary to go back and duplicate past clean-up efforts.

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I started at SSFL on January 23, 1962 as a senior engineer at the Shield Test Reactor. Later I worked at the SNAP Critical Facility. I travelled to other locations as part of my job, including the Idaho National Laboratory. There I worked on a reactor test in Test Area North called the SNAPTRAN-3 – we blew that reactor up on purpose. For AI, I managed work at several places in addition to SSFL. That was the only reactor we blew up on purpose.

I handled radioactive materials as part of my job. Mostly I handled fuel rods when we were putting them into reactors. They were clean and there was no concern about handling them. Generally, the reactors were supporting research. The experiments produced gamma rays and neutrons. We were testing how the reactor handled various situations and various shielding designs.

The fuel was generally stored at the facility where the reactor was located. If it was stored the way it was supposed to be, it posed no risks. We did things the way we were supposed to. Critical facility fuel was not radioactive, so we could handle it without any risk before, during, or after the testing. When fuel was removed from a reactor, it was stored temporarily in the same building, and then it was shipped out. Some went to Oak Ridge and some went to Idaho. Some of the SNAP cores are still at Oak Ridge. I know one guy did some work on some fuel that came from here; I saw that he used some of the calculations from my report in his work. He confirmed my calculations. They used some of our fuel in the Tower Shield Test Facility at Oak Ridge. Much of the fuel removed from the reactors here was not that radioactive. We would store the fuel in the water pools for a while, and then ship it somewhere else for reprocessing. We used fuel that was composed of a standard uranium-aluminum alloy.

In some cases, we decided what to do. No one had done it before, so we made up the rules and documented what we did. If there were paper pushers they could not tell us what to do because they did not know anything more than we did, probably much less. Today, it is more paper than work. But back then, we could figure out what was best without interference.

I think we had logbooks. I do not know what we did with them. You got me. There were retention rules. Five years, or ten years. We kept them as long as we were supposed to.

I did not handle many chemical materials. We did have some hot gases, some transient fuel tests. We handled all sorts of stuff. Mostly when we were working with something that was potentially dangerous, we worked with it under a hood. We were not crazy. We did not do anything stupid. We didn't put ourselves in any kind of danger. We had plain water drains and we had contaminated liquid drains. We did not put anything but water down the water drains.

Some of this is hard to remember. That was a lot of years ago. Aside from the reactor tests, I cannot really distinguish between some things I did up on the hill and what I did down in Canoga Park. But we did not pour anything in the toilet in my day.

Nothing unusual or out of the ordinary happened on my watch.

We always wore film badges and sometimes we had pencil dosimeters. The film badges recorded what we were exposed to, but they did not tell us anything. They were checked later by the health physicists. The pencil dosimeters would show the level of radiation. All the buildings were alarmed. If we didn't hear the alarm, we knew that we did not have anything to worry about. The film badge just tells you what you were exposed to. The dose that you got was the dose that you got. You could not undo that.

Later, when I worked for General Electric up in Vallecitos, a guy dropped a bit of plutonium on the floor. He bent down and picked it up. He nearly turned purple he held his breath so long. We used to joke about how he turned purple from holding his breath. Nothing like that ever happened near me at SSFL.

We wanted to do things safely. We were about safety, in spades.

I went to school for nine years before I went to work up at SSFL. I did summer jobs under people who were outstanding in the field at Oak Ridge and at Brookhaven. I was well trained by good people. I learned good habits before I got here.

It has been said, if you can do something, you do it. If you cannot do it, you teach. If you cannot teach, you do Quality Assurance (QA). There was not anything of consequence that wasn't documented. We might occasionally have something happen that had no health and safety consequence that we would not bother to record. The reactors were designed to shut down (or SCRAM) if something went wrong. Sometimes they were over-sensitive, and shut down too easily. It was a hassle to start them back up again. There were safety interlocks designed into the facility – that's the purpose of the instrumentation,

Occasionally we would have power hiccups. Everything was designed to fail-safe. It was a pain in the neck, but it was designed to be that way.

At the MIT reactor, the controls on our subcritical facility attached to the reactor were on a relay such that if a shutter was opened too fast the relay would trip and shut us down. There was no safety risk, just unneeded instrumentation. In this case, the instrumentation was overly sensitive and hindered our ability to get our work done. In those circumstances, we would purposely put a matchbook cover between the contacts of the relay to prevent the automatic shut down. This would allow us to operate and not shut down most of the time. This type of thing was probably not documented, but it was done. Back then, I would have no problem with this sort of thing because it helped me get my job done. There is no way you could do something like that today. You would have to go through a lot of paperwork to get rid of the useless relay.

I do not know anything about the sodium burn pit. I have heard that they shot barrels there. That was the way things were done. Sometimes it was important to let the pressure out of a barrel, to expose the contents to air. It would have been dangerous for a worker to open a barrel. The safest and easiest way to puncture a barrel was to shoot it. That was done all over the country in those days.

I have heard there were places to dispose of things on site. I wasn't a cleanup guy. I was a reactor guy. I do not know where those disposal sites were. I know we ran a clean facility.

I do not have any information on leach fields, septic tanks, drainage locations, sewer lines, storage tanks, and gas holdup tanks.

Most of what the community is worried about here is over-blown. I have no doubts that EPA will do a good job on the survey and that DOE will clean up whatever is found. I am confident of that. There have already been clean ups and my guess is that 90% of the contamination has already been cleaned up. The surveys will not find any smoking guns.

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I think most every site that I was involved with at Santa Susana Field Laboratory has probably already been cleaned up.

The first time I was on the hill was probably about 1956 on a visit. I started with Atomics International in 1954 at the Downey plant – actually it was called North American Aviation at the time.

I transferred up to the Liquid Metals Engineering Center in 1959. I was an engineer and I worked on the Kinetic Experiments for Water Boilers (KEWB). I designed a water boiler reactor. I had worked on a very similar reactor on a project in the 200 Area at Hanford before moving to California. The KEWB was underground. They eventually filled it in and put a cover on it. I assume it was cleaned up before it was filled in, although I have no knowledge that this was done.

I didn't have to wear a film badge in the beginning because we were just designing the facility. Film badges weren't necessary until the reactor went critical. The KEWB was the first reactor to go critical at SSFL, even before the Sodium Reactor Experiment. That was in about 1957. The SRE furnished power to the city of Moorpark for a little while. SRE was a lot bigger than the KEWB. I did not work on the SRE design.

I never handled any radioactive materials at SSFL. I handled radioactive materials at Hanford before I moved here, but I never handled any at SSFL.

KEWB was an experimental reactor. Once I had finished my job, contributing to the design of the reactor, I worked on other projects. My involvement was really only during design and construction. I wasn't involved once the reactors were operational.

I did work on other reactor designs, including two for Japan and one for Germany. I also worked on a small reactor for Denmark. I didn't go to any of those places. They shipped the reactor to Denmark after it had been constructed. Another engineer went to Denmark and supervised it until it went critical. I got my picture in Newsweek along with a Dane while I was working on the Danish facility. This was a similar reactor to the KEWB. They were built of metal parts, mostly steel parts.

They did have a lot of radioactive materials in the Hot Cell at LMEC – but I was not involved in that operation. I would visit once in a while, but I wasn't assigned there. The research done there was part of the Advanced Sodium Program, which was funded and monitored by Argonne National Laboratory.

I left the company in 1963. I went to work for Aerojet in Azusa, California. I supervised the radiation effects program. They had two reactors in Fort Worth, Texas. Aerojet eventually moved everyone to Sacramento. I still lived in Northridge, but I flew up to Sacramento on a daily basis. The program manager was out of Cleveland. The company had four private jets. They were large and could carry 40 passengers.

In 1965, I went back to Rockwell and worked at Downey and Compton on the Apollo program. I was recruited by Rockwell to work on ground support equipment (GSE) for the Apollo program.

In about 1970, I went back to Hanford to work on the Fast Flux Test Facility. That was a \$3 billion program. I was the systems manager, in charge of all of the sodium systems. Bechtel in S.F. designed that facility. We were the program managers. I was in charge of waste disposal, also. They built this facility out in the desert. The foundation was poured while we were still working on the design.

My first wife hated it there. We didn't want to live there. So, I went back to work for Atomics International at SSFL in 1972 and became involved in the sodium program. I worked directly for ILM. I was the program manager for the Advanced Sodium Components Test Program. A lot of my job was concerned with fiscal budgets. I was to make sure we spent money wisely.

I took courses in nuclear technology on my own, not through the company. I was a degreed engineer at 20. My degree was from the University of Washington.

At ETEC, I was not involved in handling radioactive materials or chemical materials. I had an office at ETEC formerly LMEC, not far from where the SNAP work was being done. That was JMN's program. Eventually he left the company and started his own company.

Every job up there was different. One time I was working at the Small Components Test Laboratory and I was supposed to document all the piping in that building. It was three or four stories high. We needed to have a full inventory of all the piping so we could have accurate drawings. Things were getting changed all the time. One time I stopped at the end of a day and I marked the pipe that I was at with a piece of black ribbon. When I got there the next day, the entire pipe had been re-routed.

I was involved in responding to a letter from DOE or AEC, whatever it was called at the time. CF Braun had been doing a design construct for the Large Component Test Facility. They had been working on it for seven years. They claimed they were 85% done. DOE got fed up with them. They asked if we could help get the building finished. I ended up writing a 13-page letter for ILM that described how we could get that facility finished. They liked the letter. They fired CF Braun and put me in charge. I used about 12 engineers to help me. We got in there and realized they were only 30% complete. We ended up completing the project in only a few months.

Any way, we finished it up. I had to supervise the electrical work in addition, even though I am not an electrical engineer. I finished the electrical design in about a month, and then we built it. The LCTF was built to test large pumps that were to be used in the future fast breeder reactors.

I don't know anything about any liquids being disposed down drains or in toilets. The company was pretty careful. Things were pretty lax at Hanford, but not at SSFL. LMEC was pretty good. Everyone wanted to do a professional job.

We used bottled water the whole time I worked up there. The tap water was never drinkable. It wasn't contaminated, but it didn't taste good. It was hard water.

I never went to the Sodium Burn Pit. I saw a movie of them throwing sodium in it, but I never witnessed that myself. It was just a big hole in the ground that contained water. In the movie it sounded pretty loud. Pure sodium is an excellent heat transfer medium. It is non-corrosive in pure form, but very corrosive as sodium oxide.

I don't know anything about any leach fields. I don't really know anything about on-site drainage. I think we outsourced a lot of design for the waste management work.

I don't know much about the old conservation yard. I t knew about it, but I didn't know where it was and I never went there. We may have gotten some materials from there for the KEWB, because we didn't have a lot of money when we were building that facility.

For the KEWB reactor, we had to order special state-of-the-art valves. They took 20 weeks before they were delivered. They came, and I told the contractor to take the internal seals out of the valves before welding them into place. He forgot to do that. The valves were ruined when he welded them into place. The valves leaked live a sieve. We would have to order them all over again. This incident would have set the project back 20 weeks. However, the contractor was able to get replacement valves in one week because he didn't have to go through the company process, which was inefficient.

The SSFL was one of the cleaner places I worked. It was above average.

I never knew very much about the SNAP program. That was JMN's area. I used to hear stories about some problems with that program. But in general, I think the SSFL was run pretty well.

By contrast, I remember they used to say at Hanford, if you needed to dispose of radioactive material, just take it out and bury it. That was not how things were done at SSFL.

It's too bad there is so much fear about SSFL. The residential community grew up around the place. They didn't make the same kind of mistakes that were made at other sites. I remember one time at Hanford they wanted to build another chemical reprocessing facility. Everything would be done in it by remote controlled robots. There was one in 200 East and one in 200 West, and they wanted to build another. They pulled out the old drawings; they were in a big hurry. They poured a foundation, an 5-foot thick concrete foundation, and then decided they didn't want it after all. Then they just covered it up and cancelled it. I am not aware if the project was ever re-started.

Atomics International was run originally by the physicists, not by engineers. Physicists figure out the science, and engineers figure out how to get it done. It is great to work around the physicists.

I also worked for Lawrence Laboratory for about four years. I worked at both locations; in Livermore for one year and at Berkeley for three years. I worked there after I worked at Hanford and before I went back to SSFL. I helped set up Livermore Lab. I worked for Dr. Teller. It was exciting. One time I was in a meeting room with three Nobel Prize winners. I felt privileged.

I was working for IJL prior to the SRE core meltdown. He wanted to increase the power of the reactor. I told him I thought it was a bad idea. He wanted me to take over the project even though I did not want the job. They announced that I was taking over that program, and then the accident happened before I started. They took a lot of pictures of the damage down in the tank of the SRE. They gave the slides to me. IJL told them to give the pictures to me, so they did.

I don't think there was a cover-up at SRE because after the accident I was asked to give a talk at the last minute. I asked IJL if I could talk about the accident and use the slides I had been given and he said I could. I thought I was going to talk to 20 people for about 30 minutes. They gave me the address and I had just enough time to get there. I arranged the slides on the way and drove to the place where I was to give the talk. Three guys came out and met me. They said we've been waiting for you; you should start in about two or three minutes.

I went inside. It was an annual meeting the East Coast Utilities. There were 1,500-2,000 people in the audience! I talked for over four hours! I talked for two hours, then we took a break, and then I answered questions for two more hours. I showed all the slides. That's not what I would call a cover-up. No one was trying to hide anything, especially not Atomics International or DOE.

I told the audience what I thought. Everyone was interested; they stayed the whole time. I didn't hang onto those slides. I gave them back to the library which contained thousands of reports. Atomics International had a weekly newspaper and they had stories of what was being done all over the site. Atomics International and Rocketdyne had very little to with each other back then.

I left the company in 1981 and took an early retirement. Right after I left Atomics International and Rocketdyne merged one company and Atomics International was a part of Rocketdyne.

Interview 300

On July 16, 2010, I was interviewed in my home about my experience between 1958 and 1968 at the Sodium Reactor Experiment (SRE). This statement is based on my recollections.

From mid 1958 until mid 1968, I worked for Atomics International (AI) at SRE. SRE was located at AI's Nuclear Field Laboratory in the Santa Susana Mountains. During that time, I was employed successively as Senior Reactor Engineer, Senior Physicist, Experimental Supervisor, and Operations Supervisor. As an engineer, physicist, and the Experimental Supervisor, I planned, performed, and led the reactor physics work necessary to understand the performance of the SRE. As Operations Supervisor, I was responsible for operation of the reactor plant 24 hours per day, seven days per week. While I was a nonsupervisory employee, my immediate superior was LNO. As operations supervisor I reported first to GHJ, later to OQR, and finally to MOP. While I was Operations Supervisor, the Shift Supervisors and the maintenance foreman, NPQ, reported to me. Prior to joining AI, LNO had worked at the Hanford Engineer Works (HEW). After leaving SRE as Assistant Group Leader, OQR was promoted to Superintendent of the Hallam Nuclear Power Facility (HNPF) and later returned as Group Leader of SRE.

Prior to working at SRE, I was among 200 technical graduates hired by General Electric Company to work as Engineering Assistants at HEW. HEW produced weapons grade plutonium. During the 1940s and 50s, information related to the production of fissionable material was very highly classified, and no nuclear energy curriculum existed at any university. To prepare us to work in the nuclear field, GE trained us formally in their own Nuclear Training Program. While working at H Reactor, I received a 0.5 roentgen equivalent mammal (rem) dose of radiation during a refueling incident. Because of the training program, I understood the risk involved. The acute lethal dose is 500 rem (5 sieverts or 5 sv). After my exposure, I was required to submit collected urine for 24 hours and to stay out of radiation work zones for two weeks. Analysis of my urine indicated no ingestion radioactive material. My career dose is approximately 3 rem. Safety was paramount at HEW and at AI. Later, I would find safety paramount at Atomic Energy Commission (AEC) and Nuclear Energy Commission (NRC).

After leaving GE and before joining AI, I was commissioned in the United States Navy and served as an engineering duty officer. Most of my experience was in new ship construction in two commercial shipyards. All the work was nonnuclear. During the two years that I was stationed at Avondale Marine Ways, four workers died in the yard.

At the time I was hired by AI, I was qualified for the job based on my experience at HEW. I did however receive additional training at AI in supervision and management.

I left AI after AEC decided in September 1967 to retire SRE. By mid 1968, SRE staff had dwindled from 70 people to a chief operator, a reactor mechanic, and myself. Although AI offered employment to me in the Space Nuclear Auxiliary Program (SNAP), I elected instead to join the staff of AEC's regulatory arm that later became the Nuclear Regulatory Commission (NRC). During my time at AEC/NRC, I visited many licensed commercial power plants but rarely entered a radiation field. However, on one occasion, at the Robinson 2 nuclear power plant, during a plant outage, I did enter a 5

rem per hour field in the end bell of one of the steam generators. The purpose of my entry was to increase my awareness of the work in progress and working conditions.

I am a Registered Nuclear Engineer in the State of California.

The SRE reactor was located beneath the floor of the high bay in Building 4143. All of the primary reactor cooling systems and part of the secondary cooling systems were also located beneath the floor. The reactor and cooling systems were in heavily shielded concrete vaults. The reactor vault was designed to be physically inaccessible to personnel entry. After decay of sodium-24 during plant outages, entry to the cooling vaults was safe and necessary for system maintenance.

Natural sodium is comprised of one isotope, sodium-23. In a reactor, sodium-23 absorbs neutrons to become sodium-24. This isotope is strongly radioactive, is a beta (electron) emitter and a gamma emitter, and has a 15-hour half-life.

Storage cells for fuel and moderator elements and wash cells for fuel elements were also located below the high bay floor.

The high bay accommodated two overhead bridge cranes, one of large capacity and the other of lesser capacity for auxiliary work. The heavy-duty crane was capable of lifting the concrete shield blocks covering the cooling vaults and the reactor loading face shield. It was also used to position the heavy lead-shielded fuel and moderator handling machines. These were necessary to transport irradiated fuel and moderator elements from the reactor to storage.

In addition to the high bay, Building 4143 contained the reactor control room, electrical equipment rooms, a hot cell, health physics laboratory, and most of the SRE staff offices.

Power was piped via the main primary and secondary cooling systems to the steam generator. The steam generator was the interface between the secondary cooling system and the feedwater/steam system that served the electrical turbine generator. Southern California Edison (SCE) owned and operated the water system, the turbine generator, and power lines connecting the generator to SCE's electrical distribution grid.

The main and auxiliary primary and secondary cooling systems each had a motor driven, vertically oriented, centrifugal pump. Each pump had a shaft seal to prevent liquid sodium at temperatures up to 500° F from leaking out of the pump. Instead of using conventional seals, freeze seals were developed for this purpose. Tetralin cooling systems were designed and installed for the freeze seals. They reduced the sodium temperature in the seal to less than 208° F, the melting point of sodium. Tetralin was selected because it is chemically similar to kerosene and compatible with sodium. However, tetralin is an organic and decomposes pyrolytically at liquid sodium temperatures. Carbon is a decomposition product of that process.

Radioactive liquid and gaseous effluents were piped to storage tanks buried on the hill behind Building 4143. The tanks were covered with backfill.

Nearby were Buildings 4003, 4043, 4153, and 4163. The remaining SRE staff offices were in 4003. That building also provided space for nonradioactive test work. Building 4043 was used exclusively for warehousing nonradioactive spare parts for SRE.

Building 4153, the Sodium Service Building, contained the secondary sodium storage tank and the sodium melt station. One end of Building 4163 was used for disassembly and maintenance of radioactive and non-radioactive SRE components and equipment. The remainder of the building was a machine shop that served the Nuclear Field Laboratory (NFL).

The fuel and moderator handling machines, when not in service, were parked in a bay off one end of the high bay. A carriage on the bridge crane was used to pick up the moderator-handling machine from its parking bay and move it onto the crane. A second carriage was needed to expedite movement of core moderator elements. An engineer on the SRE staff, OQR, discovered parts in the NFL Conservation Yard that could be used to inexpensively build a second carriage for the moderator-handling machine. I had informally approved OQR's request to proceed, but before we could do so, it was necessary for me to get approval from the Division Director.

The reactor core was an array of hexagonal logs of graphite moderator 11 inches across flats and 10 feet long arranged on end in the reactor vessel. Fuel elements were positioned in cooling channels on the axes of the moderator logs. The fueled portion of rods was six feet long. All fuel rods and graphite logs were metal clad – the former to prevent fission products from entering the sodium coolant and the latter to prevent sodium from entering the graphite.

The SRE Group Leader was the senior manager at SRE. The supervisors of the operations, experimental, analytical, and modifications units reported to him. However, there were two small groups at SRE that were independent of the Group Leader. They were health physicists and hot cell operators. Health physicists were always at the reactor when it was operating or being maintained, and they reported to AI's health physics management. Their independence assured that operating objectives would not obscure safety considerations. Hot cell operators were there when they had work to do for SRE or other NFL clients.

Fuel elements for Core 1 each contained seven rods of uranium enriched to 2.778 atom percent uranium-235. Six of the rods were in a hexagonal array around the center rod.

There were 14 power runs with Core 1 separated by outages for maintenance and modifications and for operation at criticality (zero power) for testing. Power Run 1 started in July 1957 and design full power, 20 megawatts thermal (Mwt), was reached in June 1958. Power Run 14 ended in July 1959 after the fuel melting accident and subsequent diagnostic testing at criticality and low power.

During the last few power runs with Core 1, tetralin leaked into the primary coolant through the freeze seal on the main cooling pump. When SRE was taken to criticality for Power Run 14 enough carbon had deposited in the lower part of fuel cooling channels to seriously degrade fuel cooling. While attempting to take the reactor from criticality to full power, the operator lost control of the reactor. Power increased by approximately 50% in perhaps 100 seconds. The operator reacted by inserting the control rod to regain control. He recovered control at low power where the reactor performed normally. He then attempted to increase power again and again lost control. This time power increased more rapidly to about 14 Mwt. The operator pressed the

scram button which dropped the safety rods into the core and simultaneously drove in all control rods.

The reactor became unstable because of voids in the sodium coolant caused by boiling of sodium in the fuel elements, which was caused in turn by carbon blockages in the fuel cooling channels, which was caused in turn by pyrolytic decomposition of tetralin during preceding power runs. Thirteen fuel elements were partially melted, and the cladding on several moderator elements failed. Fission products were released to the primary coolant and to the helium cover gas above sodium pool in the reactor vessel.

All Core 1 fuel and all damaged moderator elements were removed from the reactor. New replacement moderator elements were loaded in the reactor. New freeze seal cooling systems were installed on all the sodium cooling pumps. The coolant for the seals was sodium potassium eutectic alloy. The eutectic alloy is molten at room temperature and is compatible with sodium. SRE personnel were not evacuated from Building 4143 during the melting accident or at any other time except for one practice drill. The cost of recovery was 1.25 million 1959 dollars and required 15 months for repairs and modifications. New fuel would be loaded for Core 2 operation. PRS was operations supervisor during the Core 1 power runs.

At one point during cleanup after the accident, the Group Leader required all SRE personnel including supervisors and himself to participate for one shift in the physical decontamination of the high bay. Most horizontal surfaces were cleaned by mopping. Most vertical surfaces were cleaned by swabbing with Kotex® because of its absorbency. Operating and maintenance personnel continued the cleanup effort until Health Physics could release the high bay for unrestricted access by plant personnel. Health physicists used survey patches similar to gun cleaning patches to collect 100 square centimeter swipes of surfaces. Radiation counters were used to determine the amount of radioactive contamination collected on each swipe.

The fuel for Core 2 was thorium uranium alloy enriched to 7.1 weight percent uranium-235. The fuel elements were five-rod bundles surrounding a center unfueled support rod. Initial criticality with Core 2 was achieved in September 1960. Low-power physics tests were performed, and in January 1961 while increasing power for Power Run 15, the reactor performance was unstable. QST, Director of AI's Sodium Reactor Department, ordered shut down of the reactor pending review by AI's Sodium Reactor Review Committee. The committee provided an advisory function while necessary testing was performed to identify the cause of the problem.

RTU and SUV used an analog computer obtained from Systron-Donner Corporation to model the performance of the reactor. In this way, they demonstrated that the power coefficient of reactivity was positive, in other words that reactor had fast positive feedback. This led to the theory that fuel rods were bowing away from the axis of the bundles and into higher neutron flux. Testing verified the theory. Each fuel bundle was restrained with a spiral wire wrap and positive feedback was eliminated. The spiral wrap was installed in the SRE hot cell.

Reactor operation was resumed, and in October 1963 during Power Run 41A, the SRE returned to full power for the first time since Power Run 13. During that interval, various other problems were addressed including core temperature oscillations, several

ruptured moderator elements, and gas inleakage in the main primary cooling pump. These problems were corrected.

In February 1964, the reactor was shut down for the Power Expansion Program (PEP). PEP increased the power output capability from 20 Mwt to 30 Mwt. New moderator elements, control and safety rods, and sodium pumps were designed, fabricated, and installed in SRE. Core 3 fuel elements were received and stored in the high bay. PEP modifications were completed. The fuel was uranium carbide, a ceramic capable of operating at considerably higher temperature making possible the production of high quality steam for more efficient production of electrical power. The fuel was enriched to 6.5 weight percent uranium-235. However, the fuel was not loaded in the reactor. AEC refused to continue funding operation of SRE. Shift operations ceased in September 1967. AI-AEC-12572 (see Bibliography) presented seven plans considered by AEC for the future of SRE. It was initially retired, and sometime after mid 1958, it was demolished.

Sodium is a soft metal at room temperature. It melts at 210°F and boils at 1620°F. Its thermal capacity is one-third and its thermal conductivity is 10 times that of water. Because of its high boiling point and high thermal conductivity, it is an attractive heat transfer medium for nuclear power plants. However, sodium reacts violently in water, can ignite spontaneously in moist air, and, if ignited, burns in dry air. In high school and college chemistry laboratories, it is stored in kerosene.

Sodium was received at SRE in sealed 55-gallon drums and taken to the Sodium Service Building. Individual drums were connected to appropriate sodium piping. The drum was wrapped with electrical strip heaters and thermal insulation. Temperature was increased above the sodium melting point, and the sodium was transferred to the appropriate reactor cooling system.

Residual sodium from fuel elements was washed away by steam or water in the wash cells. The cells were needed to remove residual sodium from irradiated fuel elements prior to shipment for reprocessing. TVW continued to do developmental work on the wash cell process after the reactor went on line.

Sodium pumps, valves, and intermediate heat exchangers were examined and repaired as necessary in Building 4163. The work there involved components from both radioactive and nonradioactive systems. The building was decontaminated as necessary so that personnel access was generally unrestricted.

On one occasion, a reactor mechanic, in violation administrative and maintenance procedures tried to clean a sodium valve with toilet bowl cleaner. Toilet bowl cleaner is acidic; sodium is an alkali metal. He immersed the valve in a bucket of the cleaner. The chemical reaction was immediate and violent. Fortunately, the mechanic was not injured, but did receive a three-day suspension without pay for his violations. A liquid stain on the ceiling of the building remained as a reminder of what had happened.

On another occasion, a sodium leak developed at the steam generator with the reactor at zero power and the cooling systems hot. The leakage was collected in a pan that, to the best of my recollection, contained calcium carbonate. Atmospheric humidity was very low, and a fire watch was maintained until the secondary cooling system could be

drained to the sodium storage tank. Had a fire developed, AI's Fire Department would have responded.

Large canisters of Ansul®, a powder for fighting fires including sodium fires, were available in the high bay and elsewhere.

SRE used copious amounts of nitrogen in the vaults for the primary cooling systems and in the sodium service vault. This provided protection against combustion of high-temperature, radioactive, liquid sodium leakage. The gas was stored in liquid form in an outdoor storage tank adjacent to the high bay. Helium gas was stored in 2200 psig bottles manifolded together. Helium was used as the cover gas in the reactor vessel and the fuel and moderator handling machines.

The sodium burn pit was an outdoor facility located on Jackass Flat. It consisted of a small, relatively deep pool of water constructed of concrete surrounded by a concrete deck. The deck was at grade. At one end of the deck, was a single strong bulkhead with a few portholes in it. The portholes were glazed with high-strength glass. The bulkhead also had a hand hole to accommodate a hose nozzle. Debris, including scrap sodium system piping, bearing residual sodium-23 was washed with water from a fire hose. The reaction was violent, and the bulkhead provided protection for the operators. The reaction product was sodium hydroxide. When cleaned of residual sodium, the sodium hydroxide and debris were washed or pushed into the pool for later disposal.

After the AEC decided to decommission SRE, the primary sodium was shipped in drums to Hanford where the Fast Flux Test Facility, a sodium-cooled fast reactor would be built. The secondary sodium was shipped by rail in its storage tank to HNPF in eastern Nebraska. The speed of the train was limited to 35 mph, and an experienced sodium systems engineer from AI's NFL accompanied the shipment.

Personnel at SRE were required to wear carry pocket dosimeters and wear film badges. The dosimeters were collected daily and reissued the next. The allowable daily dose and the range of the dosimeters was 50 mrem. The wearer could read the accumulated dose as necessary during the day. Film badges, as I recall, were collected weekly and were capable of recording a considerably higher dose. Health physicists were responsible for issuing, collecting, and processing dosimeters and film badges. In addition to these measures all persons exiting the site used the hand and foot counter in the lobby of Building 4143.

Health physicists were responsible for surveying the SRE and environs for radioactive contamination, roping off contaminated areas, and establishing portals with stepoff pads to prevent tracking of contamination into clean areas. Health physicists issued Special Work Permits (SWPs) to operators, mechanics, and others to enter contaminated areas and/or radiation fields. The SWP specified the protective clothing required, breathing apparatus, and the time permitted in the protected area. In high radiation areas, a health physicist carrying a radiation meter capable of measuring low, intermediate, and high level fields always accompanied the work party. The health physicists reported to separate management and their orders were absolute. In addition to these duties, health physicists monitored effluents from SRE.

On one occasion, and only one occasion, was I aware of health physicists not neglecting their duties, but rather establishing the wrong priority. There had been an inadvertent spill of radioactive liquid on the asphalt surface outside Building 4143. The two health physicists on duty were decontaminating shoe soles of two truck drivers from offsite instead of determining the extent of radioactive contamination and roping off the area. This problem was promptly corrected.

On another occasion, an operator's dosimeter was reading higher than expected based on the fact that no high radiation fields or contaminated areas were known to exist in the high bay at the time. Surveying disclosed a fine collimated beam of radiation exiting from a slight gap between the concrete shield blocks above the vault for the primary cooling system. Packing the gap with lead sheet corrected the problem.

The SRE had two large liquid waste tanks buried in the earth a few hundred feet from Building 4143. The bottom surfaces of the tanks had severely corroded. The tanks were entered, decontaminated to the extent necessary, repaired and returned to service. To the best of my knowledge, this was done during the Power Expansion Program.

Solid and liquid waste from SRE was taken to the radioactive waste handling facility at NFL. It was managed by UWX.

I have no knowledge of toilets being used for disposal of chemicals or radioactive materials. I believe that the culture at AI in general and SRE in particular would not have tolerated such behavior.

AI had a training department that was responsible for the training and certification of Sodium Graphite Reactor (SGR), Organic Moderated Reactor (OMR), and SNAP reactor operators. SRE had an engineer, VXY, whose principal activity was assisting and cooperating with the training department in their work with SRE operators. VXY did much of the work in writing the SRE training manual and presented many of the classroom lectures. The classroom was located in Building 4143. Lectures covered layout, design, and operation of the various systems and the physical principles underlying their operation. On satisfactory completion of the training program, operators were granted certificates documenting their competence. All operators, chief operators, and shift supervisors held valid certificates.

The SRE training and operating manuals were, in my view, the two most important documents at SRE. The SRE Operations Manual was edited and maintained by WYZ of the SRE staff. It was an evolutionary document that depended on input from shift supervisors and other staff members for its technical content. The manual contained detailed procedures that identified valves, pipes, and other components by specific name or identification number.

During shift operations, a log was always maintained by shift supervisors to facilitate transfer of responsibility for the plant to the relieving crew. Management used the log books to stay abreast of plant operation and maintenance. The Group Leader, Supervisors, and Maintenance Foreman initialed the log after reading it. The Shift Supervisor on day shift prepared the Night Orders for the Operations Supervisor's approval. The Friday day shift supervisor prepared orders for the weekend. Holidays

were covered in like manner. Each of the Unit Supervisors and the Maintenance Foreman prepared a weekly report of their unit's activities, and the reports were combined for documentation of the Group's activities. They also met as a group with Group Leader to discuss the week's activities.

For a time, we experienced thefts from SRE. Vacuum tube voltmeters, gloves, and gasoline were disappearing. To the best of my knowledge no radioactively contaminated tools or materials were removed from the site. We asked security to inspect cars leaving the site. Security did this on a random basis at the NFL gate. We believe that this stopped the thefts.

During my time at SRE there was no sodium fire at the facility. Furthermore, I am not aware of any sodium fire at SRE before or after my tenure. However, near the end of my tenure, a brush fire burned through the Rocketdyne Test Facility and AI's NFL. This occurred on a weekend. The AI and Rocketdyne Fire Departments fought the fire as did departments from local jurisdictions. To the best of my knowledge, the fire started in Box Canyon and off property controlled by Rocketdyne and AI.

SCE owned the redwood cooling tower which was necessary for operation of their turbine generator and hence was essential for distribution to SCE's grid of the power produced by SRE. Although we believe that the automatic sprinklers designed to maintain the moisture content of the redwood functioned sometime in the preceding 24 hours, the cooling tower burned and was totally destroyed.

I spent some 19,000 hours of my life at SRE. I am now 82 years old, have four children, and six grandchildren. Neither I, nor my family, have suffered any ill effects from my employment.

Appendix H
Approved Interview Reports – DOE Interviews

Approved Interview Reports - DOE Interviews

A total of 114 interviews were conducted by DOE. The following interview reports include 102 that were approved for inclusion in this report as well as one for an individual who passed away before his approval could be obtained.

Interview 2

I began working at SSFL in September 1956 and worked for Atomics International (AI) for 11 years and for Rocketdyne for 2 years. At AI I designed equipment to support reactors. I originally started in Area I and moved to Area II.

We were highly involved in making sure that everything was safe and everything I did was done in that direction. I worked on just about all the reactors.

I made things for the SRE and supported the sodium graphite reactor quite a bit.

In Building 2, I did a lot there. We had some trouble when we put the used fuel cells in for cleaning and they were reacting too fast in the water. So I made a device that would wash with steam rather than water – the reaction was slower than it was with water. The device was installed in the wash cell. The fluid went from the wash cell to the holdup tank up on the hill at the back of the reactor. Other people would monitor the radiation in the holdup tank with monitoring equipment until it was safe to empty the holdup tank.

I did not handle radioactive materials, although I was adjacent to it. I did wear a film badge. The contaminated fuel rods were stored in the wash cells.

I was around when the SRE accident occurred and I remember it. We had a coffin that we used to transfer the fuel cells from the reactor to the wash cells. One of the fuel rods was distorted probably by excessive heat. The rod jammed in the coffin and that's where the contamination was. The coffin with the jammed fuel rod was moved out of the way and the other coffin was used to finish the job.

They were always very keen on safety. I saw protection supplied in adequate proportions. Remember that this was a research reactor to develop technology for nuclear power. We were highly conscious of the need for protection all the way along. I did wear a film badge but never wore a dosimeter. I did hear about one other reactor, the Organic Moderated Reactor that I remember was never working properly and they shut it down and never did restart it.

I'm in favor of nuclear power and thorough research. There are people that get goofy about it – there's not much danger in it if it's done properly.

Very definitely there were procedures about handling radioactive materials – there was always a procedure when working with nuclear materials and power.

I always wore a badge and don't remember hearing of anyone being exposed to nuclear radiation.

Contaminated materials were shipped offsite to somewhere but I don't remember where. Probably a hole in the ground.

I never heard or knew of any radioactive waste being buried on the site and have no knowledge of nuclear materials being disposed in drainages. But they were not as neat over at Rocketdyne (his response when told that some rocket fuel materials used in Areas I and II were disposed in drainages leading away from Area IV). We were forced into proper disposal because of the materials we used. It would have been a BIG NO, NO, NO (very emphatic) to have disposed of anything down the drains or toilets. That would have been a very stupid thing to do, wouldn't it?

Some of the help had to be watched all the time! We had one guy who placed his film badge next to a source and it turned black. He was severely chastised – he was knot-headed and certainly shouldn't have been working there. We called him LNM.

I have no knowledge of any other spills, leaks, dumping or other releases of radioactive materials at the site and I never worked with any chemicals.

I was familiar with policies and procedures but training was individually based to get you familiar with what you were doing. There wasn't a classroom or anything like that. Everyone was pretty darn serious about what they were doing and handled their work accordingly. Most of it was really just common sense – most everyone had lots of common sense. Except LNM – he was the only one I ever saw disregard procedures.

The people over me kept track of my performance – I was “reviewed” constantly – there were no special things like performance reviews. I was intelligent enough to do it properly.

I didn't keep a logbook but there were people over me who knew exactly what I was up to. I don't know if my boss (the head of the engineering department) kept a logbook but I would think so. They did have running log books on the SRE.

I did know of the sodium disposal facility in the western part of Area IV – they never took anything there that was contaminated. I didn't have much to do with the old conservation yard but I did know of it. All of the fuel element cleaning would have been done inside of the reactor building.

The crew did an excellent job up there in research and development of electric power and we had a real good reactor that told us a lot of good stories of how to build a nuclear power plant. I was very proud of that. We thought safety all the way along. The SRE for a time provided power to the City of Moorpark. It had a pump that controlled the coolant, the heat went into a heat exchanger and from there transferred heat into another unreactive loop, that in turn exchanged heat to provide steam that drove the electric generator. It was a very safe operation, because of the two loop system, so nothing got out of the reactor building.

I also designed a seal for a reactor mock up, built and ran tests and had to stay within the allowed tolerance. There was a reactor back east that used this design. They sent the seal to us for testing and it leaked. They didn't follow the proper design because it was cheaper to build their way. If they had followed my design, it would have worked.

Interview 3

In 1976 I was hired as a Heating Ventilation Air Conditioning (HVAC) technician by Atomics International (AI) and worked less than one year at AI's DeSoto facility. I was then transferred to Rocketdyne at the Santa Susana Field Lab (SSFL) in 1977 where I was continuously employed until 1985 when I took a job at Vandenberg Air Force Base. At the SSFL, I also worked as a HVAC technician/mechanic and as such, I had work assignments in various buildings in all areas. I worked day shift in the Maintenance Department (I cannot remember the building number but it was located near Security) assigned with other HVAC technicians.

One of my frequent jobs was to change the HVAC filters in buildings that had air conditioning systems. In 1979, while working in building 55, I was changing HEPA filters which generally measured two feet by two feet by one foot. I accidentally slipped on the ladder on which I was standing, which caused the respirator I was wearing to slip and fall from my face. During the moments my face was exposed, I inhaled plutonium particles and thus was exposed. Health physicists (HP) examined me later and through bio-assay testing it was determined that I had been exposed to radiological material and following that incident, I was no longer permitted by the HPs to go into or work in areas where radioactive materials were present. Previous to that, I had worked in building 20 where spent fuel rods were kept, at the SRE, in buildings 22 and 10, and in SNAP-associated buildings. Of course, I regularly wore film badges when entering these and other hot areas. I however worked on the HVAC systems of buildings throughout the areas where Rocketdyne operated at the SSFL. In about 1980, my job switched to that of a test stand mechanic on shifts 2 and 3 and as such, I was assigned to test stands Alpha, Bravo, Coca, CTL3 and 4, and others. This was my job I held at the time I departed the SSFL in 1985.

The paperwork I generated was fairly minimal and usually involved with signing off on work orders with a description of what work was performed. I would make occasional entries into log books as well.

Other than the radiological materials previously mentioned, I also utilized cleaning solvents such as trichloroethylene and trichloroethane in small quantities as well as Freon 11. I assisted in the off-loading of liquid oxygen and hydrogen from transport trucks and helped in the transference of propellant on test days.

I was not involved in the disposal of spent solvent or other hazardous waste, nor am I aware of any such waste being disposed of onto SSFL property. The radioactive-contaminated HEPA filters previously mentioned were double-bagged and taped according to procedure, and left in the hot areas where they were later picked up and disposed of off-site, I assume. I was never involved in the transportation and disposal this waste. I do not personally know of any locations where contamination may exist at the SSFL. I do not recall observing the disposal of liquid materials into toilets or floor drains; a surface disposal area at the western edge of Area 4; storage tanks or gas holdup tanks; or problems with pumps, sumps, piping, and sewer or drainage systems. I do not remember a location called the "old conservation yard" but recall a bone yard of parts located near the main gate. Also, I was not familiar with the Sodium Burn Pit or any of its operations.

A lot of my training at the SSFL was on-the-job. However, I received substantial health and safety training particular from the HP staff which were super helpful. They were always very attentive to personal protection when I had jobs in hot areas.

While I worked at the SSFL, I lived in Simi Valley and would commute daily up through Black Canyon. I loved working there as I had a great job, associated with a lot of fine people and it was a good atmosphere in which to work. I always carried my lunch to work and liked the rural setting of the SSFL. It was quite common to see wildlife there, such as rattlesnakes, deer and coyote.

Interview 4

I started my career in Area 1 in July of 1955 and finished my tenure with the company in about October of 1996. I worked in most of the areas of the field laboratory. These would have been Area's 1, 2, 3, and 4.

My proximity to SRE experiment occurred when I was assigned to the SETF during testing of small rocket engines for the Gemini and Apollo development projects.

During the SETF testing we never had any contact with health physicists' regarding any exposure to radiation effects. The SRE was frequently off line because of leaks in the system which were discussed in progress reports distributed throughout the company.

I never suspected that there would be a problem in my working in the immediate vicinity of this experiment. I do remember that there were some serious leaks in the system but we were never visited by any health physicists. We also were never briefed on the impact of working in relatively close quarters.

I had never worn any glasses in life until I worked in this area of the hill, and I do not know if this affected my eyesight.

Interview 5

I started working at the Santa Susana Field Laboratory (SSFL) in October 1962 for Rocketdyne as a Research Engineer, with specific responsibilities in instrumentation. Most of my 36 years were on the hill, primarily in testing and on the test stands. It was a good place to work. I worked in all the Area 1 and 2 test stands and on the J2 program until 1966, at which point I was transferred to the Florida facility for seven years to support NASA's (launch support effort for the Apollo Manned moon missions) efforts. I returned to the hill in 1973, working for AI at LMEC/ETEC in Area 4. Area 4 was used for testing (sodium pumps, steam generators and nuclear fail-safe systems) components (for the DOE contractors). We tested everything, including sodium instrumentation development testing of pressure, temperature, level, flow and proximity measurements, using small amounts of radiological materials, for projects for Westinghouse, GE, Germany and Japan. My job was to get data (calibrate instrumentation systems to obtain valid recorded test data) for testing and to record it. Everything I did was instrumentation related, which was a specialty I had that allowed me to not get laid off.

I did not work with any of the reactors. I rarely used a film badge except when moving source materials, and was never dosed. I knew about the SRE, and worked in an adjacent building called the Burn Facility (to measure temperature and to detect explosive level of Hydrogen during sodium disposal) detecting hydrogen in sodium disposal.

Ear protectors were the primary safety gear that I wore, but I did use self contained breathing devices as well. There was a lot of training, primarily in health and safety, which were required and involved certifications and re-certifications. I was sent to technical conferences for specific training.

I did not handle hazardous materials very often, as the technicians were primarily responsible for that. I was around hydrazine and other fuels. Trike was used as a cleaning agent by the technicians as well as in engine cleaning, but I handled it very little. I have no information as to where contamination may exist at the SSFL, nor was I involved in any remediation.

I knew about the Sodium Burn Pit but did nothing with it. I had nothing to do with the Conservation Yard beyond sending technicians there to get parts.

I had no experience with or knowledge of liquid materials disposed in toilets of floor drains; a surface disposal area at the western edge of Area 4; any of the leach fields, septic tanks or drainage discharge locations; any storage tanks or gas holdup tanks; fuel element cleaning areas; or problems with underground pumps, sumps, storage tanks, piping, sewer or drainage systems.

Interview 17

I started working for AI in about 1962 or 1963, and worked for the company for 22 years over a 24 year period, taking two years off in 1970. I have an electrical engineering degree from the University of Wisconsin. I had Q clearance. Most of my tenure with AI was at the DeSoto facility, with occasional trips driving up to the SSFL when supervising experiments. I was never assigned to the hill, but only was there occasionally, no more than once a week, on half day or full day assignments.

My work required that I wear a film badge, but I don't know my accumulated dose. AI kept those records. I only supervised, and did no hands-on work in the hot cell. I was not required to wear protective clothing. I worked on building hydrogen recombiners for protection of reactors.

When on the hill, I worked in the mechanical assembly building. I did no hands on work with radiological materials when on the hill.

I had particular expertise in high radiation and high temperature experiments. The thermometry had to be very reliable, and I knew how to build the devices for accurate measurements.

I had no experience with the Sodium Burn Pit, but understand that is where people would use sodium barrels for target practice. I did not handle any hazardous waste.

I knew nothing regarding cleanup efforts there. I do not remember any disposal of wastes in toilets or floor drains, nor was I familiar with any disposal area at the western edge of Area 4. I know nothing about the old conservation yard, fuel element cleaning areas, storage tanks or gas holdup tanks, or any problems associated with underground pumps, sumps, piping, sewer or drainage systems.

Paperwork was generally handled by a secretary. The primary paperwork dealt with records on fuel movement.

People who worked up on the hill complained that their tires wore out too quickly. Since I was assigned to DeSoto, I got a few bucks every time I had to go up to the SSFL.

AI was a fun place to work, it was a research company that felt more like a college. There were a lot of smart people- a lot of brain power. AI was full of PhDs. It was very interesting work, we put the first nuclear reactor in space. I can remember the roar of the Rocketdyne engines screaming through the valley. We had a lot of training, which resulted in certificates upon completion. There were also noon time lectures by the PhDs, in fact, that is where I heard about the Big Bang Theory for the first time.

Interview 18

In 1958 I was hired by Atomics International (AI) as a mechanic and initially was assigned to work in its Canoga Park and its Raymer Street facilities in repairing equipment. Not long thereafter, I was reassigned to work at AI's facility at the Santa Susana Field Lab (SSFL). I was continuously employed by AI at the SSFL until 1990 and eventually became a Manager of Remote Designs. In that position, I designed and developed many types of remote tooling to be used in the inspections and operations of nuclear reactors. Much of my work involved the disassembling and decladding of fuel rods, and removing the fuel from the rods. The decladding occurred in the basement of the SRE hot cell then later in Building 20, which was the hot cell. In fact, I was involved in some of the cleanup activities relating to the 1959 SRE accident. All waste, as I remember, was stored in casks and went to Building 22 and later was shipped to Savannah for reuse. I recall CEF was an engineer that oversaw the shipping of the radiological waste to Savannah in the latter years.

Another location that I occasionally worked at was in Building 55, known as the plutonium facility, where I worked on various types of equipment. I also worked for a period in the SNAP area including Building 25. As a manager, I oversaw much of the activity in Building 20 hot cell. I ran a hot cell where I managed a shop and oversaw the decladding activities of 18 to 20 other workers that operated manipulators, etc. I, along with other employees in my group, occasionally was assigned to conduct inspections of other nuclear reactors located in places all over the world. The inspections we conducted were routinely scheduled events wherein various components of water-cooled reactors were inspected for cracks. My team did not make repairs; only report our findings so that repairs could be made. I assisted in the deactivation of the Frankfurt Arsenal where radioactive bullets were once manufactured.

I did not work in areas at the SSFL where AI activities were not located. I regularly wore film badges and dosimeters during the course of my work as I was continually working with radiological materials. The health physicists (HP) at the SSFL did a fantastic job in assisting and monitoring employees working with or around radiological materials. OQP was a HP that I remember that actively checked film badges and dosimeters and cared for and monitored employees for exposure to radioactivity. AI management was very cautious in containing and managing its radiological materials and in taking care of the health and well-being of its employees.

Throughout most of my career at the SSFL, I was involved in little, if any report writing or similar documentation. Usually, I had subordinates to document and write reports where such was needed, and my job was to read and correct them.

I remember the Sodium Burn Pit but I had nothing to do with it or its operation. The only thing I recall about the Conservation Yard was that it was an area where parts not needed or not in use were stored. I had nothing to do with it either. Also, I never observed the disposal of liquid materials into toilets or floor drains nor do I recall a surface disposal area at the western edge of Area 4. Further, I never dealt with storage tanks or gas holdup tanks, nor do I remember problems with pumps, sumps, piping, and sewer or drainage systems.

Much of the time when I worked at the SSFL I worked the dayshift, but also worked other shift assignments, and I lived in the San Fernando Valley. I drove to work from the San Fernando Valley side of the facility through the canyon. There were a few times that I drove up to my job through the winding road in Black Canyon from Simi Valley. I later moved to Palmdale and commuted to the SSFL by the San Fernando Valley side of the facility's access road. I generally took my lunch to work and occasionally at lunch I and other fellow employees took walks around the field lab.

I generally enjoyed my time while assigned to the SSFL. It was a rural area where various wild life like deer, mountain lions, bobcats and snakes were commonly seen. I worked in a rather specialized group of employees and as such, no one in Canoga Park or elsewhere bothered us.

Interview 20

I started working at the Santa Susana Field Laboratory (SSFL) in 1975 on a laser stand at ETEC as an electronics tech, where I worked for approximately seven years. I was transferred to the Canoga plant, where I worked for three or four years as a system analyst, and then transferred back to “the hill” for the rest of my tenure with Rocketdyne. I worked at Alpha, Bravo, Coca, CTL4, CTL3, SPTF, STL and SCTI. Much of my work was in calibrations for the various tests, such as calibrating proximeters on pumps, test stands while working in the Maintenance Calibration Shop, etc. I was strictly in electronics, and did not work as a rocket tech. 18 of the 27 years I worked at Rocketdyne were at the SSFL. I have a BS in Business Administration.

I was involved with the cleanup of the SRE for approximately three months. We had to wear “double redlines,” meaning we had to put on redline coveralls, duct tape rubber gloves on, then put on another set of coveralls, with a another set of rubber gloves that were also sealed with duct tape, and a respirator. I was chipping out radiologically contaminated concrete. The SRE area was excavated approximately 40 feet deep and 100 yards long. The material was sent to a dump in Nevada.

I also handled radiological materials by moving them with a 20’ pole with a hook on the end. The pole required three people to handle it, and we could only work for three minutes before having three other people take over. I was never exposed to more than 15 milliroentgens per day. My lifetime exposure while at the SSFL was 1.5 roentgens.

I wore both a film badge and a dosimeter, actually two of each, while working at ETEC. I had a film badge and dosimeter on my sock, and also on my breast pocket. I did not wear them when I worked at SCTI or SPTF. The only exposure concern to radiation was at the SRE.

When performing calibrations, each calibration was recorded and logged. All work that I did was logged, but I did not keep any documentation after I left.

I worked at the test stands at Alpha and Bravo, and was involved with engine firings there, primarily with replacing parts as needed. I worked on measuring burn rates of solid fuels.

I worked with cleaning sodium off parts. I remember a “squirt” of sodium in building 39, which trapped an employee while releasing sodium. We put on protective gear to get the employee to safety, while the firemen there only watched.

I remember TCE as a degreaser that I used to wash my arms up to me elbows with. It was very effective, but at some point was replaced by a much less efficient non-carcinogenic degreaser. I did some cleaning with TCE, mainly on parts and components. TCE was either brushed on or applied with a pump spray. I didn’t use TCE while in Area 4, but the guys on the test stands at ETEC used it too and were very good at cleaning.

I was a little familiar with the conservation yard as a place where I would occasionally search for materials to use in the test stands. It would not be a likely place for contamination.

We had training and refreshers all the time. A new job up there was like going back to school with a mean teacher. They didn't want anyone to get hurt.

Safety was number one. I was in charge of safety records in one of the labs I worked in for two years.

I did not handle hazardous waste, and am not familiar with its disposition. Rocketdyne built boxes to hold hazardous waste for shipping off site.

The sodium burn pit was used to provide to workers various demonstrations of reactions. One demonstration was how to put out a sodium fire by using a fine water mist spray. The burn pit was not used for disposal.

I was a member of the UAW.

I had no experience with or knowledge of liquid materials disposed in toilets of floor drains; a surface disposal area at the western edge of Area 4; any of the leach fields, septic tanks or drainage discharge locations; any storage tanks or gas holdup tanks; fuel element cleaning areas; or problems with underground pumps, sumps, storage tanks, piping, sewer or drainage systems.

I enjoyed my time on the hill. When I first started, we parked in lots and were shuttled to our buildings, but eventually we were able to park next the buildings. I hope that the big test stands are not removed, but are preserved for their historical significance.

Interview 22

I started work with Rockwell in the 1950s and worked at various plants, including the Canoga plant in 1980, and retired from there in 1987. I was a Metallurgical Engineer and worked in Materials Quality Control. There were two subsections, Metallic and Non-Metallic, and I worked in the former. It was during my assignment to the Canoga plant that I went up to the SSFL.

I occasionally went up to the hill when tests or experiments were conducted so that I could be present in case there were any failures of a metallurgical nature, but there never were any failures. That was for one or two days, occurring every two or three months. I knew there were several buildings at the facility, but I can't remember which ones I was in. I also knew there were different areas up there, but it was never clearly delineated to me where the areas were. I never got a feel for what was where up on the hill. When I went, I either drove up with other engineers, or went up to the first parking lot and then got in a company car with other employees to go to where the tests were being performed. I remember that the road up there was pretty bad.

Many of the programs I worked on were for the Air Force.

I did nothing with AI, and never worked on anything where exposure to radiation was a concern, as I was never required to wear a film badge or protective clothing except for a hard hat. I never worked with any chemicals, nor did I handle any waste.

I was already knowledgeable about my area of specialty, so technical training didn't occur; however we were always receiving health and safety training.

Interview 29

I was not very familiar with the Rocketdyne side of things, and I only worked on the reactor side part of the time. Most of the time, I was down here at AI (Atomics International) at DeSoto working at a desk. I was up there every day when running tests, but only a month or two usually.

I was associated with the SRE (Sodium Reactor Experiment) doing some testing of titanium bearing alloys. I was a metallurgist, which was my main forte, but not the only one. I was primarily investigating the reaction of titanium materials after irradiation. We had one quite extensive series at the SRE to test how well metals under tension withstood the rigors of a reactor. I was testing U235/238-titanium alloys under tension and used strain gauges to measure creep and elongation.

Following irradiation in the SRE, KNO (now deceased) would pull the rods and clean them. I did not handle any hazardous materials or clean any test elements as all washing of fuel elements would have been done in the Hot Cell adjacent to the SRE. There would be no direct handling of the fuel or test elements as all would be done remotely in the Hot Cell by manipulators. We actually had a little toy train rigged up by KNO to transport the elements from the reactor to the Hot Cell.

My job was to take physical measurements of the test elements before and after being put into the reactor. I performed hardness tests, both Brinell and Rockwell – I never measured activity. We used gloves behind leaded glass to handle the samples, and after completion of the tests the materials were placed in a container that was monitored, and then into a barrel lined with lead. As far as we knew, I believe they were disposed of at sea from what I can remember. There was not a Burn Site at the radioactive site.

We wore film badges when in the area—we did not use dosimeters – which were supposed to be turned in once a week seems like, I can't really remember for sure, but I was never told if my badge was exposed. No criticality excursions or off-normal events occurred during my time at SRE, and I do not recall any incidents of spills, exposure, or anything like that. I do remember one time a co-worker who was a real jokester, who as a joke put his badge on sealed source for a couple of days until it turned completely dark. He turned his badge in but was never contacted subsequently.

There were company policies and procedures in place that governed how work was to be done. So there were operating procedures and every now and then a new rule was put in place or regulation imposed. They also did provide some training, and people were pretty good about following directions, because the uninitiated were very worried about being exposed at that time. But most of the workers were college graduates and had a little exposure to working with radiation. I cannot remember of any instance where people were exposed – I never was, and we were not immersed so there was no need for a decontamination procedure.

We wrote our own reports; we were in a department where you wrote something up and gave it to your boss. He would either ok it or change it, then you would take it to a publishing department and they would turn it into a report. I do not have any original notes here at home –just copies of the published reports, but cannot remember

anything not being documented. Anyway, all of the original notes would be in the form of printouts from an Instron Machine (tensile machine). It would be in the form of a graph from the tensile machine, as graph paper would be used to record data.

I never saw or heard of anyone disposing liquids into floor drains or toilets, and have no knowledge or evidence that radioactive wastes or materials were disposed to the north of the SRE. Another person you could talk with is LOP, he was my helper for a while. He also ran some of the tests and did a lot of the grunt work. He lives in Simi Valley the last time I spoke with, but could have passed away for all I know.

I do not have any mementos or photographs I can remember, just copies of the published reports I wrote. I will look around and see what I have. There is nothing else I can think of with respect to the site, but I am not aware of any spills of radioactive material—we were never very casual about it. I have no knowledge of storage or drains into sump tanks, but I do see they are following the run-off very closely—I see a lot of wells being developed around here.

Interview 30

My on-site participation during the Sodium Reactor Experiment (SRE) Building final clean-up for unrestricted use was as a member of the management team. I was the manager of a quality engineering function at Atomics International (AI). One of my QA engineers was up there full time for about 3 months. AI had decided to complete the clean-up of the SRE Building so that it could be used for a steam generator test program.

Initially we went through the building and ran a radiological survey. We didn't find much because the building had been decontaminated to a certain extent. We were attempting to establish a baseline to determine what additional measures were necessary so we could certify the building for unrestricted use. We developed a sampling plan, but I was not a statistical expert so I brought up another Quality Engineering manager, EHI, who had a degree in statistics and had designed plans for other applications. I sat with EHI and reviewed my thoughts regarding the sampling plan and she suggested a few changes, which were implemented.

The plan basically imposed a 1-yard square grid system on all of the exposed surfaces of the SRE Building with letters running in one direction and numbers in the other. An appropriate number of grid squares were randomly selected for sampling as defined in the sampling plan. Representative sample material was obtained from the selected squares and submitted for analysis.

A contract team did most of the work. The Quality Engineer was there full time and I would go up there 3 or 4 times each week. The contractor, Program Manager, myself, and the facilities people met on a regular basis to review progress and confirm plans and methods for subsequent operations.

My recollection is that most of the concrete had already been removed downstairs. We did swab and soil samples at pre-selected locations per the sampling plan for all forms of contamination, not just radionuclides. We got back a pretty good, clean bill of health, but there were some places that were a little iffy. We did additional cleanup, re-sampled those spots a second time, and then got a clean bill of health.

This follow-up program to the decommissioning and demolition (D&D) effort was necessary because we wanted to use the building to test three steam generator systems – liquid metal to water heat exchangers. This was going for a fast breeder reactor (FBR) program up at Hanford, Washington – the Fast Flux Test Facility (FFTF). AI had a contract to build sodium-water steam systems; a steam generator and wanted to use the building for a test program for this system. This could have been around 1981. The heat exchangers were built in San Diego by Amatek Straza.⁴

Back to the SRE building. The testing verified to our complete satisfaction and those overseeing the project that we had met all requirements for unrestricted use of the building. We began to refurbish the building for the test program. One day while driving from the DeSoto facility, the Program Manager and I noticed road construction at the northwest corner of Topanga Canyon Boulevard and Plummer Street, where the hill that

⁴ The correct spelling for this company could not be confirmed.

used to be there was being carved up. We talked with the construction supervisor there and asked where they were transporting the dirt to and lo and behold it was a long way away. It was mutually beneficial for them to bring that dirt up to the SRE to use as fill in the basement that had already been excavated. We wouldn't let them dump any rocks larger than 10 inches in diameter, so they broke them up rather than take the dirt back down the hill. The quality engineer rejected 3 or 4 of the loads because they had rocks in them that were too big. Then the FFTF program was cancelled and funding for the steam generator program was terminated. The steam generators were being built to ASME Code 3 standards. I don't know what happened to the steam generators.

There should be a final report of our cleanup – it had three signatures on the front, all Registered Professional Engineers and my name was included as the Quality Engineer. That is the document that covered the work we did to complete the previous D&D as part of the program to show the building was cleared for unrestricted use. This report covered the work we did and not the previously completed D&D. Our document was completed while refurbishment of the building was going on.

I don't what radionuclide levels were found as a result of the swab sampling that occurred both at the start and the conclusion of our efforts. The program manager was an ex-Air Force colonel, a pilot, and was a real stickler for having all the records auditable to their source. He was concerned that after we got the dirt down in the basement we would have to dig it up again. The Quality Engineer was also a stickler for having everything documented.

We inherited a building that was pretty clean. Before we started, all the reactor core, sodium systems, and most of the equipment for the SRE had been removed. Some additional hardware had to be removed to complete the sampling. Some of the hot spots had to be worked on a second time. All in all it was a pretty clean building when we started and met all of the imposed standards when we were finished.

The only radiological materials we handled were what was residual from the cleanup.

[When asked if there were procedures in place for handling radiological materials the interviewee replied] Oh yes! Oh yes! Oh yes. I don't recall what they were but due to the sensitivity within the company about handling nuclear materials within the fuels facility and other places, AI had set up meticulous procedures for handling all radiological materials. Up there the only radiological materials we had to deal with was the soil and concrete from the hot spots that was shipped offsite for disposal.

Everybody who worked at the site wore film badges, but I did not wear one due to my rather brief visits to the site. People who were resident at the site had to wear them. Radiation monitoring was not routine due to the cleanliness of the building, but we did have people available to us who could do that. As I recall, about half-a-dozen trucks loads of material were hauled off-site. Radiation monitoring equipment was used to confirm cleanup of an area and swab and soil sample test were also performed. I don't recall but I assume that the swabs that were sent for analysis stayed with the laboratory that analyzed them. The only thing we got back from the lab was a report of the findings.

The only temporary storage of radiological waste was when it was waiting to be picked up for offsite disposal, and that was very temporary. There was no use of hazardous chemicals during the work we did on preparing the building for the steam generator test program.

I was part of the management team on this project for about 3 or 4 months, and did not have any knowledge of anyone disregarding the procedures established for that area. The contractors were responsible for training their own people – we had companies that were very satisfactory. We would look at their procedures to see if they complied with our established procedures and if they were not adequate, then we would have them bring their procedures up to our standards.

As far as documentation went, we had logbooks. There was more documentation by exception; if something was not done correctly we would note that in the logbook and make sure that it was corrected. The on-site quality engineer was there to see to it that the Contractor did the work in full compliance with the established procedures. When people were following the procedures, we didn't need to document that. The quality engineer kept the records in his "office" at the SRE building – it was just a small room where he had a desk. I don't know what happened to the logbooks he kept when the project ended.

My experience with Rockwell and Rocketdyne was that we were pretty darn careful. We wouldn't have gotten where we did by cutting corners. Everyone tried to do things right based on the standards of the day; they were very meticulous about doing things right and there was precious little cutting of corners.

Interview 32

I had a high school degree and a semester of college then went into the Air Force in the Strategic Air Command at Limestone (later Loring AFB) where I worked on B-52's and B-56's. I got out of the Air Force in 1957 and started working at Santa Susana in January 1960. I left in 1978 and went to work for Rockwell at Hanford, Washington.

I transferred from Rocketdyne in Canoga Park to Atomics International (AI) and was supposed to go into maintenance, but when I got up to Santa Susana, they needed a reactor operator at the Sodium Reactor Experiment (SRE), so I started as a reactor operator instead of working in maintenance. When I started working they were in the process of recovering the First Core (that operated from 1957 to 1959). The incident at the SRE was definitely not a meltdown. I spent many nights over the top of the reactor recovering the fuel slugs. All of them were recovered.

I became an operator during the Second Core (that operated from 1961 to 1963). It was all on-the-job training. At the end of the second core, in 1963, we started modifying the reactor during the Power Expansion Program (PEP) to increase the power from 20 megawatts to 30 megawatts, but DOE shut down the program. The Core III fuel was ready in the hot cell. With modifications made during the SRE PEP, we would have been able to adjust the flow from the top of the reactor. The Core III fuel was never put into the reactor. During the PEP we replaced the heat exchangers and the main primary pump in addition to other work. I also helped to retire the SRE. We wore film badges and dosimeters all the time. A yearly report was given to each of us with results for our film badges and dosimeters. Whole body counts were only 15.5 rem. From 1977 until 1979 it was still 15.5 rem.

I'm not sure why, but we changed the kerosene coolant to tetralin – it may have been a better heat transfer material. We used very little TCE; we didn't have any drums of it. For cleaning sodium we use a dry steam – it had very little moisture, less than one percent, with a nitrogen purge. After we drained the reactor, we did the nitrogen purge and then filled it with deionized water.

There was a sodium treatment cell on the east side of the SRE – we called in it the sodium cleaning pad but it was only used for secondary sodium and not primary sodium. Once we had a pretty good fire when someone used water trying to speed up the cleaning process! I never worked at the sodium burn pit. We also tested shaft seal pumps in the sodium test loop at SSFL for the Fast Flux Test Facility.

I stayed at the SRE until 1968 and then went to work on the SNAP 8 program as an operator. It was a 1500 watt space reactor. I don't remember any problems that they had with it – they actually ran pretty well. It was a unique operation, when the reactor went critical, the louvers were closed to keep the neutrons from escaping. It was cooled with NaK and was a much smoother running reactor than was the SRE.

Regarding record keeping, there was a carbon copy logbook in the reactor room. Each shift change could see what had happened during the previous shift. Everything was duplicated. We would take a complete set of measurements every 2 hours and enter them on the 11- by 17-inch sheets in the logbook. But they were all being mechanically recorded as well, so our readings were used as backup. When a logbook was

completely filled, I think it was sent down to DeSoto. They also had a department at DeSoto where we all went once a year for a physical exam. There wasn't anything that went on that we didn't record.

The fuel elements for the Third Core were pulled out and sent to Building 64 (the fuel storage facility) where they were stored. They were never irradiated. Other fuels went to Oakridge National Laboratory for reprocessing.

We worked eight hour shifts and ate on the job. So if you were working at the reactor you would eat lunch in the control room. Otherwise, we would play cribbage if the reactor wasn't running. I lived in Santa Susana for a year and went up Black Canyon everyday to work. I could see my house from the top of the reactor building. Then I moved back to Canoga Park. The new heat exchanger for the PEP was supposed to be at the SRE at 3 p.m. Well it didn't show up until 12 midnight because the driver had made the mistake of going up Black Canyon Road!

There was nothing outstanding that happened during the time I worked there, but there was a wildfire in 1968 or so, but it didn't reach as far over as the SRE buildings.

Interview 38

I worked at the Santa Susana Field Laboratory (SSFL) for a short period, probably starting in 1964 and left in 1965. A chemical engineer by training, I was hired by AI in 1958 and worked for the company in various locations until I terminated my employment in 1969. During my time at the SSFL, I primarily was involved with doing paperwork in an office setting; specifically, abstraction reports for an indexing system specific to liquid metal research. I also spent approximately two months on part of the SRE cleanup. I worked days during my entire time at the SSFL.

The indexing and writing work I did were part of the overall Liquid Metals Engineering Center's efforts to catalog information and findings. I do not recall the name of the building I was in. I do not know where the documents eventually ended up. I did not write any other reports or logs.

My work at the SRE was specifically to disassemble an intermediate heat exchanger to evaluate its condition and so that it could be transported off site for disposal. I was required to suit up with all the appropriate protective gear, and had to take a shower following each time I was in there as part of the decontamination process. I remember one time needing a towel, and the nearest one was on a high shelf. I had to get a cardboard box on which to stand to reach the towel, and my foot went through the cardboard and on to a light bulb. When going to the infirmary, the doctor was concerned about radioactivity in the cut, even though I had already taken a decontamination shower. He opened the cut and swabbed it so he could check for radiation.

I wore a film badge and dosimeter, and while I don't recall what my exposure was, I know it was minimal due to a report that I once saw. Those two months were the only time on site where I was exposed to radiation.

I did not handle any hazardous chemicals such as solvents, fuels, etc., and have no knowledge of their use on site.

I had no experience with the Sodium Burn Pit. I was told that sodium was occasionally sprayed with water there.

I had no experience with or knowledge of liquid materials disposed in toilets of floor drains; a surface disposal area at the western edge of Area 4; the old conservation yard; any of the leach fields, septic tanks or drainage discharge locations; any storage tanks or gas holdup tanks; fuel element cleaning areas; or problems with underground pumps, sumps, storage tanks, piping, sewer or drainage systems.

During my time there I lived in Canoga Park, and drove to work every day up Woolsey Canyon. I parked right at the building where I was doing the indexing and writing, and when at the SRE, I parked in a lot approximately 100 yards up the hill. I don't remember any outside activities by others there. I don't recall a cafeteria, but I usually packed my lunch.

Interview 45

While working on the SRE, I had a Bachelor of Mechanical Engineering degree from U C Berkeley. Later I received a Master's in Engineering from UCLA. I started work at Atomics International in 1952. Early during the SRE project, I was assigned to manage the manufacturing of the reactor vessels being done by outside contractors. In 1954 I was assigned to the Construction of the SRE at the Santa Susana Field Laboratory (SSFL) and was the first construction Engineer on the site for the Reactor Construction Group. I managed the Contractors who installed the reactor structure and supporting fuel handling and storage systems. I completed my construction assignment and left the site in 1957. I handled no radiological materials or waste during the construction as they were brought on the site after my departure. Following my time at the SRE, I was transferred to the DeSoto plant

I went back to "the hill" in 1963 at the LMEC which was being built to test large components for sodium systems (pumps, valves, steam generators, etc). I continued working there until 1976. I started out as a Project Engineer for large sodium pumps being designed and built by Westinghouse and Byron Jackson. The pumps were to be tested at LMEC. I later became design group manager for LMEC.

After 1976, I left the hill and became an Engineering Group Manager, a position I held until 1981 at the DeSoto plant. I supervised the decommissioning of the SRE and facilitated all the related activities. Of primary interest were issues relating to radiological contamination. I wrote two papers published by the American Society of Mechanical Engineers detailing the decommissioning of the SRE. I have no information of radiological contamination other than that which was removed from the SRE in the concrete and the soil. The waste was removed from the site, and was not stockpiled at the SSFL anywhere. I have no hands on experience with handling hazardous materials or waste, but was two levels over it as a Program Manager; so while I had responsibility for its removal, I had no direct supervision.

I knew about the sodium burn pit but have no firsthand knowledge of its use. I wore a film badge on visits to the SRE, which was a one-day badge. I kept no logs, documentation, etc. from my time at the SSFL. There was training on site, mainly safety instruction by health physicists.

I am aware of the incident at the SRE that occurred in about 1959, which has been mischaracterized in the community. It was a fuel element failure, not a meltdown.

The Conservation Yard was operated by Rocketdyne, not AI, but I used it once when needing 30 tons in test weights for a test.

I had no experience with or knowledge of liquid materials disposed in toilets of floor drains; a surface disposal area at the western edge of Area 4; any of the leach fields, septic tanks or drainage discharge locations; any storage tanks or gas holdup tanks; fuel element cleaning areas; or problems with underground pumps, sumps, storage tanks, piping, sewer or drainage systems.

The hill was an enjoyable place to work, very pleasant to always be working with bright, smart, dedicated people. There was wildlife on the property, and I saw many deer and even a cougar. I once saw a black panther that had escaped from a local facility. I saw

Indian hieroglyphics in a cave-like area, which was not widely known among the employees. Rocketdyne took steps to preserve the area, and I believe efforts were made to make it an historical Native American site.

Interview 47

I started working for Rocketdyne in 1956 as a Machine Parts Inspector during a time when they were doing a lot of hiring. I started at the Canoga plant inspecting parts, and also worked on an assembly line building engines, such as the Navajo, Thor, Delta, Atlas and Space Shuttle engines.. I worked at the Van Nuys plant at the RIPE project. I worked at the SSFL for approximately 5 years in the 1960s, then went back to Canoga until about 1988, when I switched back to the hill, where I worked until my 1991 retirement. I was laid off twice, but ended up with 30 years in employment with Rocketdyne. I was always in Quality Control.

During the 1960s on the hill I worked at CTL3, but sometimes I worked in CTL4. I parked in a lot in Area 1 and was bused to my workplace.

While on the hill from 1988 to 1991 I was a Lead Man in Area 2. I was able to park at my building at this time.

Reports were generally for approvals of inspections. If something was wrong, I wrote up the discrepancy, but there were no other daily logs or written reports.

I never wore a film badge or dosimeter. Protective gear included a hard hat, and when occasions required, respirators, rubber suit, hood, etc. This would be when I worked about MMH, NTO4, and other hazardous materials. I worked around liquid hydrogen at CTL3, and I used TCE and acetone for cleaning parts. I did nothing with hazardous waste.

I had some technical training, but health and safety training was more emphasized. Safety was always a concern, as it was a dangerous place at times. I was always conscious of my surroundings, and everything was done to ensure safety, so I never feared while working there.

Everything done on the hill was performed with an Air Force representative witnessing.

I had no experience with or knowledge of liquid materials disposed in toilets of floor drains; the Sodium Burn Pit; a surface disposal area at the western edge of Area 4; the old conservation yard; any of the leach fields, septic tanks or drainage discharge locations; any storage tanks or gas holdup tanks; fuel element cleaning areas; or problems with underground pumps, sumps, storage tanks, piping, sewer or drainage systems.

It was an interesting place to work and a good company to work for. I usually ate off the roach coach or I brought my lunch. I have nothing but good to say about Rocketdyne. I have fond memories and gratitude for Rocketdyne and the way they treated me.

Interview 52

I started working for Atomics International in 1962 and a retired after 29 years. Most of those years, I worked down at the Canoga Park facility. I was only stationed up at SSFL for about two years, when they were cleaning up the Canoga Park facility. During the time that my office was up at SSFL, I worked in a building near the fire station. I made many visits up to SSFL over my 29 years, but I was only assigned up there for those two years.

My degree was in mechanical engineering and when I first started with Atomics International, I was an engineer. AI had some experiments related to the Hanford Project, and we would bring the experiments down from Hanford. We would cut up the fuel elements and then use the Hot Cell up at SSFL to examine the pieces. I would go to Hanford once in awhile for those experiments. When the experiment was ready to come back here for examination, I would go back and forth up to the Hot Cell for about six months at a time. Whenever I went into the hot cell, I would wear protective clothing and a film badge.

Whenever I needed to go into a building that had radiation in it, I would wear a film badge. We would turn the film badges in and get new ones. I never got any feedback that I had been exposed to radiation at a level that would have been a concern.

After a couple of years as an engineer, I went into Quality Control. I was responsible for doing inspections and audits. It was my job to make sure that everyone was following the rules and requirements, following the procedures. We had a big book of procedures and it was my job to make sure that the procedures were being followed. If I found that a procedure was not being followed, I would document the situation and write a corrective action. I would give the corrective action to the responsible parties. Then I would go back later to verify that they had followed through on the corrective action.

In my job in QC, I travelled all over the United States. My degree provided me with an engineering background, but I learned how to do the QC work on the job.

Later, they installed a second gate to get into ETEC. For awhile, I had an office in a building near the gate. We had to go through two levels of security to get to ETEC. Because of my work, I had access to all the buildings in ETEC. I had to go into all the buildings to do my audits and inspections.

One year, AI and Rocketdyne merged into one company. It didn't affect my work in any way. I started going to Rocky Flats in Colorado occasionally after that. But I never had any involvement in the rocket program. All my work was on the nuclear side.

When I worked up there, I would usually bring a lunch from home, but sometimes I would buy lunch from the lunch truck. I would occasionally take a walk outside or sit on a rock end enjoy the scenery. It was pretty up there, and there were wild animal running around.

I wasn't involved in fuel fabrication or liquid metals research. My QA work focused on normal laboratory operations, not on waste handling.

I got along well with everyone. I could go in and talk to whoever I wanted to or needed to talk to. People wanted to do things properly. If I found something wrong, I would

write it up and tell them how to fix the problem. Then I would go back to verify that they had made the changes. Everyone who worked up there was very nice. Some of the buildings were located far away from other buildings, but I was allowed access to every building that I needed to go to do my work. Everyone did their job and they understood my job and why it was important. I don't remember any serious violations. Mostly the corrective actions I wrote up were to address little things.

I wrote up the reports on the inspections and audits and submitted them, along with copies of the corrective actions. They were kept in project files, and the project files for classified projects were kept under lock and key. I had a key to get into those files, but no one else did. I don't know what happened to those files later. I don't know where the records went after I retired.

I never felt like my health or safety was jeopardized. I wore my badge and I felt safe. At the end of my time, I was working on a black project for about 6 months.

I retired after 29 years, almost twenty years ago. I have enjoyed my retirement. We do a lot of travelling. We have been to Europe four times and to South America. We are going to Mazatlan next. We have a place down there. We are slowing down some, but we still travel some.

I don't remember very much and I didn't prepare for this interview. I didn't know what you were going to ask me about. I think you have asked me the right questions. I don't remember anything that I haven't told you about.

Interview 53

There was a lot of wildlife up there. My husband worked all over the site, in all the facilities and buildings. We used to eat lunch out on the balcony of our building and we could see the rattlesnakes out there. Even the drive up the mountain was interesting.

I supervised an office with up to six girls. We were responsible for making arrangements for shipments of equipment and materials for NASA and the US Air Force. We coordinated with engineers all over the SSFL. Shipments went back and forth between SSFL and the Pacific Islands as well as cities throughout the country. We had an office, but we worked all over the site. I mostly got involved when a shipment was expedited. Most of the shipments involved parts of machines or engine parts.

There were company policies and procedures for everything that we did. We followed those policies and procedures, everyone did. That's the way things were done up there.

There was paperwork for every shipment, depending on the program it was for and what was being shipped. I never handled any radioactive materials or any hazardous chemicals myself, but some of the shipments I made arrangements for may have involved radioactive materials or hazardous chemicals. I typically knew what was being shipped so that I could make suitable arrangements, but I didn't actually handle what was being shipped. One time they had to take apart an entire engine so that we could make a list of all of the parts that were being shipped. Whenever management wanted us to change the ways things were done, they provided training.

I did not get involved in shipments for Atomics International.

I received mostly 'on the job' training for what I did. I was one of only two women in management in those days; they thought women weren't smart enough to be in management. I reported to someone higher up in management.

Every program had record-keeping requirements. We kept whatever records were necessary for each program. Many of the records were classified. Everything was kept under lock and key and you had to have the proper clearances to have access to those records. There was a filing system. We kept records of everything that we did. The records were kept on-site. There may have been another set of records off-site, but I don't have any knowledge about that. All of the records we needed were kept at the site.

(In response to a question about whether anything that occurred was undocumented) Not that I know of. We kept records of everything that we did. That's the way things were done.

Interview 63

I worked at SSFL for 42 years. I started up there in June of 1957 at the SRE. It was just starting up. I worked at the SRE for about 5 or 5½ years as a Senior Engineer and later as a unit manager.

I very much enjoyed my work up there. It was much cleaner and cooler than working down in the valley in those early days. The work was very interesting. Initially, we were testing the design of the facility. I was involved in a number of modifications based on what we were learning. For example, we had excessive convective cooling. Once we shut the reactor down, the sodium would continue to flow because of natural convection and we didn't want excessive flow through the core. I did some research and based on a variety of considerations, I recommended something we called an "eddy current brake." I designed and tested the concept and eventually we installed it in the primary cooling system. Another modification was made when we installed an eductor that changed the rate of flow in the lower grid.

We did have a partial meltdown in the reactor when I was working there. It wasn't a full meltdown, but some of the fuel elements melted. We spent a lot of time looking at the core. We corrected the problems and put the reactor back into service.

I was assigned to work in Idaho for two years. I reported to Argonne National Laboratory when I was there. When I came back to Atomics International, I reported to work at the TRW facility on Roscoe, and then I moved to DeSoto. I finally got back up on the hill in about 1965 or 1966 and I stayed up there until I retired. When I first got back up on the mountain, I did engineering studies – paper studies looking at various reactor designs. Later I was assigned to be the manager of the SCTI in about 1968 or 1969. There we tested steam generating equipment. I did that for a number of years. In mid-1970, I was made manager of operations. I had 120 employees and all of the work was non-nuclear. There were many operating facilities at SSFL during that time. We had a big pump test loop and a number of instrumentation areas. We had an instrument lab and a chemistry lab.

I didn't need to wear a film badge at SCTI or thereafter. The only time I had to wear a film badge was when I worked at the Sodium Reactor Experiment.

If there hadn't been a reduction in DOE's activities up at SSFL, I would probably still be working up there. I would wake up in the morning and I couldn't wait to go to work. It was fascinating work that we did. At one time, it looked like nuclear would be the answer to all of our energy needs in the future. We could have reduced our dependence on fossil fuels if things had worked out that way.

I don't know anything about the tritium in the groundwater or how it could have gotten there.

One thing that I have always wondered about is how there could be such a healthy population of animals up there if there was something so drastically wrong with what we were doing. It seems like if things were so dangerous, there would have been evidence in the wildlife.

The public has the impression that it was a secret area up there. When we generated electricity for the city of Moorpark, we were so excited; we had tremendous press coverage. Even after the accident, we never hid anything.

If you are looking for contamination, the only places I would know to suggest you look would be in the Sodium Burn Pit and at the SRE.

Building 59 originally housed a SNAP reactor. It had a very deep pit. We only used the upper half.

Everything that we did up there was documented.

The SCTI cooling tower put off a plume of steam. I heard that people were worried about that plume. All it had in it was steam, water! People assumed it was like the towers that they frequently used to depict the accident at Three Mile Island, even though those were equally innocuous.

I played bridge at lunch. There were all kinds of animals up there, including bobcats and raccoons. We enjoyed watching the animals.

We had literally hundreds of procedures. Everything was written down. We had training programs for sodium safety, hearing protection, and things like that. Everyone always knew what they were supposed to do and how to do their jobs correctly.

The primary purpose of the SCTI was to come up with a foolproof design. We wanted to make something that would be safe, right off the shelf. It couldn't have leaks or other problems. It needed to be leak-proof and dependable. The Big Pump Test Facility was used for a number of purposes. All the work we did there was developmental. We were always trying to improve on the design, make better probes, better pumps, improve reliability.

We documented what we did in logbooks. Every facility had a logbook. The facilities operated around the clock. That's how the operators from one shift to the next kept each other informed of what had been done and accomplished on each shift. They recorded what happened on their shift in the logbook. They really weren't that great – they just offered an accounting of what went on during the shift. I don't know where those logbooks went later. We did have a very good library in Building 38. FIJ was the librarian. When we filled up one logbook we went in and got a new one. We also had strip charts. I don't know what happened to those.

The physicists had instruments that they would use to measure the results of the experiments. I don't know how they recorded their measurements. There weren't computers in those days, of course. We did eventually get a data acquisition system.

I was never told to get rid of anything – equipment or records – that was perfectly good, in the interest of cleaning up.

All in all, it was a pretty decent operation. I'm sure things didn't go perfectly every day, but we tried hard to do things right.

In Building 59, which we designated the Large Leak Test Rig (LLTR), we deliberately ruptured some tubes, just because we wanted to see what would happen within a steam

generator in that situation. It was a controlled environment and we wanted to see what would happen if a tube ruptured. We were doing research.

There is one thing that I still appreciate about my time working up on the hill. We worked with high pressures and high temperatures, we had fires, we had spills, and we had various things go wrong over the years. But I never lost a man. I did have one guy get burned one time, but never any other serious accidents. I am grateful for that.

Towards the end, when we were closing things down, it was hard on me. Seeing those buildings becoming derelict, sitting empty, being torn down. That was very sad, very depressing. They would have had to throw me out if things had kept going like they did during the heyday. I would never have retired otherwise.

I worked for Aerojet before I started up at SSFL. I majored in mechanical engineering in college. The engineering work at SSFL wasn't the cutting edge stuff; what the physicists did up there was cutting edge. We did come up with some innovations at the SRE. We had a problem with tetralin leaking into the sodium and we fixed that.

I hope the work we did up there will have lasting benefit.

Interview 69

I graduated from Pratt Institute in 1952 with a degree in mechanical engineering and was hired in 1959 by Rocketdyne in Canoga Park. While I cannot recall specifics about many aspects of my employment, I was continuously employed between Rocketdyne and Atomics International (AI) until about 1978 when I left for a job with TRW. Much of my employment was at the Canoga Park facility but I recall that I worked around a total of two years, from approximately 1972 to about 1974, at the Santa Susana Field Lab (SSFL). In my position as a Senior Design Engineer and a Senior Project Engineer, I was at various work locations all over the hill for both Rocketdyne and AI. These included test sites at Coco 4 and other rocket engine test stands, and design work at the liquid sodium heat exchanger facility. Other than building 38, I cannot remember the designation of other buildings or areas at the SSFL in which I worked during the two years there. While I do not recall working specifically with radiological materials, there were occasions when I wore film badges in certain areas of work assignments. Insofar as handling or working with hazardous materials, I worked around a lot of types of rocket fuels including liquid oxygen and kerosene, as well as cleaning solvents such as trichloroethylene. As an engineer, I did not manage these materials or hazardous waste.

I may have written various documents, memos or reports relative to my jobs at the SSFL, but I do not recall what they were. I do not recall observing the disposal of liquid materials into toilets or floor drains; a surface disposal area at the western edge of Area 4; storage tanks or gas holdup tanks; fuel element cleaning areas; or problems with pumps, sumps, piping, and sewer or drainage systems. I remember the old conservation yard was a location where surplus materials were stored but I had nothing to do with it. Also, I occasionally visited the Sodium Burn Pit with other employees to watch the disposal of sodium and "fireworks" there, however I had nothing to do with its operations.

I usually worked the day shift at the SSFL and drove up there from the San Fernando Valley side of the facility. There were a few times that I drove up on the hill through Black Canyon but did not care for that commute because of the curvy and winding road through the canyon. I could usually drive and park near the facility where I worked. The surrounding area was remote compared to Canoga Park and I could take hikes throughout the area during my lunch breaks. I saw little, if any, wild life there, but there were occasional snakes about. I remember once a liquid oxygen truck, which had just unloaded liquid oxygen at the SSFL, failed to negotiate a curve as the driver drove back down toward Canoga Park. The truck rolled off the road but I don't recall any being injured. The only other incident I recall happening at the SSFL was the SRE accident in 1959, the year I started at Canoga Park. I had nothing to do with that event, but just remember it happening the same year my employment started.

Interview 70

My perspective on the Sodium Reactor Experiment (SRE) was that it was a major advance in nuclear energy as it was the first nuclear plant tied to a power grid. The SRE had a partial core meltdown that caused no external damage. The damage was confined to the reactor fuel rods and moderator cans. I was one of the grunts doing restoration work. I was an engineering student at University of Southern California where I graduated with a degree in Chemical Engineering. One summer vacation, I think it was 1959, I worked as a junior mechanic – a grunt – on experiments building test rigs for a sodium powered educator pump that would build vacuum to provide flow. We put together a rig a mile away from the SRE. We were requested to assist in the recovery after the SRE partial core meltdown. I was the equivalent of a jumper – when a workers dose was exceeded, they would have to go work somewhere non-radioactive and I would take their place. When I graduated from college in 1962, the salary offered to me of \$650/month by AI as an engineer was the second highest offer to a USC graduate that year in engineering school.

I was a junior reactor operator at the SRE in February 1962. I had a light semester load and was broke. I would work nights, swing, graveyard, and weekends. I was “hands-on” until I graduated. I worked a few weeks until they found a replacement for me and then I joined the Engineering Support Group for the SRE. I had extremely interesting assignments during my career. After the partial core meltdown, the redesigned fuel elements had ± 100 degrees per second temperature oscillations and several engineers worked for a year on an orifice design that was totally unsuccessful. I was responsible for attempting to resolve that problem. I designed new fuel element hardware with bundled rods and succeeded in resolving the temperature oscillation problem. The rods were steam cleaned in a special cell in the reactor floor and then moved to the hot cells. My assessment was that the core was unstable. The clearance between the rods and moderator cans was too great and the rods would randomly move. The nuclear flux would change as the rods moved and the change in flux couldn't be measured due to rapid changes. Thermal input in such a small area made a big difference that the instrumentation couldn't measure. I oversaw the re-design of the fuel element assembly. I probably wrote a memo to document this work. The SRE was no hush-hush project, it was an “Atoms for Peace” project and we were very proud of it.

At the time we called it a fuel element meltdown. The freeze seal pumps used Tetralin, a heat transfer fluid used in oil refineries. This fluid leaked and caused the “goo” that formed a plug in the fuel channel causing the partial core meltdown. Later we used NaK, which is a liquid at room temperature, as a freeze seal coolant. This is compatible with sodium.

Once when removing the moderator cans – our shift was very efficient – we would pull up one moderator can and as soon the can cleared, I insisted the gate valve be closed immediately. The lifting probe had a rounded edge on it and as the valve was closed, the hoist was taken to the upper limit to shut down the hoist power. The limit switch failed and the motor kept running, breaking the cable. The moderator can came down and punctured a hole in the gate but did not cause damage to the core.

I was given the task of redesigning the fuel handling machine (FHM). CDH designed the original fuel handling machine, which was manually operated. There were a series of steps to properly operate the FHM and the operator would have to follow all of the steps in the correct order or it wouldn't work. I designed the first semi-automatic FHM. I did it electronically with relays and switches. Today it would be laughed at, but at that time it was the only way to do it. Its operation involved a series of steps and interlocks so that steps couldn't be missed. I think there was a total of 8 steps and when the proper lights on the panel would go on, then the operator could proceed to the next step. This allowed for the proper removal of elements from the reactor without accident. I know that I wrote a "blue-covered" report on that project.

At 24 I was a relief shift supervisor. Southern California Edison (SCE) was controlling the steam cycle and operation of the electrical and water systems at the SRE. We only had to provide them with sodium. When the SRE was generating power to SCE's system, the 6 megawatts of power that it generated to the grid was a joke to SCE. When we told them we were sending them power they would reply: "we can't see you"!

I was transferred to the Steam Generator Test Facility – I was told that I would be responsible for the water chemistry on this project because I was a chemical engineer. I designed water treatment systems to improve operations. I used hydrazine and morpholine for pH and oxygen control for the steam generator work. Ion exchange resins were used to purify the boiler feed water. Then I went to the Liquid Metals Test Center where I was in charge of all test facility planning for the fast breeder reactor.

I went into nuclear waste storage at Hanford from 1977 to 1985, got fed up with politics and quit. I found the SRE experience very valuable. The sodium handbook was written by LMEC and was extremely valuable information. I was very impressed with the SRE. One of the reasons that I went into the nuclear industry was because of the safety. I had worked at a chemical plant in Henderson, Nevada in 1961, where they produced ammonium perchlorate for Thiokol solid rocket propellant. This was the plant that blew up. Chemical workers were expendable.

I was also impressed that while the U.S. and Russia and the other members of the nuclear community were setting off above-ground nuclear tests, the SRE floor was cleaner than the parking lot outside. The Health Physicists (HPs) working as support and doing oversight were very dedicated and worked hard to make a safe environment for all. We always had appropriate protection. There were very few accidents. Once a 90-pound shield plug rolled off of a pallet and onto my foot – I probably had my foot in the wrong place! I always wore a film badge and a dosimeter. The film badge and dosimeter were worn always. The dosimeter was reset weekly and the film badge was exchanged monthly. Definitely the HP's had the authority to shutdown a project. They were a part of the team – they had respect for us and we had respect for them.

In regard to recordkeeping, we did hourly logs in response to operations and recorded data but I have no clue where those logs ended up. An operator was responsible for taking readings – it was on a 15-minute, or ½-hour or 1-hour basis on 11-inch x 17-inch paper. Records for a shift would be turned over to the shift supervisor and the supervisor would sign-off on the readings. The shift supervisor would note in a logbook what happened during the shift and there would be a formal turnover of the logbook and

they would discuss what had happened during the previous shift. I don't have any idea what would have happened to those logbooks after that.

I drove up the hill daily to the test facility. In 1965 I moved up to Simi Valley, 2 blocks from Corriganville and drove up Black Canyon Road. When I got to about 1,800 feet in elevation I would break through the inversion layer into blue sky. It was like a spiritual experience. The SRE reactor floor was at about 1,850 feet in elevation.

Most of the people I worked with were very, very competent and dedicated to their work. There were very competent machinists at the SRE – we worked with them to manufacture parts. I worked for DEI who was one of the original shift supervisors, EFJ who was my counterpart, FGK – reactor operator and mechanic, GHK – reactor operator, and CDH who was in charge of recovery of the core after the partial core meltdown.

I brought my meals with me. We would eat in the control room. There was a lunch wagon/roach coach but I had a family and wasn't making a lot of money at the time.

Interview 71

I worked at SSFL for 28 years, 6 weeks, and 4 days, not that I was keeping track. My whole family worked for Rocketdyne over the years, including my parents and my aunts and uncles. Boeing bought Rocketdyne and then sold the Canoga facility to Pratt Whitney and then things really went downhill. They bought the site thinking they would win a lucrative cleanup contract – they never had any intention of continuing the good work that had been done up there over the years. They ruined SSFL.

Back in the old days, there were always two unions. United Auto Workers Local 1519 was up on the hill (and at Hill Air Force Base) and Local 887 was in Canoga Park. People went back and forth, but they lost their seniority when they moved to the other location.

I worked at the Mechanical Engineering Test Lab in my first year, in Building 300. I moved from there to the CTLIII – which was the first laser program. It was called COIL – Chemical Optical Iodine Laser, something like that. I worked there for 1½ years. Work slowed down, and I ended up on third shift at the Coca program, testing J2 clusters – they had five rockets per assembly. Testing went on around the clock. When the round the clock testing ended, that was the end for the Coca program. Vince Neal (of the band Motley Crew) filed a lawsuit against the company claiming some health problems were caused by the testing that went on at night. They ended the night-time testing after that. The customers for the Coca program wanted round the clock testing. So, that killed the program.

In 1988 I worked on the shuttle engine test. It was cool, it burned water instead of fuel.

I started out as an auto mechanic. When I was 12 years old, my dad told me I had to learn how to take care of my own motorcycle. I took it all apart and eventually figured out how to put it back together. I started to work for the local Chevrolet dealership in 1976 – they sent me to training to be an auto mechanic. That's the only formal training I had. Everything I needed to know to work at SSFL, I learned on the job. Later they established a certification system and they started requiring that we become certified to do everything we did. By the mid-80's I had lots of kinds of certifications. Some of my buddies from back then are in Florida now, Mississippi too,

I didn't work in Area IV during the research days. I didn't go to work in Area IV until 1999. I helped in the cleanup program. They had a completely different culture. Atomics International was completely different from Rocketdyne. I would hear from friends that they worked all night at AI, friends would say people who work over there die. They really said that. Seniority didn't translate between the two sides – the skills were different and the culture was very different. Maintenance people worked on both sides, but no one else did.

The only thing that I ever saw disposed of in Area IV was some pellets of uranium that were dropped down a drain.

Boeing made us sign something that said we understood that we could be fined \$250,000 and put in jail for up to ten years if we were caught talking about what we weren't supposed to tell anyone about. They didn't even give me time to take it home and think about it – they demanded I sign it then and there.

There was a clean room behind the Bravo Pre-test that had a drain hole that went right into the underground river. People laugh and say there wasn't an underground river, but you could hear it. As far as I know, that hole is still wide open.

I spent 1½ years working at STL IV and then 4 years in the Hydrogen Lab. All together, I think I worked in Area IV about 2½ years over my 28 years up there. The first time was for about 6 months in 1999 or 2000, then I went back again later.

(Looking at the June 19, 1995 aerial photo) There were two tanks that held about one and a half a million gallons of diesel fuel each. They were supposed to run a power generator if we lost power to the site. A lot of days there wasn't that much to do and we would just hang out there around those tanks. That's all that was there in 1999. But Christina Walsh has a picture of the same place from back in the 1950s and it shows all these drums dumped there, down in the ravine. They were gone in the 1990s and all the old guys denied that the area had ever been used as a dump site. But the photo tells the truth. DOE should probably look in that ravine for evidence of contamination. I don't know what was in those drums, but they should look in areas that were originally dump sites.

In my last year and a half, we were pulling debris out of this ravine (indicating the location on the aerial photo). We used backhoes and other equipment to pick stuff up. There were a lot of pieces of carbon fiber of all different sizes and shapes. It was molded to fit, and used as shielding within the reactors. Those pieces of carbon fiber may have caused contamination.

I did a lot of work at the SRE. We put in outfalls to collect surface water run-off samples. I helped install three separate outfalls.

I heard stories about people throwing pipe sections into the sodium burn pit. There was a gun range near there – an old gun range. Later they started using a new gun range. (He indicated both locations on an aerial photo.) I used to go out there to shoot at the new range when I worked on third shift. They said the old gun range was cleaned up. There was a little mountain that people fired into. I was standing out there one day and reached down and got a whole handful of bullets. I asked someone what they were and he said they had already cleaned it up. Two days later, they pulled in dumpsters and they were going to remove the whole little mountain, haul it away. Those dumpsters sat there for six months, then they hauled them away. They never did remove that little mountain.

We used trichloroethylene (Trike) and freon to do most of our cleaning. We used them as vapor degreasers in the lab. It was like a big freezer. We walked out on a platform, opened up the lid, and dropped equipment in using a crane. There was no lid to protect anyone from the fumes. We were an equipment lab – we fixed lines, made hoses, that kind of thing. We used trike and freon as degreasers. I don't remember what we did with the resulting sludge, or even if we had a sludge afterwards. I am not aware of what they did with any sludge.

We all wanted to work up on the test stands – the folks up there were all labor grade 18 and over and the pay was good.

Everything had vacuum pumps on it. The CTLV was the only one that was still working in the 1980s. We also worked on an old German electric motor – left over from World War II. It was in mint condition. I don't know why we were doing that.

We did work with hazardous chemicals – we used NTO and MMH. They were both propellants that can be stored as liquids in rocket engines. They ignite when they come in contact with each other so there was no need for an igniter.

There was a line in the sand, an invisible barrier, between Area IV and the rest of the site. No one on the Rocketdyne side ever knew anything about what went on the other side of that line. It was so secretive. They watched the weather very closely. When they wanted to vent something nasty, we would all watch for the BFRC – the big friggin' red cloud. They could only do that when the wind was blowing towards the Alpha and Bravo areas. They wouldn't do it when the wind was blowing the other way.

The trike and freon were stored in 50-gallon drums on carts over a concrete pad. Some of them may have had covers over them, but I don't think they all did. They didn't wheel them around; they kept them in one place. How were they used for cleaning? We just wiped with our hands or we would spray them with solvents. If you left a little bit of TCE somewhere and came back later, it would have evaporated away. We didn't have to worry about where to dispose it.

When we stopped using trike and freon, we started using alcohol and acetone. We switched over in the early 1990s. It never made sense to me that using something that was flammable was thought to be safer.

We never threw anything on the ground. I wouldn't do that at home, why would I do that up there? We never dug holes and we never poured anything into holes. That just wasn't the way things were done up there. We used the gear oil on the Alpha and Bravo programs only once – when we had used it, we would just throw it in the fire that was used to burn engine fuel. It was kind of messy, but that's what we did.

Later they installed a catchment basin, it held 2000 gallons in a big tank. They started an oil recycling program.

There was that one dump site back in the 1950s and 60s – there behind the maintenance yard. They cleaned it up and then later they denied it was ever there. They lied to us, said it never existed.

There were times we had to wear scuba gear. That was awful. Standing around all day long in that heavy gear was awful. Some of the equipment had air hoses that supplied air non-stop. The masks would get all fogged up so I couldn't see. I would crack the valve just a bit to get some fresh air in the mask. The other kind involved wearing these grey suits that covered us head to toe in a ½ inch thick suit. They were even worse on a hot day.

I followed the rules. The bosses liked me because I did things the way we were supposed to do them. Some other guys would hold their breath and run in there to do something, they wouldn't wear the suits. But I would do it the way we were supposed to and they liked that.

I did not ever see anything dumped anywhere it wasn't supposed to be during my entire time up there. I did see them flush an ounce or two of TCE once in awhile, but never more than that at one time.

The culture was pretty strong – it was hard to change. People just didn't break the rules. Once you got into the union, you didn't want to rock the boat. Moving up in seniority, you didn't want to take any chances.

The only hazardous spill I ever saw was hydraulic fluid at the Bravo test stand. This Vernier engine that was used to turn the space shuttle around was being tested.

It took an act of Congress to change any of our procedures. Everything was written down, and the procedures were followed. They weren't laying all around to keep reminding us how to do our work, but they were printed up and we knew they said, what we were supposed to do, and we did it. With procedures that old, the engineer would say, why should we change that? It's been working for us for 40 years.

I do remember one time when someone pulled the relief valve out. We were supposed to tag it so that everyone knew the relief valve wasn't in place. This guy was just going somewhere else for a few minutes. Someone else came along and didn't know the relief valve had been pulled, and he fired it up. 300 gallons of hydraulic fluid got spilled that time. But that was a rare occurrence.

There were even procedures for cleaning up. There were four guys that wrote those procedures. I remember two of their names. Don't know why I can't remember the other guys names. They were just like us, just test technicians, but they ended up being sort of specialized. They wrote the procedures for how to clean spills up.

Rocketdyne Operating Procedures – R-O-Ps we called them. There were different procedures for the Alpha Test Stand than for Bravo and Coca. The propellants had to come off the rockets at the Alpha Test Stand but they stayed on at Bravo and Coca. They had a different mission. Alpha was used to test rockets. We tested each rocket three times, then shipped it off to the customer. Bravo was used to test all kinds of different designs. The quantities of hydrogen involved made it impossible to pull the propellants off. We didn't have anywhere to store that much hydrogen.

They made new procedures for new programs. They just didn't change old procedures. We just followed them. That's the way things were done. The old timers were there back in the beginning. They knew how things were supposed to be done. That's who wrote the procedures.

We all worked to the written Engineers Work Request. They said what they wanted done and we did it. They were responsible for our work as long as we did what they said. We didn't want to be blamed if something went wrong. If we followed the procedures, we couldn't be blamed if something went wrong.

We had one valve up on Alpha that went bad, it didn't vent. They didn't want to spend \$75,000 to replace it. They were saving pennies and it created unsafe working conditions. They stopped being so committed to safety once Boeing came along.

You can't really say they broke any rules in the 50s, 60s, and 70s. There weren't any rules to break.

The only thing I ever dumped up there was some trike. In the 80s, they installed these catchment basins, and after that, we dumped excess trike in there. They probably ended up with 50-60,000 gallons of trike. Prior to that, they just rinsed down where we worked and it flowed down into a pit that was then flushed down into the canyons.

In 1989-90 I was working at Bravo and they decided they needed to clean the place up. They came and interviewed me. They asked if we ever dumped anything on the ground. I told the truth, just like my supervisor has always said. Then they came along and told me I wasn't acting like a team player. They told me to tell the truth, then when I did, they didn't want me to do that anymore. I filed a grievance after that happened.

The catch basin between Alpha and Bravo collected everything that dumped down onto the test stands. It all flushed down and eventually ended up in the Silvernale Pond. They called it the Storable Propellant Area (SPA). We had our own spa – it was like a flat football field surrounded by concrete berms. They dropped things onto the area to test the integrity of the containers, to make sure the containers would be fine.

We used other propellants as well. Fluorine was used in the laser program in the 80s.

When we signed off on something, we signed the form. Later they decided they couldn't read our signatures, and they gave us stamps. We stamped something to say it had been done according to procedures. Those stamps kept us all accountable. There were records of everything that was done up there, back to the 50s and even the 40s. I would bet it's all been shredded by now. They don't want records any more.

They lost my medical records. Can you believe that? I got a physical on November 21 every single year for 25 years, and now they can't find those records. How could they lose my medical records? Why would they lose my medical records?

We didn't keep any records ourselves. There were five copies, pink, yellow, blue, white, etc. You had to write hard so the marks would go all the way through. One copy went to the engineer in charge, another to the archives, another to the lead man. Once a job was done, I guess you could make a personal copy if you wanted to. I didn't but I suppose if you wanted to, there was nothing to prevent you for doing that.

The lead man had a log book. At one time, everything was documented in a log book. Things got very lax towards the end. The managers got more worried about cigarette butts than they were about leaks. People like me, maintenance guys, didn't keep copies of anything unless you were worried about the engineer you were working with. Most were good, but if you were worried about an engineer, you might make a copy of something.

Building 55 was next to Building 20 – that's where they made the plutonium (uranium?) pellets. They had these manipulator arms that they used to work with the pellets. Every once in a while, they would drop one down a drain. We would get called it to fish it out. They did it by accident – it was hard to hold onto them using the manipulators because they were so small - but it was a pain to have to go in there and fish them out.

The maintenance guys were well trained. We would suit up and go in. We never had any special training. We just did what we were asked to do, the way they wanted it done.

I do have one friend that I have been trying to talk into being interviewed. He hasn't decided to do it yet. I'm working on him.

I saw no more than an ounce of trike get dumped on the ground at one time.

There was one engineer who set up his own personal photo lab up there. He dumped his chemicals and they were analyzing what went down the drain and came back and said – what's this stuff and how is it getting into the drain? They caught him and made him dismantle his little photo lab. We were not connected to the normal storm sewers. We had our own septic tanks. Actually, each area had its own septic tank. We knew what was in the sewers and where it came from.

Once in awhile a maintenance guy would find something and we would ask around and find out who was responsible.

(In response to a question about the Sodium Burn Pit) It was located by Building 9. It was located at the end of the main road and up a hill along a dirt road. Now it is covered with pea gravel and 3 water monitoring wells are located there. That's where I found the bullets. It took 50 guys to remove everything and two years to fill it back up. They used excavation equipment like conveyor belts and separated everything. What went into it when it was in use? Who knows? There weren't procedures on that side of the hill. No one was in charge and people just took whatever they wanted to dispose. PA5 was the same sort of place as the Sodium Burn Pit – it just wasn't as big. Little stuff went into PA5, big stuff went into the Sodium Burn Pit.

We used the dumpsters to throw most stuff away. We never dumped anything over the side of the hill. That just wasn't done, there was no reason to throw stuff anywhere else than the right place.

My whole family worked up there – I met astronauts when I was a kid. We were proud of what we did up there.

(In response to a question about the Old Maintenance and Conservation Yard). They found PCBs there, from transformers that were dumped there. It was a place to dump large equipment and construction debris until a contractor got paid to come up and clear it up. There was an old 1971 Bronco in there and the maintenance man knew I had a Bronco – he told me I could go up and take spare parts off it before it got hauled away. Later, they used the helicopter pad for that function.

(In response to a question about problems with pipes, tanks, etc) I heard there was a lot of water in the basement of the OVHD building. All the buildings on the site had basements. You have probably heard about the big hole in the ground where they were going to build a new reactor. Well, they dug the hole and it filled in with water. Once the hole was dug, they couldn't keep water out. Well, the OVHD building wasn't too far from that hole, and I heard once that they had a lot of trouble with water in the basement.

Sodium was stored in a pit in the building with the big crane where the elevator door was located at the ground level. There was argon in the pit to keep the sodium from coming into contact with air.

90% of my time in Area IV was spent in Building 24. I pulled a lot of piping out of there, and a window. I took a lot of pictures in there. I gave those photos to Christina Walsh. She could probably send the pictures to you if you ask her.

They scabbled (scraped to remove the surface of) the walls and took core samples in Building 55 and Building 20 – I don't know why but they were looking for something. Maybe DOE and EPA should look around there. There must have been a reason they scabbled those buildings two or three separate times.

Here (on the aerial photo) is a location where they dropped 30 uranium (plutonium?) plugs to see how they would hold up to being dropped. They found 29 of the plugs, but they never found the 30th one. They should probably go back and look for the 30th plug. That happened 30 years ago and as far as I know, they never found the last one.

There was a sodium spill once, but I think that was well documented.

DOE/EPA should look behind Building 9 (SNAP reactor) and around the big X-ray machine in Building 100. One time a big dinosaur was excavated somewhere, maybe in Montana, and they brought it to SSFL because that was the biggest X-ray machine they could find.

Finally, they should probably look around the wooden water towers in the SRE complex (adjacent to the SRE retention pond) that were destroyed by a brush fire in 1978 and then the remaining portion was removed in 1998. I heard that MMH was used in the water. DOE/EPA should probably check for chemicals around there, now that the pond is gone.

Interview 73

I'm a licensed pilot and flew over the site and took some pictures. I have an aerial photo from 1975 where I can show you where there might be something. Water drains down towards Simi Valley from the North side, and in 1975 I spent several nights with a gang of guys pumping water up from where there was a spill of something down the mountainside. I don't know if there are records or what the contamination was, but we were sent down there in rubber boots and told to clean it up. They walked around with detection equipment and every time something would register, they would say pick it up. We filled a 55-gallon drum. This area was where Charles Manson lived for a while—remember him? That was his territory. There were also the WKFL (Wisdom, Knowledge, Faith and Love)—a clan that used to come by and buy stuff from the bakery—they were a religious group that lived up there. I bet you can Google on WKFL and find out more about them.

Have you learned anything about sodium? There was a pond over there. When I first got hired—there were 4 or 5 of us who were undergoing orientation as a group—and they did a little demonstration for us. They took a 55 gallon drum, punched some holes in it, and threw it into the pond. It hissed and grumbled a little bit, and then exploded. It went at least 60 feet up into the air, and the top and bottom went off in two different directions. The middle bowed into a half moon. Watching that demonstration put us on immediate notice that we needed to be very careful.

I remember another time, when a guy had a rope with a hook on the end of it. He tossed the rope into the pond and when he started to pull it out, it started hissing. He took off, trying to get out of there as fast as he could. A second guy who was also there took off running too. After witnessing that, I'm wondering if there might still be some stuff in there. If you do run into sodium and need to get rid of it, somebody cleaning valves came up with a good idea. Somebody discovered that ethyl alcohol was a good way to get rid of sodium. We'd found that we could put something with sodium on it into ethyl alcohol and then gradually add water, a little at a time.

I suppose you already know that if you put sodium and water together—you've just got a bomb. That's what they were trying to teach us with the demonstration—to be careful. When I saw that barrel go 60 feet in the air, it was very clear to me to take safety very seriously. I'm wondering if there is still some stuff in the Sodium Burn Pit—but of course that was something like 30 years ago.

I worked there until 1970 and they had a big lay-off, and I was one of the ones that got laid off. That was back when people would stand around with signs that said "No more nukes." I went to work for Qualitron in Burbank as an aircraft mechanic—I had a license for that too. Qualitron was an aircraft maintenance company that took care of aircraft under contract for the oil companies, movie studios, and even some movie stars. I had a chance to go back to Atomics International (AI) after about two and a half years at Qualitron, which I did. Then I stayed put until I retired.

The first job I did when I went back to AI, I made a "Kentucky Still" from scratch. Of course even though it was ethyl alcohol, you couldn't drink it—they put stuff in it. The still was in Atomics International's part, but I also did work on the North America Aviation (NAA) side. I started out as an hourly employee, and after a couple of years I got off

that and went on salary. But during the interim when I was laid off, the Union came in and they only gave salaries to degreed people. We all made the same pay, but you had to have a degree to have a salaried position.

What do I know about how radiological materials were handled? Well, they had a crew that went around and checked on you and they could tell how much radiation you had, and they would tell you that you can't work at what you were doing and you would be doing something else. It happened to me maybe 3 or 4 times. I remember one time when Atomics International tried to make coal. I hated that job—they would grind up the coal and it was really dirty. It was very dirty—what do you expect—it was coal. I finally got out of that job, but every time something went wrong, guess who they would come and get! Anytime you worked in a place like that they would come around and check on you. About once in a year we had to get some sort of physical examination.

I never operated a reactor—although I did help take them apart and get the material ready for disposal. There was this one guy named ABF who had been a steel worker from back east, in Pennsylvania, and he was working with Vermiculite, which we used as an insulating material. It was nasty stuff. We were supposed to wear coveralls, gloves, and masks, and tape all the openings. He was a big, heavy guy—but he just couldn't stand wearing a mask, even when he was working around it. Eventually he got fed up with it and he just took the mask off. He got lung cancer and died—this happened before I retired.

Well, we had one place that was about 60' down and I was put in charge of that for a while. They had a wall down in there they could move around. They picked mostly colored people to work down there, but I was there too so it wasn't like they didn't assign any white guys to do that work. They told us to keep behind the moving wall, but eventually we all said, "Oh what the hell," and just moved around it.

Well, they would have classes sometimes and you would have to get a company license to do something. But if they were in a hurry—they would give you a license on the spot! For example, one time they said "Go get a forklift" and I had never driven one in my life. They gave me a license to drive that forklift right then and there. We did have written procedures, though, and I believe most of us followed those procedures. They would have classes now and then, to train us how to do things we were supposed to do.

Not everything was dangerous. Mostly, it was the sodium thing, or the coal thing, but the best thing was when we got to do some metallurgical research for Japan. It was research into how materials behaved under stress—but it was clean!! I spent 2 ½ years trying to develop a strain gauge that would work at both ambient and extremely high temperatures—we never got that gauge to work—even BCG got laid off because we could not get it to work right.

Anything we did was supposed to be documented in a logbook. We would have a sheet and you would write in whatever the result was—every once in a while we would have a meeting and sit around and talk about it. There were a couple of things that I developed myself—they took pictures of it.

Let me tell you a little more about that spill I mentioned when you first got here. No chemicals were dumped there; it was mostly items like what was stored in the Old

Conservation Yard. There was a lot of Vermiculite stored there as well, because they didn't know what to do with it. They would let people haul stuff away as well. I'll tell you one thing—they had a LOT of lumber—I know because I build a garage out of it!! Everything was hauled away eventually. The only storage place I know of is where they kept the live rods, but I would guess even that's gone by now.

I have no recollection of any liquids being disposed down floor drains or in toilets.

I didn't have any problems working up there. What I thought when I first started is—“What the hell is this?” —I thought it was like a plumbers' factory. I remember about the first week I was there they had one of these loops. It had sodium in it and they got some water in it and it blew a hole through the roof and I-beam. There wasn't any place in the building where there wasn't a little sodium on it.

For lunch I would go out to my car, eat a sandwich, and count deer. I counted as many as 70 once. On another day I saw a bobcat eating a gopher or whatever—I don't know what it was. We also saw coyotes, rattlesnakes and King snakes. We were allowed to kill the rattlesnakes—and they did, but the King snakes were harmless and they left them alone.

I would like a copy of the final report. Please send my narrative by hard copy; we don't use the computer very often.

Interview 77

I was first hired by Rocketdyne as a mechanical engineer at the Santa Susana Field Laboratory (SSFL) in 1959 and was continuously employed there until 1964. I was assigned to work in Area 1 in a rocket research building located near the entrance of Area 1. I worked on a number of research projects, but the primary one involved the investigation of combustion dynamics, specifically acoustic instability. This was a condition that was associated with the engine performance and at that time of rocket development, acoustic instability caused engines to blow up. These included rocket engines in the Gemini, Apollo and other programs. In solving this problem, I developed a solution later published in a 1972 NASA SP-194 publication entitled "Liquid Propellant Rocket Combustion Instability." In 1964 I terminated my employment with Rocketdyne and went to work for Aerospace Corporation in El Segundo. I was re-hired by Rocketdyne in 1980 in the new Environment and Energy Division. During the years between 1980 and 1985, I was involved in a research project in Area 4 that focused on the reduction of acids in exhaust from large scale coal combustion. I was thus engaged until my retirement from Rocketdyne in 1985.

During my periods of employment at the SSFL, my association with chemicals and exotic fuels was minimal, although there were occasions when I was involved in Area 1 research on the use of the propellant hydrazine. A lot of hydrazine-fueled rocket engines were fired on test stands near the research area. On several occasions volatile hydrazine was released onto the concrete pad in the research test area, possibly draining into nearby soil, and I was exposed to it while walking on the pad. I am currently diagnosed with leukemia (holding steady), I have heard that there may be a connection between leukemia and exposure to hydrazine, and have wondered if my medical condition might be related to my exposure at the SSFL. The California Air Resources Board did some research on the possibility of such a connection but apparently saw no significant relation. This is apparently not the opinion today.

Another fuel that was researched but eventually not used in rockets was chlorine trifluoride. I cannot remember other hazardous liquids or solids that I work with. None of the work areas or projects on which I worked involved radioactive materials, thus I never wore film badges or dosimeters while at the SSFL. As an engineer, I frequently kept various logs of research activities and wrote many reports dealing with tests and their results. I don't recall receiving any type of training there as I was focused daily on my project work.

I do not remember any disposal of wastes in toilets or floor drains, nor was I familiar with any disposal area at the western edge of Area 4. I know nothing about the old conservation yard, fuel element cleaning areas, storage tanks or gas holdup tanks, or any problems associated with underground pumps, sumps, piping, sewer or drainage systems. I vaguely recall the sodium burn pit as I think we once used it to dispose of coal ash there, which apparently caused some kind of reaction in the pit. As I was mostly always inside a sealed building, I never wore any type of protective clothing or equipment.

I consider having worked for Rocketdyne at the SSFL as being one of the highlights of my life. It was a pleasant place to work and as the science was on the leading edge of

rocket development, I was privileged to have been a part of it. I enjoyed the group of employees with whom I worked. The facility had an outstanding fire department who trained other fire personnel in chemical fire fighting and so forth. I always worked day shift and regularly carried my lunch. I enjoyed my daily drive up and down the hill on which the SSFL was located.

Interview 83

I started working at SSFL in March 1957 and stopped in June 1986.

We disposed of a lot of material by the north flats near the property line. We had a regular disposal area out there. It was near the northeast corner, almost to the property line. It was just out in the open area.

The Large Component Test Loop (LCTL) would have been on the east side of the facility.

I was in the fire department and eventually I was the fire lieutenant. I understand you are interested in what I know about materials being disposed of on-site in Area IV. We did dispose of sodium-contamination at the sodium burn pit. When we had to get rid of something that was contaminated with sodium, we'd hit it with water and it would explode. I remember one time one of the guys hit a barrel with water and it was right below some large power lines. It shot up in the air. It was amazing; it went through those lines and didn't hit anything!

There was a lot of radioactive material that was sent to Hanford from the plant. That was about the only place where we could ship stuff to, where they could bury that stuff. I guess I remember that some radioactive material went to Nevada, too, for burial in the desert – I don't remember the name of the facility that things were sent to in Nevada.

I've got cancer and it was the type of cancer they've got up at Hanford. We've filed a claim twice for bladder cancer. I don't need more information about how to file a claim as I have already done that.

The fire department was responsible for getting rid of hazardous and chemical cleaning materials. The disposal area was right along the east boundary of the plant. Back in those days, kids would go hiking up on the mountain. I remember one time when a bunch of kids got up there and we had to call their parents to come up and get them. I was doing a normal security patrol when I noticed a lady walking toward the back gate. I told her to stop right there; I shot my weapon in the air and told her to stop. She and her husband were coming up to look for her kids, but of course the facility was not open to visitors as the work that was done there was classified. The lady was upset that I shot my weapon, but I was following procedures and her husband saw that I shot straight up in the air. That was probably in about 1963 or maybe 1964. PRQ was our chief at that time. We had to write a couple of reports on the incident. I thought you should know this.

All of the labs had to get rid of the chemicals on occasion – handling that was part of the fire department's job. The disposal area for AI was in the north flats. It was an ordinary thing and all the waste that went in there was from AI. We took material from other parts of the site to other locations. There would be different chemicals used in their testing. They were in containers, which we would take out to the disposal area. Every Saturday we took it out to the disposal area. It was in the vicinity as the sodium burn pit. It was near a ranch owned by Joel McCrae's, adjacent to his property.

When a facility had something to dispose of, some oil or chemicals or something, they would call the fire department and ask us to pick it up. Sometime before Saturday we'd

pick up the material to be disposed; disposal happened on Saturdays. Stuff that was contaminated with sodium would go to the Sodium Burn Pit. Usually that was in big containers that were used in a test loop. We'd hit it with water and it would blow. Sometimes we would have to shoot the container or barrels to puncture them, to get them to sink and let water get in there so that they could blow up. I have heard that some people would take sodium home and use it for fishing – they'd put it in water and blow the fish out. None of the firemen did that though.

To my knowledge we worked mostly with chemicals. They never gave us any radiological materials. That stuff was stored at the facility and then shipped out someplace else, off-site. I heard rumors that it was dumped at sea, although I don't know whether that was true or not. The Fire Department was not responsible for disposing of any radiological materials. I did wear a film badge and dosimeter when I worked near the reactors, just to be on the safe side.

Most of what we got rid of was residual sodium on machine parts that were not longer needed. After the sodium burned off, we just left the items in the pit; I would guess they just rusted away eventually. We were in charge of that operation because we were qualified firemen and that was our job. It wasn't dangerous as long as we did what we were supposed to.

If an alarm went off in a building that handled radiological materials, everyone inside would evacuate and go to an assembly area to wait until we could clear them to return. Then one of us from the fire department would go in to do the re-entry inspection with a health physicist. We would work backwards from the assembly area to make sure no one was hurt and that no one had been left in the building when it was evacuated. Then we'd sweep the entire building to check and see if the radiation monitors indicated it was safe for people to go back in the building. We had to wear our film badges, breathing equipment, and protective coveralls.

I was never told I was exposed to radiation, but I was in areas where it was; I'm sure I was exposed to some over the years, but nothing that would register any concern. We turned in our badges every month and got a new one. Nobody on the Fire Department had exposures that I knew of. There were three shifts of firefighters working at the time, first shift, second shift, and third shift. QSR was exposed and had to stay off for a while, in Building 5 I believe. I think he was actually in sickbay for a while. There were a few of them that had that happen over the years. RTS was another one. He got caught a couple of times in a hot cell. They both died of cancer as a result of working at the plant. RTS was a lock and key man who worked on alarmed buildings. QSR was a fireman; I think he eventually ended up as a captain in the department.

There were hazardous materials stored on site at the hot cell, in a vault in the chemical yard which had access controls and alarms.

With regard to procedures, I don't know if there were any regulations but we had to be taught how to handle classified materials. I had already been a fireman when I hired on, but I needed training in how to handle the chemicals they used at SSFL. I got my training right there at the site. There were written procedures on how each of the chemicals was supposed to be handled – I know they had them, but I don't remember anything about those procedures.

The Fire Department was part of the security department – there were two divisions, fire and security. We all ran detection patrols, to look for property intrusions into the classified sections of the site while we were out on patrol. And we looked for intruders in buildings if there were people working in them. We'd review paperwork if we ever found an unattended experiment.

I don't recall keeping records or anyone else keeping records of what went into the burn pit. We would have had the order to pick up whatever needed to go there, but I don't remember what happened after that. I think the completed order went to the Fire Chief. I don't know what happened to it after that.

Once a wildfire came up the canyon and then went through the area. I had just pulled up to the station at the west end and started up the pumper truck. I was maybe a quarter of a mile from the boundary line. I think it was near Building 21 or 22. I was standing there watching the fire burn. Everyone had left and then, all at once, it seemed like the entire place ignited. The fire was burning so hot and so fast that it went right over the top of me. All I could do was hope for the best. We lost the cooling tower at the reactor – that's where the fire chief was during the fire. The fire went over the west end of the plant toward Thousand Oaks. I lived in Thousand Oaks at the time, and so I took some hose home with me. I ended up fighting a fire on one of my buddy's property.

If something unusual happened we would have to prepare a report and give it to the chief. And of course I did a shift report and kept logs of what I did, but it was mostly things like who I talked to on the telephone that day. When I was lieutenant, I would report when men were late for shifts or got into squabbles, disciplinary stuff like that.

I have no knowledge of:

- Liquid materials disposed of using toilets or floor drains;
- Any other surface disposal areas besides the sodium burn pit and the other pit I spoke of earlier;
- Leach fields or septic tanks'
- Storage tanks or gas storage tanks;
- Problems with pumps or storage tanks.

The Old Conservation Yard was right by the entrance; maintenance would put things there that they thought could be reused – metals or wood. Sometimes the maintenance supervisor would let employees take something home. I guess some of it got reused.

I liked working there. It had a lot of variety.

After I was a fireman, I went to work in the LCTL; it was very interesting. Our job was to take large components that would go into reactors and then test them to see if we could make them fail. That's what I did after I stopped being a firefighter. You knew that stuff would break down eventually; we wanted to see how long it would take. The company was in the business of selling reactor parts, and we wanted to make sure how long the parts we sold would last. We needed to know when and how they would fail so we could protect the company's business.

Eventually, I ended up being a shift leader at the LCTL. We sent a lot of the materials to the same disposal areas. Somebody in the Fire Department actually did the disposal.

Interview 85

I worked in liquid sodium transfer for Atomics International (AI). I started with AI in 1958 and stopped working there in 1986. I designed a system for transferring liquid sodium from one tank to another. We used a log chain system. The liquid sodium had to be kept at a temperature of around 3,000 degrees, so it was challenging.

We were switched back and forth between Rocketdyne and AI. Mostly designers went back and forth. Our skills were needed on both sides. I worked on rocket engines for a short period of time but I spent most of my time with fuels irradiation at the Desoto facility. I did not have an office on the mountain although I went to work there on a daily basis.

At the Desoto plant radioactive materials were handled pretty well. In the field it was a little different. People hired to work at SSFL did not have the right background. They should have had experience with radiological materials. The company did provide training for them out in the field, but the Desoto plant was much stricter in comparison.

I remember hearing about some irradiated material that was dumped on the roadway by the fire station and the guy that was responsible tried to cover it up⁵. I wasn't working up at SSFL at the time, but as I recall, he dumped it in the wrong place and then they had to go back and clean it up. It was not liquid – it was solid material that was radioactive. The only thing I know was that when that guy dumped it, our badges went off. The company got excited and tried to clean it up. My recollection is that there was quite a bit of material that was dumped that wasn't properly documented.⁶

There was spillage at the Desoto plant when we worked with fuels there.

I only got irradiated once. I was wearing some nice clothes that day, which was a mistake and I learned a valuable lesson – I lost them. I was working at the Desoto plant. We were trying to measure gasses that were coming off the cores. There was a defective part and it blew out. They detected the radiation on me. I took my clothes off, took a shower, and wore different clothes home. I had to go see the radiation doctor for about three or four months after that.

I also worked for the SNAP program based in Desoto. There was a SNAP accident in 1959 – it fell into the Indian Ocean. I never heard that they found it; it might still be out there in the middle of the ocean.

One time we had some foreign visitors. I was asked to find a non-radioactive ladle – we called that piece of equipment a crucible – it was used for molten metals. I thought I'd play a trick on them, and I found one that had been discarded in the Old Conservation Yard because it was defective. (The yard was a place where we discarded metal parts that were not radioactive.) At any rate, it was not up to code and so we had thrown it

⁵ The interviewer specifically asked if he meant that the guy tried to cover the spill with something like dirt or if he meant that the person had tried to conceal the fact that the incident had occurred. He did not know. The way he remembered the incident being conveyed to him was using this wording.

⁶ The interviewer attempted to learn the location of this incident, but the interviewee did not know the exact location. He recalled that it was along the roadway near the fire station and he recalled hearing about an attempt to clean it up.

away. I heard later that the Japanese tried to copy the design, but never could get it to work. They didn't know it was flawed until someone told them several months later.

We always had chemicals in the lab for cleaning. We were very careful with chemicals. They were usually stored in lockers, under lock and key, and they came in 1.5 gallon containers. We took out the quantity we needed and then put the used chemicals into another container. When the container was filled up, they were shipped out. To my knowledge all hazardous chemicals were hauled away; none were disposed of onsite nor dumped down the drain or toilets.

In my opinion, the SRE accident was an unplanned event that should have never happened. In addition, there were a couple of things that happened in the lab that shouldn't have happened, but I don't know much about those events as I wasn't there when they occurred. There was a spillage or something that resulted in contamination in the hot cell one time, and it took a long time to clean that up. I was not involved in the clean up.

There were policies and procedures about how things were supposed to be done, especially when we were shipping materials to other sites. Towns had to be notified; every town along the transportation route was supposed to be notified, like when we were shipping something up to EBR 2 for example. I don't know how often the policies and procedures were changed. But I believe that they had some classes when they changed them.

I do remember when we fooled them one time. We couldn't get the clearance for making that shipment over the road. They didn't want the shipment to go through a certain place. So we boxed those fuel rods up in a cask and sent them by air, in a DC3.

People pretty much followed procedures, but people being people, sometimes they didn't. Workers were indoctrinated in how we were supposed to do thing before we went to work. We were taught how they wanted things done.

I do remember when we had a shipment to Babcock and Wilcox one time, when were designing tanks. The shipment was supposed to have placards so people knew what was inside and how it should be handled. The placards weren't there so one guy ended up losing his life. It was really sad; he had a big family – 7 or 8 kids. His widow got a good settlement. That shipment should have had signs on it. The guy who was responsible for placarding that shipment got a reprimand.

I remember once during the Vietnam War. They were looking for new kinds of weapons. We suggested to DoD that they could put sodium in the Viet Cong tunnels and stand back and let them blow up. The DoD wouldn't have anything to do with that idea; they said it was too dangerous.

We did have performance evaluations and monitoring by supervisors.

Like everyone else, I had to document my work activities. I wrote up reports and turned them in. I don't know what was supposed to happen with the reports, but I know that it seemed like they were laying all over the place. It didn't seem to me that they were stored properly. There was documentation about what we did in the lab on a daily basis. I should point out that I am talking about what went on at Desoto, since that was where my office was.

I can't remember anything happening that didn't get written up when it should have been.

I don't recall any liquids or other materials that went down the drains at SSFL.

As far as I know the sodium burn pit wasn't for radioactive materials, just materials with sodium. I have no recollection of a surface disposal area.

Occasionally, pumpers would come up and pump out the sewage tanks, but nothing that would have had chemical contamination.

The Old Conservation Yard had metal material which we used in the shop to build things, make things. There was more than one junkyard on the site.

I have no knowledge of underground tanks or with any issues about pump, sumps or any piping.

Interview 90

I joined AI (Atomics International) on April 15, 1955 in Downey after leaving the Air Force where I had been an instructor in the Armed Force's Special Weapons Project (AFSWP) at Sandia Base in New Mexico from 1952 to 1955. I have no college degree but I had some college education in chemistry, mathematics, and physics that I acquired piecemeal. I had planned on becoming a pharmacist and went to the School of Pharmacy at the University of Colorado, but after studying that for a while I decided that I didn't really want to be a pharmacist. During the early years of the Korean conflict, there was no such thing as educational deferment and rather than risk getting drafted, I decided to join the military and get into some field that might help me get into a future career. In 1951 I joined the Air Force and completed the Nuclear Technician training course at Sandia Base. In early 1952 I was requested to remain at Sandia Base as an instructor in the Technical Training Group, which was great because I didn't get sent to a far off place like so many guys did. For the next three years I taught fundamentals of radiation detection and the use and maintenance of detection instruments to Nuclear Technician (enlisted) and Nuclear Supervisor (officer) classes. I designed and constructed electronic training aids to improve such training, and designed a low noise, high voltage power supply that was eventually adopted by AFSWP as a field modification to a proportional neutron detection system. In April 1955 I was discharged from the Air Force and applied at AI.

When I joined AI in the Health Physics Section, they were in the process of building SSFL and I was one of the last to leave the Downey facility. I oversaw the radiation protection aspects of the move from Downey to Canoga Park and on to Santa Susana. While I was working at Canoga Park, I decided to get back to college and went to Pierce College in Woodland Hills where I took courses on nuclear engineering, reactor engineering and math. As both my family and my responsibilities at AI grew, they took precedence over my continued education so I never did get a degree.

I participated in the construction and operation of the Kinetic Experiment Water Boilers (KEWB), the AE-6, the Sodium Reactor Experiment (SRE) and other reactors, as well as the Component Development Hot Cell. My days would involve a number of activities. When I got to SSFL, the SRE, KEWB, AE-6 and the hot cell were in various stages of construction and there were no major problems. I was placed on a rotating shift at the SRE for several months. There were four crews that worked around the clock. I was learning my way around the SRE when I was made senior HP (Health Physicist) and became Supervisor of the Santa Susana Health Physics Unit in December 1959. I directed other HPs working under me and also got involved myself.

The shift HPs recorded information about our activities in the reactor operating log. We also had other logbooks in which we recorded survey measurements and such, but I don't remember the details. As a HP, I was in charge of the film badges. Later I became responsible for the personal monitoring program. It probably was procedure that you would only be notified if you had received exposure that needed attention. For the most part exposures were very low. If urine samples came back indicating internal exposure, then you would be notified also. I believe that negative results were not passed back to the employee.

It was standard operating procedure (SOPs) for anyone who worked around radioactive materials to wear a film badge, except for janitorial personnel who may have worked in a reactor building but were not around any radioactive materials.

I was familiar with the handling and disposal of radioactive materials, but I never actually did much myself. SOPs were followed for routine activities. We would have to derive special procedures for non-routine activities as it was not possible for them to be described in advance.

Sodium-24 and other contaminants were hard to keep contained during movement of components into and out of the reactor, and we had contamination problems from time to time. Wastes from the SRE eventually went to the Radioactive Materials Disposal Facility that was located west of the SRE. I am not aware of any intentional disposal of radioactive waste to the environment but there were accidents like the one involving NPQ. NPQ was superintendent of maintenance and once in the early 60's after the SRE incident he removed a sodium pump to change out an impeller. One of the shortcomings of the SRE was that it wasn't well equipped – you had to use plastic and plywood for containment to get something repaired. There was a lot of contamination of Sr-90. The pump was removed and bagged up. NPQ would not ask someone else to do something he wouldn't do himself and he was a bit of a “bull in a china shop” guy. He got suited up with respiratory protection and did the job safely. When he got out at the end of the job, he raised his mask for a breath of fresh air with his contaminated gloves still on and inhaled some Sr-90. His urinary excretion of Sr-90 was followed for several years. The problem went beyond his personal contamination in that it created contaminated waste that had to be boxed and drummed for disposal. I ended up with a fairly lengthy body of research. He got an intake of Sr-90 such that we didn't have to worry about the effects on his body but it was large enough that for several years we could measure what was excreted in his urine. I presented several papers based on this research. No limits were exceeded in this exposure and we learned a lot about excretion of Sr-90 from the human body.

One other event was a “no never mind” I guess in the early- to mid-60's at the SRE. NPQ supervised the machine shop where they did a lot of machining of zirconium (Zr). AI learned from the Atomic Energy Commission (AEC) that there had been explosions of Zr turnings at other labs such as Oak Ridge National Laboratory. The turnings were contained in barrels and covered with oil to prevent explosions. AEC wanted to know if we had any Zr turnings at SSFL. We did have barrels with Zr turnings and they were covered with oil as they should have been. The AEC told us that we had to dispose of them. Someone, perhaps JKN, decided that 2 or 3 of these drums should gently be forklifted away from the SRE compound to an area about 100 yards west of the KEWB. The tops were taken off of the drums remotely and the contents set on fire. What happened was not very effective. No one knew in advance if this stuff was contaminated or not, but there was no reason to believe that the Zr had been activated in the SRE. People were more nervous about the explosion danger than they were the contamination danger. Air sampling revealed no airborne contamination.

I was there in 1960 after the SRE incident, but I was not onsite when the incident occurred. As far as I know everything was disposed offsite.

Sodium would arrive at the site in drums that would be put into a heating device. The sodium would be heated and drained into the secondary system. East of the SRE, near the old firehouse, the firemen would cut the lids off the top of the emptied drums with a special device and then spray water over the drums to create sodium hydroxide. Then they would dump the sodium hydroxide somewhere.

Sometimes we would have to jury rig an operation due to design limitations. Such as the SRE fuel bundles. In their early life, the bottom end of each fuel rod had a flanged pointed device and immediately above that was a circular plate with a series of holes around the outside that were sized to allow for proper sodium flow. It was decided that they needed to change the plates because the size of the holes was not correct, but it wasn't real clear how they were going to do that. They could pull the bundle into the fuel handling machine (FHM) and move the FHM over a temporary shielding and then maybe the plates could be changed manually. There were trenches in the building floor maybe 2 to 3 feet deep. The grates were removed, shielding installed, and we lowered the fuel elements partly into the trenches and changed out the plates manually. That was the way life was at the SRE – forever running into unforeseen occurrences. Life was never dull working at the SRE!

I remember when we would measure surface contamination at SSFL, weapons testing fallout (from Nevada and who-knows-where-else) sometimes affected our ability to monitor contamination in and around the SRE and other facilities. It was not uncommon to find more contamination outside of reactor and other buildings than inside. This annoyance was always resolved, but in those days it was not easy to identify the source (weapon or reactor) of the contamination. This made for some interesting discussions about whether weapons testing fallout on the outside of the buildings should be of greater concern than contamination inside. But because the fallout radionuclides were mainly short-lived and because we had no control over them anyway, we regarded them as a monitoring nuisance, rather than a hazard, and we required shoe covers inside of buildings whenever in doubt.

I was not involved in the use of chemicals unless they became radiologically contaminated. I wonder what we might have thought in the 1950s or 60s if someone had suggested that someday there would be great concern over our impact on the environment. I believe we considered ourselves environmentally conscious and thought that following AEC regulations would protect the environment. My, how times have changed.

During lunch time in NPQ's machine shop, there were guys that would play checkers – one old guy in his 60's could beat anyone at checkers! There was also a ping pong table, and one guy who read during lunch claimed that he could read about 3,000 words a minute. There was a good relationship between operations and maintenance – it was sort of jovial. I don't remember there being any friction between the two groups. GHJ was the head man at SRE.

I lived in Bellflower first, while working at Downey, then moved to Canoga Park where we lived for five years, and then to Northridge for 5 years. Most people lived in Canoga Park not far from the De Soto facilities. There were still gravel roads back then. It's a great shame that the SRE went down the way it did. I enjoyed my 11 years at AI.

I left AI in 1966 to work at Battelle Memorial Institute at Hanford, Washington where I was Manager of radiation protection at Battelle operations, then Manager of Environmental Monitoring, and then Senior Development Engineer working on special studies concerning the measurement and effect of radionuclides released to the Columbia River. After that I went to work for the AEC/NRC (Nuclear Regulatory Commission) in Glen Ellyn, Illinois and other locations, where I got involved in a lot of interesting things. I was the last AEC person to see Karen Silkwood alive. I was also heavily involved in the Three Mile Island aftermath. I worked for the AEC/NRC for 23 years.

Interview 93

I worked as a backhoe operator at the sodium burn facility for four years. We started excavating in the 1990's. I first started there in 1992. We did the first excavation from ground level. I was in one of the first crews that started there and we finished the excavation in about 3-4 years. We dug down to bedrock. There is not much to say about it – it was a pond that they put material in. We found asbestos and sodium containers, but not too much radioactive material was found. Anything that they couldn't get the sodium completely out of, they put into the pit in several feet of water to activate the sodium. There was a lot of piping, cold traps, and things like that. A lot of the sodium pipes were wrapped with asbestos for insulation. All I know about is what I came across personally; the stuff that they had pushed in the pit and opened up was all before my time. I guess they got the pit released later on. They would cover the burn pit excavation every winter with a tarp so there would be no runoff. The things you hear about security shooting holes in containers – I actually saw the bullet holes, so I know that is a fact.

Then I went to the Hot Cell at Building 20. I'd say that procedures were pretty well followed. My biggest concern was what they did with the TCE. A lot of it was just poured outside on the ground. There was no procedure for its disposal. I don't know of any tanks they had where it could be disposed. I think that most of it got dumped or they let it evaporate. They didn't really have a storage area for chemical waste disposal at the Hot Lab. I worked in a lot of the other areas, but I only knew personally what I saw. I can't speculate.

I worked on the manipulators. We tore them down, cleaned, and repaired them. We used TCE to clean all of the parts. They did have collection points for all of the "red lines" – the protective clothing we wore when working with radioactive materials. They were white coveralls with red-trim at the cuffs and necks, which is why we called them "red lines." They were collected in barrels and a private company picked them up and cleaned them off-site. We would pull clean ones out of a cabinet, but they were radioactive to begin with up to a certain limit. It was all radioactive used clothing. If we put a pair next to a Geiger counter, it would go off. After we wore them they were dumped into a radioactive waste collection point. The red lines would get soaked through and sweaty. We disposed of those that got torn or ripped, saturated, or were otherwise not reusable. I wore the clothing almost on a daily basis for years. I can say that they were very good about their radioactive materials disposal and packaging; everything was contained. We would also wear respirators. Every day I wore a film badge; you couldn't go into Building 20 without it. You put your film badge and dosimeter on a shelf near the door every day.

I ran the limits up to where I couldn't work in those areas anymore. A few times I was exposed. I had a couple of incidents where my gloves tore. First, they would try and wipe it off. Then I had to come out and take off all of my clothing and I had to get in a shower, like in that movie "Silkwood." They wanted you to use soap and cold water, not hot, so that it wouldn't open up your pores. Then we would go into the "hot showers" with cold water. Hot showers meant contaminated showers. They kept at it until you got the level down. I saved the reports I was given about those incidents and my exposure.

Building 20 has been gone a long time. I was there when it was cut into giant concrete blocks.

All of the training was done up there at SSFL. The only training I had was 40-hour HAZWOPER. They also brought people from UCLA to do the 8-hour refresher training every year. Their training was very good. I have worked for Lockheed and now I work for Northrup-Grumman, but AI's training was better than what I'm getting now – or anyone else's. They had a very good training program. They didn't let anyone's training expire. Training was very adequate.

[Regarding documentation] I don't know that it applies on my level. I was given a job, I had to sign in and out at the front door, but I didn't really have to document anything. That was more the responsibility of management.

[When asked about a surface disposal area in the western part of Area IV] I have no knowledge of a surface disposal area in that part of Area IV. Are you talking about the RMDF? All I know about are the facilities where I worked; most of the time I worked at the sodium burn pit, 3 or 4 years at the Hot lab, 3 years at the RMDF, and then 3 years doing D&D at Building 59, where the SNAP reactor was. The "live" fuel from Building 20 went to the RMDF.

[When asked if he'd ever heard of the RMDF being called the "Really Mean Dragon Fly"] That was more of the maintenance guys. There were all over the hill. They would just check out a film badge and go wherever they were needed. What they nicknamed things I wouldn't know.

I would drive up the hill every day. I live in Winnetka about 2 miles from the Canoga Park facility and about 8 or 10 miles from Santa Susana, but I have been up and down Black Canyon Road many times as well because I have friends in Simi Valley. Trucks were up and down Woolsey Canyon Road dozens of times a day. There were probably a couple of hundred containers lined up at the Burn Pit – a couple of acres with wall-to-wall containers; you could barely get through them. We passed those trucks all the time going up and down the hill. We had to have trucks on-site daily just to move the containers around.

I don't know of any spillage on the road, but I do know of complaints about dust because in the beginning the trucks weren't being covered. So, they started tarping them; some had roll-on covers. We became more cautious about covering them. When it rained the containers would get water in them so we would open them up and pump the puddles of water out into tanks, not on the ground. Every year around October, we would gear up for the rainy season and get a big tank and a new tarp to cover the excavation at the sodium burn pit.

I do not know off-hand of any radioactive waste being buried onsite. You know, I heard things, but as far as witnessing, not really. There was a lot of sodium at the burn pit, but we did pull radioactive materials out of the burn pit also; it was low-level and all of it was segregated in a separate dumpster and we monitored it. When we pulled stuff out, we put a Geiger counter up to it and if it was radioactive, it would get put into a separate dumpster. It wasn't a significant amount.

Interview 94

In about 1962 I was hired by North American Aviation (Rocketdyne Division) as a Radiographic Inspection Technician operating X-ray equipment in its Canoga Park facility. I was generally employed by Atomics International (AI)/Energy Systems, Rocketdyne, Rockwell, Boeing and Pratt Whitney until 2010 when I retired. During that period, I was laid off from that employment for two 4-year periods in the late 1960s and in the mid 1980s. I was assigned to the X-ray Lab in Canoga Park. During the period between 1962 until the late 1960s, I was assigned at various times to temporarily work and conduct inspections on projects or assignments at the Santa Susana Field Lab (SSFL). I X-rayed various components, piping and parts, and other materials both as routine scheduled maintenance and inspections, and on specific projects. The X-rays were conducted in an effort to determine if there were any cracks in the object and to inspect the integrity of components. My assignments were in Area 4 and on the Rocketdyne side of the SSFL where I had jobs at various test stands including CTL 1, 2, and 3, and in the Coca area. These temporary SSFL assignments were for durations of one day to one month and accumulatively, I would estimate my total time at the SSFL to be about two years. The shifts that I worked there varied as I had no set shift that I worked.

Although I was assigned to the Canoga Park facility I, along with fellow staff members occasionally was given jobs to perform at other facilities around the country. These usually included conducting scheduled X-ray inspections of various equipment and metal components to insure their integrity.

During the course of X-raying projects at the SSFL, I wore a film badge and a dosimeter. This was because of the nature and type of X-ray methods being conducted that utilized isotopes, often iridium 192 and certain quantities of cobalt. I was not required to wear any particular personal protection equipment but would be protected both by a shield behind which I stood, and by the distance between the actual X-raying activity and me. Also, some locations in Area 4 required the wearing of film badges if job assignments were in those particular areas. I remember that I turned in my film badges to the health physicists once a month for their examination. The only other hazardous materials I occasionally used were small quantities of solvents such as trichloroethylene and perchloroethylene when I cleaned components of the equipment that I used. None of the used solvents were ever disposed of at the SSFL that I know of.

I was required to maintain records of isotope and machines usage. I also wrote reports of findings I made on each inspection and X-ray that I conducted. Other documentation that I made were sheets which documented the number of exposures on welds, etc., and logs documenting the film exposure techniques and locations where they occurred. I do not know where these records are today, or if they still exist.

I never observed the disposal of liquid materials into toilets or floor drains nor do I recall a surface disposal area at the western edge of Area 4. Further, I never dealt with storage tanks other than if assigned to conduct X-ray inspections periodically. I do not remember fuel element cleaning areas or problems with pumps, sumps, piping, and sewer or drainage systems. I remember the Old Conservation Yard was a location

where old parts were stored but I had nothing to do with it other than maybe searching it for a needed part. I am not aware of the Sodium Burn Pit in Area 4.

During much of my tenure and work at the SSFL, I lived in Monrovia and drove to work from the San Fernando Valley side of the facility through the canyon. I drove my car and parked it near the X-ray lab there. As my work at the SSFL was sporadic, I did not pay particular attention to the surroundings, however I do remember various types of wildlife could be seen, such as deer, mountain lions and snakes.

Interview 98

I started working at the Santa Susana Field Laboratory (SSFL) in October 1962, retired at the end of 1990, but worked as a contractor until spring 1991. From 1962 to 1969 I was in Area 1 in the Rocket Engine Test Program. I worked in the Large Engine Test Department and worked on various projects for the space program, including the Saturn. I worked as a test engineer in the bowl area on J2 engines, as an Engineer In Charge at Vertical Test Stand 3, and as an Equipment Engineer with Rocketdyne.

I also worked in the Operations Surveillance Unit, checking out all Rocketdyne areas and programs to make sure everything was running correctly, particularly where engine and component testing was going on. We prepared Field Lab Procedures applicable to all Rocketdyne test groups. We also performed regular on-site overchecks of the various test facilities to assure compliance with Field Lab Procedures and the various industry codes and standards.

In June 1969 I accepted a position in the Quality Assurance Department, assigned as the responsible AQ Engineer to overcheck and review all activities at the SCTI, which performed extensive testing of several test steam generators using liquid sodium as the heat source.

I was Manager of QA Engineering from 1980 to 1990, where I supervised several QA Engineers and interacted with QA inspection personnel and other LMEC/ETEC departments to help resolve any problems dealing with QA policies and procedures. It was my responsibility to make sure all operations were in compliance. I constantly interacted with Operations to ensure compliance with all policies, and helped the various departments to with refinements.

There were a couple meteorologists who had some responsibility over the various rocket engine tests, in that conditions needed to be right for the tests to be carried out.

I had training in radiological safety, but I did not wear a film badge. I was not involved with handling of radiological materials or waste. I wore only a hard hat and safety glasses for protection.

I cannot recall the specifics with regard to the use of TCE, and how component cleaning was conducted, as that was performed by the techs and not engineers.

I remember the Sodium Burn Pit in Area 4 as the place where sodium was removed from components.

I was aware of but never worked with any of the fuels there, such as hydrazine, MMH, NTO4, etc.

I kept no logs or documents from my time at the SSFL.

I heard about a radiological release at the SRE, but I have no firsthand knowledge of it. Its decommissioning was carried out after my retirement.

While at ETEC, I parked at the buildings where I worked; while at Rocketdyne, I had to park in Area 1 and get shuttled as there was no parking at the test stands. It was very satisfying to work there. I used to go on walks for exercise up by the water towers.

I had no experience with or knowledge of liquid materials disposed in toilets or floor drains; a surface disposal area at the western edge of Area 4; any of the leach fields, septic tanks or drainage discharge locations; the old conservation yard; any storage tanks or gas holdup tanks; fuel element cleaning areas; or problems with underground pumps, sumps, storage tanks, piping, sewer or drainage systems.

Interview 99

I graduated from Pomona College with a BA degree with a major in Mathematics. Attended UCLA and earned a BS degree in Engineering. My first employment, starting in early 1951, was with the Sperry Gyroscope Co. at Point Mugu working on the Sparrow I Air-to-Air Missile program.

I started working at the Santa Susana Field Laboratory (SSFL) on June 2, 1955, where I worked as a full time employee until 1990. Following my retirement, I worked for 18 months as a contractor on site, and then off and on as needed until 2004. The last 20 years of my career was spent in Area IV, except for the radiological areas.

I started off in the Canyon Area (TRE) in Area I as an instrumentation engineer operating a test stand. I worked in Area I until 1960. First on a test stand, then engineer-in-charge of testing on a test stand, and eventually instrumentation engineer-in-charge of the control room and area instrumentation and controls.

There were five test stands that were testing engines up to 5 to 8 times per day at times, and each time an engine was tested, it had to be flushed out, or cleaned, with trichloroethylene. I would estimate that thousands of gallons were used. It flowed down from the test stands into a holding area beyond the Bowl area and CTL V.

I did not actually handle the TCE, nor did I have anything to do with its storage or disposal. I had nothing to do with hazardous waste. The mechanics did the flushing of the rocket engines, so they would be the best sources for that type of information.

One time when I was walking from the test stand area in Canyon, I walked through a cloud of NTO from the research area, Happy Valley. I hope that I remember correctly this happened from time to time for a period of time. I heard of some NTO spills and of a cloud of it that floated down through the Valley.

There were two basic divisions at SSFL: testing and support. From 1955 to 1960 I was in the Canyon Area. From 1960 on I was assigned to the Engineering department, Instrumentation Engineering group. From 1960 to 1969, my desk was in Area II, but I was working in supporting activities all over the SSFL. In 1969, I was transferred to AI, assigned to the Instrumentation Engineering group, where I worked until 1990. There I was assigned to work with SCTI, SCTL and several other test facilities. I was later assigned to help design the SPTF and when the construction was completed, I remained as Instrumentation and Controls Engineer. My time after 1990 was spent working as a job shop employee. I continued supporting controls and instrumentation at SPTF.

In my position in engineering, I did not keep logs, but I did maintain diagrams and schematics. I remember something about log books, but I can't recall their specific purpose. I also maintained photographs of components and instruments. I have pictures depicting Area I, but none of Area IV. I have some design books from the canyon area, some directories, and also an organizational chart. I have no newsletters or periodicals that may have been published at the SSFL. I maintain contact with some of the people I worked with through monthly breakfasts with Rocketdyne retirees and lunches with AI retirees.

My training occurred on the job. There was no formal training that I attended, I learned on my own. I think there must have been a training program, but I can't remember. I recall no operational procedures early on in Area I but as the programs progressed to production hardware procedures and records were required. Most of the documentation, was kept by engineers at the Canoga facility. I did not record the amounts of fuel or solvents used with the tests.

I spent some time at CTL4, or Components Test Lab 4, where we did rocket engine and component testing. We used a lot of hydrazine and NT04. Over in Coca they used some red fuming nitric acid and hydrazine for testing small rocket engines for a battlefield missile. I visited the SRE after it was decommissioned. I had heard about the "meltdown" in 1959, but I did not see any of it or work around it.

I spent perhaps 10 or more years at the Sodium Pump Test Facility. Before that I worked at SCTI. I also spent short periods of time at several of the other test sites at ETEC.

I did not do anything with the Sodium Burn Pit.

I remember the conservation area or junkyard, and recall recovering items discarded there for use. I don't think they would be areas where contamination would be found. Contaminated soil for another part of the SSFL was stored in the conservation yard in metal containers temporarily until they were shipped offsite.

TCE was used at CTL IV to wash out the test articles and perform other equipment cleaning. All the test facilities should be checked for TCE contamination.

Another area that may merit cleanup attention is the research area of Area I, where a lot of nasty stuff was used, such as exotic fuels and the like. At SPTF there were quite a few small leaks in the sodium lines as well, but I think those were cleaned up.

I remember one of the tests that was conducted at the SSFL dealt with the rubber bumpers that went under buildings to lessen the effects of earthquakes.

I had nothing to do with the handling or managing of radiological materials or waste.

I had no experience with or knowledge of liquid materials disposed in toilets or floor drains; a surface disposal area at the western edge of Area 4; any of the leach fields, septic tanks or drainage discharge locations; any storage tanks or gas holdup tanks; fuel element cleaning areas; or problems with underground pumps, sumps, storage tanks, piping, sewer or drainage systems.

In summary, I was at least familiar with all of the SSFL test facilities, but was most familiar with the Canyon area and the ETEC non-nuclear sites.

Interview 100

I started working at the Santa Susana Field Laboratory (SSFL) in 1988 and spent three years on site, after which I supported the site from other locations at Plummer, Canoga and DeSoto. I worked in an office trailer in Area 4, and did work in buildings 55, 100, 436 and many others. My degree is in Electrical Engineering, at the time I worked as a Facilities & Industrial Engineer performing computing hardware purchases and network installations. This was under the Operations Department, which was responsible for computer related needs before companies started forming IT Departments. We used many types of computers, including HP, Sun and IBM. The network lines were pulled overhead among the buildings, and I remember the first time fiber was used. I stopped support at the hill a year after the company got sold to Pratt & Whitney, which I believe was in 2005 or 2006.

The SSFL was well utilized when I worked up there, and almost every office was occupied. After being transferred to the Plummer facility, I still supported the hill, and traveled up there at least twice a week, which later tapered down to once a week when we were bought by Boeing. I needed to attend staff meetings in support of the laser department.

I never needed to wear a film badge. I worked in buildings that formerly had radiological materials, which had been removed prior to my being on site. One of them, Building 100, had an X-ray machine that was used for tomography, which allowed images to be taken of hardware to diagnose problems without taking them apart. I remember the unit once imaged a dinosaur head.

I never handled hazardous materials or waste, but I recall there were some cleanup activities taking place after I was transferred. I was aware of the Sodium Burn Pit and went by it on occasion, but never witnessed any activities there. I knew that the Conservation Yard was for parts storage, but I have no other information regarding it.

We had no training on site, but I remember being told not to drink the water, so we drank bottled water while up there.

I had a lot of paperwork, which I assume is stored somewhere. I documented approvals of capital funding, purchase orders, specifications, RFPs, vendor related documents, etc. I also wrote technical requirements and procedures.

I usually took my lunch to work. There was a lunch wagon that came every day, but I never used it.

It was beautiful up there, and I enjoyed going on walks. I was warned about snakes, so I always stayed on the paths. I saw deer there.

I was at the SSFL for many of the engine tests. It was common to not advise the new employees when the rocket engines were being tested, to surprise them. People thought they were major earthquakes at first. I was able to bring family members, such as my niece and husband, to the rocket firings.

Interview 101

I started working at the Santa Susana Field Laboratory (SSFL) in 1986 in the AI Engineering Department as a manager of System and Test. I managed buildings 133, 005, 006 and 023, as well as some inactive buildings, and a total of perhaps 15 people. Prior to that I was at AI on DeSoto. I stopped working at the SSFL in 1997. I have a Ph.D. in Chemical Engineering, and managed mainly others with Ph.D.'s, Master's, and a couple of technicians. All my work was on the research side, with an emphasis on developing processes for treatment of hazardous waste so that it is no longer hazardous. My job included lots of selling and proposal writing, with many trips to Washington, D.C. to meet with DOE. I had nothing to do with the Rocketdyne side of the operations.

I'm a California farm boy, so I loved working up at the SSFL, often going on walks in the area. It was a pleasant day to day environment, the countryside was pretty, there was some wildlife, but you had watch for snakes. It was also the perfect place for a test facility, isolated yet close to where people lived.

One of the projects I worked on used molten salts, heated to 900 degrees centigrade, to convert potential hazardous waste chemicals to non-hazardous molecules, which we did effectively. We also developed a process for treating mixed wastes, which would be oil and radiological mixed waste, for which we were granted a Small Scale Feasibility Study permit by the EPA and funded by the DOE. We were successful in demonstrating the technology, which we operated at the RMDF for approximately ten weeks. The hydrocarbons were volatilized as CO₂ and H₂O and the salt, when cooled down, was hauled away as radiological waste for disposal in a licensed facility.

There were several inactive buildings on site, some of which were under my management. One involved a lithium hydride shield, developed in building 049 in the 1950s, which was designed to protect people in space from neutrons near a reactor. When the project ended decades earlier, much expensive equipment remained idle in the building. There were many other project specific buildings, government funded, that were very expensive yet were inactive.

I used to walk all over Area 4 and knew the area very well. The area has been surveyed numerous times for radiologic contamination, and the whole site cleanup controversy seems like much to do about nothing. I think the DOE did a poor job at the start of educating the local community, which created a lot of extra work and expenses responding to the community's misplaced concerns.

I was not around radiological materials much in my work, so I never wore a film badge unless I was going to building 020 for a meeting. I was at building 020 perhaps once every three months. Building 020 was called the hot lab with shielded containment cells for working with radiological materials using mechanical manipulators.

Building 023 was used for research in a joint DOE / Japan project, lasting 8 years, dealing with chemical separation for fuel recovery. Building 005 was a molten salt test facility, where work was conducted relating to coal burning, coal gasification, hazardous waste treatment research and development (using non-waste materials), etc. Building 006 had a heated sodium loop.

During the time I managed Building 133 it was used roughly between 1986 and 1989 as a Sodium Disposal Facility, which was a licensed facility, used to burn off sodium metal from parts.

The product gas was passed through a water scrubber and the liquid was collected in a tank on-site. A hazardous waste contractor hauled the liquid waste off site. This building replaced activities at the sodium burn pit as a controlled way of cleaning sodium. I had no experience with the sodium burn pit.

I had radiological training, as did anyone who worked in Area 4.

Any chemical waste that was created was collected by the environmental group. We had 5-gallon cans for holding the waste, which when filled was picked up by the environmental group, manifested, and taken off site for disposal. Waste products would include acetone, acids, solvents, alcohol, toluene, etc. I am unaware of TCE usage.

There was once a sodium leak on the floor from the Building 006 sodium loop, to which the SSFL fire department responded. Other than that, I am unaware of areas that may require cleanup.

Logs would have been kept in building 133, including hours operating, materials processed, etc. The environmental group would probably have those. I kept no logs or documentation from my time there aside from some tech papers and component photographs. I believe most of the documentation from my group (Test Procedures, Test Reports, etc.) ended up at Iron Mountain.

I wore protective clothing only as needed by specific tasks.

Interview 104

I started working for Atomics International (AI) about 1956. I was first involved as an engineer in the engineering analysis group on Canoga Park where I designed some of the heating elements for stainless steel valves. I got involved in some minor engineering design jobs for the Sodium Reactor Experiment (SRE) while it was still under construction. This included design of a heating element in the seal around the reactor vessel that was made of some kind of lead alloy. I ended up designing items for the Organic Moderated Reactor Experiment (OMRE). I went to the OMRE in Idaho around 1958 where I was the shift supervisor and was there when we first achieved criticality. Shift engineers were running experiments on the OMRE. I came back to Southern California after being in Idaho for about a year and a half.

HIJ was in charge of a group called the Safeguards Review Committee. Each reactor at AI had such a committee and because I had been in operations for a year and a half in Idaho I got involved in the committee for the SRE. We reviewed the facility design as well as the operating instructions for performing the experiments and overall safety. We also reviewed all written instructions for running the reactor. I spent about 15 percent of my time on this work and was a project engineer on other things. On occasion I would go up to the SRE and meet with OQR, the engineer in charge of the SRE experimental and test programs. I also worked on the safety committee for the Piqua reactor that was located in Ohio. People were selected from a variety of different jobs, mainly from Canoga Park, to sit on this committee and a lot of the review was done in Canoga Park. During each of my visits to the SRE I never had a film badge but I always had a pencil dosimeter. I got much more exposure from the OMRE in Idaho than I did at SSFL.

The only other reactor at SSFL that I reviewed was a little boiling water reactor – I believe it was the Kinetic's Experiment Water Boiler (KEWB). The fuel was uranyl sulfate dissolved in water in a 12- to 15-inch spherical core and was a prototype and test reactor used to prove the safety for the AE-6 reactor. The design was from Los Alamos. We referred to the experiments done on this reactor as BURP experiments because during the tests, the power was increased rapidly so that the liquid appeared to boil and then the reactor would automatically shut down. I believe that AI sold several of the AE-6 reactors to universities and other research institutions that needed a neutron source for the production of radioisotopes and to perform other reactor experiments.

I was not involved in the SRE incident review committee post mortem, but I do remember when that happened. We didn't have containment domes (that people associate with nuclear power reactors) over any of the reactors at SSFL, but our reactors were much smaller and contained within buildings. We did things very cautiously.

One of the reasons AI hired me was because I had a Chemical Engineering degree and knowledge of sodium and NaK that was valuable to designers and operators. The sodium pump test facility I believe had an electric conductive pump. There was some kind of secondary sodium test facility but I was never involved in any type of review of that facility.

The only “off-the-shelf” items we used were stainless steel control valves and other commercially available laboratory devices.

I had no knowledge of the storage and disposal of radioactive waste and I was not aware of the existence of the sodium burn pit.

As far as records go, all of my comments I made as a result of my safety reviews would have been put into a report that HIJ prepared, and the report given to whomever was in charge of the project that we had reviewed. We would go through operations manuals page by page and provide comments to whomever was in charge of the project. We were all well compensated for what we did and a lot of us got involved in working with nuclear energy because we felt that it was the bright hope for the future. I still believe that today and feel there will be a resurgence in the use of nuclear power. We believed that we were on the leading edge of technology as we were working with a new technology that had never been tested before. There is nothing more appealing to someone like me than to work on a job where everything you learn is new.

AI's facilities had both interior and exterior radiation detectors that would go off if a background level was detected. I can remember the exterior detectors would go off whenever weapons tests were detonated at the Nevada Test Site because they were sensitive enough to detect the fallout.

After I left AI in 1966 I went to work at Vallecitos in Pleasanton, California for General Electric until 1972. I was lucky enough during my time with General Electric to have worked with Volney Wilson, one of the pioneers of the Chicago PILE-1 (the first nuclear reactor to go critical in this country).

Interview 106

I started working at Santa Susana in 1954 on the “other side of the fence” at Rocketdyne, on hydraulics for the thrust chamber preflight testing. It took 20 months for me to get my security clearance so that I could work for AI. After that I worked at Building 020 [the Hot Lab], the Engineering Test Building (ETB, Building 003), the hot cell and the SRE. My job titles included: Senior Research Mechanic, Analyst, Process Analyst, and Research Analyst; basically I was a glorified mechanic. At AI, I hydrided zirconium and uranium for the SNAPs 2, 4, 8, and 12 and also melted, alloyed, extruded, and fabricated the fuel elements used in the SNAPs. The SNAP 8 was the only reactor with a fixed fuel element and it was launched from Vandenberg Air Base, then some engineer destroyed it by accident. The SNAP 8 had a ½ meg power delivery and an operational power life of 4,800 hours at maximum power output. It would sure be the means of putting electrical power on the moon in a small compact unit.

I also fabricated plutonium into fuel rods. At one time I had enough materials in my safe to make four bombs. I had to balance the radioactive materials every night to 1 gram. People that I worked with included QRS, TUV, WXY, and ZAB. There were an amazing number of people who worked there with a diversity of experience from different lifestyles.

I worked back and forth between SSFL and DeSoto and Vanowen. I opened DeSoto and closed down Vanowen for AI. I lived in Whittier and drove 150 miles a day on surface streets; there were no freeways back in those days. I always brought my lunch, but there were many “slop shops” or “roach coaches.” We played chess at lunch – there was a chess club with about 200 members and we had a round robin between players from DeSoto and the hill. And the ping-pong matches were quite unique. We would get a lot of snow up there in the winter and the animals would come lie on the asphalted areas because it was warm. I saw a lot of animals: deer, squirrels, foxes, jackasses, and coyotes.

It was a joy to work on the hill. I had more fun and learned more and wrote more at that job. A lot of times we weren't even clocked in – we used the honor system. Many times I worked off the clock. I didn't take a sick day in ten years because I enjoyed working there so much – even if I was sick I would go to work. We would have what we called “bullshit sessions.” Each engineer who had a problem they were working to figure out would put it up on the blackboard and 60 guys would put their heads together to try and solve the problem. This occurred on both sides of the fence. I had an education that I couldn't have gotten in college.

CDE was my lead man. I alloyed and extruded elements for reactors and made fuel rods out of elements. We achieved high enrichment of fuel for the SNAPs because they needed higher (weapons grade) enrichment of fuel to function. Mercury was used as a coolant in a Rankin cycle. I developed a technique for hydriding fuel. We sent our fuel to the National Lab at The University of Chicago where they tested everything we fabricated for purity using gas analysis. I had a courier clearance and would take the fuel in a birdcage on a plane from California to Chicago; sometimes I would be back in the same day.

I had a good rapport with my boss and had a lot of fun. They had to change what was written in the textbooks based on what we did at SSFL. There are 26 patents that have my name on them. You didn't have to have a college education to work at SSFL. I had a high school education but it was "on the job training." A couple of employees became millionaires based on the ideas they had.

I retired after 26 years in 1972 and moved up here [to Washington, CA]. Then I went to work for GE in Japan, China, and Australia – all over the place! I paid off this place in 6 years. If I could, I would go back to AI today if it was still the same as when I worked there.

I always wore a film badge and a dosimeter. I was on the first ship to arrive five days after the atomic bombs were dropped on Hiroshima and Nagasaki. We had no protection like a film badge there.

As far as materials handling and disposal we had people who took care of that stuff. I did develop a cleaning technique to clean oil from ones hands so that it wouldn't be transferred to the fuel elements that involved using ethyl alcohol or acetone and a triple set of gloves. But the oil would still show up on the fuel. We also stored the uranium and plutonium fuel in birdcages so that there would be no interaction between them. A maximum of one birdcage could be carried on a truck. We couldn't stack them together or they would go critical. Once two fuel elements that were on opposite sides of a wall came too close together at a lab down in the valley and started a fire. We stopped the Los Angeles fire department at the door as they were ready to spray them down with water which would have caused an even bigger problem because they are pyrophoric. The only thing you can put on such a fire is G4 powder or something similar – that will strangle the fire. When I worked on magnetic pumps the sodium would snot on us.

Everything including people and equipment would be decontaminated. Everything had to be cleaned before you left at night and it was smear tested every day. We wore booties and paper whites. The booties would be laundered up there on the hill. The laundry re-circulated the water at the SRE. We would use duct tape to remove dust, then burn it and weigh it to calculate how much radionuclides were in the dust. I wasn't involved in the disposal of any radioactive waste. That was all special. The waste would be put into 55-gallon drums and then concrete would be poured on top of it. They were dumped in the ocean near the Farallon Islands. They required that we have new tools every year. I can remember putting entire Lyon tool kits, completely good tools, into 55-gallon drums and then pouring concrete on top of them – it was such a waste.

When the SRE generated power to Simi Valley, people there wanted to know if radioactivity would come out of the wall outlets and into their homes. Training sessions included Walt Disney cartoons with Donald Duck, Pluto, Mickey Mouse, that were done just for AI. That way it was harder for guys to go to sleep during the training. Even the engineers would be required to watch them. We had sodium fires but no nuclear incidents in the places where I worked. Polonium is the hardest stuff to work with - it has a mind of its own. Actinium and polonium can be used to start up a reactor.

We didn't stay in just one department as they would move you around based on your expertise. Some guys would come up with the weirdest ideas but they worked. I had four notebooks that I always had with me or in my safe. When I left I turned over 12 lab books of research that went to the library at the University of Chicago. Everything was signed and countersigned either by FGH or TUV. I'm the only one of us left who knows how to build equipment and hydride fuel. I still remember how to build the equipment to hydride the fuel and also how to clad the fuel itself with Zircaloy. The SNAP labs built the reactors for an experimental nuclear-powered airplane and a nuclear-powered locomotive at Area 51. There was so much expertise there. More real research was done there than most people can imagine. If you could put our group of guys back together, with the computers that we have today, they would be able to get anything accomplished now. General Atomics tried to build a reactor similar to the SNAP 8. It took them 2 weeks to make their fuel – it only took us 5 days. They ended up asking us to make their fuel. Yttrium is one of the lightest transition metals. I was the first to hydride it and General Atomics didn't understand how I did it. You have to purify it first – run it through hydrogen to get rid of the oxides. During this time I didn't see the sun for 2 years – I would get to work at Building 1 at DeSoto before sunup and left after sundown and worked in a lab without any windows!

We also made tooling. We did everything – we designed, fabricated, and manufactured tools. The Fermi Fuel Handling Cask was fabricated at DeSoto and was used world-wide. It is also used quite frequently in Japan. Work was done at both SSFL and DeSoto because it was easier to move the piece to the needed tooling rather than the tooling to the work. Stuff would go in the trash and I would pull it out and reuse it. Like Vacco valves that were very expensive. I would rebuild them with a \$5 rebuild kit and reuse them. We would hide stuff rather than get rid of it.

I would do a lot to try and help the colored guys in maintenance. I set up an apprentice program and would tell them: "get yourself trained." I encouraged five of them to take classes and I taught them math. They went to Pierce College in the San Fernando Valley and got apprenticeships. They made more money than just being a sweeper.

We learned an awful lot during the cold war. For every dollar that we put into space we got a 1,000 dollars back. A lot of the things that we enjoy today are because of what we did in the space race – like personal computers.

Interview 108

I started working for AI in 1960, and worked there for a few years as a repro-typist, at the brand new Building 2 at DeSoto. I used an IBM Selectric Typewriter and typed technical reports, proposals, laid-out art work, etc. The nature of the work required that I had Q clearance. I moved away, and upon moving back in 1968, became a department assistant or secretary up on the hill, where I worked continuously until my 1990 retirement.

Up at the SSFL I worked in several buildings, including 38, 39, 487 and 211. I was a secretary in the Engineering Department. There were three secretaries in Building 487 and four or five in Building 38 as I recall. There was a lot of paperwork, including setting travel plans, making reservations, doing reports, etc.

I never had to wear a film badge as I was never in an area with radiation. I did see them pull the core from the reactor from my office in Building 39. The areas with radiological materials were clearly marked, so I never went in them. The hot lab was definitely off limits.

I remember the firings of the shuttle rockets, which were very loud and made everything vibrate.

I knew nothing regarding cleanup efforts there. I do not remember any disposal of wastes in toilets or floor drains, nor was I familiar with any disposal area at the western edge of Area 4. I know nothing about the sodium burn pit, old conservation yard, fuel element cleaning areas, storage tanks or gas holdup tanks, or any problems associated with underground pumps, sumps, piping, sewer or drainage systems. As I was mostly always inside a sealed building, I never wore any type of protective clothing or equipment.

I drove up Black Canyon to work every day, which I enjoyed, except for the people who lived in the Knolls area. They would put up insulting signs and would even throw rocks at the cars going up the hill. I parked across from Building 211 and walked to where I worked, which was usually several buildings away.

It was very interesting to work there. We were always busy, but it was always fun. We were a big family. AEC personnel were up there. My daughter was a Contract Administrator for 17 years there. I brought my lunch every day, as the only other option was the roach coach, and ate in conference rooms. The water up there was not potable, so we drank Arrowhead water. I went on walks with my friends during my lunch hour, often up to the tower, where I saw a lot of wildlife, including deer, rattlesnakes, coyotes, raccoons, etc. People regularly fed the animals. I saw frogs and birds in the supposedly contaminated ponds over on the Rocketdyne side. We had a cat up there too. There was an Indian cave up there, but it was off limits.

Interviewee's husband added: I was a manufacturing engineer at the Canoga facility for Rocketdyne. I worked for Rocketdyne for 35 years, hiring on at the Slauson facility in 1956. I moved to Canoga in 1959 or 1960, retired in 1991, and I have worked there off and on since my retirement on a consultant basis. I worked on the space programs, and went occasionally up to the hill to gather tooling to refurbish back at Canoga. I went up to the hill perhaps 20 times. I saw pallets of tooling flopped down in the sagebrush. I

remember that the Conservation Yard had barrels of oil and partially completed parts, and tooling from the Atlas and Delta engines.

Interview 110

I was a member of the technical staff at SSFL, which was a blanket title for just about everyone. I designed and tested high temperature liquid sodium systems. I can't specifically remember working on anything radioactive. I also worked at the DeSoto facility, but when I moved to SSFL that became my permanent spot. I became an expert in high temperature sodium facilities. My second specialty was as a high temperature stress analyst. I graduated from UCLA with a B.S. degree in Engineering – back then that was all they had, they didn't give specialty engineering degrees like they do today. We were working for AEC (Atomic Energy Commission) or ERDA (Energy Research and Development Administration) at the time and I was a jack-of-all-trades, anything of an engineering nature I would do.

After the failure of the fuel elements in the SRE, I did some testing work to try and determine how the fuel element failure occurred – whether they were actual fuel elements or mock-ups, I do not recall. I do remember the Hot Cell in Building 20 where we examined elements from the OMRE (Organic Moderated Reactor Experiment). I designed the fuel elements or control rods for the OMRE. After action work included Hot Cell examination of the fuel elements that were shipped from Idaho to SSFL in sealed shipping casks. I was looking to see how well my fuel element designs had worked. I was primarily an observer and was examining the fruits of our labor be they lemons or oranges.

What got me started becoming an expert in high temperature sodium systems was that we had a contract with ESADA (Empire State Atomic Development Authority) to run tests on what would happen if a water-filled tube ruptured in a sodium steam generator. One of our major concerns was how the shell of the steam generator would respond to the thermal hydraulic stresses. We put strain gauges on the steam generator tubes to see how they would react – thus a career was born and me and sodium came to love one another!

With respect to impacts to the environment, the only thing that we discharged directly into the atmosphere was non-radioactive sodium and water. Sodium oxide eventually degrades to become sodium carbonate which is just chalk. Sodium oxide is corrosive and it may have landed on a cow or two and their skin may have gotten a little irritated.

We had a test stand, located west of Building 20 and south of the sodium burn pit in the far southwestern corner of SSFL. From this test stand we could watch drums with residual sodium in them at the sodium burn pit exploding into the air when it rained. We could do our tests only when the wind was blowing towards the west – where the cows were, not the people. Anyhow, having gotten hooked on this sodium stuff, I went to Building 6 (the Sodium Laboratory) where there were three or four sodium loops and I managed testing that went on there for some time. I also designed one of the loops. Building 6 is still there – I remember driving by it when I took the tour last year. Eventually in the late 70's I became Lead Engineer for the sodium purification system – I was the man who knew all about it. But not everyone agreed with me in terms of technical disputes! I trained outsiders such as people from DOE on one of the loops in Building 6 to give them a taste of what it was like to operate a sodium system. They actually got to operate a loop. With respect to Building 6, as an example, the company

did not have a strong sense that people performing these tasks should be heavily trained and follow well thought out procedures. The people who preceded me in Building 6 did everything from memory. There were no recorded procedures until I came along. I wrote procedures detailed enough so that my secretary could operate the equipment.

I went to nuclear weapons school in the military at an Air Force base. I remember when Three Mile Island went kablooey, the first thing that came to my mind was that the operator screwed up. I was in “HAZOP” where they put procedures and designs in place to keep people from screwing up. People make mistakes so you have to put enough controls – instrumentation and procedures – into the system to mitigate the effect of human error.

Another example of what concerned me on the hill was the SPTF (Sodium Pump Test Facility). There was a period in the late 70s when I “borrowed” the facility to run tests on a cold trap I designed for a sodium purification system. This was something that ran 24/7 so I had a chance to spend time getting to know the operators who ran this facility – keep in mind that this was a non-radioactive sodium system. They told me that they were like robots – open a valve, do this, do that, and that their training had been minimal. They didn’t really know what was going on. They were told what to do but not why. So I explained to them what my tests were all about. They said that was the first time anyone had explained the process to them.

In my opinion there was not good documentation of procedures. I will not say that at the time anyone was trying to cut corners, they were just told enough to do their job and nothing more. You might say they were “worker bees” and there was no reason to tell them anymore. They were robots being controlled by the next level of management. I know of two instances where performing work by relying just on memory had bad results. During one of my training sessions, a trainee opened a valve on the system we were working on. The system should not have been pressurized, but it was and when he opened the valve, sodium blew into his face. Fortunately he was wearing a face shield and did not get hurt. In the other accident a guy ended up losing his eye.

I recorded all my work in logbooks but I don’t know what happened to them after that. We had reams of paper – strip charts – but no one really cared what happened to them after the Liquid Metal Fast Breeder Reactor program went down the tubes because no one cared about liquid metals anymore.

But sodium purification using plugging meters and cold traps was very important. You could not afford to have oxides in the sodium because they could be corrosive or erosive. Cold traps were used to remove the oxides before they would eventually cause plugging. I developed a new plugging meter by drilling three holes in a gate valve instead of having slots in the plug. I also developed a simple way to calibrate electromagnetic flow meters.

I can only guess that my logbooks were reviewed by my superior. Looking back, I had developed a reputation that my work didn’t need a lot of review. In the end, I would write a report and of course it was reviewed by my superiors, but I can’t think of anything of significance being changed by said superiors. I can only say that I must

have been good at what I did because I survived a half-dozen layoffs due to my knowledge about more than one thing.

Most of us had to wear film badges if we were even remotely working around radioactive materials. I did wear a film badge when I worked in the Hot Cell. We also had blood and urine testing done for concerns about beryllium contamination. I do not recall ever being told that my film badge showed any excess exposure to radioactivity. At DeSoto I participated in fabrication of uranium-molybdenum fuel elements for the OMRE reactor. I also got tested for plutonium exposure due to some work I did up at Rocky Flats. I personally had nothing to do with storage of radioactive materials.

Other than smoke and noise, I know nothing about Rocketdyne. The first time I stepped foot on the Rocketdyne side was during the tour I went on last year!

TCE was used for anything and everything with no thought as to whether it was harmful. The same is true for asbestos that was used for insulation of piping. We were as much concerned with our families and our health that we would not have done anything as stupid as put anything radioactive in the sodium burn pit. It would have been incredibly stupid to burn radioactive sodium in the burn pit. It would have burned the person taking it to the pit first and then they would have had two-headed children! Other than seeing an occasional drum flying through the air, I don't know anything else about the sodium burn pit. I can see the steam generator testing area as possibly having been used as a disposal area but I can't tell you that for certain. I never heard of anyone disposing of anything down drains or toilets that they shouldn't have. Sodium was easy to get rid of and its by-products are non-toxic. Improper disposal did not occur in areas where I worked and frankly, I was one of those people that if anyone had proposed of doing anything stupid like that I would have gone ballistic!

I drove up there every day. It was a bit of a tricky road but I became good at driving it. I never heard of any big trucks going off the road – we would have been aware of any problems like that. Everyone was made aware that this was not a place to be a road racer. If anything ever happened in that respect it has not suck in my mind. Other stupid things have stuck in my mind but none of them would have harmed people down below.

My detailed procedures at the steam generator were followed while I was there, but it's my guess that they were no longer followed after I left. I did everything in advance to make sure that every step in my procedures wouldn't cause anyone else any problems. There was one time I didn't follow my own procedures and I learned how quickly I could climb down a ladder. Professionally, this was the very best time of my life – I became one with the facilities. There was something about my psyche that I got a really good sense about how everything worked.

After I left Santa Susana, I went to work for Bechtel in the San Francisco Bay Area and then went to work at Fluor. Everything I have done since working at Santa Susana has been "paper analysis." I currently do hazard analysis for the petrochemical industry. What I tell people about my hazard analysis work is that as far as I'm concerned, my goal is to keep them from ending up on the wrong side of a courtroom.

Interview 116

I was running tests through the 1960s; testing started in 1959 and we were done by the start of the 1970's. We started with the Kiwi A series in the summer of 1959 that ran until October 1960, for which we only supplied the nozzles. The Kiwi A reactors were makeshift reactors for testing; whereas the Kiwi B were 35-inches diameter and 52-inches long, and rated at about 1,000 megawatts (MW). For the Kiwi B tests, of which there were 5, those ran from December 1961 until August 1964. They ran up to 1000 MW and used liquid hydrogen. The reactors were used to supply heat to get the hydrogen up to 5,000 degrees.

The next Rover Program series were the Phoebus tests, which consisted of 3 devices. Phoebus IA and IB were rated at 1,000 and 1,500 MW, respectively, and IIA was rated up to 5,000 MW. Phoebus II had a 55-inch diameter core designed to achieve 5,000 MW. We got it up to 4,150 MW after which Los Alamos National Lab (LANL) switched to the smaller Pewee design in December of 1968 for the final tests of a new fuel type. The NF-1 reactor was operated as essentially a "nuclear furnace" for the new fuel tests that were conducted in June and July of 1972.

In parallel with the Phoebus Program was the NERVA Program, involving a joint team of Aerojet and Westinghouse. It used a series of 6 reactors on the order of 1,100 MW and was separate from the LANL Phoebus program for the Rover, except for the conduct of the NRX reactor tests. The maximum test took 61 minutes and we achieved 1,100MW. I was one of the test conductors who was tasked to make sure they got the liquid hydrogen to the correct temperature. The original purpose of development was to create an actual flight engine to be used for both exploration and manned Mars missions.

We were ready to design and build the flight engine, but interest was curtailed by the government, even though it originally had the support of President Kennedy. He came out to Nevada and I have pictures of him at the site. The government as of the late 90's started and stopped showing interest in the Mars program. Because of our test activities and successes, the Russians got interested in manned Mars missions, and I started interacting with them and was invited and went over there 3 times. The Russians are continuing their interest to try and initiate manned Mars flight, and their leader, a colleague recently sent an e-mail to me stating that they will begin with nuclear propulsion. Our administration terminated the program for missions returning to the moon and the current 2011 budget is structured to only continue the series of interesting technical work but with no manned missions being planned.

The budget has accommodated technical work in 3 kinds of nuclear propulsion thrusts; 2 involving electric propulsion, and 1 which is a continuation of nuclear thermal propulsion. There is nothing focused on manned Mars or Lunar manned missions. VXW, my partner who is retired but still working as a consultant, and I have been looking into what it would take to have a manned mission capability in 15 years, although there is a fast track program of 7 years. We would like to see if we can get within the President's budget for the start of a recovery of proven capabilities, and see what is needed for propulsion within next 15 years. We gave presentations to our two senators from the State of California, as well as relevant DOE and NASA officials on the various approaches to achieving this capability.

My initial objectives were: 1) full retrieval of capability to produce and deploy "proven" composite fuel elements, having hexagonal cross-sections, 3/4-inch flats, and 19 holes down to 52 inches. By proven, we mean proven in a reactor, as well as on the rocket engines, with the capability to heat hydrogen to a temperature of approximately 4,750 degrees Rankine with a life expectancy for the reactor of 10 hours. Both Oak Ridge National Laboratory (ORNL) and Idaho National Laboratory (INL) have been involved in the first work focused on new element development, operable at 3,100 degrees Kelvin, and to increase impulses to better than 1,000 seconds.

I have written a paper with Westinghouse on the design of a superheat nuclear thermal rocket engine using composite fuel elements that is cooled with liquid hydrogen. The composite fuel consists of a carbide dispersion matrix rather than spherical. A couple of good contacts who were working in this area are WYX at ORNL and XZY at NASA Marshall Space Flight Center. There are also some people at Glen Research like YAZ, but unfortunately he got into the NERVA program about the time it closed down. It was designed to develop about 15,000 to 25,000 pounds of thrust, and could also be used as source for nuclear power generation.

After that introduction, let me spend a few minutes talking about Rocketdyne. My very first responsibility, after I left General Electric (GE) and joined NAA (North American Aviation) in 1953, was concerned with eliminating combustion instability in high-thrust, oxygen-hydrocarbon fueled thrust chambers. At that time it was aerospace technology that was pursuing development of rocket engines. Up to 1956 we made trips to central Los Angeles where they did the engineering, but all testing was done up on the hill at SSFL (Santa Susana Field Laboratory), which due to that intensity became night and day operations – we were there when all the smoke and fire went out over the west end of the valley.

At same time Atomics International (AI) had a division getting into nuclear energy, and in January 1956, AI and Rocketdyne were formed. Prior construction was ongoing on the Canoga Park facility where both divisions activities were performed. The emphasis shifted to bigger elements and I was pulled off the hill and made the leader of Advanced Propulsion as Program Manager, with responsibility in: advanced chemical propulsion systems, nuclear thermal propulsion systems, electric propulsion systems, and ion propulsion systems.

I had a total of 11 people working for me when doing testing at SSFL, and got involved in working with nasty propellants, the type in which 2 substances were brought together. We also looked at propellants that needed ignition during the Kiwi A testing in Nevada from 1959 until 1961. We were investigating the utilization of gases as coolants, so we had to do testing of mixtures and nasty propellants as AI was getting set up for their systems. The test reactors were originally right inside the gate at the "Old B-1 area," and there was a lot of concern about the existence of nuclear environment, so we were messing around with lots of different weird propellants.

During this time Rocketdyne began the construction of engineering facilities at Canoga Park. The Canoga Park facilities were completed and AI started up with a test area. Although it was a small facility, it had a room with a hot cell where one could generate rather intense nuclear radiation, and my group took over this room.

I received my highest exposure while working on Kiwi B at the Nevada Test Site (NTS). I needed to look at the condition of the nozzle, so was given instructions on how to do so. I could have had the nozzle separated from the rest of the reactor assembly and looked at the nozzle condition, but for no more than 30 seconds. They put a rope around my belt and when my 30 seconds was up, they would pull me back. I was told, "We don't know how much radiation you got," but my film badge was completely dark.

We also created a TNT test that was conducted at Test Cell A in Nevada, but it was outside (not inside) the cell as would normally be the case, and about 400 yards away. Everybody moved away and we brought it up to full power and beyond, until the reactor blew itself apart. After destruction, LMP with LANL (the full time local director) and I looked at the pieces, and each of us got over 10 Roentgens.

Out of the total number of reactor tests I was involved in, I got radiation from 16 tests, and now I just want to get to the point. My father, who was a professor at Michigan State, passed on 6 weeks after I enlisted in the Army; he was 56 years old. My mother lived until she was 79, not just quite 80, and my older sister lived until not quite 83. Here I am at 87, and who knows how much longer I'll be here, but I received a lot of radiation here at SSFL and everywhere else, as well as being exposed to the combustion of all the chemical reactants.

Just recently, a 116-year old woman in Japan died who was at either Hiroshima or Nagasaki, I don't remember which. Several of the Los Alamos workers and scientists who received a lot of radiation have recently died; one colleague, ZBA, just passed away at 92. A couple of other long time LANL colleagues are ABE and BCF who also received a lot of radiation over their careers. The point I am trying to make is the contention that anyone associated with SSFL or down the hill to the extent they have been exposed to harmful materials—should look to paying the government for all the good radiation they received!

Around this time I become involved with lasers. I got interested through Stanford University where CDG was developing the Free Electron Laser (FEL) Program. We supplied some hardware, the undulators—commonly called "wigglers." Other people got interested in FELs, and CDG moved to Duke University in North Carolina, and he took his equipment, including our wigglers, with him! CDG was there at Duke for a number of years where he spent half of his time using lasers for medical purposes and treating people, and the other half for performing his own research. Well, Duke wanted him to spend all of his time on treating people and CDG wanted to do research, so he left and is now at the University of Hawaii.

I worked with researchers at LANL creating another FEL for fusion research called the Helios, where we had a contract with them developing the optical system until late 1980's. Other laser work included collaboration with the University of Hawaii which had created the Institute of Laser Engineering (ILE), and with researchers in Japan who had the Gekko XII Facility, which was still being used until a couple of years ago in Inertial Confinement Fusion (ICF) research. I understand LANL has been using an e-beam, and will ask one of my grandsons who is getting his PhD at Berkeley, to look into if LANL is using FEL to drive fusion.

I was all over the place at Santa Susana, and was up there intermittently until the mid-1960's. I am not sure how much of my exposure was from the site, as I said my highest exposures were at NTS, but it was broader than nuclear—the chemicals in which we were immersed were much, much worse, but we didn't know that back then. I will never forget the time we had a mishap near my office. The warning horns started blasting and 3 or 4 guys, at least 3, staggered out of the middle of Test Area I from exposure to chemicals.

With regards to documentation, the most significant change was when we moved down to Canoga Park and we had to deal with classified documents, which were checked in and out. I had a secretary who maintained my current notes and work. My current wife was my secretary for the first 5 years (1960-1965) I was down at Canoga Park.

We did have Standard Operating Procedures (SOPs) in place as we were not ramshackle at all. When I was section chief 1960-1970, there were 80 people who worked for me. Where CTL III is located we would do liquid hydrogen testing for the proposed J-2 engine, later used on the Saturn 5 launch vehicle of the Apollo Program, and nuclear program testing—we were kind of pioneering in those days. The initial test area was not far from where the offices were, by the Chemical Test Lab (CTL I) where we were developing the nasty propellants—that's where the explosion occurred where the 3 people came staggering up the road. I have no knowledge of the disposal of hazardous materials—we just accepted it, but during tests materials were dispersed all over the place.

I have copies of the documents I wrote which were printed, and the group working for me kept logbooks, but I don't know what happened to them. You can ask a couple of the guys, DEH—who worked for me, EFI, or FGJ, they have lived around here fairly close.

As for nuclear materials, at that time I was unaware of how nuclear materials were handled, but one good guy to talk to is the current owner of the Los Angeles Lakers. He was the top official of Atomics International back when Rocketdyne was closely affiliated.

Finally, thinking about working at SSFL—it was so easy. I shared rides with a couple of other guys and we had fun coming down in the evenings. We would turn off the headlights and see how fast we could drive down without going off the road! And the work—we were doing stuff that hadn't been done before. I can't think of anything in my mind that is washing down from the area that is harmful to anybody. I started working on nasty propellants while getting my PhD at Purdue University—red fuming nitric acid and aniline, maybe we should have been more careful, but we weren't.

Interview 117

I started working at the Santa Susana Field Laboratory (SSFL) in 1957, but was hired by AI predecessor Nuclear Engineering & Manufacturing in 1955 in Downey as a chemical research engineer. In 1956 I transferred to the Vanowen facility, and then finally to the hill in 1957, where I worked in Building 3A until 1961, when I transferred to DeSoto. Building 3A was where the hot caves were. I was full time at Desoto until the early 1980s, but had numerous assignments back up on the hill. I was transferred from DeSoto back to the hill in the 1980s, where I worked in Building 6 until my 1996 retirement. I was never involved in production or manufacturing, but spent my career in Research and Development, and Engineering.

I was in AI and its derivative organizations the entire time of my employment. I did no rocket work. The Building 3A hot caves was a shielded facility, holding up to 1000 curies of radiological material.

I never worked at the SRE. I wore a film badge until 1965. I had worked with uranium and fission products up until that time, but not after. I received 14 roentgens (REM) of exposure during the early years. There was a lot of radiation waste early on, the most radioactive of which was packaged in one-gallon paint cans. Some of them required shielding. The RMDF handled the disposal.

Hazardous materials I worked with include sodium, caustics, acidic materials, small quantities of lots of different solvents such as acetone, benzene and chlorinated solvents. The cleaning solvents were used in small quantities. I was involved in a research program for the handling and treatment of hazardous waste. The facility was licensed for hazardous waste management, and that which was produced was packaged and transported off site. I oversaw the techs doing the packaging and shipping. The waste in the laboratories could only be stored there for up to six months, after which the transportation group obtained the waste, which was shipped off site. As my time was spent in doors, I have no information regarding possible dumping at the SSFL.

One of the projects was developing the recycling of nuclear fuel. AIROX was something I worked on, which Korea uses and Japan is interested in. It converts oxide nuclear fuel to a powder, which is then re-enriched and reused.

Cleaning of fuel elements occurred at the cleaning cell at the SRE as well as fuel element cleaning at the hot cell unit. I worked in neither place.

I understand that the sodium burn pit was a mess, but I never went there. A vapor trap that I invented somehow ended up there, and the personnel there went to the time and effort to take it apart instead of asking me. (The vapor trap removed sodium vapor from the helium and argon gas in a reactor. I had at least six patents for items I developed.) Communication is a common problem at secure facilities, as there is a lot of compartmentalization. That meant that people did not know what other people were working on or doing.

Protective gear that I wore included coveralls, shoes and rubber gloves. The only time I wore a respirator was when working in the hot caves.

I created a number of reports, such as technical reports and laboratory records, but did not keep any of them. I retained a couple old publications as well as some photographs of people I worked with. All photographs were taken by the company photographic department.

There was little formal training early on by the company, and then training started to be required by the government at some point, such as with OSHA and other agencies. Al also had other types of classes up there, such as mathematics and other subjects.

The Conservation Yard was a junk yard; I walked there all the time on lunch breaks. I would often look to salvage materials from there. To my knowledge no hazardous materials were stored there, mostly scrapped materials. A lot of good stuff could be found there, including unused items.

I was involved in no decommissionings.

I had no experience with or knowledge of liquid materials disposed in toilets or floor drains; a surface disposal area at the western edge of Area 4; any of the leach fields, septic tanks or drainage discharge locations; any storage tanks or gas holdup tanks; or problems with underground pumps, sumps, storage tanks, piping, sewer or drainage systems.

I really loved working there, I wouldn't trade it for anything.

Interview 118

Before we start this I just have one question—what is this nonsense of the EPA trying to find something where everyone knows nothing exists still going on? I lived in Simi Valley for quite a while and we switched over to Colorado River water in the late 60s, so no one from around the site drinks the water. The rain water goes down the Simi arroyo, and they have checked it forever and never found any instance of contamination. The EPA is a dubious outfit and they make mountains out of mole hills.

I started with North American Aviation (NAA) in 1955 and I worked on designs on various reactors—mainly at first at the SRE (Sodium Reactor Experiment) and then later at the OMRE (Organic Moderated Reactor Experiment) in Idaho Falls. I worked on fuel handling equipment and other reactor parts. I worked for 35 years for Rockwell which was NAA.

The reactor had a big problem sometime around 1963 and I was in charge of shipping damaged graphite moderator cans to Beatty NV. I designed the shipping casks that they were transported in to Beatty. I went to the Beatty burial site which receives about two inches of rain per year. They took the graphite moderator cans in the containers, and put them into a dirt trench. The moderator cans were inside of a stainless steel canister. They dug a trench and buried them. There was no concrete involved. Beatty is one of those wide-spot-in-the-road towns -- a really small, small town.

I handled radioactive materials. I spent a couple years at OMRE in Idaho. It's been shut down for a while. I used to carry around new fuel elements. We always wore film badges for radiation exposure at everyplace I worked, except for Canoga Park. I wore a dosimeter as well. OMRE is in the national reactor test station outside of Idaho Falls. What was life like up on the hill? I didn't spend a lot of time up there, just when there was a piece of equipment that needed to be tested.

In 1985 I worked for ETEC as a manager--at that time we were working for Rockwell International. Some of my people were in charge of the demolition of the SNAP reactor facilities. A man named QRU was a structural engineer in charge of that. He was working for Rocketdyne last I heard but he could have retired. SRE demolition person in charge was TUX and UUY – I can't remember his last name—those two guys teamed up together to do SRE demolition. They worked for Rockwell International as well. When they decommissioned that whole site they poured concrete on everything. The problem was they poured concrete and nobody had done a survey on the background radiation of the site before anything was built. So they had no reference point to compare to—but nobody thought of that in 1955. There were many, many dump trucks of slightly radioactive material that was hauled away and I don't know where they took it. No one had ever taken a radiological survey before the site was ever built so how would they know how clean it was? When they said the area was clean who's to say they were right or wrong.

I was at SRE after they had the incident after the moderator cans. People were cleaning up over the main area over the reactor. I had a film badge and dosimeter. I haven't had any problems with bad effects at all. I didn't have any significant exposures. I turned those badges in every week and if you had a problem they'd let you know. How about all the foxes, birds, raccoons—even the occasional mountain lion—and snakes?

There was a lot of wildlife in the area and if there were any effects they would have shown up in them.

We produced some fuel elements at our facility at Canoga Park, but not for SRE. Those were for the OMRE. The fuel elements were stored in some kind of very safe facility. They also had a Cobalt 60 radiation source that was used for experiments there at Canoga Park--it was used for food irradiation experiments to see if they could kill the bacteria in food.

I also worked on the designs for the kinetic energy water boiler (KEWB). I designed some of the gas tight doors and control rods. I never personally did work on the SNAP reactor. They were in operations and they did experiments on those little reactors, but it failed after 90 days in space. It was launched from Vandenberg. They couldn't control it—something in the electronics—and they left it out in orbit but I'm not sure if it's still orbiting.

I cannot recall any off-normal events – something that didn't go exactly as planned, other than the SRE. With regard to radiological waste disposal, as I mentioned earlier, I designed shipping cask and canisters for getting rid of the graphite moderator cans. This was special – we didn't have any place to dispose of it on site. In the early days they'd ship minor contaminated stuff, mainly wipes and such, and put in drums and take them out to the ocean. They'd put them out in the ocean and sunk them. I don't recall where it was taken after they quit dumping it in the ocean. It wasn't like we had a pit out there and covered it up – nothing like that ever happened.

When I was at the National Reactor Test Station (NRTS) in Idaho Falls, I looked from the top of a pool-type reactor and saw the eerie blue glow in the water. That was an experience.

I don't have any knowledge of the Old Conservation Yard. I'm sure there probably was one, but it wasn't anyplace I remember going to. If you want to find out, you should ask old TUX, he was living around Palmdale. He was about 10 years older than me, so that puts him around 80. He was a World War II veteran—he was a bomber pilot and got shot down and captured by the Germans. He escaped and went all the way across Germany to Russia—he was a pretty sharp guy—and could probably tell you all about it if it existed.

I have no recall about anything about chemicals or solvents at Area IV. We used to have a sodium spill from time to time and put it out with a dry carbonate powder. You can't put water on it—that just adds fuel to it—it even reacts with air and the water molecules in air.

I did visit the hot lab up there at SSFL Area IV. When I was at OMRE they used to ship fuel elements to the hot lab for metallurgical examination. We had two lead casks to ship the irradiated fuel in to the Hot Lab. That's the one with the remote manipulators and the leaded glass. That was at Area IV. They had a lot of radiological material there – three big cells. They were all lined with stainless steel and every once in a while we had to clean it.

Training: when I first got there I took a class run by a whole bunch of our PhDs and experts in all kinds of phases in nuclear engineering. One of them was KMN —he was

a good friend of mine. He was a sharp guy. He was older than me too. The last time I saw him he was on a breathing apparatus. He's probably close to 90 years old by now. A lot of our early people came from Oak Ridge, some out of Berkeley too, and some of them just out of aviation.

One of our early nuclear shielding experts was a guy named VWZ. VWZ lives down there by the Los Angeles airport. I don't know if he's living or not. He's a little older than me. He'd find out what the source of radiation was and tell us what kind of shielding to use. He would find out the level of the source and would tell you need so many inches of steel and so many inches of lead. He also looked at radioactive gasses. Very sharp guy. Worked with him on a lot of projects. A lot of the guys were older than me and must be pretty old now. Like me, I'm 76 already and I was one of the young guys there.

They used to do demonstrations in the sodium burn pit there every so often. They would start a sodium fire and show you how to put it out—so it was used for training purposes. The sodium was not disposed there—it was shipped out. I think the sodium was transferred to ETEC and shipped out. It was never permanently disposed of on site that I know of. They had a big sodium loop at ETEC, where they were testing the longevity of valves, pumps, etc. different things like that.

We didn't keep records other than highlights and monthly reports. In Idaho we had to write a monthly report because I was working at the reactor site. There were cold, long winters. We had organic moderator coolant – Ortho-metaparateraphenyl. It was like wax—it would be solid up to about 195 degrees. We did a number of experiments there that had nothing to do with Area IV.

I can't remember much about hold up tanks, underground tanks or leach fields, but I'm sure they had some tanks like that up at the SRE. Sometimes they had to drain the whole system. I suppose that they had a tank big enough to hold all the coolant—because they drained the sodium out several times over the life of the SRE. I guess they drained it to big tanks. I designed the moderator cans grapple when SRE was being put together that grabbed the top of them. It was my first job other than part time work. I worked for 35 years and survived many layoffs. I retired at the end of 1990.

I don't remember anything going down toilets. The people up at the SRE would use Kotex to clean up—you would see technicians walking around with Kotex hanging out of their back pockets. They used Kotexes for cleaning. What they did with them after they contaminated them I don't know. I guess they went out with the other slightly other contaminated material.

The moderator cans had welding defects. The Zirconium cans were heated, cooled, and eventually got cracks in the welds. It was the weld between the casting and the thin skin. During heating there was some flexing in the moderator can, and the outside of the cans were pretty thin, and there was some welding in between which developed small cracks. One of my friends re-designed them and then the plan was to restart the reactor and the project, but then they cancelled it. That was the end for SRE. There was another problem, but this time it was with the Fuel Handling Machine. The original fuel handling machine got a fuel element stuck in it. Some of the wire wrap around the elements came loose and jammed it inside. They had to make a new fuel handling

machine and the broken one sat up there for a while and I wasn't involved with that. That had a radioactive fuel element in it and it sat in the corner for a long time. It sat there because it was in a lead shielded machine.

Someone shot or captured a mountain lion at ETEC. There was a lot of deer. You couldn't have a red-tailed hawk feather in your possession. I found one on the ground and picked it up and took it home. Even if you found one on the ground you weren't supposed to pick it up.

I used to hear the rocket engine tests go off and watch the big blasts. They weren't too far away.

You might want to talk to TUX. He lived between Palmdale and the first town you get to when come out of the valley. I haven't talked to him in a long, long time. You should talk to him and ask him where they shipped all the material from SRE. He would know where they took out many, many dump trucks of dirt from the SRE down the hill.

I remember him telling me they had a guy from YZC's outfit and he used plastic explosives to get something out of the SRE when they were decommissioning it. Probably something that got corroded and they couldn't take the bolts apart or whatever. The guy said YZC gives you a broom and dustpan and tell you to start sweeping. The idea was he wanted to see if you could follow orders, and if you complained you wouldn't get a job.

When I was at ETEC I had a jerk of a boss named WXA. He was in charge of the engineering department. He was a second line manager—he was a little man—he had the "Little Man Syndrome"... He thought he was God's gift to the engineering world. He had quite a temper too. We had some pretty sharp people at ETEC. We had a machine that was designed to test earthquake snubbers for buildings to help them withstand an earthquake. We did vibration tests on piping, sodium valves, and then we tested a steam generator in our main sodium loop. And then we tested a great big steam generator from Westinghouse that came clear across the country. They had to get an extra tractor or two to get it up the hill. We put it in our sodium loop and ran sodium through it and produced steam. It took special road permits to come across the country and it took a couple of months to get here. We had to get portable cranes to get it off the cradle and in place to weld.

I will tell you why WXA was such a jerk. My team was working on some job for the Navy – working about 60 to 70 hour work week and really working hard. WXA said, 'I expect you to do this and that' and came up with a schedule without consulting people who were doing the work. We went from one job working overtime and just backed up jobs end to end and my guys refused the overtime any more. He didn't know how to handle people. He was a stress analyst that came from Cal Tech. He came in second in his class. We hired the valedictorian from his class and WXA resented that. He was very good technically and was a horrible manager. They wouldn't let me hire any new people until I got down to three left. Then I had to hire job shoppers. If they didn't shape up I'd fire them in 2-3 days and get another one.

There was a diesel tank up there in Area IV we used to fill some of our vehicles. Sometimes diesel would spill and they had to haul a lot of dirt out of that area where the

tank was. I'm sure XYB is still living and is probably about 60 years old by now. XYB was the guy who helped decommission a lot of those SNAP facilities and reactor sites. Another very smart engineer. If you get a hold of him he could tell you how they did the commissioning. He used to live in Canoga Park but that was probably 7-8 years ago when I talked to him last.

If they are going to spend all these millions of dollars on a survey and the amount of time people will be in the area around it they won't get any exposure. I'm sure there aren't any gamma hot spots up there. What are they going to do with the information?

Interview 126

I started working at the Santa Susana Field Laboratory (SSFL) in 1988, and was laid off 16 months ago, being the last plumber on site, in April 2009. I have been in the trade for 35 years, and was a member of the UAW. I was a Plumbing & Pipefitting Mechanic-Senior when with Rocketdyne, but when Boeing took over I was demoted to Plumbing & Pipefitting Mechanic. I worked in all areas of the SSFL, including on every test stand. My work was strictly on water and natural gas lines, except for a few remote buildings that had propane. I was based in Building 204 in Area 4 with other Maintenance Department personnel, and had essentially the same responsibilities throughout my entire tenure. I worked the first and second shifts, and worked in all areas: 1, 2, 3 and 4.

Operations began on the hill in 1946, so the water lines there were very old. There were leaks every day, and maintaining the piping was never-ending work. Pipes would sometimes freeze and blow up during cold weather. There were big lines there too, up to 48 inches. The lines were above ground except when crossing roads.

I worked on the decommissioning of many of the buildings there. My job was to cut the gas and water lines, cap them, and reroute. I operated a backhoe during this process.

There were underground tunnels around the test stand areas in Coca, and sometimes groundwater entered the tunnels, so it was part of my job to pump it out.

A lot of water was used in flame buckets at the test stands. It was originally reclaimed water, but eventually changed to fresh water.

There were eight tanks up at Skyline, (above the SSFL,) several with 100,000-gallon capacity, and one was held 1 million fresh-water gallons. Their purpose was for fire protection and for use at engine firings. It was originally reclaimed water that was used up there, then it was switched to fresh water 15 years ago.

There were four ponds on site, Silvernale and R2A in Area 2, R1 in Area 1, and the Perimeter Pond. They were used for water storage, and each had aerators. Silvernale was approximately two acres in size. R2A was smaller, but was 16 feet deep, and was located near Bell Canyon. R1 was near the Bowl. The ponds were connected to each other, and levels were maintained by flowing to each other through manual controls. When needed, they emptied to portable Baker tanks. Silvernale was near the test stands, and a mixture of fuel and water emptied to that pond from them. Whenever R1 would over flow, effluent was designed to flow into a creek down to a perimeter pond located about 1/2 mile away in Area 3. Whenever the perimeter pond got too full, it was pumped up to R1 to prevent overflow into Bell Canyon. There were occasions when there was too much rain and the pond could not be prevented from overflowing into Bell Canyon. A monitoring station in Bell Canyon, operated by some agency, monitored the outfall flowing into to canyon to insure it did not exceed permitted standards. If standards were exceeded, Boeing would be issued a notice of violation.

There was a filtration plant for contaminated water that was installed by contractors on site two years ago. Filtered water was discharged to the creek at Bell Canyon. I understand that the SSFL was fined on occasion for contaminants being discharged. OPQ at Boeing would have the most information on that.

The site originally received all its water from wells, of which there were 13, but the SSFL little by little switched over to water from Calleguas to where it completely relied on Calleguas water 15 or 16 years ago. As various areas closed down, so did the adjacent wells. I don't know if there was any contamination in the wells.

There were three sewer plants there that we maintained as well. Precipitation would cause the sewer system to overflow, which included two 10,000-gallon tanks in the ground, so portable 20,000-gallon Baker tanks were used to hold the extra waste water. IJK was employed to haul the contaminated water off site for disposal or treatment.

Chemicals were generally used by mechanics at the test stands. We used chlorine and caustic soda for water treatment, as well as other additives. The cost for chemicals to treat the water was \$300,000 per year for all three plants.

I wore a film badge and dosimeter for work in Area 4, where I was required to suit up in a bunny suit prior to entry. I was checked thoroughly for radiation exposure after doing any repairs there, as well as my tools, but work occurred in areas with potential for low doses of radiation. Sometimes tools were hot, so they had to be removed. LMN was the person who checked people and equipment for radiological exposure. I didn't wear a mask or other protective gear unless it was part of cleanup activities at a decommissioned site.

I kept daily logs of water ph levels. I also kept maps of all piping at home in case there was a leak, so I could talk on site personnel through the proper response procedures if I was at home. I would then take care of the problem the following day.

I knew about leach fields up on the hill, that they were there in the early days before the sewers were brought in. The sewer lines that were there were old clay pipes with leaky joints, which I would estimate caused 10% of the contents of the sewer lines to percolate to the ground. People dumped to the sewers through either the toilets or drains as evidenced by the readings we got on the discharges, even though people were told not to do that.

I knew about the Sodium Burn Pit but had no experience with it. I had no experience with the Conservation Yard. I had no experience with or knowledge of a surface disposal area at the western edge of Area 4; septic tanks or drainage discharge locations; any storage tanks or gas holdup tanks; fuel element cleaning areas; or problems with underground pumps, sumps, storage tanks, piping, sewer or drainage systems.

I loved my job, really liked working outside up there. There were a lot of deer and all sorts of animals. I drove up Black Canyon to work every day, parked right outside Building 204, and used company vehicles while at work. There used to be van pools for employees there. For lunch I either used the catering trucks or brought my food from home. I used to go on 5-mile runs during my lunch hour, and I was on the Rockwell track team for the Corporate Games in Irvine.

Interview 128

I was hired by Rocketdyne in 1961 shortly after graduating from high school, and worked at the Canoga plant until my 1973 layoff. A former manager had transferred to the SSFL, and he hired me, so my layoff was only approximately two weeks. I worked on the hill until my 1998 retirement. My father also worked for the company, starting at the North American Aviation plant in 1952. We were a Rocketdyne family. While I worked in Area 4, I visited the other areas occasionally.

I was a computer programmer, starting in Building 436, then Building 427, and then Building 19, where I spent most of my time. I was not actually in the office a lot due to the type of work I did, but I also spent a lot of time in the test facilities, HTF, Bowl, Building 57 and Building 13. Many places make a distinction between a systems programmer and an applications programmer, but at Rocketdyne we did both. We wrote programs to allow the computers to acquire data from the test stands, and provide it in a meaningful way for the engineers to review. I worked on the Apollo and Space Shuttle engine projects, and was able to witness many of their spectacular engine firings. I provided the reports to the engineers, but little else was generated in the way of reports or logs.

When I started in the Data Management Department on the hill there was the manager and three employees. We grew to as large as 10 people in our department, but by the time I retired, I was the only person left.

The company provided no training on the computers, which were Hewlett-Packard mini-mainframes. They just gave us a manual and expected us to go to work. HP did have some training when new computers were bought. Other training was primarily on safety, specifically on the handling of sodium, which I never did.

The computers were extremely reliable and very powerful. The computer at SCTI monitored 1300 sensors at 10 times per second, recording the values at varying intervals. It also had 20 or 30 alarm systems. The amount of memory on the computers varied from 750KB to 1MB, but the efficiency of the code allowed the computers to be very fast. We kept backup tapes on site for seven years per DOE requirements, and then they were stored somewhere else off site.

In the Data Management Department, we each took turns being in charge of various tests. Building 13 and HTF were both mine, so I was there a lot, perhaps 30-50% of the time. We worked days, but our schedule was flexible as long as we got our eight hours in. We started anywhere between 6AM and 8:30AM. We were on-call 24/7, and if there was a problem after hours, it was generally "pilot error," which we could direct them to fix from over the phone. Perhaps 10-15% of the time I had to go back up to the hill to resolve the problems.

I never wore a film badge or dosimeter, and was never in any areas where radiological materials were stored, used or disposed.

I never handled any hazardous chemicals, but the toner in our printers was considered a hazardous substance due to its paraffin content. The toner bottles were disposed of in blue barrels, which had to be hauled out every three months. We had an MSDS for that toner, and the disposal and handling generated a lot of paperwork.

I loved driving up Woolsey Canyon every day, and I parked at whatever building I was working that day. There were deer quite frequently in a little glen before getting to the fire station up there, and people had to watch for deer running across the road at dawn or dusk. There were scorpions, rattlesnakes, mountain lions, and lots of mice. People frequently threw coffee out the back door in one of the buildings, and one of the ladies opened the door to throw out some coffee and was met by a rattlesnake coming in. The mice were in and on peoples' desks quite often, and often left evidence behind. The guys in the office took turns on mice control, checking on all of the mousetraps set up in the office.

During the lunch hour, I frequently walked up to the water tower. Rattlesnakes generally stayed in the tall grass instead of coming out in the open, so they were not any trouble for people staying on the trails. I remember seeing the writings in the Indian Cave, which was eventually closed off to all employees. I also played hearts there during lunch, and they were serious about it in Building 38. We kept a running tally of our points, and the winner at the end of the year got their nickname put on a perpetual trophy, which they could display in their office for the next year. I also knitted at lunch.

It was good working there, people abided by the procedures, and we were like family. I remember one of the programmers played trumpet in a band in Northridge, and we'd get a group and go down for some of his noontime concerts. We were very close, in fact, I still keep in contact with some of them.

Interview 131

I started working at the Santa Susana Field Laboratory (SSFL) in 1956 as a mechanic, and worked there until 1970, at which point I was transferred to the Canoga plant for a few months before being laid off. I was with Rocketdyne the whole time and never at AI. After working as a mechanic for a few years, I worked in Budget Control, after which I worked in scheduling of manpower at the SSFL, Edwards Air Base and Sparks, NV. All of my work was in the Engineering Department under Research and Development.

Most of my time was in CTL4 and CTL2, but I started at CTL1. I still have the CTL manual from when I was hired.

I never worked at the SRE, and only knew of the meltdown from reading about it in the newspaper.

I did not handle radiological materials or waste, nor did I wear a film badge or dosimeter.

Hazardous materials I was around included NTO, hydrazine, ammonia, JP4, peroxide and hydrogen. I had no experience with hazardous waste. The materials we used would get burned up in the tests, so nothing was ever hauled away.

Protective clothing was limited to a hard hat, however, when around the ammonia I wore a Scott air pack.

I did not handle sodium.

I used TCE to clean everything. It was the only thing we used to clean with, and if it spilled, we washed it off with water.

I remember an explosion at a tank containing peroxide, but no one was injured.

Most of my training was on the job, however there were safety lectures that were routinely given, especially if new fuels or chemicals were being used. I took evening college classes at Rocketdyne's request.

I had no experience with or knowledge of liquid materials disposed in toilets or floor drains; the Sodium Burn Pit; a surface disposal area at the western edge of Area 4; the old conservation yard; any of the leach fields, septic tanks or drainage discharge locations; any storage tanks or gas holdup tanks; fuel element cleaning areas; or problems with underground pumps, sumps, storage tanks, piping, sewer or drainage systems.

When I started, we worked nine hours a day and six days a week, which eventually transitioned to a 40-hr work week. It was an interesting job where I was treated well. There was a lot of togetherness, with BBQs and picnics. I enjoyed what I was doing.

Interview 135

I started about 1974. I transferred to Atomics International (AI) from Rocketdyne where I was working on the Apollo program. I also worked on the F-1 main engine valves – for a while I was the worlds expert. I was a valve engineer but they put me to work on pumps. I worked on the Byron Jackson pump at the Sodium Pump Test Facility (SPTF). I did component engineering of various valves and specifications for the SPTF mostly. I was a Project Engineer for the SPTF and the Component Handling and Cleaning Facility (CHCF). That was Building 463 – right next to the SPTF which was Building 462. Pipes would be lowered into the cleaning tank with a 3-legged derrick and then put into test position. There was a large clean tank with alcohol that was used to clean the sodium from the pumps.

The sodium burn pit was in operation before I got there. AI used it a couple of times and then it was closed down when Rocketdyne took over AI. When they were building the cleaning vessels for the SPTF on the far western side of the SPTF building (which was Building 463), they ran across some really nasty stuff that was obviously left over from prior operations. It was clay mixed with sodium and alcohol residue and sodium hydroxide. It was yellow orange in color and had a very nasty smell. This was before there was an environmental group and they just left it there and constructed Building 463 over it.

I was also a Project Manager at the Sodium Component Test Installation (SCTI) working on the steam feed system and then became Program Manager for the SPTF. I worked at ETEC for about 10 years. As the AI Industrial Facilities Manager, I had no jurisdiction over ETEC. I was associated with the decommissioning of the SRE and decontamination of the fuel rods. We funded some Operations folks so they could go mining for stuff that they had buried over the years. We tended to get rid of low level radiation hardware and residual sodium by burning it in the area of the Building 56 landfill. KLO ran the clean up for the burn pit.

When Rocketdyne acquired AI, I became manager of industrial engineering. I had projects going all over SSFL but mostly for Rocketdyne. I changed career paths 3 or 4 times during my 35 years with Rocketdyne/AI - although the basic skills were still the same, there were some differences in terminology.

At the SRE there were still some rods buried in the floor and at the Hot Lab, fuel rods were taken apart and shipped to Hanford for disposal. Any liquid sodium and any sodium waste was shipped offsite.

I drove up to the lab every day. There were 400 employees at ETEC – it was like a little company. When I would have parties at my house there would be 12 of us from work in the hot tub!

Sometimes I brought my lunch and other times we would go off site for lunch. The cafeteria was gone before I got there. There was also a roach coach where you could get lunch. They had to widen Woolsey Canyon Road in order to get the steam generator for the SPTF up the hill.

I didn't wear a film badge at first, but later on when I worked at AI I would wear a film badge. I never handled chemicals or radioactive materials or wastes. At ETEC I was on the project engineering side – facility design.

Fuel rod storage was at the Radioactive Materials Disposal Facility. One of the buildings was used for storage of radioactive materials, maybe it was Building 59.

The liquid sodium was delivered in 50-gallon drums. A vendor would pick-up the empty drums. The drums were supposed to be cleaned out before the recycler could pick them up. Once, 3 drums were picked up that had not been cleaned out and somebody tracked the drums to the recycler, but they had already cleaned the sodium out of them.

The SCTI steam and feed water system condensers produced what was really pure distilled water and we wanted to pipe it into the Simi Valley water system rather than dispose of it on site. There were people who came from all over the United States to protest this plan. It was eventually piped over to Silvernale Reservoir. The SCTI was originally a heat exchanger test facility – one of the boilers had been salvaged from a battleship.

North American Aviation/Rockwell used an offsite company for document storage and after 10 years they were eventually destroyed. But I can't see that being done with the ETEC records because they were all government. DOE had a couple of people on site overseeing work that kept cost centers pretty much divided. AI may have provided help with financial stuff. When I was at AI we did not store ETECs materials – even the mechanical stuff. As far as records go, there is no way I could envision ETEC records going offsite or to Canoga Park.

Logbooks, operation manuals, and operation records, were stored at the facility in file cabinets in the managers offices. If there was a clean-up campaign, they would have been dumped. People could have taken their personnel files and records home. The library in Building 38 had official reports, copies of every letter, and information brochures from manufacturers for items like gaskets. The operations manager programs offices would keep files related to design and test issues. There was a guy with an office maybe 20 feet square with so many papers stacked everywhere that you couldn't see the floor. He probably ended up taking it all home.

The test data belonged to DOE and the manufacturer of the test article – it would never have gone to AI. There would have been no incentive to give it to AI.

I remember once at the SPTF during a long test, the operators had made a “nest” where they could sleep. They were caught by management and laid off 3 to 5 days without pay. The union got involved and argued that no one told these guys that they couldn't sleep on the job and they ended up getting their back pay and reinstated!

We all got along really well – it was very much a team effort. There was no infighting among the various organizations. If you changed jobs from one side of the fence to the other, it basically depended on your experience.

They would also have “family day” and all of Area IV would be open for the worker's families to tour the facilities. The salaried folks were very professional there. The ones who didn't care as much were the day-to-day operators – the union members.

Coming from Rocketdyne, I was surprised at how primitive the equipment was. We used the same type of water pumps that were used in hydroelectric and the oil field. On the rocket side, equipment was much more specially engineered. But, at the SCTI and the SPTF the stainless steel welding was VERY high tech.

Interview 142

I started working at the Santa Susana Field Laboratory (SSFL) in 1958, where I worked for 11 years. I worked for the US Postal Service, but hired on with Rocketdyne as they offered better compensation. I was a truck driver and also did production follow up with igniters. I departed in 1969 when it became clear that I would be transferred to the Canoga plant due to layoffs after the moon landing.

I drove everything from one-ton trucks to 10-wheel tractors. One of my jobs was as a bus driver, where I drove crews in from where they checked in at the traffic office. I drove the crews all over the SSFL except for Area 4, where the employees had their own parking up there.

As a truck driver, I performed tasks all over the facility, including Area 4. One task I did in Area 4 was picking up deionized water in a 5000-gallon tanker to take over to the test stands for defusing flames. Another task I had was hauling exotic fuels in trailers to and from the test stands. I hauled engines in and out of test stands. Drivers would drive to the various test stands and receive their orders. A lot of the things I hauled I had no information about. I was never involved with the hauling of waste.

Every test stand had a flush, with 5000 gallons of water to cool the engines. I do not know where that water flowed, except for test stand 5, which flowed to a ranch. Rocketdyne fenced in where the water flowed to prevent the cattle from drinking it. The water didn't kill the weeds, so it couldn't be too bad.

I recall hauling test pills in a 14-foot van. I remember going to pick up the test pills and saw that the test pills were in a lead-lined insulated container, being handled by two people in protective gear. They arrived on site on an insulated transport. I had no protective gear on, and as I drove with the test pills in the back, they were secured by those two workers. I believe I hauled the test pills to the RMHF. I did this approximately five times.

I did not know there was a burn pit in Area 4. Area 3 had a burn pit for igniters and other things. I have no information on TCE.

I was familiar with the Old Conservation Yard. There were engine and component parts that had gold on them, which were burned off and collected in five-gallon cans that were so heavy they were moved by forklifts.

I never wore a film badge. I did attend training on topics such as safety, usually as part of a group lecture. I had no training relating to Area 4. I was also an auxiliary fireman, and we did have monthly training sessions that lasted two hours.

I never took any logs, documentation or photos off the hill. In fact, our lunch pails were searched at the end of every shift.

In Area 1, not too far from the Transportation Office, there were some old engines and parts that were covered up and buried by a bulldozer.

I was never informed about the incident at the SRE, beyond what I heard from coworkers. I remember a V2 German rocket engine blowing up in the Coca area.

In terms of hazardous waste releases, I remember a brown/orange cloud that was released from the bowl test stand when a test failed.

I had no experience with or knowledge of liquid materials disposed in toilets or floor drains; the Sodium Burn Pit; a surface disposal area at the western edge of Area 4; any of the leach fields, septic tanks or drainage discharge locations; any storage tanks or gas holdup tanks; fuel element cleaning areas; or problems with underground pumps, sumps, storage tanks, piping, sewer or drainage systems.

The SSFL was a good place to work, which I enjoyed, other than a little pollution in the area. I saw cougars, deer, skunks, snakes, coyotes, raccoons, and I once saw a cougar stalk a buck across the Alpha and Bravo areas. I remember seeing the astronauts visit the site before their space trips.

Interview 149

I started at Atomics International (AI) in April 1961 and retired in 1989 and worked on occasion at SSFL. I started working at AI as a research engineer with 3 years of experience and a BS degree in aeronautical engineering from Purdue University. Prior to this I had been working at Marquardt in Van Nuys on the X-211, which was a nuclear powered ramjet. I went to graduate school at night off and on for 12 years and studied nuclear engineering and then got my professional engineers license. I got a MBA in 1973. When I was hired by AI, I worked in R&D for about 8 years, until 1968 or '69. I basically worked on control systems for SNAP, a design for functional reactor systems in space. I made a career change to program management in 1968. In those days there were 20 or so different programs at AI. Eventually I worked on special assignments at both Hanford and Rocky Flats.

At the time the SNAP programs reached their zenith, the company won contracts for research and development of fast breeder reactors. I was a project engineer for design of control systems in the Fast Breeder Reactor program.

The world's largest privately operated hot lab was at SSFL. They did amazing things there – among other things, spent fuel was cut apart and examined. The Fermi-1 fuel that had experienced a melt-down was brought to the SSFL Hot Cell for examination. Fermi-1 was the granddaddy of the sodium-cooled reactor. The Hot Cell facility had 6 cells. A Lionel train was used, on special occasion, to move the fuel from one cell to another.

Technicians did the work in the hot cell. I had oversight of some of these operations and only had a film badge when on site. Someone else would write procedures and I reviewed them. At that time I had responsibility for the engineering release process and design control.

As work was done, the procedures were written and we learned from our failures. "Our successes were due to learning by failure." Success by failure was a motto. Engineers at that time were "fix-it" guys. We would see a problem and fix it. Apollo 13 is a good example. On Apollo 11, Armstrong and Aldrin were ready to fire the engine to leave the moon, but the engine had never been tested under those conditions and the ignition switch fell out of the console. They were able to get it back together and made it back from the moon. You had to be clever – it was a very creative set of people that came out of World War II. The procedures for how to do many jobs were created as we went along; they weren't there when we started.

I think it was in the mid-70s; ERDA contracted with the Energy Systems Group (formerly Atomics International), to define an overall plan to decontaminate and decommission (D&D) all radioactive sites that ERDA was responsible for. We wrote a plan and identified procedures in the plan. Some of the procedures were already available and others had to be written. We did this for sites all over the country. Operation of the SRE was before my time at SSFL but was included in the D&D plan we did for ERDA or DOE sites.

At SSFL there was an experimental plutonium fuel development program for which we were tasked with developing a plutonium fuel. Plutonium in powdered form, I'm

guessing 3 percent plutonium with U-238, was formed into cylindrical slugs of different shapes and length that were installed in stainless steel tubes. We studied heat transfer by installing liquid metal (sodium or NaK) as a cladding between the fuel slug and the steel tubing. My group was tasked to write procedures for this process.

Workers wore leaded rubber gloves inside glove boxes when necessary to handle the slugs in their hands because it emitted low level alpha radioactivity. They would always use respirators for breathing protection while doing this work.

The SNAP 10 ran for a 10,000 hour test. The facility was built below ground level with a vacuum tank that contained the reactor. It ran for an entire year before it was taken apart and the fuel examined. It was NaK cooled which was also magnetic and pumped with an electromagnetic pump. It seemed to work well - there were a series of operational tests but I don't know the details. The coolant flow needed to be consistent otherwise hot spots would develop.

I don't recall the facility design of the SNAP10. It must have had shielding, but apparently it didn't work [in reference to tritium that is now found in groundwater]. I didn't have anything to do with SNAP10 beyond development of the control system for startup. Startup and operation was accomplished when the beryllium reflectors turned escaping neutrons back into the core.

As I recall, there were 12 nuclear systems operating at one time at SSFL. These ranged from power reactors and simple isotopic systems to ones used for researching neutrons.

I did not work with chemicals and thus had no exposure to them. The technicians used TCE to clean parts. Sodium was sometimes misused – throwing a block of sodium into a pond was unauthorized but it did happen. The burn pit would be the source of these problems. When I was hired in 1961, I was given a tour of the SSFL and the LOX plant was already gone by the time ETEC was up and running.

Other than a siren that went off, we were not alerted to impending rocket engine tests. They couldn't test the F-1 at SSFL as it was too large.

I lived in Northridge, about 2½ miles from DeSoto and would drive up the hill whenever I had an assignment there. I had an office at DeSoto, but I also had office space on the hill. I always brought my lunch and ate at my desk in my office – I never ate in the cafeteria. I drove a TR-3 and would wheel up the hill in it. I didn't see radioactive clean-up trucks as they were scheduled for off-peak hours but we would watch large transports go up the hill. My wife worked at Rocketdyne for 10 years as a secretary where they tested liquid oxygen fuel pumps.

I did not keep a personal logbook. In R&D we kept a notebook at DeSoto that consisted of specially designed forms with spaces for the date, signature, etc. I think that was done for the purpose of developing patents. The logbooks did get filed at DeSoto.

Interview 155

I started work at the SSFL on February 2, 1959, Groundhog Day. I hired in as a fireman on the Fire Department. The fire station (indicated building 4724 on the map) was located at the northeast corner of the ETB (Engineering Test Building – Building 003). I worked the entire Area IV. That one year as a fireman there weren't many fires. When I was in the Fire Department, we would inspect the areas and issue burn permits for welding, etc. I was very familiar with the Sodium Burn Pit. When 55-gallon sodium drums were emptied, there was always residual sodium in the drums. To clean or remove the residue, we would punch holes in both ends of the drums and roll them into the water in the Sodium Burn Pit. If there were any empty drums, it was my job as a fireman to clean them weekly to eliminate any hazard to employees or personnel. Sodium doesn't so much catch fire but you get a hydrogen explosion when the sodium and water make contact. We watched closely so that the drums did not land on any of us!

After a year and a couple of months, I transferred to the Radiation Safety Department (Health Physics). Then in approximately 1966 or 1967, I was transferred from Area IV to DeSoto Avenue to work as a Health Physics monitor in the fuel fabrication facility for the Hallam (located in Nebraska) and Piqua (located in Ohio) reactors. This assignment lasted about 1 year then I was assigned to Area IV, DeSoto, and later Canoga Park with Rocketdyne.

During my employment at Rockwell/AI/North American Aviation, I wore a film badge one hundred percent of the time, as did all personnel working in a radiation area. Every month the film badge was processed. When I was in health physics – radiation safety – if someone was going to work in an area where they could get a higher exposure, then they would wear 2 film badges (a regular one and a visitor badge) as well as a pencil dosimeter. I was the Health Physicist (HP) at the Hot Lab, for a year or so. I would collect the film badges and send them down to headquarters where they would process them or send them to Landauer's⁷ in Burbank. They would call me as to what they had found and I would give a report to each person's supervisor. The supervisor would then let anyone know if they had reached their limit for the month and that person would have to be reassigned somewhere else for the remainder of the month.

As the HP in the Hot Lab, I only did the monitoring (not the film badge processing) and I would take smears daily. If they were going to change manipulators they would lay down plastic or whatever I asked them to do. We had air samplers going constantly. Radiation safety was very important. RST was the supervisor in the Hot Lab and when he went on vacation or was absent, he told me "if they don't like what you tell them to do, then just stop the job and tell them 'that's it'."

I was there for the last days of the SRE. I went to work at the SRE – it was July 1960 – no maybe it was closer to August or September. I worked on a rotating shift as the health physics representative for one year. I did training in Building 9 – the SGR (Sodium Graphite Reactor) and OMR (Organic Moderated Reactor) – for 3 or 4 months as a HP. I was at the SRE when they were running the second core. There was a

⁷ The spelling of the name of this company could not be confirmed.

mess in terms of contamination leftover from the accident. Everything had to do with the spread of contamination. I've heard that the reactor seals leaked, but I'm not sure what they are talking about, when they pulled the fuel rods out I was involved in health physics. When I started working at the SRE, they were building a new fuel handling machine (FHM). The old FHM still had the broken elements in it the entire time I was there. After I was off rotating shifts, I went in one Saturday with the crew that removed the broken elements from the FHM. UVW was the man in charge. The uranium from the fuel elements and the cladding I think went to the Hot Lab.

When I went off of rotating shift, I worked at the KEWB (Kinetics Experiment Water Boiler) and the AE6 reactors – anywhere they needed me. I also worked at the SNAP reactors in Buildings 10, 19, 24, 28, and 59. Building 10 was the S8ER and was the second reactor they had in that building. The outside of the containment vessel was leaking water which was the vessel coolant. I was not aware if they were using lithium in this building. To stop that leak, Bar's Leaks was used. You may want to see if irradiation of that product would produce tritium. Building 28 was real close to Building 10 and they had a swimming pool reactor in that building. Look at the elevations of the two buildings – I bet the vessel in Building 28 was probably lower than the Building 10 vessel.

I recorded all my measurements in logbooks. When they were completed they supposedly went to a library but I don't know what happened to them after that. I never had a reason to look at any of my old logbooks. As I understand, everything went to headquarters, which was kind of like a separate company. I wanted to go to school – a lot of the HPs at headquarters went to school and bettered their degrees. I could have quit and gone to school but had a family and had to work. Training was all "on the job." I would go to night school when I could.

I lived in Reseda and drove up there every day. Some days, coming back down you could see there was a big gray cloud of smog and then you would start smelling the smog. By the time you got to Chatsworth you couldn't smell it anymore. I never ate in the little café up there – I brought my lunch every day. The rocket engineers were across the fence. It was never the same from one day to the next – everything was experimental so it was not routine. When there were emergencies during the night, I would get called in to check out the radiation alarms at any of the facilities on the hill (or in Area IV).

(When asked if he ever knew of a burn pit at the SRE) I was not aware of any other sodium burn pit. If there was a sodium wash pad at the SRE, it must have been before my time. They had a storage facility at the top of the road (pointing to Building 654). There were liquid waste holdup tanks on the hill above the SRE and another storage facility there but they never used it when I was there. I think it was used for storing radioactive material before Buildings 21 and 22 (the RMDF) were built.

After it was built, we ate lunch and played hearts in the office at the RMDF. When I was the HP at the RMDF I would survey the casks and sign off on the shipper and survey the truck drivers cab. There were maybe a couple of shipments a week. There weren't a lot of accidents on Woolsey Canyon Road - if there were, we didn't hear about them.

When I left, I was a Senior Industrial Hygiene Safety Engineer. I was proud because I had worked hard to get where I was. I started at \$2.09 an hour as a firemen.

When I went into Industrial Health and Safety, I was involved with chemicals also and used a hand operated air monitor. TCE was used to clean all kinds of parts and acetone was used a lot to clean any oil off of parts. They used a lot of TCE at Rocketdyne!

There was no disposal of radioactive materials onsite. My job was to make sure that nothing got out of the buildings or into the offices that would harm anyone. I was there when they dug the Building 56 foundation. I knew they were going to fill the area next to that excavation. I was the HP when they pulled the reactor out of Building 59. They found tritium in some of the sand that was around the reactor vessel. I was also there when they D&D'd the KEWB, Building 28, and the SRE. ABD was the engineer in charge when they D&D'd the SRE.

XYZ took care of all the monitoring of the ponds and soil samples and I think also the leach fields and septic systems. That was all done through headquarters at the DeSoto Facility.

Oh yes! I do remember the Old Conservation Yard – I killed the biggest rattlesnake you ever saw there! Building 4113 or maybe 4623, I think, was the guard shack where you would show your badge before going into AI. They stored surplus metal and things like that – I've seen laboratories that looked worse than it did. I don't remember anything there that was out of the ordinary. If there was going to be an inspection in one of the facilities they would tell us to clean stuff up and a lot of time guys would send it to the conservation yard.

Based on my memory, the SRE had the major reactor issue. The SNAP issue was minor in terms of cleaning up contamination compared with the SRE. I've heard stories about how the HPs told the scientists that they should shut down the SRE but it wasn't done. I heard about that in a roundabout way. I worked at every reactor that was on the hill and the Hot Lab and I was HP for a couple of years at the plutonium facility.

I worked with a lot of good guys. It's funny – so many times I would get into an argument telling someone that they couldn't do this or that and when I went out, I was amazed at how many of these people I had argued with came to my retirement party.

Interview 157

I worked in the nuclear power industry from 1951 to 1976 and for Atomics International from 1963 to 1976. I worked at the DeSoto Avenue plant in Canoga Park in the marketing department from 1963-1974. I am a mechanical engineer and a Registered Professional Engineer. In 1951-52, I worked for Westinghouse Bettis Atomic Laboratory on the Nautilus reactor project.

From 1953 to 1959, I worked on the Dow-Detroit Edison project, initially as a consultant for the Consumers Power Company. We investigated the feasibility of commercial nuclear power from a sodium-cooled fast breeder reactor. I worked on reactor core design and fuel cycle research and development. When we decided to build the FERMI-I demonstration plant, I then worked as project engineer for the conceptual design of a 300 MW follow-on commercial plant with a closed fuel cycle. I visited the SRE facility in 1958-59 to observe its operation.

From 1963 to 1974, I worked in the Marketing Department for Atomics International and took potential clients and visitors up to the SSFL frequently. In the 1960s, there was a lot of enthusiasm to observe nuclear technology development in operation at a operating nuclear power plant. In addition to the SRE plant, we had the SNAP 10A reactor in operation in a vacuum to replicate the SNAP 10A plant launched into orbit in 1964. I wore a film badge and dosimeter when visiting the reactor plant to meet Atomic Energy Commission regulations.

After partial fuel melting in the SRE in 1959 and in Fermi I in 1964, we applied lessons learned from these accidents to new sodium-cooled reactor designs. Safety was paramount in AEC regulations based on industrial codes and standards when commercial power plants were licensed.

I have no information on or knowledge of:

- Radiological or chemical handling processes;
- Materials storage or disposition;
- Hazardous chemical handling;
- Company policies and procedures for materials handling;
- Worker performance monitoring;
- Drainage of liquids into floor drains or toilets;
- How work that was done up there was documented;
- Liquids disposed of using toilets or floor drains;
- Surface area or leach fields or drainage discard locations;
- Old Conservation Yard;
- Gas or other storage tanks;
- Sewers, underground piping, etc.

I cannot recall ever seeing any fresh fuel at SRE or SNAP facilities. In the 1970s, AI did fabricate enriched uranium fuel for the ATR reactor under contract at the DeSoto Avenue plant, next to my office.

I am aware that the SRE partial fuel melt was an unplanned and unintentional event. I believe this was handled properly under AEC-approved procedures and the reactor

went back into normal operation. I was informed later that no radioactivity was released from the building beyond normal operations. I am not aware of any on-site disposal of radioactive materials at SSFL.

I was never worried about radiation while visiting SSFL and the SRE plant. The AI workers were well trained and indoctrinated to meet safety requirements of the AEC and AI. The most dangerous thing about visiting SRE was the drive up the winding road to SSFL.

I visited the "sodium burn pit" occasionally. I am unaware of anything that went into the pit that should not have gone in there. I do not believe that any plutonium was handled at SSFL, but we had strong interest in fabricating plutonium fuel for nuclear reactors. The potential customers went elsewhere.

If there is any measurable radioactivity at SSFL, I would expect it was a result of the worldwide nuclear weapons testing fallout rather than by any activities at the site. In the 1960s, nuclear weapons atmospheric testing occurred around the world, not at SSFL.

AI operated the SSFL nuclear facilities under contract to the AEC. In the 1950s, most "infield reactor" documents would have been classified information not available to the public or news media. The U.S. led the world in nuclear technology in the period from 1950 to 1970. Our safety culture, reflected industry codes and standards approved by the AEC, set the pattern for other nations.

Today, the 104 operating nuclear plants in the US, which were all purchased before 1973, are constructed to proven AEC standards which were developed before the US NRC existed. Engineers in the U.S. had been indoctrinated with "design in depth" philosophy for nuclear safety. The 1979 partial fuel melt at Three Mile Island 2 was proof of principle that our philosophy could protect the public from nuclear operator error. However, our culture had changed and the new NRC panicked. Consequently, the plant was not returned to operation after cleanup. In addition, about 100 U.S. commercial reactor plant contracts were cancelled - in part due to unpredictable regulatory requirements.

Since retiring, I have been active with a network of nuclear professionals who would like to see the U.S. nuclear power plant construction program restarted in this country. It is time to reestablish the important Integral Fast Reactor program in the U.S. Other nations, including France, Russian, China, and South Korea, have proceeded ahead of the U.S. in the industry infrastructure for construction of new nuclear power plants worldwide for the 21st century. U.S. nuclear regulatory reform is needed to bring the U.S. back to leadership in nuclear power construction on a competitive basis. I will help make that happen.

Interview 162

I had a degree in chemical engineering when I was hired by Atomics International (AI) at the Santa Susana Field Laboratory (SSFL) in 1962 and was continuously employed by AI until 1973. I had previously received my engineering degree from Tulane University in the ROTC program and served three years in the U.S. Navy aboard a ship that was present during some of the atomic testing in the Bikini Islands. After my discharge and following some graduate work, I was recruited by AI and was initially a Research Engineer. Later, was promoted to Senior Research Engineer. I was assigned to the Space Nuclear Auxiliary Power Program (SNAP) and specifically to PSM3. I worked in the SNAP Test Lab and in its nearby office building, a Quonset hut as I recall, for eight or nine years until that program shut down. I don't recall the Area at the SSFL where the SNAP Test Lab was located. Afterwards, I was assigned to AI's Canoga Park facility. I was laid off in 1973 without ever returning to the SSFL to work. Much of my time at the SSFL when I was assigned to PSM3, I was very focused on my job and enjoyed it very much. I paid little attention to the surrounding environment outside my work area. My focus was on research and use of the CRU (Combined Rotary Unit) made by TRW and components such as turbines, electrical generators, pumps, large condensers, sodium loop, and so forth, and the zero gravity test simulator. As a Senior Research Engineer, I ran the nuts and bolts of the operation of the test lab.

There came a time when the mercury chewed a hole in a tube allowing it to mix with liquid sodium that resulted in the material solidifying. Thus, the whole system froze which in essence brought an end to that research project. Thereafter, I was assigned research on the high pressure water reactor and breeder reactor for a while, and then I was transferred to Canoga Park where I worked on the Sodium Emission Control System and other assignments before being laid off.

The only hazardous materials that I worked with at SNAP was liquid sodium (mixed with potassium) and mercury and mercury vapors. I may have used solvents in small quantities as cleaning agents, and there may have been others which I do not remember. There were no significant releases of any of these materials at the SNAP that I recall, nor do I remember any events or areas where hazardous materials or was stored or disposed of. I never wore any type of protective equipment or clothing, but I had a film badge or dosimeter that I wore daily. I was never told I had received significant exposure to radiation, nor do I ever remember dealing with radiological materials at any time. There was an occasion when a large orange cloud of UDMTH was released from Rocketdyne and drifted toward the AI complex. We were told to stay indoors to prevent exposure to it and I don't believe anyone was affected by it.

I don't recall writing many documents, records or reports much, nor do I recall receiving any training while at the SSFL. Once the PSM3 program was finished, I was the co-author to a rather large report concerning it. Things that I do not recall happening or observing included the disposal of liquid materials into toilets or floor drains; areas known as the old conservation yard or Sodium Burn Pit; a surface disposal area at the western edge of Area 4; storage tanks or gas holdup tanks; fuel element cleaning areas; or problems with pumps, sumps, piping, sewer or drainage systems.

I always worked the day shift and was pretty much sequestered in the office or test lab where I work and did not move about the SSFL very much. I was able to drive directly to and park my car near the SNAP Test Lab. At lunch time, I often sat out on the rocks outside and watch rocket engines being tested on test stands located in the distant Rocketdyne area. I don't remember a cafeteria being available although there may have been a lunch truck that came around. The surrounding area was pretty and I saw little, if any, wild life there. I was completely focused and absorbed in the work that I was doing that I paid little attention to anything else. The program in which I work had a goal of space travel to Mars and I felt, because of its concepts and goals, I was involved in the cutting edge of this science.

Interview 164

In 1989, I was hired as an Environmental Engineer at Rockwell International, Rocketdyne Division. Except for several months at the Plummer facility, my office was located at the Santa Susana Field Laboratory (SSFL). I was continuously employed there until my retirement in 2006. During the last ten years my office was located in Building 38 in Area 4. During my 17-year tenure, I became the Program Manager for Environmental Management and for Site Closure of Energy Technology Engineering Center (ETEC).

Initially, as an Environmental Engineer, my work focused on multiple environmental concerns at several locations, regulatory compliance, clean up of the federal facilities in Area 4 and in Area 2 and later management of surface water and hazardous waste activities as well as remediation. Later as a Program Manager, my work at the SSFL involved the oversight of cleanup and closure activities by company personnel, contractors and consultants as it related to the approval of their scope of work, regulatory compliance, and completion of the Historical Site Assessment of Area 4. Some of my efforts also dealt with contract management and interfacing with the Department of Energy and the public.

I wore a film badge whenever I was in radiologically controlled areas. Most of the work in which I was involved at SSFL is documented in one form or another, such as the Historical Site Assessment of Area 4, RCRA Corrective Action relating to all Areas at the SSFL, various regulatory permits and other sundry reports and documents. I was aware of the existence of Incident Reports and logs kept by the Radiological Department of occurrences of radiological releases. During my tenure I am not aware of any significant releases of this type. I am not aware of any missing documents relating to the historical operations or releases at the SSFL.

The above--mentioned documents, particularly the RCRA Corrective Action documents information on the historical operations involving currently identified hazardous materials. The RCRA Corrective Action process identifies and investigates any concerns or problems, if any, dealing with hazardous chemicals being disposed of into toilet or floor drains during the historical operations of site activities; leach fields, septic tanks or drainage systems and discharge locations; storage tanks and gas holdup tanks; and underground pumps, sumps, storage tanks, piping and sewer systems. The Historical Site Assessment of Area IV similarly identifies those concerns as it relates to radioactive material. Yes, I was involved in the investigation and remediation of the Old Conservation Yard and the Sodium Burn Pit. I have some recollections about an alleged surface disposal area at the western edge of Area 4, but I do not recall the findings of that investigation. I do not remember when that occurred. Also, I vaguely remember something about the fuel element cleaning area, which may have been near the SRE or building 133, but I don't recall anything specific about it.

None of my assignments at the SSFL ever required my personal handling of chemicals or radioactive materials. I am aware of their existence, or previous existence there. As an Environmental Engineer, I oversaw some assignments and activities of technicians who handled and managed hazardous waste in the early 1990s, and ensured the regulatory compliance thereof. I participated in audits of the use and handling of

hazardous chemicals. People have been more aware of the hazards of radioactive materials versus the personal and environmental hazards of chemicals historically used in manufacturing and cleaning operations. Consequently I would say that the tracking and documenting the use of radioactive materials was better and more complete than the tracking of most of the chemicals that were historically used at the SSFL although they have made tremendous efforts to recreate operations and chemical usage during the 50s and 60s.

Fellow workers and I received timely and required training to meet regulatory requirements, to perform work assignments in a safe and compliant matter, and to obtain and maintain various federal and state certifications that were held.

I regarded my job at the SSFL as being both challenging and rewarding as it presented multiple environmental issues relating to the operation and clean up of the facility. It was a great place to work. I enjoyed my interaction and association with my co-workers as they were smart people and some of them were old timers who had been involved since the early days of rocket engine research and development. It was enjoyable also because of its remote location (outside the multitude of housing developments) where there was still native vegetation and a place where various wildlife were often seen.

Interview 166

I started working at the Santa Susana Field Laboratory (SSFL) in September 1959 in data reduction in Operations 2 in Area 2, putting recorded data into tabular formats for engineers to use. I went to work for AI at the DeSoto plant in February 1960 as an Engineering Lab Mechanic, where I worked until October of that year. I worked up at the SSFL periodically in Area 4 during that period doing things like determining densities of fuel elements, simulated testing of fuel elements in one of the reactors, working on a scale in a hot cell, and other related activities. I received a year's worth of radiation in the one day where I worked in the hot cell.

In October 1960 I was laid off by AI, after which I assumed my former position at Rocketdyne. I was soon promoted to Research Analyst at one of the test stands. During this period I attended school and received a BS in Process Control Engineering. I was transferred to the Canoga plant, where I worked from 1961 to 1962, and then went back to the SSFL where I worked on a test stand until I left the facility in 1967. By the time I left, I was a Lead Engineer over several test stands, including three in the Bowl area. Aside from the time I was with AI, my time at Rocketdyne was spent at Areas 1 and 2.

I remember there was a trike-flush during the component and engine testing. Sometimes the trike was used before the test, and sometimes following the test. The trike flowed out onto the ground below the spillway, combined with the flame deflector water, at Alpha, Bravo, Coca, Delta and TRE areas.

The tests used fuels such as liquid fluorine, UDMH, NTO4, solid fuels such as H1, and other storable fuels. Solid fuel was used in the Solid Propellant Gas Generator of the H1 engine.

We tested German rocket engines and then transitioned to our own, using denatured alcohol and liquid oxygen as fuel.

I had no experience with sodium, the SRE, or the Sodium Burn Pit. I did not know about the incident at the SRE until I read about it in the paper.

There was hazardous materials training for engineers, but most training was on the job. Ongoing training was more for the technicians. I never handled hazardous waste.

I only have a vague recollection of a conservation yard, which I think each area had.

I had no experience with or knowledge of liquid materials disposed in toilets or floor drains; a surface disposal area at the western edge of Area 4; any of the leach fields, septic tanks or drainage discharge locations; any storage tanks or gas holdup tanks; fuel element cleaning areas; or problems with underground pumps, sumps, storage tanks, piping, sewer or drainage systems.

I have no information relating to any releases.

I did not maintain any logs or documentation from my time there, but we did a lot of documenting. There was a big log on a temperature test I took part in while at AI, for example.

I recall that the Air Force had one inspection person per area at the SSFL, and Rocketdyne had perhaps one inspector for every three test stands.

As engineers never unionized, I never joined the UAW.

I loved working up on the hill. The work was fun, and the engineers had a lot of autonomy. There were 5500 people there, in a self contained facility. We saw raccoons, deer, rabbits and lots of rattlesnakes.

Interview 174

I was hired by Atomics International as a senior scientist in July 1957. I worked there for three years until 1960.

Prior to going to Atomics International, I worked at the Oak Ridge National Laboratory for four years, doing instrumentation work. Then I joined the Physics Department at North Carolina State University where they were building the first nuclear reactor on a university campus. It was a water boiler reactor. I was the reactor supervisor at NC State for the five years I was there.

While I was at SSFL I worked on experiments to measure the power coefficients of the Sodium Reactor using reactor oscillation techniques. We could vary the reactivity by inserting an aluminum rod inside an aluminum pipe with both the rod and pipe having small squares of a boron containing aluminum squares which would vary the reactivity of the reactor as the inner rod was rotating. One could measure the reactivity coefficient of the moderator and fuel separately since each had a different time constant.

I recall working with a number of good people. KMN was head of the AI Reactor Development division. At the SRE, EFH was the leader of Operations and KLM was the leader of the technical staff. JMN headed the Snap Program.

I chaired the Atomics International reactor safety committee called the Ad Hoc Committee after the SRE incident, partly because an additional member was added. We reviewed reactor experiments to see if the experiment was needed and well designed. The proposal had to outline what the researchers wanted to learn and the data they intended to collect. We were more involved at the front end of research until the SRE incident in July 1959. I think all of the meetings were held in the high bay office area above the reactor. We had little information of the radiological or decontamination procedure being used to clean up the reactor area.

I was not required to wear a film badge in those days because I didn't go into the immediate reactor area during cleanup activities. I would have worn a film badge or dosimeter if I believed I was at risk of radiological exposure.

After the SRE event I spent a large percentage of my time with the investigation committee. I also worked as the supervisor of system analysis and safety aspects of flying a SNAP reactor system in space. Also during the year after the SRE incident the Committee reviewed the Piqua OMRE reactor and I served on a number of committees including a health and safety committee.

I do not know anything about how radiological materials were generated, handled, or stored at SSFL. I am not aware of any on-site disposal of any hazardous chemicals on the site.

I do not know about how hazardous chemicals were generated, handled, or stored at SSFL. I am not aware of any on-site disposal of any hazardous chemicals on the site.

I have no knowledge of any radiological materials that were leaked, spilled, or disposed of at SSFL.

I am not aware of any log books. The Reactor Safety Committee filed minutes but did not keep a log book. The Committee was required to file the minutes within 24 hours of meeting with the Technical Director of AI, and the Technical Director was supposed to advise the Committee within 24 hours of the recommendations we had made of those he accepted or rejected.

I do not know anything about any liquid materials being disposed of using toilets or floor drains for disposal. I do not know about the sodium burn pit; a surface disposal area at the western edge of Area IV; any leach fields, septic tanks, or drainage discharge locations; the old conservation yard or junk yard; gas holdup tanks, etc. I am not aware of any problems with underground pumps, sumps, storage tanks, piping, sewer, or drainage systems.

You might want to talk to PQU who was a health physicist. He lives in Florida. You can mention you talked to me. He did some radiation level measurements at the SRE area after the incident that were part of his project.

Interview 182

I worked at SSFL from 1972 to 1975 or 1976, I don't remember exactly. I was a member of the Senior Staff and primarily we were getting ready to test the steam generator for use at the Clinch River Breeder Reactor (CRBR). AI had a contract for fabrication of the full scale generator but it never was tested because the project was cancelled. I was transferred from Rocketdyne to AI, primarily because I was a Professional Engineer (PE), to head the upgrade for the sodium test system at SSFL to get up to 70 megawatts capacity. The test generator system was initially about half the size of what would be needed for the actual reactor. I decided what components would be used in the upgrade through use of computer modeling. We knew that we had to go with air cooled condensers. My job was to double the capacity of the steam generator for the actual CRBR. It had to be flexible enough to meet the test specifications and have the capability to simulate a scram.

I never worked around radioactive materials and I never wore a film badge or dosimeter. I was the personal computer guru at AI. On other projects I used Hewlett Packard workstations and worked with Argonne to write the software to run the hot sodium battery tests from 1976 to 1978 after I left ETEC and moved down to the DeSoto plant.

We did most of the modeling analyses on the hill using General Electric terminals that communicated by phone (using a 300 baud band rate) with the main frame computer at Autonetics (a separate branch of Rockwell). They only had one main frame computer system. At the time, everything was going through a rapid change in computer capability.

While at Rocketdyne, I was a staff consultant to the Vice President during the Gemini & Apollo programs and then became a project analyst developing rocket engines for the Minuteman 3, and the Mariner & Viking space programs. Because I had used computers for modeling, AI was interested in hiring me. Everyone was telling me that I was the only person that could handle it, I didn't believe it but I finally gave in and moved over to AI.

We were very worried about fatigue damage to the sodium system and failure of the mixing tees, where two different temperature streams of sodium mixed together. The idea was to simulate the conditions the steam generator would be subjected to as the reactor went through thermal ramps up and down. We wanted to simulate the reactor ramps, including scram after all the rods were shoved in, so that we could develop an adequate thermal model to know what we had to acquire in terms of new equipment. We were worried about thermal stress fatigue that might be placed on the reactor during testing.

I had been involved in acceptance testing of the attitude thrusters for the Apollo Program and ended up using one of the Rocketdyne rocket test facilities for the water test on the mixing tees. The test stand was for the small thrusters, it may have been one of the component test stands. I wrote an AIChE (American Institute of Chemical Engineers) paper on the tests.

Just after I left Santa Susana as computer guru, they had me write the first film badge information compilation program in BASIC. But my program wasn't used for more than

half a year as DBASE had become available, and we changed over to it from my cumbersome BASIC program.

I worked with halogenated solvents (trichloroethylene and perchloroethylene) my whole career from Aerojet through Rocketdyne. I heard they could cause bladder cancer, but no one I knew suffered from it. As far as I know none of my colleagues have been affected by using it. It was hard to get rid of in the water supply. We found out much later about the problem with Lockheed down in Burbank, which was the first facility to my knowledge where they found it in the groundwater, but of course we had nothing to do with that.

I set up all of the specifications for the steam system for the 70 megawatt test facility that we planned to use to demonstrate the specifications for the CRBR. With respect to documentation, I signed as PE on the final plant design and wrote a report on the 70 megawatt system. The system was never tested because the program was cancelled. Once we had the final specifications and had hired an Architect/Engineering (A/E) firm to build the system to my specifications, I moved down to work at the DeSoto plant.

There were no off-normal events during the time I worked there because we had no contact with people working with radioactive materials. We were in a completely separate area and I have no knowledge of how such materials were dealt with.

I drove from home and because of limited parking almost everybody carpooled then. At that time, I lived in Granada Hills-Northridge, as did a lot of people that worked for Atomics International. I got along well with my bosses and the people who worked under me.

I retired early and opened a software company with a professor from SC. We used Open Office and a version of UNIX on a Sun System to develop a program that later became known as COSMOSM.

Interview 188

I started with the company in Downey in 1950. Five years later, the company moved me to the Santa Susana Field Laboratory (SSFL). The lab was informally known as "The Hill." I worked in one of the first buildings built at the site. I started working with a water boiler reactor. Towards the end of my employment I worked on the SNAP reactor. When I first started with the company in Downey, there were about 400 employees and when I left Atomics International, there were 3,000 of us.

Most of the time I was up there, I worked at a water boiler reactor that beamed energy through different materials in different configurations. We worked mostly with depleted uranium, which wasn't very radioactive. The depleted uranium was kept in racks. We put slugs of the depleted uranium into aluminum tubes, then put the tubes into the specified configuration. We also called the tubes cylinders or cans. They machined the pieces and attached foils onto them. The foils were made of different materials. They were about 1 centimeter square and very thin. Then we counted the radiation.

The system was designed to be used with either water or graphic moderators. We compared the radiation using graphic moderators to the radiation that resulted when we used water.

When we were using water, we put the aluminum cylinders into a large tank of heavy water (deuterium). When the tank was completely full, it could hold hundreds of the cylinders. The cylinders were open on one end and we could pull the slugs out and change the configuration. We would run a series of tests and measure the radioactivity.

Then we would run the same set of tests using graphite instead of water.

We had about 13 PhDs who designed the tests we ran. CDF was the senior physicist.

I don't know where the depleted uranium came from; it was shipped to us in boxes. I don't know where it went when we were done with it.

We didn't have to wear film badges. It wasn't very radioactive. We handled it with our bare hands.

One time we handled enriched uranium. I remember that we had to be careful not to put the rods too close together. We had to be much more careful, particularly when we were loading the vessel to avoid them going critical. We wore coveralls.

I was an operator for a little while. The reactor beamed neutrons through a vessel to radiate whatever was inside. It would throw a beam of neutrons at the big pot of water. We studied the radiation levels as a function of the configuration within the cylinders.

When I worked at the SNAP reactor, it had already been built and launched. It was underground. I was an operator for a while. There was a twin reactor. We ran a year-long test. All access into the reactor was controlled. The area was closed and marked. One time a janitor came. For some reason he wanted to clean something. He slipped into the area that was closed. He was using a ladder and he was up behind the console. The ladder fell and it scammed the reactor. My boss was so upset he picked the janitor up!

We needed to know what we were doing. The reactors could produce a lot of heat. Generally, I wore my street clothes and a film badge. When we were doing maintenance work, we wore coveralls.

When the reactor was operating, we would take data points. The reactor was underground. It was really hot, 140°F, down there. When we had to go in, we would go in quickly, take the necessary reading, and then get back out.

I don't know of any radiological materials being buried at the site.

One time we had something unusual happen in the water boiler. We had uranium liquid control rods. One time the criticality spiked. The building alarm went off. I was unloading enriched uranium at the time and laying it out. Not much happened except for the alarm going off.

I did not work with any hazardous chemicals, except for the sodium. I do remember a pond we had that we used to clean sodium off. It was a lot of fun, like fireworks. They would throw items in there. They would leave the items for awhile. Every once in a while they would haul the items out. It was heavy work.

I think they did have procedures, although I didn't know what they were. I just did what my supervisor told me to do. I did, we all did, what we were supposed to do.

The last thing I remember about working up there was that they wanted to clean up the SRE. I think there was some coolant in the primary loop. There had been an accident and the sodium came in contact with the uranium. The sodium was contaminated. The sodium was very radioactive. They decided to put it into a tank to let it cool down. Then they put it into pressurized barrels.

The thing I didn't like was that we used galvanized barrels. There was one engineer who thought he was pretty clever. He put the hot sodium into the barrels. We were only supposed to fill them so full. We would tap on them and listen while we were filling to make sure we didn't feel them too full. Like you tap on a watermelon. I didn't like that we couldn't see how full they were getting.

I did not document that I did. Whoever was in charge was responsible for doing the paperwork.

I don't know anything about the sodium burn pit, unless maybe that's what they called the pond I mentioned. They used a skip loader to put things into it.

I don't know anything about any disposal areas, leach fields, septic tanks, drainage discharge locations, conservation or junk yards, or any problems with piping, pumps, or tanks.

When I worked at the SNAP reactor, we weren't the first ones to use that vessel. There were a lot of leaks in it. There were some fellows from the Navy that used it on the Nautilus program. We used automobile radiator sealant to try to seal up the leaks. We put little bits of the stuff in and it swelled up and sealed the leaks.

Another time I remember a chemist put a fluid into the uranium liquid. It made a slurry. A radioactive gas resulted. We took a wall out trying to figure out what happened. A

health physicist came around. He found radiation on the back of my neck. We washed my neck until it was clean. I don't know if that incident was documented.

It was very nice to work at SSFL. When I was working at the water boiler, we used to see lots of deer. I used to run there, and they didn't even startle when I ran by. It was so quiet and peaceful up there. It was so nice there after working at DeSoto. It was a madhouse down there.

Interview 192

I moved to California in 1957 and started work at Atomics International in January 1958 down in the valley, across the street from Canoga Park High School. I worked both places - down in the valley and up on the hill. I did some limited work at DeSoto from 1960-1961. I moved there from the Vanowen building. I started working off and on the hill after the early '60s. At one time, I left the company for 5 years.

I don't know what they did from place to place, but if we wrote procedures, we followed them. There were procedures developed for everything we did and they were well thought out in advance. One of the procedures was that a signature was required on every step you took. I never saw a place with so many procedures! There were written procedures for everything and a board of people would review every step. I was a Health Physicist for a long time and I reviewed many procedures. Such as the when you would take filters out of filter boxes, there was a procedure written for that.

There were some deaths – a good friend of mine, MNO was 49 when he died – probably as a result of work that he did at the Hot Cell (on the hill), which was very radioactive. I have read lots of articles about radiation causing leukemia and maybe that's why I've got it after all of these years.

I did some work on the SNAP reactor and wrote Volume 3 of ***Non-Destructive Testing Determination of U235 Content of SNAP Fuel Rods***. SNAP was launched into space back in 1960 I believe – this was all done down in the valley, but it was tested up at Santa Susana. We wore film badges. If you were doing some work using your hands, you would wear film rings – a ring badge on your finger – rubber bands with little film badges that you wore inside of white gloves. In fact, I did a monthly exposure report as to what my exposure might have been over time. It depended on what area you were working in. I touched a lot of things.

In the early '70's they started remediation up on the hill. There was a habit in the '60's and '70's early on, that if you were dealing with sodium, you found a water drainage somewhere and would throw sodium in there to boil it off. Little bits of sodium were disposed in drainages, but no radioactive materials. As a Health Physicist - radiation safety engineer - I worked out of the Radioactive Materials Disposal Facility (RMDF). BDF was running the RMDF, which had high radiation materials underground with very detailed procedures about raising it up and moving it about the country. It was a very carefully run facility. Everything was done by procedure. The RMDF was a huge building, actually. They stored a lot of stuff outdoors in barrels. I was called in from home when the hill was on fire in the early '60's. We were concerned that the fire could have spread to buildings that that hot materials in them.

Sodium of course was very hazardous. I worked with sodium as a coolant and NaK. The NaK was handled very carefully; it was contained in glass tubes from which the air had been removed otherwise it would start burning in the air. They used NaK over at the SRE complex, there was a building over there, a small lab. It was only a small amount, but I had never seen it before. I did not work with TCE, at least I don't remember working with it, we may have been near it, but it was handled carefully. This was when I first went to work up on the hill back in 1960.

We had a beryllium lab (with negative air) for a year or so that was also hazardous, but that was down below. I don't think that we did anything with beryllium up on the hill. Not when I was doing things. All of the facilities had strict, strict, procedures. As I said, everything you did you had to sign as you did it. Pretty good care was taken to do everything correctly.

There was a lot of training. I ran through four courses on radiation safety and a lot of us went through training every year in certain things. Towards the end, I was the Training Coordinator until I retired in 1994. We also had a lot of outside training, people would come in and do training – like on waste disposal – or what to do if something went wrong in a building there. You got training certificates and training records were kept on computers. Sodium safety was re-trained on every year. Even some of the secretaries were trained so that they got a feel for what went on working with the sodium.

Facilities like the Sodium Pump Test Facility (SPTF) periodically might get a leak. I was Shift Leader there. The system was set up with 0.5-inch diameter in-line sample tubes so that a small amount of sodium could be drawn out. It would come out around 1200°F and after it cooled down it was sent to the lab to check for purity to determine if it was still clean. You are awakening old memories of things I had seen or done up there!

But, I enjoyed my 30 years up there. The personnel were excellent people. Once in a while, there was an engineer who didn't like somebody, but all-in-all, most everyone got along and we would even get together off the hill outside of work.

At the sodium burn bit, there was water beyond the barrier and you would throw things into the water that sodium needed to be cleaned out of. Years later, there were still pipes that the sodium hadn't been cleaned out of that we found in the burn pit. But there were no radioactive material put in the burn pit.

It is not my experience that anything went down the drains. There were disposal procedures and they were followed, but things got better as time went on. I worked at a place in Cambridge, MA called Nuclear Metals. I thought the safety back there was horrendous. North American Aviation did a good job and then Rockwell took over. Some people may have thrown stuff away haphazardly where it shouldn't have gone.

I kept a training logbook, of course – that was computerized later on – of who I was training and the schedule, but that was toward the end. I think we did keep logs as a Health Physicist such as for fuel transfer at the RMDF – we kept notes about things we would have to sign off on. We had to sign off on activities that happened and the date. I'm sure that did happen. All facilities had logbooks that would track things that happened there. My assumption is that they were put in a desk there, and then I have no idea where they went.

I enjoyed working there for so many years. It was a place to go and do something (not just go to work), and there were some good people. I lived in Woodland Hills, which was about 15 minutes away; it was on a back road. I drove up the hill every day. I didn't mind the drive. My wife had worked at Rockwell International - that is where I met her. She worked down the street on Vanowen. I took her with me on Family Days on the hill and she was amazed at all of the things that we did up there. I don't think my sons ever went with us. Everyone who worked there was about the same age - from 22 to 24 -

and everyone fraternized. I met a lot of my good friends there. It was a good place to work.

Interview 193

I was a part of a team made up of contract administrators that was sent to the Santa Susana Field Laboratory; we were housed in Building 30 in Area 4. The reason that we were sent there was to provide a quick response time for the technical team in the administration of the procurement process or in incorporation of any changes that were required to be made to the contract as a result of new developments that were discovered. This proved to be a very valuable mode of operation in the handling of contaminated or hazardous material that had to be properly handled and in some cases removed to an authorized government storage area.

Like most people, when I first went up there, I was concerned about working in an area where they had hazardous and nuclear materials. However, the more I became familiar with the mode of operation, the more I became comfortable working at Santa Susana. I was deeply impressed by the method in which the technical teams handled the performance of their duties. I felt completely safe. Safety in the removal and handling of waste was the primary objective of the entire team that was working at Santa Susana. At all times, we (the workers) were lectured on safety. We were required to wear protective clothing and breathing apparatus as were required for the safety of the working personnel.

During the time I was there I do not recall any major problems at the site but I was there during the tail end of operations. Whenever there was any event that was outside the jurisdiction of the construction contract, immediate action was taken to stop the work and get it incorporated into the contract properly in order that the work could continue. This was always done on a high priority basis.

I was always impressed by how professionally the scientists handled the removal of hazardous material. I was clear to me that the policies and procedures were adhered to 100%. In addition, these policies and procedures were updated frequently when required. The policy binders were checked continuously to make sure that they were up to date at all times.

I have no personal knowledge of the sodium burn pit and I was never involved in the operation there.

I do not have any personal knowledge of the Building 56 landfill site and anything I know is strictly hearsay.

Again, I was always impressed as to how serious the personnel at SSFL took their jobs. They responded quickly to any changes in a professional manner and safety for both the environment and the personnel required to work these problems was paramount and professionally handled. Again, I would like to emphasize that if I did not feel safe working at the SSFL site in the removal of hazardous material I would have requested to be removed from that effort and even possibly quit my job.

Interview 195

I started working in 1965 at De Soto in fuel rods for the JAERI (Japan Atomic Energy Research Institute) and fuel plates for the ATR (Advanced Test Reactor) elements in Idaho. In 1968 I started at the hill in Area IV Building 355 the Sodium Component Test Installation (SCTI). I went into other buildings up there like Building 19 where there was a SNAP reactor. I also worked at the infamous sodium burn pit, Building 4013, and Building 59. Building 59 was a hot rascal – there was a leak there. I hope someone has talked about the spill that ran downhill from the SRE to Brandeis. Brandeis sued and the company bought the land to shut them up. In Building 59 there was the SNAP 8DR, the one with the groundwater problem. PST can tell you all about that. Also I worked in Building 19 where they built the “snubbers”—shock absorbers—great big rubber donuts that they put under pavement for earthquakes. This work was done for the highway commission. When they cleaned up Building 19 they had a lot of hydraulic lines. Did you talk to WTU? We did very dangerous things at the sodium burn pit as you are aware, such as the occurrence at the burn pit on the other side of the hill where two guys got killed.

Some of the hearsay – I put sodium valves in the sodium burn pit and watched them react and explode. I know we had a lithium facility in Building 56 and Building 58 and I think some of that lithium got put in the burn pit also. Have you talked with RUV? How about SVW? No he’s dead. The same as MNO, who passed away with leukemia. My brother, TWX, worked up there in the late 1950’s at the RMDF when it was nasty. They didn’t have the controls over how stuff was handled then. Have you talked with LMN? I heard about the cleanup from UXY. Have you talked to VYZ? She was very good at getting us trained at UCLA, such as how to use the Geiger counter. Well you could talk to WZA, but he’s dead. You mean he’s still alive and lives in Redding? I thought that he’d passed away. He worked with MNO in radiation monitoring.

The Hot Cell—I worked there too. Get a hold of LMN; he will tell you about the black gentleman, I can’t remember his name, how he came down with beryllium poisoning as a result of working on a cleanup there. PST went with him to Huntsville and the Redstone Arsenal where they were both exposed.

Back to the burn pit. As to the question if any radioactive materials were disposed there—yes, that’s why the hillside is being ground down into small pieces and being hauled away. I worked on that. Oh! YAB is the name of the black gentleman with the beryllium poisoning—he was a super nice guy. Go ask PST— he was really involved in cleanup on the hill. I know that he will say anything and won’t hold back. Have you talked with the union president, YBC?

I also worked at the Kalina facility, an ammonia turbo-generator facility, where they used ammonia in a specialized cycle. They took the excess heat out of the SCTI’s heaters and ran it over to the Kalina facility thru a turbine to produce electrical power. I also worked on coal gasification, they had so many good programs that they let go—nuclear too. When I worked at DeSoto they made the plates for the ATR in Idaho. Over at the RMDF, I loaded the tubes or cylinders. There were procedures and they were pretty well followed. By that time they had gotten their act together.

At the “infamous Powder Room” down at DeSoto, we used to make the powder and grind it up and put it in the plates for the ETR and the ATR back in the 1960’s. We ground the powder and put it in aluminum plates. That Powder Room became so dusty and contaminated a couple of fellows—ZCD and ACE—got so hot that they sent them to Oak Ridge to be counted. They put them on a plane and flew them there and back. When I worked in the Powder Room, we had to have full body counts at UCLA every year.

I got laid off in 1988 or 1989 and went to Rocketdyne in Canoga Park until 1992 or 1993. Then I went back up the hill and worked on Kalina and at the SCTI.

At SCTI we were not required to wear film badges but there were certain areas in Area IV where you were required to wear a film badge. Some of the sodium tanks had radioactive material to measure the level of the materials in the tanks. In Buildings 13 and 19 we didn’t need to wear them. When working cleanup with PST at Building 59, we had to wear film badges. We would turn the film badges in—they were mandatory to wear at the RMDF—but I don’t remember how often they collected them and gave you a new one. I would leave mine on the shelf next to the door when I left the RMDF and pick it up at the same place the next day. Sometimes you wore a film badge and sometimes you also wore a dosimeter. I briefly worked at Building 20 also and there were very strict controls about the film badges and dosimeters there. I had been notified about being exposed by BDF who was the HP at RMDF. Another gentleman at Building 20 was WZA who was all over the hill. I had heard that he had cancer, throat cancer I believe. I also worked at the hydraulic test facility although there were no radioactive materials there. We called it the “water loop.” I was a Reactor Mechanic, I got that title when I made the fuel plates. I got the title of Jet Propulsion Mechanic at Rocketdyne after working on the test stands very briefly.

[When asked about “off-normal” events occurring] Well that was a normal procedure back then at the sodium burn pit. You threw it in the pit and let it bubble and blow up. A lot of people didn’t like working there. Then we got into cleaning the pipes. We would soak some of the larger lines in alcohol. They brought in an outside company that did it by steam-cleaning. Normally the pipe would be disposed but the valves and other components might be reused and put back in service and tested for another 1,000 hours.

Here is the hearsay about logbooks being destroyed. We heard that a distraught employee burned them up or otherwise destroyed them. Every time that I got laid off I asked for my medical records, promotions, demotions, pay scales, and other documents, but I never got them. But they are, excuse the expression, lying to you if they don’t have them—they kept records! Some of the files were destroyed or mysteriously disappeared or were vandalized we were told, but they are probably at Iron Mountain!

There were cases where they would go in and x-ray pipes with our own people, and sometimes the dumb engineers would lift the “DO NOT ENTER” tape while they were x-raying the pipes and got exposed. There were times when people got exposed to x-rays when they were doing examination of the welds, but they tried to keep it sanitary and keep people out of where they shouldn’t be.

I tried to keep to procedures and I made an entry in the logbook when I was performing something. I was the shift leader at SCTI and when you took on that responsibility for a shift, say from 8 to 3:30, you wrote in the logbook who was doing what: “Joe Blow is doing Procedure X, Revision whatever.” My boss would review my logbook—everything was supposed to be logged. Some facilities were tighter and some were looser about logbooks. CEG ran the facility in Building 39 (not Building 57) where they worked on sodium and lithium. There was a lithium loop in Building 57. DFH ran a smaller sodium test loop in Building 32.

Training was pretty good. As I mentioned about VYZ, she was the Health and Safety employees union representative. They called her “Safety VYZ” and she did a really good job. She ran the employee training program. A lot of the guys were really macho but she was really good and stood up to both the employees and management. She pointed out when things weren’t safe or management was in a big hurry to get something done. This was true more so at AI because there was a conflict in job classifications and titles between Rocketdyne and AI. Back in my brothers time you would get to the top of the hill and then you had to go through multiple gates to get to Area IV – it was very segregated, but it wasn’t that bad when I got there. It got less so as we learned to work together.

There was radioactive waste buried at the sodium burn pit—some of the sodium barrels had radioactive waste in them. I know they are trying to clean it up—I bet it is cleaner than my backyard except for where the SRE is and down the hill from there.

We used acetone and alcohol and a lot of chemicals to keep the water purified. TCE was handled with precautions and we used the procedures and wore face masks. People followed the procedures if they didn’t want to get their “you-know-what” chewed out. Chlorine was used for cleaning the water as the steam generators needed to have their water very clean. They would test the steam generator water purity at the Chemistry Lab in Area IV that was performed by PST’s dad – EGI I think was his name; his manager was FHJ.

Procedures were changed on an ongoing basis. As I said, it was an ongoing thing if you were running a test and something wasn’t working you’d call an engineer and say “hey, it ain’t working.” You and the engineer would write in changes and he would sign-off in something that we called “redlining the procedures.”

We were developing a dump heat exchanger to be used for heat removal after a reactor failure. We tested it by running hot sodium through the heat exchanger and cooling it real quick using super blowers underneath to cool it down. They even had a solar place up there – a big solar dish called the Solar Concentrator Facility, but I never worked there.

I have no knowledge of a surface disposal facility—unless you’re talking about the burying on the western edge near Runkle Ranch and the Indian caves. Over at Building 59 I can tell you they had lots of problems at the pit – the sand was very hot when they excavated it.

Some of the facilities were very classified; they didn't want you to know what was going on there. I wish my brother was alive, he was 4 or 5 years older and he could tell you the horror stories.

It was a job I felt good about and you hoped you were helping the energy system. We were testing lithium loops as a method for transferring heat in Building 57 along with the sodium test rigs run by GIK, but there were no reactors near there. I was proud when a test went as expected. In Building 19 there were a couple of reactors built into the ground and my brother worked on the SNAP. It was long buried and covered with cement before I got there.

HJL came so late that he was the new kid on the block, but he was going to tear everyone a new one. IKM worked at the KWEB.

When I worked night shifts especially with fog, it was really a hazard driving up Woolsey Canyon Road as there were no markings on the road. Especially if we would work rotating shifts and you didn't know if you were coming or going. It was a safety concern when working rotating shifts—it was very hard on the body. Then they went to a different system which was much better. RUV implemented that.

It was a good experience working up there. I put in my time and hope to have a pension until Boeing runs out of money. But the rotating shifts were very hard on the body. JLN, an old timer, was at the pump test bearing facility, Building 357. I didn't work there but it was right next to the SCTI and they had some close calls with bearings heating up. The oil was heating up and burning up the bearings or the bearings were heating up and burning up the oil. KMO could tell you which it was. It got so bad—the testing of bearings—that they had to shut the facility down.

Everyone was supposed to be working by procedures and you'd better be following them, but everyone was not that good about keeping their logbooks up to date.

At Building 59 they had an alcohol cleaning facility during D&D and one of the pumps froze up and the assistant manager when out without a mask and he got burned very badly in an alcohol fire. Now I'm going to tell you one of my horror stories. When I was shift leader at the SCTI, I sent an employee out to tighten a valve and he went out without his face shield and got squirted in the eye when the valve developed a weep hole as we called it. I didn't make sure that he was properly dressed-down, but he did not lose his eye.

Have you talked with LNP? She was the secretary in Building 355 and she kept all the files and was a great secretary for RUV and SVW. You should interview some of those secretaries—I bet they know more than the employees. Have you heard about the old employees meeting? They get together every third Thursday of the month at the recreation center just off of Fallbrook. I heard Pratt & Whitney will be shutting the recreation center down.

Interview 196

I received my undergraduate degree from West Virginia University and masters in physics from UCLA. I started to work at Atomics International in 1957. I spent six months in "purgatory" at the Vanowen facility while waiting for my clearance.

I started on the hill (Area IV of SSFL) in 1959 and worked there until 1981, except the two out-of-state assignments mentioned below. Then I was back on the hill from 1991-1995. Over the years I worked for Atomics International, North American Aviation, then Rocketdyne, then Rockwell. I moved from Rocketdyne to ETEC. I worked on the 1993-95 radiological survey of Area IV.

Uranium was the major radioactive material we handled. For the sodium-graphite and organic critical assemblies in the high bays of Building 4009, it was solid metal of moderate enrichment in U-235, and part of fuel elements assembled elsewhere at AI. At the AETR critical assembly there were several forms of uranium. All were in the form of solid 2-in. by 2-in. by 1/4-in. to 1/2-in. blocks. U-233 was clad in stainless steel. Highly-enriched U-235 was in a U-Al alloy. Natural and depleted uranium was in the form of metal blocks. The AE-6 reactor was a small water boiler, in which the moderately enriched uranium was in an aqueous solution in a shielded sphere. This solution was drained into a shielded container and replaced with a fresh solution. This was in about 1959, and as far as I know was the only time a refueling was done. The shielded container was transferred to the Area IV fuel storage building. The AE-6 reactor was the neutron source for a series of sub-critical arrays of uranium slugs (about 1/2-in. diameter by 6-in. long) in aluminum tubes. The uranium used included natural and enriched forms, as I recall. The enrichment was moderate, I think, but we did get some enriched uranium that required locked storage. (The shipment had an armed guard during transport.)

Other radioactive materials were in smaller amounts. The AETR used plates of thorium. There were foils of various materials with appropriate neutron cross-sections and half-lives (I recall dysprosium as one) for testing neutron flux distributions in critical and sub-critical assemblies. I think there was also a neutron source for each facility.

We had on-site storage. Radiological materials were not transferred between buildings, except for transport of the low-level radiation and short half-life foils for counting their activity. The material used in connection with the operation of the facilities was kept either in a reactor, including the small critical assemblies, or it was solid materials, U-235 and U-238. We had a storage building (building 4096) at the AE-6 for the enriched uranium that required locked storage. There were shielded storage rooms in Buildings 4009 and 4100 for storing fuel materials in a criticality-safe configuration.

When I first went up I worked on AE6, the original reactor from Atomics International that was transported from Downey to up on the hill. It was a small water boiler. Then I went to the critical assembly for the organic moderator reactor – in building 4009. And then I went to AETR – advanced epithermal thorium reactor – in building 4100. The sodium reactor critical assembly was also in building 4009 – OMR STR. We would irradiate material and then take it to the counting room.

I was in the first building from 1959-60. Then I moved to building 9, the organic critical assembly. I then moved to Piqua, Ohio, in 1963, for a couple of years for the start-up of a small power reactor with organic coolant and moderator that AI built. After I came back I worked in building 100 until I went to Idaho Falls for two years from 1967-69. The reactor in building 100 was similar to the one in Idaho where I worked at Argonne National Laboratory as part of the AEC Industrial Participation program. The reactor in Idaho was called ZPR-3. It had two tables, one stationary and one movable. To bring it critical you would bring the tables together. You'd put plates in these drawers to make a pseudo-spherical reactor. On the outside we had a driver of U-235 plates and on the inside it was U-233 plates and those were sealed in cans. And it was radioactive so you handled those behind glove-box type facilities. I'd lay out the loading patterns and such.

In 1981 the area I worked in on the hill sort of shut down and I went to the Desoto facility and became a system engineer. In 1991 I came back on the hill working at ETEC in building 38, ETEC Engineering Office Building work on the ETEC radiological survey. That was fascinating. Before, I had gone to whatever building my office was in, and then home again. Because we walked all over Area 4 doing the radiological survey, I became much more familiar with Area 4. Then I retired in 1995 and went back to work for one week in September as a contractor to finish writing the draft for the report of the survey.

Between 1959 and 1995 the way materials were handled was basically the same, except there were different configurations. For example, in building 4093 there was a water boiler neutron source – a little reactor about a foot and a half in diameter. There would be a matrix of moderators and aluminum tubes that held uranium slugs, and I guess that's where we would take samples. (My memory is all very vague. It was a long time ago.) This was generally depleted uranium and you'd put the slugs in the tubes.

The only fuel handling at the AE-6 I can remember involved depleted uranium slugs in aluminum tubes. The diameter of the slugs was about the same as the inner diameter of the tubes. Eventually we would have to cut them out because they were too tight to slide them out. We wore respirators; there was a lot of dust. It was a dirty job. I'm sure I must have inhaled some uranium dust. When I left Argonne West many years later, I had a full body count done and I passed, so I think I felt safe. We had film badges and dosimeters.

I have no knowledge of materials being left on site; everything left I'm sure.

We did eventually get a warehouse for storing radiological materials. It was a great place to play ping pong – better than our previous, and later, location up in the high bay – until it got certified and they put it into use. After that they kept it locked up since it was a storage place for U-235 and other radiological materials.

There were rules on how we had to handle the material. I don't remember all of them specifically. There was a health physics guy, there were film badges to monitor dose and we did what the health physicists said. I can't remember about the storage configurations. Once we got U-235 we probably had to keep it in a certain geometry.

In building 100 there was a fuel storage room which had racks on the wall that were spaced to prevent criticality. There were rules for example, that you could only have

one tray out at a time when you were loading. It did get "hot" in that room, the radioactivity was mostly due to the U-233. We wore coveralls, booties and film badges. We were set up where there was a changing room. I think the radioactive materials were handled with care. We also had beryllium blocks. Beryllium can be hazardous, but ours were solid metal blocks. The major hazard had been in making the blocks in the machine shop. We were aware of the possibility of a hazard, but I don't recall special precautions. The blocks were handled with gloves, as were all of the materials loaded into the drawers which made up the critical assembly.

In building 9 we had the full assemblies. They were built somewhere else. I can't remember the storage for those but I'm sure the configuration was safe. They were long cylinders that contained uranium of some enrichment. Then we put them into another cylinder tube surrounded by a heated organic liquid. There wasn't any real handling of any radiological materials there like there was at building 100.

The culture in the work force was to do things the way you were supposed to do. There were rules for each facility.

The chemicals used for cleaning weren't as well controlled. If you wanted to clean something in building 100 you'd go outside for better ventilation. We would go to the concrete pad in the back and cleaned with rags and Xylene. The small amounts of excess cleaner went into the ground or onto the pad to evaporate. It was like they did for the rocket engine cleaning, only in much smaller quantities. As it turned out the cleaning chemicals went into the soil and water in some areas of Santa Susana but hardly at all in Area IV. I really don't remember much else. That was a minor thing. We'd have a bottle of solvent that was handy where we needed it. We had a workroom and things were cleaned there too. If people doing the current investigations look in close proximity to the buildings' footprints, any likely remaining contamination would most likely be found there. We didn't clean parts in the middle of nowhere; we stayed pretty close to the buildings. Now that I think of it, we did do some cleaning in Building 4093 towards the end.

There was a SNAP reactor in building 59. In the 1990s, the plan for decommissioning it was to excavate the building down to ground level and fill it in. I worked on the final (at that time) decommissioning report. There were some solvents in the ground at one location. I made a very rough estimate about how much would be there and my calculations predicted that there might have been as much as one bottle! Eventually, the decision was made to excavate everything and then backfill.

The sodium burn pit was where everything ended up. I never went up and watched, but occasionally, we could hear explosions. I guess all sorts of things went in there. I don't know if small things remained; big things may have been fished out but I don't know for sure. I think the burn pit has been excavated to bedrock, so there would be no parts left. We had technicians. We gave equipment to them and they took care of it.

There were leach fields in Area IV. It was interesting to note them when we were doing the 1995 survey. One of my colleagues found the inlet to the leach field when we were doing that survey to take soil samples to test for radioactivity.

Everything we worked on went as planned pretty much. We just made measurements. In one facility (the organic critical assembly) we had a four day run measuring the temperature coefficient where we raised the temperature and we measured the radiological effect. We made temperature readings once per hour and neutron flux in different areas. (During the start-up of the reactor at Piqua, I used the temperature coefficient we had measured.)

There were company policies and procedures that governed the way things were done. Radiological monitoring was done by health physicists. I suppose they were governed by procedures. They had off site monitors for background. There were procedures for assembling the drawers with the plates that I already mentioned. We loaded them in the order we were supposed to. We had strips which gave the sequence of plates. There were calculations for configurations for storage.

We had one operation one time where we were supposed to replace a neutron or gamma source from the reactor. The material was in a cave and it was very radioactive. There was concern about the exposure we were going to get. So CEF wrote up the procedure for how we should do this. We were to go in the back door, move really fast, replace it quickly and then get back out again. We followed the procedure and I believe very little dose was received from that operation.

What we did was determined by designers or project people. They wanted to know how the power reactor would behave at a certain temperature. As far as procedures for individual experiments there was a plan. I believe people did what they were supposed to do.

People who worked there came with an academic background – university degrees of various levels (members of technical staff); my training was in physics, not necessarily nuclear; during my time in “purgatory” I read a book on reactor physics. That was pretty much how I learned what I needed to know. When I first started there the reactor physics department had a lot of PhDs. We had lectures from time to time – various people would come in from Cal Tech – like Mössbauer, for example – there were others. I don’t know how the non-technical staff was trained, but we had capable mechanics who were interested in their jobs.

I can’t remember formal annual reviews. There was an annual raise and a form that defined the job and a job description. I didn’t have to do evaluations for anyone else. Later when I was down at Desoto there was an annual review and they would define goals for the next year.

I don’t know of anything that was disposed of on-site or in drainages at Area IV. Everything that was disposed went off-site. We didn’t have fluids so much, but what we had was disposed of in some way. We did change the fuel in one reactor once, which was liquid fuel, and it was put into a shielded container and taken to the fuel handling building. I presume it was sent back to somewhere.

We had logbooks for each of the critical assemblies. The person responsible for the measurement had a notebook to record them. That wasn’t part of my responsibilities. I didn’t have anything that documented what I did on a daily basis. I don’t know what happened to the logbooks.

I am not aware of anything that wasn't documented that should have been.

I don't know of any liquid materials that were poured down drains or in toilets.

I have no knowledge of surface disposal area on western edge of Area IV – although that could be reference to burn pit. I am aware of leach fields, some leach fields that appear to be labeled on your map. I remember they took samples from some of those at one time. I don't know much about the old conservation yard, storage tanks or gas hold up tanks.

No problems with underground pumps, sumps, sewer systems, that I am aware of.

I went up the Lincoln highway, which got its name because of an industrial engineer with that last name. I drove a carpool for a while. I was working up on the hill when the SRE accident occurred and I didn't know that anything had happened. We were all very busy; I was working what I was working on.

When I was asked to work on the "final" survey in 1995, it was supposed to be a radiological and chemical survey. I went away on a five week vacation. When I got back, they had changed their minds and the survey was only for radiation then. They'd put in stakes every 25 feet and we'd walk along the stakes. We did find a location in the southeast area where there was some dirt with a low level of radioactivity that was higher than the surrounding dirt. CEF did an analysis and found it similar to background levels in other locations, but not in this location. The executives said "get rid of it." They got rid of it.

There was some tritium on the creek in the northeast part of the facility. That was a surprise. CEF's theory was that the only plausible explanation was that neutrons from one of the SNAP reactors which was located underground could have reacted with lithium in the concrete enclosure around the reactor, and that could have resulted in the release of some tritium that migrated out of the concrete into the ground. He wrote that theory up in some sort of internal letter or report. The only tritium I know about at the site was a particle source for an accelerator was in building 4035 or perhaps 4030. I've talked to the guy who was in charge of that accelerator, DGH. As I recall he didn't know what happened to the source. It was a small source.

One other thing we found – in the vicinity of these small storage buildings near Building 4723 - we found low levels of radioactivity contamination, which probably came from equipment that was moved out there after the SRE accident. Those were nominally clean areas and we were a little surprised. It should be part of the report of the Area 4 radioactivity report.

Interview 203

I started working at the Santa Susana Field Laboratory (SSFL) in 1976, but was hired on in 1961 with the AI Division of North American Aviation. I started as an electrician, and soon became a lead man and then supervisor. When I went to the hill I was primarily involved in construction engineering, (building the structures), working out of a trailer next to Building 40. I worked mostly on the AI side, but I worked two or three times on the Rocketdyne side. I retired in 1989, but between 1976 and my retirement, I worked the whole time on the hill, except for two three-month assignments at DeSoto and also in Los Angeles.

Regarding radiological contamination, I knew that it was found downstream of the SRE, near the RMHF. The contaminated soil was removed and taken to Hanford for disposal. The cleanup occurred in the mid-1970s, and the soil was tested following the remediation to ensure that it was clean. I did not do the actual clean up, but was involved in a supervisory role.

On the hill, my protective clothing was generally a lab coat, booties and rubber gloves. I wore a film badge at all times.

I was not in a union, but I dealt with contractors in all the trades, so I was familiar with six unions that were there. I supervised primarily contractors.

I never handled hazardous waste nor worked with hazardous materials, including solvents.

I knew of no waste disposal or dumping on site. There were deer, jack rabbits and coyotes, and you'd see vultures if any animals were dying up there from any contamination, and there wasn't.

There were not many accidents that occurred on construction projects.

I knew nothing regarding cleanup efforts there. I do not remember any disposal of wastes in toilets or floor drains, nor was I familiar with any disposal area at the western edge of Area 4. I know nothing about the sodium burn pit, old conservation yard, fuel element cleaning areas, storage tanks or gas holdup tanks, or any problems associated with underground pumps, sumps, piping, sewer or drainage systems.

I kept a log of daily work conditions and activities on construction projects, but I disposed of them at the end of the job.

I conducted the training of my people on various subjects, including health and safety, which amounted to two hours per week.

Interview 206

I came to California in the summer of 1955 specifically to work with Atomic International (AI) on the Sodium Reactor Experiment (SRE). The building was under construction when I arrived and was completed in the late fall. We immediately started moving equipment into the building, training the staff and preparing procedures for loading moderator elements and fuel, and for operating and maintaining the plant.

The plant was organized in a dual-command arrangement with EFH in charge of operation and I was in charge of the experimental and test programs. My responsibilities included equipment maintenance. EFH and I reported to GHJ, Group Leader.

Both groups kept detailed log books of our activities. IJL, AI Vice President, held weekly review meetings at which we discussed the status of the facility, test results, and planned test/operations for the upcoming week. AEC officials monitored our progress and we had frequent visitors from Washington. These visits seemed to peak around Rose Bowl time—purely coincidental, I am sure.

I only know that our records were moved to DeSoto when the SRE shut down. Later, most of the records from DeSoto were transferred to the Rocketdyne offices. I discovered this sometime in the 1970's, when IJL asked me to help him put together a paper he presented at the American Nuclear Society's annual conference in San Francisco. We could find very few of the records. The AEC got copies of all our reports but I have no knowledge if they are still available.

The fuel was loaded and the plant "went critical" in 1957. The SRE was a 20 Megawatt thermal (MWt), sodium cooled, graphite moderated thermal nuclear facility. The plant was built as a "proof of principle" experiment and as a fuel test bed. Various fuel combinations and configurations were tested. The experimental fuel elements were loaded, the reactor started up and operated to expose the fuel to a pre-determined neutron exposure. The reactor was then shut down, the experimental fuel elements were extracted, transported to the fuel wash cell, sprayed with water to remove residual sodium, transported to the hot cell, disassembled, and examined.

The original plant design provided for the heat to be removed by an air cooled heat exchanger. Southern California Edison (SCE) installed a steam/electric generating plant, about 6.7 Megawatt electric (MWe), to utilize our waste heat. As you can imagine, the SCE operators were not pleased with our intermittent operation. Their objective was to generate electricity; our primary objective was to evaluate fuel technology. The SCE Manager once told us we reminded him of his 5 year old kid. He and the kid planted some beans and the kid kept digging them up to see if they were growing.

In 1957 we hosted an "open house" and a television program from the high bay to publicize the plant. Several AEC and local officials attended (including Sam Yorty who was the Mayor of Los Angeles at the time) and made speeches. During the program the town of Moorpark was completely powered by SRE generated electricity.

All plant personnel, and usually visitors—especially if they were going to do any work in the plant, were required to wear film badges. Badges were "read" weekly. I do not

recall hearing about any excess exposures. Operators or maintenance personnel who did any work that might have involved excess exposure carried “pencil dosimeters” which were monitored during and after potential exposure. We always had a health physics (HP) engineer or technician in attendance. There was a HP/safety engineer on my staff. He reviewed each task prior to it being carried out. We also had a “hand and foot” counter just inside the entrance to the building that all personnel were required to use on entering and leaving the building.

As for the storage or disposal of radioactive materials, we didn’t have much. Santa Susana had several nuclear facilities at that time. There was the KEWB (Kinetic Experiment Water Boiler), sodium and organic critical facilities, several Systems for Nuclear Auxiliary Power (SNAP) reactors. I took a model of SNAP-10—the reactor that was put into orbit—to Geneva to the Atoms For Peace Conference and tried to explain it to the Russians—without divulging any secrets). All facilities used the burn pit and other site facilities for material storage and disposal. No nuclear material was disposed of on site. Radioactive wastes were turned over to contractors for disposal.

Contaminated sodium—contaminated with chemicals, not radioactive material—was disposed of in the “sodium burn pit.” I don’t remember that I ever visited the pit. Cleaning materials, lightly contaminated clothing, monitoring swipes and such were sealed in steel drums and disposed of off-site. Of course, no fuel, exposed or not, was put into the drums. Fuel, fresh or exposed, was handled by other departments. We normally saw only complete fuel elements that were stored in the fuel storage cells in the high-bay floor before and after exposure in the reactor. No radioactive material was disposed of on site.

I know of three exceptions to the above:

The first occurred when a fuel element was removed from the reactor and stored in a fuel cell. The fuel handling machine (FHM) was then moved to a storage bay for maintenance. Water was admitted to the wash cell to remove residual sodium from the fuel element. Normally (by procedure) the FHM would remain over the wash cell during the wash. Excess sodium on the element reacted with the wash water, causing an explosion. Without the FHM shield on top of the cell there was only the weight of the fuel shield plug holding the element down. This was not sufficient and the element was blown into the air. Fortunately it fell back into the cell, however partially reacted sodium was scattered over the high bay floor. This required considerable cleanup to get the floor back to its usual non-contaminated state.

The second was more serious. The fuel channels were 3-inch diameter channels running axially through the center of the graphite moderator elements. There was normally about 30 inches of sodium above the tops of the moderator cans. On this occasion we had cooled the reactor sodium to about 350 degrees F and drained it down to the tops of the cans so we could inspect the core with a bore scope. While the sodium level was down, there was a scheduled fuel element change. In a case of the left hand not knowing what the right hand was doing the operators proceeded with the fuel change. Since there was no sodium in the plenum to preheat the element, the cold element entered the fuel channel. The 3-inch diameter column of sodium in the channel was cooled below the freezing temperature of 204 degrees F, thus blocking the

channel. The FHM continued to lower the fuel element which had no place to go. It was coiled up on top of the moderator cans, looking like a few strands of spaghetti dropped on a plate. When we finally figured out what had happened we drained the reactor completely. Working through a moderator access port and using a tool fabricated like a “rabbit snare” by one of our technicians, I lay on the loading face shield and picked up the fuel slugs and the element hardware that were placed in syrup cans and transported to the hot cell. The reactor activation was low enough that I could do this with minimal radiation exposure.

The third is the event which gave rise to the spurious rumors that have resulted in the existing panic. The sodium pumps were cooled with tetralin, a liquid hydrocarbon that was used instead of water to avoid having water in close proximity to the sodium. Somehow a leak developed in the pump cooling coils allowing the tetralin to enter the sodium coolant. The tetralin combined with the sodium to produce a gooey mass [I love that technical term—but cannot think of a better description] that partially plugged some of the fuel channels resulting in overheating some of the fuel elements. These became hot enough that a low-melting point alloy (eutectic) was formed between the stainless steel fuel cladding and the uranium fuel; the cladding/uranium alloy melted allowing some fuel slugs to escape from their enclosing tubes. The temperature never approached the melting point of either the uranium fuel or of the stainless steel cladding. The accident report by the safety analysis committee that investigated the event describes the event and its results in great detail. The committee was chaired by KLN. KLN is still available for consultation if you desire. He lives in Maryland, near the NRC headquarters, and has expressed his willingness to be interviewed.

In 1961 I went to Lincoln, Nebraska, to get the Hallam Nuclear Power Facility (HNPF) built and into operation. I was Field Manager, AI’s representative on the site. Hallam was a 75 MWe nuclear power plant. The HNPF design was based on the SRE, with what we thought were design improvements. Unfortunately the “improved design” of the moderator cans proved to have the flaw that led to the plant’s failure. The HNPF was one of several plants built as part of the AEC’s Power Demonstration Program. Several different reactor designs were built to evaluate the feasibility of commercial nuclear power. I was in Nebraska until 1964 when the plant was turned over to the Nebraska Public Power Company for operation. I then returned to AI and worked at ETEC until I left AI in 1970.

For a bit of background—my introduction to the nuclear program was in March, 1944 in Oak Ridge at the Y-12 plant. This plant was separating uranium isotopes for the Manhattan Project. We were utilizing the electro-magnetic process, developed by GJK of University of California at Berkeley. GJK had been working on cyclotron research and when the need for large scale isotope separation arose he realized that half a cyclotron would do the job. Ionized UCl_4 vapor was accelerated through electric and magnetic fields. The individual atoms traveled in a circle. The radius of the path depended on the mass of the atoms. Thus if the beams were captured at the 180 degree point the 235 atoms would be separated from the slightly heavier 238 atoms.

At the end of the war the electro-magnetic process was discontinued in favor of the more efficient gaseous diffusion process and I moved over the hill to the Oak Ridge National Laboratory. There I was in the Instrument Development Laboratory. I was

fortunate to be assigned to the Low Intensity Test Reactor (LITR) where I was responsible for the control and Instrumentation systems. The LITR was the prototype for the Materials Testing Reactor built in Idaho. I designed essentially the same instrumentation and control systems for the Bulk Shielding Reactor, the Homogeneous Reactor Experiment, and the Molten Salt Reactor Experiment (MSRE).

Before the MSRE was completed I left ORNL and moved to Groton, Connecticut to work with the Electric Boat Co. on the Nautilus and Seawolf nuclear submarines. There I worked with a group of six engineers who prepared test procedures, supervised test performance, analyzed test results, and prepared the reports. We stayed with the Nautilus through dock and sea trials until the Navy accepted the boat in 1955 then I moved to AI.

After AI, I worked with Fluor Engineers. My first assignment was as Engineering Manager for the Los Alamos Plutonium Laboratory (Building TA55). The lab had their plutonium work scattered in several locations and, for security and safety reasons, wanted to consolidate it in one properly engineered building. When the building was constructed a delegation from the British Atomic Energy Authority toured the lab and were impressed enough to hire Fluor to design a similar plant to be built at Aldermaston. I was Fluor's liaison for this project and spent several weeks with the British design team in London.

After retiring from Fluor in 1980 I spent several years consulting with Management Analysis, a design and quality assurance consulting firm. There I worked at Hanford, Washington on the basalt rock waste fuel disposal project, at the Nine Mile Point nuclear power plant to help straighten out their problems with the NRC, at the Savannah River Site on the construction of the glass melter for the immobilization of radioactive wastes, and in Las Vegas on the design of the Yucca Mountain Nuclear waste disposal site.

Interview 207

In 1959 I was hired as a trainee operator and mechanic at the SRE, as referred by a family friend, who also was my supervisor. I worked there approximately one year, and it was during that time there that the fuel element failure occurred. I was on site a few hours after it occurred, and was involved in the clean up. When the SRE shut down, that reduced the need for personnel, so being low in seniority, I was laid off.

All my training was on the job. I don't recall any specific training courses or training meetings, but I was working towards becoming a certified operator on the reactor, which was not accomplished due to the layoff. I was quite fortunate in that the person who hired me took care to make certain I was involved in safe activities. I don't remember any safety meetings, but my coworkers were aware of safety issues and passed along those concerns to me.

I wore cotton coveralls and cotton gloves to work in, and on several occasions had to wear a respirator. I wore a film badge, but shortly into the clean up, Al took the film badges back. The levels of radiation were high enough that the badges would have shown high exposure, resulting in people having to cool off and not get any work done. The employees were willing to accept the risk in working in those risky conditions to maintain their job, and to hopefully get the SRE back running so that everyone could continue working. Safety was a concern, but it was overlooked in this instance. Some areas were so hot that it was off the Geiger counter, and those areas were roped off.

My cleanup activities went from approximately July to November, and I was involved with cleaning up various levels of contamination. I remember lying on the floor on plastic working on some of the reactor repairs. We used buffing machines on the floor as well as sponges and mops, also on the walls, but determined those efforts moved the contamination around more than clean it up, so we went to use Kotexes. Those were used to wipe and then discard. All items that were used in the clean up, as well as contaminated items, were stored outside in back of the SRE. It was there when I was laid off, so I am unaware of how it was eventually disposed. All the office equipment and supplies ended up there as well.

We used chemicals in the cleanup process, such as various cleaning agents purchased at the store, acetone, paint thinner, etc. We experimented with TCE to see if that would be effective in the radiation cleanup. There was a lot of TCE on site as it was used to flush out the rocket motors after Rocketdyne did testing.

Contamination within the building occurred as the result of operator error with a fuel transporter, also known as a coffin. It was a lead-lined device used to pull the fuel rods out and to transfer them. It had a lead shield that went over the reactor during the rod removal process. During these efforts, an operator failed to keep the shield in place, which resulted in irradiated reactor gas getting out and contaminating the building.

The reactor gas was stored in four tanks behind the SRE. It was kept in those tanks until the radiation degraded enough for it to be safely released to the environment, which took approximately two weeks. One of my assignments was to check the wind direction and weather conditions. If the wind was directed towards the ocean, or over the San Fernando Valley and Los Angeles, then the gasses would be released from the

appropriate tank. This occurred at night, to minimize the possibility of exposure to SSFL workers.

There was a building next to the SRE where the fuel rods were chopped up and cleaned, as they were transported there from the SRE. New cladding was put on the fuel rods there.

I had some reporting responsibilities, which included daily readings that I kept on a clipboard that was eventually used for reporting by others. Those readings include wind and weather, how hot the sodium was, temperatures of each fuel rods, etc.

I remember the Sodium Burn Pit, but I never worked there. I know that people I worked with took sodium from the SRE in 55-gallon drums over to the Pit and ignited it by firing a .22 rifle at it. I recall that there was a disposal area at the western edge of Area IV, but was not familiar with what was disposed there. I did nothing with the conservation yard.

I loved working there, it was a dream come true type of job. I was the youngest person at AI, and enjoyed working alongside people twice my age. I drove up Black Canyon every day and parked right at the SRE. I brought my lunch every day, as there was no cafeteria. I knew other areas of the SSFL could have their employees involved in leisure activities during lunch, such as cards or horseshoes, but we had to be vigilant with our responsibilities even during our breaks.

I am unaware of any of my former associates who may still be alive. I am glad you are recording what happened during this period of time at the SRE Reactor. Once I am gone there will be no one else that actually worked hands on in repairing the SRE Reactor in 1959.

Interview 209

I was first hired at North American Aviation Rocketdyne Research and Development as a mechanical engineer at the Santa Susana Field Laboratory (SSFL) in about 1954 and was continuously employed there until 1960. I was assigned to work in Areas 1 and 2 and worked on research projects involving gas generators in the production and testing of rocket engines. Some of the projects I recall involved the Navaho, Thor and Jupiter rockets, and the MA2 and MA5 booster and sustained engines. For about the last 1 ½ years at the SSFL, I was promoted to supervisor. I recall the 1959 accident that occurred at the SRE but I was not aware of the event until some time afterwards. In 1960, I was transferred to Rocketdyne's Canoga Park facility and worked there until being laid off in 1968. Between 1960 and 1968, I occasionally went to the SSFL on various test firings of rocket engines, which were usually not permitted after 10 PM. From 6-30-1976 until 12-30-1983 I worked at Atomic International (AI) at DeSoto and subsequently I worked at Canoga Park on the Peacekeeper Program until my retirement in 1987. For one or two years prior to my retirement, I was assigned to work on NASA projects in Area 4.

During the period of time while in Areas 1 and 2, I worked around components that involved various exotic fuels, including fluorine, RP1 and others. Many fuel types and names I cannot readily remember, but I never handled or worked directly with them. I recall that trichloroethylene was frequently used as a rocket engine cleaning agent. While later working in Area 4, I never was involved with the handling, management, or disposal of radiological materials or waste, nor was I in areas that required my wearing film badges or dosimeters. There were brief periods when I wore a film badge when working at DeSoto, however.

While working in Areas 1, 2 and 4, I was never required to wear any special personal protective equipment or clothing other than the standard hard hat and safety glasses. I recall that personal safety was important and emphases were on that more so that concerns with environmental protection, particularly in the early years.

During my tenure at the SSFL, I mostly worked shifts 2 and 3. I recall that I was not required to maintain daily or weekly logs and as the shifts often overlapped; whatever information was to be passed onto the oncoming shift, it was usually done verbally. I did write various reports in which tests results, problems, and so forth were documented.

I do not recall the names or numbers of the building in which I worked at the SSFL, but I spent a lot of time in block houses. In Area 4, I do not remember what or where the sodium burn pit was, the old conservation yard, waste disposal areas including an area at the western edge of Area 4, leach fields, septic tanks or drainage discharge locations, or fuel element cleaning areas. Further, I did not work with or have knowledge involving storage or gas hold up tanks, or problems with underground pumps, sumps, piping, sewers or associated drainage systems.

I enjoyed working at the SSFL, the projects on which I worked, and the group of fellow employees with whom I worked. I felt I was on the cutting edge of this industry and was privileged to be involved. I usually brought I lunch to work with me and ate in the lunch area with other employees. I often went walking along the pathways at the SSFL after lunch for exercise, as it was located in a remote area. On one or more occasions I recall

having lunch with astronauts that were visiting, which was memorable and enjoyable. I also remember meeting and providing some briefings to visitors who came on tours of the SSFL. While assigned to Area 4, I would walk among and into abandoned sites utilized in early atomic reactor tests. A building of interest contained the roped-off deep hole that had contained the failed reactor operation.

Interview 210

I was first hired at Atomics International (AI) as a steno at its DeSoto Facility in about 1959 and was there for about three months while I was getting my security clearance. Once that was received, I was transferred to AI's facility at the Santa Susana Field Lab (SSFL) where I worked both as a steno and as a secretary until the late 1960s. Then, I was transferred back down to the DeSoto plant until I left on maternity leave in about 1970. At that point, I resigned and decided to be a stay-at-home wife and mother.

During my eight to ten years at the SSFL, I worked at several locations. My initial work station was in an office building near the SRE. I had heard about the melt down at the SRE in 1959 but that event had no impact on my job nor did it concern me. Follow a brief period there, I then worked in the old SNAP at Building 36, however much of my time at the SSFL was in Building 6. As previously mentioned, I worked at secretarial duties for primarily engineers and occasionally, such as every Friday, I would deliver payroll checks to employees by driving to various AI buildings at the SSFL. I should note that I never worked or visited areas at the SSFL where Rocketdyne operations were located.

As my job pretty much confined my work locations to office spaces, I was in AI areas that required me to regularly wear a film badge. I never worked with radiological or chemical materials and I was not aware of incidents where liquid materials or waste might have been disposed of in toilets or floor drains. Further, I am unfamiliar with a surface disposal area that may have been located at the western edge of Area 4; any leach fields, septic tanks, or drainage discharge locations at the SSFL; a place supposedly known as the "old conservation yard" junk yard; any storage tanks, gas hold up tanks, or fuel elements cleaning areas; nor was I familiar with any problems that may have existed with underground pumps, sumps, storage tanks, piping, sewer or drainage systems. I had heard of what was called the Sodium Burn Pit but I never saw it or had anything to do with it.

During my tenure at the SSFL, I lived in Reseda and commuted daily to work in my car, which I parked nearest the building in which I worked. I usually brought my lunch with me but occasionally bought food from the lunch truck that made the rounds. Often, I would walk over to nearby Building 20 (Hot Lab) where I would meet and have lunch with friends. I never took lunch time walks around AI for exercise or pleasure although I would say that I had a great experience throughout the period of time I was at the SSFL. I enjoyed the people with whom I worked as well as enjoyed the remoteness of the location where deer and other wildlife could be regularly seen.

Interview 211

I started working for Atomics International (AI) in 1958 as a maintenance mechanic. I was involved in the union so I got some work. A couple of years ago I filed a report with this government agency, because I had prostate cancer and went through chemotherapy, and now I go for yearly check-ups.

I would do maintenance work in the areas where they used lasers. I think it was Building 2 or 3. I was exposed to radioactive materials. We had radiation badges and dosimeters. I think they would exchange them quarterly. You had to request information if you wanted to know if you received any dose on your film badge. They would change the dosimeter frequently, but we always had a film badge. We had to suit up and get our badges to do our maintenance work in the basement of Building 20 (Rockwell International Hot Laboratory) and Building 55 (Nuclear Materials Development Facility). They would give us the tools we needed to do our work – we weren't allowed to use our tools due to the radiation; they didn't want to spread the radiation outside of the building. The Health Physicists would check us out with a meter, and sometimes we would have to take a shower. They used protective clothing was but in a barrel; I don't know what they did with it after that. Once someone got a certain amount of radiation, they wouldn't let them work in there anymore – they would have to take some time off. I don't know what the dose or percentage was that they let them get before they had to have a rest.

In my files here I have a copy of the Rockwell International Medical Surveillance Program data sheet which lists the types of work I was qualified to perform: Toxic Materials, Confined Space Entry – Group A, Confined Space Entry – Group B, Processing / Neutralization of Hazardous Materials, Laser, Radioactive, Hearing Conservation Program, Lift Truck, Power Truck, Truck, Bridgecrane, Forklift, Manlift, and Telelect 6000 (Bucket Truck).

I don't remember any training we had for working around radioactive or hazardous materials. I didn't have anything to do with disposal of anything. To account for the amount of time I was exposed to hazardous chemicals, I just had to keep track on a timecard—how long I had the parts while I was cleaning them. We would wash parts with solvents – I don't remember the names of the solvents we used. I think we used trichloroethylene. There were special bottles they put the stuff in. The used solvent was put in a tank. We had special containers that we would put used rags in and the environmental department would come pick them up. I worked with asbestos also – the pipes had asbestos on them.

I was told back before my time about leaks that happened but I never experienced anything like that myself. I never heard that anyone disposed of stuff in the toilets or drains, but I heard that the old timers back in the 30's and 40's would put stuff on the ground. That's why they had to clean up all that dirt.

I worked on a vacuum compressor in the building basement. We only did repairs so we didn't have any operating procedures, but the people who worked in there had some that they followed. We had work assignments and they would keep track of how much time we spent in each building. Our procedures were that we had to have the "ok" and

special paperwork to go into buildings to do our work. We had to sign in and then sign out and we always had to have our badges on.

I heard about the sodium burn pit but I never worked there. You should talk with VYZ – she was the safety representative up there and she knows all about this stuff. Once in awhile I run into some of the people I used to work with; if I find some of these guys I will give them your phone number and have them call.

Interview 217

I started working at the Santa Susana Field Laboratory (SSFL) in 1958 as a mechanic, and subsequently became a lead man, supervisor and manager before my 1996 retirement. I immediately went to work for Rocketdyne after my retirement as a consultant until 2000. My expertise was in working on valves, and I made service calls all over the SSFL for valving, including support for valves at the test stands. My work on the test stands was limited to repairs, not operations. I worked in CTL3, CTL4 and the Building 302, which was the Equipment Lab. I also supported valves at other Rocketdyne locations, including Edwards Air Force Base.

I worked entirely on the Rocketdyne side, so I never had a need for wearing a film badge. I was aware of the SRC incident, learning about it the day after it happened, but it was unclear to me what exactly occurred for quite a long time.

Chemicals that I was around were typically LOX, LN2, GN2, helium and hydrogen. To clean valves, I used nitric acid, TCE, acetone, Freon, etc. Solvents were stored in a tin Quonset hut. TCE was used in a 205-gallon vapor degreaser in the Equipment Lab, which drained to a 3000-gallon underground storage tank (UST). All solvent waste was disposed of in that UST. There were minor spills that would occasionally occur, but they were quickly cleaned up. The UST was serviced by outside contractors. Whenever we used acids, they were neutralized before their release. A supervisor had to see litmus paper readings before the neutralized acids could be drained to the sewage system. Even though it was neutralized, it still ate away at the clay pipe. Eventually it was drummed and hauled offsite, after being temporarily stored near STL4, in Area 3 near Delta. I was not involved with fuels.

We wore protective gear such as hardhats, graylites (rubber suits), hoods, gloves and face shields which were required when in the acid bay.

We provided technical training to other Rocketdyne employees, which were usually conducted by a lead man, supervisor or engineer. There were schools for all the solvents and acids, which required passing tests. For Health and Safety we had people come from the Canoga plant as well as outside vendors to provide training.

Reports and logs were maintained on valves, known as an EWRS, which showed what was found, details of any repairs, historical information, etc. The Lead Man was responsible for documentation.

I had nothing to do with the conservation yard. I was aware of the Sodium Burn Pit but not involved in its operations. I did not work with sodium.

I had no experience with or knowledge of liquid materials disposed in toilets of floor drains; the Sodium Burn pit; a surface disposal area at the western edge of Area 4; any of the leach fields, septic tanks or drainage discharge locations; the old conservation yard; any storage tanks or gas holdup tanks; fuel element cleaning areas; or problems with underground pumps, sumps, storage tanks, piping, sewer or drainage systems.

It was a nice job, very interesting. Where I was, was the best. There was a lot of good people. I parked near my building and either ate lunch from home, from the lunch truck,

or a nearby cafeteria. There was a lot of wildlife, including raccoons, deer, rattlesnakes, etc.

Interview 218

I was hired as a mechanical engineer at North American Aviation/Rocketdyne's Santa Susana Field Laboratory (SSFL) on July 5, 1955 and worked mostly at the Components Test Lab. I also worked to a great extent in support of Engine Testing in Areas, 1, 2 and 3. In May 1956, I was reassigned to Canoga Park and although I was attached to that facility, at least 60% of my time was spent at the SSFL. I worked on the research and development of rocket engines and my specific assignments were developing and testing engine components, specifically liquid oxygen pumps and gas turbines (turbopumps). I mostly worked in the Components Test Lab where liquid oxygen pumps, gas turbines and related components were tested. I often was at various engine test stands for test firings to monitor the performance of components that I had worked on. In addition to Areas, 1, 2 and 3, I occasionally had project work in Area 4 where I followed testings and served as an advisory to those events. I did not deal with projects where radioactive materials were used, nor did I work in buildings or areas of Area 4 that required me to wear film badges or dosimeters. During the period of about 1965 to 1968, my time at the SSFL diminished and I was at the Canoga Park facility mostly. There were occasions that I followed testing of engines at Edwards Air Force Base. In 1968, I terminated by employment with Rocketdyne and moved to Arizona where I had accepted a job offer.

As a Development Engineer, then later as a Senior Development Engineer, much of my work at the SSFL could be characterized as giving orders and providing plans to test engineers at the Component Test Lab to conduct tests as directed in the orders. My job then was to review and analyze the test results. Generally, I would deliver various pressure charts and strip charts and other recorded data to the Data Reduction Group in Canoga Park who would calculate the test results for my analysis. There were daily logs and the like maintained at the lab. I might note that one of the women who worked in the Data Reduction Group became my wife in 1959.

I recall that I worked around various chemicals such as kerosene, benzene and trichloroethylene, as well as jet fuels, resins, adhesives, fibers, plastics, dusts, possible radiation, corrosives metals, high explosives, etc., as well as rocket propellants. I was not required, nor did I wear any type of personal protective equipment, clothing, gloves, hardhat, or safety glasses while working at the SSFL. There were times that I handled these chemicals and so forth, but during that early period there seemed not to be much of a concern with personal exposure or environmental protection. Also, I do not remember receiving any type of technical or health and safety training. I saw ponds of liquids composed of what was water, fuels, and I believe chemicals in Areas 1, 2, and 3. I recall the Sodium Burn Pit but I never dealt with it in any way. I also remember the nuclear accident occurring in Area 4 in the late 1950s. I remember the day it occurred but I was not at the SSFL that day in 1959.

While I worked in many areas at the SSFL, I was not aware of incidents of liquid materials being disposed of in toilets or floor drains if such occurred. I did not know of a surface disposal area at the western edge of Area 4, of any of the leach field, septic tanks, or drainage discharge locations, the old conservation yard, fuel element cleaning areas, nor was I aware of any problems with underground pumps, sumps, storage

tanks, piping, and sewers or associated drainage systems. And, I had no knowledge of storage tanks, gas hold up tanks or anything such as these.

In general, I enjoyed working at the SSFL as it was an important component of the space race at the time. I had a lot of responsibility with my work in the development of pumps and turbines. It was it was a labor of love. I'd say it was the most important part of my working life. I recall in particular two explosions of man-rated engines involving pumps on which I worked. One occurred on a Christmas Eve at the SSFL the other was at Edwards AFB. On both occasions, I was responsible for the reassembly of the pieces of the turbopumps to investigate the cause of the explosion.

As I lived in Canoga Park, I enjoyed my daily drive up to the SSFL as well as the remote working environment. I recall having to park my car and then subsequently traveling in company vehicles on unpaved roads leading to the various test stands and other areas. This caused considerable dust to become airborne each time I traveled these roads and I've since wondered if there should be cause to be concern over possible contamination exposure.

Interview 221

I worked at SSFL for approximately five and a half years and quit in April 1980. I spent 4 years in the maintenance/garage facility, maintaining the vehicle fleet, generators, lifts, cranes, and other equipment. During the last year and a half I was supervisor of the machine mechanics. I left SSFL because management would keep placing individuals in maintenance and repair who did not have the qualifications or skills to do the work.

I worked in Building 204 and ZAD was my boss. When I started working at SSFL there were 120 individuals in maintenance, but the number dwindled as programs kept coming to an end. I did not report to management in Building 204 but to management at the Canoga facility.

As to the management of hazardous materials generated in the maintenance facility, the garage had cleaning tanks that were in compliance with environmental laws. All waste oils and cleaning solvents were placed in 55-gallon drums for transport to the yard by Building 6.

I always wore a film badge while working at SSFL and it was replaced monthly. Security would call me if I didn't exchange my badge in a timely manner.

When I first started at SSFL, I had to keep restarting a forklift in the SRE excavation that continued to have a corrosion problem with the battery cables. No one could explain why they kept corroding.

It is my understanding that the soil from the SRE excavation was taken to Rocky Flats in Colorado.

I drove up to the site daily and was supervisor of the second shift that started at 3:30 PM. There were three other guys that worked with me in the garage. We also did crane load testing at night. I normally bought my lunch from the food truck and I didn't have a specific lunch-time activity.

We maintained all of the vehicle and maintenance records. There were weekly safety meetings addressing general safety protocols.

The only "incident" that I recall was an oxygen cloud fire in the Coco Test Stand area. A couple of painters in a truck attempted to drive through an oxygen cloud. The truck stalled so the painters got out and as they were walking away, it burst into flames destroying the truck.

I would refuel refrigerated containers that contained MX rocket separation chambers that were being worked on at SSFL.

Working at SSFL was a good education. I still meet with a group of retired workers at the recreation center. They are a good bunch of guys. After I left SSFL I expanded a side business I had installing and repairing garage door openers.

Interview 222

I was hired by North American Aviation at the Lakewood plant in 1954, and transferred to AI at the SSFL (on the hill) in 1967, where I worked until 1987 or 1988, when AI was merged into Rocketdyne. At the time of the merger, my department was transferred down to the DeSoto plant, where I worked until my 1994 retirement.

When transferring up to LMEC on the hill, I was a Quality Control Analyst, and for approximately a year to a year and a half I wrote QA procedures for the SCTI and SCTL. That was in Building 36, if I remember correctly, which was a fairly new building just across from Building 11. It was strictly an office building.

Following my time as a QC Analyst, I transferred to Purchasing in Building 30, which was near the SRE. I was a Major Subcontractor Administrator, with charge over subcontractors who performed work in Area 4, specifically construction and capital equipment. Upon retirement, I was the Manager of Capital Equipment and Construction Procurement, over a group of 20 buyers and support staff.

I never handled any chemicals or waste.

I never handled radiological materials. I wore a film badge and dosimeter when overseeing the demolition work by subcontractors at the SRE, the Building 20 hot cells, and the Building 55 plutonium facility. I was never exposed to radiation. The subcontractors were used for the "heavy lifting," including the use of heavy equipment, but the actual cleanup work was conducted by AI personnel. The radiological waste was either hauled off site by a subcontractor, (overseen by a different Subcontract Administrator), or it was taken to from the site over to the RMDF. The RMDF would seem like the most likely place where possible radiological contamination would be located.

All potential subcontractors were provided with project specifications as designed by engineers, invited on site to walk through areas where construction was to occur, and they would submit a bid. The lowest bidder would be awarded the contract. All contracts and supporting materials were kept in filing cabinets in the office, then eventually stored off site at a central storage area, I think in El Segundo.

There was training provided on the hill, but I can't recall all of their subject matters. There was periodic training on safety, and occasional seminars for sensitivity training.

I remember when a SNAP building was just starting to be built, the subcontractors were digging a large hole and hit an aquifer, which caused the hole to keep filling up with water. That facility's location had to be changed as a result.

I remember the Sodium Burn Pit, having visited it numerous times and witnessed the disposal of sodium there. There was a pond in the pit, and putting sodium in it produced the expected reaction, resulting in a spectacular show. I know of nothing else being put in that pond but sodium.

I used to walk through the Conservation Yard all the time. It was full of items that were no longer in use, and some of stuff looked brand new. Every six months or so, sometimes up to 12 months, subcontractors were invited to bid on hauling it all away. The subcontractors however were not allowed to choose what they took, it was either all

or nothing. I know of nothing in the Conservation Yard that would have caused contamination, as I saw no hazardous or radiological materials stored there.

My entire time at the hill was in LMEC, which I believe became known as ETEC when the AEC changed its name to the DOE. I lived in Simi Valley, so I drove up Black Canyon daily, and parked at the buildings where I worked. I usually used a company vehicle when driving around the SSFL. I saw many rocket firings there. When the siren went off, people generally stepped outside of their offices to watch. I usually brought my lunch, even though there was a cafeteria on the Rocketdyne side, and enjoyed playing bridge and hearts with other employees. On Fridays I went down to one of the restaurants in Chatsworth with my friends there. I could see wildlife from my office window, which included a mountain lion, fox, deer, etc. There was a fire one year that destroyed much of the vegetation, so the employees took up a collection, and in cooperation with Fish & Wildlife, provided feed for the deer up there.

I am not ashamed of any of the work we did up there. Where would we be if AI and Rocketdyne did not do any of that work?

I enjoyed working there, as we had some freedom to do our work without being micromanaged by high level managers. Whenever our work required us to go to headquarters, such as a major contract, there was a common necktie in the offices that whoever was going down would wear. It was a good group of people, and good management who let you do your job and helped you when you needed it.

Interview 223

I started working at the Santa Susana Field Laboratory (SSFL) in 1965 after a year at AI's DeSoto plant, starting at the RMDF. The RMDF was for disposal of low level radiological waste, which processed liquid and solid waste. There was no dumping at RMDF or in Area 4, all radiological waste was hauled for disposal at Beatty, NV. This was overseen by safety engineers. Some liquid had very low radiation so it was taken to DeSoto for disposal to the sewage system. I was there for approximately a year before being laid off, and was less than a year later was back at the RMDF but working at the SRE to revamp and modify the system, which was a three month assignment. I worked in a sodium pit, where there was some asbestos exposure. I worked for AI for two years, one of which was on the hill in Area 4, then transferred to Rocketdyne in early 1966 to CTL3 in Area 1 as a B-level propulsion mechanic. I worked on the Apollo 11 and packed parachutes for several of the Apollo missions. I met some of the astronauts who came to the facility. I worked at the Area 2 Delta facility on the J2, and was transferred in 1969 to work at the Space Division in Downey for a year on the Apollo program, after which I quit. I was rehired in January 1979 at the hill, where I stayed until 2004.

At the Equipment lab, I overhauled valves, vacuum pumps, centrifugal pumps, regulators, etc. I repaired, rebuilt and tested many different items. I worked at a test stand in Area 2 and in CTL 4, where I worked with NTO (kept in cast iron pigs) and MMH (stored in stainless steel drums). I worked at APTF in Area 1 for two years, but spent most of my time prior to retirement in the Equipment Lab.

I wore coveralls and a particle mask while there, and also a film badge and dosimeter. The film badge was turned in every 30 days, and the dosimeter was checked daily. The dosimeter was always monitored by supervisors to ensure that exposures were low. Altogether I worked for perhaps 1.5 years in areas where I could receive exposure to radiation, but I never received a high level of exposure. I did not work with any radiological materials after leaving AI.

I used trike to clean parts at Delta, and we used it to wash things down like it was water. The trike would run off onto the ground and down to a pond. I worked in a clean room at the Equipment Lab cleaning small components, using hydrochloric and nitric acids and other cleaners. We started there with TCE, which was replaced by trichloroethane, replaced by Freon, which was finally replaced by an aqueous solution.

I received training for health and safety, and there was always good supervision to guarantee safe working conditions. I went to lots of classes and training for working on the Apollo engines.

I heard of the Sodium Burn Pit but have no information regarding its use.

I went to the Conservation Yard (near the RMDF in Area 4) all the time to get parts, mainly just hardware. No chemicals were stored there. I believe that one closed and another opened near the Equipment Lab.

We had lots of safety classes there, in fact, I was Safety Man for many years. We did weekly and monthly checks of the facilities, equipment and people, which was logged and reported. I kept logs while at RMDF when processing liquid waste, such as

temperature readings, number of barrels processed, etc. The safety engineers inspected the areas.

I knew nothing regarding cleanup efforts there. I do not remember any disposal of wastes in toilets or floor drains, nor was I familiar with any disposal area at the western edge of Area 4. I know nothing about fuel element cleaning areas, storage tanks or gas holdup tanks, or any problems associated with underground pumps, sumps, piping, sewer or drainage systems.

I loved my job and enjoyed going to work every day. I enjoyed the people I worked with and the surroundings were beautiful. I often ate lunch on the lawn near the trees, which was very relaxing, but I also used the lunch room at the Equipment Lab.

Interview 226

I have worked over the years for North American Aviation, Rockwell, Boeing, and most recently, Pratt Whitney. I started this career working at SSFL from 1983-86, primarily doing reactor testing area in building 20.

The way radiological materials were handled in Area IV seemed to me to be appropriate and in accordance with procedures that were designed to meet Department of Energy standards. To assure materials handling was done properly, all work was overseen by independent health physicists. They weren't swayed either way by who was paying them. They made sure employees like us didn't do anything wrong.

The radiological materials in each building I worked in had heavily controlled storage areas and heavily secured working areas. There were different storage configurations for radiological materials, based on the type of material, to reduce the potential for criticality. For example, one type was stored vertically underground in a canister in a vertical vault. If they were to be installed in a reactor in a horizontal configuration, they were stored in a horizontal configuration. When we worked with the materials, we worked on them in the same configuration

I never observed any mishandling of devices, vessels or shipment containers. The radioactive materials came in large configurations. The radiological material vessels were always heavy. They always had to come in through a big roll up door. There were always security escorts when material was moved and the on-site transportation routes were closed off for the duration of the shipment. The material was always in a building or on asphalt adjacent to a building; never on any unpaved ground. I didn't observe any spills. Things were well maintained. It was like a city up there.

As part of our orientation training when we started to work, we watched a training video that showed how to safely work with radioactive materials. It showed container testing and showed the safety of the shipping containers. DOE spent millions on the testing of the shipping canisters and video showed the results of the testing. It showed simulations of trains crashing into shipments and what would happen if that occurred. There was heavy emphasis on safe procedures for fuel carrying, transporting, and handling.

Workers were monitored by third party health physicists. I wore a film badge and a dosimeter, and I submitted a urine sample on a regular basis. They said if it something was wrong they'd let me know. I was never notified that I had been exposed to anything above an expected exposure based on what I did. They erred on the conservative side. They would give someone another assignment if the monitoring results demonstrated that someone was getting close to their exposure limit.

I have no knowledge of on-site disposal of radiological materials. There were no cutting corners due to lack of funding. They never told us we couldn't do something that needed to be done because of a lack of resources. The money we needed was there.

Depending on the job requirements, and in between processing jobs, we cleaned the cells within the building with chemical cleaning materials. The chemicals were very caustic. After the walls were cleaned they were surveyed and then painted to encapsulate any remaining radiological residue. The paint was like two-part epoxy paint

that was oil or acrylic based to encapsulate any residual material. I did hear of one guy in the union with the same classification as me that did get serious chemical burns. Based on what I recall about the incident, the guy hadn't followed company procedures. We were taught to handle the chemicals very carefully. That's why we were told to suit up, wear protective clothing, and follow procedures. After each task, the cells were hosed down. The runoff went into a floor drains into a holding tank. All the cells were vented. I had to empty the holding tanks into the large vessel that was eventually shipped out. Many of the tanks were cement lined and lead lined and the contents were isolated. The chemicals that were used to clean the materials and facilities were treated with the same strict procedures as the radiological materials. Everything was shipped off-site when we were done with it. There was no difference in how seriously we took in handling of any dangerous materials.

There were company policies and procedures for the way things were done.

People did follow procedures. The health physicists were so focused. They arrived before our shifts started and they didn't leave until we were done. You couldn't break the rules if you wanted to. The health physicists took their jobs very seriously. Even if you were friends with one, they were very strict about enforcing the rules. They were above board all the time.

Procedures didn't change very often. If the procedures changed, they were posted in obvious spots and we were retrained. When I started, I was the new kid. There were a lot of people who seemed like they had been doing it for quite a while. They were well-versed in their jobs. There was a training program. We had videos, handouts, figures, drawings to help us do our jobs. We had a lot of on-the-job training. I had worked in a machine shop before starting up there, and they knew I had that background. They asked me to help with some machining from time to time.

Safety was always a priority. Safety was never compromised. We were never rushed. The only thing that seemed to be rushed was if you were getting close to your exposure limits. You needed to get your work done and limit your exposure. If you got near your limit they took you off the job and you did something else for a while.

I do not know if anything was ever buried illegally. We were shown showed pictures of Hanford and of a place in Nevada that showed how cumbersome burying waste was.

We had logs and rosters for our film badge and dosimeters, respirators and supplied air. You would check it out from a tool clerk and match the control number to the log that was signed out to you. I was not a lead employee so I didn't document what I did on shift.

The vessels that held radioactive material were numbered; and there was paperwork associated with each vessel. The more they were used the higher the number and the more contaminants remained. Four cells had mechanical arms which were controlled from the outside of the cell. The outside walls were two feet thick and the space between the window panes was filled with oil. The tube that held the fuel slugs was about six to eight inches in diameter and maybe 20 feet long. Cells were like jail cell size. Vessels were pulled into the cell where work was performed on a conveyor belt.

We used remote controlled grapples to manipulate the fuel. . The vessels were destroyed after each use if my memory serves me.

I am unaware of anything that was not documented. The paperwork was a necessary part of our contract. We used it to record what we did. If someone wanted to do an audit of the paper trail they could find out who used what, from start to finish. I would think those records would have to be retained for many years but I don't know that for certain.

There were liquid materials that went into floor drains that went into holding tanks. You could see tanks under the building and where it went.

I remember hearing people talk about the burn pit but I don't recall the word sodium used with it. I never went to it. I have no knowledge of any surface area disposal sites. I remember hearing a little about leach fields from maintenance staff in passing conversation, but that's about it. I was aware of the bone yard. Everyplace had a bone yard, even here at Pratt Whitney. A facility like Santa Susana only used the best equipment. It was like a hardware store on steroids. The metal buildings were made of exotic materials. For example a door hinge was made out of stainless steel. It was all the best of the best. There was never any cutting of corners.

Material was only temporarily stored in the holding tanks that we emptied out.

I don't know anything else about sumps, pumps, sewer systems, etc.

I was laid off from SSFL. If I hadn't been laid off, I'd still be working there today. It was a great place to work. I was proud of the work we did there and the fact that they had my personal safety in mind the whole day made me feel good. You felt that they cared when you reached your limits of exposure they pulled you out. It was neat to work there. You just didn't meet people like those who worked there every day. Even if I was not allowed to go into the cell because I had reached my exposure limits and I was stuck doing something menial, I felt good about what I did. I felt like they took care of me.

It was a brotherhood because of the danger we faced in the work we did. Your colleagues watched your back. There was lots of communication. When we were working in the cells other people were assigned to watch our work through the windows. We had radios that allowed us to talk to each other. When I was working in the cell, other people were watching what I was doing and helped make sure I didn't do anything wrong. They would even tell me to look at my dosimeter and tell them what it read while I was inside the cell. We had a write up with the daily work scope that I read before I went in. I was expected to read that work scope and initial it, indicating that I understood what I was going to be doing each day.

Some people had more seniority than me and they didn't want to work in there. I have had no health effects since I left there. I never felt jeopardized or fearful. On our lunch we would go jogging in areas designated for us to do that. That's how safe we felt for our own health.

Interview 231

Yes, you can contact me again if you want to. Both the address and telephone number you have for me are correct. Before I forget it, there was a little cafeteria that you entered at the end of Area I that had a German V-2 rocket engine right in the middle of the cafeteria. It was from World War II, and one day this engine just disappeared. I don't know how we obtained it. I don't remember the details, but was told by YZB, my bosses' boss, who was friends with ACD.

I spent a lot of time on special assignment. At one time or another it seems that I had about every job at Rocketdyne. I would be reassigned to help get people out of trouble. I must have worked on at least 20 engine programs over the years, in addition to attempts to make Commercial Programs such as water jets for the Boeing Jetfoil, for example. As a result, I was all over the site when I worked the various projects. I also did some work on water jets, which were very successful, we learned a lot about salt water corrosion. However, Boeing did build the Boeing Jetfoil, which was around for a few years. When I was in Tokyo, I rode on it. It was a hydrofoil and felt like you were on a bunch of skis. I have some old photos of it somewhere – I can fix you up with pictures.

I took the bus up from Canoga to the site many times, but usually I took my personal vehicle. There were places where you parked your car, and then buses took you to various remote locations at the site, such as the CTL (Components Test Lab), Area I, II, III, and IV. I worked mainly at CTL I, which was used for the testing of materials, solid propellant, engine testing, and stability testing. I did not work on nuclear, but CTL 4 is downwind of Area IV so there is no way you could go home without exposure to the upwind environment.

There was a reactor that got away from them, so they stopped everyone from going into the area. There was a loudspeaker system to let everyone know of the emergency, it was just individual-to-individual notification of an event. The people working on the other side of the fence had special badges, but people on our side did not have any special badges. Test notification was over this loudspeaker system. I think our area was evacuated on a couple of occasions, but not because of an emergency.

On the Minuteman III engine development project, the Air Force got into trouble. By giving Rocketdyne too much of the business, they put out a procurement and specifically requested us not to bid. They gave the contract to Bell, but their engine would not work. So they came to us with their hat in hand and asked us to build an engine for them. They gave us a 6-month program to develop the engine for the Minuteman. We worked a full 6 months, 12 hours a day to build the RS-14 engine, which was made of beryllium. I was the development engineer, but felt uneasy working at the site because the "glow in the dark" stuff just downwind of the other side of the fence. We made the 6-month program with about 2 hours to spare, and the Air Force was so happy, they kept us working on developing the engine. The RS-14 engine was further refined into 2 versions – the RS-14 and RS-21, which were the Mariner 71 and Viking 75 adaptations for the Space Program. The primary distinction between the two designs was that the Mariner 71 had a 40:1 nozzle and on the Viking 75 it was 60:1.

Over the years I worked my way from Research Analyst to Junior Engineer up to Program Management jobs, and I did work in both US and Japan. I can't overemphasize how important flexibility was – that is why I was so successful. I did everything from Program Management to Advisor following retirement.

I was 18 years old and wanted to get married, and was only making \$44/week. So I walked up to the door at Rocketdyne and said I'm looking for a job. At the front desk they asked me, "What can you do?"—and I said "Anything". They said, "Well you need to go the building next door." Some guy came over and said. "Are you looking for a job?" and I said "Yes." I talked for two hours with MNP, who said he would like to offer me a job in Combustion Devices. Rocketdyne which made the engines for the Atlas, Thor, and Jupiter rocket programs. Wow, what a wonderful opportunity for a kid looking for a job.

I used many chemicals as I worked on hardware and engine testing. There were chemicals used though, like Trichloroethylene, which were solvents to clean the nickel tubes on the engines. I did not manage the chemicals; I just used them to look at spray patterns generated by the injectors. I used Freon TF or TE on a low-flow bench to watch flow injector patterns, as during development of the engine.

MNP did not smoke, he chewed cigars! He was a fun guy. One day out at the site here was my boss who was in swim trunks, chewing a cigar, looking at spray patterns at the low flow water bench. On our research programs we always had a logbook which went into a library—though I still have 1 or 2 of the books. Once they were full you would drop them off at the library and they will give you a new one. It is a little bit of a sore point, but fairly often Rocketdyne Management would go on a tirade and go about "cleaning up the place." The workers knew this just meant trouble, resulting in a "Good News/Bad News" situation. The "Bad News": "We are going to make this place clean—if anything is not used in 60 days it goes in the waste basket—unless somebody pays for it." The "Good News": A lot of the employees said it was dumb and took stuff home. One guy put stuff in an old car in the back of his house. There was one time they needed some document, which they could not find, and they looked in this guy's old car—and it was what they were looking for!

I was working on a combustion instability problem with small engines, together with another engineer, OPR who worked with me. OPR and I developed the Acoustic Cavity to eliminate the combustion instability. We performed many engine tests at the sites, so I'm sure there is Beryllium vaporized all over the CTL IV area. We had an SE5 engine that was put into the wastebasket three times and retrieved. The third time I took the engine out and brought it home. As being the only one left, I was able to donate the SE5 to the Canoga Ave Museum. About a year ago I saw it at the museum, but I think they are going to close it due to financial problems, and then we will lose all that history.

QRT, another person I worked with, was into creative thinking and was supportive of young engineers. When they would get together to do "Show and Tell" they would look at the stability testing hardware we used on the engines. There were rifle ranges just outside the main gate. I did not use any radioactive sources for instrumentation when conducting instability tests. I was often on the graveyard shift, so I did not have lunch with the people on the other side of the fence.

The CTL IV had a road coming into the area. On the right hand side was a little shack that was my office for 6 months. On the left hand side was Cell 16 - which was a test stand for engines using UDMH (Unsymmetrical Di Methyl Hydrazine) and IRFNA propellants. There was an RS-14 test facility where we would run Apollo and Gemini engines at ambient atmosphere conditions. An engineer named STV managed the Cell 16 test position! STV and a group of guys had a regular Bridge game going on during lunch. One day, STV was playing bridge and made an error. A friend said "What did you do that for?" and read him the riot act. Well just one week later, he was diagnosed with brain cancer and he passed away shortly after that.

Once there was an explosion at CTL IV. Most engines used both MMH (Mono Methyl Hydrazine), and one of the test mechanics put both N2O4 and MH into the same tank. One guy was killed and another injured. Local management was going around picking up body parts. There were a few on top of the Control Center. I did not know the individual.

I woke up in the middle of the night last week thinking about this interview and jotted down a few notes just to make sure I could remember. There was a fellow, whose name was UVX (I'm not sure how to spell it) who was a test engineer working at the Control Center. Now picture a Control Center with a concrete wall about a foot thick. His job was to fill out test forms, but he had a really neat sense of humor and was always trying to get the best of somebody. One day while we were getting ready for a test, we heard a loud scream. The CTL IV is down in a hollow and the sewage disposal is located above. Well what happened was he was sitting on the can when the check valve failed and he came out of there as brown as could be.

Also, WXZ was Senior Management representative for all facilities at the site and when it came time to show visitors around, it was his job to do so. One day while showing some VIPs around, there was a real house hissing sound and he told them to turn the purge off on Cell 37. Well it turned out it was really a rocket engine, a Gemini thruster, and not a purge and it came very close to being a major incident.

Interview 233

I hired on with North America Aviation (NAA) in 1956 and worked there until 1996. I started working at Component Test Lab I (CTL1), then moved to CTL II, and finally to CTL IV. I worked at Alpha, Bravo, Coco, and Delta test stands. I spent a lot of time at CTL II doing rocket engine component testing.

I started as a "C" mechanic, the lowest class, making \$1.98 an hour. I also worked at ECL, where we wore film badges when we worked with lasers—due to the high voltage electric discharge. I also worked with exotics, propellants including nitrogen tetroxide (NTO), hydrazine, dimethyl hydrazine (DMH), and monomethyl hydrazine (MMH). I did a lot of LANCE missile work for the Army.

I started in CTL I in Area I and worked there for 1 year, then moved to CTL II, and finally to CTL IV which later became STL IV in the 1970's. I worked in the Hydrogen Laser Lab at the ECL, which was the chemistry lab. Hydrogen was brought in on trailer trucks, which we used to test the durability of rocket engine materials being exposed to hydrogen while under stress and strain.

I got laid off in 1969, but got hired back and worked at Bravo for 2 years, which used Hydrogen Peroxide (H_2O_2) as the propellant. Working with peroxide was dangerous and would be expended quickly; after, a test there would be no excess peroxide – any remaining just evaporated. Rocketdyne had courses for working with chemicals that I took. They were held in the old cafeteria in Area II. The Hydrogen Lab that was across from the ranch house (which is now gone) is which we performed hydrogen embrittlement tests for engines used on the Space Shuttle.

I did not do any handling of radioactive materials. I was working the second shift at CTL II when the SRE incident occurred. We were not really notified, we just heard about from other individuals. I built the test stands where we would place components and tried to burn the whole thing down in a millisecond. This was to make sure the components would survive before the real thing was launched. We tried to destroy them during the tests, but we just got better and better at what we did and they endured and survived. Depending on what we were doing we had procedures which we followed, and we had logbooks in which we wrote down the activities every night, but I don't know what would have happened with them.

MPQ took a crew over to help clean up after the SRE incident, but neither I nor my crew were asked to do anything. We all had radiation badges which we turned in every 2 months or so, but I'm not sure about how often we turned them in. There was only one person I ever knew who had cancer. He worked at the Equipment Lab on the Coal Gasification project on the old vertical test stand (VTS) and lost an ear as a result of the cancer. Cleaning the tanks out with the dangerous chemicals after a test was the problem as the tanks were under high pressure and ran at super high temperatures to convert the coal to gas. We had above ground tanks in the VTS area where the used chemicals were disposed after cleaning the coal gasification tanks.

The first work I did after being hired was repair a turbo pump on a peroxide driven missile; I changed out the lock seal and reassembled it. I almost did not get hired. I was just out of the Navy and they asked me what I did and I said that I could repair

turbine machinery. They said "You have turbine experience?" and hired me on the spot, and then sent me to courses on turbo pumps. So my specialty was repairing turbo pumps. Sometimes they would fly me out to Edwards Air Force Base to fix one there. I would pick up a turbine at Canoga Park and fly out of Los Angeles and be back the same day. It made for a long day, but it was a lot of fun.

There was big layoff during the Navajo missile program when congress cancelled the program. The Navajo program was located on the west wing of CLT II and after it was ended, we could not even clean out the tanks because there was no charge number. I had 14 guys working under me and I lost them all in the layoff. I got other lead men from other test stands that came to work under me but some of them refused because I was just a kid straight out of school. This happened just before there was a union, the layoff caused the union to come in.

In the early 1970's we used TCE to clean the tanks, once in a while we would use carbon tetrachloride, but mostly just TCE. We didn't use any acids. We would dispose of the used TCE in a tank or drum. A truck would come and pump the stuff out of the tank and drums. Once at CTL I, I cleaned the LOX lines with TCE soaked rags drawn through the pipeline. The lead man told me to throw them away so I threw them off the dock onto the asphalt. The next day a forklift had gone through the asphalt because the TCE had soaked the asphalt so that the forklift sank through the asphalt. The lead told me I should not let anyone know what I did, so we kept it a secret. I don't recall anyone dumping TCE down the drains or in the toilet.

Around 1957, 1958, or maybe 1959, there was a dirt pad, not lined with concrete, behind the blast wall behind CTL II where we burned rocket propellant 1 (RP1). CTL I also had a burn pit behind it that was lined with concrete. Anything that spilled would go in there with the water, and if there was something that you could see floated on top, then it would be burned. It would be burned off at night, as we had a permit with the fire department that allowed us to do so. I heard that they burned stuff in Area IV - they would drop stuff from a crane into the pond and it would make the water boil.

I worked on one program at CTL I where we were using sodium to purify the laser gas. One time I was putting a solid sodium cartridge in a line on the "Rebel" laser at EDL. The sodium oxidized on the surface and it wouldn't fit so I scraped it off to make it fit so that we could pump the laser gas (NF_3) through it. The laser gas would become contaminated and we were trying to figure out how to decontaminate the gas. A reciprocating pump was used to pump the gas, which used a large rectangular capacitor bank to run the pump.

I moved from CTL I to the "REL," which was the Rocketdyne Experimental Laser laboratory on Owensmouth. I worked with NQR in Chatsworth, who was the lead man at CTL I and also worked at STL IV. I am not aware of a place where logbooks were kept.

At the ECL we manufactured TATB, an explosive used to detonate the H-bomb, for the Air Force. After making it we bagged it in plastic bags and put it in cardboard barrels, and then into 55-gallon drums with vermiculite and put on a truck. There was only one barrel sitting in the middle of the open bed, but I'm not sure where it was shipped.

We had 2 big triple-walled tanks built like car batteries with plates. We put liquid nitrogen (N_2) in the outer wall. With the Hydrogen (H) gas coming off, the H would burn and the other gas would condense. We would blow liquid N_2 out of the heated air, in a process called "Expansion of the Tank," and as the gas expanded to fill up the tank we would drain off and keep the higher purity product in the lower portion of the tank. The different gases would come off at different temperatures, which would be put in a tank that was shaped like a hot dog sausage. Nitrogen Fluoride (NF) was what we were making. In the early 70's this was done behind CTL V, and only one person at a time could work there because they were afraid it would blow up.

They had an accident trying to increase size of the plant, going from 30 gallons to 600 gallons, by scaling up the process. We only had one 600 gallon glass lined tank, another was on order, but it had not yet arrived, that had acid in it. We were dumping 100-ound bags of ice into the tank to quench the acid while it was mixing. The engineer in charge or scientist in charge was trying to do the same thing in a beaker, and there was a lot of red nitric acid coming off. He decided to turn the mixer off hoping it would reduce the amount of nitric acid coming off. But they were doing it backwards; he was putting water into the acid—and not adding acid to the water. One of the first things I learned in chemistry was that you always add acid to water, and not the other way around.

With the mixer turned off, ice was piling up and the whole thing erupted—the only thing we could do was back away from it. The ladder was obstructed by a fork lift we used to hoist the ice up to the top of the tanks and we only had about 5 feet in which we could move around, so I jumped off of the tank onto the fork lift. I broke an ankle, but was immersed in acid. We had protection suits on with a mask attached to a respirator line. When I jumped, the line pulled the mask off my face and acid ran down my forehead and into my eyes. I still have scar tissue in my right eye. I was taken to the hospital, but no one had told my wife. And even though I didn't know it at the time because I was lying flat on a hospital bed, I had also hurt my back.

ORS was the other guy working on the tank with me, but he didn't get hurt. I got to a safety shower and doused myself in water, but after rinsing off, the only thing I got back was the soles of my shoes. There was an accident report prepared by the scientist in charge, but he ended up quitting. He had caused the problem and knew he would be going nowhere with his career.

Interview 242

I moved to this community after I left AI (Atomics International); my mother lived here and I wanted to be close to her.

Before I retired, I was working at the ATP (Advanced Technical Programs). In 1968, the company was downsizing, and they elected to put me in “open retirement”—which would have allowed me to go anywhere in the company. I chose not to be declassified and they decided to terminate me. I chose to put my pension on hold and got another job here so I could be nearer to my mother. SMUD (Sacramento Municipal Utility District) was opening a reactor in Sacramento and I interviewed for a job with them. I thought I would be perfect for that job. But they had some delays. I needed a job, so before I could start with them, I ended up taking another job for the city of Novato, a small town about 10 miles south of here. I worked for them for over 20 years. Incidentally, I don’t know if they ever started that reactor up.

Regarding the handling of radioactive materials: I know absolutely nothing about the stuff in the Hot Cell. There was a storage building about half a mile away from my building where they stored the fuel rods from the SRE. They moved them in a container that they called a cask. I removed the graphite and we put the rods into the cask.

For my job as an engineer in experimental operations, we analyzed a lot of stuff—we looked at temperatures and flows—particularly when the reactor was behaving strangely. The accident at the SRE wasn’t a melt-down even though lots of people called it that. I know because I was there; I helped recover the building. They were not unusual events—they were tests—that’s what we called them. One of the experiments was examining a “shadowing effect”. We inserted a cylinder containing an element—I think it was Boron—and we rotated it and watched the temperature fluctuate up and down. We used very sophisticated equipment; I think it was manufactured by Sanborn. The data was recorded on big rolls of paper. We put the print-outs up on the wall, like the Dead Sea Scrolls, to see if we could make sense of the fluctuations over time. Once we removed the fuel, we removed the graphite canisters as well—effectively “mothballing” the reactor—and then I went on to do maintenance work elsewhere on the site.

You’ve got to remember this—there was nothing to compare what we were doing to. We knew you could take 5 Rem on any particular day and no more than 300 Rem over a lifetime. I wore 2 film badges and a dosimeter. They would screen our hands and feet as we left the building. If they detected anything, they wouldn’t even allow you to leave the building until you were decontaminated. They (H&S—Health and Safety) would take smears of the building, and if it was over a certain level they would make us take some time off. If a particular area had higher levels than were believed to be safe, they would rope off the area until levels came down again.

Building 100 was already up and running when I got up there. It had been used to run a Doppler experiment. They had slugs of different metals that they would fire at—this was a Zero Power Experiment so no heat was generated—and measure the Doppler Effect. We were trying to get a new computer working and we were only able to get in one run per day. The slugs were radioactive—but nothing else was. The slugs were about 6 inches long and ½ inch in diameter and they were loaded into a capsule. Compared

with other buildings, the potential for exposure was much lower; we all wore lab coats and gloves but no dosimeters.

In the SRE we needed more information on the heat exchanger. There were two heat exchanger systems—the primary and secondary system and both systems had a main heat exchanger and an auxiliary exchanger. We didn't know if it was moving heat, so I installed strain gauges on the elbow so we could measure the flows.

Regarding the handling of hazardous chemicals: Toluene was used to clean things. It was used in small quantities and kept outside in a container. In addition, we all used oxygen when we went into the pipe galleries.

After the SRE accident, when we found out that the cladding had failed, Health & Safety roped it off and we went down in full suits—just to inspect. It took about a full day to do the inspection. I really didn't pay that much attention. You need to remember that back then people smoked cigarettes without concern as well. Regarding procedures, we followed them but they were perceived as general guidelines. Most of us came to the job with adequate and appropriate training. We usually followed the procedures. Generally, the engineer that wrote the procedures was right there, working alongside the rest of us and could explain why they wanted us to do things that way.

If one of us wasn't happy about something, we spoke right up. There wasn't any back stabbing or animosity. There was a lot of camaraderie. We worked as a team.

When we cleaned something up, we created waste. When we suited up and came out—you put whatever you had worn in there—like gloves and coveralls—into a barrel and the entire barrel was shipped off to Idaho. We didn't keep any of that stuff at SSFL, everything was shipped off site.

An Operations Logbook was kept right on the console. Every time something happened the Operator put in an entry into that logbook. Do I know where the logbooks went?!? Are you kidding?!?

All of our Supervisors wrote reports. My supervisor was—GHK—and he would have written all of our reports as the Supervisor of the Experimental Department. HIL—who was shift lead for Health & Safety—he documented almost everything as well—he was very good. He made sure we knew how long we could stay in there every time we went in.

I have no knowledge of anything getting dumped down a floor drain or in toilet. I never saw anything like that happen.

I never witnessed what happened at the Sodium Burn Pit. I know they used it to remove small quantities of sodium from pumps and impellers. We also had a steam machine to remove sodium outside our building, on the pavement.

I never heard of any Surface Disposal Area in the western edge of Area IV.

I don't know anything about any leach fields, septic tanks, or drainage discharge locations.

There was a junkyard down below the SRE. As I recall, they actually sold the metal that was dumped there every once in a while—it was a bunch of junk.

I don't know anything about any storage tanks or gas holdup tanks. I am also unaware of any problems with underground pumps, sumps, storage tanks, piping, sewer, or drainage systems.

Most of the people who worked up there when I did were old World War II veterans. Everyone was very cordial and professional. There was a guy, I seem to recall his name was something like IJM, who was in Rickover's Navy. They had gone under the polar ice cap in the Nautilus!! The camaraderie was just great—there was none of the “I'm your boss” or stuff like that. There were up to 5000 people at one time, but they were down to about 900 by the time I left.

We had a lunch truck that would come up. HIL had a photographic memory and he would read a book in 45 minutes and remember everything about it. I played Ping-Pong a lot!

Interview 243

I started working for AI in Canoga Park in October 1958. My prior work experience was at the Westinghouse Shippingport, PA Atomic Facility; my first employment after graduating with a BS in Physics. I worked at AI's facilities at Owensmouth and DeSoto before transferring to Hallam, NE in a field assignment. I worked on the hill from 1969 to 1974, then back down to DeSoto working on management systems until about 1980. After that I worked in business related tasks, including technology development. I retired in 1996 after 38 years with the company.

In 1958 the executive management staff of AI were primarily scientific PhDs. The company's research arm and the engineering department were roughly equivalent in size. AI had an excellent education assistance program, paying a third of the cost towards a graduate degree and upon completion, reimbursed for the other two-thirds. I started an MS in Nuclear Engineering but determined that my future with the company was better suited to a background in business, so I obtained an MBA in finance.

Upon being hired at AI, my first job there was writing a Technical Data Report on a component numbering scheme to support the writing of procedure manuals for use at Hallam. After Hallam, I was in project management for aerospace safety with SNAP program working on scenarios involving a reactor re-entering the earth's atmosphere. A safety concern was the result of a re-entering SNAP reactor landing intact in the pool adjacent to the United Nations building. Another project manager oversaw an experiment called SNAPTRAN which demonstrated the behavior of the reactor under accident conditions. The test was conducted at NRTS (Idaho) then operated by Phillips Petroleum Co.

I traveled from AI's headquarters on DeSoto to the hill frequently in preparation for my eventual transfer to Hallam. The SRE was essentially a little brother to the Hallam facility, so I was on the hill at various stages of the SRE's operation. My primary responsibility was the fuel handling machine at Hallam, so I became familiar with the SRE machine design, test and operation.

I was familiar with the incident at the SRE only to the extent of the reports that were issued and informal conversations. It was my understanding that all radiological material was contained. The fuel handling machine removed and held some irradiated fuel from the SRE, and was temporarily relocated and stored just behind the SRE. Health physicists took readings several times a day to make sure that there were no leaks in the fuel handling machine, and it was determined that the seals held. (This provided confidence that the fuel handling machine would work at Hallam as well.) I worked in the SRE area at times, not on the floor but in the mezzanine area. I never received hits on my film badge or dosimeter. I did not wear any protective gear when working there.

My opinion of the SRE is that it was a technology development activity that performed well. AI, in general, did a lot of useful R&D on sodium cooled reactor systems and components, even though the concept didn't reach the development and application level of pressurized water cooling.

In the later 1960s, there was a downturn in the SNAP program, which led to layoffs, in turn leading to my being transferred to ETEC. I was there for five years initially in charge of finance, in Building 38 with the other management staff. Later, I was given project work, such as the management of the CHCF construction. We obtained the largest crane in the world for use there from NASA. I also worked on the FFTF heat exchange project at SCTI. I never needed to wear protective clothing, film badge or dosimeter, as I had no responsibilities with radiological materials.

I never handled hazardous materials or waste in any of my AI work assignments. As far as paperwork goes, while at ETEC it seemed that the bulk of it was government correspondence. I underwent management development training, and we had periodic health and safety training. Safety was something people were particularly focused on. The DOE emphasis on codes and standards resulted in substantial on-the-job training and development in that area.

I knew nothing regarding cleanup efforts there. I do not remember any disposal of wastes in toilets or floor drains, nor was I familiar with any disposal area at the western edge of Area 4. I know nothing about the sodium burn pit, old conservation yard, fuel element cleaning areas, storage tanks or gas holdup tanks, or any problems associated with underground pumps, sumps, piping, sewer or drainage systems.

I moved to Northridge when hired by AI, and continue to live in the same home. I drove up Woolsey Canyon to the hill every day when assigned there, and parked near my building. I brought my lunch from home and occasionally went on walks around the property during my lunch hour. I did not participate in many social activities during lunch, such as playing bridge.

The work on the hill was invigorating. We believed in what we were doing, that it was important work. There were many talented people there doing their best. I seemed to learn things daily.

Interview 244

I started working for Rocketdyne in 1986 as a Quality Engineer at the Canoga plant, where I worked until 2000. My experiences at the SSFL were limited to taking various Space Shuttle program parts to a CT scanner at the SSFL. I forgot the building name where the CT scanner was located, but I think it was a liquid sodium experimentation building at the far end of the SSFL. I wore a film badge whenever I visited, which was perhaps 10 or 20 times. Each visit lasted approximately 30 to 60 minutes.

I had no experience with or knowledge of liquid materials disposed in toilets of floor drains; the Sodium Burn Pit; a surface disposal area at the western edge of Area 4; the old conservation yard; any of the leach fields, septic tanks or drainage discharge locations; any storage tanks or gas holdup tanks; fuel element cleaning areas; or problems with underground pumps, sumps, storage tanks, piping, sewer or drainage systems.

Interview 246

In April 1988, I was hired and trained as a Health Physics Technician by Rocketdyne. From 1988 until 1997, I was continuously employed at the Santa Susana Field Lab (SSFL). From 1997 until 2005 or 2006, I was reassigned to the Canoga Park facility and during that time, I periodically worked at the SSFL on various assignments when the needs would arise. While at the SSFL, I worked in Areas 1, 2, 3, and 4 and was assigned to work in two different groups. One was the radiological group wherein I conducted numerous radiological surveys and assessments and was assigned to work out of building 4100. The second one was the Health & Safety and Industrial Hygiene group where I also had numerous assignments to oversee worker's health and safety on various work projects and in their daily routine job assignments involving potentially hazardous conditions. Part of my job was to ensure worker safety by seeing that they utilized the correct personal safety equipment and the like. Currently I am working at the DeSoto facility.

Some of the locations in Area 4 where I remember working included the RMHF Building 20 where fuel rod decladding occurred as well as storage of radiological waste or materials before being shipped off-site for disposal or disposition. There I often checked to insure workers were using proper radiation protective equipment. During the decommissioning of Building 20, I was present when the hold-up tanks in the basement were being removed. These were tanks that held effluent which drained from onsite washing activities or rainwater runoff and where isotopes would usually be present. Part my job also was to obtain liquid, soil and air samples from possible contaminated areas. I remember that building 64 was used for storage of radiological materials slated to be used at the SSFL. There were areas, such as building 59 where underground hold-up tanks were used for the collection of waste effluent, which were excavated and removed. I was often present at these events, taking samples of soil and liquids, as well as overseeing worker safety. During the remediation of the Sodium Burn Pit, I recall obtaining soil and water samples there. All the sampling at various locations were submitted to MNR (name removed to protect confidentiality) in building 4100 who would assess them for presence of isotopes and other contaminants. I should note that during most all of the work I did at the SSFL, I usually wore a dosimeter and a film badge. In some of the radiological surveys and assessments I conducted, checking for the presence of isotopes in building drains was done. By using a gamma spectrometer I recall finding isotopes in the drains of building 20, however there other buildings that such findings occurred but I do not recall which ones. My findings were reported to management who in turn would decide what clean-up or corrections to take, which I was not involved in.

There were occasions when I was assigned health and safety oversight of projects and jobs in Areas 1, 2, and 3. I was present at test firings overseeing worker safety. In Area 1, I recall a dewaxing facility where I dealt with some hazardous chemicals but do not recall the names or types. There was a lot of trichloroethylene and other cleaning solvents used at the SSFL and with which I occasionally worked. I was at various rocket engine test firings for oversight of worker safety as well.

As a Health Physics Technician, I received substantial training and certifications over the years, much from outside companies who provided specific health and safety

training. I ran the Respiratory Protection Program wherein I trained and certified many Rocketdyne employees. At one time I had over 600 employees at the SSFL and in the Canoga Park facility under my supervision for training. Also, I saw to it that all the radiological workers were trained and certified.

During my SSFL tenure, I created a substantial amount of documentation consisting of numerous surveys and assessments detailing what and where such was performed, and my findings. There were other various sundry reports, logs, and documents I created, and after submitting them to my managers and others, I do not know what happened to them. I assume that they're probably stored at the SSFL someplace. Several of my managers at the SSFL were NOS, CEF, and OPT (all names removed).

I never observed the disposal of liquid materials into toilets or floor drains although I inspected them for the presence of isotopes as previously stated. I do not recall a surface disposal area at the western edge of Area 4 nor do I know if any problems that existed with pumps, sumps, piping, and sewer or drainage systems. I do not remember the old conservation yard and I was aware of the existence of the Sodium Burn Pit and its remediation as previously noted.

Most of the time when I worked at the SSFL I lived in the San Fernando Valley. I drove to work from the San Fernando Valley side of the facility through the canyon. There were occasions that I drove up through Black Canyon from Simi Valley. It was a rural area that provided a relaxed working atmosphere compared to that at Canoga Park. I liked my job there and also my fellow workers. Out behind building 4100, many times I saw wild life such as deer, bob cats, coyotes, owls, hawks, tarantulas and snakes there. I usually took my lunch but also bought food from the lunch truck that made the rounds. I enjoyed taking walks around the hill during my lunch breaks.

Interview 249

Everyone you talk to will have a slightly different perspective as they were in a different spot at the site. I didn't work at Santa Susana the whole time. I started at North American Aviation (NAA) in Department 94 at Downey in October 1955; the company (by then, called Atomics International) moved (over the December 1955 Christmas holidays) to the Vanowen Facility. I remember because I had not gotten my clearance re-instated and I became one of the "moving coordinators" — I got three weeks of extra pay including double time pay.

I had a Bachelors degree in mathematics and education—I was going to be a teacher. But the draft board was after me so I tried to get a commission. I enlisted in the military and was in England for 18 months. I went to Sandia (Sandia National Laboratories) and took the nuclear training. I went straight from Sandia to NAA (North American Aviation). At Sandia I was in class NT-10, which is where they taught you to basically assemble and disassemble bombs in the early 50's. When I joined the company there were growing so fast they were desperate for workers—and it opened lots of opportunities.

Atomics International became Energy Systems in 1978. Energy Systems operated nuclear operations at Desoto facility and the Santa Susana site, Energy and Technology Engineering Center (ETEC) and the Environmental and Energy Systems unit within the Santa Susana area; they also obtained the operating contracts for the Hanford site and the Rocky Flats site. ESG was terminated in 1984 and the remaining components were consolidated under the reconstituted Atomics International Division which was transferred to Rocketdyne. Hanford and Rocky Flats contracts were transferred to North American Space Division.

North American Aviation (NAA) merged with Rockwell and became Rockwell North American, which then was renamed Rockwell International, and that is the name it was known as when I retired in 1990.

AI started nuclear operations in 1948 down at the Downey facility, focusing on reactor research. The company was just finishing the core of the reactor for the Sodium Reactor Experiment. In the early days, I went back and forth from the AI Headquarters to the Santa Susana site a lot. I started with the company in 1955. I began as a Junior Engineer and held various titles until I was reassigned in 1968 as Supervisor/Manager of a unit, which was later designated as the Nuclear Materials Management unit.

Because of the amount of nuclear material required for the various operations an additional storage facility was constructed at the Santa Susana site — I think it was Building 64. I had a person stationed there full time in the beginning while I continued maintaining an office at the Desoto site. I didn't move to Santa Susana until sometime in the early 1980s. My office was in Building 100. When I was assigned there, I was still named Manager over the Nuclear Materials Management unit although most of the nuclear material has been returned to designated government sites. When they began decommissioning the SRE, I believe I had already moved up to the site.

Most of the radiological material handled up at Santa Susana Field Laboratory was in the form of finished fuel rods or elements, except for Building 64, the Hot Laboratory, and the Plutonium research laboratory, thus very little was handled as raw material. We

obtained fuel material from such sites as Fernald, Oak Ridge, Hanford, Mallinckrodt, etc—all over the place. Most of the nuclear material to be used as reactor fuel was for research reactors development. All the SNAP reactor fuel, ATR, EBR, and SRE II was manufactured at Desoto. The only decladding on the hill would have occurred at the Hot Cell, which was designed to examine irradiated fuel. The Nuclear material from the Hot Lab decladding operation, I think, was shipped to Savannah River for eventual reprocessing.

A lot of the scrap nuclear material from the Desoto operations went to Nuclear Fuel Services; some went to Oak Ridge. Most of the finished nuclear material fuel was stainless steel clad, but some was aluminum clad – that includes fuel elements manufactured for, and sent to, the Experimental Breeder Reactor II and the Advanced Test Reactor, both in Idaho.

At the Hot Laboratory we didn't actually manufacture any fuel, we just decladded and examined the fuel post-irradiation. Plutonium fuel was the hardest to handle—it originated from Hanford and was received at Building 64 and then it went to the Plutonium Facility. It seems to me there was some work involving plutonium done under private enterprise contracts.

A lot of the work on EBR and ATR was done under license. It was done by Atomic International as a private company, under NRC license with both NRC and DOE oversight.

The Nuclear Regulatory Commission regulated all of the work, public and private, under the same regulations. NRC would audit the work and Idaho would audit the work.

Building 64 was a storage facility—there was some scrap material that was stored outside on the black top—mostly in 55 gallon drums awaiting shipment to a recovery site. The un-irradiated material was shipped by the government in SSTs (Safe, Secure Transporters). The recoverable material was generally shipped by Tri-State Motor Company. Waste material was shipped to Hanford, Idaho and Beatty. The irradiated material was shipped out in casks under a government contract, but not in SSTs. The only other thing we had in Building 4064 was outside near the part on the map that is labeled as 4511 Parking (67-83); it do not think that it was paved in those days. We cleaned and then repainted shipping containers which showed minor contamination. That's what we did back in those days – we thought it would keep the contamination from leaving the location. Surveys did detect slight ground contamination later on.

There were also some drums stored around the Northwest corner of Building 64. For example, material from the first Seawolf attack submarine was stored in a lead-lined drum.

Bare fuel pellets, slugs, etc, were stored and used in the OMR/SGR Building 9, which used as to perform reactor studies as a Zero Power Facility. Building 100 had a critical facility that had clad and unclad materials used for studies in a moveable matrix. I think they had some sealed plutonium pellets (used in the Critical Test Facility) there as well.

Building 20 was the Hot Cell/Hot Lab; that's the building utilized for hot fuel examinations and decladding operations.

Building 55 was a plutonium facility – it was called the Nuclear Material Development Facility, was used for experimental fuel development studies. Personnel brought in some plutonium oxide or perhaps obtained or manufactured plutonium carbide capsules for further fuel studies.

Building 373 had one of the original reactor development studies. It was a highly enriched sliced cylinder—similar to a Godiva Machine—which was one of the first reactors at the Santa Susana site. That was most likely the original SNAP facility.

The RMDF was in the “sliver” (extended triangular area on north side of Site map), which had underground fuel storage. The site also was used for storage and shipping of waste packages from site cleanup functions. They eventually had a name change for that facility because it was assumed by outsiders that radioactive materials were disposed on site – the name was changed to the Radioactive Materials Handling Facility (RMHF). RMHF had a leach field that had toilets going into it. Surveys later found radiation in the soil at this leach fields and the company had to remove soil to decontaminate the area.

Building 12, where critical experiments were conducted—also handled unclad material. (All the other buildings generally handled only clad materials.) Building 12 had holes in the wall where nuclear material was stored.

The individuals who handled nuclear material generally wore protective clothing—but not necessarily respirators in all cases—although I think that in most cases respirators were available. Everybody in Building 12, as well as other nuclear facilities, wore film badges. Some people had dosimeters as well, depending on the activity type. The health physicists monitored exposure of all employees of all nuclear operations. Whenever the HPs detected an unusual exposure, they would perform a study to determine a “why” and then determine a “fix”.

There were some other buildings that I remember where they handled nuclear materials (Building 1431 for instance).—there was an area connected to the SRE (Sodium Reactor Experiment) where they built the first core. I remember that it was a brick or cinder block building.

Building 3 there contained a Hot Cell that was moved from the Downey Facility to the Vanowen Facility, and then finally up to Santa Susana. It was all blocks so each was just numbered as disassembled, then moved it up to each new and re-assembled brick-by-brick and in Building 3.

Another storage facility was used to stored irradiate material from the SRE. It was actually just a concrete pit, not really a building, but they called it “Building 654.” It was used as in interim storage facility for the spent SRE assemblies. As I remember, It was used only for SRE “overflow” storage. The Interim Storage Facility—Building 654, might be a good place to look for contamination since it was decontaminated but I do not remember it being excavated and covered over.

There was another pit up at the site – they dug it for the SNAP (Systems for Nuclear Auxiliary Power) reactor which was never built. They couldn’t keep or no attempt was made to keep the runoff drainage out—someone even put goldfish in!

Another time, some scientists wanted to see how far slugs would go into the ground if they were dropped. As I remember they dropped 3 or 4 slugs out of a helicopter. The slugs were about 2 inches in diameter and about 6 to 12 inches long; they were pretty heavy. I recall that they found all but one of those slugs. That happened sometime in the 70's and they were either normal (NU) or depleted uranium (DU) – I don't remember.

We had a several displays of depleted uranium slugs and I recall that it was possible for companies to buy normal or DU on the open market back then.

While they were decommissioning the SRE and started digging outside the building boundaries lots of NU was found to be on the site!! It is probably documented in the SRE D&D (Decontamination and Decommissioning) Report from the late 70's to early 80's.

I don't really know much about how hazardous or cleaning chemicals were handled at SSFL—that was not my area. The only non-radiological contamination I knew about was the NaK (Sodium-Potassium) and the sodium. It was hard to clean sodium contamination since it was explosive when exposed to water. We did some cleaning of sodium contamination at the RMDF using steam. For example, we cleaned the pumps from the Hallam reactor using steam. That was done outside the building on the blacktop.

I know they also used some TCE (trichloroethylene) at the rocket engine site—to get rid of the TCE, they pumped the ground water and sprayed it into the air. The TCE then just evaporated away. They used a lot of TCE as a degreasing agent during nuclear fuel operations the DeSoto facility.

In the early days, before nuclear material could be procured and manufacturing could begin, we would have to complete a "Feasibility Plan" for the AEC (Atomic Energy Commission)—this is described what you were going to do and how you were going to do it. For example, we had to develop a plan, for every program, to include each operational step as to describe how we intended to perform the work, which included the amount of nuclear material required and planned operations/. Once the feasibility plan was approved by the AEC, then we would develop an "Operating Plan" that specified how the each step of the work would be done. The Health and Safety unit had approve the operating plan and the Engineer in Charge had to sign off on it. The company had Review Boards which would approve everything we did for any program, starting probably in the 1960s.

The people I worked with pretty much followed the rules are they were written. If someone thought they had a better idea for how to do something, they would request a modification to the policy or procedure.

We had procedures up the kazoo—everything had a procedure. I am sure there may have been occasions when someone wouldn't try to take a shortcut, but generally, everybody followed the procedures. I don't recall any instance where someone didn't follow the procedures.

I remember there was a liquid reactor in the early years, back in the 1950s. The point of the SSFL was to run nuclear experiments, to do research, so we could advance the technology.

I think occasionally they did some training classes for everyone, because I took them myself. As far as I know you weren't allowed to do anything involving nuclear material without training—you just didn't walk in and do something. Each work area had a book containing procedures that explained how each step was to be done.

As far as I know performance evaluations were always done by supervisors. Those were most likely done at least once a year, although I don't if it was done on a regular schedule basis.

There was no work log in my unit; we did have a manual covering all operational activities—my unit was involved the procurement, acceptance, storage, disbursement, accounting (bookkeeping), inventory, inventory control, statistical evaluation, and eventual return of nuclear materials. We had special forms for material identification and control. The material forms were color-coded—highly enriched plutonium was red, depleted uranium was gray, etc each color designating a criticality function—a system which was actually developed by the Criticality guru. I wanted him to show me how he did his criticality calculations, but he never did—he kind of kept that to himself.

I know all of the material from Hot Lab decladding operations was sent to the RMDF (Radioactive Materials Disposal Facility) after it was repackaged, and then packaged and shipped in special containers for shipment to a DOE designated site. Some un-irradiated SNAP fuel was shipped to Idaho for recovery/disposal.

For accounting purposes there was something we called MUF, or Material Unaccounted For. It was a bookkeeping entry to document nuclear material written off the record which the government no longer needed and included quantities “missing” because of statistical measurement differences.

After I took over the RMDF each container shipped for disposal or recovery had a document associated with it, which should still be at the site.

About 1965, after we moved to the Desoto Facility, and because we didn't have any room for old classified documents, security destroyed those records—but Oak Ridge may have a copy. A copy of every document associated with every nuclear material shipment or receipt was required to be sent to Oak Ridge.

I kept a daily log—but it wasn't for documenting what I did. I used it to document telephone calls for recording what was discussed. Did anything ever happen up there that was undocumented? Not that I can think of. It has been said that the SRE meltdown was undocumented, but there was a press release after that incident, which is still available. How can they say we kept it secret when we issued a press release? Actually at the time it happened, it was of no great concern to anyone.

We buried those canisters from the SRE— the Zirconium sleeves (Moderator Cans)— up in Mercury, Nevada as far as I can remember. We buried more than we thought we had because the individuals doing the calculation thought the nuclear fuel extended to the top of the fuel rod, but there was actually several feet of sodium.

UCLA did an epidemiological study and said people at Santa Susie had a higher rate of cancer than they should have—but that study also found that the SSFL workers were healthier than average!!

I don't know how any contamination may have occurred at the Burn Pit. The only thing that I know of that was sent there was sodium and it burned off when it was exposed to water. I suppose that perhaps a barrel put in there for disposal may have been contaminated, without anyone's knowledge.

I have never heard anything about an onsite surface disposal area.

I don't remember anything about a conservation yard or junk yard.

Building 64 had a leach field, and they excavated it, as well as the leach field at the RMDF, and the one at the Hot Cell.

I don't know anything about any storage tanks or gas holdup tanks. I never heard anything about any problems with any pumps, sumps, storage tanks, piping, sewers, or drainage systems.

I really enjoyed my job because there was always something new coming up—I was never bored. I was occasionally frustrated with my supervision, but I was never bored. When I joined the company it was really growing so rapidly that there was no hierarchy to get in the way. Everyone worked together to get the job done, no matter what their job title was. The only person who insisted on being called a doctor was in the Chemistry Lab—and it turned out that he really didn't have a doctorate!

During lunchtime, I mostly played bridge—that's basically where I learned to play bridge. Since we had only 40 minutes for lunch—the "dummy" dealt! I lived 4 miles from the Santa Susana Field Laboratory, 4 miles from Vanowen, and 4 miles from the Desoto Facility; it didn't really matter where they wanted me to report to work. A lot of people worked over 40 hours; we all liked our work so much.

I drove all the way to Downey to work in the first months of 1956 as the nuclear material had not yet been moved. The freeway hadn't been built yet. Going home from Downey would take a good two hours. The existing #5 freeway ended at Studio City; the 101 Freeway did not exist at that time. Thank goodness it was only for six months.

RST is another person that it might be good for you to talk to—he was in charge for the Hot Cell and later, the RMDF. There was another individual, UWV, who had a prodigious memory—but I can't remember his name.

Interview 251

I was employed at SSFL as a Senior Electrical Designer. Although I performed engineering tasks, I could not have the title of engineer. I did attend NYU College of Engineering for two years. I did not graduate. My electrical education instead was a five year apprenticeship leading to journeyman wireman. I graduated first in a class of 150.

Prior to my employment with North American Rockwell, I had many interesting and educational assignments ranging from electrician journeyman to chief electrical designer.

At RKO studios and laboratory on 10th Avenue in NYC, I worked as an electrician installing lighting and sound systems. At that studio they developed many movie films for distribution to the theaters. They used chemicals which cleared the silver from the films and sent those solutions down the sewer. I would bet there's more than \$50 million worth of silver plating out in that NYC sewer. Someone could make a fortune if they could figure out how to get it out of there.

I worked as a field engineer for an electrical contractor at the SSFL in 1958. I was correcting designs for the installation of instrument cables between the CTLIII control building and the engine stands. At the facility propellant pipes were being installed. The welded joints were x-rayed using a cobalt 60 pellet. The pellet was attached to a cable. The cable was reeled in or out to the weld location where a strip of film was placed and exposed by the pellet in the pipe. At the end of the day, the cable and pellet were reeled into a heavily shielded case. A piece of the film was exposed at a window in the case and developed right away to prove that the pellet was in the case. That was supposed to have been done on Friday. It wasn't. This was Sunday and I found a pellet sitting on a test stand. I had no idea what it was. The electrician foreman picked it up and showed it to me. I almost picked it up to take it home with me. It was a curiosity. Before the day was over, I was assigned to report to Vandenberg Air Force Base the next day. The foreman lost his hand and the electricians who were sitting nearby terminating the many cables lost their legs. I was not informed of this by my employer. I learned of this months later on a different job where I met some other electricians who had been working at the CTLIII site. I was not affected.

The biggest mistake I knew about anyone making during all my years in construction took place at Vandenberg Air Force Base. There was a recently completed underground missile silo with an elevator designed to raise the missile up to the surface for launching. Once at the surface, the missile was filled with fuel and liquid oxygen (LOX). Then it would be launched. Apparently no one told the guy the program. He was simply assigned the task to test the elevator. The missile was raised to the surface and the final step was "lift and lock" (to prevent the missile from pushing the elevator down during launch). The missile was then loaded with fuel and LOX. The missile was not launched! Instead the loaded missile was going to be lowered into the silo. The elevator locks were retracted, during the short interval before the elevator cables could pick up the load, the missile dropped, and the fuel and the LOX tanks ruptured, causing the biggest Roman candle you can imagine. Nobody on the site was hurt. One man

was in the tunnel. He had just passed through two heavy doors which housed a pressure relief valve. The blast made him fall but he wasn't hurt.

I worked at Vandenberg AFB for several years, at times with my tools and other times as a field engineer. All of the work was on weapons systems. When the pope told John Kennedy to stop sword rattling, he did, and that ended most of the projects. Some were stopped before completion.

I was working with my tools at the Nevada Test Site. One of my assignments was to remove and roll up a huge coaxial cable remnant the day after an underground nuclear blast left a 500-foot diameter crater. While my partner and I were trying to figure out how to remove that cable, the health physicist chased us out of there.

Years later, another incident at the site occurred that stands out. A two-star air force general showed up with about 50 GIs. They just kept piling out of the trucks. They rounded up all the workers and told us to turn our backs to the test site. They said they would shoot the first guy to turn around. After awhile, a very loud noise occurred. Of course, everyone turned around. There was an SR71, breaking MACH II, flying just above the desert floor. We weren't supposed to know what it was but I had built a scale model of that plane two years before. I knew exactly what it was.

I worked at all three theaters of the LA Music Center, including the Dorothy Chandler Pavilion. The lighting consultant disapproved the solid-state dimmers that were already installed. She had been unavailable at the time they were submitted for approval. She prevailed and \$250,000 later the dimmers were replaced. It broke the company I was working for.

A short time later, I was hired by a company that designed the electrical and mechanical plans for the theaters. I worked at first on site as a field engineer; then in the office as chief electrical designer. The most memorable assignment I had was to design a hidden system to distribute video camera cables throughout the theater. This had to be done because during taping of shows like the Oscars, cables were dragged over the Founders; Circle seats. Also the cameras at that time were huge, some weighing as much as 300 pounds and taking away six seats. I got little or no cooperation from the commercial broadcasters and was forced to select cables of my own design. The building manager made adaptors to suit for the broadcasters. I found out later that there was only one building furnished with hidden camera cables and that was the White House, designed and installed at the same time as my work at the Pavilion.

I was working with my tools making changes to the lights in what I thought was a twenty story building in Manhattan across the street from Bryant Park. One day I was sent to repair some lighting fixtures at the sub-station on the twentieth floor. Was I surprised! There on top of the building was another twenty stories of steel framing for another building. Today that is the Verizon Building.

Back home in 1972, I was able to land an assignment with Hughes near LAX with a job shop firm. After about six months the job shop came up with an offer to work at Atomics International at DeSoto as an Electrical Designer. While there I was offered employment by the AI division of North American Rockwell.

I had many assignments while working for AI. A large one was to implement the wiring of temperature and pressure sensing instruments on a full size molten sodium steam generator.

I was given an assignment to electrically heat a large tank of water to 1100° Fahrenheit. It was to produce steam in connection with a ruptured liquid sodium vessel. After the fact I was informed of missing criteria. They just wanted to heat the water to 1100°, not boil the water away.

Another time I had to design the program for removing the wiring from a reactor building they were taking down. You can't turn everything off at once. You will need lights and ventilation up until the end. So I had to figure out what to remove first and what to remove later.

I worked on a new design to provide power for the new sodium burn facility. The oxides of sodium would be contained and not be released into the atmosphere as was done in the past. I remember as a kid that I played around with sodium not aware of the hazards I produced.

I always wore a film badge at SSFL. I turned it in once a month and got a new badge. They never reported any exposure on my badge.

I had a radiation survey meter that was quite expensive. The AEC had a bunch of equipment that they auctioned off as surplus. I won it for \$15. I also got a swivel chair for \$15. I used the meter up on the hill, but I used it surreptitiously. I used the meter to check myself to see if I picked up any radioactive material. It never registered anything above ambient.

Sometimes I was loaned out to Rocketdyne where I worked on test stands to provide lighting, power, and alarm systems. They used to have something they called the Big F@%#&\$ Red Cloud. They said if you saw a BFRC, you should run for your life. It was scary. The cloud would contain red fuming nitric acid and hydrazine.

I also heard a story about Werner Von Braun. He was visiting the Test Stand 1 at the time. He saw that they had exposed grease to liquid oxygen. He knew that was a very dangerous hazard from the Peenemunde facility during WWII. He bolted from the test stand screaming at the top of his voice in German, "Get those men out of there." They thought he had lost his mind until they found out what the problem was.

At one point in my employment with AI, I was named Energy Coordinator. I designed systems that would automatically cycle the 40 or more air conditioning units so they wouldn't all be loading the system at the same time, raising the demand costs. I designed lighting control systems that would turn off any lights that were on after normal work hours. Specific instructions to operate overrides for those working after hours were provided. At DeSoto, the installation was done in house. They purchased relays that were not to my specifications. The system could not operate as intended. Also the relays were defective. In short, the system was a disaster. On the hill, the work was done by an electrical contractor. The system worked fine and I believe the buildings are still there. On the hill I would guess there were 900 buildings. Most of them were small shacks housing pumps or compressors to service other installations. The problem was that the maintenance men would leave the lights on after they left. I solved the problem

by having them install one hour time switches by simply replacing the existing light switches at a cost of \$9 each. Meanwhile I was replaced as energy coordinator by an office politician. He replaced my switches with \$120 motion sensors that had to be wired in place at still more cost. He bragged to my boss that his system was way better than mine. It turned the lights off as long as nobody was there. As a matter of fact, his system never worked. Each building had ventilator fans and other exposed moving parts that kept the lights on all the time.

At a coal gasification experimental site, in addition to providing support for power, control, and instrumentation systems, I had to provide lighting. There were many instruments that had to be reviewed both day and night. My contemporaries would choose floodlighting for the task. That would provide one half a foot-candle on the instruments. I thought I could do better. Two very tall vertical tanks were included in the facility. They had accessible platforms on top where I designed batteries of as many as sixteen individual spotlights. These could be aimed directly at chosen instruments providing ten foot-candles.

One time on assignment to a radiation secured vault, I came across a situation that disturbed me. I was in a radiation secure vault, where there were many x-ray boxes containing cobalt 60 pellets. I did not have my survey meter any more. I was not able to tell whether or not I was safe there. There were many radiation detector devices in that vault, but none were activated. I took the liberty of plugging one in and found out that I was safe. I could not get any of the health physics personnel to tell me why there wasn't at least one of them activated before I entered that vault.

One of my assignments on the hill was to provide lighting for the guards who toured the site at night. Some of the places they had to check and key in were in total darkness. I was taken on a tour by one guard. We went out by the test stands one night and found hundreds of opossums and raccoons. They were picking up scrap food and looking at us as if to say "What are you doing here?"

I liked working at SSFL because it was closer to home than all of my other jobs. I probably worked on every building up there over the years. I enjoyed feeding the blue jays at lunch. I even taught the crows how to eat peanuts. After watching the blue jays they finally figured out how to crack open a peanut. I did see a bobcat once that was as big as a mountain lion. Sometimes I took my lunch from home, sometimes I would eat food I bought from the lunch truck. I visited Google Earth recently, and saw a number of buildings I worked on still in existence.

After I retired in 1987, I met someone through my orchid club. He was a project manager for a major Los Angeles electrical contractor. He was in charge of a large installation for the Department of Power and Light in Sylmar. He needed an engineering assistant to handle details on the site. Other sites I worked as a field engineer were an outpatient health clinic at UCLA and a City of Los Angeles sewage treatment plant near LAX.

Later I worked as a senior electrical designer for a Simi Valley engineering firm. Of all the tasks I had there the most outstanding one was the electrical system for Moorpark High School. That included a 400-seat theater designed to teach students the art of theater production. In my design, I specified winches to raise and lower the assembly of

theater lights known as tormentors. This was absolutely necessary because there was no room for a lift or ladders where they were located. Unknown to me or the principal user of the theater, the winches were removed from the specs as a negotiated budget reduction item. The theater manager blamed me; the real culprit was the architect who agreed to the change at a meeting without notifying those of interest.

Interview 252

I started working at the Santa Susana Field Laboratory (SSFL) in 1956 as a test engineer, being hired after answering a two-page advertisement in the Los Angeles Times. I have a BS in mechanical engineering, and have worked in natural gas and LPG related industries prior to and after my time at the SSFL. Most of my time was in Area 4, working for Rocketdyne in CTL4. I never worked in or had occasion to go over to AI. There were four test stands in CTL4, and I worked on projects such as the AR1 engine, liquid hydrogen tests, the lunar module engine testing, target drone testing, and others. My job was to coordinate with the development engineering unit in Canoga Park regarding the test program of rocket engines and components. This required designing and overseeing construction of the test facility and conducting a successful test program. Information gathered was flow rates, temperatures, pressures, thrust levels, etc., as well as high speed motion pictures of the test runs.

I never worked in areas where radiological tests occurred or materials were handled or stored. I was not required to wear a film badge or dosimeter. I have no information regarding the activities at AI. I knew that there was a reactor on the site, and I had heard about the SRE explosion after it happened, but I have no first-hand knowledge of the event. There were explosions all the time in the area I worked, when something would fail on an engine or component testing.

As far as hazardous materials go, I worked with high pressure oxidizers and fuels, including NTO, liquid oxygen, hydrogen peroxide, etc. I recall that there were two mechanics who were killed on the 2nd shift, (I worked the 1st shift,) when they were cleaning an NTO tank with TCE.

I was not involved with the handling of hazardous waste, and I have no information on any releases or dumping of hazardous waste at the SSFL. Releases of hazardous substances in the form of gases occurred when releasing pressure in tanks, and there were safety zones for employees during those events. I have no information on the sodium burn pit. I knew of no hazardous waste soil removed while I was at the site.

There were quite a few training programs relating to such things as the handling of chemicals and safety. We were periodically notified regarding the classes we had to take.

Regarding documentation and paperwork, I had to write up work orders for a lead man to carry out for the testing. The union required that the mechanics carry out all the work designed or ordered by the engineers- I couldn't even flip a switch. I did not keep any logs or related material, but I do have some old photographs of test stands, etc.

A lot of water was used to cool the flame buckets while testing, and the water pooled up below the test stands. The cleaning that took place after the various testing was conducted by the mechanics, as per the company tech manuals received during the required training classes. Some propellant lines and valves required special cleaning in the "Passivation" lab.

Life at the SSFL was interesting but hazardous work. Safety gear that I wore was limited to respirators and hard hats during the various tests.

I was familiar with the conservation yard, which held items that I used in the building up of the test stands.

I had no experience with or knowledge of liquid materials disposed in toilets or floor drains; the old conservation yard; a surface disposal area at the western edge of Area 4; any of the leach fields, septic tanks or drainage discharge locations; any storage tanks or gas holdup tanks; or problems with underground pumps, sumps, storage tanks, piping, sewer or drainage systems.

Interview 256

I worked for Rockwell International Energy Systems from 1983-1988 as a Manufacturing Engineer Specialist. We designed and tested the electrical safety systems for nuclear reactor facilities. The initial systems built were tested in Area IV. There was a six month period when we were performing 24 hour testing of what was called hydrogen re-combiners. That was probably in 1986.

I was familiar with support systems for nuclear reactors. I had knowledge about the operations in Area IV. I knew they had radiological materials processing and decontamination disposal facilities. I was familiar with that decontamination operation as it was located in Area II I shared Inspection resources with the Area IV equipment decontamination and disposal facility.

From 1988-1994, I was the manager for Rockwell International Rocketdyne electrical assembly and test in Area II in building 203. Building 203 had a capacity of 25,000 square foot. We worked on electrical assembly for the space shuttle and space station. Rockwell International Rocketdyne performed an Area IV soil cleanup in early 1990's. Soil in Area IV was transferred from Area IV and taken to Area II. It was brought into Area II and stored in the large parking area near my building on the edge of Area II. Big garbage trucks hauled it here from Area IV and it was stored until they could find a place to take the material for disposal. There was a lot of residual dust in Area II during the removal process. Rockwell International was looking for someone to take this soil material that was stored in Area II. The material consisted of piles of dirt with a minimal amount of plastic covering material. It remained there for a few months before removal as Rockwell International had difficulties finding an off-site disposal facility. I think maybe I learned about that from reading the Los Angeles Daily News,

Inspectors who worked in both places had to ensure that the bills of lading and packing lists were correct for shipment of Area IV equipment for disposal. The inspectors worked for the company – that was their job. I talked to the inspectors about operations in Area IV Radioactive Materials Disposal Facility and was assured that the same rules were followed and that all of their paperwork was QA compliant.

No matter what product was going out the door it had to be done per procedure. I don't know how materials were stored before they were shipped to Area II because I didn't work in any of the areas in Area IV where they had hotboxes and that type of equipment. I saw them stored in various building in Area IV but wasn't involved directly with them.

I knew a little about how they protected workers against being exposed to radiological materials. I knew people who calibrated the equipment that was used to monitor the area for radiation. I was told that the radiation detectors showed elevated readings following Chernobyl. Those monitors had to be calibrated in accordance with the National Bureau of Standards. I have no knowledge of any workers being exposed to radiation or of any radiological material disposed of on site.

I guess you could say that the whole huge area was plumbed for TCEs for the rocket engines. The piping ran for miles all over the hills. I used to see cleaning operations when they were getting ready for a test and the entire inside of a building was

degreased prior to the final testing in some cases. They cleaned the test stands after every rocket firing. There was an infrastructure of plumbing for TCEs. There was nothing like that in Area IV. They used TCE, but not in such large quantities. Besides the TCE there were 50 gallon drums of other chemicals – including methyl ethyl ketone, isopropyl alcohol, NAK, and Freon until it got banned.

Drums were stored on stands; they had faucets installed on the ends and we poured out the amount we needed into smaller containers. We had a log sheet where we recorded information when we took some, including things like – how much, the date and for what purpose. I have no knowledge of any of those chemicals being disposed on-site. Chemicals were put into storage containers and hauled away by the plant maintenance staff – what they did with it I don't know. Plant maintenance operations were done by the same people for the whole SSFL. I have no knowledge of spills, and don't recall ever hearing about any incidents that weren't planned.

There were policies in place that told workers how to work. There were work orders, etc. that provided direction related to project requirements. There was occasionally some interpretation; we called it the manufacturing process procedure – that was written up to clarify when the work orders weren't clear. The project manager would occasionally have to sign off on such procedures to clarify which implementing option to take. Work orders were produced by production planning staff. They took plans and wrote up the steps it would take to get an assigned project or task done.

People followed the rules in our area. That was the culture. Work was stopped when something didn't seem right. When that happened, we wrote up a "discrepancy report." We couldn't start back up until we got a "disposition" from a qualified engineer that specified the corrective actions to be taken I was in production and they were strict. I came from a military background and I was more comfortable with clear rules.

In other areas such as research they were not as strict. An Engineering Logbook process was utilized. They often didn't have written work instructions – they could work based on verbal instructions by the Engineer in charge. The 60s and 70s were probably a little different. I would get small jobs from other areas of the site and they didn't seem to care as much about following the rules as we did. There were different cultures in the laboratory than in the area where I worked. People running Area IV were a little different than the people running the rocket division. Area IV people seemed brash, aloof.

When I was there, there was a right way to do things and people did it the right way. Everything that was supposed to be done was listed in a work order. When a process or procedures were changed, it went through an RDC process (requested a document change) first. You put the request in to a board – it was proposed or rejected. Changes were implemented through the engineering process – an engineering order was written and distributed to everyone; configuration management was implemented. It rippled down and cascaded to the work force. Changes were made frequently.

Different levels of workers received different training, although it was mostly on the job training. Most workers had high school diplomas; mid-level people generally had taken at least some classes at technical schools or at the junior college level. Higher ups

worked their way up through the ranks; some worked way up. 90 percent of the engineers had college degrees. I moved up through the ranks myself.

Performance was monitored through yearly goals that were set employee with his supervisor. We sat down with supervisors and went over it. They were called 63Ps. If someone wasn't performing correctly they'd have to improve. This was at the salaried level. The unions followed procedures specified in the union contracts.

I didn't see any radiological materials being disposed of on site, but heard about the sodium burn pit, and of problems in the nuclear area. I was told in my building there was a mercury still at one point in Area II. They used mercury for a lot of instruments. It wasn't there when I was there. I am unaware of any materials left in drainage pipes or on the ground.

All work orders needed to be validated as complete. Every task had its own paper trail. Record retention was performed by Iron Mountain or whatever it was. Records were kept and filed. There was a requirement to keep them for 100 years or something like that. I don't have copies of any records.

Some of my workers said they got liver problems caused by exposure to TCE. They claimed they had some problems and I had to fill out paperwork – sometimes I had to report that Person X wasn't even in the area where he said he had been exposed. These were minor workers compensation issues. Liquids were not drained into toilets.

Here is what I heard about the sodium burn pit. Whenever there were problems with a piece of equipment they'd take it up there to burn the sodium off. That was their way of disposal but I wasn't in on the day to day operation of it. I am unaware of any surface disposal area on western edge of Area IV. There was a junk yard type place. The junk in it wasn't all facility related. Stuff stayed there for awhile. The Clinch River steam generator was there. It weighed 120 tons. They brought it from El Segundo. I don't know how they got it up that mountain.

To my knowledge there were no leach fields but there was an infrastructure for fluids from point A to point B. If there were problems with any of these liquid storage facilities it would be the responsibility of facility maintenance, plant engineering. The potential for that was there – some of these were buildings from the 1940s. It wasn't brand new.

Other than what I've told you, I don't have much else to add except that there was a lot of material in Area IV over the years. I don't know how the material was managed and disposed of. MON is in charge of it now. Talking to other people in charge would be useful: NPO is in charge of SSME group that supported the test stands.

Interview 258

I was hired as a patrolman at Rocketdyne's Santa Susana Field Laboratory (SSFL) in 1984 and worked in Areas 1, 2, 3 and 4. After about 1 ½ years I was promoted to sergeant at which time I was transferred to DeSoto. I remained with Rocketdyne until 1997 when I was laid off due to the company reducing the size of its workforce. At that point, Rocketdyne's police department was disbanded and the company commenced contracting for its security services.

During my 13 years employment as a patrolman and as a sergeant, I was crossed trained as a fireman like all the other patrolmen and firemen at Rocketdyne. In essence, I had a dual role in the facility's security and in fire prevention and suppression. My primary job was as a patrolman, but whenever there were fire emergencies, I and other patrolmen became and served for the moment as firemen until the event was resolved. Of the total 13 years I was with Rocketdyne, I estimate that I served about two years at the SSFL. The other 11 years were at either DeSoto or at Canoga Park. My duties at the SSFL as a patrolman included that of being a gate guard and patrolling all four areas as I worked a rotating schedule that put me on all three shifts at various times. Whenever I was assigned patrol between the hours of 6 PM and 6 AM, I traveled a route that required me to punch a clock at or inside various buildings and locations in Areas 3 and 4 while a second patrolman would do the same for Areas 1 and 2. During the night, I would switch Areas with the other patrolman and conduct rounds in the same manner. Occasionally I had gate guard duty both on day and night shifts. Sometimes whenever the fire department was short personnel, I was assigned to work as a fireman for a shift and would conduct fire inspections and so forth during the day.

I was continually receiving training of one type or another. Occasionally, the lieutenant would come to the SSFL Control Center, which was manned 24 hours a day, and advise the day or night duty sergeant that a drill would be conducted at a certain time and place. It could be a fire (such as a building fire) or security (such as a suspicious person) drill designed to keep the personnel vigilant and ever trained for such events. At the designated time, the sergeant would sound three beeps, signifying an emergency thus alerting on-duty personnel. The sergeant then would announce "This is a drill," and give the circumstance and location of the drill. Then, the firemen and/or patrolmen would respond accordingly. These exercises occurred about once a month.

At the Control Center, there were security alarms that were set to monitor doors on certain buildings and other secured areas at the SSFL. Whenever a night patrolman was about to enter such a building, he would call and alert the sergeant at the Control Center. The patrolman would then enter the structure and the alarm would go off, which would be reset by the sergeant. The patrolman would punch his clock and upon exiting the building, the same routine was followed thereby notifying the Control Center that the alarm was intentional. I remember one Area 4 building where radioactive materials were kept or stored, on which a security alarm was attached, but I cannot recall its number.

Occasionally, the alarm in the Control Center that was connected to the sewage treatment plant would sound. Typically, that meant there had been a malfunction of

some sort at the plant and a facility plumber was usually notified to respond to repair the problem. Alarms were also fixed on buildings in Area 4 that contained radiological material but I don't remember any of them actually being actuated.

As a patrolman, I always wore a film badge. I recall that I swapped it out for a new one every month or once a quarter, I cannot remember exactly. I was never advised that I had ever been exposed to radiation. Because of the nature of my job, I was in every Area on patrol or as a fireman at one time or another, but I do not know or remember where radiological materials were used or stored in Area 4. During my initial training at the SSFL, I recall that a certain building was identified as containing fuel rods but I can't remember its number or location. I never handled or dealt with these types of materials or radioactive wastes during the course of my job.

I remember one large brush fire that occurred in Area 4. No buildings were burned but a lot of trees, brush, shrubbery and weeds were destroyed. I don't recall the exact cause of the fire but it occurred during very hot weather and it took all day to extinguish. One night when I was not on duty, a large rocket engine fell off a test stand and tumbled down into a canyon which resulted in a fire. When I came to work the following morning, the fire had been put out.

I remember a certain pond of water located in Area 2, I think, near the sewer treatment plant. It was surrounded by a fence and there were no test stands in the area. I recall seeing fish which appeared like perch to me, jumping out of the water. The fish had been previously been put into the pond at various times by employees. I looked closely at the fish and saw that they were covered with sores and knots on their heads, and their eyes were bulging. I don't know that caused these problems but assume it was caused of the adverse effects by contents of pond. There was stuff in that pond that you don't want to know about.

I had a good friend whose name was GIJ who had 30 or more years as a fireman at the SSFL. He retired and has since died of cancer. I recall GIJ telling me of a detail he once was assigned before I became employed at the SSFL. On that occasion, supposedly GIJ escorted a vehicle or vehicles that were hauling something away from the SSFL. He told me it was taken to the ocean and dumped, but I don't know what it was or when it occurred.

I remember locations in Area 4 called the Sodium Burn Pit and the old conservation yard but had nothing to do with them. I do not recall incidents when liquid materials were disposed of in toilets or floor drains; a surface disposal area at the western edge of Area 4; leach fields, septic tanks or drainage discharge locations; fuel element cleaning areas; or problems with underground pumps, sumps, storage tanks, piping, sewers, or drainage systems other than what I have already identified. I did not maintain any sort of daily reports or record keeping other than the gate guard logs previously described.

When I worked at the SSFL, I lived in Mission Hills and took my lunch with me daily. It depended on my assignments as to where I ate lunch. As a sergeant, I was always at the Control Center and ate there. As a patrolman, I usually ate in the patrol truck. I was in contact with the Control Center by radio and personnel there always knew where I was on the hill. Although most of my employment period was at both Canoga Park and DeSoto, I enjoyed the several years I was at the SSFL and with my fellow patrolmen

and firemen there. At the fire station there was a weight room where we could exercise and work out. Some employees jogged around the SSFL, but I never did.

Interview 262

After leaving the University of Texas in Austin, I began my career in the field of nuclear engineering at North American Aviation in Downey, California. I started work in July, 1955. Shortly after going to work there, North American Aviation reorganized into various divisions with separate facilities. I went with the Atomic International (AI) Division which set up its headquarters on Vanowen Street in the San Fernando Valley and had most of its actual operating, test, and experimental reactors located at the Santa Susana Field Laboratories (SSFL). I worked at the headquarters facility on nuclear reactor safety devices until about 1960. I then moved to the SSFL where I began experimental physics work at the Advanced Epithermal Thorium Reactor (AETR), a split-table, zero-power, nuclear, critical-assembly reactor that later became known as the Epithermal Critical Experiment Laboratory (ECEL). My work consisted of general measurements of the physics characteristics of different fast reactor configurations that simulated an actual fast reactor for electric power production, but I placed an emphasis on measuring the Doppler effect in thorium, uranium-238, and uranium-235 in a neutron spectrum with a median fission energy in the range of 190 Kev. Up until that time, only "ball-park" values for the Doppler effect had been experimentally determined.

We used a square wave oscillator to insert into and withdraw from the critical assembly the above listed samples. We measured the periodic change in the reactivity as a function of the temperature of the sample and carried out a Fourier analysis on the reactivity change in order to extract the small signal from the high background noise. In general, the split-table critical assembly work was directed toward the development of fast breeder reactors for commercial applications. The oscillator and Fourier technique turned out to produce the first definitive measurement of the Doppler effect in a fast neutron reactor spectrum. The project lasted about two or three years. We published our results in the *Journal of Nuclear Engineering*, and various topical reports and conference papers. See the attached resume and list of publications and reports.

With regard to the physical characteristics of the split-table critical assembly, it consisted of a fixed half and a moveable half, each of which had several hundred aluminum drawers (each about 2 inches by 2 inches by about three or four feet long) that were filled with plates (wafers) of encapsulated fuel (U-235, Th-232, U-233, U-238), cladding material (stainless steel, aluminum, etc.), coolant material (sodium and potassium), and other materials appropriate for the core of a commercial fast reactor. Each plate was about 2 inches by 2 inches by either 1/8 inch or 1/4 inch thick. These plates were assembled into the aluminum drawers in order to simulate the core of a fast reactor. A photo of the ECEL split-table critical assembly is attached hereto.

I believe both Argonne National Laboratory and Idaho National Laboratory also used split table critical assemblies. See Argonne National Laboratories: (1.) W.Y. Kato and D.K. 1959. *Nuclear Science and Engineering*, p. 320-330, and (2.) A.R. Baker and P.J. Jaques. 1958. "Measurement of the Coefficient of Doppler Due to Thermal Effects", AGRE RM 168, June 1958.

We produced internal documents (non-classified) about all of the work at the ECEL.

I became the supervisor of the experimental physics unit at the ECEL sometime around the late 1960's or early 1970's. I had a reactor operator's license for the ECEL critical assembly. I also did reactor safety experiments and some transient studies there.

By way of more background, North American Aviation became North American Rockwell, then Rockwell International, and perhaps a few other names in between. During these changes, Atomics International became the Energy Systems Group which dealt with more than just nuclear power (i.e., solar, geothermal, and wind power, as well as advanced energy storage systems, etc.)

Yes, I handled radioactive materials: in the thin drawers of aluminum, as described above, we placed various solid materials clad in either stainless steel or aluminum. The U-233, Th-232, and U-235 were clad in stainless steel, and stacked toward the front of drawer. They were a "flat-plate" equivalent of fuel materials found in an actual fast reactor. Each drawer was pushed into the matrix, one after another. The configuration effectively formed a central core in spherical form which simulated a fast reactor. Surrounding the central core was a decoupler in the form of a spherical shell, and around that was a driver operating in the thermal energy region and consisting of U-235 and polyethylene. Finally, there was a spherical shell reflector consisting of polyethylene. One half (the movable table) of the assembly was brought up to other half (the stationary table) where criticality was achieved. A sample of interest would then be fired into and out of the center of the core through an approximately 1-inch by 1 inch square tube, and the reactivity would be measured. We would determine how the power level changed based on the neutron flux, and collected as much data as possible for Fourier analysis. We would perform a Fourier analysis to enhance the signal over background and obtained very good sensitivities.

We handled 2" x 2" wafers that contained sodium or potassium that were clad in stainless as were other hazardous materials. We did about twenty core changes (configurations) over the lifetime of the machine. In the process of changing the core configurations and thereby handling radioactive materials, we often hit our maximum allowable radiation dose. When that event occurred for any individual, other staff members would step in and work so that no one exceeded the allowed dose. I, as well as everyone else, wore both a film badge and dosimeter.

The 2-inch by 2-inch wafers of all types that were not in the core at any given time were, I believe, stored in a vault located within the containment structure and above ground. I can't remember the exact location of the vault, but I am quite certain it was in the facility. The containment room in Building 100 consisted of 3-foot-thick (or so) concrete walls and had a big concrete/steel door that provided access to the spit-table assembly. The health physicists took care of monitoring personnel radiation exposure, especially during the core changes which occurred roughly every 3 to 4 months. I don't recall any off-normal events. There were no criticality excursions. In fact, it would be difficult to inadvertently have an excursion event with these types of assemblies.

Every aluminum tray had a spring which acted like a fusible link and held the wafers tightly against the front of the drawer. The spring-loaded device would release if it got too hot and force the wafers out of the core. We had a few instances where a spring would randomly break and the reactor would go subcritical, but the spring failure was

not related to any flux excursion. Sometimes a spring would break even when the assembly was not operating.

I don't recall anyone ever being exposed to radiation where we needed to conduct decontamination, but we did have decontamination facilities, mostly a shower facility for eyes, if that were ever necessary. We conducted routine swipes, but I don't recall any significant radioactive material present, but there were procedures to wipe an area down.

I don't recall any spills, leaks or other releases of radioactive materials in Building 100. When we were building the mechanism for the Doppler effect experiment, we cleaned the parts with small amounts of trichloroethylene (TCE). The solvents, about ¼ or up to a pint at a time, were then spread out on a concrete pad to evaporate on the east side of Building 100 near the workshop. The workshop had drill presses, etc., that we used to build devices for the experiments. Building 383(?), located roughly 50 yards to the west of Building 100, had a larger and more extensive machine shop, but none of this involved machining of radioactive materials.

I'm not sure how the solvent-stained rags were disposed of. To my knowledge, the waste did not go to the Area I Burn Pit, but we could see smoke from the burn pit from time to time. We knew about it. I don't believe that I actually visited the Burn Pit myself, but of course, I knew of its existence. The rags that were used to wipe down the trays went into a hazardous waste bag, but I'm not sure where that bag went. I am not sure at this point in time as to whether or not there was a floor drain in the containment building of Building 100. If there was one, I'm not sure of the location to which it drained. Presumably it would be an underground storage tank.

On the south side of Building 100, there were offices.

Building 100 is presumably still there, but some of the surrounding buildings are gone.

Area IV contained all of the nuclear activities, so far as I know. Because our activities were so different, we didn't interact much with the Rocketdyne personnel who worked on the rocket engines. However, we could see and hear their rocket engine test activities to the east. They tested propellants and the smoke clouds had a greenish tint to the exhaust on occasion.

I heard about the incident at the Sodium Reactor Experiment (SRE), but I did not participate in the program, and I don't remember the incident being a significant public safety concern.

We had safety courses on what to do and where to go if there was a nuclear accident.

Experiments conducted at the ECEL were documented in journals and presented at conferences, and we published our reports in conference proceedings.

Standard laboratory notebooks were kept at the ECEL and filed in filing cabinets in the building, but I'm not sure where they went subsequently. We were absolutely not allowed to keep these on a permanent basis, and I don't remember a library or a records center nearby, but we had one at the Vanowen and DeSoto Facilities. I don't recall any incidents or incident reports. I don't believe we ever had an accident written

up by HP personnel because I can't recall an accident ever happening during my time there.

Other people who worked at the site included: (1.) CEF, who operated the reactor and did experiments similar to those that I did in the ECEL, (2.) MOQ, a supervisor who left 1-2 years after I got there and went up to the reactor in Idaho, and (3.) NPR, who operated the reactor and also did similar experiments.

In the early 1970's, I prepared a proposal to NASA to do experiments on a compact fast reactor for space power. We were awarded the contract and built a zero-power critical assembly that was a very close physical mockup of a multi-megawatt, space-power reactor (the uranium-nitride- fueled, Li-7 cooled, molybdenum-reflected, drum-controlled, compact, fast-spectrum reactor for space application). For this experiment we used an existing SNAP reactor test facility. There were no incidents associated with this work—it went smoothly. The reactor simulated the physical characteristics of a space reactor and was an actual, to-scale, mock-up of the reactor designed by the NASA Lewis Research Center. Tantalum metal was used as an absorber, All refractory metals were cast into full-size pieces. The reactor criticality control was accomplished by 6 drums which were cylindrical in shape and were rotated to act as neutron absorbers in one position and as part of the fuel core in another. This work was performed under Contract NASA 3 – 1421 with NASA Lewis Research Center in Cleveland which issued a report No. NASA – CR – 72820. See the accompanying information for a photograph of this assembly.

We also had an EPRI (Electric Power Research Institute) contract to do geothermal testing at sites where there were promising hot water sources. I also did solar power-tower experiments at the Solar Tower at Sandia National Laboratories using a sodium-cooled panel at the top of the tower.

Interview 267

I started working at the Santa Susana Field Laboratory (SSFL) in 1963, stopping in 1968, worked as Maintenance Manager at Magic Mountain, and then again at the hill in the late 1970s until 1988 or 1989. My total time on site was approximately 14 years. I worked the entire time for AI in Area 4. I worked for nine years with plutonium at Hanford, then at NAA in Downey, then AI up at the SSFL. I was hired based on my experience at Hanford, and was used initially to write procedures for handling plutonium and handling contamination up at the SSFL.

I started in Building 200 East in the hot cells. There was also a Building 200 West that was configured exactly the same way.

I worked on the sodium cooled reactor, which at that time was not in operation but was more in limbo. I worked on projects that supported the SRE, which were attached to it second hand. Many projects overlapped with bigger projects, and I worked on projects that supported those who worked on the SRE.

I did not deal much with radiological contamination, but I feel that the investigation of contamination while I was there was more scratching the surface than being very thorough. There were test wells on the site where contamination was checked.

I worked in Building 55 where plutonium was processed for fuel for field program processes in Idaho as well as for the SRE. I initially helped define the processes and handling. 13 men worked in Building 55, and we all worked rotating shifts. It was AEC-contract work. We used glove boxes to handle the plutonium, which were in the form of fuel pellets. The pellets were nickel plated through the application of nickel carbonyl. The radiological material was also handled with manipulators. This was also known as Building 2345, (because it had Divisions 2, 3, 4 and 5 within), and was Top Secret. Everything that left the building had a red tag indicating Top Secret. As far as I know, I am the last living person who worked on the production line in Building 55.

Building 55 generated low level radioactive waste that was shipped off site for disposal in small boxes. I remember someone putting too much waste in a container, which went critical. I don't remember how it was mitigated.

These buildings that used radiological materials had air systems that always sucked air in. You could always feel the air movement. It moved in from the outside and up a large filtered stack. The air in the buildings would completely change every 30 seconds.

I worked in Building 59 on the LLTR- the Large Leak Test Rig. We ran sodium tests in the rig, which was 50-ft long by 12-inches diameter. We would heat sodium up to 1100 degrees and inject it with water heated to 1000 degrees to measure the reactions. Building 59 also had nuclear testing before the LLRT, and the building had a very large vacuum system, a large bridge crane that hung from the ceiling and a 16-cylinder GM diesel engine.

I worked several years at the SPTF. I worked also on the SNAP, SNAP 2, SNAP 7, SNAP 710 and SNAP DR projects, all of which were associated with flights. This work took place in Building 13.

Working with glove boxes mean you always got a small dose of radiation on your hands, and the daily limit was 15 milliroentgens. Sometimes working with tools would cause holes to be poked in the gloves, at which point the contamination increased quickly. I was not advised of what my total dosage was, but it was small.

I wore a dosimeter and film badge at all times. Readings were kept by the health physicists.

There were no significant accidents or releases of radiation of which I was aware. I did not work with any hazardous substances other than radiological.

I remember a very large hole was created in anticipation of constructing another hot cell. A crane fell in the hole, and was unable to be retrieved without taking it apart.

Across the street from Building 55 was Building 20, which was used for stripping and decladding used fuel rods that came offsite from different contractors. There was also Building 231 nearby which decladded fuel as well. Casts were also prepared there to transfer radiological materials. The difference in Buildings 20 and 231 was that 231 handled AI materials only.

There were AEC personnel all over the SSFL in Area 4.

I wrote some procedures in the beginning, and a limited number reports throughout my tenure there.

I had expertise in welding and taught new techniques to experienced welders. I remember getting in trouble for teaching the welders, as they were union workers and I was a salaried employee.

There were large delivery trucks which surprised me at their being able to come up the roads, especially those with 200-ton casts. Sometimes equipment such as large forklifts from the SSFL needed to assist with bringing the deliveries up the hill.

I recall the Old Conservation Yard as a place where there were large diesel fuel tanks, which was a supply point for heating test rigs. I remember that it fueled the test rig behind Building 59. The Old Conservation Yard was located in Area 4.

We watched many films for training regarding radiation handling and procedures.

I do not remember any disposal of wastes in toilets or floor drains, nor was I familiar with any disposal area at the western edge of Area 4. I know nothing about the sodium burn pit, fuel element cleaning areas, storage tanks or gas holdup tanks, or any problems associated with underground pumps, sumps, piping, sewer or drainage systems.

I liked everything about my job except the ride up there. I drove up Black Canyon to work every day, putting over 200,000 miles on my Corvair, and parked most of the time right at Building 55. When working in other areas I parked in a lot near Building 238. I brought my lunch and ate in a rest area within the SPTF and Building 55. There were a lot of people who went on walks at noon. I saw a little wildlife, including deer. There were caves with Indian paintings near Building 20. A couple guys regularly used marijuana, but the guys were generally good to work with.

Interview 269

I grew up in the San Fernando Valley and attended Cal Poly (California Polytechnic State University) in San Luis Obispo where I obtained a Soil Science degree, and then went to CSUN (California State University Northridge) where I received a Masters degree in Health Science with concentration in Environmental and Occupational Health. I worked two and a half years at the Hughes Research Laboratory as an Environmental Scientist where I found the inherent challenges of environmental compliance supporting industrial research to be appealing.

In 1991, I started working for Rockwell International's Rocketdyne division in the Environmental, Health, and Safety group doing permit work and performing a variety of environmental-related projects for the company. I also managed the hazardous waste yard for a few months at the Rocketdyne Canoga Facility. I worked at SSFL from 1992 until 2007 performing a variety of environmental-related projects.

While working at Santa Susana Field Laboratory (SSFL) I provided environmental regulatory support to the FSDF (Former Sodium Disposal Facility) by characterizing the excavated soils and completing transportation and profiling paperwork. I worked on a DOE-funded project to remove the Coal Gasification FHP (Flash Hydro-Pyrolization) systems from the Bowl Area then wrote an historical operations review. The FHP report gave me the opportunity to take a look at the history of the Bowl area and SSFL in general. I enjoyed learning about the SSFL history and engaged many of the old timers who were willing to share stories of the SSFL past. Many of them are gone now.

The Bowl Area was the site of the first of the large kerosene propellant liquid rocket engine test stands, and was said to have been modeled after Pennemunde (rocket development center on Usedom Island, Germany). They essentially just copied the V-2, changed the units from English to metric, and went on developing from there. The FHP was done on the PTCC (Propellant Test Control Center) at the Bowl where they conducted rocket engine testing. The DOE was concerned with the possibility of contamination from the FHP operations and wanted to know the nature and extent of previous contracting in the Bowl area.

Following the FHP project, I performed a variety of projects generally involving energetic materials, exotic containerized oxidizers and a number of surplus compressed gas cylinders. As those projects were completed I was invited to assist in solving some of the problems at ETEC.

At ETEC, I provided environmental support, mostly environmental regulatory interpretation and implementation, at the Radioactive Materials Handling Facility (RMHF). I also provided the environmental support to the FSDF (Former Sodium Disposal Facility) closure and the D&D (Decontamination & Decommissioning) of Building 20 (Rockwell International Hot Lab). There were a number of legacy mixed and radioactive wastes at RMHF and technical assistance was needed. I was also responsible for the closure permitting for the HWMF (Hazardous Waste Management Facility). Off and on, that took 8 years to get an approved Closure Plan mostly because of DTSC delays. I was responsible for the permitting for the RMHF, a RCRA Part A facility which was authorized to perform treatment of mixed wastes on-site. There were quantities of mixed waste so small they were not acceptable for treatment by

Envirocare, so we treated them ourselves and met the State and Federal Land Disposal Restriction treatment standards.

As time went on, I gradually took over the position of an infirm Project Manager who eventually retired. I was then promoted into a Project Manager position. I officially started in 2002 in the Program Office working for DOE who had a contract with Boeing to complete the closure activities. At the Program office I did budgeting and forecasting, and had to report monthly Earned Value. My areas of responsibility were the closure of the permitted units (RMHF and HWMF), nuclear facility D&D, radioactive soils cleanup, soils and groundwater cleanup.

For a long period of time, I also had the cost and schedule responsibility for the RCRA soils and groundwater investigation. We were often driven by the DOE to determine when cleanup would be completed which caused a fair amount of discussions with people like HJK, who was the technical lead for the RCRA soils and groundwater investigation. We looked at the SNAP (Systems for Nuclear Auxiliary Power) Storage Building (4626) groundwater maps and recognized Building 57 may also be the source of VOC (Volatile Organic Compound) contamination in that area and not Building 59 as was presumed.

One of my projects was to oversee the removal of Area IV septic tanks and leach fields which had been abandoned sometime in the early sixties when a sewage treatment plant was installed in Area III. To remediate the old leach fields, the usual practice was to simply cave them in, fill in the hole, and cover them over. While investigating Building 93 (AE-6 and L-85 Reactors) we found records that a leach field was planned but found no evidence that it was installed. In fact, with the exception of the SRE, we did not find radioactivity at any of the other leach fields above the then-current release limits.

The DOE Historical Site Assessment (HSA) stemmed from the need for the DOE Site Closure Program to have an idea of how much work remained. We talked about applying MARSSIM (Multi-Agency Radiation Survey and Site Investigation Manual; a technical document noting observations you need to get to a cleanup goal) to a 290-acre area, and the information we had available to do it. Among the concerned parties was the problem of multiple tenants with dissimilar goals. Boeing and DOE didn't want to end up having to regulate something after the closure cleanup, and the other customer was DHS (California Department of Health Services).

The HSA obviated the need to sample the groundwater underneath the sites where reactors were operated. We found tritium at Building 10 (SNAP 8 Experimental Reactor and SNAP 2 Experimental Reactor), about 30,000 pCi, where the 1 MW water reactor was located. Building 28 housed the STIR, the Shield Test Irradiation Reactor Facility, but we did not find tritium there. We did not find tritium at the SRE, which may be because the SRE had a large amount of shielding. We informally investigated the source of the Building 10 tritium which is unclear given the large concentrations found. We did not arrive at a conclusion, but I currently believe the native lithium in the bedrock assisted in the conversion of the neutron energy from the two Building 10 reactors into tritium. Lithium occurs naturally in the Chatsworth formation. It would be interesting to see the results of core hole bedrock sampling to produce an aerial distribution around the site which may correspond to the neutron flux generated by the reactors.

I was involved in ten public meetings, planning, creating the invitations and developing the presentation materials. Our philosophy for the public meetings was to provide and present materials as one neighbor talking to another neighbor. After all, we were proud to be working at SSFL. I believe interacting with the engaged community is an obligation that comes with the job. I would like to see more public communication from Boeing regarding SSFL. I was also the project manager for the initial DOE ETEC website so I have some experience overcoming the challenge of communicating technical information.

I worked at SSFL for some sixteen years cleaning up buildings and soils and dealing with the fine edge of environmental regulations. Now that I am no longer working at SSFL, many people I talk to want to know the secrets. Is there really contamination up there? Are there really UFO's up there? What about the secret nuclear waste dumps? Seems like I have heard them all. There is even a video of some guy on YouTube telling the Simi Valley City Council that primary coolant from a SNAP reactor was piped to the FSDF and poured out onto the ground! As the person who took the samples, who reviewed the analytical results at the FSDF, the notion that primary coolant was disposed of at the FSDF is absurd at best but probably just bizarre. And just for the record, yes there is contamination up there, mostly from rocket TCE in the groundwater. If there are UFO's I have never seen them (but then again maybe I am an alien!). And no, there isn't a secret nuclear waste dump. One final thought. Most people who ask such questions seem genuinely disappointed to hear my answers. I guess some people just don't like good news.

I can't prove something doesn't exist, so let me just make a few declarations. During my time at SSFL, we did not dispose of materials on site and I am not aware of anyone disposing of materials on site. I am not aware of intentional release of radioactive materials above what was allowed at the time. The 2005 Historical Site Assessment is the best representation of the activities conducted in Area IV over a fifty year period and no relevant information that we were aware of was withheld from it.

I am also aware that nuclear facility D&D has been performed over a period of time at SSFL and that the cleanup standards have changed over the years. I would therefore not be surprised to learn sites cleaned to a previous standard do not meet the SB990 cleanup standard in effect as of the date of this interview.

Thank you for this opportunity to participate in the historical interview for the Santa Susana Field Laboratory, Area IV.

Interview 270

I started working for Atomics International in 1956 at Vanowen facility in a small hot cell which was later moved up to the hill, in late 1957 or early 1958. It was a small "cave." It was made of high density blocks and had to be taken apart to move it up on the hill. The entire facility at Vanowen where the hot cave was located had to be decontaminated before the cave could be moved. It was moved to building 3A, on the south side of Engineering Test building on the hill. I moved when they moved the cave, or cell as some people refer to it. I worked on and off the hill in a research department that performed fuel decontamination and reprocessing. We started out with uranium slugs from Hanford, then went to reprocessing uranium oxide. I was a member of the technical staff. I was there for a total of 33 years; and then five more as a consultant. Before I started with AI, I was in nuclear strike force for the Air Force. Then I went to Westinghouse Atomic Power Division in Pittsburgh and after that, I moved to California where I been for over 54 years.

When I was there radioactive materials were stored in a facility behind the SRE. It was a walled off area with a crane over it. The material was contained in lead-lined "pigs". We moved the pigs in and out through a tunnel. We wore dosimeters, film badges, etc. I assume that we would have been told if we were exposed to anything. When I did retire from there I got a whole body count and I assume that if something was there I would have been informed. I think I'm pretty healthy.

Building 3A was decontaminated by people who worked in building 20. Later on building 20 became the large hot cell area. The building where we stored the material mentioned above is gone. I would hope they knew about this building; I'm sure they did. I never had a feeling the company put me in any kind of jeopardy. There was adequate training and as long as you went along with the way training specified there were no issues. And I think everyone did follow the rules, for the most part. When I worked for Westinghouse, I had times when my dose was over 300 mr, but that never happened up at SSFL.

I worked with and handled chemical materials such as lead and benzene. We always used a fume hood when doing so. I would say that most people I worked with were careful; people didn't want to jeopardize their own health. I was very fortunate because I worked with knowledgeable people who looked out for each other. We talked to each other if we saw anything questionable. Some of the guys I worked with had a contract to build lead pigs. They worked outside with an acetylene torch – a lot different than the way some of that work would be performed today.

I have no knowledge of radiological materials disposed of at the site. Waste was always picked up whether it was k-pads from decontamination or anything else it was always picked up.

No radiological materials were stored somewhere other than in a building. I am not aware of any large materials spills. There were some small ones I'm sure – I remember being down on the floor cleaning. We did our own monitoring; it was all part of people being there for each other. We took smears, counted them and didn't rely on health physicists all the time. Any small spills were cleaned up to the best extent possible.

I don't have any knowledge of any off-normal events. I ended up in the research department. I enjoyed the work we did because it was challenging and interesting on a day to day basis. Nothing off normal happened in our department.

There were policies and procedures that dictated how things needed to be done. They changed infrequently. If they did change at all to my knowledge, the changes were minor. Changes came down through the supervisory level and I was informed.

The work culture was that generally everybody did what they should do in the right way. Working in research, some of the scientists may have had some inkling that something may happen during the course of an experiment, but I never saw anything bad happen.

There was a lot of on the job training. The workers in building 20 may have gone through a more formal education because they were new hires that didn't have much experience with radiological or chemical materials. When I went to work there I was 26 and had some previous experience because of my former employment with Westinghouse Atomic Power Division.

Performance reviews came later on in my career; it became more formalized. If someone wasn't doing things right the supervisor gave you a talk. Our supervisors were closely aligned with the work we were doing. They were spot on. You worked with them most of the time.

Anything with any experimental work was documented in a North American notebook. They were signed out from the library to each person who needed one. Then you documented any data and observations of experimental work. When it was filled out you turned it in and got another one. The notebooks were probably to protect patent rights. I have no idea what happened to them after they were turned in. I have no knowledge of people who had separate records for their personal use. We had to do monthly reports but that's about it. There is nothing I can think of that wasn't documented that should have been

I am not aware of any toxic or radioactive liquids disposed of down floor drains or toilets. Chemical wipes worked to clean up any of the small spills that occurred.

I had nothing to do with the sodium burn pit. I have no knowledge of surface disposal area on the western edge of Area IV.

I have no knowledge of leach fields, septic tanks, sewers, etc.

I spent a lot of time in the conservation yard. You could find anything there, mostly metal parts but nothing dangerous at all.

I have no knowledge of storage tanks, gas tanks, sumps, pumps, drainage or sewer systems.

Decontamination was handled by a group of workers who resided in Building 20.

It was ok to work up there. I made a good living. Overall I enjoyed my work, mostly because of the people I worked with. In research it was always a challenge and I enjoyed it. Later on I went to Rocky Flats and helped with decommissioning a plutonium line.

Others to talk to may include: EGF, FHG, GIH (who had a Ph.D. and went on to Oak Ridge), HJI (who worked in maintenance), IKJ (was in sheet metal) and JLK (who was an oiler). KML was involved in writing the cleanup site plan.

The five years I spent as a consultant were at the Westlake facility where I worked on the SST.

Interview 277

I was 23 years old when I hired on at SSFL on May 5, 1975 as a Labor Grade 6 Technician, the lowest grade tech on the hill. I worked for AI at the Sodium & Component Technology Group. I worked for 1 ½ years at this labor grade for \$4.35 per hour. When I hired on the highest technician labor grade was 17. I went to a labor grade 12 and had more responsibility for 16 months. Then there was a labor grievance and those that were grade 12's became 17's. When I started I would support the senior technicians and engineers as a gopher. I could bend tubing, wrench components, and put in gas lines. I had no responsibility for running tests on my own. HIM was the manager of our unit. There were 14 mechanics that worked in Building 006 and Building 005 and other smaller facilities. We did sodium research.

I got involved in chemistry lab work where we sensitized strips of various grades of stainless steel, such as SS301, SS305, SS316. We would heat them up to different temperatures, clean them, and then do wet tests on them where the liquid sodium would bond to the stainless steel. They were used for reactor experiments. I worked on dip seal tests and sodium chain tests at Building 006.

At Building 006 I worked for IKL – he brought me in to the chemistry lab. I always kept a notebook as to what I did on experiments. I would turn the notebook in to the Engineer or Department Head. We would take samples. JLM worked on sensitizing stainless steel by putting it in different acid baths like acetic or nitric. The samples would go in the sodium loop and it would be run for a number of hours and then we would look at them to see if the sodium was still adhered to the stainless steel. We would see how we could clean the samples to test how well the sodium bonded.

After working for 2 or 3 years at Building 006, I was transferred to RST's department at the radioactive materials disposal facility (RMDF). We would receive casks with radioactive fuel rods inside, open them and put the fuel rod bundles into baskets and number them. Some of them were 30 feet long. The fuel rods came from places like Hallam and Savannah River. The Tri-State truck drivers would not leave their trucks until the cask was off the truck and placed in the vault. The fuel rods in the canisters were stored at the radioactive materials handling facility (RMHF) until they had cells ready at the Hot Lab (Building 020) to unclad the sodium from the fuel rods. They would open up the bundles at Building 020. We would lower the baskets into the floor vaults at the RMHF. Note that at the Hot Cell Building 020 would always clean up the cells used in each project and then paint the cells in order to keep the radiological contamination down in each cell for the next project.

There was training in radioactivity, respirators, radiological handling, dosimetry, and dress out. We were trained on what we were supposed to wear as well as what we were NOT supposed to wear. To tell you the truth I was pretty impressed with KMN's department (health physics). We would wash down the cell at the RMHF and would have to wear plastic rain suits. There was a hot cell at the RMHF with an evaporator where we were sometimes required to wear a respirator. We had filters for radioactive water that was generated onsite – it could come from the SRE decontamination and decommissioning (D&D) or sometimes from DeSoto.

We would bid on contracts for receiving fuel rods from other sodium reactors such as Hallam. The cladding and bonding would be removed at Building 20. The fuel rods stored in casks had water in them from the leak test. There were 7, 8, or 9 bundles in each cask. We would take the bundles out of the cask and make sure there was no water on the bundles, there would be water remaining in the cask – not a lot, maybe a couple of gallons. We had to be careful if there was any water in the cask because it would be very hot. We wore film badges and dosimeters. We would wear the dosimeters on our heads and arms. They had been using dosimetry for a good 10 years before I started work there.

We had company procedures. We had to sign off on the procedures. As time when on we had more and more checklists of procedures that we had to read and check off. We had a working copy of the procedures, there was a copy in the Engineers office, and there was a QA inspector copy. We were trained on how to use radiation monitoring equipment and we were trained on how to survey ourselves. We had to sign off on training from the very beginning.

It is simple to ask about “off-normal” events. There would be little things that would happen, like a clevis would jam. More serious things would happen maybe once a month, like somebody would forget to take off their booties before walking out of an area and everyone would have to freeze until it was cleaned up. Such events would be documented by the engineer or health physicist (HP). This is just what we had to do.

We were trained to use cold water and to never use hot water for decontamination. We were trained in self decontamination and if you found something, you would call the HP. There was a spray, something like Simple Green or that orange spray that they would use with a wipe to remove radiation that was better than just water. We would also use duct tape to remove contamination. There were a lot of other little tricks.

I think I was there for about 4 years and then that work dried up and I had to move on. I got to do something I thought was more exciting – coal gasification. This was during the Jimmy Carter days. At Building 5 there was the Molten Salt Test Facility (MSTF), I think but I’m not sure, and the Process Demonstration Unit (PDU). I worked at both. The PDU was built and we had 20-25 mechanics there who were getting the unit ready to function. The unit was built by an outside contractor and we did testing and checked everything out. I worked with Kentucky coal and Pennsylvania coal and worked with coke which was a more refined coal – it was very fine and air bubbles would come out of it like a volcano. The vessels ran at 1900 degrees and were lined with ceramic bricks at the bottom and the coal bed was like lava. When cooled there was a by-product we called “green liquor” that would eat the leather off of your boots. If you got it on your hands it would start to burn and you would have to wash it off.

There was a spill of the green liquor that when down the 17th Street drainage. I was working off site back east deconning at the Frankfurt Arsenal when I was asked to come back to help with the green liquor spill. The cause of the spill was that the pumps weren’t working and the stuff overflowed into Silvernale pond. It turns out that one of the technicians was smoking cigars with plastic tips and throwing the butts into the area that was being pumped out and these plastic cigar tips jammed up in the pumps.

When I worked for HIM, I also worked at the sodium disposal facility. I was 23 years old and they were telling me to throw stuff in the water that had sodium on it and let it explode. We were never told if there was contamination on it or not. If something came from the SRE D&D, we wouldn't know if it was hot. I don't think anyone ever buried stuff on purpose – it may have been done by accident.

Once we had a spill of water at the RMHF when a tech left the water running and the fill tank with radioactive water in it overflowed onto the asphalt. It was handled immediately like the charge of the light brigade. I was called in at night in the rain to help vacuum the water off the asphalt that drained to the pond at the bottom of the hill. The pond did overflow into the canyon in heavy rains. The pond is no longer there – it was dug out. The pond was actually built for Building 28 – there was a drainage line direct from Building 28 to the pond. Now drainage water is pumped into a Baker tank, to 17th Street and then to Silvernale Reservoir and to outfall 18, I think. There was also a septic tank and leach field in the canyon to the north of the RMHF. In 1984, maybe 1985, they found radioactive water got into the septic system; the leach field was dug up and never replaced. The septic tank remains but it was plugged with cement.

(Regarding disposal of radiological waste to floor drains or toilets) Unless somebody had something against the company, it would only have happened by accident or neglect; it was never done intentionally. I do know that Buildings 5 and 24, the Hot Lab, and RMHF had radioactivity in the drains. The system could easily be breached. Also the HEPA vents were radioactive, but they would get blocked and then taken out later when we took the building down.

TCE was only used in Area IV for cleaning machine parts and at the Hot Lab we worked with cleaning fluids but there was no procedure or protocol to dispose of some of the chemicals. The mechanics would put some of it in a coffee can and when they were done, I think the mechanics would just pour it on the ground. I don't recall anyone dumping oil but I know asbestos was buried in the landfills. The contractors would change filters and throw them into the drainages – I cleaned them out 20 years later.

In the late 80's things started getting more stringent. Safety Health and Environmental Affairs (SHEA) started bringing people in to manage hazardous materials and wastes.

A lot of the senior techs were Korean and Vietnam war vets – mostly Korean vets. They were very protective of their areas – they had their own offices. They were not in a rush and resented it when the young guys would make the old guys look bad.

I dug out a lot of DOE septic tanks – a lot of them were breached and not properly demolished. You had to get a permit from the county to destroy a septic tank which was difficult to get. We had to show the County that we destroyed the unit and we would just punch the tops in. I know for a fact that the Building 64 septic tank was found that had radiological in it. Building 064 received radiological shipments for the SNAP program in the early 60's – that was way before my time. The building had a hot shower for decon and those drained to separate tanks. That was where they found contamination – along the lines that went to a separate tank where that water was stored. Building 100 also had one of these systems – they found minimal contamination – I tore that one out too.

Starting in 1996 I tore out a lot of buildings in Area IV and by that I mean we had a contractor who did the work and I supervised them. They had me hustling and bustling – I tore out Building 010 (first SNAP to be demolished), 012 (old reactor building), 013, 014, 020, 024 (mechanical and HEPA rooms), 030, 032, 035, 039, 042, 059 (SNAP reactor), 228, 310, 363 and the rest of the hydraulic test facility buildings, 373, 393 (the old “church steeple” building – one of first original buildings in Area IV) 483, 484, 485, 486, 487, 626 (warehouse near Building 59), 641, 848, 883, and the fuel farm (Buildings 4313, 4320, the 1.5 million gallon diesel fuel tanks [Buildings 4731 and 4732] and the whole area, the septic systems at 353 and 373, and the Power Pak at the SCTI. We did radiological surveys and collected countless samples. If there was any hint of nuclear business, we went crazy. We continued until 2004 or 2005 when we were starting on Building 024 when the stop work order came in and all of a sudden it all stopped. What is funny is that if we hadn’t been stopped, Building 024 and the RMHF would be gone by now.

Building 019 has a cell with a hydraulic piston that went 80 feet into the ground – I know that the oil contains PCBs. The piston moved the ground floor in the building up and down. I worked in Building 020 – I never thought that I would be the person to tear down my own house.

In the 80’s and 90’s we did the remote controlled torching in Building 059. In the interim I did in-service inspections of reactors and hated it with a purple passion. There were 46 people in the company including me that received over 2 rem. Not all of them are still living. I got my burn-up at other sites like Clinch River and River Bend in Louisiana – I went there 5 or 6 times.

I will say that the radiation protection group here on the hill was very good. They had a program they had us train in – it taught you everything that you needed to know. We had a protocol. I was lead person in Building 059. We could have layoffs all over the hill and they would ask people if they were willing to work in Area IV, even managers. Anyone was put through all the training – 2 weeks of training – and then put you with a seasoned tech. Even after the training there were guys that started not being able to sleep at night or were scared to death, and management would interview you and if you really didn’t want to work in Area IV, they would not force you to work there. If they ended up not working there they’d be out of a job but it would buy them 4 or 5 more weeks of having a paycheck.

Interview 279

My first job at Santa Susana Field Laboratory was in the unit that did instrumentation research and development. We were housed in the Engineering Test Building, around the corner from the SRE. Mostly we worked with instruments for use in a high temperature environment. My degree was in electrical engineering. I went on to achieve professional engineering status in instrument control engineering and nuclear engineering.

After I had been there awhile, I was chosen to be on the start-up crew for a new reactor being built in Hallam, Nebraska. I was to be a shift supervisor. In order to prepare me for those responsibilities, I worked at the L77 reactor located at the DeSoto site long enough to become licensed as an operator. Then I worked in the SRE so I could be trained on the system – which was similar to the one that was to be at Hallam.

I went to Hallam sometime during 1961, my son was about 18 months old, and I was there a total of 18 months. I served as a shift supervisor through the initial start-up, through the initial criticality. I returned to California before the reactor went operational.

After I returned to California, I worked for HKL – the project engineer for Hallam. I went back to Santa Su as an instrumentation engineer. I worked for awhile in support of a procurement for the data acquisition system that was purchased for the SCTI. I also worked on a solar energy project in Barstow and a geothermal test facility in Brawley.

My first job out of college was at the Hanford site. Back in those days, General Electric had an orientation program for new engineers. They circulated us through a variety of positions to help us find the best fit. Each assignment lasted three months. One of my assignments was in the 200 Area, where they did chemical separations. I was exposed to more radiation in that position than I was ever exposed to at SSFL.

In the 200 Area (at Hanford), there was an overhead crane that had problems because the controls had gotten wet. These big cranes were on tracks and they were used to move large items around. Operators used remote controlled tools to do their work. The crane was heavily contaminated with high levels of radiation. In those days, workers were limited to 100 millirem in exposure a day, or 300 millirem in a week. They decided we could only work for 3 minutes on any given day and no more than three days a week, without exceeding our maximum exposures. Everybody was pressed into service as it took a lot of 3-minute shifts to complete the work! Every electrician helped out. We were trouble-shooting the controls, trying to get them to work again after getting wet.

I was never exposed to that much radiation in all my years at SSFL. Of course, we were required to wear a film badge whenever we went into an area where radiation exposure was possible.

The permanent job I had at Hanford before I moved to California was in the 105 B reactor. I was the reactor engineer there. I shared an office with a reactor physicist. I learned a fair bit of physics from sharing an office with him.

My wife and I both graduated from high school in Richland, Washington, but we didn't really like the area. We decided we wanted to move and we both started looking for

jobs. I got the job with Atomics International in 1956. She was a teacher, and she found a job here too, so we moved here. I worked at the Canoga Park facility for the first six months or so, while I was awaiting my clearances. Then I moved up to Santa Su. My specialty was measuring sodium levels. I didn't get involved in instrumentation to measure exposures or radiation.

I worked with instrumentation that measured temperatures, pressures, and levels of sodium. I mostly learned on the job. Of course, I was trained as an engineer first. I did participate in safety training back at Hanford, when I was working for General Electric.

I never worked for Rocketdyne and I don't know about their operations.

I recorded everything I did in a notebook. I think I turned the notebooks into my supervisor and then I got a new one. Frankly I don't remember much about that.

We worked with liquid sodium in running our experiments. I was never contaminated by anything, including sodium.

I worked in the instrumentation laboratory, and then at the SCTI. I was involved in the procurement for the very first data acquisition system. We bought the system from a firm in Florida. I spent some time in Florida, testing the system, before it was shipped to California.

I liked working at Santa Su. Everything was pretty informal and I liked that. I never wore a tie. I was a runner and I would run at lunch. There were a few of us that ran. Occasionally we would get ambitious and run all the way up the hill to the water tank. I also played bridge sometimes at lunch; we played in Building 38. When I went running, I would see a lot of deer. I saw mountain lion tracks several times. I saw a pair of kit foxes, a bobcat, and rattlesnakes.

I don't remember handling any chemicals, except sodium. I would guess that occasionally something like trichloroethylene was probably used for cleaning, but I never used any chemicals myself. We kept the sodium in tanks. They were kept side by side and we would move the liquid sodium back and forth to test our instruments. I didn't measure radiation, just temperatures and pressures and things like that. The tanks were heated with electricity. We were cautious about everything we did.

I knew about the sodium burn pit, but I never went there. I don't know of any other places on the site that anything was disposed.

I retired in 1986. Now I spend my time riding a bicycle four times a week. I read and watch television. I spend about 2½ hours nearly every day visiting my mother who lives in nearby. She will be 104 years old on September 28th.

Occasionally we would get a leak in the piping at the SCTI. If sodium leaked out, it would cause a fire. We were all trained in what to do when something like that happened. We had some powder that we would sprinkle on it, I think maybe it was calcium carbonate, that would put it out. Sometimes we would call the fire department if we couldn't get it out ourselves. When we would get a leak, we would have to shut the experiment down, drain the sodium back out of the pipes into the tanks, wait for everything to cool down, and then fix the leak. It didn't happen often, but it did happen.

I liked working up there. It was 10° degrees cooler than the valley in the summer and 10° warmer than the valley in the winter. This is the only house I have ever owned. We bought it in 1959. I took an early retirement when they offered it to me; I was 55 at the time. The work had gotten kind of boring by then. They offered to pay me a full retirement, so I took them up on it. For the first five years or so after I retired, they would call on occasion. I would go back up there for a month or two. I got tired of doing that and stopped going back.

Some of us still get together once a month for lunch. It's good to see them and hear what's up in their lives. The years I worked up at Santa Su were good years.

Interview 280

I started working in Building 20 at the Santa Susana Field Laboratory (SSFL) in April 1959, as a Senior Mechanic, hired to open the Hot Lab after working at the Westinghouse Atomic Plant in Pittsburgh, PA. I did the same work, which including the same tools and equipment, at the SSFL as in Pittsburgh, and worked at the SSFL at AI until I was laid off in 1968. I returned to AI in 1975, and continued there until 1979. I never once worked on the Rocketdyne side during my time there, nor did I do any sodium work. While I was assigned to the Hot Lab, I also worked at the SRE, as the personnel generally worked in both locations.

At the Hot Lab, we would receive reactors and work on fuels used at the SSFL as well as by other companies, which included examining the fuel, take the elements apart, dekad, and test. There were no releases at the Hot Lab. The Hot Lab contained four cells. The front part of the Hot Lab was safe from radiological exposure, and hot items were handled behind walls with mechanical arms. The back room was where exposure was a concern.

The SRE generated power for a short time, including providing electricity to the city of Moorpark, which was the first city in the U.S. to be powered by atomic energy. I can't remember much regarding the incident when the reactor shut down, as I was not around it when the accident happened. I walked around the outside of the building afterwards, which was safe to do. All the rods in the SRE had to be taken apart at the Hot Lab, but most were intact as very few failed or broke apart. I was involved with the cleanup, which included taking things apart to clean and decontaminate.

The limit for exposure was 200 milliroentgens per week, and I received five roentgens per year for the first nine years. I wore a film badge and dosimeter every day. I also wore two coveralls, a hood, and AI-provided underwear, socks and shoes. I was tested for contamination every day before leaving work. We were well protected, both from the standpoint of protocols and gear. To my knowledge, no one ever got sick from radiological exposure while there.

I got rid of stuff a couple times at the Sodium Burn Pit, when contaminated sodium needed to be processed. I did nothing with a conservation yard.

We used TCE for cleaning, for wiping down items with small amounts. After wiping, we disposed of the rags into containers in plastic bags which were taped, put in a barrel, and sent off site as low level contamination.

The documentation I mainly did was with a Polaroid camera, from which also inspections were made. Logs on each experiment were kept, which went to the engineer on the project, who used it to write the report.

I had no experience with or knowledge of liquid materials disposed in toilets of floor drains; a surface disposal area at the western edge of Area 4; any of the leach fields, septic tanks or drainage discharge locations; the old conservation yard; any storage tanks or gas holdup tanks; fuel element cleaning areas; or problems with underground pumps, sumps, storage tanks, piping, sewer or drainage systems.

Due to the nature of government contracts, every December there were layoffs, and every January hires. This was a good place to work, I enjoyed it. I met a log of big shots, worked with some interesting people, and saw a lot of wildlife including mountain lions and deer. I either ate off the lunch wagon or brought my lunch from home.

Interview 285

I started working for North American Aviation, Atomics International (AI), at Downey under JKN in 1955. I had just graduated from the University of Wisconsin, Madison with a Master of Science degree in Metallurgy. Most of the time I was in AI's Fuels and Materials Group, which was a separate department from engineering. We reviewed drawings, specified fuels and cladding, and built and monitored experiments. I worked on the SRE for 6 months at Canoga Park. We were a collection of people out of universities, government labs, and the military. We built our facility in Canoga Park and moved in. Things got tighter as we went on – there was a fairly large contingent from the west at AI.

I worked as a Junior Engineer under OPS and PQT; we were doing experiments on fuel fabrication at the SRE. We were looking to develop fuel for Sodium Graphite Reactors like Hallam. We alloyed fuel and put in a bunch of experimental alloys. The thorium enriched with uranium was carefully measured as to densities. We took the assemblies apart in the SRE hot cell. After irradiation we got one out before the incident. There wasn't a lot of burn-up – 11 percent or approximately 1,000 Megawatt-days per metric tonne (MWd/t) – almost the same timing as the accident. We were also responsible for the much maligned thermocouples and putting them inside the reactor. I can remember sitting on the face of the reactor – on top of the shield plug making measurements. We were in the Fuels and Materials Group that was not part of Operations – they were King and we had to be careful how we interfaced with them. They ran a tight ship. The groups had a certain amount of rivalry and we had to go through channels. PQT was group leader of the Fuels and Materials Group and UWV was the group lead of Operations. We had training to suit up – we had to go through a change room. We learned how to put on the proper equipment and put on a dosimeter and a monthly film badge that also had a neutron dosimeter. If we were working on the face of the reactor or in the hot cell, we were monitored going in and coming out. I was impressed that I was being well taken care of and that we were following proper procedures.

We didn't have any cowboys – everyone knew what to do regarding their own work, but the standards then were a lot looser. The exposure limit in the Hot Cell was less than 3 rem per year; today it's about 10 percent of that! I never got too close to any radioactive waste. Anecdotally, I understand that some of the contaminated sodium got out into the Sodium Burn Pit way on the west side of Area IV.

The Hot Cell and the Plutonium Facility (Nuclear Materials Development Facility [NMDF] Building 55) and Building 6 were part of Materials Engineering. The Plutonium Facility was a fully licensed fuel fabrication facility. We were trying to get qualified – and I think we were – to make the fuel for the Fast Flux Test Facility in Hanford, Washington. You couldn't do that today in Los Angeles! We lost the bid to Kerr McGee, but we did some work to do mixed carbide fuel – plutonium and uranium carbide – as an experimental fuel for a fast breeder reactor. We stayed active in the sodium reactor business. We also had a big engineering effort as part of Clinch River. We were looking at high temperature fuels that also had high thermal conductivity. But we didn't get beyond the kilogram quantities. We did have security and fencing that we also needed in order to get qualified.

I was the manager for the Hot Lab, the Plutonium Facility, the D&D of the SRE, Building 6 and Building 5 (across the street from Building 6) that had originally been a fuel fabrication facility. We used it as an experimental molten salt combustor that was non-radioactive. There was a molten salt reactor at Oak Ridge National Laboratory (ORNL) and some of the guys that came out from ORNL pushed it, but it was a loser. We gasified the coal with molten salt in a mini-foundry. We would heat a pot of molten salt and took waste x-ray film and combusted it – silver went to the bottom and we would recycle the silver. The Building 6 operation had offices and sodium loop experiments that stayed with AI and didn't go to ETEC. There were a few loops running there. A larger combustor was built into which we put coal and molten salt and got combustible gas – very similar to a fluidized bed.

In the early days most of our documentation was in the form of Quarterly Reports to the AEC which were a big deal as most everything in those days was classified. The Quarterly Reports had to go out on schedule, but the topical reports could be issued later. In some ways the Quarterly Reports were more complete than the topical reports and were a pretty straightforward account of what happened.

Going back to the fuel incident at the SRE – I was either up there or close to being there when they tried pulling the fuel rods out – none of us ever thought that we had catastrophic melting of the fuel. By the way, I recall that they had a good timeline of the SRE at the meeting last year in Simi – it was very good and I would not argue with anything on that timeline. Anyway, we figured out that we had gotten to the eutectic temperature – the data was there, there was a book of phase diagrams from Argonne. Throwing in the chromium got the eutectic formation temperature down to 1,200 degrees. We weren't concerned with calculating what fraction had escaped. Nothing dangerous had gotten loose that would have affected anyone in the area and as I recall it wasn't a secret. We made something available to the newspapers and no one ever told us to keep it a secret. I remember the young engineers wrote a song that went something like this: "On top of old Susie – all covered in rust, there was an old reactor that must have gone bust." If we had looked at the data more closely we might have gone more slowly, but we didn't think it was particularly damning to the public. And it just did not seem like anything out of the ordinary.

I can't think of any circumstances when someone would try to hide data. Now KMN was in charge at the time and he was a good scientist. I was impressed that they did a good analytical job of monitoring. Later on I looked at the Environmental Impact type documents that we had to do for licensing. I reviewed the Hazards Analysis documents where they analyzed worst case releases and what would have gotten down to the water table.

Not too long after the SRE accident – I was reassigned to be the Project Lead on the SNAP 10A power conversion system – the one that we flew into space in the mid-60s. This involved a lot of travel. My involvement at SSFL was limited to SNAP 10A prototype test and assembly of the thermoelectric power conversion system rather than the reactor. We were more projectized than departmentalized. During this time I had friends who put together a major fuel fabrication facility at De Soto where they built fission fuel for the EBR-II (Experimental Breeder Reactor-II) using the same injection

casting into the tubes. We were licensed to build fuels and also ran a water boiler research reactor that they tried to sell to the University of Tehran!!

NOR was chief con-man of the neutron rays (N-rays) and research reactors. MNQ was in charge of Quality Assurance for the X-ray facility. This was the industrial side of the business. The N-rays were opaque due to the resins and organics for which the X-rays worked well, so we had a complementary capability to perform Non-Destructive Assay (NDA).

After SNAP 10A flew in '64 or '65 it wasn't a secret as it was reported in Time Magazine. It was the first operating power reactor system in space and the Russians copied it. Ours is still up there – we put it in a 3,000 year orbit. It was a criticality test on the SNAP – it was put into stable orbit and then the reflector controlled reactor was started up. It generated power for electricity and not for propulsion. It ran for 60 days and the Lockheed voltage regulator blew off the reflectors and shut it down – it did what it was designed to do.

I stayed active until about 1970 when I went back into the Fuels and Materials department. I was responsible for materials engineering. My group did fuels and failure analysis of what went wrong with the OMRE (Organic Moderated Reactor Experiment) that was similar in many ways to the failure of the SRE. It was a reactor similar to the submarine simulator up in Idaho. It used fuel clad in stainless steel plates similar to submarine fuel. The radioactively enhanced organic material formed a clinker but the oxide fuel was dispersed in the stainless steel plates. Nothing melted, but it was distorted and we couldn't get the fuel out of the reactor. It was shipped to the Hot Lab where extremely responsible and conscientious people were able to take it apart.

I was responsible for fuel evaluations from the SRE, OMRE, Piqua, Hallam and we ran experimental tests at Vallecitos in Pleasanton, CA. I was in Engineering then and not in Operations.

There was another reorganization, and as part of my group we picked up the Hot Cell and the Plutonium Facility. I was responsible for getting the Plutonium Facility operational and for the management of both. We did safety drills and inspections. At staff meetings we would randomly choose a facility and make sure that they had brush cleared, and other safety concerns addressed. We did get the plutonium facility licensed.

CEF was a jewel. He was very conscientious and well respected and wanted to do things the right way. RSV was under STW in research – he was a good operational technician. In the mid-70s we got involved with the D&D (decommissioning and demolition) of the SRE. In the mid 70's I got moved to SSFL and what facility that was Al's that wasn't in ETEC got put under me: Building 6, Building 100, the Hot Cell, the plutonium facility, RMDF, and coal gasification. For a while I managed a Rocketdyne test stand at the Bowl Area in Area I where we did coal gasification tests. The big, old vertical test stands gave us the height needed for the new gasification facility. The TCE that they used to wash down the test stands after a rocket engine test ended up in the lenses of water underneath the site. In the Safety Analysis Reviews (SARs) they always claimed that there were "isolated lenses" of groundwater under Santa Susana and down in Simi.

The D&D of the SRE was not an ETEC deal. We were under contract to the government but weren't as captive as ETEC was. ETEC was run pretty tightly by the government. We developed the plasma cutting technology used to cut the SRE vessel apart. After it was cut apart, it was shipped to Beatty, Nevada for disposal. The fuel handling machine from the SRE was also being shipped to Beatty and a California Highway Patrol (CHP) helicopter pulled the transport over. We heard over the radio the CHP thought that a large rocket engine was being transported through the Antelope Valley and they didn't think we had the proper transport license. We thought that we were taking the SRE down so that you could put a kindergarten school there. When we suited-up and taped-up we would have horrible fights about whether you could qualify a person with a beard!

I was also involved in the D&D of the old SNAP buildings and clean-up of the sodium burn pit. Sometimes the health physicists (HPs) would snoop around and find a little bit of cesium there and then it would be excavated. My reports were internal through the HPs - they weren't widely known records. My recollection is that the HPs kept very good records and when you did work for the government it was very well documented. They also trained the radiation workers at the hot cell. At all times the HPs were competent and had authority when working directly for Management. During later cleanups all records went into the HP files and where they are now I have no idea but they may be at the library at SSFL.

There is a canyon beyond ETEC to the north – directly north of the plutonium facility at the edge of ETEC – over and down the canyon, where no radionuclides were found but they did find a lot of asbestos (apparently referring to the Building 56 landfill).

We shipped the fuel from EBR II in Idaho to SSFL where it was opened up and we de-cladded the fission pins that were bonded with sodium to stainless steel cladding. We cleaned the pins with alcohol, repackaged them, and sent the fuel back to Idaho for reprocessing. We did some other de-cladding and repackaging of fuel that was used commercially. Molten salt reprocessing was never anything major. IJN was the head of the research department. We went to society meetings and would talk about fission reactors, plasma T, superconducting radionuclides, and other developing nuclear technologies.

I retired in 1987. We finished D&D of the SRE and the Sodium Burn Pit, but the Hot Cell was still operational. We may have already surrendered our license for the plutonium facility. Actually most of our work was taking our technology and expertise around the world to do in-service inspections of reactors. We were peddling our instrumentation and the associated software which as close as I can tell, the electronic geniuses could make signals out of noise. We were hanging out doing D&D for other places.

A guy that knows a lot about the Hot Cell stuff who started there on Day 1 was RST. No one has been able to make contact with him for a very long time. He doesn't like to talk about this stuff anyway.

I was really happy when I got assigned up on the hill because I wanted to quit smoking and I was overweight – so I just started walking all over up there. I would really hate to see them destroy any of the rock art – especially since it is a solstice site.

Interview 288

I started working at the Santa Susana Field Laboratory (SSFL) in 1961 as a Senior Engineer and Research Scientist, and was employed by AI until 1979. I started in reactor shielding (manufacturing and testing), and also worked in Building 41. I developed a means of cleaning sodium pumps with alcohol. I also worked at headquarters on DeSoto, but 75% of my time was on the hill. I have a BA and MA in Chemistry.

All reactors need radiation shields to prevent leaks, and we did the fabrication out of lithium hydride, while testing of the shields was conducted by others. The reactor shield fabrication would require constant monitoring of 40 to 60 hours. I was on Technical Staff 5 where I supervised at times between three and six persons.

I examined an irradiated shield, the Snap 10A shield, and was fully protected with proper clothing and a Scott air pack. I took a sample of the shield as part of the examination. I wore a film badge and dosimeter on this assignment, which occurred perhaps halfway through my time on the hill. It took approximately 20 minutes to examine the shield, which took place in a pure nitrogen environment in the hot cell. AI had made the shield for the Snap reactor, which was the size of a breadbox. The radiation was localized to one or two buildings, which names or numbers I cannot remember.

I handled all kinds of chemicals, working a lot with Teflon, solvents, alcohols, sodium, potassium, lithium, etc. I think we used trichloroethylene. There was a lot of work done with mercury in building 41.

I created many reports, perhaps 1000 between my work at AI, GE and Oak Ridge. We kept secret notebooks in the earlier days, but I don't know what became of them. We documented procedures as we created them, noting every step taken so that they could be duplicated. I did it the first time then trained others on the process. We had safety training all the time, being provided by Health Services and Security Services.

I drove my own car to the hill and parked in the areas where I worked. It was not very crowded during my time there. For lunch I either brought my own meal from home or bought from the roach coach. There was no cafeteria in the area, but the conference room doubled for an eating area. Some people pitched horseshoes during lunch. I saw a lot of deer up there. I remembered a big buck would stand on a hill of ice plant with a dozen or so does around him. I didn't see many snakes, but there were a lot of rabbits. There were occasional wildfires in the area.

I remember the Sodium Burn Pit (SBP) as a place where sodium on parts was hosed out. In the early days, we cleaned lithium hydride in the same way, which ended up leaking down to a nearby farm. There were cows at that farm, and their owner detected lithium in the milk, necessitating a change to where lithium hydride waste was shipped out.

There was not too much in polluting around the SSFL.

I was in charge of the conservation yard, which was an approximately one-acre junk yard where scrap was stored. Also stored there was potassium, which was dangerous

as a metal. Every once in a while it would rain, and the drums would rust, causing potassium to leak and cause a fire. Other drums had NAK. There were drums where the labels were unreadable due to the elements, which I had no idea regarding their contents. The fires were common, occurring perhaps once a month. I remembered an area of the yard marked "Potential Radiation" for items that were not heavily irradiated, primarily surface radiation.

I had no experience with or knowledge of liquid materials disposed in toilets or floor drains; a surface disposal area at the western edge of Area 4; any of the leach fields, septic tanks or drainage discharge locations; any storage tanks or gas holdup tanks; fuel element cleaning areas; or problems with underground pumps, sumps, storage tanks, piping, sewer or drainage systems.

Interview 290

I started working at the Santa Susana Field Laboratory (SSFL) on 1-13-64 as a forklift driver, hired from the AI headquarters on DeSoto. I worked exactly 35 years for the company, retiring on 1-13-99. During my first three or four years I had 13 different job classifications. Of the time I was employed with the company, I worked perhaps a year to a year and a half down at the DeSoto plant; the rest of the time was on the hill, specifically the AI side of Area 4. I was in the UAW for nine years, after which I went into shift leader or operations engineer (OE).

Some of the positions I had included the shift leader or operations engineer over five different test facilities at the same time. I also was OE in charge of the daily operations at the Earthquake Test Lab at Building 13, which at that time was the largest earthquake test facility in the world. While in that capacity I wrote operational procedures, did testing, oversaw equipment and daily operations, etc. I spent 20 years in Building 13.

I spent 11 years in Building 356, which was the SCTI. I also ran the water loop as the OE, in a building whose number I can't remember, known as the HTF.

All my work was sodium non-nuclear, with no responsibilities relating to radiological materials or waste. I wore a film badge during my time as a forklift operator, such as when entering the RMDF. I hauled spent fuel rods from the SRE to there, as well as other radiological materials. I was aware of the SRE meltdown but had no experience with it, beyond hauling out the fuel rods. I was aware of no significant releases, and I never had a daily burn out from radiation exposure.

There was a disposal facility, near the SRE, that was used to clean minor sodium components from Area 4.

We had a lot of training, probably between four and eight hours per week during the last 15 to 20 years I was there. The training was always different and was on topics such as health and safety, firefighting, chemicals, etc. We were always very conscious of what we were working with. I spent around one week per year in chemical response training and was 40-hour responder certified. The more training we had in different areas made us more useful to the company.

I was a certified crane operator instructor, providing instruction to others there. I was certified by OSHA and CAL-OSHA.

We were required to document everything and to maintain a lot of logs. I didn't keep any of them, but I do have several photographs from my time there.

I was in and out of the Conservation Yard three or four times a day as a forklift driver. There were items there, scrap, that also came from the DeSoto plant. The items were scrapped out to different dealers with best prices. There were no hazardous materials at the Conservation Yard to my knowledge.

I was involved in the initial clean up and remediation of several areas, including Building 59, Building 19, the SNAP 8 test reactor and the Chemistry Lab. I never worked at the SNAP otherwise except as part of my forklift duties.

I handled hazardous waste during operations of different test facilities. These included oils, trikes, alcohols, sodium, sodium potassium, etc. We were responsible to package it and have it hauled off. I never handled propellants.

There was a pond in the area that generally received runoff from various areas around the SSFL. Someone put some goldfish in it. The goldfish never died, so it couldn't have been too bad.

At Building 463, CHCF, we had tanks with ethanol and dowanol for cleaning of sodium components.

I hauled and treated items at the Sodium Burn Pit. I recall mercury being taken there, but I don't know what they did with it. I recall sodium components taken there for cleaning, and NaK in cans that was disposed by shooting them with rifles and letting them leak to the water. LA County Fire Department also brought items, such as a cyanide cylinder, which was chained down and had the top shot off.

Sodium leaks happened on occasion. I remember several at the SCTI, which caused a lot of damage.

All the rods in the SRE had to be taken apart at the Hot Lab, but most were intact as very few failed or broke apart. I was involved with the cleanup, which included taking things apart to clean and decontaminate.

I had no experience with or knowledge of liquid materials disposed in toilets or floor drains; a surface disposal area at the western edge of Area 4; any of the leach fields, septic tanks or drainage discharge locations; any storage tanks or gas holdup tanks; fuel element cleaning areas; or problems with underground pumps, sumps, storage tanks, piping, sewer or drainage systems.

I had a great time working there, I loved it. I felt confident in the training and safety. The environment was enjoyable too, with 100 head of deer, coyotes, bear, cougars, bobcats, and many rattlesnakes.

Interview 291

I worked in Building 38 at ETEC in the Technical Services Division (TSD) from 1978 to 1988. I processed, distributed, and released engineering and administrative documents. The engineers would write their specifications or document and after it was approved by their manager, we would check for the proper signatures. I have no idea what happened to the logbooks, but I have been gone from there for over 22 years. The project manager would issue the proper documents to release into the system. They would determine the proper distribution and then come back to us. We went by their list.

I also did some work in telecommunication, faxes, filling in whenever the full time person was out of the office. I was also alternate lead for several years and would cover for the lead whenever she was out. In 1985/86, there was a cutback in personnel and we were down to just two people and I covered most of the functions in the TSD for our area. I would also do computer work at some of the other facilities. I didn't know a lot about what was going on. I realized in later years that there were areas where there was radiation, but I didn't know that when I was hired. The technical things that I learned about, that I was exposed to, were very interesting. I kind of figured out what was going on. I believe that I had a Q clearance, but when I asked questions, I may not have gotten the correct answer because it was probably classified. I had several assignments – one was in Bethesda, Maryland – I can't really go in to what it was about.

I interfaced between the administration and the technical staff. That is how EHI and I met. I enjoyed the work and met a lot of nice people. It was a wonderful experience in my life looking back on it. Women were treated fairly well. I was treated fairly well when it came to raises. There was only one time when I questioned a raise and it was explained to me in terms of budget.

I did have a position that required a lot in how I handled different types of situations regarding documents. I would contact people to correct a problem with a document and then it would be re-submitted properly. The paperwork that was submitted had to have the titles verbatim. I had to call the submitter to make any corrections; I couldn't do them. I also worked a lot with the copy and blueline machines.

Interview 293

After receiving a degree in Physics, and went to work at Rocketdyne in 1957. During the next 17 years, I worked on the preliminary design and engineering of many rocket engines. In 1974, I was assigned to Atomics International (AI) as Director of Research and Engineering. That office was located in Canoga Park, but had authority over engineering activities conducted by AI at Santa Susana Field Laboratory (SSFL), including decommissioning and cleanup projects.

In 1980, I was named the Vice President and General Manager of ETEC. In that position, my office was at the SSFL. ETEC was a Department of Energy (DOE) facility and my responsibility was to assure that the DOE operational and test objectives were achieved.

In 1988, I left ETEC to become Vice President, Strategic Technology. My office was moved, but still at SSFL. I remained in this position for 4 years. In 1992, I was named Vice President, Advanced Programs. Although this position still had responsibilities for some activities at the SSFL, my office was not at the site. I retained that assignment until my retirement.

In summary, during my nearly 40 year career, I spent about one third on site at SSFL and another third offsite with responsibility for numerous Field Lab activities. The work was varied and interesting. I believe we did much to advance the government's objectives in space, defense, and energy. I am proud that I had a part in it. I am also proud to have worked for a company and management that took its responsibilities and commitments seriously. The commitment included environmental matters. Throughout my career, the attitude was "comply fully with requirements, spare no cost or effort."

Originally, the Atomic Energy Commission established the Liquid Metal Engineering Center (LMEC) to do non-nuclear engineering and test work on liquid metal components for fast breeder reactors. When DOE replaced the AEC, that work continued. The LMEC name was changed to ETEC and the scope of activities was expanded so that ETEC's skills could be applied to a wide variety of energy sources.

ETEC was increasingly used by DOE to do three things; engineering, construction management, and project management. That's what we were good at. At one time we were helping DOE on 500 solar and wind projects around the country. We even had an office in Denver that was focused on DOE's oil shale work. We would evaluate cost estimates developed by contractors. We excelled at managing large projects. At the end of a project, we would often come in with actual costs that were within 1-2% off the original cost estimate. It was not unusual for other DOE sites to overrun their estimates by over 100%.

ETEC has the only facilities in the world for testing full size liquid metal steam generators and pumps.

The steam generator is the most critical non-nuclear component in a breeder reactor. DOE had to be certain the designs were very reliable. This was achieved by testing these units for thousands of hours. We tested the Clinch River steam generator, a Babcock and Wilcox steam generator, and a Japanese steam generator.

One innovation that greatly reduced the cost of these lengthy tests was the cogeneration project. A steam generator test involves heating sodium and transferring the heat to water to produce steam. So why not use that steam to run a turbine and generate electricity? It would be enough electricity to power thousands of homes. Southern California Edison agreed to purchase the power and DOE approved the project. The results were very positive; DOE saved many millions in test costs and a large amount of electricity was added to the local grid.

I remember one fun job. DOE had done some research into the possibility of generating energy using ocean thermals. They wanted to test the heat exchange for this energy source and asked us to do this. We bought an old Navy tanker, had a shipyard in Oregon modify it, and then we anchored the ship seven miles off the coast in Hawaii. We purchased long plastic tubes to handle the cold and warm water. Some were a half mile long. They could sustain a flow equal to the flow rate of the Mississippi River. We hired a crew to run the ship. They did an excellent job operating the ship around the clock. Our small testing crews worked round the clock. They would spend two weeks on the ship, and then some time on shore. The ship was out there about a year; it only needed to move during a really big storm. The two best places in the world that can use ocean thermals to power a heat exchanger are Hawaii and the Virgin Islands. These locations have sufficient difference between the surface temperature and the temperature at a reasonable depth.

EETEC was a great place to work. I attribute a large part of our success to ILM who managed the site before me. He was ex-Navy guy from Annapolis and had worked at one time for Admiral Rickover. He saw to it that our operations and activities were well procedurized.

The book of procedures made it very clear what each person's responsibility was. We had weekly meetings to review status of our projects. Everyone knew what they were expected to do. As result of the procedures and the clear expectations, everyone cooperated. If someone was having a problem and they came to the weekly meeting saying, "I am having a problem" or "I am falling behind," often someone would volunteer to help.

Twice a month, I held vertical staff meetings. About fifteen people that were randomly selected, representing every level of the organization would attend. Different people were invited each time so in two years the entire staff would attend at least once. Those meetings were a good way to make sure that everyone had a good source of information. So much time and effort can be lost when people worry needlessly over rumors. The vertical meetings provided a reliable source of accurate and up to date information. People knew they could rely on what they learned at those meetings and attendees could and did bring up any subject. Each question was answered, if possible, on the spot, but if further research was necessary to get an answer, the inquirer would get an answer later. People were anxious to attend those meeting.

The work that we were doing often required testing 7 days a week, 24 hours a day. Shift work was required. The nature of these shifts was governed by a long standing union contract. I was concerned how the work schedules impacted our people. I did some research into circadian rhythms and decided that the way we were scheduling

people wasn't really the best way to do things. It could impact the physical and mental health of our staff. We hired some independent experts to come in and lecture our staff on circadian rhythms and methods to minimize the effects of shift work on health. I then asked the union folks to get together and devise a better shift schedule, based on what they had learned from the experts. The staff picked three alternatives and voted to select the one most favored. We pursued this new shift plan with the constraint that it should not cost the government more to run the test with the new plan. We found out that implementing the new plan under the existing union agreement would be expensive, but after some negotiations with the UAW, the new shift plan was adopted.

I loved working at ETEC and I loved my job.

In response to your questions:

1. Logbooks were not used at ETEC. Test results were documented and delivered to the customer
2. I possessed a film badge, but only wore it occasionally for visits to some non-ETEC facilities.
3. I have no historical knowledge about the sodium burn pit.
4. In the 1970s, the Idaho lab conducted a sensitive gamma radiation aerial survey of SSFL. This could reveal unknown radiation sources. As I recall, there were no surprises.

Interview 302

I started working at the Santa Susana Field Laboratory (SSFL) in 1960 for AI as a Senior Mechanic while I was attending school. I subsequently became a Technician, and when I graduated, was promoted to Project Engineer. I worked at the SSFL until 1965, was transferred to other AI facilities, and then again from 1970 to 1973 as a Design Engineer. At all times at the SSFL I was employed in Area 4 by AI.

My job as a Senior Mechanic was assembling equipment to be tested, worked with control rods and filled out daily reports and weekly reports for the project engineer. As a Technician I was more involved with development, taking designs and oversaw assembly of equipment and test plans, confirming results, and making necessary changes. I worked on mechanical equipment for reactors.

As a Project engineer, I was the principal engineer on the design and fabrication for the Advanced Epithermal Thorium Reactor (AETR) Experiment. I also oversaw the testing and installation. As a Design Engineer, I worked on sodium loops as a roving engineer, doing piping maintenance on the loops, re-designing when needed, analysis, and testing of sodium pumps, valves and instrumentation. It was mostly maintaining or modifying existing loops.

During the 1960s, I cleaned up the SRE, worked in sodium labs, and worked on the SNAP program. When I was hired, I went immediately to cleaning up the outside of the SRE, which was typical for new hires as those employees doing that job got burned out pretty quickly. I moved equipment that had low levels of radiation as well as irradiated tools, piping and clothing. All the contaminated materials were boxed up, but I don't know where it went.

I was around radiation many other times and wore a film badge and dosimeter. I never received any high doses, but was well within maximum exposure limits. If I was designing something for an existing lab, I had to visit the lab to look at what I was to design, which at times was in hot areas. I did fill in work on the SNAP, including testing of materials to determine applications in areas of use.

I had to wear protective gear on occasion, such as during cleanup at the SRE and when in the SNAP building. I wore full gear except for respirator, which included whites, gloves, hard hats and glasses.

I worked on the AETR Experiment, where thorium was used as a moderator. It was strictly experimental, and was located between the Sodium Lab and the Sodium Burn Pit. (I worked on remote handling equipment and not the actual experiment- building and testing only.) There were no radiological materials at the AETR at that time. The project last approximately 12 to 18 months.

I worked on the Clinch River Breeder Reactor Program during my time at the SSFL in the 1970s, which was a fast breeder reactor. I continued on that program after transferring to DeSoto, and then when transferred to Hanford Rockwell in Washington.

I carpoled with two or three others from Canoga Park, and parked right at the building where I worked. There were no buses when I worked up there. I was assigned to the day shift, but there were some days when we had long hours on site while on control rod testing. Those tests were run 24-7.

I did design work for those working at the Sodium Burn Pit, which was a shield to protect workers doing cleanup. I didn't work there, but I witnessed cleanup activities. There were barrels of sodium waste dumped in the pond at the Sodium Burn Pit and allowed to burn, and there were low levels of radiation there as well.

We had regular safety training conducted monthly by safety experts, which included films and lectures. These were group meetings. There was general training specific to equipment or lab, such as sodium handling, but no real training for the specific jobs we did.

We used solvents such as TCE for cleaning small parts, including valves and fittings. They were cleaned in a bucket of TCE, and blow dried afterward, prior to assembly. Old solvent was stored in 55-gallon drums and shipped off site. We were told not to dump the spent solvent. We had a vapor degreaser in the lab, but I never used it so I was unfamiliar with it.

I used a lot of equipment from the Conservation Yard, including stainless steel valves, pipes, etc. I don't know if there was any contamination there.

I had no experience with or knowledge of liquid materials disposed in toilets or floor drains; a surface disposal area at the western edge of Area 4; any of the leach fields, septic tanks or drainage discharge locations; any storage tanks or gas holdup tanks; fuel element cleaning areas; or problems with underground pumps, sumps, storage tanks, piping, sewer or drainage systems.

My best years at AI were on the hill. We were working with new and advanced technology, the facilities were state-of-the-art, I enjoyed the people I worked with, it was just a fantastic place to work. I occasionally walked the surroundings at lunch. There was no cafeteria, but there was a small kitchen with a radar oven. Most guys brought their own lunch. The craft people, who worked more outside, pitched horseshoes, played catch with baseballs, and did other similar activities. Some guys went running during lunch, and there were showers for them. I played cards quite a bit, such as hearts, bridge, etc.

Interview 303

I started working at the Santa Susana Field Laboratory (SSFL) in March 1953 as a Development Engineer, testing gas generator components. I worked under Combustion Devices, which included Gas Generators and Thrust Chambers, spending my time in the former. I never worked at AI, but spent my time in Research and Development while on the hill. I knew that AI and Rocketdyne were in separate areas, but I do not know their specific areas. I never worried much about activities at AI. I worked in the PTCC, or Propulsion Test Control Center, most of my time there, which was near the bowl. We test fired hardware to see if it would blow up. We tested gas generators in the cells, and we tested different fuels, such as MMH and one of the nitrates. I spent two years initially on the hill, one down at Canoga, and then a final year up on the hill, where I supervised Gas Generators and Systems, which included 30 engineers and technicians. While on the hill I seldom went to other test stands; I just stayed at the PTCC.

All transportation on the hill was with government vehicles, assigned one car to every two or three workers; there were no buses. Personal vehicles were parked by the office building.

We developed the fuel RP1, which we used with liquid oxygen. RP1 was a special cut of kerosene developed there by a research chemist.

We used TCE as a cleaner. We did not use as much as was used down at the Canoga plant, but we used as much as we needed. Components were worked on above a floor grate so that chemicals could drain down and out of the building to a pool that was below the PTCC and test stand. The chemicals were generally additives, fuels and solvents. Contractors were engaged occasionally to clean out that pool. The Bowl area was used for the storage of chemicals. I recall something smelling awful at the test facility, and I learned that Research had dumped a vat of fluorine.

Things would blow up at the Bowl during tests sometimes, and I recall that it would send parts and debris over to the tents at AI. I remember something blowing up at AI, which caused a fine sodium mist to spread around the SSFL, including on some cars. I was told that AI paid for paint jobs on six cars. We were later told that was from a reactor blowing up.

We built a version of the German V2 rocket engine, which used LOX and alcohol, which became the Redstone Engine.

We did not keep any daily logs, but we wrote reports by the hundreds, including weekly progress reports. I believe those ended up at the Redstone Arsenal. The reports were often used to advise higher ups of developing problems.

I never had to use a film badge or a dosimeter. Protective clothing included rubber gloves and a hard hat.

The training was primarily a facilities oriented indoctrination. There was no program or book for safety, but everyone was alert for safety, even without formal training. There was a lot of practical concern for safety. The Lead Man was a very responsible position and would often ensure safety.

I had no experience with or knowledge of liquid materials disposed in toilets or floor drains; the Sodium Burn pit; a surface disposal area at the western edge of Area 4; any of the leach fields, septic tanks or drainage discharge locations; the old conservation yard; any storage tanks or gas holdup tanks; fuel element cleaning areas; or problems with underground pumps, sumps, storage tanks, piping, sewer or drainage systems.

There was nothing beyond the Bowl but deer, coyotes, rabbits and rattlesnakes. The SSFL was far better than working in an office, as there were animals all around, trees, bushes, etc. I liked it up there. I ate lunch in the cafeteria there. It was non-union. It was very challenging working with combustion science, chemistry, high stress tests, etc. I worked with a very sharp group of people.

Interview 305

I started working at the Santa Susana Field Laboratory (SSFL) in early 1957 and continued, with an interruption of 2 years (1969 - 1971), until 1992 when I transferred to Advanced Programs at Rocketdyne. The first 12 years were spent in Rocketdyne Engineering Test initially in support of testing ICBM and IRBM engines (Atlas, Thor, and Jupiter), later in support of testing Apollo engines and other deep space engines. I started on the test stands in operations and equipment. There were 19 large engine test stands at one time. I worked on the J2 and Apollo programs.

The 21 years from 1971 to 1992 were at LMEC/ETEC in Area 4 of SSFL, where I worked in support of the Liquid Metal Fast Breeder Reactor (LMFBR) program. LMEC (Liquid Metal Engineering Center), later renamed ETEC (Energy Technology Engineering Center) was a center for testing components for the liquid sodium systems that would be needed to support the LMFBR program. LMEC/ETEC was not a reactor facility, but was co-located with nuclear operations of the Atomics International Division of North American Aviation (later merged with Rockwell Standard to become Rockwell International).

My work at LMEC/ETEC involved heat transfer analysis for component test. I progressed to Project Engineering work, 1st line management in Engineering, and lastly in new business acquisition. I worked on the design of new test facilities as a liaison with the design/construction contractor (Holmes and Narver), my Engineering unit provided system support to the test facilities. To acquire new business I was in contact with DOE labs (Sandia, Los Alamos, INEL, FTF), Kirtland Air Force Base, and EPRI (Electric Power Research Institute). I was part of a team that worked on the acquisition of the cogeneration system for our steam generator test facility. The cogeneration system provided about 30 MWE to the SCE grid for about 5 years (I may be off on the total time). I was also instrumental in acquiring the Kalina Cycle (using ammonia) pilot plant that was tested in the ETEC steam generator facility.

My work with the Russians occurred after I left ETEC.

During part of my stay at ETEC I had a DOE "Q" Clearance.

I also worked on facilities construction at ETEC, specifically with the design contractor. My involvement was primarily at the start of construction projects.

From 1992 to 1996, I went back to Rocketdyne.

In terms of documentation, I didn't do any logging, but I created a lot of progress reports and documentation. I retained only a few reports that I created.

I went to the SRE only a few times- it was a big store room. I didn't handle any radiological materials, but I wore a film when needed, such as when I would go to the hot lab once in a while.

I had nothing to do with the Sodium Burn Pit. I walked by it many times and sometimes saw dead rats floating in the water.

Protective gear that I wore was limited to a hard hat and safety glasses.

I used TCE to clean parts while at the equipment lab, as part of my early training program. TCE was used to flush engines in the Areas 1 and 2, after testing, and it went to the ground after flushing.

The Conservation Yard was also known as the Bone Yard for people to get stuff out of. There were Conservation Yard in Areas 1 and 2.

There were always training classes being held, including health & safety, technical, business, conflict of interest, etc.

I had no experience with or knowledge of liquid materials disposed in toilets or floor drains; a surface disposal area at the western edge of Area 4; any of the leach fields, septic tanks or drainage discharge locations; any storage tanks or gas holdup tanks; fuel element cleaning areas; or problems with underground pumps, sumps, storage tanks, piping, sewer or drainage systems.

It was a great place to work, especially at ETEC, which had a nice work environment. Rocketdyne hosted heads of state there and ran engine tests for them there. There were herds of deer, raccoons, birds, snakes, squirrels, rabbits, etc. It was a lovely place.

Interview 306

I started working for Atomics International (AI) in February 1959. My first office was near the AE6 reactor building. Later on I had an office in Building 100. I did tests using reactors in Building 9 (OMR/SGR Critical Facilities), Building 100 (Advanced Epithermal Thorium Reactor), at the AE6 reactor, and Building 24 (a SNAP test facility). There was a hill between the reactors and my first office. My office building was corrugated metal with 6 or 7 offices in it.

I wasn't involved with any chemicals—it was all radioactive materials. If it was a test reactor like they had in Building 100 or Building 9 (OMR/SGR Critical Facilities), other people would assemble it, then I would run tests. In some of the tests we put foils in the reactors, irradiated them and then took them out and put them in counters to measure the radioactivity. We would then draw conclusions about the materials and the way the reactor behaved during operations.

In Building 100, the reactor had 3-foot long by 2-inch square drawers. The fuel was in the form of plates about 1/8-inch thick and we would stack materials in the drawers and build a spherical configuration. At one point I was working with a detector that was a small hollow sphere filled with gas, which was connected to electronic instrumentation. We would run an electrical signal out of the reactor into an instrument room to an electronic detector that you could use to study what was going on in the reactor. The Advanced Epithermal Thorium Reactor was one of the names; as the configuration of the reactor changed, so would the name.

The AE6 reactor was used for different purposes. It was encased in concrete and the top was open so neutrons would come out of the top. A test assembly was erected on top. The configuration and geometry could be changed. How the neutrons would affect the foils in the assembly materials could be changed. After a while that work stopped and we started using the reactor for non-destructive purposes. We did non-destructive testing where we looked at various absorber, reflective, and fuel materials. We did activation analysis and also neutron radiography where we could see things that x-rays couldn't see, such as in the fins of turbine blades of jet engines that had minute passages in them that had to be clear. If the passages became blocked, the fins would develop hot spots and they could burn up. The neutron radiography could detect any imperfections in the turbine blades. We also tested the explosive train for the B-1 bomber cockpit. It was designed to separate the cockpit from the rest of the plane if it was going down, by the use of explosives. All of the explosives had to fire or else the cockpit would not completely separate from the plane. We made neutron images of the explosive materials to make sure the explosives were continuous around the cockpit, so that it would come completely apart from the rest of the plane if it was going down.

Other testing that I did involved using the SNAP reactor in Building 24 (SNAP 2 Development Reactor) as a neutron source. On one wall there was an opening about 2 feet in diameter. We could put a fission plate in front of the opening. Slow neutrons would hit the fission plate and fast neutrons would come off of the plate. I would put different materials in front of the fission plate and insert indium foils throughout the materials. They would capture neutrons that had slowed to 1.44eV (indium resonance energy).

We were calibrating computer codes to predict what would happen as neutrons slowed in various materials. Some measurements were made inside a tank of water, some were made in solid sodium and others were made with iron, zirconium, or aluminum plates inside the tank of water. The fast neutrons are born at 2.5 Mev and slow to 1.44 ev, and the distance they travel while slowing is called the “age” of the fission neutrons to indium resonance energy. All the measurements I was taking were of the age of thermal neutrons; which was incongruous to what AI generally was doing—research on fast reactors. These materials I studied were used primarily in thermal reactors as moderators.

Another thing we did at Building 100, after the test reactor had been removed, was work on the CRBR (Clinch River Breeder Reactor) Program. The concrete shield walls remained after the reactor was removed. One of the things they were worried about with the Clinch River reactor was the sodium leaking out and catching fire. They were going to build a test reactor at Clinch River, Tennessee, and the safety tests were performed at SSFL. We built a platform in the concrete shield walls with holes and pipes overhead with spray nozzles, to spray sodium over the platform, and see if the sodium leaking through the holes in the safety plate would put out the fire. But Congress cut the funding which killed all fast reactor research in this country. That was the end of the Fast Breeder Reactor research program in this country and I had to find a new job within the company.

The people who built the reactor had operating procedures, including protective clothing procedures. After they configured the reactor, I would come in and irradiate foils, then take them to the “Counting Room” where they had people who would run the counting equipment. I had a film badge all of the time, and I sometimes wore a dosimeter. Radiation monitors were everywhere. They had Health Physicists taking measurements all the time. As far as I was concerned, it was very safe and by the book. There was routine gathering of film badges and their replacement. I think they took them monthly. I had nothing to do with disposal of radiological materials. For Building 59 (SNAP 8 Development Reactor), I helped write the decommissioning plans and helped clean out offices. It was kind of sad watching them tear down the facilities, but I was not involved in any of the radioactive work. I was never involved with the SRE, and I don’t remember any “off normal events” or anything like that occurring.

We produced internal documents—“ILs”—Internal Letters which described our technical work, and sometimes I would produce papers and give talks at conferences on the work I did with the stacks of foils. But I think everything else was ILs—I don’t remember keeping a logbook. Mostly I would collect data and make graphs and tables – they would be filed in a library of Internal Letters. I don’t know who took care of the files. I was a licensed Reactor Operator, so if the physicist in charge was not available, I could run the reactor. I was licensed for the AE6 and the reactor in Building 24 (SNAP 2 Development Reactor), or it might have been the reactor in Building 100 (Advanced Epithermal Thorium Reactor).

We had different spherical sensors which used gases—maybe methane, different gases at different energies. The incident neutrons would react with the protons. We had four different sensors with different gases and pressures which would give different results, and the size of the sphere would give different results.

I don't remember any "accidents" or anyone telling me they "got too much" exposure—it would have to have been some kind of accident for that to happen. There might have been some exposure when raising and lowering the poison rods. Mainly I just followed what I was told to do, such as if we were told to evacuate. I can't remember if there were any training classes in particular, but there may have been. Typically, people would go into a reactor with Geiger counters to make sure it was safe. It also seems like there were always Geiger counters around, like in the Changing Room, and you could move them and take them with you. They must have told us how to use them; it was so straight forward—a needle on a gauge, and it made a noise—pop, pop, pop, so you didn't take any special training. There were other types of counters that measured beta radiation, but it is pretty much stopped by the skin. Alpha radiation is even less invasive than beta radiation.

Everything there was done "by the book" and everyone went about their business pretty professionally. We were aware of concerns regarding radiation levels and the government kept changing the minimum level of exposure. There is no step effect really—a certain dose would cause a certain result. So it wasn't like I would work up to a certain dose and just quit. Early on, everyone realized that "no dose is the best dose." The health physics personnel did a good job and I always felt like we were being monitored and they were on top of things. KMN was the head of the HP (Health Physics) department for years and years and CEF took over from him. I worked with CEF in Building 100 for many years before he went to HP. I never felt threatened by the environment, where I was working, or anybody I was working with in any way. I never felt insecure or that I was in any danger. Everyone I worked with and for were very conscientious and we never felt like we were pressured by a schedule that had to be met – that didn't run our work – so no one was cutting corners to meet a schedule. That was the beauty of working at an experimental facility.

It was experimental, I would say. All the reactors were experimental. There were a lot of us that didn't have PhDs. There were 2 types of reactors at AI, the SNAP reactors and the production reactors, which included thermal and fast breeder reactors. When SNAP was ramping up I wasn't involved, but I remember they were hiring all these people who hadn't been cleared yet, so they put them in "Purgatory"—stacked them up in one of the buildings while they were waiting to be cleared. Where the buildings are, I remember I got hit by a deer one night about 6 o'clock. I had a VW bug and I was going back to work and "clunk"—and the deer kept on going.

Interview 307

I joined AI (Atomics International) in 1956 and went up to “Santa Sue.” When the SRE (Sodium Reactor Experiment) building was being constructed, I was an electrical technician doing checkout of the instrumentation there. At the time there was nothing radioactive in the building. I worked all over ETEC (Energy Technology Engineering Center) starting before it was called ETEC. I became a technician when they started the SNAP 10. They built those buildings in a secured area. That was when I went to work at Building 66 – the Instrumentation Lab – where they did instrument and electronics calibration for the SNAP. The buildings were owned by DOE but they were operated by AI. I was the lead technician right under the Manager and I hired the technicians that worked under me. I went to the NBS (National Bureau of Standards) in Washington D.C. and brought back the standards that we used for calibration. They were sensitive standards. Our lab became a standards lab traceable back to the NBS standards. I was going to school at night but I never did get my degree to become an engineer because kids came along. I took physics, chemistry, and calculus classes. One night my daughter asked me “Daddy, when are you going to quit studying and play with me?” So I decided to quit school. Work started to get pretty busy and I hired more technicians on from the space test stands – they had been laid off and I hired them. I did that through testing of the SNAP (Systems for Nuclear Auxiliary Power) 10. I didn’t get mixed up much with the SNAP 2.

I can give you names of guys who worked at the Sodium Burn Pit. A fellow who did a lot of cleaning-up was XZA and he lives in Camarillo. I haven’t talked with him in 13 years or so and I don’t know if he is still alive. I also worked at the SPTF (Sodium Pump Test Facility) and there were a bunch of us guys known as “The Mavericks.” None of us had college degrees and we didn’t have our noses up in the air. We would do whatever it took to get a job done – short of killing ourselves! I have a picture of us all when we worked together in Hawaii on the OTEC (Ocean Thermal Energy Conversion) project. The concept of that project was to use the differential temperature between warm ocean surface water and the colder water found at some distance beneath the surface to generate electricity. It was originally build by TRW and was a converted tanker with a hole in the center with a gimbal holding a cluster of 3 pipes that were 2,000 feet long. Cold water was pumped up through the pipes and the difference in temperature was utilized to turn a turbine and produce electricity. This was just a side line and I did it for about a year.

As far as procedures go, I wrote procedures for a long time. You see, in the aerospace business, it’s hard to dodge the bullet all the time. I had a good buddy in Quality Assurance and when times were bad, I would work over there as an inspector and that’s when I wrote procedures.

Building 19 was where the SNAP 10A was tested and loaded with plutonium. In fact, I was the inspector watching the technicians load the plutonium into the reactor. I also helped the technician load the plutonium – he was nervous! The plutonium was in a fuel rod and they went into the reactor one at a time. The beryllium shields were not in place so it couldn’t go critical. The reactor was lowered into a chamber in the ground and then the concrete plug was placed on top. Everything was procedurized and you never did anything without following a procedure. Whoever did the work would sign

their name next to each step of the procedure as they did it. Then someone else would sign off on your checklist after they reviewed it.

YAB, one of the Mavericks, was an operator at the SRE when it started up. He is in tough shape now – his wife just died. I keep up with him. He was up there for the SRE incident. I asked him about it and he said that nothing really happened, that it was no big deal. At the time, I kept getting transferred back down to DeSoto. When that job finished up, I went back up to Santa Sue to work on SNAP 10.

They had two SNAPs. There was SNAP 10A and the prototype was in storage in Building 59 below ground. The only problem was that Building 59 was located next to an old quarry, I guess, and you know how water and ground work. I heard that water leaked into where the prototype SNAP 10A was stored and the groundwater got contaminated. If it got into the reactor portion of SNAP 10A, that was plutonium. But if they ran that thing when it was loaded, it got up into the thermoelectric devices in the tubing. If it got into it that was possible. The SNAP was maybe 10- to 15-feet high, a conical-shaped device or structure and at the very top sat the reactor. It was originally made to generate electrical power for Lockheed. They put the flight one into a 35-year orbit, but I never heard of it coming back down thank God! There was a big device that would circulate NaK down the tubes and the NaK of course would remove the heat from the reactor. It came down these D-shaped tubes to the thermoelectric devices. I was the inspector for the soldering of safety wiring, and I made the mistake of griping in a meeting about them not having proper procedures for doing and inspecting the soldering and they told me: “Fine, you write them!” I used a copy of procedures from Lockheed that I had (so as not to reinvent the wheel) and hustled to get the procedures written. We had some procedures, but they were not adequate because this was a satellite and it was built to operate in a different environment than ours.

I also worked at the KEWB (Kinetics Experiment Water Boiler). It simulated an atomic bomb with a very short, very intense period of radiation. We were working on experiments to see what would happen to insulators exposed to high level fast radiation. I never did get to operate the reactor. The AE-6 reactor was there also, but I didn't do much on that one. When I first went up to Santa Sue I was working on instrumentation in tents because, oh my gosh, they hadn't yet built the buildings!

I also worked in Building 27 which was a vibration laboratory. They had shaker tables where we tested the Lunar Excursion Module (LEM), which was not radioactive. I was the technician who calibrated the accelerometers. Next to Building 27 was Building 19 that had a reactor that made neutrons. They did experiments to see if pyrotechnics could blow away the tanks on the Space Shuttle. They had a theory that if you radiated the pyrotechnical material with neutrons next to X-ray film that it would show the organic material such as cotton.

Rockwell bought AI and we became Rockwell North American, but things didn't change, just the name. I'm retired from Boeing because they bought Rockwell. I liked working at Santa Susana because you could work in your specialty. Mine was instrumentation and ETEC took over the jobs that AI used to do. I was appointed to make Building 66 a standards lab. I had 14 technicians that worked under me. Then my boss, ZBC, died of a heart attack and I thought that I would get his job as I was next in line. I talked with

KLM who was the director – he is a very nice man and he saved my butt several times. I got laid off several times and he helped me get other jobs. I worked on the Hallam Plant protective systems and I built the bread board for the reactor. It's a shame that reactor never worked – I think the (moderator) cans swelled. Anyway, when ZBC died I thought I would become a supervisor. They had a klutz in Building 38 and they brought him down to take ZBC's place. So I stayed a couple more years and then left to be plant manager for RTR Industries that was a speaker business some of my friends owned. I was plant manager down there until business got slow and I brought in another guy to be plant manager.

I called a friend who did QA work and I went back up to SSFL and worked in QA until I got squared away and back into instrumentation after 2 years. ADE was the manager over the engineers. I did a few engineering jobs for him and then they had a cutback and of course they let me go. That was when I went to work for Rocketdyne and did instrumentation procedures for Atlas and Delta rocket testing until I retired.

While I was writing procedures for Rocketdyne (what the hell did I know about rocket engines?) my supervisor at Rocketdyne wanted me to come back to the Atlas/Delta test stands but I was told that I couldn't run the test stands without making MTS-3, so that's how I got it. That was thanks to my supervisor at Rocketdyne down below. They were just starting up the test stands again but now they were using computers so they took out all of the strip recorders.

A buddy of mine who went on a tour last year told me that Building 66 is gone but Building 38 is still there. Buildings 19 and 59 were pretty hot places and the plutonium facility on the main drag – what the heck was the number of that building? See, my technicians would go to these places and do calibration and I would check on them and that's how I got around so much.

Building 4514 was the Sodium-Water Reaction Test Center—now there is a place that you might not know about – it was down in the flats where they were injecting water into a tank of sodium to test sodium/water reactions. The tank was sealed with a flapper valve. The engineer in charge of the instrumentation was BEF – a very nice guy. Also out in that area was Building 100 which housed the Advanced Epithermal Thorium Reactor.

I can give you the name of a HP (Health Physicist). This gal checked out the facilities with a Geiger counter before you could go in. I know her well because she is my ex-wife, but there is no animosity as she is the mother of my children. CFG is her full name.

[When asked about working with radioactive materials] I handled radioactive materials for the SRE back when I first joined the company in '56 or '57. I was assigned to check the density of the fuel plates that were going to go into the SRE. Don't forget that AI used to be where Rocketdyne is over on Vanowen and Canoga. I also helped build the core that one time for the SNAP.

[When asked about knowledge of the sodium burn pit] The sodium disposed in the sodium burn pit may have been contaminated but I don't know for sure. XZA used to do a lot of sodium disposal.

[When asked about keeping a logbook] I did not keep a logbook, but it would have been neat if I had! Some of the projects, I still have the procedures that I wrote out in the garage. I hope your hindsight is as good, but a lot of stuff we did we just didn't know about. I remember experiments at De Soto that were crazy!

[When asked about where he lived] I lived in Chatsworth and drove up Woolsey Canyon every day. For a long time I lived in Moorpark and then I drove up Black Canyon. Life was good and it was a good place to work. To be honest, I liked Santa Sue. The only thing I didn't like was the lies from management. When I would ask for a promotion or raise at ETEC, they would tell me: "Well, we don't want to put you in competition with the smarter engineers." They weren't good about promoting people. But Rocketdyne was – I should have gone there a long time ago.

[When asked about wearing a film badge and/or dosimeter] I always wore a film badge and a dosimeter because I never knew where I was going to be.

Interview 411

I started with North American in 1952, went to Rocketdyne in 1954-55, and then on to Atomics International in 1974. The name changed again in 1985 when AI became Energy Systems; we merged back with Rocketdyne later. I was a manager, construction engineer, member of the design group, project manager, and eventually, manager of distribution. I didn't actually work up at Santa Susana until 1985. I managed distributions while I was up on the hill.

It was beautiful to work up there – everything was beautiful – from the natural beauty to the work ethic. It was like a family. I loved to go to work. I was in charge of receiving and shipping. We'd receive items and make distribution over the whole Santa Susana Mountain. We would receive and ship rocket parts, nuclear parts and everything in between. I served the entire facility. BDC worked for me at Energy Systems in DeSoto. When CED retired, I made BDC a manager. I had managers and foreman under me.

I was responsible for overseeing shipment of radiological materials off the mountain. I didn't actually have anything to do with how radiological materials were handled, we just managed the paperwork for the shipments. We had to check their radiological readings before we put them on a truck for transport. We made sure they met the requirements for acceptable levels of radiation. I made the arrangements for all the shipments and thus I knew where everything that was shipped was going. All radioactive materials that were shipped were shipped off-site; nothing stayed at the SSFL. There were some materials that we stored temporarily until there was a sufficient quantity to ship - I think the building we used for that was building 5 - where we stored things until we had enough to ship. I really can't remember. Everything was stored inside a building.

Materials that were to be shipped came to me boxed up and in containers – we didn't pack things up. I didn't handle them myself. I was just arranging for the shipment to happen. We had film badges to detect radiation and every month or so many days we had to have a specimen test. In 1985 when we left the hill we turned the film badges into medical. I don't think I ever had an exposure. They read my badge and they would have told me if I had been exposed to anything that I should be concerned about. To my knowledge I was never exposed.

When I was working up at SSFL, there was an explosion in another building and one fellow was killed. But where I was working nothing happened out of the ordinary. I was not aware of any on-site disposal of any radiological materials. I don't know of any radiological material spills, dumps, or releases at Santa Sue. Any hazardous chemicals we handled were already in containers.

We had procedures; there was thick book full of them. They didn't seem to change that often during the short time I was there. We were given an orientation to learn procedures before we went to Santa Sue. My people did what they were supposed to do.

We attended meetings and conferences with the DOE in different locations, such as Oak Ridge, TN and Columbus OH, every year, every six months or so to help make sure we knew what we were expected to know. The company tried to get me to transfer to jobs at Hanford and Houston. My wife was also employed by the company, in

personnel. I told them I wouldn't go anywhere unless she also had a job. We actually went to Hanford to check on a new job once. We went to dinner with DFE. On the way back from dinner, we hit some black ice and that did it for my wife. We stayed in California.

Performance was monitored in my group by my director and I gave my people evaluations every six months to a year. I also had people under UAW and Teamsters. I also had to follow union rules for doing performance evaluations. The system worked; it ensured people were doing what they needed to be doing.

Regarding record keeping – we filed our documents on a daily basis. BDC took care of all that and was responsible for managing the records for the shipping department. Every so often we were audited.

Nothing happened that wasn't documented. Everything we had to ship was documented or else it couldn't get off the hill. Some shipments were escorted. Sometimes they had to call in to let us know where they were so we could track the progress of the shipment.

I don't have any knowledge of liquids being dumped anywhere.

I don't have any knowledge about the sodium burn pit, surface disposal area, leach fields or septic tanks. With regard to drainage discharge locations, I don't have any specific information on those. But I know there were a few pools here and there but I'm not sure where they drained from. The ponds were upstream from the stands. There were catfish living in those ponds and some of the people fished for catfish there. They would catch them and eat them. Some of the guys who worked at nights did that, especially those in maintenance. I don't know what made the ponds.

I remember the conservation yard but had nothing to do with it. That would come under maintenance, I think. Some companies would come in and buy some of the material that was there.

Interview 419

I worked for Rockwell International and ultimately Boeing, and worked at various positions with increasing responsibilities for 22 years. At the time of my retirement, I was division director for environment, health and safety (EH&S). I was responsible for environmental health and safety at several Boeing locations, including SSFL. I had offices at various locations including SSFL at various times. I spent about two-thirds of my time at Santa Sue.

During the course of my employment, from 1985-2006, there were no active operations involving radiological materials. But there was on-going cleanup and containerization of radiological wastes. There was no unauthorized on-site disposal of radiological materials since I started up there, but there was on-going clean up. The radiological materials that were under my purview were the result of cleanup and already containerized wastes. I think there were maybe 30 or 35 drums of TRU and LLW up there in the time of my tenure. Up until that point, we had been allowed to keep those drums in a California-licensed Treatment, Storage, and Disposal (TSD) facility that had many safety features including video surveillance capability.

The Superfund reauthorization in 1986 required different licensing requirements for those facilities. We started shipping that material to Hanford at that time. Starting in 1986, the California Department of Toxic Substances Control started doing inspections in addition to those done by the California Bureau of Radiological Control and DOE. The transuranic waste we had generated previously went to Hanford. It took a memorandum of agreement between the states of California and Washington to get the waste shipped off site.

The Radiological Safety group had responsibility for monitoring worker exposure. They oversaw dosimetry, and controlled badging as people went in and out of areas storing radiological materials. Some people wore TLDs and some people had pocket dosimeters.

The sodium burn pit did have some incidental radiological contamination, but it underwent several cleanup activities as regulations and requirements changed, and it was cleaned up to very high standards.

All faucets at SSFL were posted telling employees not to drink the water.

I am not aware of any dumping, or spills of radiological materials except historical contamination incidents. I'm not aware of any disposal of liquids using toilets or floor drains.

I am not aware of any unplanned events that may not have been documented properly.

There were fewer chemicals on the DOE side of SSFL. Lots of TCE was used on rocket side. The US Air Force operated a plant up there before SSFL was established and I understand that something like 500,000 gallons of TCE was dumped there during their tenure. There was much less TCE in Area IV. Small quantities of acetone and isopropyl alcohol were used. There was training and procedures that prevented dumping of hazardous chemicals into drains. Historically, there were leach fields in

Area IV, until the sewer treatment plant was installed in Area III which then received sanitary wastes from Area IV.

There may have been an occasional spill and maybe some releases where the agencies were not notified, but everything that happened was documented.

There were on site disposal areas – landfills – dating back to the 1940s and 50s and of course the sodium burn pit. There was also a landfill in Area II. But there wasn't any land filling of any waste since '85 when I was there.

There was a radiation safety manual used back in the early 70s that was partially written by KMN, the Director of Radiation Safety. It had literally dozens and dozens of procedures and was used during that operational period of Area IV. Most procedures were updated annually.

Workers who were responsible for handling chemicals or radiological materials were trained by the full-fledged training department. Training and procedure update were conducted in tandem.

Management was fully responsible for all actions so that's how procedures were enforced and compliant performance was measured.

I think that everyone tried to follow the rules. The people working at SSFL were all engineers. Prior to RCRA and CERCLA we had a sodium burn pit – one procedure was to shoot the barrel in the sodium burn pit. The fire department observed everything that happened in the burn pit; they were watching every single time. On many burn days the Ventura County Air Pollution District came out to watch the operations. There was a lot of regulatory oversight.

Any employee could shut down any operation at ETEC at any time. The impact on schedule wasn't even considered. If that happened, no questions were asked and there was no retaliation or anything else. The president of the company was safety oriented. Many of the senior managers worked their way up through the ranks. Everyone put safety first.

I was responsible for much of the hiring, and I hired many people who had experience working for one of the many regulatory agencies in California. I really worked to hire regulatory people because they knew what the rules were.

With regard to documentation, we had spill reporting forms, we called them spill files, that went back to 1985. We had lists of agency contacts and reported what happened, who you talked to, etc. Records were kept. We had weekly or monthly activity reports (depending on what was required at the time) that went to our management and up to the senior management of the company. Operational and environmental information was included. I don't know what happened to the reports nor did I keep any a personal copy of any of the records. There was never any effort to dispose of records when I was there. I suppose it's possible that the company mergers may have resulted in records being destroyed or lost.

All sanitary waste from Area IV went into a sewage treatment system just outside the entrance to Area IV; it was monitored for radiation 24 hours a day. The treatment facility was located on the road between area III and Area IV. The contents underwent

radiological screening and treatment and then were discharged from the sewage treatment plant off site. Records were kept if something triggered the sewage treatment systems radiological sensors.

The parking lot at the RMDF drained to the RMDF pond, which was also radiologically monitored. There was a cleanup on the RMDF slope between the parking lot and the end of the property. It entailed cleanup of the parking lot, slope, and an adjacent leach field. After the cleanup was completed, asphalt was put in place to seal any remaining contamination in place during the RMDF leach field clean up. The spill was the result of a large plastic carboy that failed.

The sodium burn pit was about 1 acre and was also known as building 886. It was 8-9 feet deep. It's been cleaned up several times but they kept raising the standards. There was sodium found during the various cleanups along with things that the DOE programs had used back in the time prior to the site being cleaned up, including chemicals, mercury, TCE etc. The potential was there for the contaminants to get into the cracks and crevices in the sandstone. I was there when it was cleaned up to bedrock and backfilled it. The only contamination that could have remained would have to have been confined to the sandstone fractures. Those potential areas of contamination are monitored. Groundwater monitoring wells have been installed and soils removed and areas cleaned up by DOE down gradient.

Workers didn't always remove stuff out of the burn pit right away because they were waiting for the chemical reaction to finish – sometimes it took awhile. When sodium hits moisture it can ignite, but it doesn't explode. NAK could explode (sodium and potassium).

I do recall some contamination found down gradient from the sodium burn pit that couldn't have come from anywhere else. There were no other sources of contamination uphill from that location.

I'm not aware of any surface disposal area at western edge of Area IV, but I am aware of a place just west of the burn pit where it looked like somebody dumped a truckload of metal (maybe aluminum) shavings and other materials there. I do not recall there being any chemical or radiological contamination in that location.

There were some leach fields, septic tanks, and drainage systems at SSFL until the sewage system was constructed in the late 70s early 80s. The prior facilities were all cleaned up. There is fracture dominated sandstone under the whole site. I think there was another leach field near Building 3 but it was cleaned up in the mid 1990s. It was right next to Building 3 and it had a tank that held some sort of liquid, or possibly recycled oil. It was cleaned up in accordance with the relevant requirements.

The Old Conservation Yard next to that building has been cleaned up. Materials were put out there for salvage and recycling, including old chemicals and recycled oil went there until it was picked up. Some of it was sold to bidders. GAO has requirements that we had to try to sell many of the materials that had value (drums of materials, piles of coal, various recyclable metals, etc). I believe there was an asphalt berm all the way around it. A person who worked in the area and was responsible for the area was FHI.

There were storage tanks and gas hold up tanks. There was a radiological gas hold up tank when the SRE partial meltdown occurred in 1959. Gasses were containerized and then released according to AEC requirements and permit limits at the time. That's the only one I'm aware of. They did have tanks to hold diesel fuel storage tanks – thousands of gallons. Diesel was used to run sodium heaters. There were two tanks – with a combined capacity of 1.5 million gallons and a day tank that could hold something like 10,000 gallons. The sodium heaters were heated 24 hours a day for weeks to months, but it became an air pollution permit issue because of NOX from the heater.

There were also underground gasoline and diesel storage tanks in Area IV where fuels for the automobile fleet were stored, east of the SCTI. These tanks were permitted by the regional water quality board and taken out of service under permit from the board in the 1990s. The gas and diesel tank east of SCTI were cleaned up and closed under permit.

DOE also had a large amount of coal gasification work at SSFL as well, which required on-site coal storage near the Old Conservation Yard. Coal has naturally occurring radionuclides in it. Some naturally occurring low level radioactive waste may have been generated through this work. DOE's bio diesel project generated a lot of chemical wastes as well.

I don't know of any spillage of a reportable quantity that wasn't reported. We were very conscientious about our work. That's why I hired ex agency people who worked for the regulator.

It was exciting during the early days when they were testing rockets in Area II. Families sat in bleachers a mile away on Friday nights to watch. The sound waves went a different direction every time there was a test. There were two licensed meteorologists working at various times to ensure safety and that wind conditions were right. They also advised work being conducted in ETEC Area IV.

Interview 427

I joined Atomics International in June of 1957. Atomics International started out as an adjunct to Rocketdyne before it branched off. I was assigned to the Pyroprocessing Refabrication Experiment (PRE) as test engineer working for OQS. I later went to work on the Zirconium hydride reactor system. We were well assigned and sequestered in our own area where I worked on the reactor system components. JMN, co-inventor of the Zirconium hydride reactor and PRT were the leaders of SNAP concepts; PRT was the President of Atomics International for awhile. He went to Three Mile Island and the incident there happened 3 months later. JMN has since died and I went to his funeral last year.

I went to the SNAP Design Organization to design a liquid metal (NaK) pump which ran at 40,000 rpm for the Rankine cycle mercury vapor turbine.

I began at the Santa Susana Field Laboratory (SSFL) when we started the first Critical Assembly in an old Rocketdyne Test Block House. During approximately 1958 or 1959, the hardware evolved and I moved into the critical assembly work on the Block House (small rocket test building). Rocketdyne wasn't using the building anymore. After we proved we could build a hydride reactor, the real work began on the SER, not to be confused with the SRE. We wore film badges and were monitored, and worked inside a security fence. There were health physicists onsite.

I have transported enriched fuel elements, three at a time, in the back of my VW from the plant at the bottom of hill where they were constructed at Atomics International (the Vanowen Facility) up the hill to SSFL. Everything was contained within the fuel elements. NaK was the flowing coolant in the primary and secondary systems and heat exchangers.

Any experimental reactor is always "off-normal"! We had a NaK leak inside the vault. There was a little water in the bottom of the vault that condensed from the concrete, and the heater leaked NaK which caused the metal membrane that sealed the vault to raise the concrete blocks rhythmically! We thought it was a leak in the primary, but it was actually in the exchanger. It was just gas created by the reaction of the NaK with the water, but it sure got our attention for the remainder of the test program! The DeSoto folks wrote up the reports.

For safety purposes, the reactor was located in a big steel tube way down at the bottom and controlled by long rods going down to the reactor reflector controls. We had an air-blast heat exchanger on the outside of the building to get rid of excess heat. You had to load the fuel, seal the reactor, and then load the liquid metal NaK. There were many steps to be followed.

The only radiation exposure would be coming through the shielding—it would not be airborne, but we had people coming through and monitoring us to ensure we hadn't been exposed. I was never involved in the disassembly of the SER, as I was always reassigned to the next generation of upcoming reactor systems. For a short time, I was assigned to the power conversion side for the 3kW mercury system for the Cleveland site. They had some real technical problems, particularly with the bearings regarding dirt contamination.

After that, the SNAP-10A ER reactor was developed. They modified the SNAP-10 which had a thermoelectric convertor to a solid-state one and designated it the SNAP-10A. Building 24 had 3 vaults—with a nuclear reactor vault on each side of the center vault where the power conversion system would be connected to the SNAP reactors. SNAP-2, a 3 kWe system, was the original idea, but they had too many technical problems. We went from a dynamic system to a solid-state system, in which the first converter material was PbTe and the second was a Ge system. The SNAP-10A was rated at 500 W. We knew what the configuration should be for the final system so we just had to make the parts work.

The biggest disposal problem we had was getting rid of contaminated NaK coolant. For each test you had to drain and re-fill, so there was a lot of NaK you had to get rid of. You would wet the NaK with steam and it would “hiss” a little bit and then it would be gone. They did this on the outside of the test buildings.

For the hardware that was contaminated, we would turn it over to a group of guys that had a “sodium burn pit”. A friend of mine who worked on the sodium component, QSU, learned that things can happen when mixing steam with alkaline metals. You can drain the sodium out, but there is still hardware contaminated with sodium that you have to clean up and what do you do with that? I never buried or hauled anything to the sodium burn pit.

There was a certain amount of technology you had to learn about. They actually had a health physics (HP) group that handled all of the safety. Our job was technical development. There were a lot of laboratory books depending on what the test was; some were just simple notes and others were more detailed. You were issued a laboratory notebook, and you had to turn them back in. They were actually kind of boring—every time you changed a setting, you made a note in the logbook.

The SNAP Program was a very fast-moving project. My principle job was to run and evaluate the engineering design of the integrated system so I got involved in designing the building to accommodate future SNAP tests. I went from being a Test Engineer on the SER to a Supervisor of non-nuclear testing in Building 32. I was on the heat/power generation side of the building and we had some NaK leaks inside the vacuum chambers which were found and fixed.

On the other side were the SNAP 2 non-reactor tests. XZB was in charge of the SNAP-2 side of the building.

The West Disposal Area was used for the hardware that was hazardous (sodium, NaK); it was cut up and disposed over there. I don't recall it being a “junkyard,” we called it the Old Conservation Yard. We were at the forefront of acquiring data, so whatever happened to the old scrap metal hardware, I did not know or care.

I was involved with nuclear acceptance testing prior to mating the SNAP 10A to a launch vehicle. The first Flight System (FS-1) was tested quite thoroughly to see if it was acceptable for launch vehicle integration, for launch, and for orbital startup. It was installed in an underground vacuum chamber in Building 19 and had a nuclear fuel loading in the core. The system had to be raised to operating temperatures by heating the return piping. In the process of running the test, NaK leaked into the vacuum

chamber from a failed expansion compensator. The vacuum chamber was then filled with inert argon to enable removing the system to determine where the failure had occurred and what repairs could be made..

The firemen started spraying the smoking NaK with their hose to try to keep it cold! A very, very wrong thing to do with liquid NaK. Instead, they started a real uncontrollable fire. Normally, we would throw chemicals on the NaK liquid to slow down the reaction until the liquid could be scooped up and put into a safe container. The firemen didn't know the right NaK fire fighting procedures or the proper procedures for containment of spilled NaK. At that moment, FS-1 could not be repaired and became unusable scrap!

The DOE representative had a sidekick, RTV, who said it was an act of sabotage, but it was really a design flaw in the expansion compensator, which were small thin metal bellows that required many difficult welds. The multiple welds weakened the bellows which caused the failure, and that's why FS-1 was scrapped. The nuclear fuel was removed and returned to safe storage.

Flight System 4 (FS-4) became the launch system and we repeated the process with a revised container around the bellows so that if the NaK leaked, it would be contained.

The test was re-done, the temperature was increased but could only go up to operating temperature a few times because the resistance heaters had a finite life. The first time the system temperature was increased, the converter shorted out and produced no electricity. Analytical tests were performed and people from DeSoto were involved and they couldn't find the failure (i.e., the short). It shorted when the temperature went up and came back when the temperature went down. The launch date was less than one month away so what do we do?

I got on a ladder and sat on the top of the vacuum chamber and looked through the little windows to see if I could see a spark and find where the short was located. A second person also looked for the spark, and we both found it in the exact same spot, (on top of the converter in the space between the radiator and the structure). We removed the vacuum chamber and placed a ladder against the radiation shield and found the arcing spot. Because we had a launch date coming up, we fixed the short ourselves by cutting off a small insignificant part of the converter radiator. Then we completed the test and shipped FS-4 off to the launch site to be launched on 13:24 PST on 3 April 1965. ----- FS-4 became an American Legacy!

There were four test and development functions under my supervision that included 60 people. I was the Group Leader over the component converter acceptance, system assembly, nonnuclear system test and qualification, and fuel loading and criticality testing of the flight systems. Coworker supervisors included: TVX—in charge of Component Tests, UWY, in charge of assembly—just retired not too long ago, SUW—who was in charge of nonnuclear system qualification and was selected to be the representative on the launch crew, and VXZ—in charge of criticality acceptance system tests.

All of this took place within a 5-year period of time, however, the reactor technology development occurred earlier and was borrowed from the SNAP-2.

After the successful launch and startup of SNAP 10A, I was assigned to be the new Fuel Manager in charge of nuclear fuel manufacturing to make nuclear fuel for the ATR and ETR reactors in Idaho, and the fuel for JAERI (Japanese Energy Research Institute) Tokai-Maru in Japan. Raw metal from Nuclear Fuels in Tennessee was purchased and broken break into fines and mixed with aluminum powder. Aluminum cladding was roll-bonded to the pressed compact fuel inserts. We made lots of fuel elements for Idaho and they are still being used. We went all the way from the raw metal to the completed fuel elements. All powders and compacts were processed in a string of glove boxes at DeSoto Facility of North American Rockwell.

Interview 428

I started working at SSFL in 1964 and left in 1968. I worked for AI (Atomics International). I was a health physicist all over SSFL and at the fuel fabrication plant at DeSoto; I supported both facilities.

We operated under the AEC (Atomic Energy Commission) regulations and Chapter 0524 contained the requirements regarding radiation protection including worker safety and off-site safety. With respect to actual operations, those in charge of operations had the primary responsibility for safe operations but it was part of our job (the HPs) to assist in the interpretation of the requirements. In general, they complied with the regulations. Operations staff were very concerned with following the regulations. It was interesting in those days because the AEC was both our customer and our regulator. That was one of the reasons Congress broke the AEC into two parts in the early 1970s. Congress established the NRC (Nuclear Regulatory Commission) to serve the regulatory role and ERDA (Energy Research Development Authority). ERDA was established to promote and develop nuclear power. In the 1960's, when I worked at AI, this was not the case. AEC did both, and so we had a lot of incentive to comply with their requirements, as well as completing their contracts efficiently and effectively for experiments and other activities.

Chapter 0524 was easy to understand if you were an HP. We were required to take air samples and measure radioactivity around the workers as well as recommending air containment to protect the workers. We were often asked by the operators, why do we have to do both? If air containment is in place, the workers won't be exposed. If we measure their exposures, we shouldn't have to have air containment. But we understood the need for the redundancy. Both were required to protect worker health and safety. We took measurements and performed external and internal dosimetry.

I worked at the SRE (Sodium Reactor Experiment) for a month or two on one of the shifts where my job was to take dose rate measurements when something was taken out of the reactor that was radioactive, and make routing radiological surveys.

In general, all handling of radioactive materials was done according to established procedures. We also performed audits to ensure compliance with the procedures. If we found areas that hadn't been properly cleaned, we would have access to those areas shut down until they were cleaned-up to the levels required by Chapter 0524. I also would review planned experiments to make sure that the plans would comply with requirements. We would discuss plans for design and operations with the research planners before giving them my approval. We would review procedures and experiments to make sure that they were designed properly from a HP aspect.

The reactors were all shielded and high level radioactive materials were handled remotely. The hot lab had cells with very thick concrete walls and thick glass windows so that the workers were shielded from the radioactive materials. Workers used remote manipulators to handle radioactive materials within the cells, watching their work through the windows.

The main problem at the SRE was that the sodium would become contaminated when it came in contact with radioactive material, then, if the contaminated sodium came in

contact with the air, it would generate hydrogen that would burn, but it never got outside of the building. There were lots of fires – that’s what happened when sodium comes into contact with water. The fires were easily detected and usually easy to put out.

When unexpected or out-of-the-ordinary events would occur we had alarm systems and fixed air monitors as well as portable dosimeters and monitors. Occasionally workers feet would become contaminated, which would trigger alarms and monitors when they walked into another area. The HP would determine the extent of contamination and recommend clean up procedures.

If dose rates or air levels were significant enough, there was a requirement to do a root cause investigation as to what went wrong, determine the extent of the contamination, conduct a cleanup, and then figure out how to correct the situation so that it would not happen again. The findings of this effort were documented in incident reports. There were two kinds of incident reports. Minor incidents were documented with a letter to the manager of the facility where the incident occurred. More serious incidents were to be documented after conducting a full-scale investigation and preparation of a report with a report number. I don’t recall any major incidents requiring a full-scale investigation and report at SSFL during my tenure with AI.

All who worked around radioactivity wore dosimeters and we sometimes wore self-reading dosimeters meaning that the dosimeter would give an immediate measure of the dose received. We monitored whether the actual dose exceeded what was expected. If anyone received a higher dose than expected, everything would be stopped and the incident would be investigated. We would compare the results to other information available. We also wore film badges. If the expected dose on the dosimeter was exceeded, then the film would be developed and the results compared. We also had hand held dose rate meters that could be used to confirm other readings. An exposure would go against a workers allowable exposure limits. Workers were only allowed to be exposed to so much radiation on an annual basis, which was broken down to a monthly and a daily allowable dose. If that dose were exceeded, they would be assigned to another work area for an appropriate time depending on the dose they received, until we could allow them to work in a radioactive area again. The regulations provided the annual exposure limits. I do not recall any worker at SSFL ever being kept away from their normal work assignments because their annual exposure was exceeded.

It was a cooperative venture between the HPs and the operators. Dose records were given to the operators and if they were conscientious they would schedule workers accordingly. A worker might use up their allowable dose for one experiment or project. Then they would be moved to a job or task with no exposure.

The main way that we controlled for internal exposure to radiation was through monitoring the amount of radioactivity in the air. We would use modeling to determine where the internal exposure was in the body and that was difficult to determine. We worked very hard to avoid internal exposures. I don’t recall anyone having an internal exposure at SSFL, although I do recall it happening at DeSoto now and then.

We had a waste disposal facility where all radiologically contaminated materials were packaged and shipped offsite. I don't have any recollection of any radiological materials ever being disposed of on site at SSFL. To my knowledge, everything was shipped off site.

Regarding hazardous chemicals, I don't know much about how they were handled. We had an Industrial Hygiene Group that was concerned with such things. SUT was the manager of that group and KMN was his manager. TVU was the Manager of Radiological Safety, and he lives in Virginia. He would be a good person to talk with as I think he would remember who was responsible for handling of hazardous chemicals. He wrote the health physics handbook that we used at SSFL. I don't know anything about how hazardous materials were handled.

SSFL was big on policies and procedures. There were many policies and procedures that we followed and they were very important – even for experiments where they didn't know what was going to happen. The HP handbook of procedures didn't change very often, but we were always revising operating and equipment procedures, on a monthly basis or sometimes even weekly. It was required in the general policies that when a change needed to be made to a procedure, the HP office had to be notified so that the change could be reviewed from a safety standpoint. If necessary, we would make comments on the proposed change to the procedure and have it revised. Revised procedures required approval by an HP. We required that the workers be retrained on the changes to the procedure and would discuss the changes with them.

As far as the safety "culture," it depended on the group you talked with. It wasn't uniform across the facility. The workers at the SRE were very concerned about safety; at some of the other experimental areas it was like pulling hen's teeth to get them to comply with safety procedures. Sometimes they would improvise – that did happen on occasion. Sometimes higher than expected contamination resulted because people did not follow established procedures. Generally, people avoided compromising safety, but they didn't always understand why things were done a particular way.

As a general rule, workers were hired for their operational experience, but they had not all been trained in how to work with radiologic materials. I trained 10 or perhaps even 20 thousand people in how to work with radiological materials over my career. That included several hundred people during my time at SSFL. We had a standardized week-long radiation safety course that people were required to take. People realized that it was in their best interest to follow safety procedures and not get exposed or contaminated because then they may not be able to work for a while. It was best in the long run for the operators to have the primary responsibility for safe operations. Some operators wanted to delegate that responsibility to us, but it really worked better if they retained that responsibility and let us do our health physics jobs.

We monitored radiological exposures to workers using graphs and charts of each worker's exposures on a weekly basis. Sometimes we monitored daily exposures. Generally, the workers didn't care very much about it. They relied on us to know if they had been exposed to too much. That didn't happen very often at SSFL.

I have no knowledge of hazardous chemicals being disposed improperly at the site, but they occasionally found leaky piping under buildings when they tore them down. They should make sure to check for such things when they tear down any more buildings.

For documentation of radiological surveys, we had survey sheets where we recorded information such as the date, time, location, instrument number, dose rate, and any laboratory analyses, in great detail particularly whenever we found elevated levels. The survey sheets would go into the records - a copy in the files, a copy for the operator and I kept personal copies of all my survey sheets. I still have some of them, but I have no idea what happened with the other copies. And for incident reporting, a letter was written or report made as I already explained. Documentation at the time was complete especially for incidents as well as for routine monitoring. I have no idea what happened to those records.

I have no knowledge of anyone disposing of any liquids into toilets or drains. That was known to be a big "no no."

I recall a "sodium reaction facility" at the western end of the SRE where they experimentally burned reacted sodium with water; no radioactive materials were involved. The experiment was designed to see what would happen if very large quantities of sodium came into contact with water. That was a very expensive experiment to run and I only recall it being done twice. That facility was at the very western end of the SSFL, nothing was beyond it.

The only thing I knew about the sodium burn pit or disposal facility was from the standpoint of it being a curiosity. I never observed the operations there.

I also have no knowledge of any surface disposal area at the western edge of SSFL or anything about septic tanks, leach fields, or drainage discharge locations. I don't think that I ever went to the old conservation yard although I knew it existed. I don't remember anything about gas holdup tanks.

I felt that SSFL was one of the safest places I ever worked. I think the historical records would bear that out. We worked very hard to avoid contaminating the environment with radioactive material. Occasionally we would have a fire in the area where sodium stored, and sodium would get on the asphalt. We were very careful to make sure no radiological contamination was ever released to the air, water, or soil. I liked the work, it was challenging and you could learn a lot. I felt like I made real contributions there.

I was sorry to leave AI because I liked working up there. I was offered a good opportunity to work for GE in San Jose, CA where I assisted in designing boiling water reactors. After that, I went to work in Grand Junction for the Bendix program and then, from 1986 until 1997 I worked at the Chem Plant in Idaho Falls. We left Idaho Falls when my wife said she was leaving in May and I was welcome to join her. We got tired of the cold weather and long winters there.

Interview 429

In 1962 I was hired as a test engineer at North American Aviation in Downey. I transferred to the SSFL in 1964, where I worked as a test engineer on the 2nd stage Saturn in the Coca area, where I stayed until September 1968, at which time I transferred over to the LMEC, later known as ETEC. My job title may have changed over time, but I generally functioned as a test engineer during my entire tenure. I was hired by YAC, who is deceased, and spent approximately 20 years working under the supervision of ZBD.

At LMEC, I worked primarily in instrumentation supporting the fast breeder reactor project. Specifically, I worked on strain measurements, pressure measurements and load measurements. I worked in all the buildings at LMEC at some point, but most of my time was spent in buildings 38, 57, 211 and 487.

As engineers, we are hired for our knowledge, so we don't necessarily go through any training. We were the ones doing the testing. The technicians, who manually carried out our designs, often had training, such as for handling hazardous materials like sodium. Safety was always an issue, and there were times when engineers were the ones in riskier situations, as they had a better understanding.

I used some chemicals, but they were always in minute quantities, such as one-ounce or less. There were trademarked chemicals that were used in the strain gauges, and cleaning agents included trichloroethylene, MEK and acetone. In the earlier years, concern about the disposal of solvents was not an issue as it is today, so it would not have been uncommon for a technician to clean some parts in a bucket of MEK, and for that MEK to get tossed out onto the ground.

I was never in a position where radiologic exposure was a concern. I did not wear a film badge or dosimeter at the SSFL. All my work had to do with components for liquid sodium cooled reactors.

I wrote many reports, such as test procedures. There was a lot of paperwork, and it all ended up in the library on site and also with the DOE.

I was aware of the Sodium Burn Pit, but I never worked there or even saw it. I know the technicians took parts there to clean, and at times the sodium could be heard popping.

The conservation yard was a place where unused items were stored, but I had no experience with it. I would not think that it would have been a place where contamination would be a concern.

I enjoyed my time up at the SSFL. I usually bought food from the "roach coach," which was pretty good. There was no cafeteria in Area IV. During the lunch hour I often played chess or volleyball. One of my coworkers went jogging during lunch. I remember a group of ladies went on lunchtime walks. I lived in Simi Valley while employed there and enjoyed driving up Black Canyon to work. There were deer everywhere, as well as other animals such as bobcats and coyotes. I remember working in one of the canyons, and observing a bobcat walking along side me, about 10 feet above my head, a couple times. There were also a lot of snakes there. Rattlers

were always getting into the buildings. I remember taking a group of people from back east on a tour of a lab, and there was a rattler at the door where we were exiting.

Interview 431

Upon my discharge for the U.S. Air Force, I was hired by Rocketdyne, a division of North American Aviation, and worked as a Technician at the Santa Susana Field Lab (SSFL) on the second shift from 1963 until 1966. During the day, I attended Pierce College in Woodland Hills and later transferred to the San Fernando State College in San Fernando, California. My employer then transferred me to Canoga Park where I worked in Contracts as a Buyer. I eventually completed my education at California Lutheran College and obtained a Masters of Administration Degree in 1984. I left the Canoga Park facility in 1983 with my wife and moved to Virginia where I worked for Boeing Aircraft Company.

As a Technician at the SSFL, I had various assignments at two of the rocket engine test stands although I do not recall their locations or names. Along with other Technicians, I worked on modifications of the engines, the gas generators, the fuel hoses and other components. I recall the engines used liquid oxygen (LOX) and hydrogen as fuel and hydrazine was another fuel used. Although I did not handle the fuels, there were occasions when I assisted in off-loading LOX and hydrogen into tanks from delivery trucks. I routinely used various quantities of trichloroethylene when cleaning parts or my hands. The solvent was usually contained in buckets during cleaning and when it was spent, it was a common practice to either dump it into a container or onto the ground, whichever was convenient. I don't remember any other hazardous materials that I had worked with.

I remember occasions when I was assigned to clean up spills of substances, but I do not recall what they were. I was supplied a quantity of Kotex napkins as an absorbent cleaning material to wipe and clean with in a building where the spill occurred, but I cannot recall the building's location or number. The only personal protection equipment I used was gloves. When completed, the Technicians put the used Kotex into a special container and I cannot remember what was done with the clean up items.

While I cannot recall if I worked with or handled radiological materials, I wore film badges when I entered certain areas at the SSFL and the badges were checked once a month. I can't remember what areas they were and I do not recall ever working in the Atomics International area of the SSFL.

My work did not require me to write reports or create documentation that I remember, but I may have occasionally made daily log entries as well as fill out work time sheets. I do not know what happened to such paperwork.

While it may have occurred, I never observed the disposal of liquid materials into toilets or floor drains nor do I recall a surface disposal area at the western edge of Area 4. Further, I never dealt with storage tanks other than the off-loading deliveries of LOX and hydrogen, or gas holdup tanks, nor do I remember fuel element cleaning areas or problems with pumps, sumps, piping, and sewer or drainage systems. I remember the old conservation yard was a location where old parts were stored but I had nothing to do with it. Also, I was aware of the existence of the Sodium Burn Pit however I had nothing to do with its operations either.

Most of the time when I worked at the SSFL I lived in Thousand Oaks. I drove to work from the San Fernando Valley side of the facility through the canyon. There were a few times that I drove up through Black Canyon from Simi Valley but I did not care to drive the curvy and winding canyon road.

I generally enjoyed my time while assigned to the SSFL. It was a rural area where wild life such as deer and snakes were commonly seen. In fact, once while driving my MG to work, a deer leaped onto the hood of my car as it was crossing the road, and left its hoof marks on top of the car. I usually took my lunch with me but on occasion, mostly after payday, I bought food from the roach coach that made the rounds near where I worked. Often during my lunch breaks, I would take walks with other guys around the SSFL.

Shortly before leaving Canoga Park to move to Virginia I had a physical. The doctor at the time told me that I would eventually have problems with my white blood cells. I don't remember what prompted the doctor to tell me that. A few years ago, I was diagnosed as having multiple myeloma.

Lastly, a former co-worker of mine, ACB, who also was a buyer in Canoga Park might be considered a former and informative employee to also interview, although I don't know if he ever worked at the SSFL.

Interview 596

I started working at SSFL in 1966. I worked for Atomics International, in Area IV in buildings 38, 36, and 27. I retired in 2008. I worked in the ETEC/Liquid Metals Library.

I know nothing about how radiological materials or hazardous chemicals were handled. My work was strictly in the administrative arena. I did not work in operations.

The company always operated in accordance with written procedures, we had a lot of procedures. The procedures prepared by managers in communication with their employees; the employees had input in the procedures. Company procedures were printed and put into books. Each employee was given a desk copy for their own purposes. There was an official copy located in each work area; for each group. All work was supposed to be done in compliance with the department copy; it was the most up-to-date version. Changes in the procedures were called either amendments or revisions. A designation of either an A or an R was included in the latest version of each procedure. Changes made to correct typographical errors were called amendments.

In the 1970s, if a procedure was changed, it was transmitted to managers/supervisors via memo and the new procedure attached. Prior to that, changes were made to procedures on an as needed basis. Later, DOE changed its policy and procedures were reviewed and revised on an established schedule. The company changed its policy to be consistent with DOE's policy.

Across the company, we followed the rules. Most of our managers were engineers. That's the way they are programmed – to follow the procedures. It's hard to imagine that anyone would have ever done anything any other way.

(In response to a question about how workers were trained) In Operations they had to pass tests to demonstrate their qualifications for the job, to qualify for their positions. They had to renew their qualifications on a periodic basis, to demonstrate that they still knew how to do things properly.

In the administrative areas, we were trained on the job, by our co-workers.

The company did have a demerit system. If someone was late for work or if they did not show up for a shift, they would receive a demerit. There were a lot of ways to receive a demerit. The list was double column, with small print.

For a portion of the time that I worked at SSFL, I was expected to send a weekly report to manager that reported on my accomplishments for the week. I assume others had to do the same. That was not true over the entire time that I worked there, but for part of the time.

Logbooks were stored in the Engineering Department files. We did not keep logbooks or ledgers in the library.

In the library, we maintained an international collection, an extensive library of books, research monographs, technical reports, etc. on topics relevant to the laboratory, particularly on sodium and NAK. Back in the heyday, we were acquiring new materials with some frequency and we would produce a weekly list of accessions (that's what we

called the items in the library) that we sent out to all the engineers. In later years, the list was produced monthly; we weren't acquiring new materials quite so fast. Not everything in the library was published; sometimes an engineer would prepare a report on something they were doing and they would provide a copy of that report to the library so that others could read it. It was not mandatory; it was up to them.

For part of the history of the library, we allowed public access to the collections. They were not allowed into the collections, but if we got an inquiry, we would conduct a search of our holdings and provide them with a list of citations that they could track down on their own, through public libraries or UCLA's library.

In 1972-73, DOE policy changed radically and the information center was closed down. We became the library on the "Hill." Information was much more tightly controlled and for limited distribution. None of the holdings in the library were ever classified. Before that point in time (1972/73), there had been a lot of sharing of information with international scientists. For example, we shared a lot of information with French scientists. Once they got their first reactor up and running, however, they stopped sharing information with us, and so we stopped sharing information with them. Things became much more formalized and international requests for information had to go through DOE. DOE entered into separate agreements with the scientists in each country and everything was much more controlled.

I don't know anything about how operations were documented. I assume that information was handled by the managers. I would not have had access to that information.

I know nothing about the sodium burn pit; a surface disposal area at the western edge of Area IV; leach fields, septic tanks, or drainage discharge locations; storage tanks, gas holdup tanks; or problems with underground pumps, sumps, storage tanks, piping, sewers, and drainage systems. I did see the old conservation yard as it was a fenced area that I drove past every day.

SSFL was a beautiful place to work. The drive was so beautiful; it was a pleasure to drive up there every day, in all the seasons. I probably would not have stayed at any other job for so long. It was so pretty up there.

Most of the people who worked up there were great. We often had potluck luncheons and everyone would bring something to share. We had a recreation center down in the valley where we had big picnics. There were tennis courts and a pool. SSFL was very family oriented. Many married couples worked up there, both husbands and wives worked on site, and then eventually their kids would get jobs up there when they grew up.