COMMITTEE TO BRIDGE THE GAP
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7 April 1997

Mr. Jerry Gaylord
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Safety, Health & Environmental Affairs
Rocketdyne Division
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6633 Canoga Avenue
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Re: Comments on Environmental Monitoring Activities at the Rocketdyne Santa Susana Field Laboratory

Dear Jerry:

Please find enclosed my comments on some of the environmental monitoring activities being undertaken at the Rocketdyne Santa Susana Field Laboratory. You requested that I submit these comments in your 10 March 1997 letter to Mr. Tom Kelly of the United States Environmental Protection Agency.

As is apparent in the enclosed comments and questions, I am concerned about a variety of serious problems I have identified in my review of the Radiological Survey and RCRA Facility Investigation activities. While my comments and questions are very specific, my overall conclusion is that it will be difficult, if not impossible, for you to remedy the underlying problems with these studies.

I look forward to your response to my concerns.

Sincerely,

Joseph K. Lyou, Ph.D.
Executive Director

002808RC

Enclosure: As stated.

cc w/ encl.:

The Honorable Barbara Boxer
The Honorable Sheila James Kuehl
Ms. Felicia Marcus, Administrator, U.S. EPA Region IX
Mr. Tom Kelly, U.S. EPA Region IX
Ms. Vicky Semones, U.S. EPA Region IX
Mr. Gregg Dempsey, U.S. EPA
Mr. Hannibal Joma, U.S. Department of Energy
✓Mr. Phil Rutherford, Rocketdyne
✓Mr. Art Lenox, Rocketdyne
Mr. Phil Chandler, Dept. of Toxic Substances Control
Mr. Larry Kolb, Acting Executive Officer, Los Angeles RWQCB
Mr. Joshua Workman, Los Angeles Regional Water Quality Control Board
Mr. Ed Bailey, Department of Health Services
Ms. Barbara Johnson, Public Member, Multi-Agency Workgroup
Dr. Sheldon C. Plotkin, Public Member, Multi-Agency Workgroup
Prof. Jerome Raskin, Public Member, Multi-Agency Workgroup

Comments on Environmental Monitoring Activities at the Rocketdyne Santa Susana Field Laboratory

April 1997

Submitted by
Joseph K. Lyou, Ph.D.
Committee to Bridge the Gap

Summary

A critical review of environmental monitoring activities at the Santa Susana Field Laboratory (SSFL) raises many important questions about the validity of two programs designed to assure the public that contaminated areas are being properly identified. For example, the use of seemingly inflated "background" comparison levels for gamma radiation measurements suggests that large segments of the Department of Energy (DOE) area within the facility could be contaminated at levels that exceed established radiation dose standards. The misapplication of statistical testing protocols raises additional questions about onsite contamination. In the area of chemical contaminants, Rocketdyne appears to have made questionable assumptions about the future use of onsite natural resources. In addition, detection limits exceed action levels for tests of several contaminants in onsite soils.

Mr. Jerry Gaylord of Rocketdyne has asked the Committee to Bridge the Gap to submit written comments on environmental monitoring activities at SSFL. The following comments and questions are, therefore, directed to Rocketdyne.

SSFL Area IV Site Characterization Report

Rocketdyne conducted a "radiological characterization" survey of Area IV of its SSFL facility. In the study, Rocketdyne wrote, "The purpose of the study was to locate and characterize any previously unknown areas of elevated radioactivity in Area IV." The following comments and questions are based on the study.[1]

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[1] Rockwell International. (1996). *Area IV Radiological Characterization Survey, Final Report.* Santa Susana, CA: Rockwell International.

Key Issue: The "background" gamma radiation level used by Rocketdyne appears to include an upward bias through the use of measurements taken at or near the facility. Areas declared clean may actually be far in excess of established release standards. This issue jeopardizes the validity of the conclusions of the entire study.

1. Table E-1 and Table E-2. So-called "background" measurements appear to include data from within Area IV. The list includes "background" measurements from the "Radioactive Materials Disposal Facility," the "Sodium Burn Pit Watershed," and the "Sodium Reactor Experiment Watershed." At the last Multi-Agency Workgroup meeting, Phil Rutherford of Rocketdyne denied that these measurements were taken onsite.[2] Please identify precisely where and how these measurements were taken. A cursory review of the data in Tables E-1 and E-2 seems to indicate (1) that higher gamma measurements appear to be associated with "background" measurements taken near (or at) SSFL and (2) that the "background" measurements taken from Area IV appear higher than those measurements taken from offsite locations.

I performed a formal statistical analysis of these data and found a significant correlation between the amount of gamma radiation measured and the distance from SSFL. Measurements taken near or at SSFL were associated with higher gamma radiation than measurements taken farther away from the facility. (The formal statistical characterization of this analysis is $r = -.61$, $N = 188$, $F(1, 186) = 107.37$, $p < .001$.) I performed a second analysis and found a statistically significant difference between those "background" measurements taken at SSFL and nearby and distant offsite "background" measurements, with onsite measurements being significantly higher than offsite measurements.

[2] The Multi-Agency Workgroup is coordinated by the United States Environmental Protection Agency and includes representatives from Rocketdyne, members of the public, the United States Department of Energy, the California Department of Health Services, the California Department of Toxic Substances Control, the Los Angeles Regional Water Quality Control Board, and the Ventura County Air Pollution Control District. The last meeting of the Multi-Agency Workgroup was held February 26, 1997, at Simi Valley City Hall Council Chambers.

Comparison of "Background" Measurements
(in μ-rem per hour)

	Onsite	Nearby (1-4 miles)	Distant (10-13 miles)	Used by SSFL
Avg.	15.9	14.6	9.2	15.6

(The formal statistical characterization of this analysis is $M_{onsite} = 15.9$, $\sigma = 1.3$, $N_{onsite} = 44$, $M_{nearby} = 14.6$, $\sigma = 1.8$, $N_{nearby} = 132$, $M_{distant} = 9.2$, $\sigma = 2.5$, $N_{distant} = 12$, $F(2, 185) = 70.2$, $p < .001$.) Rocketdyne reported that Area IV gamma measurements do not differ from "background" measurements. The apparent use of onsite measurements to establish "background" levels and the statistical analyses of these data presented here raise serious questions about the validity of this conclusion. If the "background" comparison level has been artificially inflated, areas declared clean as a result of this study may actually be contaminated at levels far in excess of established radiation dose standards. This issue jeopardizes the validity of the conclusions of the entire study.

2. Page 22. *"Area IV cesium-137 was 0.15 ± 0.51 pCi/g compared to local background at 0.09 ± 0.12 pCi/g. However, Area IV cesium-137 was well within the U.S. average background range of 0.8 ± 1.0 pCi/g (Section 4.2.3.2 and Table 10)."* The information reported on this page is inconsistent with the information reported in Table 10. Table 10 indicates that the observed Area IV Cs-137 was 0.15 ± 0.26 pCi/g, not 0.15 ± 0.51 pCi/g as reported on p. 22. Table also 10 indicates that the U.S. average background Cs-137 is 0.8 ± 0.3 pCi/g, not 0.8 ± 1.0 pCi/g as reported on p. 22. Please explain this inconsistency.

Key Issue: Rocketdyne appears to have ignored the established 15 mR/yr annual dose limit by setting its threshold for further review at an above-background dose of 35 to 44 mR/yr. In terms of assurances about public safety, the use a 35 to 44 mR/yr threshold has rendered the entire study meaningless since the public can have no confidence that any of the surveyed areas fall below the 15 mR/yr annual dose limit.

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3. Page 32. *"A counting rate of 4000 cpm, equivalent to 4-5 μR/hr above the estimated background, was used as the threshhold (sic) for further review."* This rate equates to an above-background dose of 35 to 44 millirem per year (mR/yr), far above the established

"acceptable" annual does limit of 15 mR/yr.[3] The above-background threshold for further review should have been, at maximum, 15 mR/yr (or 1.71 μR/hr). In terms of assurances about public safety, the use a 35 to 44 mR/yr threshold has rendered the entire study meaningless since the public can have no confidence that any of the surveyed areas fall below the 15 mR/yr annual dose limit. Please explain why this issue was not considered prior to going forward with the study. Please explain how, giving this problem, Rocketdyne can assure that it is not releasing areas that could include radiation dose levels above established standards. Please explain if the use of the 4-5 μR/hr above-background threshold represented the sensitivity limits of the measuring device. In addition, please explain the procedure used to convert counts-per-minute into microrem-per-hour. Please include a full explanation of all assumptions made in calculating this conversion.

Key Issue: Rocketdyne biased the "background" comparison level used to test for elevated gamma radiation by eliminating 4 of 11 background soil sample sites because of low readings.

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4. Page 45. *" . . . the Tapia Park and Tapia Park Ravine results were much lower than the other and are not used here. The Wildwood Park and Wildwood Park Ravine results are relatively low but do not differ from the others as much as those for Tapia Park and Tapia Park Ravine. They are excluded, however, for the same reason: nontypical isotopic composition."* Rocketdyne threw out 4 of 11 background soil sample sites because of low readings. This resulted in the use of an upwardly biased "background" comparison level.

5. Page 56. *"A data set from Area IV is considered to be the same as background if the p-value calculated by the test is greater than 0.05."* This practice violates the most fundamental tenet in statistics - one must never "accept" the null hypothesis. A failure to discover contamination does not mean that it doesn't exist. It just means that you've failed to prove that it does exist. The report should be rewritten to make this point clear. In addition, Rocketdyne offers no tests of, or justifications for, the assumptions made in using the Behrens-Fisher modified t-test (e.g., normal distributions and homogeneity of variance).

6. Page 58. Rocketdyne cites to Table D-2. There is no Table D-2. Please explain.

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[3] To convert μR/hr to mR/yr, multiply μR/hr by 24 hours per day, by 365 days per year, and by 0.001 μR per mR. Thus, 1 μR/hr = 1 x 24 x 365 x 0.001 = 8.76 mR/yr.

Key Issue: Rocketdyne identified 18% of its soil samples "as having possibly higher than local background radioisotope concentrations."

7. Page 61. *"Of 149 soil samples, 27 were identified as having possibly higher than local background radioisotope concentrations."* This 18% rate of above background hits makes one wonder what was missed and what would have been found if additional samples had been taken.

Key Issue: Rocketdyne failed to identify the source of contamination measured at greater than 3,000 times background.

8. Page 64. Rocketdyne discovered 271 pCi/g of Cs-137 at Building 064 Sideyard. This is greater than 3,000 times background (0.087 pCi/g). Rocketdyne does not explain how that contamination got to that location. In the absence of knowing the source of this contamination, it is impossible to determine the possible existence and location of other contaminated areas (e.g., where contaminants have migrated or been deposited).

9. Page 65. Rocketdyne reports of measurements being "within the range of U.S. background" but does not define specifically what this means. In addition, the calculated regulatory limits for various isotopes raises questions about the validity of the DOE RESRAD code. For example, the limit for plutonium-239 (34 pCi/g) is nearly three times more lax than the limit for strontium-90 (12 pCi/g) despite the fact that, based on U.S. NRC standards, plutonium-239 is approximately 1,500 times more toxic than strontium-90 when inhaled and 25 times more toxic than strontium-90 when ingested. (See 10 CFR Part 20, Appendix B.) Please explain this apparent discrepancy.

Key Issue: Rocketdyne found contamination in areas that it supposedly had already cleaned up.

10. Table 6. Several above background measurements come from "prior remediated" areas and facilities. Please explain how a "remediated" area could still be contaminated and what guarantees there are that further remediation would work, and that remediation of other sites can be considered effective in light of these findings.

Key Issue: Rocketdyne used questionable statistical techniques in its analysis of possible contamination.

11. Appendix F and Table F-1. Rocketdyne presents a "statistical comparison" between Area IV and "background" sample results for various contaminants. The comparison does not get to the real issue of concern – whether specific areas of contamination in Area IV represent a threat to public health and safety. The analyses are based on comparisons of sample means (i.e., averages), which only tells us if Area IV can be considered, on average, contaminated when compared to average "background" measurements. The threat to public health and safety comes from specific sites, not averages. In addition, the authors present no information about the power of their statistical tests (i.e., the ability to detect a difference if one really exists). Power calculations should be provided as should standard deviation or variance values associated with each set of measurements. Furthermore, the authors use a two-tailed significance test with a .05 alpha level. A more appropriate significance level test would be a one-tailed .10 alpha level test. A one-tailed test is appropriate because there is no theoretical reason for "background" measurements to be higher than Area IV measurements (unless the "background" samples are biased or contaminated). A .10 alpha level is appropriate because it is more important to identify contaminated areas (i.e., avoid Type II errors) than it is to protect against concluding that the area is contaminated when, in fact, it is not contaminated (i.e., a Type I error). Areas found to be contaminated using a one-tailed .10 alpha level can always be retested prior to undertaking remediation activities. If one must err, it's much better to err on the side of safety.

RCRA Facility Investigation Activities

Under the regulatory oversight of the California Department of Toxic Substances Control (DTSC), Rocketdyne has begun to assess the extent of chemical contamination in SSFL soils. This assessment is being conducted under the legal requirements established by the Resource Conservation and Recovery Act (RCRA).

1. As a result of the controversy surrounding the use of the contractor Transglobal Environmental Geochemistry (TEG) to conduct soil vapor sampling at SSFL, we learned that the Los Angeles Regional Water Quality Control Board (RWQCB) Soil Gas Committee objects to the practice of allowing contractors to adjust the range of detection setting of the measurement equipment while analyzing a sample. Did TEG adjust the range of detection setting while analyzing SSFL soil vapor samples? If so, does Rocketdyne intend to rely upon those results when preparing its remediation plans? Will Rocketdyne allow its new contractor to make these adjustments while analyzing samples? If so, please provide an explanation of this decision. Please provide

documentation as to whether TEG adjusted its range of detection settings during SSFL soil vapor sample analyses.

RFI Work Plan

1. Page 2-8. Rocketdyne assumes that there will be no food chain exposure pathway. Currently, avocados and oranges are grown just outside SSFL property. What specific prohibitions will prevent future site users or residents from using the SSFL area for gardening or agriculture? How will these prohibitions be enforced? Who will enforce them? How long, if ever, will it be before contaminants no longer pose a threat to public health and safety? How does Rocketdyne plan to assure that there will be no gardening or agricultural use of SSFL property (or adjoining property contaminated as a result of activities at SSFL) for as long as the contaminants remain a threat to public health and safety?

Key Issue: Rocketdyne has made questionable assumptions about future uses of natural resources at SSFL.

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2. Page 2-8. Rocketdyne assumes that there will be no future use of onsite groundwater. What will prevent future site users from using onsite groundwater? In addition, Rocketdyne assumes that the final groundwater treatment system will prevent offsite migration of "impacted" groundwater. Contaminated groundwater has migrated (and may still be migrating) offsite. The groundwater treatment system would have to alter significantly the natural tendencies of groundwater migration. In its *1996 Annual Groundwater Monitoring Report* (p. 22), Rocketdyne explains that it has not yet collected all the data necessary to design a groundwater treatment system that will prevent offsite migration of all contaminated groundwater. Isn't it presumptuous to claim that all offsite migration of contaminated groundwater will eventually be prevented?

3. Table 2-2. Rocketdyne proposes "Candidate Chemicals for Field Action Levels" that include some but not all polyaromatic hydrocarbons (PAHs) [or polynuclear aromatic hydrocarbons (PNAs)]. I understand that PAHs are associated with certain types of diesel fuels. These fuels may have been used at SSFL. PAHs are extremely toxic. Water standards for PAHs are in the parts-per-trillion range. Please explain why Rocketdyne does not propose to establish FALs for all PAHs. In addition, please explain how Rocketdyne plans to test for PAHs, what FALs will be used, and what the corresponding minimum detection limits will be. Describe how Rocketdyne will address problems associated with detecting PAHs that exceed soil and groundwater standards.

4. Table 2-4. Explain why there was no offsite background measurement for barium.

5. Page 4-9. Rocketdyne refers to TEG as a "California-certified" mobile laboratory. Similar claims were made repeatedly during the training session attended by members of the public in preparation for observing TEG perform soil vapor samples. Unlike soil matrix sampling, neither California nor the federal government certifies soil vapor sampling. It is misleading to refer to the mobile laboratory as "certified" when no certification process exists for the measurements being made.

Key Issue: Detection limits exceed field action levels for several contaminants.

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6. Table 4-3. Please explain why detection limits exceed field action levels (FALs) for vinyl chloride, NDMA, hydrazine, monomethyl hydrazine, and three types of dioxin/furan compounds. Rocketdyne will not know if these contaminants exceed the established FALs. Doesn't this make the FALs for these contaminants rather meaningless? Is Rocketdyne doing anything to address this problem?

7. Page FP-C-3-6. *"In general, only contaminants with relatively high Henry's law constants are amenable to detection using soil gas."* Please provide a list of suspected site contaminants ranked (low to high) by their respective Henry's law constant and explain what is being done to detect contaminants with less than "relatively high" Henry's law constants. Please identify those contaminants that cannot be detected by soil gas sampling.

Soil Vapor Results for Area I and Area III

1. Rocketdyne states that it has met with DTSC and Rocketdyne to discuss RFI activities. In the future, we ask DTSC and Rocketdyne to provide timely notification of any such meetings to the public members of the Multi-Agency Workgroup and to invite those members (or their representatives) to attend those meetings.

2. Please provide a copy of the CalTOX risk assessment code and any supporting guidance or technical documents.

3. Please provide a copy of the draft risk assessment work plan as soon as it becomes available.

4. Rocketdyne reports that it has sampled 18 sites, but provides data only from 10 sites in Areas I & III and 6 sites in Area II. What other two sites did Rocketdyne sample and where are the results from these sites?

5. Rocketdyne claims to have taken 301 soil vapor samples but reports results for only 296 samples. What happened to the other 5 samples?

6. Rocketdyne reports that "plots will be prepared" of the RFI results. Will these be one-dimensional, two-dimensional, or three-dimensional plots?

7. Tables 1 & 2. Please explain why past sampling and future plans do not call for any samples to be taken at the R-1 Pond or Silvernale Reservoir.

8. Table 3. Please include applicable standards, confidence intervals, and minimum detection limits in all results tables. Note that this comment applies to all studies and reports. The failure to provide such fundamentally important information makes many of the tables and figures either meaningless or impossible to interpret without considerable effort.

9. Table 3. Where are the rest of the results? In would be particularly interesting to see the depth profile for various contaminants.

Soil Vapor Results for Area II

1. Rocketdyne added five sites based on their historical review of operations at the site, including the Coca/Delta Fuel Farm, which was neither a SWMU or an AOC. What is Rocketdyne doing to assure that other potentially problematic areas are properly identified?

2. Describe the effect of "soil saturation" on soil vapor sampling. What are the varying effects of differing degrees of soil saturation on the validity of the soil vapor samples?

3. Tables 1 & 2. Please explain why past sampling and future plans do not call for any samples to be taken at SWMUs 4.5, 5.5, 5.6, 5.23, and Building 515.