U. S. NUCLEAR REGULATORY COMMISSION

REGION V

License Nos.: SNM-00031 (Terminated)
Report Nos.: 70-00038/93-01

SMB-00563 (Terminated)
40-02813/93-01

SNM-00119 (Terminated)
70-00138/93-01

04-00647-03 (Terminated)
04-00647-03/93-01

Previous Licensee: Aerojet General Nucleonic (AGN)
Aerojet General Corporation, Nuclear Division
3300 Crow Canyon Road
San Ramon, California 94583

Current Facility Name/Owner:

Buildings 1 - 15: ONB Associates
8 Red Cedar Court
Danville, CA 94506

Building 1, Current Occupants:

Aero Turbine
3355 Fostoria Way
Sam Ramon, CA 94583

Building 2: Trident Corporation
480 Market Place
San Ramon, California 94583

Buildings 3 - 19: San Ramon Valley Unified School District
Service Center
3280 E. Crow Canyon Road
San Ramon, California 94583

Inspection At: 3280 E. Crow Canyon Road and
3355 Fostoria Way,
San Ramon, Contra Costa County, CA

Inspection Conducted: September 3, 1993

Inspection By: _____ 2/3/94
H. Chaney, Senior Radiation Specialist, Facilities Radiological Protection Branch — Date Signed

J. Wong, State of California, DHS

Approved By: _____ 2/3/94
James H. Reese, Chief, Facilities Radiological Protection Branch, DRSS — Date Signed

Summary:

Areas Inspected: This was a special inspection to survey facilities where radioactive materials were previously used under NRC license. This inspection included a review of the former licensee's (Aerojet General) activities associated with the decontamination and remediation of the facilities in San Ramon California. This inspection is part of an NRC project in which an evaluation of 17,000 retired radioactive material licenses was conducted by an NRC contractor (Oak Ridge National Laboratories-ORNL). From the information contained in retired license files, sites having a potential for residual contamination were identified for further investigation. Due to the lack of specific information in the retired files ORNL concluded that the facilities formerly used by Aerojet-General Nucleonics and Aerojet General Corporation Nuclear Division (to be referred to as Aerojet) could have residual radioactive contamination present. The residual contamination found was evaluated to the NRC's release limits currently in effect - Appendix A to NRC Inspection Procedure 83890 (See Attachment 1 to this report).

Results: The NRC and State of California inspectors did not identify any radiation levels above natural background within the facilities occupied by the San Ramon Valley Unified School District (SRVUSD); however, low level fixed radioactive contamination was identified in the facilities currently occupied by the Aero Turbine Company (Building 1, internal areas 1C and 1D). A site diagram is provided in Attachment 2 to this report. No loose radioactivity was identified. A concrete sample of the area showing the highest level of fixed contamination (in Section 1C) was obtained, as well as one soil sample from area north of Building 1, thought to be the location of the old sanitary leach field for the facility. The radioactivity in Building 1 was determined to be of the isotope cesium-137 (half-life ~ 30 years). No radioactivity was detected above natural background in the leach field sample. Attachment 3 is the State of California's analysis results for the concrete and leach field soil samples.

Building 2 (Bruener's facility) was not surveyed since there was no history of the radioactive material use in the building.

Currently the areas of fixed radioactivity are not a health or safety hazard to employees of Aero Turbine or the public.

DETAILS

1. Persons Contacted

H. Simens, Consultant (former Aerojet Manager)
D. Clayton, President Aero Turbine (Tenant and Part Owner)
M. Nelson, ONB Associates (Part Owner)
J. Morrison, Director, Service Operations SRVUSD
J. Uranga, Senior Counsel, Aerojet General Corporation
R. Fricke, Supervising Hydrogeologist, Aerojet
W. Kramer, Director of Property, Aerojet
P. Meier, Manager of Property, Brueners of California

2. Background

AEC and NRC Special Nuclear Materials licenses (SNM-00031, SMB-00563, and SNM-00119), and Byproduct License 04-00647-03 (converted to California State license 0221-59), were in effect, for various periods from July 1956 through May 1970. These licenses authorized a broadscope of reactor fuel research and development, special reactor fuel production, radiochemistry, and nuclear physics research. Some of the programs carried out under the licenses were:

- AGN Nuclear Reactor fuel production
- Nuclear reactors for space vehicle auxiliary power
- Experimental breeder reactor fuel fabrication/production.
- Plasma physics research
- Radiochemistry

Various radioisotopes were used at the facility, including mixed fission products, plutonium, and enriched uranium, in both sealed and unsealed forms.

Radiological closeout surveys of all facilities were conduct between late 1969 and June 1970, by the State of California and the AEC using release criteria slightly higher than that currently employed by the NRC. The 1970 release criteria used was agreed upon by the State and the AEC. Also, the 1970 final surveys did not meet the current survey criteria or methodology for release of facilities, as set forth in NUREG/CR-5849, "Manual for Conducting Radiological Surveys in Support of License Termination," draft May 1992. Furthermore, areas previously surveyed and released prior to the 1970 surveys were not resurveyed during the 1970 release surveys, even though they were released under guidance that also had higher release limits than allowed at that time (1970). Overall, the records showed that low levels of residual radioactivity remained at the facilities, post termination. The inspectors determined that no environmental sampling of the environs (soil or ground water) adjacent to the facilities was conducted prior to its release for unrestricted use.

3. Facility Status

Based on observations during this inspection the facility, as it was shown in a NRC file drawing (1968 AGN plan CF 64-128-02, revision C, dated October 3, 1968), is almost unchanged from what was present in May of 1970 when the facility was released. Interior sectional walls in many of the buildings (Bldgs) have been removed or relocated (Bldgs 1A, 1C, 3, and 7) and a few small out buildings (Nos. 14 and 13) have been removed. The majority of the flooring is as it was left when AGN vacated the facilities.

Building 1

Currently Aero Turbine occupies the old Bldg 1 complex (radiochemistry, AGN reactor space, fuel production areas). Aero Turbine performs repair and testing of jet engines in the areas previously designated as Sections 1B, 1C, and 1D. The old area designated as "1A" is mostly vacant (approximately 50 percent of the interior walls have been removed). Aero Turbine also has a voluminous amount of material stored in the open areas south of Bldg 1D.

Building 2

Aerojet transferred ownership of Bldg 2 (a two story 75,000 square foot building) to the John Breuner Company on April 30, 1976. Brueners Corporate staff occupied the building until October 1991. Building 2 has been vacant since then and under new ownership. Currently the building is being renovated into leased storage modules.

Buildings 3 and 7

Since 1970 the San Ramon Valley Unified School District (SRVUSD) Service Center has occupied and used Bldgs 3 and 7, and adjacent small out-buildings (4, 8, 12, 13, etc.,) for vehicle repair shops, administrative offices, hazardous material storage, and school service craft facilities. Currently there is a special education school (10 or less students) occupying the rooms adjacent to the old fuel vault (Bldg 7).

4. Independent Radiological Measurements

During the evening of September 3, 1993, NRC and State of California inspectors conducted, per agreement with Aero Turbine and SRVUSD management, radiological surveys of the facilities shown in Attachment 2.

The surveys included both direct (fixed) and loose surface (swipe survey) radioactivity measurements, and general area exposure rate measurements, and general area exposure rate measurements. Instruments for detection of alpha, gamma, and beta/gamma radiations were used. See Attachment 4 for listing of radiological survey instruments used, and their detection capabilities and calibration data.

Areas Surveyed:

SRVUSD Buildings

Surveys were conducted in various areas of Buildings 3, 4, 5, 6, 7 (including the old vault), 8, 10, 13, 19. No radioactivity above background was detected.

Aero Turbine Facilities (Building 1 and 14)

Less than adequate lighting was available in Sections 1A and 1B of the facility, and the audible response of the instrument was used for seeking out areas for closer scrutiny. Selected portions of floors and walls of old radiochemistry laboratories (Sections 1A and 1B), and portions of the sanitary drain piping trench and the first few inches of the internal surface of two drain pipes exposed in section 1A were surveyed. Outside along the west side sidewalk of Section 1A the gamma scintillation instruments gave a slight increase in response above background, but the inspectors were not able to pinpoint any specific location as the source of activity.

Randomly selected floors and outside surfaces of Bldg 1 Sections 1C and 1D were surveyed. Doorway sills, cement slab joints, and building interior framing near floor levels were selected most often as survey points. Outside areas were surveyed as lighting and storage area congestion allowed.

A small volume of concrete was chipped away from the floor (in Section iC) for analysis by the State of California. Attachment 3 is the documentation of the sanitary leach field soil sample and concrete sample analyses results.

Results

No alpha contamination was detected in any of the areas surveyed.

The following beta/gamma contamination was detected in Building 1.

- Section 1C, a long narrow rectangle shaped area (4 inches wide by 72 inches long). This appears to correspond to the outline of a former wall floor plate (apparently a wooden 2x4) for the EBR II/Inert Parts Area/hot cell, referenced in Aerojet Drawing CF 64-128-2.

  Maximum fixed radioactivity was calculated to be in the range of 7,000 to 13,000 disintegrations per minute (dpm) per probe area (approximately 15.5 square centimeters-cm^2) throughout the strip of activity. This equates to approximately 46,000 to 85,500 dpm/100 cm^2, which is above current release limit of 15,000 dpm/100 cm^2 referenced in IP 83890. See Attachment 4 for the counting statistics used.

Average fixed radioactivity was determined to be approximately 1,858 dpm/100 cm^2, which is below the allowed limit of 5,000 dpm/100 cm^2, referenced in IP 83890.

- Section 1C, a small portion (2-3 inches long) of a fiber filled crack (1 inch wide slab joint) below a pedestal grinder in Aero Turbine's welding area (part of the old hot cell in Section 1C).

  Maximum ~13,150 dpm/100 cm^2

- Section 1D, along 6-10 inches of a surface crack, in the southwest corner of the Hydraulic Test Facility floor, just inside (2 feet) of the south most door of the facility.

  Maximum ~46,000 dpm/100 cm^2

- Section 1D, a spot of contamination at the east side of the doorsill of the south most door to the Hydraulic Test Facility.

  Maximum ~46,000 dpm/100 cm^2

No other significant radioactive contamination was detected within the facilities surveyed.

4. Exit Meeting

Preliminary results were discussed with Messrs. D. Clayton and M. Nelson following the survey on September 3, 1993.

5. Post Survey Activities Chronology:

- September 28, 1993, Messrs. D. Clayton and M. Nelson were again contacted and the results of the soil and concrete analysis were conveyed to them. Mr. D. Clayton indicated that they would be vacating the premises around December 1, 1993, and that this was a move that was in the planning prior to our survey.

- November 6, 1993, Mr. Jose Uranga of GenCORP-Aerojet was contacted and informed of our activities, the survey results, and that since Aerojet was the last known NRC licensee to occupy the subject premises we would expect them to conduct a radiological characterization of the subject facilities for determination of future decommissioning needs.

- January 10, 1994, Mr Jose Uranga and Rodney Fricke visited the NRC Region V office to review our Aerojet files. Mr Uranga stated that their files had been purged or what they had were incomplete.

- January 10, 1994, NRC inspector H. Chaney, Messrs. Uranga, Fricke, and their consultant H. Simons visited the Aero Turbine facility.

Mr. Chaney demonstrated how the surveys were conducted and the locations of the residual radioactivity found during the September 3, 1993, surveys.

- As of January 21, 1994, Aero Turbine was still in the process of moving out of Building 1 and adjoining property.

- January 27, 1993, Aerojet copied applicable historical documents in NRC files.

APPENDIX A

GUIDELINES FOR DECONTAMINATION OF FACILITIES AND EQUIPMENT PRIOR TO RELEASE FOR UNRESTRICTED USE OR TERMINATION OF LICENSES FOR BYPRODUCT, SOURCE, OR SPECIAL NUCLEAR MATERIAL

July 1982

U. S. Nuclear Regulatory Commission
Division of Fuel Cycle & Materials Safety
Washington, D. C. 20555

The instructions in this guide in conjunction with Table 1 specify the radionuclides and radiation exposure rate limits that should be used in decontamination and survey of surfaces or premises and equipment prior to abandonment or release for unrestricted use. The limits in Table 1 do not apply to premises, equipment, or scrap containing induced radioactivity for which the radiological considerations pertinent to their use may be different. The release of such facilities or items from regulatory control is considered on a case-by-case basis.

1. The licensee shall make a reasonable effort to eliminate residual contamination.

2. Radioactivity on equipment or surfaces shall not be covered by paint, plating, or other covering material unless contamination levels, as determined by a survey and documented, are below the limits specified in Table 1 prior to the application of the covering. A reasonable effort must be made to minimize the contamination prior to use of any covering.

3. The radioactivity on the interior surfaces of pipes, drain lines, or duct work shall be determined by making measurements at the traps, and other appropriate access points, provided that contamination at these locations is likely to be representative of contamination on the interior of the pipes, drain lines, or duct work. Surfaces of premises, equipment, or scrap which are likely to be contaminated but are of such size, construction, or location as to make the surface inaccessible for purpose of measurement shall be presumed to be contaminated in excess of the limits.

4. Upon request, the Commission may authorize a licensee to relinquish possession or control of premises, equipment, or scrap having surfaces contaminated with materials in excess of the limits specified. This may include, but would not be limited to, special circumstances such as razing of buildings, transfer of premises to another organization continuing work with radioactive materials, or conversion of facilities to a long-term storage or standby status. Such a request must:

   a. Provide detailed, specific information describing the premises, equipment or scrap, radioactive contaminants, and the nature, extent, and degree of residual surface contamination.

   b. Provide a detailed health and safety analysis which reflect that the residual amounts of materials on surface areas, together with other considerations such as prospective use of the premises, equipment or scrap, are unlikely to result in an unreasonable risk to the health and safety of the public.

5. Prior to release of premises for unrestricted use, the licensee shall make a comprehensive radiation survey which establishes that contamination is within the limits specified in Table 1. A copy of the survey report shall be filed with the Division of Fuel Cycle and Material Safety, USNRC, Washington, D.C. 20555, and also the Administrator of the NRC Regional Office, having jurisdiction. The report should be filed at least 30 days prior to the planned date of abandonment. The survey report shall:

   a. Identify the premises.

   b. Show that reasonable effort has been made to eliminate residual contamination.

   c. Describe the scope of the survey and general procedures followed.

   d. State the findings of the survey in units specified in the instruction.

   Following review of the report, the NRC will consider visiting the facilities to confirm the survey.

TABLE 1

ACCEPTABLE SURFACE CONTAMINATION LEVELS

NUCLIDES[a]	AVERAGE[b c f]	MAXIMUM[b d f]	REMOVABLE[b e f]
U-nat, U-235, U-238, and associated decay products	5,000 dpm α/100 cm^2	15,000 dpm α/100 cm^2	1,000 dpm α/100 cm^2
Transuranics, Ra-226, Ra-228, Th-230, Th-228, Pa-231, Ac-227, I-125, I-129	100 dpm/100 cm^2	300 dpm/100 cm^2	20 dpm/100 cm^2
Th-nat, Th-232, Sr-90, Ra-223, Ra-224, U-232, I-126, I-131, I-133	1000 dpm/100 cm^2	3000 dpm/100 cm^2	200 dpm/100 cm^2
Beta-gamma emitters (nuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 and others noted above.	5000 dpm $\beta\gamma$/100 cm^2	15,000 dpm $\beta\gamma$/100 cm^2	1000 dpm $\beta\gamma$/100 cm^2 R

[a] Where surface contamination by both alpha- and beta-gamma-emitting nuclides exists, the limits established for alpha- and beta-gamma-emitting nuclides should apply independently.

[b] As used in this table, dpm (disintegrations per minute) means the rate of emission by radioactive material as determined by correcting the counts per minute observed by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.

[c] Measurements of average contaminant should not be averaged over more than 1 square meter. For objects of less surface area, the average should be derived for each such object.

[d] The maximum contamination level applies to an area of not more than 100 cm^2.

[e] The amount of removable radioactive material per 100 cm^2 of surface area should be determined by wiping that area with dry filter or soft absorbent paper, applying moderate pressure, and assessing the amount of radioactive material on the wipe with an appropriate instrument of known efficiency. When removable contamination on objects of less surface area is determined, the pertinent levels should be reduced proportionally and the entire surface should be wiped.

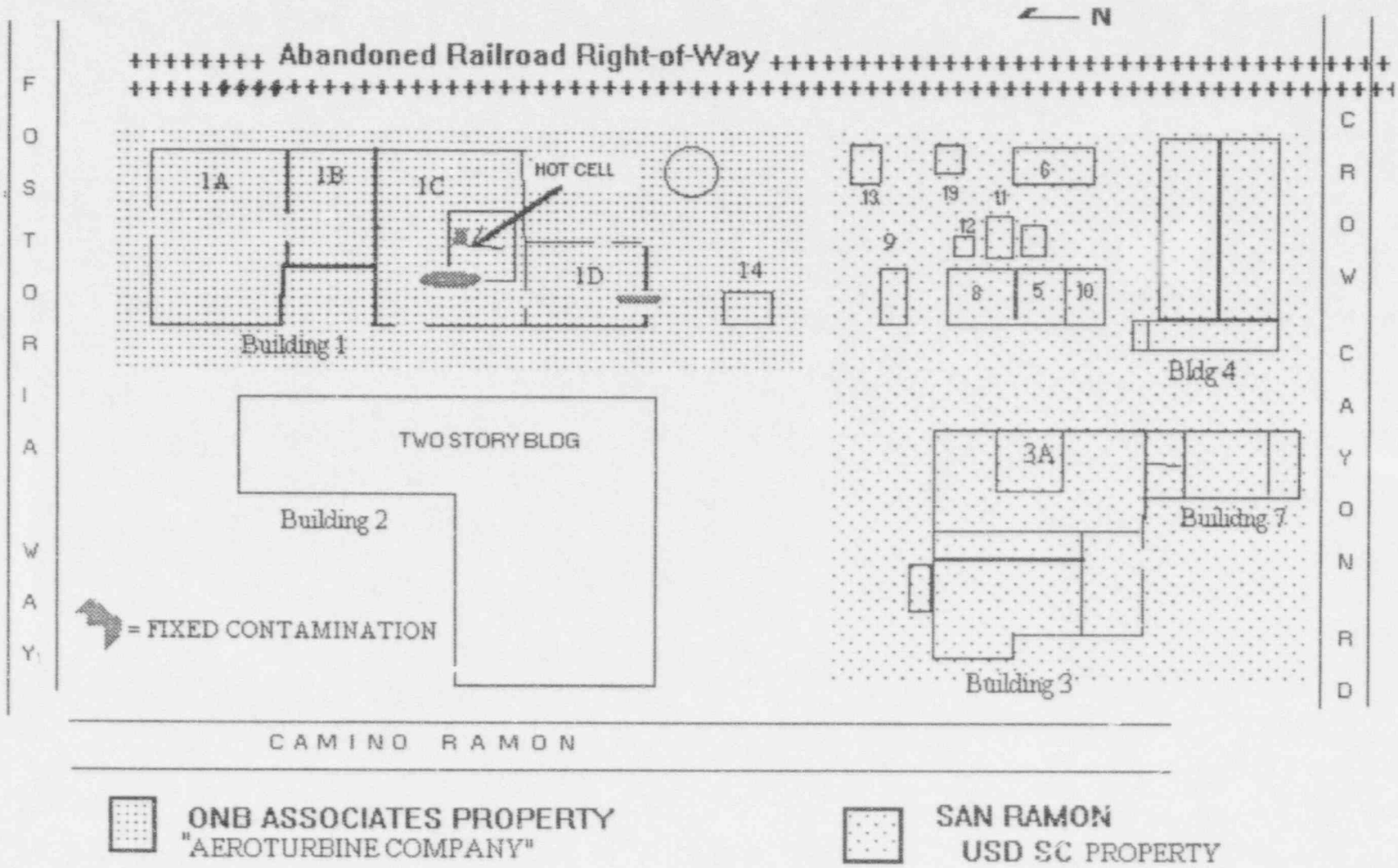
[f] The average and maximum radiation levels associated with surface contamination resulting from beta-gamma emitters should not exceed 0.2 mrad/hr at 1 cm and 1.0 mrad/hr at 1 cm, respectively, measured through not more than 7 milligrams per square centimeter of total absorber.

Issue Date: 07/11/85

Attachment 1

AEROJECT-GENERAL NUCLEONICS FACILITIES

SAN RAMON, CONTRA COSTA COUNTY, CALIFORNIA



A soil sample obtained in the location of the old sanitary leach field (an area already excavated for a drainage ditch. Fixed contamination in Section 1C and 1D of Building 1 was also sampled. Both these samples were counted by the State of California. Attachment 3 shows the results.

ATTACHMENT 2

RADIOLOGICAL ANALYSES RESULTS

Sampling Location: Aeroturbine / floor and leach field in San Ramon,CA
Sampling Date/Time:09/03/1993
Sample Type:soil, concrete on tape
SRL Number:6581, 6582
R Number:70134, 70135
Date Received:09/08/1993
Contact:Jeff Wong, RHB, Annex 2, 2151 Berkeley Way, Berkeley,CA

Sample	Analysis	Result	Isotope
6581	gamma scan	0.39 ± 0.04 pCi/g recv.wt.	U-238/daughters
6582		2.53 ± 2.02 pCi/sample	Co-60
		492 ± 6 pCi/sample	Cs-137

*6581/70134 :The sampling point is Aeroturbine /leach field.
*6582/70135 :The sampling point is Aeroturbine/ floor.

RADIOLOGICAL SURVEY INSTRUMENTS

FOR

SAN RAMON, CALIFORNIA SURVEY

Eberline Model PRM-6, countrate meter, equipped with an AC3-7 alpha sensitive Zinc-Sulfied (Ag) scintillation probe, due for calibration February 18, 1994, NRC Serial No.: 006387. Used for determination of alpha surface contamination (loose and fixed). The AC3-7 probe is considered to have an efficiency of 25 percent, which is in agreement with manufacturer values.

The minimum detectable activity-MDA (in units of disintegrations per minute per 100 square centimeters - dpm/100 cm^2) for this instrument (at a 95 percent confidence level) when use in a static survey mode is determined as follows:

Where:
Background countrate (Bkgd) = 10 count per minute (cpm)
Effective detector area (G) = 59 square centimeters (cm^2)
Detector operating efficiency (E) = 0.25 cpm per dpm
Approximate counting time (t) = 1 minute

Basic Equation (Eq 1):

$$MDA = \frac{2.71+(4.66\sqrt{Bkgd})}{(t)x(G)x(E)}$$

MDA (dpm/100 cm^2) for the AC3-7 probe is:

$$MDA = \frac{2.71+(4.66\sqrt{10})}{(1)x(.25)x\frac{59}{100}}$$

$$= 118\ dpm/100cm^2$$

Eberline PRM-7, gamma scintillation detector (sodium iodide, 1 inch X 1 inch), due for calibration October 10, 1993, NRC serial no.: 008596. Used for determining gamma radiation exposure rate (Cs-137 equivalent) at waist level, approximately 1 meter above the floor/ground surface. Instrument reads out in units of microRoentgen per hour (µR/hr), and can readily discern (per vendor literature) approximately 2-5 µR/hr above ambient background. Therefore the following MDA is used:

MDA = 3 µR/hr

Ludlum Model 3, beta/gamma survey meter, due for calibration December 30, 1993, NRC Serial No.: 035644. Equipped with the following probes:

- Ludlum Model 44-9, beta/gamma sensitive thin window pancake probe (15.5 cm^2 window). Used for determining beta/gamma surface contamination (fixed and loose).

  The MDA for this instrument (at a 95 percent confidence level) when use in a static survey mode is determined as follows:

  Where: (using Eq 1)
  Background countrate (Bkgd) = 50 cpm
  Effective detector area (G) = 15.5 cm^2
  Detector operating efficiency (E) = 0.10 cpm per dpm
  Approximate counting time (t) = 1 minute

$$MDA = \frac{2.71+(4.66\sqrt{50})}{(1)x(.10)x\frac{15.5}{100}}$$

$$2,300\ dpm/100cm^2$$

- Ludlum Model 44-3, gamma scintillation probe (1 inch). Used for searching for indications of contamination (counts per minute - cpm). The MDA of this instrument is not quantified. Normally used in audible mode for searching out gamma emitting radionuclides.

- Ludlum Model 44-38, Geiger-Mueller detector. Used for determining beta and gamma radiation exposure rates in units of milliRoentgen per hour (mR/hr).

  Per vendor literature this instrument can measure gamma radiation exposure rates at or near 0.02 mR/hr.

The State of California representative used similar type instruments. Duplicate measurements on contaminated surfaces showed very good agreement between instruments (error was less than 10 percent).