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D. E. Owens D E Owens 5/26/78	779	T055

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D. F. Kelly	9/21/78	W. R. McCurnin	9/8/78
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ABSTRACT

The results of the Radiological Survey for Region V (Gas Storage Vault) of the SRE are described. All survey results are below the applicable limits, indicating that this area may be released to unrestricted use.

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I. INTRODUCTION

This report covers SRE Region V, located north of the main reactor building (see Figure 1). Two facilities were located in this region as part of the reactor support system. They were identified as T686, the Hot Waste Storage area; and T653, Interim Radioactive Waste Vault. During the recovery phase of the reactor program (1961), additional storage space was needed to store irradiated core components, such as moderator cans and dummy fuel elements. A fenced-in asphalt area (T686) was designated for this purpose. During the lifetime of the facility no significant spread of contamination occurred. Principal radioactive material in this area was induced activity, although some mixed fission product (MFP) activity was present from fuel element failures. All material had been wrapped in plastic and placed in wooden boxes before moving to this storage area.

After Area T686 had been certified clean, it was removed by an outside contractor as one of the first facilities to be disposed of under the D&D Program at the SRE.

The second facility located in this region (T653) required extensive radiological support due to the nature of the facility. Four underground gas and two liquid holdup tanks were buried on the hillside. Along with these tanks were several concrete vaults that housed compressors and associated piping systems. Two auxiliary vaults held ten 50-gallon holdup tanks in addition to those tanks underground.

All liquid waste generated by the reactor program was eventually directed to one of the two tanks before final disposal. Principal sources of water were floor drains in the hot cell area, hot sinks in controlled areas, and the fuel element wash station located in the high bay area of the reactor room. The primary activity present in the water was due to MFP.

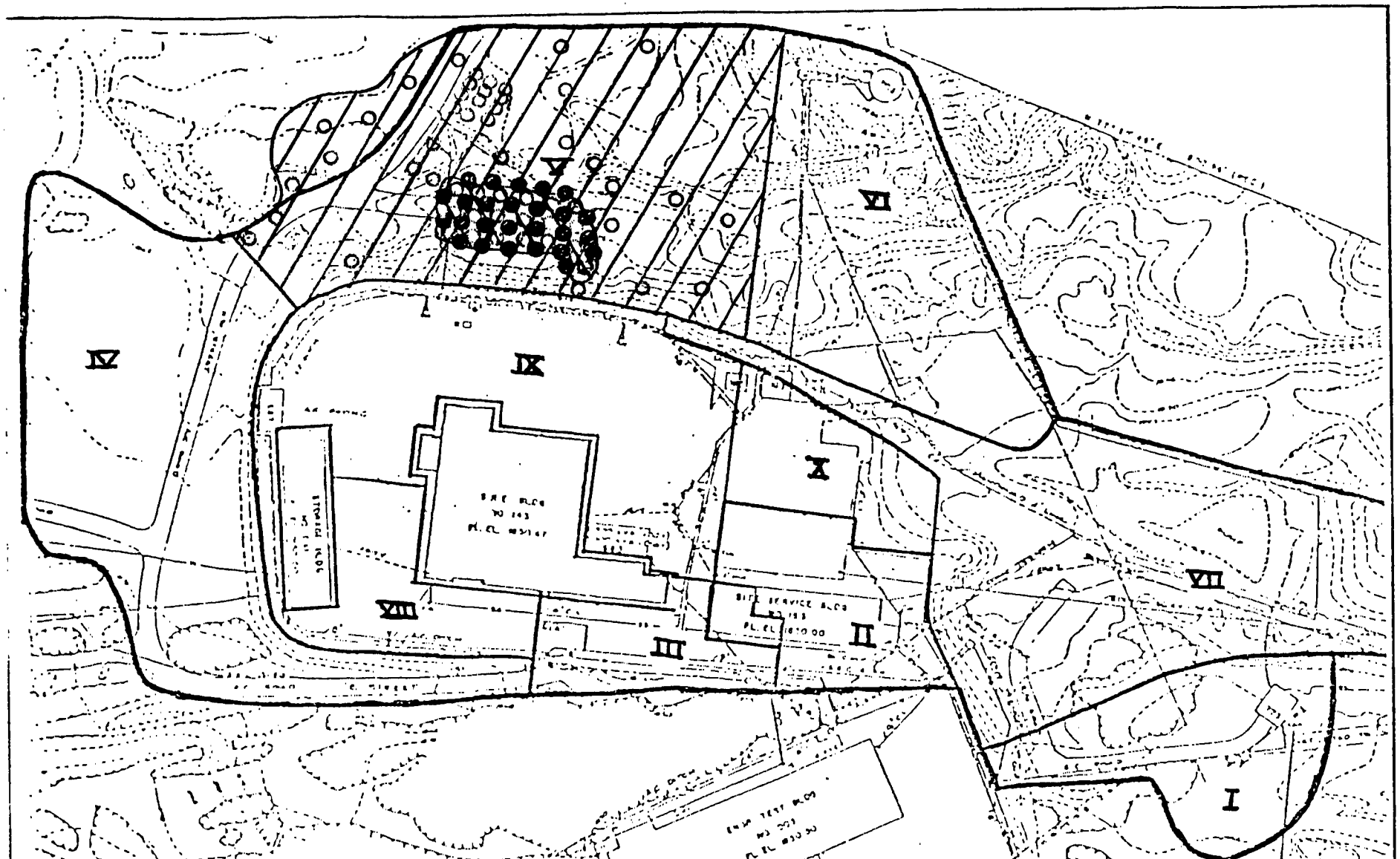

FIGURE 1

SRE FACILITY

Surveys

Instrument

Smear

Excavation

Soil Samples

Surface

Excavation

Two systems were used to collect radioactive gases at the SRE: a low volume system primarily from the core cover gas systems, and a larger volume system from all other areas. Gas was routed to one of the decay tanks where short-lived activity could decay. Activation products were the primary isotopes detected in the gas system.

Initial work began with removal of all buried tanks and associated pipes. A back hoe was used to gain access to each tank. Contaminated soil was detected between the liquid holdup tanks and a second location by one of the concrete vaults. This soil was boxed in 39-cubic-foot waste containers and shipped as radioactive waste along with the pipes, valves, and tanks from the building.

After all systems had been removed, further contamination was detected within the concrete walls and floor of one vault. To remove this activity, several inches of concrete had to be spalled away from the vault. This material was also packaged and shipped as waste.

A large number of soil and concrete samples were used to determine that no significant activity remained after all contaminated material had been removed. At this point, the concrete that was left was used as backfill to help stabilize the hillside.

II. SURVEYS AND RESULTS

A. REMOVABLE CONTAMINATION

All structures have been removed from this region. Smear surveys are not applicable for this part of the survey.

B. SURFACE RADIATION

Two survey instruments were used for this part of the report: a Technical Associates Model CP-7 ion chamber detector with an absorber thickness and range required by the specifications for this test, and a Technical Associates Model PUG1/P-11 probe thin window pancake G-M detector. This latter instrument was used to locate any unexpected source using its faster response and audible output.

A complete walk-through inspection was made in all accessible areas in this region. Each meter was held approximately 2-1/2 feet above the ground. Maximum reading recorded on the CP-7 meter was 0.08 (±0.05) mrad/hr along the south side of the region and in line with Building 041. This building, outside of Region V, is used as an interim radioactive waste storage area. Normal background for this instrument, measured more than 1 mile from the test site, is approximately 0.04 mrad/hr. There is an uncertainty of ±10% of full scale on the range used in this measurement.

C. SOIL SAMPLES

Twenty-two soil samples were taken thoughout that part of the region where Building T653 had been located. Forty-two other samples were taken in the remaining portion of the region which included that area where T686 had been located. Locations were selected for sampling by identifying areas most likely to collect and retain residual activity.

Wooden stakes were used to identify each sample point. Small salve cans, numbered to correspond to each sample location, were used to hold each soil sample. Undisturbed top soil from several locations around each station was collected, and when the can was almost full, the contents were shaken throughly to mix each sample.

All soil samples were then placed on a hot plate to drive off any moisture present. After the sample was dry, an aliquot from each sample was passed through a Gooch crucible. From this, a one-gram quantity was transferred to the counting planchette. Alcohol was added, and each sample tapped to uniform thickness. No chemical binders were added to the sample.

A thin window gas proportional counting system with an efficiency of approximately 36% for Bi-210 beta activity was used to count each sample. Normal background for this system is approximately 20 counts per minute. The efficiency of this system for alpha activity operating in the beta mode is 25%.

A one-gram prepared KCl standard was included with each group of samples counted. This sample was then used to determine a corrected efficiency factor. The maximum activity detected in any one sample was 49.3 pCi/g. All remaining samples ranged between 6.6 pCi/g to 40.2 pCi/g. Based upon errors associated with a single observation, the minimum detection level (MDL) is calculated to be approximately 10 pCi/g. The activity of natural uncontaminated soil ranges from about 20 pCi/g to 30 pCi/g.

D. CONCRETE SAMPLES

All structures have been removed from this area. Concrete samples were taken during demolition. All concrete with activity above 100 pCi/g was removed.

E. WATER SAMPLES

There are no locations within this region to entrap and hold water. Water samples are not applicable to this survey.

III. CONCLUSIONS

In each type of test performed, all samples indicated levels less than those limits prescribed by the Decontamination and Disposition of Facilities Program for release to unrestricted use.

All appropriate surveys indicate that current existing radioactivity in the area is below the applicable limits for release to unrestricted use.