

U. S. NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT

50-18/81-01 (VBWR)
50-70/81-02 (GETR)
50-73/81-02 (NTR)

REGION V

Report No. 50-183/81-01 (EVESR)

Docket No. 50-18 50-73
50-70 50-183

DFR-1(VBWR) R-33(NTR)

License No. TR-1(GETR) DR-10 Safeguards Group
(EVESR)

Licensee: General Electric Company

Vallecitos Nuclear Center

Pleasanton, California 94566

Facility Name: Vallecitos Boiling Water Reactor (VBWR) Nuclear Test Reactor (NTR)
General Electric Test Reactor (GETR) ESADA Vallecitos Experimental Superheat
Reactor (EVESR)

Inspection at: Vallecitos Nuclear Center

Inspection conducted: May 13-15, 18, 20 and June 4, 1981

Inspectors:

H. S. North, Radiation Specialist

7/6/81
Date Signed

T. Young, Reactor Inspector

7/7/81
Date Signed

D. Willett, Reactor Inspector

7/7/81
Date Signed

Approved by:

F. A. Wenslawski, Chief, Reactor Radiation Protection Sec.

7/2/81
Date Signed

Approved by:

G. S. Zvezzig, Acting Chief, Reactor Projects Sec. 2
Reactor Operations Projects Branch

7/8/81
Date Signed

Approved by:

H. E. Book, Chief, Radiological Safety Branch

7/8/81
Date Signed

Summary:

Inspection on May 13-15, 18, 20 and June 4, 1981 (Report No. 50-18/81-01, 50-70/81-02, 50-73/81-02 and 50-183/81-01)

Areas Inspected: Routine unannounced inspection by a regional based inspector of the organization, procedures, training, respiratory protection program, personnel monitoring, surveys, posting and labeling, technical specification requirements, radioactive effluents, emergency planning, GETR Seismic Trip checkout, and independent measurements. The inspection involved 32 inspector hours on-site by three regional based inspectors.

Results: Of the areas inspected, three items of noncompliance were identified pursuant to, 10 CFR 20.103(b)(1); 10 CFR 20.103(a)(3) and GETR Technical Specification 9.1 as described in paragraph 11.

RV Form 219 (2)

DETAILS

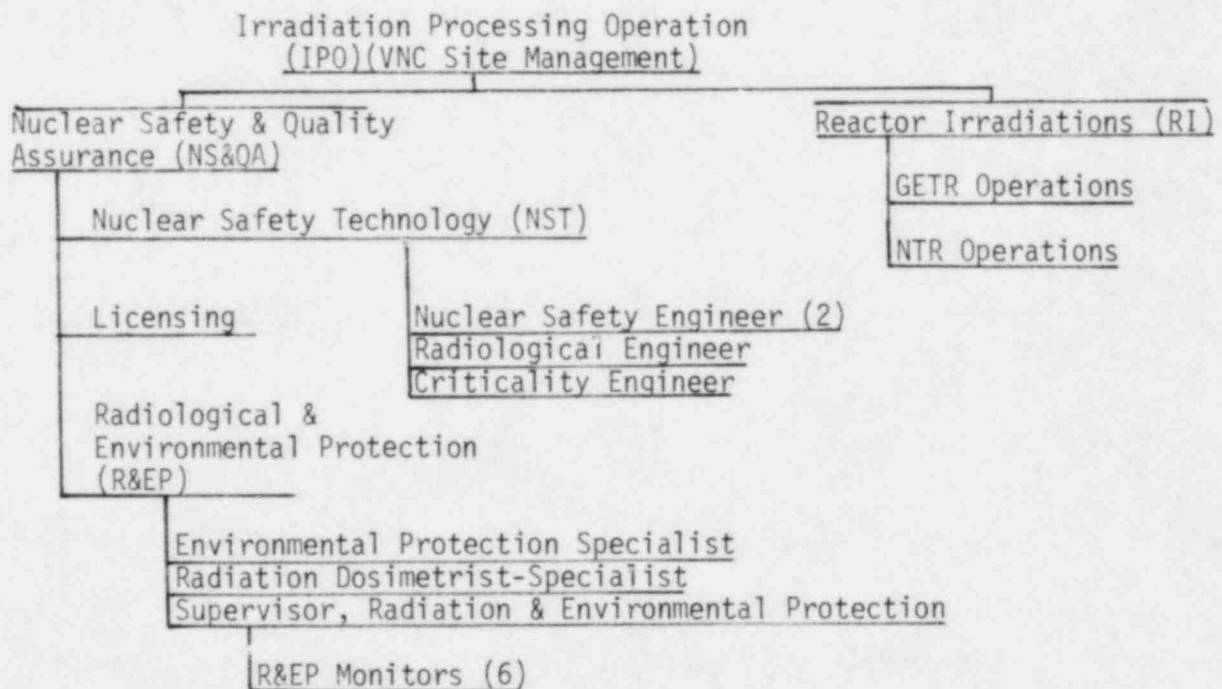
1. Persons Contacted

- *R. Butler, Manager, Radioactive Products and Services, Irradiation Processing Operation (IPO)
- G. Cunningham, Senior Licensing Engineer, Nuclear Safety and Quality Assurance (NS&QA)
- *W. King, Manager, Nuclear Safety Technology (NST), NS&QA
- E. Strain, Nuclear Safety Engineer, NST
- P. Webb, Manager, Radiological and Environmental Protection, (R&EP), NS&QA
- *C. Hooker, Supervisor, Radiation and Environmental Protection, R&EP
- R. Gest, Environmental Protection Specialist, R&EP
- R. Berryman, Radiation Dosimetrist-Specialist, R&EP
- C. Leighty, Manager, NTR Operations, Reactor Irradiations (RI)
- *P. Kachel, Manager, GETR Operations, RI
- W. Springsteen, Planning Specialist, GETR
- R. Hallquist, Shift Supervisor, GETR
- E. Hagberg, Shift Supervisor, GETR
- S. Jackson, Reactor Operator, GETR
- L. Campbell, GETR Monitor, R&EP

*Denotes attendance at exit interview.

2. Organization

The Vallecitos Nuclear Center (VNC) organization as it relates to the facilities inspected is described in the following chart.



Four of the six R&EP monitors are assigned to provide shift coverage at GETR. During weekends and backshifts the GETR monitors provide radiation protection coverage of the VNC site. The weekday GETR monitor is also responsible for monitoring activities at facilities and buildings 103 (Metallurgy and Chemistry), 104 (Facilities Maintenance) 106 (Engineering and Shop Operations), 300 (VBWR and EVESR), 400 (Administration, Personnel and Marketing), hillside storage area, waste evaporator and the site basins. The two other monitors are assigned to the RML (Radioactive Materials Laboratory) and to the NTR and decommissioning the AFL (Advanced Fuel Laboratory) respectively.

No items of noncompliance were identified.

3. Procedures

The licensee has established, implements and maintains Nuclear Safety Procedures under NS&QA and VNC Safety Standards. A VNC Safety Standard addressing ALARA contains a corporate commitment to maintaining exposures ALARA. The procedures detail the radiation protection program in the areas of dosimetry, radiation surveys, instrumentation, audits, reviews of experiments and procedure changes, training in radiation protection and emergencies and miscellaneous topics including reporting of unusual occurrences and incident investigation, recommendations and followup. VNC Safety Standards address specific topics such as dosimetry which includes assignment of administrative responsibility, issuance and control of personnel dosimetry devices, badge change frequency and external exposure limits. Nuclear Safety Manual, Volume 1, Respiratory Protection, describes the program including user qualification, equipment description, selection, use, care and maintenance.

No items of noncompliance were identified.

4. Training

The licensee provides a series of radiation safety training courses including New Employee Orientation (NEO), Initial Radiation Safety Orientation (IRSO), Radiation Protection Fundamentals (RPF) and Radiation Safety at VNC (RSVNC). Training requirements and retraining frequency are based on work activities and access to controlled access areas.

Respiratory protection training includes classroom training, a written examination, requires a medical examination, fitting and challenge atmosphere testing. A computerized system is used to maintain records

of training in addition to archival copies of examinations and scores.

No items of noncompliance were identified.

5. Personnel Monitoring

VNC Safety Standards 5.2.1 External Dosimetry, 5.2.2 Special Planned Exposure, 5.3.0 Bioassay Program and 5.3.1 Internal Dosimetry and Dosimetry Classification, describe the program. Monthly, quarterly and biweekly film badges are provided by Radiation Detection Company.

Occasionally film badges are exposed to a calibration source, using an R-meter to verify exposure, as a quality control check on the badge supplier. In addition in 1979 the licensee participated in the University of Michigan study submitting badges including NTA film and albedo dosimeters for exposure and later processing by the supplier. Records of pocket ionization chamber exposures are the responsibility of the individual user.

The total exposure for the VNC was 67 man rem to employees and 6 man rem to visitors during 1979 and 84 man rem to employees and 8 man rem to visitors during 1980. In March 1981 a total of 330 GE/VNC employees and 77 nonemployee/visitors were badged.

Individual exposure records were examined and the highest individual exposures in each period are summarized below:

Group/ Activity	No. in group March 1981	1 st Q80	2 nd Q80	High exposure 3 rd Q80	mrem 4 th Q80	Annual 1980	1 st Q81
NS&QA	21 (includes monitors)	275	565	275	280	1190	375
GETR	11	590	2240	400	690	3030	465
NTR	5	460	197	446	547	1607	630

The NTR exposure records include cumulative gamma and neutron exposures. Albedo dosimeters are used at NTR for neutron energies ≤ 1 mev and NTA film at the remainder of the site for energies > 1 mev. VNC Safety Standard 5.2.1 specifies quarterly processing of film badges at exposures ≤ 125 mrem/quarter and monthly badge changes for exposures > 125 mrem/quarter. Neutron monitoring, NTA film or albedo dosimeter are required if exposures > 10 mrem/month are expected. TLD finger rings are required if hand exposures are expected to exceed 4.6 rem/quarter or four times the whole body exposure.

The licensee's bioassay program includes whole body counts using an on site, shadow shielded, moving bed, multichannel analyzer-gamma

scintillation system; urinalysis for tritium, gross alpha and beta, uranium and enriched uranium and Americium performed by Eberline and Plutonium by Radiation Detection Company. A sample of individual records for NTR and GETR personnel were examined. Whole body counts were performed on a routine basis. The examination confirmed that individual records included the results of external and internal dosimetry and that copies of form NRC-4 are maintained. Copies of exposure records, form NRC-5, are provided to each monitored individual's manager where it is available for review. The licensee provides reports of personnel monitoring to terminating employees.

No items of noncompliance were identified.

6. Surveys-Posting-Instruments-Technical Specifications Requirements

Routine surveys are specified by NS Procedures 3550 for NTR and 3400 for GETR. The GETR procedures have been modified to reflect the long term shutdown status of the reactor. Surveys in general include dose rate and contamination surveys and air sample and CAM results. Survey records were examined and confirmatory dose rate and smear surveys were performed.

a. NTR

Survey records for the period January 5 through April 15, 1981 were examined. The records noted that the maximum dose rate in the control room with the reactor at power was 15-20 mr/hr in an inaccessible area at the reactor room shield door seal. The inspector measured 12-15 mrad/hr at the same location with the reactor operating at 100 kw. Surveys by the inspector noted dose rates of 1-2 mrad/hr at the operators position, 4 mrad/hr in contact with the wall between the south room and the control room with neutron radiography in progress, 9-10 mrad/hr in contact with neutron radiographic sample holder after radiography and removal from the south room, and no detectable radiation in the hallway south of the southroom during a neutron radiographic exposure in the south room. Surveys were performed using a Health Physics Instrument, tissue equivalent ion chamber, model 1070, serial number 117, NRC 004760, due for calibration July 15, 1981.

The maximum dose rates reported in the licensee's records were associated with "Nuclepore" irradiations. These dose rates were 1-4 R/hr associated with the "Nuclepore" machine, 20 R/hr in the center above the reactor with the plug removed and 8-12 R/hr at the sides of the open beam port. Since the last inspection "Nuclepore" irradiations were conducted for a period of approximately five months.

Smear sample results reported in licensee records were generally less than 100 cpm beta-gamma and 200 dpm alpha per square foot in the control room, south room and hallway outside the facility. Smear samples collected by the inspector on May 18, 1981 and analyzed at the Region V office included:

<u>Location</u>	<u>Beta/gamma₂</u> <u>dpm/100 cm²</u>	<u>Alpha</u> <u>dpm/100 cm²</u>
Control Room-floor	61	NDA*
Neutron radiography sample holder	45	NDA
Entrance to South Room-floor	94	NDA
South Room-floor	45	NDA
South Room-Inside Lead Shield Posted as Contaminated	1414	NDA

*NDA-No Detectable Activity

Analysis was performed using an NMC, Model PC-55 proportional counter.

Records of analysis of continuous air samples showed results that were a small fraction of 10 CFR 20 Appendix B Table I values for unidentified beta-gamma and alpha activity. Maximum values observed in north and south rooms were $1.9E-12 \mu\text{Ci/cc}$ beta-gamma and $5.7E-13 \mu\text{Ci/cc}$ alpha. Daily samples from the reactor room during non operating periods showed maximum values of $4.9E-11 \mu\text{Ci/cc}$ beta-gamma and $7.6E-13 \mu\text{Ci/cc}$ alpha. Weekly charcoal cartridges showed maximum value of less than $5.6E-13 \mu\text{Ci/cc}$ iodines for the NTR vent stack and control room and $9E-13 \mu\text{Ci/cc}$ for the reactor room.

The licensee has evaluated exposures due to thermal and fast neutrons. Following completion of shielding modifications at the facility a survey was performed on October 19, 1971. On May 12, 1981 a preliminary survey was performed to evaluate the impact of proposed modifications of the facility. In both cases the reactor was operating at 100 Kw. In the 1971 survey the "pinhole" collimator was in place resulting in a best case, while in the 1981 survey the "pinhole" had been removed, resulting in a worst case situation. The licensee is contemplating a modification of the "pinhole" and performed the 1981 survey to support the study underway. Following the 1971 survey additional shielding was added in some locations to reduce the exposure in certain adjoining, normally unoccupied areas as noted in the attached table. Gamma values are in mrem/hour. Neutron values are neutron mrem/hour to gamma mrem/hour ratios. Ranges for various locations are reported.

Location	1971 Survey			1981 Survey		
	\dot{V} mrem/hr	n^t/\dot{V}	n^f/\dot{V}	\dot{V} mrem/hr	n^t/\dot{V}	n^f/\dot{V}
Control Room (1) Console operator and normally occupied areas.	1.0 to 5.0	0.2 0.05	0.6 0.15	7.5 13	0.39 0.17	0.0096 0.046
Adjacent to walls (1) and shield doors.	7.0 23.0	0.023 0.00087	0.057 0.039	5.0 50.0	0.36 0.032	0.10 0.008
South Room (2) Exposure Area	1.0	0.08-0.2	0.17-0.6			
Hallway south of (1) Exposure Room	1.0	0.2	0.09	1.7	0.76	0.14
Area East of (1) Exposure Room	1.0	0.12	0.26	15	0.048	0.012
Room East of Reactor (1)(3)	12.0	0.43	4	0.3	0.5	0.13

- (1) Shutter open
- (2) Shutter closed
- (3) Shielding added following 1971 Survey

Access to the NTR facility is controlled by lock and key, security alarms and the VNC guard force during non working hours. The NTR staff controls access during periods when the facility is in operation. The facility is appropriately posted and access controlled as required by 10 CFR 19.11, Posting of notices to workers, 10 CFR 20.203, Caution signs, labels, signals and controls. Portable instruments available at the facility included two Eberline model E-120 G-M survey meters and one Eberline model PAC-1-SA, alpha survey meter were within the calibration frequency.

Technical Specifications:

Section 2.1 A negative pressure indicating device, observable by the reactor operator, indicated a negative pressure in the reactor room with respect to the control room while the reactor was in operation. Loss of negative air pressure is signaled by an alarm.

- Section 2.2 The NTR vent is monitored for halogens, particulates and noble gases. The monitors are set to alarm at a fraction of the annual average release rate assuming full time facility operation. Releases from the facility are discussed in paragraph 7.
- Section 10.3 Direction of air flow into the reactor room is indicated by doorway flags when the reactor room is open. The R&EP group verifies the operation of the negative pressure gauge monthly.
- Sections 10.4 & 10.5 The licensee's records of surveillance of radiation monitoring instruments for the period February 1980 to May 1981 were examined. No discrepancies were identified.
- Section 9 The administrative requirements of 9.1.1 and 9.1.4 relating to facility management and organization were verified.

No items of noncompliance were identified.

b. GETR

Records of surveys for the period January 29 to April 14, 1981 were examined. Surveys, performed in accordance with procedures include contact and field dose rate measurements and smear samples.

The survey records showed dose rates to 5 mr/hr on the third floor of containment. Independent measurements in the same area were 0.5 to 2.0 mrad/hr near the step off pad (SOP) and 1.5 to 3.5 mrad/hr on the test instrument platform. Dose rates to 10.5 mrad/hr were measured at the EEHS door on the second floor. Ground floor measurements were 0.5-1.0 mrad/hr at the air lock and SOP. The licensee's records noted dose rates to 200 mr/hr at the basement sump and 1 r/hr and 10 r/hr at the entrance to the demineralizer room and in contact with the demineralizers respectively. Independent measurements in the basement were 2.0-2.5 mrad/hr at the foot of the stairs up to 4.0-4.5 mrad/hr at the control rod drive work area SOP. The tank farm fence dose rate reported as 10 mr/hr in a recent survey was found to be 5 mrad/hr by independent measurement using the instrument identified in paragraph 6.a. The licensee reported contamination levels of from 5000 to 20,000 cpm/ft² beta gamma and less than 200 dpm/ft² alpha on the third floor north and south zones and bridge with all clean areas and SOP's as less than 100 cpm/ft² beta-gamma and 200 dpm/ft² alpha.

Independent measurement smear samples collected on May 18, 1981, and analyzed with an NMC, PC-55, proportional counter, indicated the following values:

Location	dpm/100 cm ² Beta-gamma	dpm/100 cm ² alpha*
3rd Floor-SOP	357	NDA
3rd Floor-Base of Stairs to Instrument Platform	165	NDA
3rd Floor-Top of Missile Shield	107	NDA
2nd Floor-Floor outside EEHS door	2898	< 2
1st Floor-Air lock floor	115	NDA
1st Floor-SOP	160	NDA
Basement-Liquid Poison SOP	1025	NDA
Basement-Inside Control Rod Drive Work Area- Posted as Contaminated	2000	< 2

*NDA-No detectable activity

Access to the facility is controlled by the VNC security staff and the GETR staff. The GETR staff consists of the manager and a planning specialist and shift crew consisting of a shift supervisor, reactor operator and an R&EP technician. The facility is appropriately posted and access controlled as required by 10 CFR 19.11 Posting of notices to workers and 10 CFR 20.203, Caution signs, labels, signals and controls.

Portable instruments available at the facility included Eberline, RM-15 Radiation Monitor with an HP-210 G-M pancake probe, PAC-15A alpha survey meter, PIC-6A ion chamber survey meter and an E-120 G-M survey meter with an HP-210 pancake probe. All the instruments were within the procedure required calibration frequency.

Technical Specifications

- Section C(2) Releases of radioactive material from the facility are discussed in paragraph 7.
- Section D(5) (f) & (g) The licensee submitted an annual report for 1980 which addressed significant changes in operating procedures, organization and the results of the on and off site monitoring program. The licensee stated that as of the date of the inspection there had been no significant changes in operating procedures or organization since the issuance of the annual report.
- Section 9.1 Written procedures for radiological control and for emergencies which could result in significant releases of radioactive material are subject to review by specifically assigned shift supervisors at two year intervals.

c. VBWR and EVESR

On June 4, 1981, by prearrangement with the licensee surveys were conducted in VBWR and EVESR containment structures. The VBWR entry was special and unscheduled, however the EVESR entry was used by the licensee to satisfy the requirement for one of the semiannual surveys. Patrol Log Book 3, which records the weekly patrol inspections of the two facilities was examined for the period January 4 - June 4, 1981. Other than notations concerning routine patrols the only other item was related to preparations for entry during the inspection on June 4.

Surveys were performed using an Eberline E-520, G-M survey meter and HP-270 probe serial number 1747, NRC 007907, due for calibration August 12, 1981. The entries were made in accordance with procedures including an initial entry in SCBA for air sampling. Both facilities are described in licensee procedures as contaminated, high radiation areas and were observed to be appropriately posted.

Surveys in VBWR were limited to the operating floor area.

Location	Dose Rate (3' above floor) (mrem/hour)	Smear Samples dpm/100 cm ²	
		Beta/Gamma	Alpha
Center of Building (general area)	0.05	310	< 2
Recirculation Pump Pit above opening-(general area)	0.7	-	-
Spent Fuel Pool-(general area)	0.6	-	-
Sample Station (general area)	0.4	169	NDA*
Scram Air Compressor (general area)	0.3	-	-
Personnel Access shaft to lower levels	0.2	-	-
Control Rod Drive Platform	-	294	NDA*
Airlock Floor	-	122	NDA*

The survey in the EVESR containment was performed at ground level and all below ground level elevations.

*No Detectable Activity

Location	Dose Rate 3' above floor (mrem/hour)	Smear Samples dpm/100 cm ²	
		Beta/Gamma	Alpha
<u>549' elev-Operating Floor</u>			
Air lock	0.1	26	NDA*
Above Reactor Vessel	0.1	48	NDA*
Above Fuel Storage pool	2-3	-	-
Floor near Fuel Storage Pool	-	344	NDA*
<u>534' elev.</u>			
Floor drain	20-30		
VNC Survey point	0.5		
<u>519' elev.</u>			
Bundle Instrumentation Area	0.2	-	-
Floor near Instrumentation	-	2490	< 2
<u>503' elev.</u>			
Control Rod Drive Area	2-3	-	-
VNC Survey Point	10	-	-
Sat. Steam Line	18-30	-	-
Floor	-	2231	< 2
<u>Mezzanine</u>			
Area	0.1	-	-
<u>487' elev.</u>			
General Area	< 0.2	3443	NDA
Control Rod Drive Room	< 0.1	-	-
Cleanup System-Regen HtEx	< 0.1	-	-
Fuel Cask Surface	-	9429	NDA

*No Detectable Activity

No items of noncompliance were identified.

7. Radioactive Effluents

NTR releases consisted of gaseous effluents. The effluent stream is monitored by particulate and charcoal cartridge iodine samplers. A kanne chamber is used to measure noble gas releases. The releases from the facility are discharged through a 3000 cfm stack which operates on a year round basis. The licensee's effluent release records were examined. The releases from NTR during 1980 were as follows. (IE Inspection Report 50-73/80-01 paragraph 2, reports releases for 1978 and 1979 which are repeated for comparison purposes).

<u>Activity Released (Units)</u>	<u>1980</u>	<u>1979</u>	<u>1978</u>
Noble gases (Ci)	190.92	290.6	620.8
Iodine (m Ci)	5.348	0.09	10.2
Beta-Gamma (μ Ci)	3.66	NS	NS
Alpha (μ Ci)	0.23	NS	NS

*NS-No significant particulate activity was detected.

Using the most conservative assumptions concerning the Maximum Permissible Concentrations from Column I, Table II, Appendix B of 10 CFR 20 and the Airborne Radioactivity Release Rate Limits from Table II of the Technical Specification the 1980 releases were approximately 1% of the noble gas and 3% of the halogen release rate limits.

Discussion with the licensee disclosed that for 1980, releases from GETR totaled 244.819 Ci of noble gas. Inasmuch as GETR has been shut down for approximately 2½ years the reason for the releases was examined. Noble gas releases from GETR are based on a continuously operating, NaI scintillation detector monitoring system which samples the 18,000 cfm GETR vent. Weekly the monitoring system is purged and a one hour background count rate (average of 10 points on the monitor recorder chart) is established. During May 1980 the background was 15 cps. The calibration of the monitoring system has established that 1 cps above background equals $1.45 \times 10^{-6} \mu\text{Ci/cc}$ for noble gases or at the vent flow rate the equivalent of 1 Ci/day/cps above background. The release rate from GETR based on this method of measurement ranged from 11.8 to 30.6 Ci/month during 1980. Since the licensee records counts above background and calculates a release rate on those counts but takes no credit for periods during which the count rate is below background a net positive release rate is statistically inevitable. The indicated release rate is less than 0.1% of the maximum permissible continuous release rate for noble gases specified in section 3.3, Table I, of the Technical Specifications.

No items of noncompliance were identified.

8. Tritium in Ground Water Near GETR

IE Inspection Report No. 50-70/80-01, paragraph 7, discussed the subject topic. At the exit interview reported in paragraph 8 of that report, the inspector requested that he be informed as to the results of the tank and pipe leak testing which was being conducted by the licensee. A report titled, Tank Farm Leak Test Final Report, dated October 27, 1980 was provided to the Region V office. The report identified three small leaks, a crack in an above ground pipe fitting, a leak in an instrument air line to an underground tank and a leak in a drain line

from an infrequently used sink. The report concluded that none of the leaks contributed to the low level tritiated ground water in the GETR area. The above identified IE Inspection Report included data on the licensee's ground water sampling and analysis as well as the results of NRC confirmatory analyses. Additional sample data for well B-2 was reviewed during this inspection and is reported along with the earlier data for comparison.

<u>Sample Date</u>	<u>Tritium Concentration</u> ($\mu\text{Ci/mL}$)	<u>Comments</u>
2/29/80	3.9 + 0.7 E-5	Licensee Data Previously Reported
2/29/80	4.7 + 0.06 E-5	NRC Data Previously Reported
6/9/80	4.1 + 0.69 E-5	Licensee Data
6/14/80	3.7 + 0.69 E-5	Licensee Data
8/8/80	3.9 + 0.7 E-5	Licensee Data
4/16/81	3.9 + 0.7 E-5	Licensee Data

This matter is considered closed.

No items of noncompliance were identified.

9. Emergency Planning

The licensee required biennial review of the emergency plan has been completed since the last inspection. There were no significant changes to the plan. The licensee reported that there has been considerable fire training at all facilities. Training drills include facility evacuation with the facility staff bringing emergency equipment from the facility and response to the facility by the R&EP monitors. Scheduled, announced criticality drills with unannounced radiation drills were conducted at NTR (Building 105) on September 9, 1980 and at GETR (200 area) on September 16, 1980. Critiques of the drills were conducted the day of the two drills and were documented in memorandums dated September 10, 1980 (NTR) and September 22, 1980 (GETR). Critique findings are provided to the facility manager who is required to make decisions concerning the items but who is not necessarily required to take the action indicated by the critique finding. If the indicated required action is significant and is not taken the matter is referred to the Vallecitos Technological Safety Group for resolution. None of the critique items identified in the 1980 drills at NTR and GETR were significant.

The licensee has maintained contact with offsite agencies. The agreement with Valley Memorial Hospital was reconfirmed by letter dated December 9, 1980. The site Industrial Safety and Fire Protection specialist maintains continuing contact with the fire protection mutual aid group through monthly meeting with the Twin Valley Fire Chief's organization.

The licensee reported that the Alameda County Office of Emergency Services is supplied with revisions to the site emergency plan. The licensee stated that the California State Office of Emergency Services (OES) was telephoned to inform them of emergency plan changes. The licensee reported that they had been informed that the state OES was not involved with test and research reactors at the present time.

No items of noncompliance were identified.

10. GETR Seismic Trip Checkout

The replacement triaxial seismic trip installation and checkout procedure was reviewed and the calibration was witnessed by two Region V inspectors. The installation and protective covering of the sensors appeared adequate and consistent with similar types of installations/instrumentation. The following areas of concern were expressed to the licensee.

- a. Calibration Procedure - A step should be included in the procedure to calibrate/verify accuracy of the battery check voltmeters on the front panels of the seismic trip power supplies in the control room. (50-70/81-02-01)
- b. Instrument Accuracy - A basis should be established to justify calibration frequency and obtain data from units using identical equipment to provide history base if possible. Also the affects of battery voltage versus instrument sensitivity should be resolved. (50-70/81-02-02)

A licensee representative stated at the exit management meeting that a 30 day checkout period is underway and an evaluation would be made to address the inspector concerns.

11. GETR-Tank 101 Cleaning-March 7, 1981

The licensee investigates incidents and unusual occurrences in accordance with VNC Safety Standards. The records of such investigations for the period since the last inspection (February 25 - March 19, 1980) were examined. There were no investigations associated with NTR and one concerning activities at GETR.

On March 1, 1981, an Operations Request Form (ORF), ORF No. 228-19 was issued, "Subject Tk 101/115 Clean Out". The ORF specified that on March 7 the facilities group was to provide two individuals to clean the tanks under GETR Operations supervision. The individuals were to have whole body exposures not exceeding 500 mr and have completed the VNC Respirator Training. The ORF specified the following precautions:

- "(1) Insure breathing air system operational.
- (2) Use explosive meter to obtain tank readings prior to performing any work in the tank/s.
- (3) Insure positive control of individual who works in the tank.
- (4) Radiation exposure control of individuals will be monitored by the individual supervising the job and or monitor.
- (5) Rad waste will be placed in 55 gallon 17-H drums-double bagged. The drum/s will not be sealed or transferred to Hillside Storage if the material is wet.
- (6) Personnel working in Tk-115 must have a urine sample taken as soon as possible after completion of work in tank.
- (7) Monitor to survey tank/s after clean out is accomplished. Survey No. C-165

Once tanks have been cleaned out, install manhole covers and bolt in place. Line up Tk-101 for normal operations."

A survey report date January 8, 1981 was attached to the ORF. The survey was based on the use of dosimeters and film badges which had been exposed for 65 minutes at three locations in tank 101,

Location	Exposures corrected to 1 hour to provide dose rates (mr/hr)	
	<u>Dosimeter</u>	<u>Film Badge</u>
Under manhole 3 feet above the tank bottom	70	88
West end of tank, 4 inches above the tank bottom	90	74
East end of tank, 4 inches above the tank bottom	390	46%

A survey performed on March 7, 1981 at 0830 indicated dose rates of 360 mr/hr three feet above the bottom of the tank or 6 mr/minute. The dose rate from the pile of material which was accumulated by sweeping was reported to be 10 r/hr.

Tank 101 is a buried, cylindrical, 25,000 gallon tank used to collect leakage and for primary system fill-flush activities prior to recirculation through the clean up system and transfer to above ground storage. Tank 101 is considered to be a clean drain tank. The subsequent activities on March 7, 1981 were limited to tank 101. Tank 115 was not cleaned. Tank 101 had been drained and allowed to dry to prevent the generation of wet radioactive waste. The ORF was reviewed by the GETR analyst, manager and the Facilities Supervisor. The ORF was not reviewed by anyone in the NS&QA organization. The licensee stated that procedures do not require review of proposed activities by the NS&QA organization which includes the radiological engineer in Nuclear Safety Technology or radiation protection staff in the R&EP group. The licensee noted that such reviews normally occur as a result of the activities of

several persons who were absent or otherwise occupied when the ORF was generated. The licensee's failure to evaluate the use of process or other engineering controls, appears to be contrary to the requirements of 10 CFR 20.103(b)(1) Exposure of individuals to concentrations of radioactive materials in air in restricted areas, which requires that, "The licensee shall, as a precautionary procedure, use process or other engineering controls, to the extent practicable, to limit concentrations of radioactive materials in air to levels below those which delimit an airborne radioactivity area as defined in 20.203(d)(1)(ii)." (50-70/81-02-03).

On March 7, 1981, Radiation Work Permit (RWP) No. 229-1 for, "Tk101 Cleanout", was issued. The RWP required continuous monitoring and anti contamination clothing to include, a cap, hood, no personal outer clothing, two pair coveralls with waterproof outer layer, cotton gloves, waterproof gauntlets and canners gloves, two pairs of plastic shoe covers, air line supplied respirators taped to the hood, film badge and 200 and 1000 mr dosimeters. Timekeeping on the job was not required. The RWP was initiated at 0815 and terminated at 1045. During the tank cleaning two Facilities employees (individuals A & B) and the R&EP monitor (individual C) entered the tank. Two GETR operators (individuals D & E) were present to direct the task which consisted of dry sweeping the residue in the tank into piles, shoveling the collected material into 5 gallon buckets which were removed through the manhole. On the conclusion of the work several individuals exhibited facial and nasal contamination in the range of 500-2000 cpm beta-gamma. No alpha activity was detectable.

Prior to beginning work in the tank on March 7, 1981, air samples to evaluate possible airborne radioactive materials were not collected nor were samples collected during the performance of the work. Air and tank residue samples were collected and analyzed on March 24, 1981 as a part of the licensee's investigation of the occurrence. The air sample indicated the following concentrations at that time:

<u>Activity</u>	<u>Concentration (μCi/cc)</u>
Co-60	2.0 E-8
Cs-137	4.5 E-10
Gross beta	1.2 E-8
Gross alpha	1.1 E-12

The licensee concluded that the gross beta consisted principally of Co-60 and Cs-137, the sum of the beta fraction emitted by both nuclides being greater than the gross beta activity identified. The gross alpha activity was identified to be principally Pu-238. The ratio of the Pu-238 to Co-60 identified in samples from the tank was approximately 10% of the ratio of the MPC Pu-238 to MPC Co-60. The licensee concluded that Pu-238 would add approximately 10% to the Co-60 dose received. The licensee's failure to collect air samples prior to or during the work appears to be contrary to the requirements of 10 CFR 20.103 Exposure of individuals to concentrations of radioactive materials in restricted areas, (a)(3)

which specifies that, "For purposes of determining compliance with the requirements of this section the licensee shall use suitable measurements of concentrations of radioactive materials in air for detecting and evaluating airborne radioactivity in restricted areas...." (50-70/81-02-04)

The three individuals ("A", "B" and "C") who entered the tank were provided with air line supplied "MSA-Ultravue" respirators. Individuals "A", "B" and "C" received training in respiratory protection and were fitted for respirators. The licensee's investigation and the inspectors examination of training, fitting and testing records confirmed that not all individuals entering the tank wore respirator face pieces for which they had been fitted.

<u>Individual</u>	<u>Respirator type fitted</u>	<u>Type of Use (*)</u>	<u>Date Trained</u>	<u>Examination Score</u>
"A"	MSA-Clearvue Survive Air	AP, AL SCBA	08/15/80	74%
"B"	MSA-Ultravue Survive Air	AP, AL SCBA	1/9 & 8/15/80	96%
"C"	MSA-Clearvue Survive Air	AP, AL SCBA	08/15/80	96%

(*) AP - Air Particulate Filter
AL - Air Line Supplied
SCBA - Self Contained Breathing Apparatus

The individuals were issued wallet sized cards identifying the respirator types for which they had been trained and fitted. The use of unfitted and untested respiratory protective equipment appears to be contrary to the requirements of the GETR Technical Specifications section 9.0 Administrative Requirements, item 9.1, which states in part that, "Written procedures shall be established and maintained..., for radiological control, ..." in that Irradiation Processing Operation, Nuclear Safety and Quality Assurance, Nuclear Safety Manual, Volume 1, Respiratory Protection, section 4.3 Respirator User Requirement states, "All individuals using respiratory equipment shall: ...

4. Have been qualified to use the respiratory equipment specified for the job." (50-70/81-02-05)

Work in tank 101 was terminated at 1045 on March 7, 1981. Individuals "A" and "B" received 180 and 200 mr exposures respectively as measured by pocket dosimeter during the tank cleaning. The cumulative first quarter 1981 film measured exposure for the five individuals was:

<u>Individual</u>	<u>1st Quarter 1981 (mrem)</u>
"A"	110
"B"	100
"C"	375
"D"	340
"E"	120

Following identification of facial and nasal contamination the involved individuals were counted, using the licensee's shadow shielded, gamma scintillation, multichannel analyzer whole body counting (WBC) system. The individuals were counted both with the WBC bed both stationary and moving. The licensee interpreted the WBC results in terms of lung and whole body counts with the bed both moving and stationary.

Individual	Counting Date/Time	Calculated Co-60 Activity (μCi)			
		Lung		Whole Body	
		Stationary	Moving	Stationary	Moving
"A"	3/7/81-1110 & 1400	0.005	0.039	0.019	0.042
	3/9/81-1645 & 1700	0.010	0.023	0.034	0.024
"B"	3/7/81-1210 & 1300	0.136	0.621	0.459	0.661
	3/9/81-1620	0.020	0.043	0.063	0.045
"C"	3/8/81-0230	<1% MPBB and <ICRP Investigation Level			
"D"	3/8/81-0120 & 0250	0.025	0.065	0.083	0.069
	3/10/81-0300	-	0.016	-	0.017
"E"	3/7/81-not known	0.005	-	0.016	-
	3/9/81-1010	-	0.003	-	0.003

The exposures received were less than that which would have been received by an individual exposed for 40 hours per week for 13 weeks at a uniform concentration of radioactive material in air specified in 10 CFR 20 Appendix B Table I, Column 1,

$$(\text{Co}^{60} \text{ Insol}) 9 \times 10^{-9} \mu\text{Ci/mL} \times 6.3 \times 10^8 \text{ ml} = 5.67 \mu\text{Ci.}$$

(10 CFR 20.103(a)(1))

Further the licensee implemented the actions required in those cases where the 40 hour control measure of 10 CFR 20.103(b)(2) is exceeded although the 40 hour control measure was in fact not exceeded. The licensee's actions included the investigation and documentation of the occurrence and included actions to be taken to assure against recurrence.

The licensee calculated the 50 year lung dose to individuals using the standard man value of 0.75 rem/0.14 μCi of Co-60 given in ICRP Publication 10. The licensee used the second WBC data and back calculated the initial quantity deposited to avoid errors possibly introduced by external contamination.

Individual	Calculated 50 year Lung Dose	
	Maximum Initial Activity (μCi)	50 year Lung Dose (rem)
"A"	0.044	0.24
"B"	0.082	0.44
"D"	0.022	0.12
"E"	0.004	0.02

12. Exit Interview

On June 4, 1981 the results of the inspection of the NTR, GETR, VBWR and EVESR facilities was conducted with the individuals denoted in paragraph 1. The licensee was informed that no items of noncompliance were identified in connection with the inspection of the NTR, VBWR and EVESR facilities. The licensee was informed that three items of noncompliance had been identified in connection with the cleaning of Tank 101 at GETR on March 7, 1981. The items identified in Paragraph 11 included: 10 CFR 20.103, Exposure of individuals to concentrations of radioactive materials in air in restricted areas, (b)(1), (a)(3), and GETR Technical Specification 9.1. The licensee was informed that while improved pre job planning could have avoided the problems identified in connection with cleaning GETR Tank 101, the post occurrence investigation was prompt and thorough.

The inspector expressed concern that the licensee's radiation safety reviews were informal rather than required by procedure. Further, the concern extended to the level of staffing, which was such that the absence of a few persons could defeat the informal review process.