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EFFLUENT MONITORING AND ENVIRONMENTAL SURVEILLANCE PROGRAMS ANNUAL SUMMARY - 1980 VALLECITOS NUCLEAR CENTER

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VALLECITOS NUCLEAR CENTER, PLEASANTON, CALIFORNIA 94566

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EFFLUENT MONITORING AND ENVIRONMENTAL SURVEILLANCE PROGRAMS
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R. E. Broz, H. C. Mohr
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I. INTRODUCTION

This report summarizes activities and data for the Effluent Monitoring and Environmental Surveillance Programs for the calendar year of 1980 at the Vallecitos Nuclear Center (VNC).

Effluent monitoring includes measurements of airborne radioactivity releases from facility stacks and the measurement of radioactive and nonradioactive constituents in water effluents released through the site sanitary and industrial wastewater systems. Environmental surveillance encompasses the measurement of radioactivity in air near or beyond the site perimeter and the measurement of both radioactive and nonradioactive constituents in neighboring streams, wells, soils and vegetation.

A. EFFLUENT MONITORING PROGRAM

The Effluent Monitoring Program has been developed to ensure that VNC site release limits for water are not exceeded and additionally to ensure that releases are maintained as low as reasonably achievable. Release limits for numerous non-radiological constituents have been established by the California Regional Water Quality Control Board (CRWQCB). Radiological release limits have been established by the Nuclear Regulatory Commission (NRC) and by the California State Department of Health Services (CSDHS).

1. Waterborne Effluents

Waterborne effluents released from VNC site facilities can be classified as industrial wastewater, or clean water.

Industrial wastewater includes process and cooling water which is first piped to a pH adjustment facility before discharge to one of three available 60,000-gallon retention basins. Tests for pH and radioactivity are performed on a water sample from each basin prior to discharge into Vallecitos Creek. (Any deviations from

this practice for individual basins during the year have been previously reported in writing to the Board whenever required.) In addition, samples from all basin discharges are accumulated and analyzed at specified intervals for a variety of constituents.

Clean water discharges consist of storm runoff and small quantities of water known to contain no radioactivity other than that from natural background. The latter includes condensate from building air conditioning equipment. These waters flow directly to drainage ditches which enter Vallecitos Creek.

Sanitary wastes are collected and processed in a septic tank before undergoing sand filtration and chlorination. Processed sanitary wastewater is discharged by land disposal (irrigation) onto VNC property (Figure 1). Before July 1, 1977, sanitary wastewater was discharged from the site with industrial wastewater.

2. Airborne Effluents

Airborne effluents consist of discharges from VNC facility stacks. Stack releases are monitored for radioactivity even though multi-stage filtering is accomplished prior to discharge.

B. ENVIRONMENTAL SURVEILLANCE PROGRAM

Water samples are obtained within or beyond the site boundary to ascertain to what extent, if any, VNC discharges are detectable in the environment. Receiving waters, ground water, stream bottom sediments, and soils are monitored for constituents which could have been dispersed by water. Air samples are utilized to detect the presence of radioactivity in air, and vegetation samples have been collected and analyzed in the past to assess the accumulation of constituents from both air and water pathways.

C. COMPLIANCE SUMMARY

1. Nuclear Regulatory Commission and California State Department of Health Services

The VNC radioactivity releases were well within the limits specified by these agencies. There were no items of noncompliance. Compliance limits are listed in 10 CFR 20 Appendix B and California Administrative Code Title 17, Section 30355.

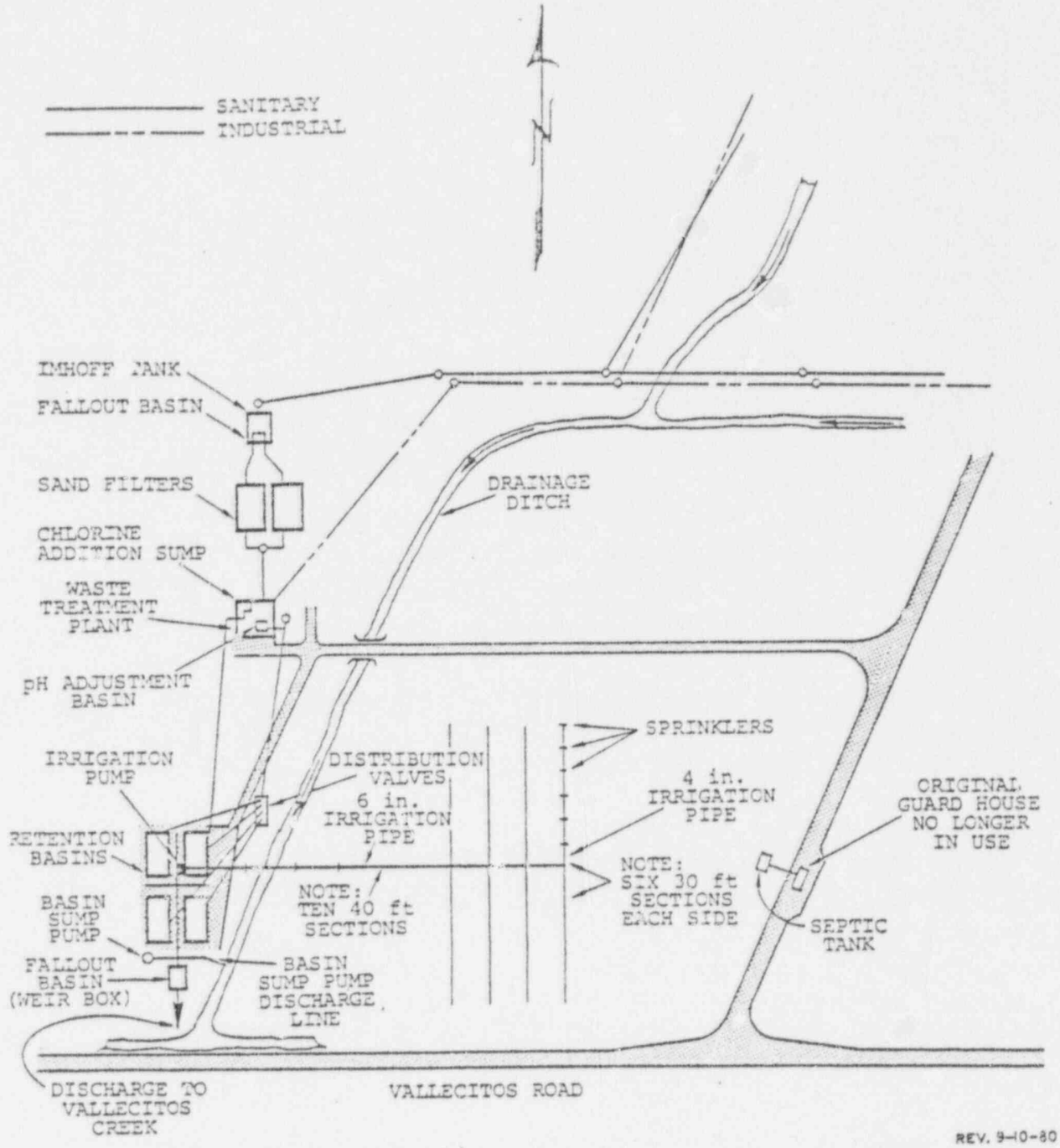


FIGURE 1. WASTE TREATMENT FACILITY

Compliance with these limits for the release of individual basins is determined by gross alpha and beta analyses based on the most restrictive isotopes which could reasonably be introduced into the system.

2. California Regional Water Quality Control Board

The CRWQCB issued Order No. 76-127 on December 2, 1976, which required that (a) by July 1, 1977, the VNC cease discharge of processed sanitary wastewater when no natural flow occurs in Alameda Creek above Niles and (b) the VNC submit a feasibility study to the Board by July, 1977, detailing a plan to regulate the discharge of industrial wastewater. Both requirements were fulfilled on schedule. The feasibility study was completed by the engineering firm of Brown and Caldwell of Walnut Creek, California. This firm also provided the design criteria for an irrigation system for use in land disposal of the processed sanitary wastewater. This system was operational before July 1, 1977. GE-VNC completed a cost update for operation and maintenance of the system as postulated in the feasibility study as required by the CRWQCB on January 15, 1980.

Although the discharge permit issued to the VNC does not specify sampling criteria for this land discharge, the following sampling program is being practiced:

1. Total coliform (weekly)
2. Settable solids (per discharge)
3. pH (per discharge)
4. Radioactivity (per discharge)

Records of these test parameters are being maintained at the VNC.

A listing of laboratories which perform CRWQCB required analyses is shown in Figure 2. Two of the external laboratories are approved by the California State Department of Health. In September, 1979, GE-VNC established a new contract with an outside vendor for analysis of environmental samples. As a result of this change, the method of reporting sample results changed in which the actual analytical results obtained from measurements are reported -- this is to be contrasted with the previous method of reporting results as "less than the minimum sensitivities of measurement." This change does not necessarily mean that more sensitive analyses are performed on any given sample.

LISTING OF LABORATORY ANALYSES DONE AT GENERAL ELECTRIC COMPANY
VALLECITOS NUCLEAR CENTER

1. pH
2. Dissolved Oxygen
3. Temperature
4. Total Alpha-Emitting Radioactivity
5. Total Beta-Gamma-Emitting Radioactivity
6. Total Suspended Matter

LISTING OF LABORATORIES AND ANALYSES PERFORMED FOR GENERAL ELECTRIC COMPANY
VALLECITOS NUCLEAR CENTER FOR COMPLIANCE PURPOSES

1.	Frederiksen Engineering Co., Inc. Executive Center Building 1755 Broadway Oakland, California 94612	Performs fish bioassays, total coliform, ammonia nitrogen and nitrate nitrogen as required.
*2.	Teledyne Isotopes Corp. 20 Van Buren Avenue Westwood, New Jersey 07675	Performs periodic soil analyses for Pu-239, -240, and -238, and water analysis for tritium.
3.	Trace Analysis Laboratory, Inc. 3423 Investment Blvd., No. 14 Hayward, California 94545	Performs total general mineral analysis on the site wastewaters on an occasional basis.
*4.	United States Testing Co., Inc. 2800 George Washington Way Richland, Washington 99352	Performs most radiological and nonradiological analyses on water, soil, stream bottom, and vegetation samples.

The director of each Laboratory listed above signs the analytical reports that the General Electric Company receives and each such report is available for inspection.

*The Teledyne Isotopes Corp. and U. S. Testing Co., Inc. are not certified by the State of California but do participate in the U. S. Environmental Protection Agency's cross-check program at the Environmental Monitoring and Support Laboratory, Las Vegas, Nevada; and the California Regional Water Quality Control Board Staff has acknowledged our use of these laboratories.

Figure 2. Analytical Laboratories

II. EFFLUENT MONITORING DATA

A. WATERBORNE RELEASES

1. Discharge Volumes

Daily industrial and sanitary wastewater discharge volumes are summarized in Table 1. Table 5 shows the number of days when the maximum design flow on the sanitary system was exceeded. This discharge volume did exceed 75% of the design flow monthly average during January and February 1980 more often because of a near record rainfall during fiscal weeks 2 and 7.

2. Radioactivity

Radioactivity measurements for influent and effluent waters are summarized in Tables 2 and 3. Table 2 indicates essentially no difference between measurements of influent (from the San Francisco water supply system) and monthly composites of industrial effluent.

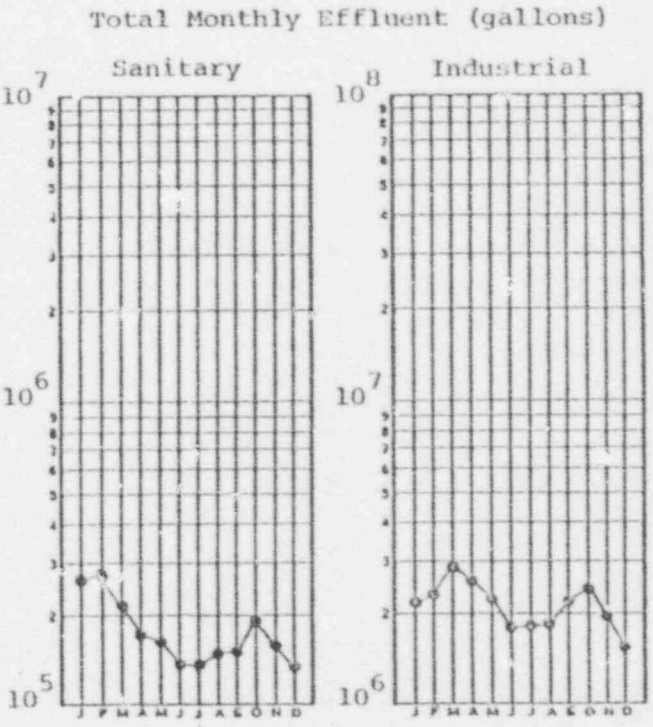
Daily basin effluent data are shown to be higher in value primarily because of the difference in minimum sensitivities between daily and monthly composite analyses, but this can result from a short half-life constituents. Aliquots of daily samples are combined to form the monthly composite. When the monthly composite is collected and counted, most of the short half-life constituents have decayed below detectability, and analyses of monthly composites are performed such that lower concentrations of radioactivity are measured than for daily samples. Naturally occuring radionuclides may affect the results of radiometric analysis of environmental samples.

INFLUENT AND EFFLUENT WATER VOLUMES

1980 MONTH	TOTAL MONTHLY FRESH WATER INFLUENT (Gallons x 10^6)	TOTAL DAILY EFFLUENT					
		Sanitary (Gallons x 10^3)			Industrial (gallons x 10^5)		
		Average	Maximum	Minimum	Average	Maximum	Minimum
JANUARY	2.86	8.97	32.59	1.92	0.735	1.20	0
FEBRUARY	2.36	9.91	45.98	0	0.838	1.80	0
MARCH	2.73	7.11	17.24	0	0.96	1.55	0
APRIL	3.62	5.75	9.58	0	0.90	1.20	0.60
MAY	3.21	5.44	9.58	0	0.77	1.80	0.60
JUNE	2.70	4.92	11.50	0	0.60	1.20	0
JULY	2.89	4.89	9.59	1.92	0.63	1.20	0
AUGUST	2.89	5.62	9.59	1.92	0.63	1.20	0
SEPTEMBER	3.09	5.62	11.50	0	0.72	1.20	0
OCTOBER	3.76	6.52	17.25	1.92	0.61	1.20	0
NOVEMBER	3.17	5.69	9.59	0	0.66	1.20	0
DECEMBER	2.75	5.38	13.42	1.92	0.53	1.20	0

*All sanitary waste effluent is disposed on land via a sprinkler irrigation system as of July 1, 1977.

TABLE 1



INFLUENT AND EFFLUENT RADIOACTIVITY IN WATER

(All data in pCi/ℓ except as noted)

1980 MONTH	Fresh Water Influent		Monthly Effluent Composite		Number of Samples	Daily Basin Effluent Samples										Weekly Effluent Composite I-131
						Alpha ***			Beta–Gamma ***			Average Concentration for Previous 12 Months		Total Activity Discharged for Previous 12 Months (Ci)		
	α	β–γ	α	β–γ		Max	Min	Av	Max	Min	Av	α	β–γ	α	β–γ	
JANUARY	0.632	3.02	2.08	<6.75	38	99.0	<30.0	<32.0	*4496.0	<50.0	<196.0	<31.3	<61.9	<0.0033	<0.0073	<30.0
FEBRUARY	0.391	<1.76	<0.694	63.5	41	42.0	<30.0	<31.0	*3482.0	<50.0	<175.0	<31.2	<77.8	<0.0033	<0.0083	<30.0
MARCH	<0.324	<2.32	<0.102	13.1	50	76.0	<30.0	<33.0	160.0	<50.0	<72.0	<31.1	<78.0	<0.0034	<0.0085	<30.0
APRIL	0.460	1.76	2.175	20.3	45	63.0	<30.0	<32.0	224.0	<50.0	<77.0	<30.8	<78.3	<0.0034	<0.0087	<30.0
MAY	0.393	5.00	0.052	10.2	40	48.0	<20.0	<30.0	98.0	<50.0	<61.9	<30.7	<78.7	<0.0034	<0.0087	<30.0
JUNE	0.602	1.80	0.848	6.92	30	49.0	<20.0	<30.0	86.0	<50.0	<56.6	<30.7	<78.9	<0.0033	<0.0085	<30.0
JULY	0.686	1.70	0.301	4.74	33	30.0	<30.0	<30.0	50.0	<50.0	<50.0	<30.7	<78.9	<0.0032	<0.0085	<30.0
AUGUST	0.671	1.63	0.671	1.63	33	55.0	<30.0	<31.0	66.0	<50.0	<51.0	<30.7	<78.9	<0.0032	<0.0084	<30.0
SEPTEMBER	0.509	6.51	0.787	2.32	36	30.0	<30.0	<30.0	50.0	<50.0	<51.0	<30.7	<78.9	<0.0032	<0.0083	<30.0
OCTOBER	0.536	4.05	0.278	<0.257**	42	31.0	<30.0	<30.0	82.0	<50.0	<52.0	<30.7	<78.8	<0.0032	<0.0083	<30.0
NOVEMBER	0.320	2.36	0.540	3.37**	33	30.0	<30.0	<30.0	52.0	<50.0	<50.0	<30.7	<78.8	<0.0032	<0.0083	<30.0
DECEMBER	0.370	2.88**	0.37**	3.17**	28	30.0	<30.0	<30.0	68.0	<50.0	<51.0	<30.7	<78.7	<0.0031	<0.0082	<30.0
Annual Average	<0.491	<2.90	<0.742	<11.31												<30.0

*<200 pCi/ℓ Sr-90

**Less than detection limit for the method of measurement.

***Due to natural leaching.

TABLE 2

TABLE 3 WATER EFFLUENT - THREE MONTH COMPOSITE

PERIOD	pCi/ℓ ***				
	Pu-239	Sr-89,Sr-90	Tritium (x 10^4)	Cs-137	Co-60
12/1/79 - 2/29/80	0.0121**	1.71	< 0.2	32.7	16.4
3/1/80 - 5/31/80	<0.0242	< 1.05	< 0.2	9.1	2.5
6/1/80 - 8/31/80	-0.008**	0.77	< 0.2	3.17	1.74
9/1/80 - 12/31/80	0.0326**	0.394	< 0.2	0.203**	0.332**
MPC*	5000	300	300	20,000	30,000

*Maximum permissible concentration
**Less than the detection limit for the method of measurement
***Due to natural leaching.

Annual average release concentrations for the past 6 years are shown in Table 4 below:

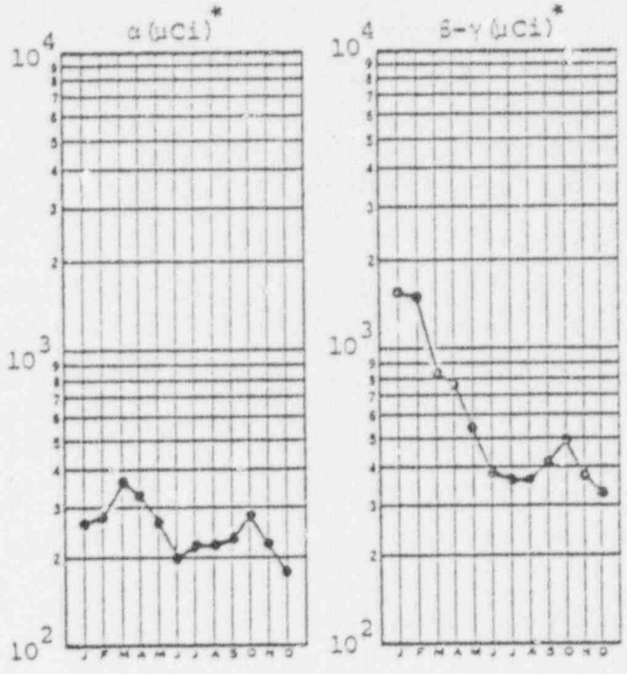
TABLE 4. Average Concentrations in Industrial Effluent

	pCi/l	
Year	α	β,γ
1975	<30.3	<176.5*
1976	<32.3	< 66.1
1977	<30.6	< 65.5
1978	<30.7	< 54.3
1979	<31.2	< 60.5
1980	<30.8	< 78.5

*Higher than normal concentrations were due to a leak in the primary heat exchanger at the General Electric Test Reactor. The primary radioisotope was Na-24 which has a half-life of 15 hours.

Total waterborne radioactivity released during 1980 is based on the daily basin effluent data and is shown below;

(Liquid Effluent-Industrial)



Annual Totals:
<3.12 mCi alpha
<8.16 mCi beta-gamma

*Unit of measure (μCi) in micro curies.

The above charts of radioactivity in the industrial liquid effluent reflect levels of natural radioactive elements present in the local soils and very slight amounts which also leach from pipes and the basins. The levels detected will vary with the amount of seasonal rainfall. No radioactive effluents are being released from VNC.

The data in Table 2 are derived by summing data obtained from measurements of short-interval (daily) water releases. Many of these measurements were less than the detection limits of the laboratory's measurement methods. The data listed necessarily include the multiple summation of these detection limits and represent the maximum values possible according to the sample analyses.

3. Nonradioactive Releases

Summaries of data relating to nonradioactive effluent parameters are given in Tables 5 through 24. The CRWQCB compliance limits are summarized on the Compliance Summary, Table 6. Although measurements are required, there are no compliance limits for dissolved oxygen, turbidity, chromium, lead, and zinc.

B. AIRBORNE RELEASES

During 1980, 14 stacks required either regular or intermittent sampling at VNC. Pertinent data for each stack are given in Table 26. Operating components serviced are given in Table 27.

Table 5

SUMMARY OF NONRADIOACTIVE EFFLUENT TESTS

I. Daily -- pH

II. Weekly (Analyses performed on 24-hour composite samples) *

Total Coliform Bacteria (weekly grab sample, sanitary only)
Total Suspended Matter
Chloride
Copper
Mercury
Temperature

III. Monthly (20-ml composite of each basin discharge except those noted)

Dissolved Oxygen (each basin is grab sampled once per month)
Total Dissolved Solids
Turbidity
Chromium
Lead
Zinc
Fish Toxicity (24-hour composite once per month)
Oil and Grease (grab sample from each basin released in 24 hours, analyzed separately, and results averaged)*

*Requirements changed effective June, 1980 with the issuance of a new NPDES Permit.

WATER EFFLUENT COMPLIANCE SUMMARY

1980 MONTH	Waste Flow: Board to be notified at any time waste flow reaches 75% of design flow; Design flow = 12,000 gpd Sanitary 600,000 gpd Industrial	Radiological Quality: No discharge in excess of limits set forth in Column 2 Table II, Sec. 30255, California Administrative Code	pH: 6.5 to 6.5	Total Suspended Matter: 30-Day Average 5.0 mg/ℓ	Total Suspended Matter: Maximum Daily 10 mg/ℓ	Chloride: Maximum Daily 250 mg/ℓ	Chloride: 90-Day Average 60 mg/ℓ	Copper: 30-Day Average 0.02 mg/ℓ	Copper: Maximum Daily 0.05 mg/ℓ	Mercury: 30-Day Average 0.001 kg/4 Basins; 0.001 mg/ℓ	Mercury: Maximum Daily 0.002 kg/day; 0.002 mg/ℓ	Temp.: Maximum 90°F 32°C	Oil and Grease: 30-Day Average 5.0 mg/ℓ	Oil and Grease: Maximum Daily 10 mg/ℓ	Total Dissolved Solids: Maximum Daily 500 mg/ℓ	Total Dissolved Solids: 90-Day Average 250 mg/ℓ	Fish Toxicity 96-hour Bioassay: Median for 3 Tests = 90%	Fish Toxicity 96-hour Bioassay: 90% Tile for 10 Tests = 70%
JAN	9/31	0/38	0/38	0/5	0/5	0/5	0/5	0/5	0/5	0/5	0/5	0/8	0/1	0/1	0/1	0/1	0/3	0/10
FEB	22/29	0/41	0/41	0/4	0/4	0/4	0/4	0/4	0/4	0/4	0/4	0/6	0/1	0/1	0/1	0/1	0/3	0/10
MAR	5/31	0/50	0/50	0/4	0/4	0/4	0/4	0/4	0/4	0/4	0/4	0/8	0/1	0/1	0/1	0/1	0/3	0/10
APR	4/30	0/45	0/45	1/5*	1/5*	0/5	0/5	0/5	0/5	0/5	0/5	0/8	0/1	0/1	0/1	0/1	0/3	0/10
MAY	5/31	0/40	0/40	0/3	0/3	0/3	0/3	0/3	0/3	0/3	0/3	0/8	0/1	0/1	0/1	0/1	0/3	0/10
JUNE	1/30	0/30	0/30	0/4	0/4	0/2	0/2	0/2	0/2	0/2	0/2	0/3	1/2**	1/2**	0/1	0/1	0/3	0/10
JULY	1/31	0/33	0/33	0/5	0/5	0/1	0/1	0/1	0/1	0/1	0/1	0/4	1/7**	0/7**	0/1	0/1	0/3	0/10
AUG	5/31	0/33	0/33	0/4	0/4	0/1	0/1	0/1	0/1	0/1	0/1	0/4	0/2	0/5	0/1	0/1	0/3	0/10
SEPT	1/30	0/36	0/36	0/4	0/4	0/1	0/1	0/1	0/1	0/1	0/1	0/10	0/1	0/1	0/1	0/1	0/3	0/10
OCT	***	0/42	0/42	1/5	2/5	0/1	0/1	0/1	0/1	0/1	0/1	0/13	0/1	0/1	0/1	0/1	0/3	0/10
NOV	***	0/33	0/33	0/4	0/4	0/1	0/1	0/1	0/1	0/1	0/1	0/9	0/1	0/1	0/1	0/1	0/3	0/10
DEC	***	0/26	0/26	0/5	0/5	0/1	0/1	0/1	0/1	0/1	0/1	0/6	0/1	0/1	0/1	0/1	0/3	0/10

*Analytical error is suspected for the single high TSM result, another sample was collected for which the result was well within the permissible range.

** Traced to contaminated sample containers

*** Requirements changed effective June 1980 with the issuance of a new NPDES permit.

TABLE 6

DAILY RETENTION BASIN SAMPLES

1980 MONTH	Number of Samples	pH		
		Max	Min	Ave
January	38	7.7	6.5	6.6
February	41	7.5	6.5	6.7
March	50	7.4	6.5	6.8
April	45	8.0	6.5	6.7
May	40	7.2	6.5	6.7
June	30	8.5	6.5	7.5
July	33	7.9	6.8	7.3
August	33	7.9	6.8	7.2
September	36	7.8	6.6	7.2
October	42	7.6	6.5	6.9
November	33	8.2	6.5	7.1
December	28	8.4	6.5	7.5
Total Samples	449			
Annual Maximum		8.5		
Annual Minimum			6.5	
Annual Average				7.02

TABLE 7

WATER EFFLUENT NONRADIOLOGICAL CONSTITUENTS

WEEKLY 24-HOUR COMPOSITE SAMPLES

1980	Total Suspended Matter (mg/ℓ)			Chloride (mg/ℓ)			Copper (mg/ℓ)			Mercury (mg/ℓ x 10^{-4})			Temperature (^{o}C)		
MONTH	Max	Min	Av	Max	Min	Av	Max	Min	Av	Max	Min	Av	Max	Min	Av
January	7.0	1.0	4.0	42.3	4.9	14.8	0.025	0.015	0.020	4	1	2.6	18	12	15
February	7.5	1.0	4.6	12.3	8.1	10.5	0.013	0.010	0.012	3	2	3	18	15	16
March	2.5	1.0	1.5	13.2	9.0	10.9	0.013	0.008	0.010	2	2	2	16	12	13
April	12.0	3.0	6.8	12.7	7.2	9.9	0.015	0.008	0.011	3	1	2	22	12	16
May	2.0	1.0	1.4	13.8	6.7	10.3	0.045	0.003	0.021	3	<2	<2.3	18	12	14
June	2.5	0.5	<1.0	12.4	10.2	11.3	0.010	0.010	0.010	3	<1	<2.1	17	17	17
July	2.0	<0.5	1.0			5.5*			0.005*			1.0*	24	21	23
August	<0.25	<0.25	<0.25			5.1*			0.013*			1.0*	26	18	23
September	0.5	<0.25	<0.44			5.5*			0.002*			2.0*	33	18	24
October	21**	1.8	8.06**			4.0*			0.022*			8.0*	26	15	19
November	1.0	0.2	0.50			7.8*			0.001*			4.0*	20	14	19
December	7.0**	0.4	<2.08			9.0*			0.010*			1.0*	17	10	13

* Due to change in permit requirements these analysis are required once per month.

** Due to algae growing in the extra-high purity water.

TABLE 8

WEEKLY EFFLUENT 24-HOUR COMPOSITE

SAMPLING DATE	Total Suspended Matter mg/l	Chloride mg/l	Copper mg/l	Mercury mg/l	pH
1/2-3/80	6.0	42.3	0.020	0.0003	7.2
1/9/80	2.0	4.9	0.018	0.0002	7.1
1/16-17/80	7.0	7.6	0.015	0.0001	6.7
1/23-24/80	1.0	0.7	0.021	0.0004	6.6
1/30/80	4.0	10.3	0.015	0.0003	6.5
Monthly Average	4.0	14.8	0.020	0.00026	6.82
2/6-7/80	4.5	9.8	0.013	0.0003	6.6
2/13-14/80	5.5	8.1	0.010	0.0003	6.6
2/20-21/80	7.5	11.9	0.013	0.0003	6.9
2/27/80	1.0	12.3	0.013	0.0002	6.9
-	-	-	-	-	-
Monthly Average	4.6	10.5	0.012	0.0003	6.75
3/5/80	1.0	10.8	0.010	0.0002	6.8
3/13/80	1.5	13.2	0.013	0.0002	6.7
3/19/80	1.0	10.4	0.010	0.0002	6.8
3/26/80	2.5	9.0	0.008	0.0002	6.8
-	-	-	-	-	-
Monthly Average	1.5	10.9	0.0103	0.0002	6.78

TABLE 9

WEEKLY EFFLUENT 24-HOUR COMPOSITE

SAMPLING DATE	Total Suspended Matter mg/ℓ	Chloride mg/ℓ	Copper mg/ℓ	Mercury mg/ℓ	pH
4/2/80	5.0	7.2	0.010	0.0001	7.4
4/10/80	3.0	9.7	0.013	0.0002	6.6
4/16/80	9.0	10.0	0.010	0.0002	6.6
4/23/80	5.0	12.7	0.008	0.0002	6.8
4/30/80	12.7	10.0	0.015	0.0003	6.7
Monthly Average	6.8	9.92	0.0112	0.0002	6.8
5/7/80	1.0	6.7	0.045	<0.0002	6.7
5/14/80	2.0	10.5	0.014	0.0002	6.9
5/21/80	2.0	13.8	0.003	0.0003	7.0
**	**	**	**	**	**
-	-	-	-	-	-
Monthly Average	1.37	10.33	0.021	0.00023	6.87
6/4/80	<0.5	12.4	0.010	<0.0001	7.2
6/11/80	<0.5	10.2	0.012	0.00025	7.4
6/18/80	2.5	*	*	*	7.15
6/25/80	<0.5	*	*	*	7.1
-	-	-	-	-	-
Monthly Average	<1.00	11.3	0.010	<0.00018	7.21

*Due to changes in permit requirements these analyses are performed on a monthly basis rather than on a weekly basis.

**Data lost by analytical contractor.

TABLE 10

WEEKLY EFFLUENT 24-HOUR COMPOSITE

SAMPLING DATE	Total Suspended Matter mg/ℓ	Chloride mg/ℓ	Copper mg/ℓ	Mercury mg/ℓ	pH
7/2/80	1.0	*	*	*	6.7
7/10/80	0.5	*	*	*	6.7
7/17/80	1.0	*	*	*	7.0
7/24/80	2.0	*	*	*	6.9
7/29/80	<0.5	*	*	*	7.0
Monthly Average	<1.0	5.5	0.012	0.0001	6.86
8/6/80	<0.25	*	*	*	7.4
8/14/80	<0.25	*	*	*	7.3
8/20/80	<0.25	*	*	*	7.8
8/28/80	<0.25	*	*	*	7.1
-	-	-	-	-	-
Monthly Average	<0.25	5.10	0.013	0.0001	7.40
9/3/80	<0.25	*	*	*	7.3
9/10/80	0.5	*	*	*	7.2
9/17/80	0.5	*	*	*	7.1
9/24/80	0.5	*	*	*	6.8
-	-	-	-	-	-
Monthly Average	<0.44	5.5	0.002	0.0002	7.10

*Due to changes in permit requirements these analyses are performed on a monthly basis rather than on a weekly basis.

TABLE 11

WEEKLY EFFLUENT 24-HOUR COMPOSITE

SAMPLING DATE	Total Suspended Matter mg/ℓ	Chloride mg/ℓ	Copper mg/ℓ	Mercury mg/ℓ	pH
10/1/80	1.8	*	*	*	7.45
10/8/80	2.5	*	*	*	7.3
10/15/80	12**	*	*	*	7.25
10/22/80	21**	*	*	*	6.7
10/29/80	3.0	*	*	*	6.9
Monthly Average	8.06**	4.7	0.022	0.0008	7.12
11/5/80	0.5	*	*	*	6.85
11/12/80	0.3	*	*	*	8.05
11/19/80	0.2	*	*	*	7.85
11/26/80	1.0	*	*	*	7.68
-	-	-	-	-	-
Monthly Average	0.50	4.8	0.001	0.0004	7.61
12/3/80	7.0**	*	*	*	7.55
12/12/80	2.0	*	*	*	7.80
12/17/80	0.5	*	*	*	7.6
12/24/80	0.4	*	*	*	6.9
12/31/80	<0.5	*	*	*	7.3
Monthly Average	<2.08	7.3	0.010	0.0001	7.32

*Due to changes in permit requirements these analyses are performed on a monthly basis rather than on a weekly basis.

**Due to algae growing in the extra-high purity water.

TABLE 12

WATER EFFLUENT NONRADIOLOGICAL CONSTITUENTS
MONTHLY SAMPLES

1980 MONTH	Dissolved O_2 mg/ℓ			Oil and Grease	Total Dissolved Solids (Influent)	24-HOUR COMPOSITE								
						Total Dissolved Solids (Effluent)	Turbidity	Chromium	Lead	Zinc	Fish Toxicity			
	Av	Max	Min	mg/ℓ	mg/ℓ	mg/ℓ	JTU	mg/ℓ	mg/ℓ	mg/ℓ	Survival Undiluted (%)	Control Survival (%)	3-Month Median (%)	10-Month 90% Tile (%)
JANUARY	10.5	10.5	10.5	0.44	28	66	0.4	0.013	0.013	0.020	100	100	100	100
FEBRUARY	9.3	9.3	9.3	0.86	22	83	0.18	0.008	0.041	0.048	100	100	100	100
MARCH	9.0	9.0	8.9	2.72	76	25	0.54	0.003	0.008	0.020	100	100	100	100
APRIL	9.0	9.0	9.0	0.23	69	122	3.00	<0.003	0.020	0.026	100	100	100	100
MAY	8.8	9.4	8.3	<1.0	46	147	**	0.006	0.015	0.015	100	100	100	100
JUNE	10.2	10.2	10.2	9.5	*	15	0.36	<0.005	0.010	0.052	100	100	100	100
JULY	8.2	8.2	8.2	7.4	*	53	0.33	<0.005	<0.005	0.046	100	100	100	100
AUGUST	6.3	6.3	6.3	1.64	*	53	0.42	<0.040	0.014	0.061	95	100	98	100
SEPTEMBER	7.9	8.0	7.8	0.67	*	14	0.42	0.008	<0.008	0.017	100	100	98	100
OCTOBER	8.1	8.2	7.9	0.37	*	35	0.33	0.005	0.07	0.025	100	100	98	100
NOVEMBER	8.7	8.7	8.7	2.6	*	89	4.1	0.002	0.005	0.015	100	100	100	100
DECEMBER	9.0	9.0	9.0	1.77	*	124	3.5	<0.002	0.012	0.036	100	100	100	100

*Analysis not required
**Data lost by vendor

TABLE 13

INFLUENT NONRADIOACTIVE CONSTITUENTS
(mg/ℓ)

	CHLORIDES	CHROMIUM	COPPER	LEAD	MERCURY	ZINC
JANUARY						
FEBRUARY						
MARCH						
APRIL						
MAY						
JUNE	3.7	< 0.005	0.015	0.010	*	0.021
JULY	4.5	< 0.005	0.004	0.019	0.0001	0.015
AUG	1.6	< 0.005	0.015	0.005	0.001	0.015
SEPTEMBER	6.0	< 0.005	0.004	0.018	0.0004	0.010
OCTOBER	4.3	< 0.005	0.008	*	*	0.037
NOVEMBER	3.0	0.005	0.017	0.025	0.0004	<0.01
DECEMBER	14.0	0.004	0.01	0.014	0.0001	0.01

*Insufficient sample to complete analysis.

TABLE 14

ANNUAL AVERAGE WASTE CHARACTERISTICS AND LOADING SUMMARY

(Unless otherwise noted, Figures in the Table are average values)

Parameter / 1980 MONTH	Flow			Oil and Grease		Total Dissolved Solids		Total Suspended Matter		Chloride		Copper		Mercury (x 10^{-4})		NH_3-N*		NO_3-N*	
	Av Daily MGD	Max Daily MGD	Min Daily MGD	mg/ℓ	kg/day	mg/ℓ	kg/day	mg/ℓ	kg/day	mg/ℓ	kg/day	mg/ℓ	kg/day	mg/ℓ	kg/day	mg/ℓ	kg/day	mg/ℓ	kg/day
JAN	0.074	0.12	0	0.44	0.123	66.0	18.49	4.0	1.12	14.8	4.15	0.020	0.006	2.6	0.73				
FEB	0.084	0.18	0	0.86	0.273	83	26.39	4.6	1.46	10.5	3.34	0.012	0.004	3.0	0.95				
MAR	0.096	0.155	0.06	2.72	0.99	25	9.08	1.5	0.55	10.9	3.96	0.010	0.003	2.0	0.73				
APR	0.090	0.12	0.06	0.23	0.077	122	41.54	6.8	2.32	9.9	3.37	0.011	0.0036	2.0	0.68				
MAY	0.077	0.18	0	<1.0	0.290	147	42.87	1.4	0.41	10.3	3.00	0.021	0.0061	2.3	0.67				
JUNE	0.060	0.12	0	9.5	2.159	15	3.40	<1.0	<0.23	11.3	2.57	0.010	0.0023	<2.1	<0.47				
JULY	0.063	0.12	0	7.4	1.76	53	12.64	<1.00	<0.18	5.5	1.32	<0.011	0.0012	1.0	0.24				
AUG	0.063	0.12	0	1.6	0.38	53	12.64	<0.25	<0.06	5.10	1.22	0.013	0.0031	1.0	0.24				
SEP	0.072	0.12	0	0.66	0.180	14	3.82	<0.44	<0.12	5.5	1.50	0.002	0.001	2.0	0.55				
OCT	0.081	0.12	0	0.37	0.113	35	10.8	8.06	2.47	4.0	1.22	0.022	0.0068	8.0	2.45				
NOV	0.066	0.12	0	2.6	0.649	89	22.2	0.33	0.08	7.8	1.95	0.001	0.0002	4.0	0.99				
DEC	0.054	0.12	0	1.77	0.363	124	27.4	<2.08	0.46	9.0	1.98	0.010	0.0023	1.0	0.45				
Annual Average	0.073	0.18**	0	2.43	0.611	68.8	19.3	<2.62	<0.79	8.7	2.47	<0.012	0.0034	<2.5	0.76				

* Analyses of these constituents are no longer required.

** Not an average.

TABLE 15

ANNUAL WASTE CHARACTERISTIC AND LOADING SUMMARY

PARAMETER / 1980 MONTH	OIL AND GREASE									
	CONCENTRATION (mg/ℓ)					LOADING (lb/day)				
	MAXIMUM	MINIMUM	AVERAGE	NO. OF SAMPLES		MAXIMUM**	MINIMUM**	AVERAGE	NO. OF SAMPLES	
				SHOWING VIOLATION	TOTAL ANALYZED				SHOWING VIOLATION	TOTAL ANALYZED
JANUARY	-	-	0.44	0	1	0.44	0	0.27	0	1
FEBRUARY	-	-	0.86	0	1	1.29	0	0.60	0	1
MARCH	-	-	2.72	0	1	3.52	0.14	2.18	0	1
APRIL	-	-	0.23	0	1	0.23	0.12	0.17	0	1
MAY	-	-	<1.0	0	1	1.50	0	0.64	0	1
JUNE	-	-	9.5*	1	2	9.51*	0	4.76	1	2
JULY	11.5*	5.0	7.4*	1	7	11.5*	0	3.89	1	7
AUGUST	2.9	0.89	1.6	0	5	2.9	0	0.84	0	5
SEPTEMBER	1.18	0.11	0.67	0	3	1.18	0	0.40	0	3
OCTOBER	0.9	0.2	0.37	0	3	0.90	0	0.25	0	3
NOVEMBER	2.6	2.6	2.6	0	1	2.60	0	1.43	0	1
DECEMBER	2.3	1.3	1.77	0	3	2.30	0	0.80	0	3
ANNUAL MAXIMUM	11.5*					11.50*				
ANNUAL MINIMUM		0.11					0			
ANNUAL AVERAGE			2.43					1.35		
TOTAL				2	29				0	29

*Traced to contaminated sample containers
**Accounting for maximum and minimum discharge volumes.

TABLE 16

ANNUAL WASTE CHARACTERISTIC AND LOADING SUMMARY

PARAMETER / 1980 MONTH	TOTAL DISSOLVED SOLIDS									
	CONCENTRATION (mg/ℓ)					LOADING (lb/day)				
	MAXIMUM	MINIMUM	AVERAGE	NO. OF SAMPLES		MAXIMUM*	MINIMUM*	AVERAGE	NO. OF SAMPLES	
				SHOWING VIOLATION	TOTAL ANALYZED				SHOWING VIOLATION	TOTAL ANALYZED
JANUARY	-	-	66.0	0	1	66.1	0	40.8	0	1
FEBRUARY	-	-	83	0	1	124.7	0	58.2	0	1
MARCH	-	-	25	0	1	32.3	1.25	20.0	0	1
APRIL	-	-	122	0	1	122.2	61.09	91.6	0	1
MAY	-	-	147	0	1	220.8	0	94.5	0	1
JUNE	-	-	15	0	1	15.0	0	7.5	0	1
JULY	-	-	53	0	1	53.0	0	27.8	0	1
AUGUST	-	-	53	0	1	53.0	0	27.8	0	1
SEPTEMBER	-	-	14	0	1	14.0	0	8.4	0	1
OCTOBER	-	-	35	0	1	35	0	23.7	0	1
NOVEMBER	-	-	89	0	1	89	0	49.0	0	1
DECEMBER	-	-	124	0	1	124	0	60.3	0	1
ANNUAL MAXIMUM	147					220.8				
ANNUAL MINIMUM		14					0			
ANNUAL AVERAGE			68.8					42.47		
TOTAL				0	12				0	12

*Accounting for maximum and minimum discharge volumes.

TABLE 17

ANNUAL WASTE CHARACTERISTIC AND LOADING SUMMARY

PARAMETER / 1980 MONTH	TOTAL SUSPENDED MATTER									
	CONCENTRATION (mg/ℓ)					LOADING (lb/day)				
	MAXIMUM	MINIMUM	AVERAGE	NO. OF SAMPLES		MAXIMUM*	MINIMUM*	AVERAGE	NO. OF SAMPLES	
				SHOWING VIOLATION	TOTAL ANALYZED				SHOWING VIOLATION	TOTAL ANALYZED
JANUARY	7.0	1.0	4.0	0	5	7.01	0	2.47	0	5
FEBRUARY	7.5	1.0	4.6	0	4	11.27	0	3.23	0	4
MARCH	2.5	1.0	1.5	0	4	3.23	0.05	1.20	0	4
APRIL	12.0	3.0	6.8	1	5	12.00	1.50	5.11	1	5
MAY	2.0	1.0	1.4	0	3	3.00	0	1.05	0	3
JUNE	2.5	<0.5	<1.0	0	4	2.50	0	<0.50	0	4
JULY	2.0	<0.5	1.0	0	5	2.00	0	<0.52	0	5
AUGUST	<0.25	<0.25	<0.25	0	4	<0.25	0	<0.13	0	4
SEPTEMBER	0.50	<0.25	<0.44	0	4	0.50	0	<0.26	0	4
OCTOBER	21**	1.8	8.06**	2	5	21.0	0	5.45	2	5
NOVEMBER	0.5	0.2	0.33	0	4	0.50	0	0.18	0	4
DECEMBER	7.0**	0.4	<2.08	0	5	7.0	0	1.01	0	5
ANNUAL MAXIMUM	21.0					12.00				
ANNUAL MINIMUM		<0.25					0			
ANNUAL AVERAGE			<2.62					1.78		
TOTAL				3	52				3	52

*Accounting for maximum and minimum discharge volumes.

**Due to algae growing in the extra-high purity water.

TABLE 18

ANNUAL WASTE CHARACTERISTIC AND LOADING SUMMARY

PARAMETER / 1980 MONTH	DISSOLVED OXYGEN (mg/ℓ)									
	C-R* CONCENTRATION					C-1*				
				NO. OF SAMPLES					NO. OF SAMPLES	
	MAXIMUM	MINIMUM	AVERAGE	SHOWING VIOLATION	TOTAL ANALYZED	MAXIMUM	MINIMUM	AVERAGE	SHOWING VIOLATION	TOTAL ANALYZED
JANUARY	10.5	10.5	10.5	No Limit Given	1	-	-	11.9	0	1
FEBRUARY	9.3	9.3	9.3		1	-	-	15.9	0	1
MARCH	9.0	8.9	9.0		2	-	-	11.6	0	1
APRIL	9.0	9.0	9.0		1	-	-	11.7	0	1
MAY	9.4	8.3	8.8		3	-	-	9.1	0	1
JUNE	10.2	10.2	10.2		1	-	-	8.3	0	1
JULY	8.2	8.2	8.2		1	-	-	7.7	0	1
AUGUST	6.3	6.3	6.3		1	-	-	8.1	0	1
SEPTEMBER	8.0	7.8	7.9		2	-	-	7.0	0	1
OCTOBER	8.2	7.9	8.1		2	-	-	8.2	0	1
NOVEMBER	8.7	8.7	8.7		1	-	-	9.4	0	1
DECEMBER	9.0	9.0	9.0		1	-	-	9.1	0	1
ANNUAL MAXIMUM	10.5					15.9				
ANNUAL MINIMUM		6.3					7.0			
ANNUAL AVERAGE			8.8					9.8		
TOTAL					17				0	12

*C-R = Reference Station (Retention Basin)
*C-1 = Receiving Water Station closest to discharge point (Sample location C-5 in Vallecitos Creek downstream of basin outfall)

TABLE 19

ANNUAL WASTE CHARACTERISTIC AND LOADING SUMMARY

PARAMETER / 1980 MONTH	CHLORIDE									
	CONCENTRATION (mg/ℓ)					LOADING (lb/day)				
	MAXIMUM	MINIMUM	AVERAGE	NO. OF SAMPLES		MAXIMUM*	MINIMUM*	AVERAGE	NO. OF SAMPLES	
				SHOWING VIOLATION	TOTAL ANALYZED				SHOWING VIOLATION	TOTAL ANALYZED
JANUARY	42.3	4.9	14.8	0	5	42.4	0	9.14	0	5
FEBRUARY	12.3	8.1	10.5	0	4	18.5	0	7.36	0	4
MARCH	13.2	9.0	10.9	0	4	17.1	0.45	8.73	0	4
APRIL	12.7	7.2	9.9	0	5	12.7	3.61	7.44	0	5
MAY	13.8	6.7	10.3	0	3	20.7	0	6.62	0	3
JUNE	12.4	10.2	11.3	0	2	12.4	0	5.66	0	2
JULY	-	-	5.1	0	1	5.5	0	2.89	0	1
AUGUST	-	-	5.0	0	1	5.0	0	2.62	0	1
SEPTEMBER	-	-	5.5	0	1	5.5	0	3.31	0	1
OCTOBER	-	-	4.0	0	1	4.0	0	2.70	0	1
NOVEMBER	-	-	7.8	0	1	7.8	0	4.29	0	1
DECEMBER	-	-	9.0	0	1	9.0	0	4.37	0	1
ANNUAL MAXIMUM	42.3					42.4				
ANNUAL MINIMUM		4.0					0			
ANNUAL AVERAGE			8.71					5.43		
TOTAL				0	29				0	29

*Accounting for maximum and minimum discharge volumes.

TABLE 20

ANNUAL WASTE CHARACTERISTIC AND LOADING SUMMARY

PARAMETER / 1980 MONTH	COPPER									
	CONCENTRATION (mg/l)					LOADING (lb/day)				
	MAXIMUM	MIN	AVERAGE	NO. OF SAMPLES		MAXIMUM*	MINIMUM*	AVERAGE	NO. OF SAMPLES	
				SHOWING VIOLATION	TOTAL ANALYZED				SHOWING VIOLATION	TOTAL ANALYZED
JANUARY	0.025	0.015	0.020	0	5	0.025	0	0.012	0	5
FEBRUARY	0.013	0.010	0.012	0	4	0.020	0	0.008	0	4
MARCH	0.013	0.008	0.010	0	4	0.017	0.0004	0.008	0	4
APRIL	0.015	0.008	0.011	0	5	0.015	0.0040	0.008	0	5
MAY	0.045	0.003	0.021	0	3	0.068	0	0.014	0	3
JUNE	0.010	0.010	0.010	0	2	0.010	0	0.005	0	2
JULY	-	-	0.011	0	1	0.012	0	0.006	0	1
AUGUST	-	-	0.013	0	1	0.013	0	0.007	0	1
SEPTEMBER	-	-	0.002	0	1	0.002	0	0.001	0	1
OCTOBER	-	-	0.022	0	1	0.022	0	0.015	0	1
NOVEMBER	-	-	0.001	0	1	0.001	0	0.0005	0	1
DECEMBER	-	-	0.010	0	1	0.010	0	0.005	0	1
ANNUAL MAXIMUM	0.045					0.068				
ANNUAL MINIMUM		0.001					0			
ANNUAL AVERAGE			0.012					0.007		
TOTAL				0	29				0	29

*Accounting for maximum and minimum discharge volumes.

TABLE 21

ANNUAL WASTE CHARACTERISTIC AND LOADING SUMMARY

PARAMETER / 1980 MONTH	MERCURY									
	CONCENTRATION (mg/ℓ) (X 10^{-4})					LOADING (lb/day)				
	MAXIMUM	MINIMUM	AVERAGE	NO. OF SAMPLES		MAXIMUM**	MINIMUM**	AVERAGE	NO. OF SAMPLES	
				SHOWING VIOLATION	TOTAL ANALYZED				SHOWING VIOLATION	TOTAL ANALYZED
JANUARY	4	1	2.6	0	5	0.0004	0	0.00016	0	5
FEBRUARY	3	2	3	0	4	0.00045	0	0.00021	0	4
MARCH	2	2	2	0	4	0.00026	0.0001	0.00016	0	4
APRIL	3	1	2	0	5	0.0003	0.0001	0.0002	0	5
MAY	3	<2	2.3	0	3	0.0005	0	<0.0001	0	3
JUNE	3	<1	<2.1	0	2	0.00025	0	<0.0001*	0	2
JULY	-	-	1.0	0	1	0.0001	0	0.00005	0	1
AUGUST	-	-	1.0	0	1	0.0001	0	0.00005	0	1
SEPTEMBER	-	-	2.0	0	1	0.0002	0	0.00012	0	1
OCTOBER	-	-	8.0	0	1	0.0008	0	0.00054	0	1
NOVEMBER	-	-	4.0	0	1	0.0004	0	0.00022	0	1
DECEMBER	-	-	1.0	0	1	0.0001	0	0.00005	0	1
ANNUAL MAXIMUM	8.0					0.0008				
ANNUAL MINIMUM		1.0					0			
ANNUAL AVERAGE			<2.58					0.00016		
TOTAL				0	29				0	29

*Corrected calculation error

**Accounting for maximum and minimum discharge volumes.

TABLE 22

ANNUAL WASTE CHARACTERISTIC AND LOADING SUMMARY

PARAMETER / 1980 MONTH	TOTAL CHROMIUM									
	CONCENTRATION (mg/ℓ)					LOADING (lb/day)				
	MAXIMUM	MINIMUM	AVERAGE	NO. OF SAMPLES		MAXIMUM*	MINIMUM*	AVERAGE	NO. OF SAMPLES	
				SHOWING VIOLATION	TOTAL ANALYZED				SHOWING VIOLATION	TOTAL ANALYZED
JANUARY	-	-	0.013	No Limit Given	1	0.013	0	0.008	No Limit Given	1
FEBRUARY	-	-	0.008		1	0.012	0	0.006		1
MARCH	-	-	0.003		1	0.004	0.0002	0.002		1
APRIL	-	-	<0.003		1	<0.003	<0.0015	<0.0023		1
MAY	-	-	0.006		1	0.009	0	0.0039		1
JUNE	-	-	<0.005		1	<0.005	0	<0.0025		1
JULY	-	-	<0.005		1	<0.005	0	<0.0026		1
AUGUST	-	-	<0.004		1	<0.004	0	<0.0021		1
SEPTEMBER	-	-	0.003		1	0.003	0	0.0018		1
OCTOBER	-	-	0.005		1	0.005	0	0.0034		1
NOVEMBER	-	-	0.002		1	0.002	0	0.0011		1
DECEMBER	-	-	0.002		1	<0.002	0	<0.0010		1
ANNUAL MAXIMUM	0.013					0.013				
ANNUAL MINIMUM		<0.002					0			
ANNUAL AVERAGE			<0.005					<0.0031		
TOTAL					12					12

*Accounting for maximum and minimum discharge volumes.

TABLE 23

ANNUAL WASTE CHARACTERISTIC AND LOADING SUMMARY

PARAMETER / 1980 MONTH	LEAD									
	CONCENTRATION (mg/ℓ)					LOADING (lb/day)				
	MAXIMUM	MINIMUM	AVERAGE	NO. OF SAMPLES		MAXIMUM*	MINIMUM*	AVERAGE	NO. OF SAMPLES	
				SHOWING VIOLATION	TOTAL ANALYZED				SHOWING VIOLATION	TOTAL ANALYZED
JANUARY	-	-	0.013	No Limit Given	1	0.013	0	0.008	No Limit Given	1
FEBRUARY	-	-	0.041		1	0.062	0	0.029		1
MARCH	-	-	0.008		1	0.010	0.0004	0.006		1
APRIL	-	-	0.020		1	0.020	0.010	0.015		1
MAY	-	-	0.015		1	0.023	0	0.010		1
JUNE	-	-	0.010		1	0.010	0	0.005		1
JULY	-	-	<0.005		1	<0.005	0	<0.026		1
AUGUST	-	-	0.014		1	0.014	0	0.007		1
SEPTEMBER	-	-	<0.008		1	<0.008	0	<0.005		1
OCTOBER	-	-	0.07		1	0.070	0	0.047		1
NOVEMBER	-	-	0.005		1	0.005	0	0.003		1
DECEMBER	-	-	0.012		1	0.012	0	0.006		1
ANNUAL MAXIMUM	0.041					0.062				
ANNUAL MINIMUM		<0.005					0			
ANNUAL AVERAGE			<0.018					0.014		
TOTAL					12					12

*Accounting for maximum and minimum discharge volumes.

TABLE 24

ANNUAL WASTE CHARACTERISTIC AND LOADING SUMMARY

PARAMETER / 1980 MONTH	ZINC									
	CONCENTRATION (mg/ℓ)					LOADING (lb/day)				
	MAXIMUM	MINIMUM	AVERAGE	NO. OF SAMPLES		MAXIMUM*	MINIMUM*	AVERAGE	NO. OF SAMPLES	
				SHOWING VIOLATION	TOTAL ANALYZED				SHOWING VIOLATION	TOTAL ANALYZED
JANUARY	-	-	0.020	No Limit Given	1	0.020	0	0.0124	No Limit Given	1
FEBRUARY	-	-	0.048		1	0.072	0	0.034		1
MARCH	-	-	0.020		1	0.026	0.001	0.016		1
APRIL	-	-	0.026		1	0.026	0.013	0.020		1
MAY	-	-	0.015		1	0.023	0	0.010		1
JUNE	-	-	0.052		1	0.052	0	0.026		1
JULY	-	-	0.046		1	0.046	0	0.024		1
AUGUST	-	-	0.061		1	0.061	0	0.032		1
SEPTEMBER	-	-	0.017		1	0.017	0	0.010		1
OCTOBER	-	-	0.025		1	0.025	0	0.017		1
NOVEMBER	-	-	0.015		1	0.015	0	0.008		1
DECEMBER	-	-	0.036		1	0.036	0	0.017		1
ANNUAL MAXIMUM	0.061					0.061				
ANNUAL MINIMUM		0.015					0			
ANNUAL AVERAGE			0.032					0.019		
TOTAL					12					12

*Accounting for maximum and minimum discharge volumes.

TABLE 25

TABLE 26. Stack Height, Size, and Flow Rate

Stack Number	Location	Height (ft above roof)	Stack Size (inches)	Design Flow Rate (cfm)
4[a]	Bldg 102A	75[b]	66 diam	70,000
12	Bldg 103	48[b]	60 diam	36,000
16[a]	Bldg 105	3	9 x 13	3,000
17	Bldg 105	11	15-3/4 x 21-3/4	1,200
26[a]	GETR	95[b]	36 diam	18,000
30	Waste Evaporator	19.5	13-3/4 x 17-3/4	2,400
34	Waste Storage	13	13 x 17-3/4	1,000
37	Bldg 400	45[b]	19 diam	21,000
41	Bldg 401	30[b]	1403/4 x 18	4,000
45	Bldg 400	31[b]	15-1/2 x 22	2,800
46	Bldg 300	15	16-1/4 x 17-3/4	4,600
47	Bldg 300	14.5	15-3/4 x 22	4,300
48	Bldg 300	14	14-1/2 x 20	2,100
50	Bldg. 302	38[b]	21 diam	7,500

[a] Major stack
[b] Feet above ground level

TABLE 27. Operating Components Serviced

Stack No.	Area(s) Serviced
4	Remote Handling Operation, Isotope Production Facility, Plutonium Analytical Laboratory, Plutonium Fuels Laboratory, Radiochemistry Plutonium Isotopes Laboratory Remote Handling Operations Radioactive Storage Room
12	Metallurgy and Ceramics Laboratories, Chemistry Laboratories
16	Nuclear Test Reactor
17	Plutonium Cladding Laboratory
26	General Electric Test Reactor
30	Liquid Waste Evaporator
34	Waste Storage Facility
37	Chemical Engineering, Process Development, Ventilation Study System
41	Track Etch Laboratory
45	Metallurgy Test Laboratory, West Area
46	Metallurgy Test Laboratory, East Area
47	Liquid Metals Laboratory
48	Chemistry Training Laboratory
50	Gas Technology Development

Each of these stacks is equipped with a sampling line that contains a particulate filter for sampling particulate radioactivity. Selected sample lines are also equipped with charcoal cartridges for radioiodine monitoring. Other stacks are equipped with noble gas monitoring systems. Filters and cartridges are changed weekly and analyzed for gross alpha, gross beta-gamma, and I-131. The noble gases are counted continuously, and a recording system provides a readout of the quantity released from each monitored stack.

Results of the VNC stack sampling program are presented in Figures 3 through y. Figures 3, 4, and 5 present the emissions from the three major VNC stacks, Building 102 (Stack 4), Nuclear Test Reactor (Stack 16) and General Electric Test Reactor (Stack 26), respectively. Figure 6 is a composite of VNC's 13 minor stacks. Figure 7 is a composite of all VNC stack discharges.

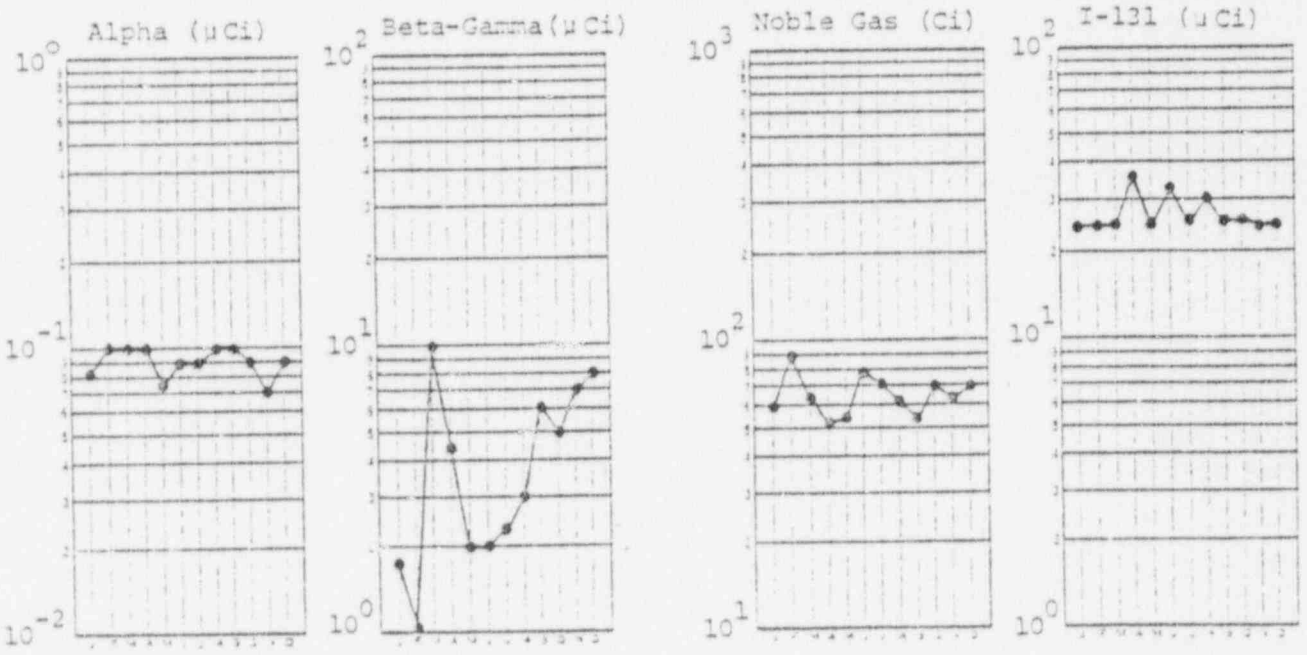


FIGURE 3. BUILDING 102 (STACK 4)

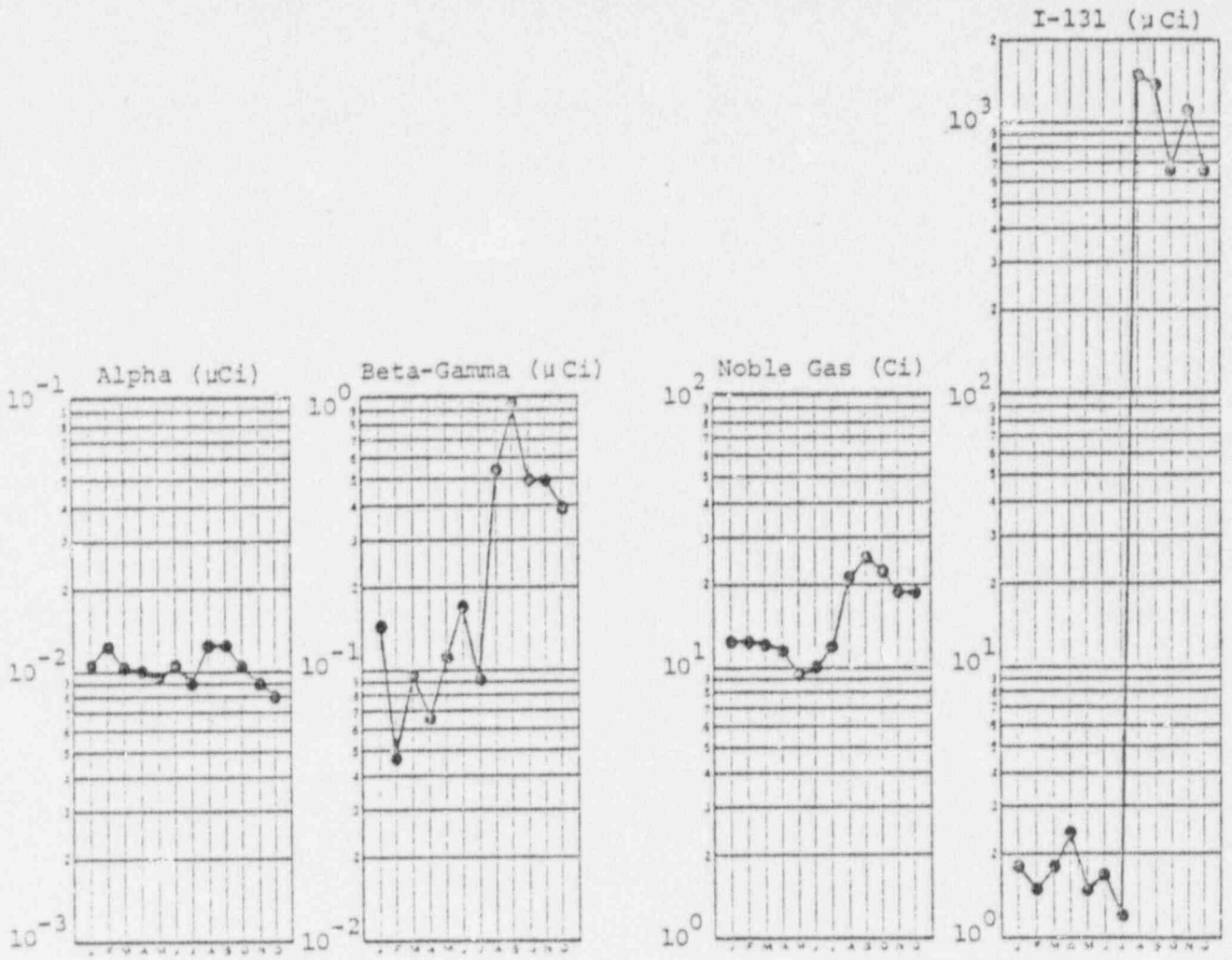


FIGURE 4. NUCLEAR TEST REACTOR (STACK 16)

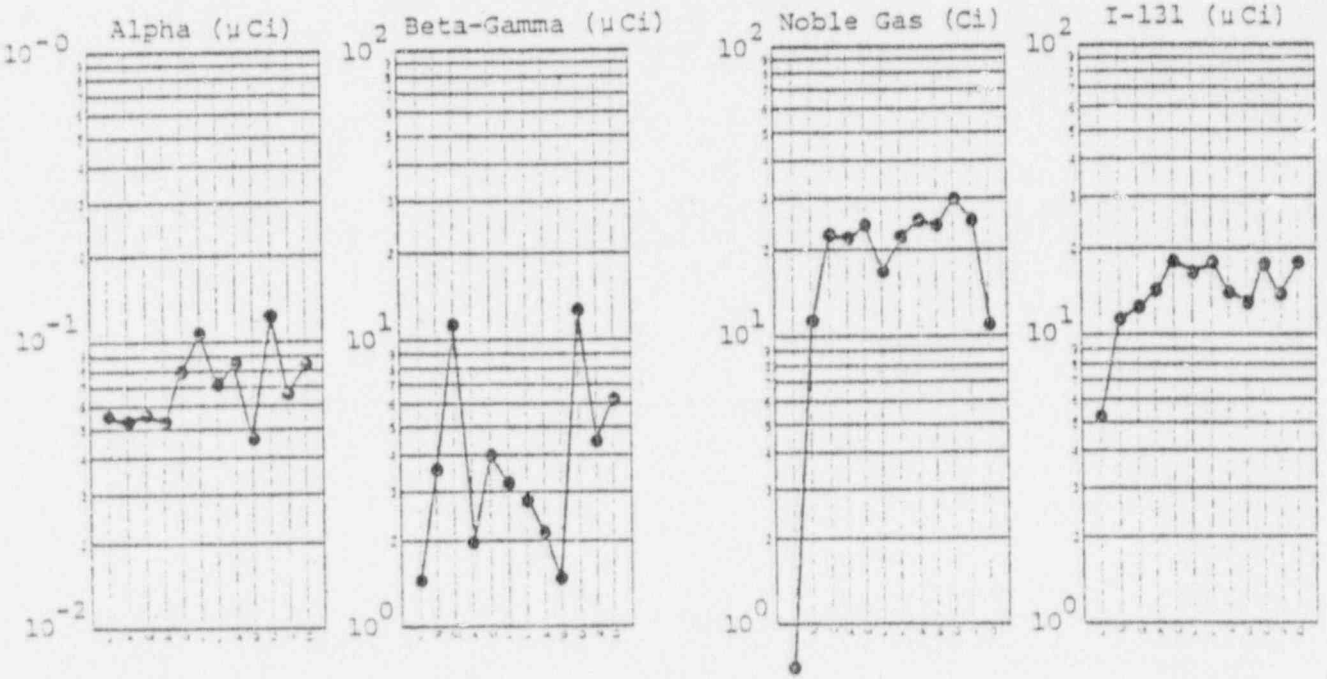


FIGURE 5. GENERAL ELECTRIC TEST REACTOR (STACK 26)

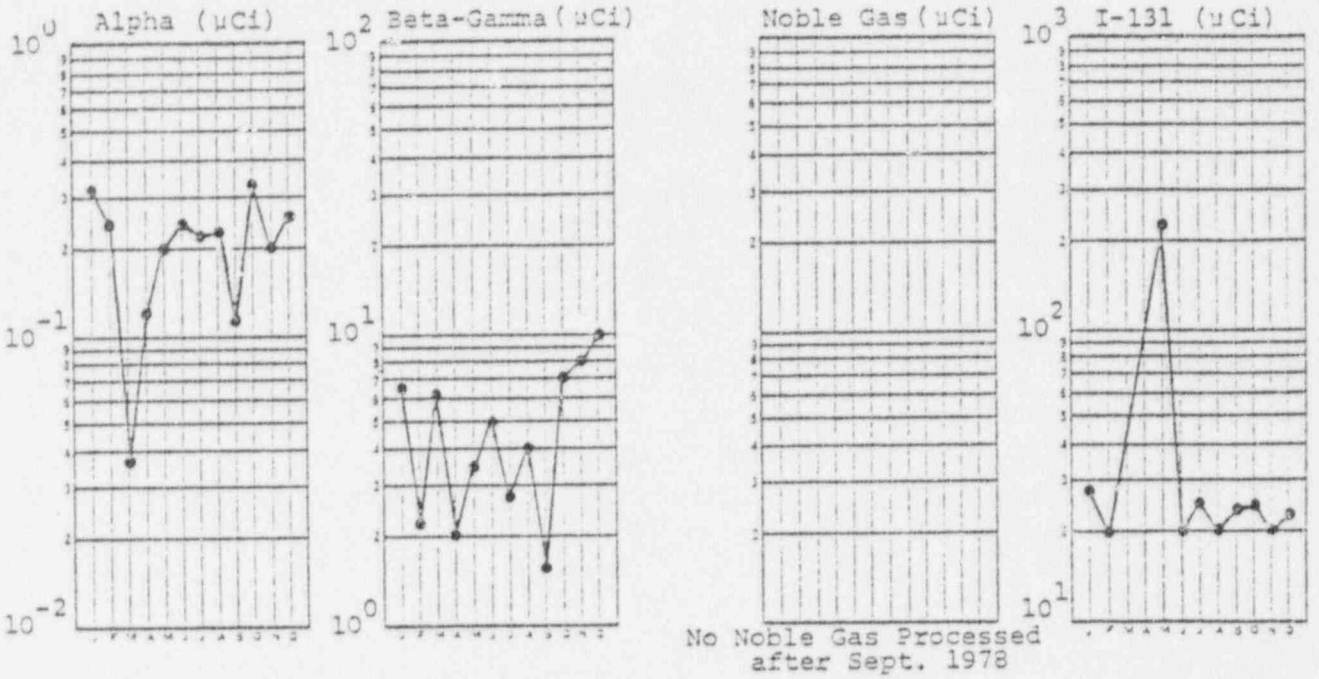


FIGURE 6. COMPOSITE ALL STACKS EXCEPT NUMBERS 4, 16, AND 26

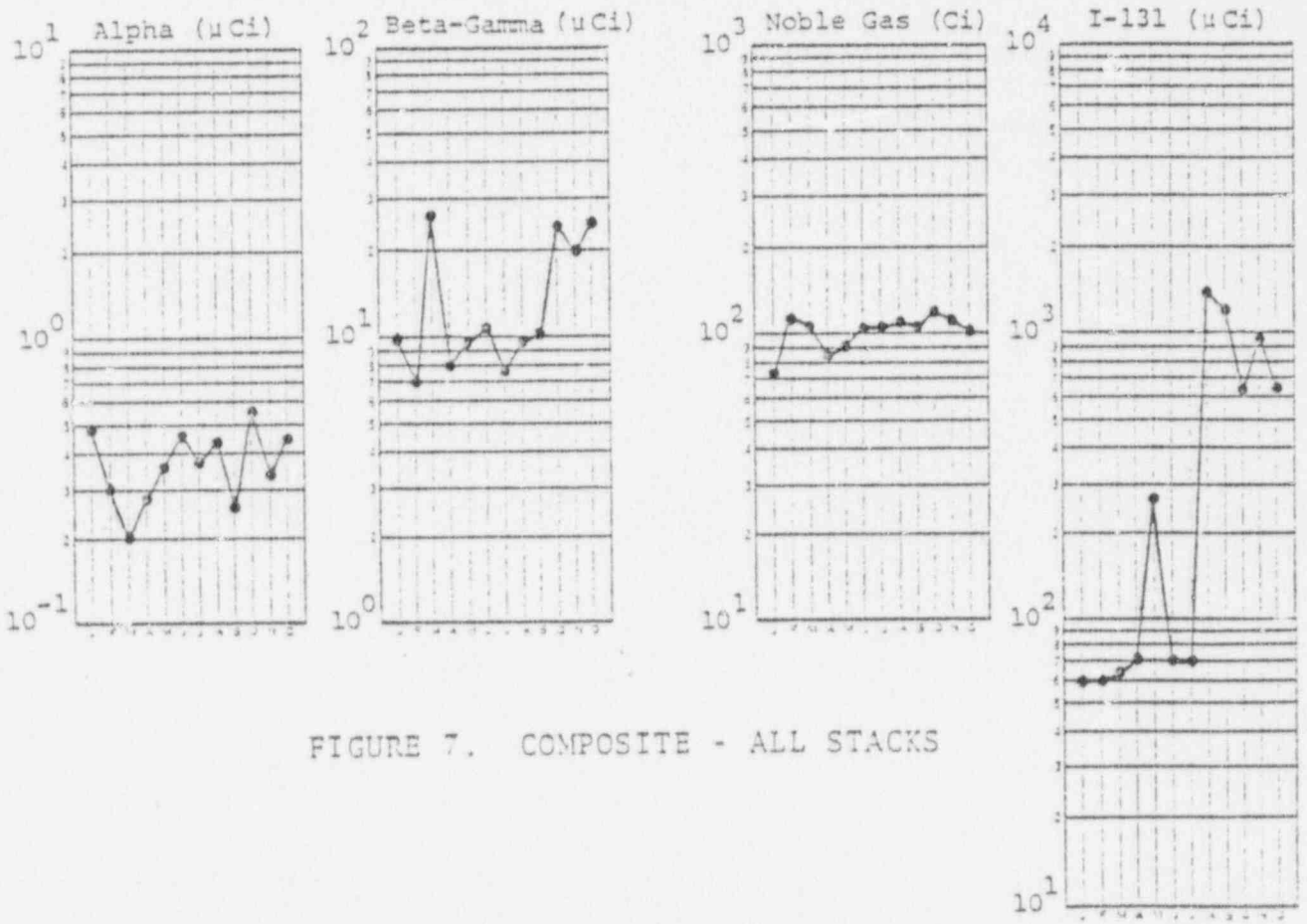


FIGURE 7. COMPOSITE - ALL STACKS

Total airborne releases (stack emissions) for 1980 are as follows:

Alpha Particulate:	<3.48 µCi (predominantly radon-thoron daughter products)
Beta-Gamma Particulate:	$<1.12 \times 10^2$ µCi
Iodine-131:	<6.13 mCi
Noble Gases:	$<1.22 \times 10^3$ Ci

Noble gas discharges were discontinued in two laboratories after September 1978, stacks 12 and 37, since the shutdown of the General Electric Test Reactor (GETR) in October 1977, radioisotope production was stopped at the site. Small quantities of radioactive material were purchased from outside vendors and was processed and analyzed during a portion of the year.

Stack 26 (GETR) shows a marked reduction in noble gas activity, Figure 5, page 34 This reduction can be attributed to two factors, (1) the reactor was shutdown in October 1977, and (2) normal background is now subtracted from the numbers recorded. This was not done during operation and through September 1978. Noble gas releases were actually much less than the quantities reported to have been released.

Noble gas activities recorded from stacks 4 and 16 integrate background readings with the actual releases, which, in some cases accounts for 40 to 50% of the activity released.

As with the water effluent data, these data above are derived by summing data obtained from measurement of short-interval releases. Many of the measurements on these releases were found to be less than the detection limits of standard laboratory instrumentation. The data listed include the multiple summation of these detection limits and therefore represent the maximum releases possible from the VNC during the calendar year.

III. ENVIRONMENTAL SURVEILLANCE DATA

A. SURVEILLANCE FOR WATERBORNE RELEASES

1. Receiving Waters

Single samples are obtained monthly from various streams near the site to monitor for constituents that may have entered the streams from airborne or waterborne releases. Sample point designations and locations are listed below.

C-1 Site Lake near dam (drained in November 1977)
C-2 Easternmost stream crossing south boundary of site
C-3 Southernmost stream crossing west boundary of site
C-4 Drainage ditch crossing the south boundary of site
C-5 Vallecitos Creek, 1 mile west of site
C-6 Arroyo de la Laguna Creek at Castlewood bridge
C-7 Alameda Creek, 1 mile west of Sunol

The CRWQCB compliance summary is shown in Table 28. Although measurements are required, there are no compliance limits for radioactivity and copper. There were no items of noncompliance during the quarter. A summary of nonradiological parameters is shown in Table 29 through 40.

COMPLIANCE SUMMARY
RECEIVING WATERS
(Tests failed versus tests performed)

1980 MONTH	Floating Solids or Foam: No floating, suspended or deposited macroscopic matter or foam	Oil: No visible, floating, suspended or deposited oil or other products of petroleum origin	Turbidity and/or Discoloration: No alteration of turbidity or apparent color beyond present background levels	Odor: No atmospheric odors of waste origin	Toxic Concentration: No surface or ground water to contain toxic contaminations of substance harmful to human or livestock	Dissolved Oxygen: Minimum of 5 mg/ℓ	Temperature: No alteration of temperature beyond natural background levels	pH: No variation from natural ambient by more than 0.5 units	Sulfide: Maximum of 0.1 mg/ℓ
January	0/5	0/5	0/5	0/5	0/5	0/5	0/5	0/5	0/5
February	0/5	0/5	0/5	0/5	0/5	0/5	0/5	0/5	0/5
March	0/6	0/6	0/6	0/6	0/6	0/6	0/6	0/6	0/6
April	0/6	0/6	0/6	0/6	0/6	0/6	0/6	0/6	0/6
May	0/6	0/6	0/6	0/6	0/6	0/6	0/6	0/6	0/6
June	0/5 *	0/5 *	0/5 *	0/5 *	0/5	0/5	0/5	0/5	*
July	0/4 *	0/4 *	0/4 *	0/4 *	0/4	0/4	0/4	0/4	*
August	0/3 *	0/3 *	0/3 *	0/3 *	0/3	0/3	0/3	0/3	*
September	0/3 *	0/3 *	0/3 *	0/3 *	0/3	0/3	0/3	0/3	*
October	*	*	*	*	*	0/3	0/3	0/3	*
November	*	*	*	*	*	0/3	0/3	0/3	*
December	*	*	*	*	*	0/4	0/4	0/4	*

*No longer required by permit

TABLE 28

RECEIVING WATERS ANALYSES

DATE: January 30, 1980	ANALYST: R. E. Broz, W. Marlais, U.S. Testing Co., Inc.						
STATIONS:	C-1	C-2	C-3	C-4	C-5	C-6	C-7
TIME SAMPLED:	Dry	0900	Dry	1008	1120	1034	1053
Dissolved O_2 - mg/ℓ		10.2		12.2	11.9	9.6	11.2
Temperature - ^{o}C		10.0		7.5	10.0	9.5	9.0
Turbidity - JTU		17.0		1.3	1.8	10.0	4.3
pH		8.5		8.3	8.2	8.3	8.1
Copper - mg/ℓ		0.012		0.10	0.010	0.015	0.012
Dissolved Oxygen - % Saturation		90.3		101	105	84	[illegible]
Dissolved Oxygen as - % of Mean for Month		90.0		107	104	101	104
Total Dissolved Solids - mg/ℓ		464		309	527	726	389
Sulfide - mg/ℓ		<0.01		<0.01	<0.01	<0.01	<0.01

TABLE 29

RECEIVING WATERS ANALYSES

DATE: February 13, 1980	ANALYST: R. E. Broz, W. Marlais, U.S. Testing Co., Inc.						
STATIONS:	C-1	C-2	C-3	C-4	C-5	C-6	C-7
TIME SAMPLED:	Dry	1515	Dry	1500	1422	1400	1330
Dissolved O_2-mg/ℓ		10.8		9.3	15.9	10.4	10.2
Temperature - ^{o}C		16		16	15	13.5	13.5
Turbidity - JTU		2.6		2.8	1.5	51.0	7.2
pH		8.6		8.1	8.4	8.2	8.1
Copper - mg/ℓ		0.013		0.010	0.010	0.015	0.013
Dissolved Oxygen as - % Saturation		108		93	156	99	97
Dissolved Oxygen as % of Mean for Month		101		88	150	98	96
Total Dissolved Solids - mg/ℓ		437		196	382	572	486
Sulfide - mg/ℓ		<0.01		<0.01	<0.01	<0.01	<0.01

TABLE 30

RECEIVING WATERS ANALYSES

DATE: March 11, 1980	ANALYST: R. E. Broz, W. Marlais, U.S. Testing Co., Inc.						
STATIONS:	C-1	C-2	C-3	C-4	C-5	C-6	C-7
TIME SAMPLED:	Dry	1055	1135	1040	1500	1435	1455
Dissolved O_2 - mg/ℓ		9.9	10.2	12.5	11.6	9.2	9.6
Temperature - ^{o}C		15.0	14.0	15.0	16.0	14.0	14.5
Tubidity - JTU		3.3	2.8	2.3	4.0	24.0	16.0
pH		8.3	8.4	8.3	8.3	8.2	8.3
Copper - mg/ℓ		0.010	0.005	0.008	0.005	0.014	0.003
Dissolved Oxygen - % Saturation		97	98	120	116	88	93
Dissolved Oxygen as - % of Mean for Month		97	100	122	113	90	94
Total Dissolved Solids - mg/ℓ		263	409	212	524	265	229
Sulfide - mg/ℓ		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

TABLE 31

RECEIVING WATERS ANALYSES

DATE: April 11, 1980	ANALYST: R. E. Broz, W. Marlais, U.S. Testing Co., Inc.						
STATIONS:	C-1	C-2	C-3	C-4	C-5	C-6	C-7
TIME SAMPLED:	Dry	1145	1045	1030	1135	1105	1120
Dissolved O_2-mg/ℓ		8.2	9.3	8.9	11.7	9.2	10.3
Temperature - ^{o}C		14.5	14.5	15	16.5	14.0	14.5
Tubidity - JTU		5.2	6.0	2.4	2.2	10.0	2.0
pH		8.6	8.5	8.6	8.3	7.6	8.4
Copper - mg/ℓ		0.018	0.013	0.013	0.013	0.005	0.015
Dissolved Oxygen as - % Saturation		79.6	90.3	87.3	118.8	88.5	100.0
Dissolved Oxygen as % of Mean for Month		82	93	89	116	92	103
Total Dissolved Solids - mg/ℓ		472	612	296	390	510	584
Sulfide - mg/ℓ		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

TABLE 32

RECEIVING WATERS ANALYSES

DATE: May 22, 1980	ANALYST: R. E. Broz, W. Marlais, U.S. Testing Co., Inc.						
STATIONS:	C-1	C-2	C-3	C-4	C-5	C-6	C-7
TIME SAMPLED:	Dry	1115	0945	0930	1030	1000	1017
Dissolved O_2 - mg/ℓ		7.8	9.9	9.5	9.1	7.3	9.1
Temperature - ^{o}C		13.0	11.0	11.0	15.0	16.5	15.5
Turbidity - JTU		0.82	5.20	7.80	3.40	7.30	2.50
pH		8.7	8.7	8.7	8.3	8.5	8.5
Copper - mg/ℓ		0.011	0.005	0.005	0.020	0.006	0.005
Dissolved Oxygen - % Saturation		73.6	89.2	85.6	89.2	74.5	90.1
Dissolved Oxygen as - % of Mean for Month		77	97	93	89	72	89
Total Dissolved Solids - mg/ℓ		567	708	227	332	246	424
Sulfide - mg/ℓ		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

TABLE 33

RECEIVING WATERS ANALYSES

DATE: June 12-13, 1980	ANALYST: R. E. Broz, W. Marlais, U.S. Testing Co., Inc.						
STATIONS:	C-1	C-2	C-3	C-4	C-5	C-6	C-7
TIME SAMPLED:	Dry	Dry	6-13-80 1210	6-13-80 1220	6-13-80 1115	6-12-80 1135	6-12-80 1150
Dissolved O_2-mg/ℓ			10.4	11.4	8.3	8.6	8.8
Temperature - ^{o}C			16.7	20.0	17.8	17.2	17.8
Turbidity - JTU			0.48	4.8	10.5	14.0	1.1
pH			8.1	7.7	7.5	7.6	7.9
Copper - mg/ℓ			0.008	0.011	0.006	0.005	0.002
Dissolved Oxygen as - % Saturation			107.2	123.9	87.4	88.7	92.6
Dissolved Oxygen as % of Mean for Month			110	121	88	91	93
Total Dissolved Solids - mg/ℓ			754	134	605	284	326
Sulfide - mg/ℓ			128	16.2	178.6	49.2	54
Chlorides - mg/ℓ			128	16.2	179	49.2	54

TABLE 34

RECEIVING WATERS ANALYSES

DATE: July 16, 1980	ANALYST: R. E. Gest, W. Marlais, U.S. Testing Co., Inc.						
STATIONS:	C-1	C-2	C-3	C-4	C-5	C-6	C-7
TIME SAMPLED:	Dry	Dry	7-16-80 0940	Dry	7-16-80 1045	7-16-80 1011	7-16-80 1033
Dissolved O_2 - mg/l			6.8		7.7	7.6	8.0
Temperature - ^{o}C			19		24	21	22.5
Turbidity - JTU			28.0		11	2.7	5.0
pH			8.1		7.5	7.75	7.7
Copper - mg/l			0.004		0.010	0.006	0.008
Dissolved Oxygen - % Saturation			72.3		90.6	84.4	93.1
Dissolved Oxygen as - % of Mean for Month			78		88	87	91
Total Dissolved Solids - mg/l			783		191	276	244
Clorides - mg/l			1.0		36	35	32.5
Sulfide - mg/l	No longer required						

TABLE 35

RECEIVING WATERS ANALYSES

DATE: August 4, 1980	ANALYST: R. E. Gest, W. Marlais, U.S. Testing Co., Inc.						
STATIONS:	C-1	C-2	C-3	C-4	C-5	C-6	C-7
TIME SAMPLED:	Dry	Dry	Dry	Dry	8/4/80 0130	8/4/80 0150	8/4/80 0215
Dissolved O_2-mg/l					8.1	7.8	8.1
Temperature - ^{o}C					23.5	22.7	23.2
Turbidity - JTU					4.2	9.6	12.0
pH					7.75	7.9	7.8
Copper - mg/l					0.006	0.008	0.008
Dissolved Oxygen as - % Saturation					94.2	90.7	93.1
Dissolved Oxygen as % of Mean for Month					93	89	93
Total Dissolved Solids - mg/l					205	261	234
Chlorides - mg/l					24.5	41.5	36
Sulfide - mg/l	No longer required						

TABLE 36

RECEIVING WATERS ANALYSES

DATE: September [illegible], 1980	ANALYST: R. E. Gest, W. Marlais, U.S. Testing Co., Inc.						
STATIONS:	C-1	C-2	C-3	C-4	C-5	C-6	C-7
TIME SAMPLED:	Dry	Dry	Dry	Dry	9/23/80 0915	9/23/80 0835	9/23/80 0900
Dissolved O_2 - mg/l					7.0	5.2	7.2
Temperature - °C					14.5	15.0	15.7
Turbidity - JTU					0.62	0.53	0.37
pH					7.85	8.0	8.0
Copper - mg/l					0.004	0.002	0.004
Dissolved Oxygen - % Saturation					68.0	51.0	72.0
Dissolved Oxygen as - % of Mean for Month					73	55	75
Total Dissolved Solids - mg/l					210	803	591
Chlorides - mg/l					117	165	105
Sulfide - mg/l	No longer required						

TABLE 37

RECEIVING WATERS ANALYSES

DATE: October 1, 1980	ANALYST: R. E. Gest, W. Marlais, U.S. Testing Co., Inc.						
STATIONS:	C-1	C-2	C-3	C-4	C-5	C-6	C-7
TIME SAMPLED:	Dry	Dry	Dry	Dry	1045	1000	1025
Dissolved O_2-mg/l					8.2	6.7	6.8
Temperature - °C					19.5	18.7	17.7
Turbidity - JTU					0.51	0.45	0.47
pH					7.7	7.9	7.8
Copper - mg/l					0.008	0.008	0.008
Dissolved Oxygen as - % Saturation					88	71	71
Dissolved Oxygen as % of Mean for Month					87	71	72
Total Dissolved Solids - mg/l					295	520	586
Chlorides - mg/l					68.5	83.0	92.0
Sulfide - mg/l	No longer required						

TABLE 38

RECEIVING WATERS ANALYSES

DATE: November 3, 1980	ANALYST: R. E. Gest, W. Marlais, U.S. Testing Co., Inc.						
STATIONS:	C-1	C-2	C-3	C-4	C-5	C-6	C-7
TIME SAMPLED:	Dry	Dry	Dry	Dry	1005	1030	1050
Dissolved O_2 - mg/ℓ					9.4	9.4	9.0
Temperature - °C					13.7	13.0	13.7
Turbidity - JTU					0.8	1.2	1.1
pH					7.6	7.85	7.9
Copper - mg/ℓ					0.010	0.028	0.028
Dissolved Oxygen - % Saturation					90	89	86
Dissolved Oxygen as - % of Mean for Month					90	90	86
Total Dissolved Solids - mg/ℓ					236	364	383
Chlorides - mg/ℓ					26.4	56.4	51.9
Sulfide - mg/ℓ	No longer required						

TABLE 39

RECEIVING WATERS ANALYSES

DATE: December 12, 1980	ANALYST: R. E. Gest, W. Marlais, U.S. Testing Co., Inc.						
STATIONS:	C-1	C-2	C-3	C-4	C-5	C-6	C-7
TIME SAMPLED:	Dry	Dry	1125	Dry	0825	0845	0905
Dissolved O_2-mg/ℓ			9.8		9.1	9.6	9.9
Temperature - °C			10.0		9.5	11.0	10.25
Turbidity - JTU			4.1		0.81	3.5	3.5
pH			8.28		7.77	7.92	7.98
Copper - mg/ℓ			0.005		0.005	0.005	0.005
Dissolved Oxygen as - % Saturation			87		78	84	88
Dissolved Oxygen as % of Mean for Month			87		81	85	88
Total Dissolved Solids - mg/ℓ			860		446	277	251
Chlorides - mg/ℓ			200		130	51.0	55.0
Sulfide -mg/ℓ	No longer required						

TABLE 40

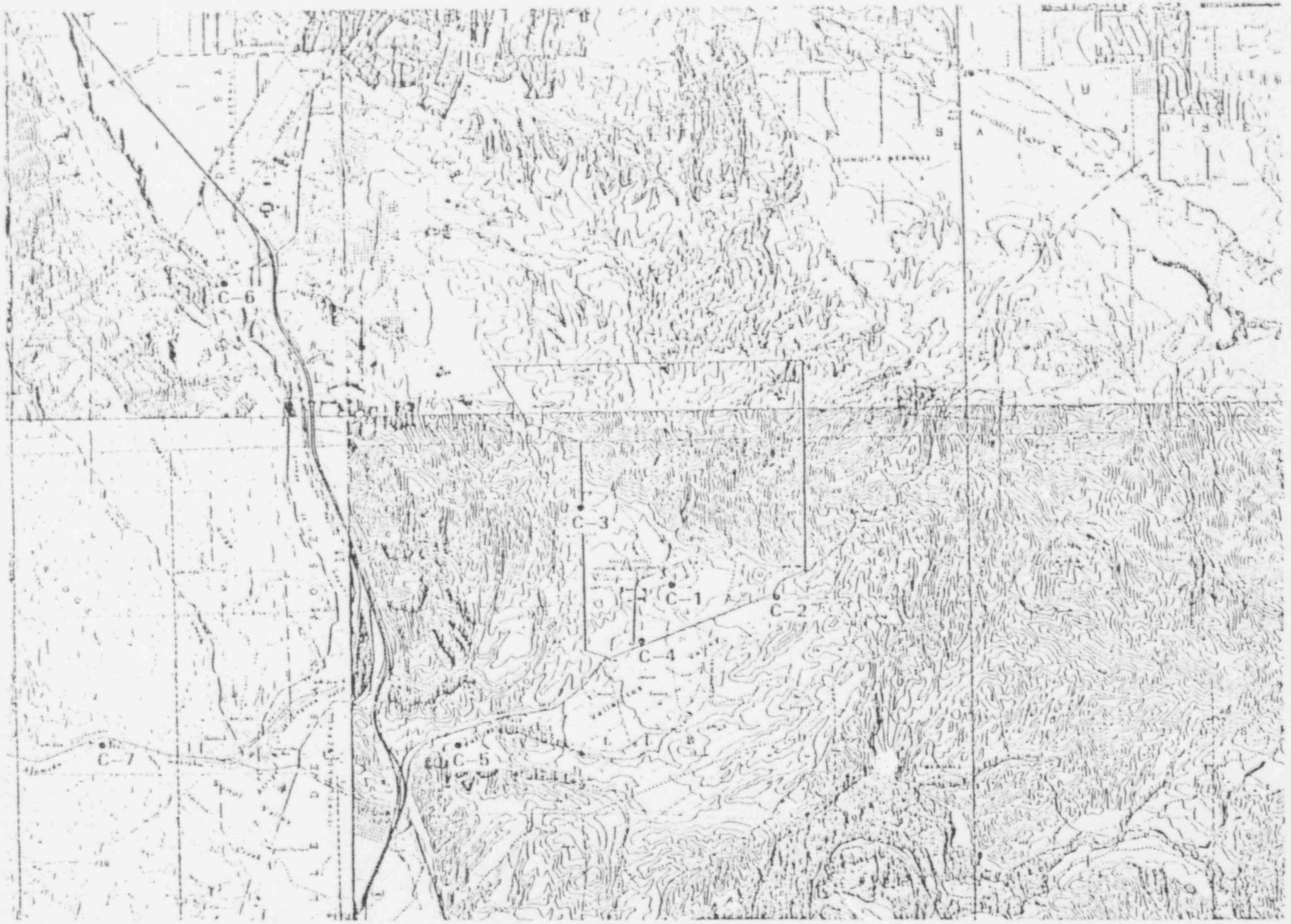


FIGURE 8. RECEIVING WATER SAMPLE LOCATION

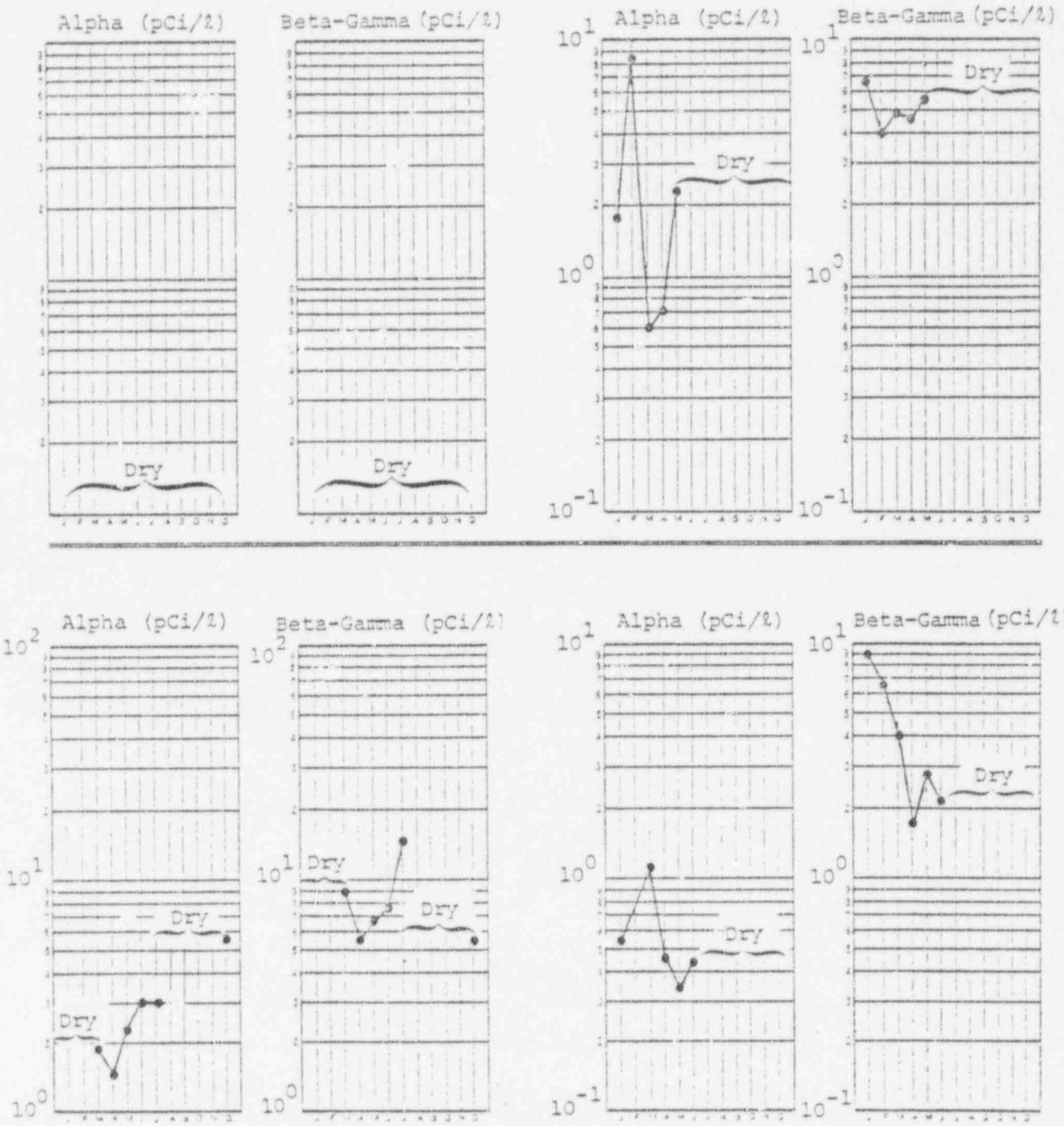


FIGURE 9. RECEIVING WATERS ANALYSES - RADIOACTIVITY CONCENTRATIONS, C-1, C-2, C-3, C-4 (pCi/ℓ)

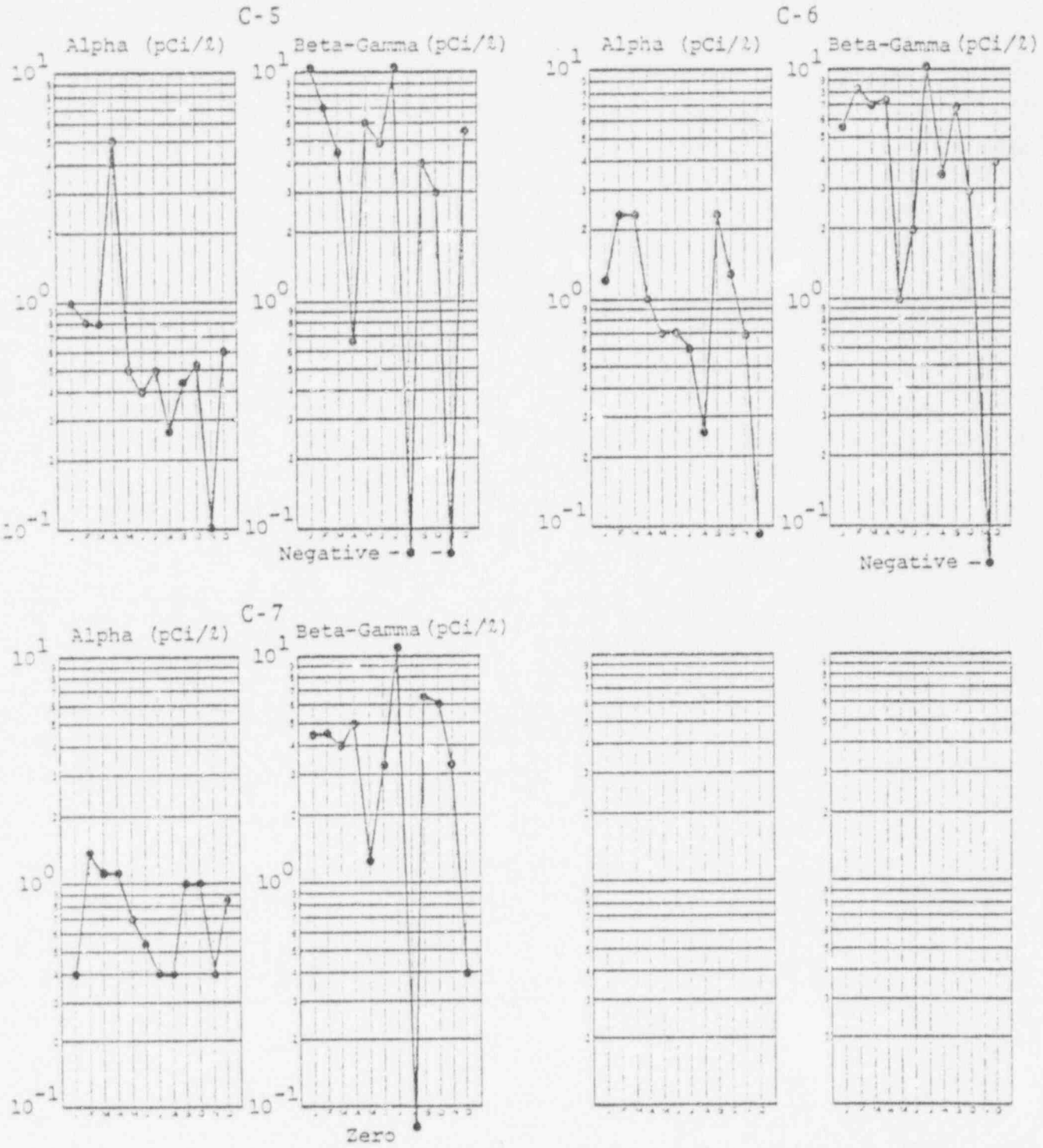


FIGURE 10. RECEIVING WATERS ANALYSES - RADIOACTIVITY CONCENTRATIONS, C-5, C-6, C-7 (pCi/ℓ)

A. SURVEILLANCE FOR WATERBORNE RELEASES (continued)

Annual average radioactivity concentrations in receiving waters are summarized in Table 41 below:

TABLE 41. Average Radioactivity Concentrations in Receiving Waters

	pCi/l	
Year	α	β,γ
1975	<10	<30
1976	<10	<31
1977	<10	<30
1978	<10	<30
1979	< 7.82	<27.6
1980	< 1.57	< 5.23

2. Ground Waters

Ground water is monitored by obtaining quarterly samples from four wells on or near the site. Sample point designations and locations are listed below.

G-1 Well southeast of Building 105
G-2 Well southeast of Waste Storage Facility
G-3 Well on private property west of General Electric Test Reactor
G-4 Well on private property south of site entrance

Sample data are summarized in Tables 42-43.

GROUND WATER

	NUMBER OF SAMPLES PER STATION	SAMPLE STATIONS											
		G-1			G-2			G-3			G-4		
		ANALYSIS			ANALYSIS			ANALYSIS			ANALYSIS		
		TDS	Cℓ	pH	TDS	Cℓ	pH	TDS	Cℓ	pH	TDS	Cℓ	pH
FEBRUARY	1	-	-	8.3	-	-	8.2	-	-	8.1	-	-	8.0
MAY	1	710	229	8.7	316	99	8.7	347	148	8.7	487	224	8.6
AUGUST	1	650	210	7.9	295	80	8.4	503	120	7.8	556	186	8.3
NOVEMBER	1	280	196	8.0	688	76.3	8.1	488	122	7.9	512	170	7.9

TDS = TOTAL DISSOLVED SOLID (mg/ℓ)
Cℓ = CHLORIDES (mg/ℓ)
*LESS THAN DETECTION LIMIT FOR THE MEASUREMENT METHOD.

TABLE 43

GROUND WATER

	NUMBER OF SAMPLES PER STATION	SAMPLE STATIONS											
		G-1			G-2			G-3			G-4		
		Radioactivity (pCi/ℓ)			Radioactivity (pCi/ℓ)			Radioactivity (pCi/ℓ)			Radioactivity (pCi/ℓ)		
		α	βγ	H^3 ($\times 10^3$)	α	βγ	H^3 ($\times 10^3$)	α	βγ	H^3 ($\times 10^3$)	α	βγ	H^3 ($\times 10^3$)
FEBRUARY	4	1.48	4.34	<2	0.10*	7.31	<2	1.06	2.15	<2	0.32*	4.76	<2
MAY	4	1.50	2.26*	<2	0.03*	1.61*	<2	1.50	2.02*	<2	0.39	2.30*	<2
AUGUST	1	1.34	1.61	<2	0.14*	0.66*	<2	1.09	-0.55*	<2	0.51	4.44	<2
NOVEMBER	1	1.36	5.53	<2	0.05*	-1.51*	<2	1.01	-2.65*	<2	0.44	2.42*	<2

*Less than detection limit for the measurement method.

TABLE 42

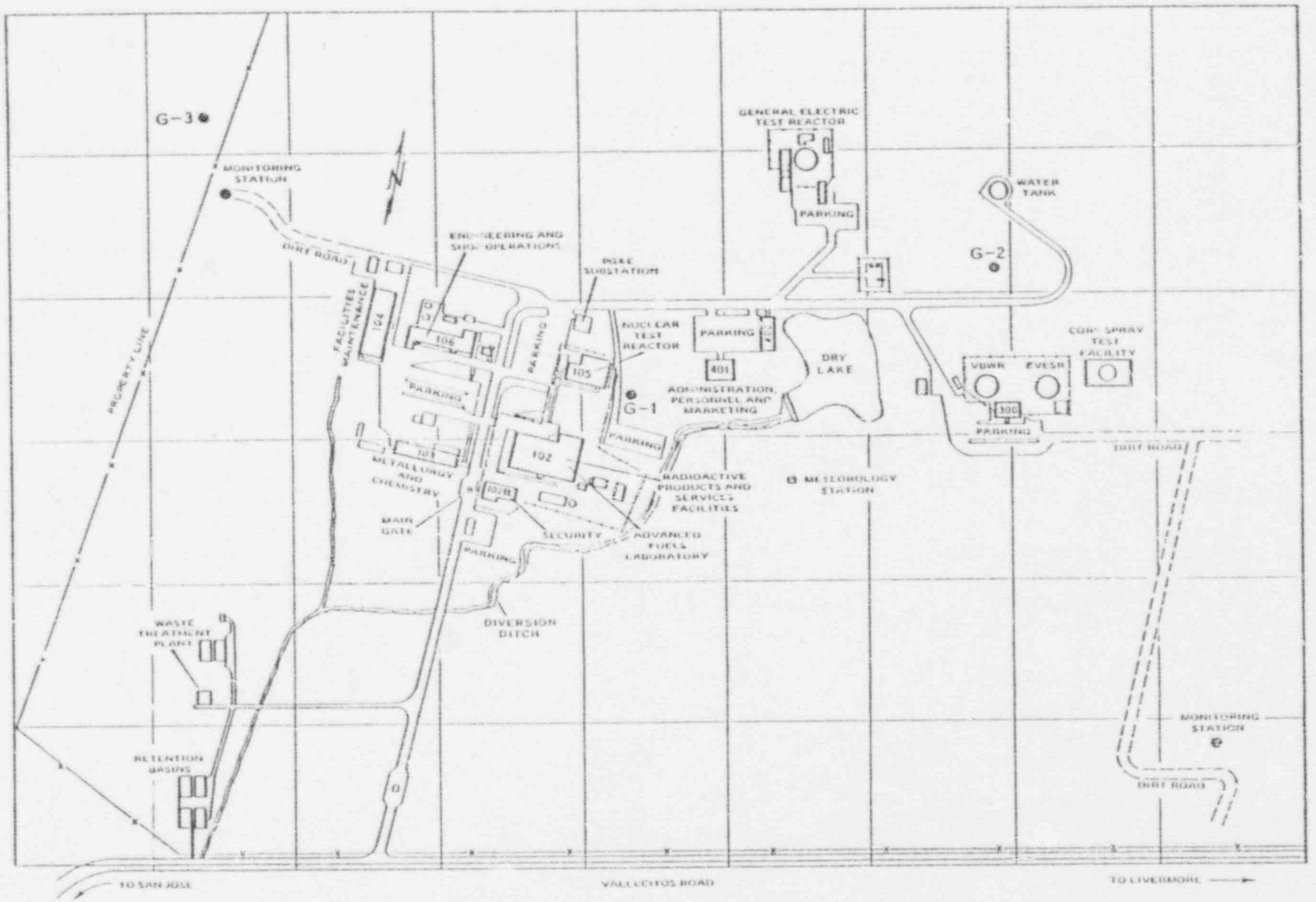


FIGURE 11. VALLECITOS NUCLEAR CENTER - PLOT PLAN INDICATING SAMPLE WELL LOCATIONS STREAM BOTTOM S-1

3. Stream Bottom Sediments

Stream bottom sediment sample locations are listed in Table 44. Quarterly data are required for CRWQCB permit compliance and are shown in Table 45.

TABLE 44

STREAM BOTTOM SEDIMENTS - DESCRIPTION AND SCHEDULE OF SAMPLES

Sample Number	Location	Frequency	Gross Rad.	Co-60	Cs-137	Sr	Pu-239
S-1	Easternmost Stream crossing south boundary of site	Quarterly	x	x	x	x	x
S-2	Outfall of retention basins at south boundary of site	Quarterly	x	x	x	x	x
S-3	Vallecitos Creek, 1 mile west of site	Quarterly	x	x	x		
S-4	Alameda Creek, 1 mile west of Sunol	Quarterly	x	x	x		
VR-2	Stream bed south of Highway 84 - 3 miles east of site	Annually	x	x	x	x	
VR-3	Arroyo del Valle Creek near bridge east of site	Annually	x	x	x	x	

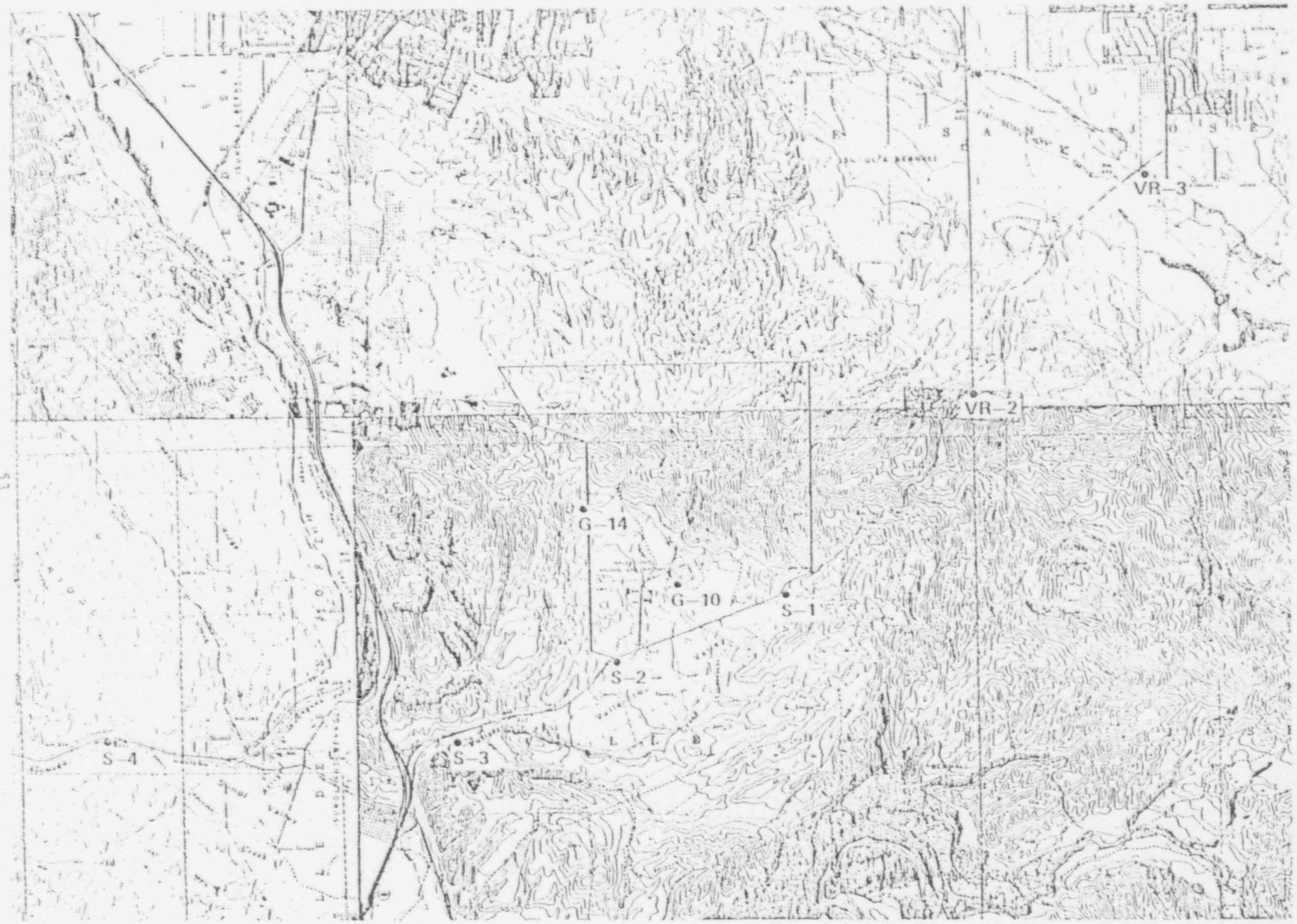


FIGURE 12. BOTTOM SEDIMENT SAMPLE LOCATIONS

BOTTOM SEDIMENTS

1980 MONTH	NUMBER OF SAMPLES	SAMPLE STATIONS (all results in pCi/g)																			
		S-1 (VR - 1 SB)						S-2 (G - 6 SB)						S-3 (G - 7 SB)				S-4 (G - 8 SB)			
		α	β-γ	Cs-137	Co-60	Sr-89 + Sr-90	Pu-239	α	β-γ	Cs-137	Co-60	Sr-89 + Sr-90	Pu-239	α	β-γ	Cs-137	Co-60	α	β-γ	Cs-137	Co-60
FEB	4	0	12.3	0.053	-0.024*	0.094*	<0.01	0	18.6	11.7	1.41	0.053*	<0.01	0.676*	10.3	0.233	0.172	0.676*	9.65	0.019*	-0.016*
MAY	4	0	10.7	0.021*	0.035*	0.052	<0.02	0.95*	22.1	14.1	1.57	0.049*	<0.02	1.28*	7.29	0.607	0.434	0	11.60	0.048	0.009*
AUG	4	0.4*	11.7	0.129	0.031	0.069*	<0.02	0.95*	14.9	0.035*	-0.014*	0.073	<0.02	1.49*	7.55	0.939	0.332	1.01*	10.3	8.21	0.993
NOV	4	2.4	10.8	0.072	0.007*	0.046*	<0.02	2.43	21.0	11.1	1.51	0.082*	<0.02	0.00*	8.88	1.36	0.46	0.81	12.8	0.13	0.017*

*Less than detection limit for the measurement method.

TABLE 45

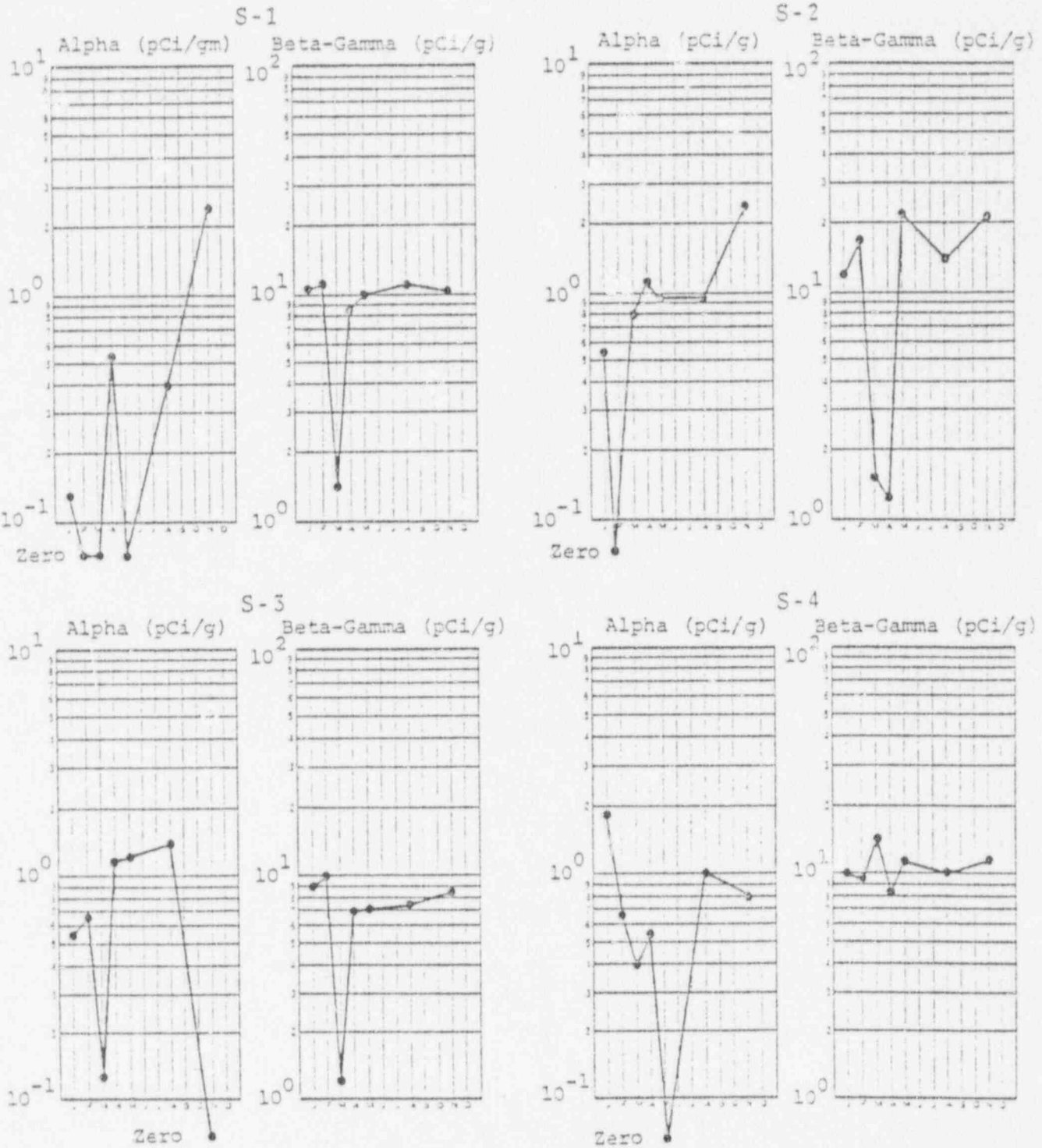


FIGURE 13. RADIOACTIVITY CONCENTRATIONS IN STREAM BOTTOM SEDIMENTS, S-1, S-2, S-3, S-4 (pCi/g)

TABLE 46. Annual Bottom Sediment Sample Data (pCi/gram)

Sample Number	Gross α *	Gross β,γ	Sr-90*	Cs-137	Co-60	K-40
G-6 (S-1)	0.42	9.5	0.07	0.05*	0.0009*	5.0
VR-1 (S-2)	0.98	15.0	0.17	8.1	1.1	5.5
G-7 (S-3)	0.76	7.3	0.02	0.66	0.35*	4.0
G-8 (S-4)	0.76	11.0	0.04	1.2	0.15*	6.3
VR-2	1.14	11.0	0.04	0.19	0.09*	5.4
VR-3	0.43	7.7	0.00	0.02*	0.05*	3.9

* Less than detection limit.

4. Soil

Soil samples are obtained annually from the points listed below and shown on the map Figure 13.

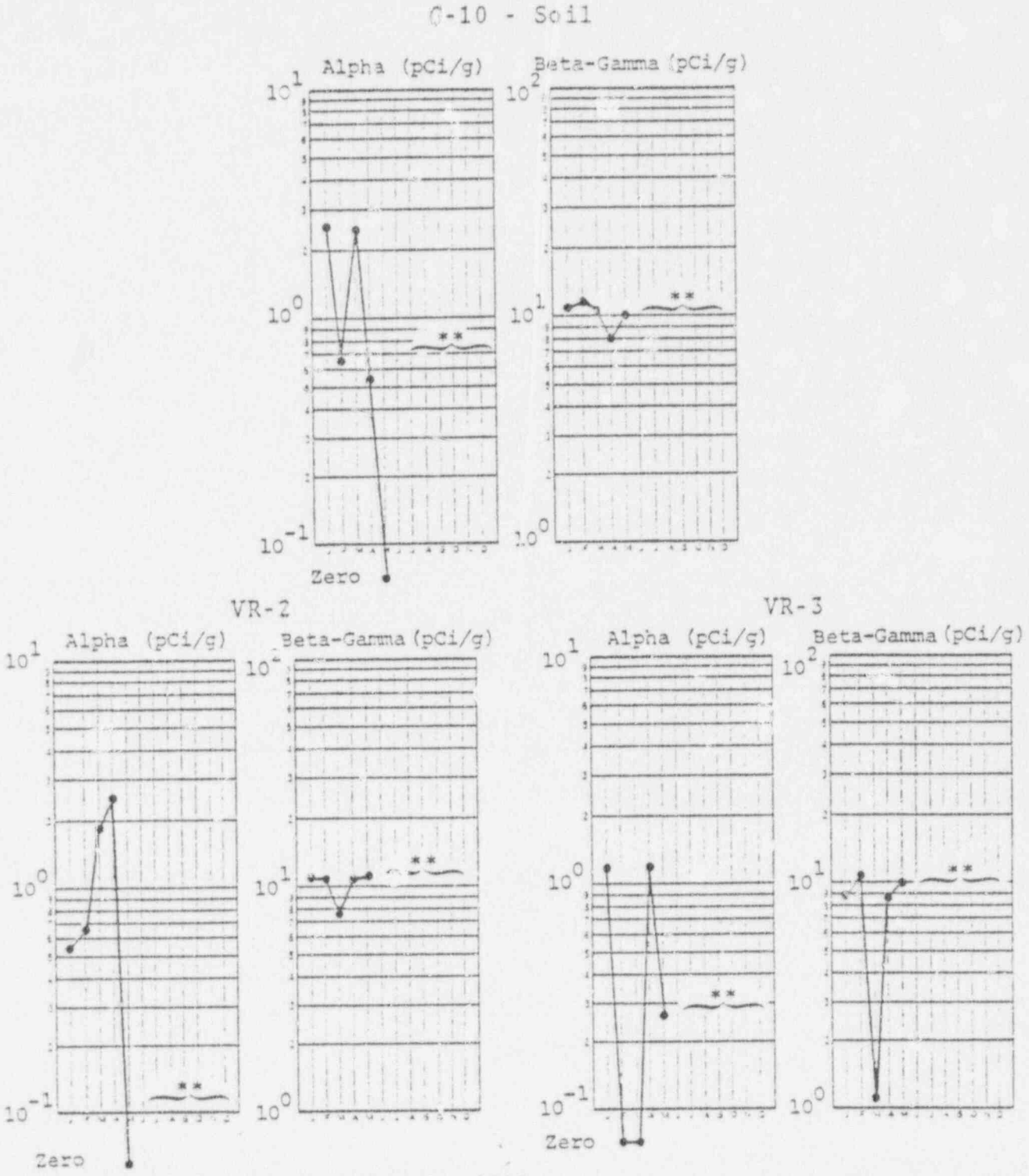
G-10 Site lake near dam

Results of sample analyses are shown in Table 47. G-10 is sampled monthly and analyzed for gross radioactivity. A graph of this data is shown below:

TABLE 47. Annual Soil Sample Data (pCi/gram)

Sample Number	Gross α	Gross β,γ	Sr-90	Cs-137	Co-60	K-40
G-10	1.2*	10.0	0.13*	0.13*	0.04*	4.2

* Less than detection limit.



**Requirements changed effective June 1980.

FIGURE 14. RADIOACTIVITY CONCENTRATIONS IN G-10 SOIL, VR-2, AND VR-3 STREAM BOTTOM SEDIMENTS SAMPLES

B. SURVEILLANCE FOR AIRBORNE RELEASES

1. Environmental Air Samples

Environmental air monitoring stations are positioned approximately 90° apart around the operating facilities of the site (see Figure 15). Each station is equipped with a membrane filter and an activated charcoal cartridge. Filters and cartridges are changed weekly and analyzed for gross alpha, gross beta-gamma, and I-131. Results are graphed in Figures 16 and 17.

2. Cloud-Gamma Monitors

There are 31 stations on site for measuring cloud-gamma radiation. These are located in sixteen 22.5° sectors surrounding the facilities. Each station consists of a thermoluminescent dosimeter (LiF or $CaSO_4$:Dy) sealed in a plastic coated aluminum foil package which is placed in a protective brown paper covering. These dosimeters are changed once annually (Station 4 quarterly) when weather conditions permit travel to those stations located in the hilly northeastern portion of the site. Stations locations are shown in Figure 17. South boundary stations are numbers 1, 2, 3, 8, 9, 31; East boundary stations are numbers 10, 11, 12, 13, 14, 15; North boundary stations are numbers 16, 17, 18, 19, 23, 24; and West boundary stations are numbers 25, 26, 27, 28, 29, and 30.

Cloud Gamma Monitors*

(mR/year)

South Boundary	East Boundary	North Boundary	West Boundary
0.5	0.5	4.3	1.0

* Boundary Cloud Gamma Monitor data is reported as the mean value.

NOTE: Background radiation in this area, due to naturally occurring radioactive elements and bomb debris, is approximately 125 to 150 mRem per year.

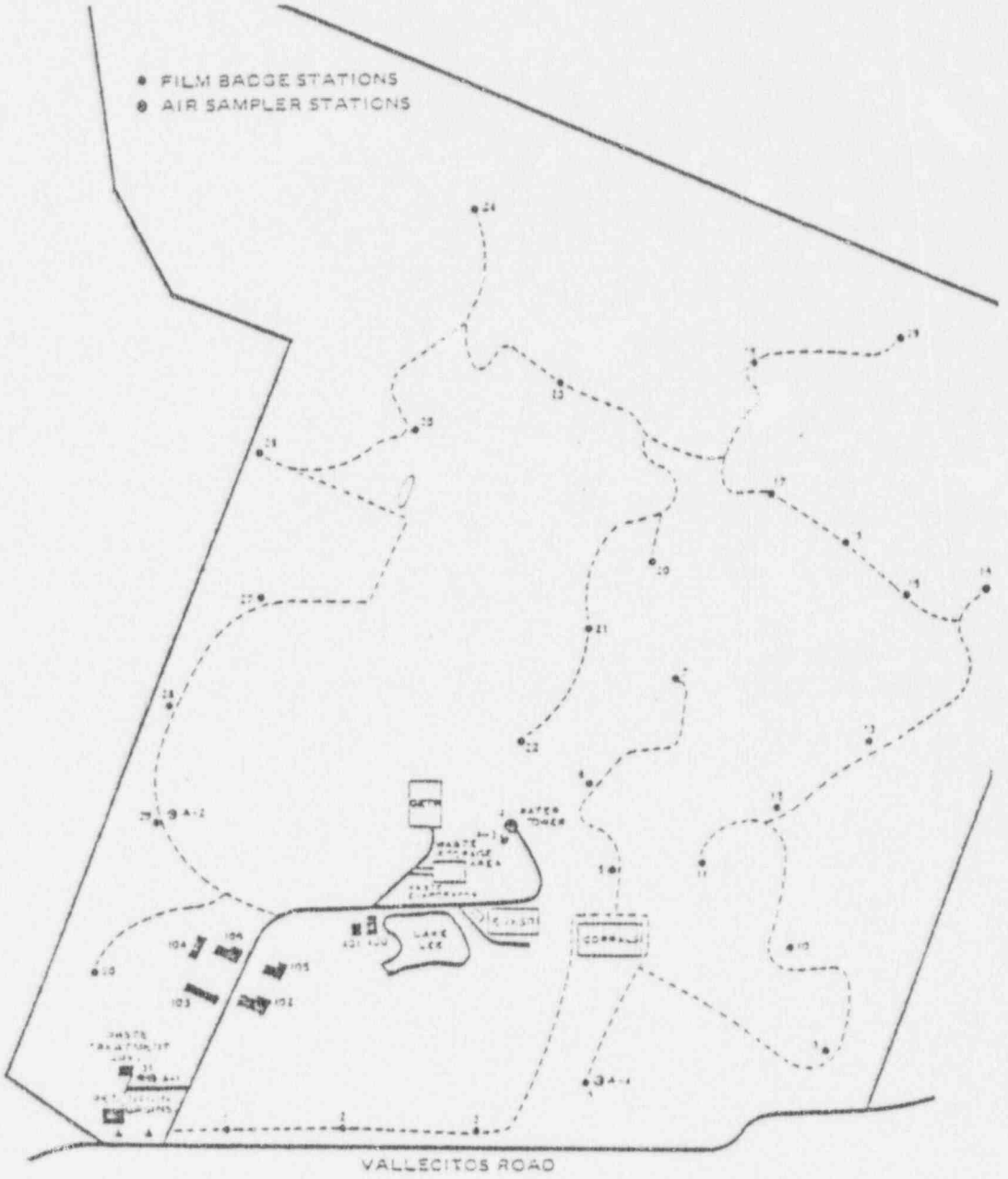


FIGURE 15. ENVIRONMENTAL AIR STATIONS AND CLOUD-GAMMA MONITORS

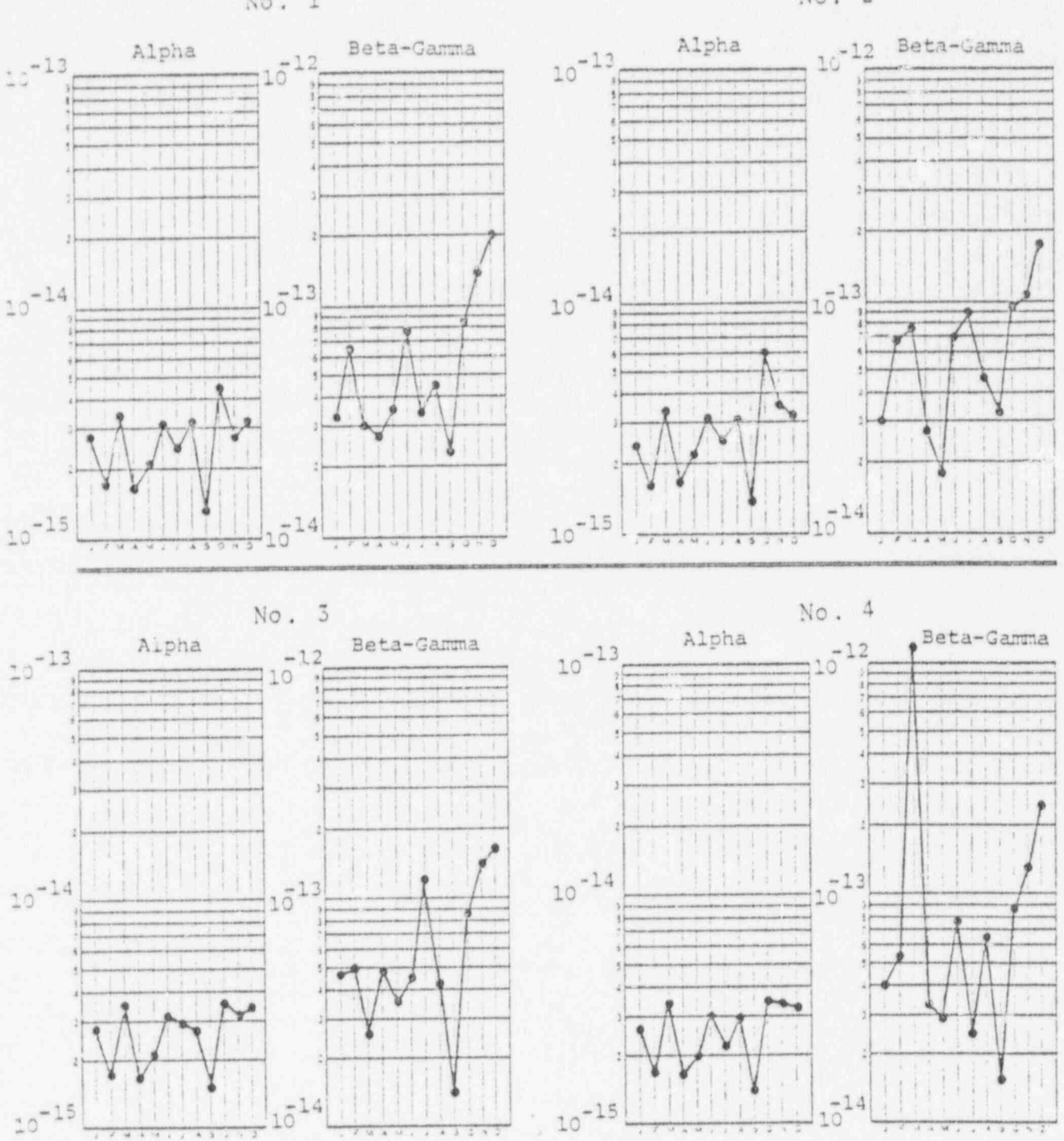


FIGURE 16. ANALYTICAL RESULTS FOR ENVIRONMENTAL AIR STATIONS FOR PARTICLES (μCi/cc)

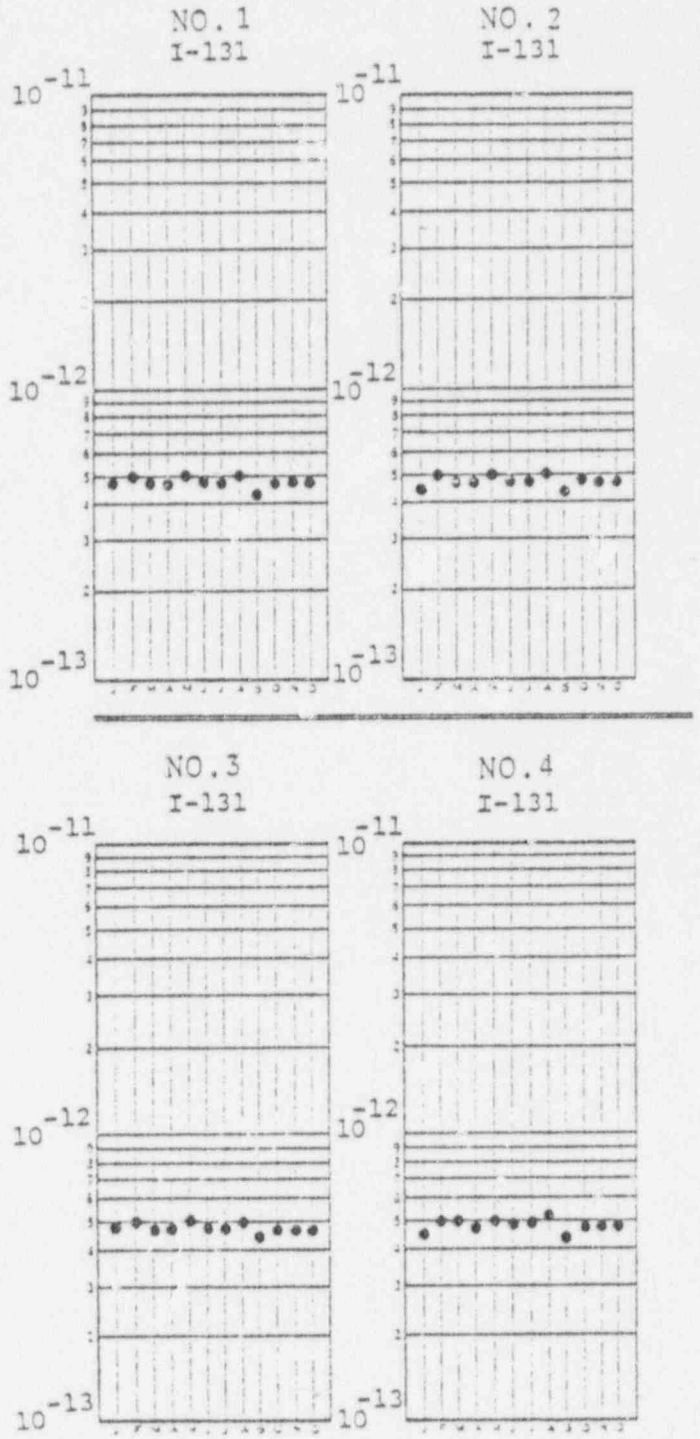


FIGURE 17. ANALYTICAL RESULTS FOR ENVIRONMENTAL AIR STATIONS FOR I-131(μCi/cc)

3. Vegetation

The description and schedule of vegetation samples is summarized in Table 48. See Figures 18 and 19 for map locations. Samples collected monthly are analyzed for gross alpha, gross beta-gamma and I-131. These results are graphed in Figures 20 through 27. All sample points are sampled annually (during March for 1980). These results are shown in Table 49.

IV. WATER TREATMENT CHEMICALS

For the year 1980, the following amounts of Calgon chemicals were used in the General Electric Test Reactor's (GETR) cooling tower water:

1.	Calgon TG-10	18 pounds
2.	Calgon H-212 (microbiocide)	5 gallons

H_2SO_4 (sulfuric acid) is normally added to the water to prevent calcium carbonate deposition and to keep the pH as close to 7.0 as possible during reactor operation.

The active ingredients are as follows:

1. Calgon TG-10

   sodium-zinc
   phosphate glass
   soluble pellets

2. Calgon H-212

Dodecylguonidine hydrochloride	10.78%
Bis (tri-n-bityltin) oxide	3.32%
Isopropanol	9.90%
Xylol	5.00%
Inert ingredients (includes dispersing and stabilizing compounds)	71.00%

E.P.A. Registration No. 10445-6

The reactor was shut down October 27, 1977.

TABLE 48. Description and Schedule of Vegetation Samples*

Sample Number[a]	Location	Monthly and Annual Sample	Annual Sample Only
G-6V	Outfall of retention basins at south boundary of site	x	
G-7V	Vallecitos Creek, one mile west of site	x	
G-8AV	Alameda Creek, one mile west of Sunol		x
G-10V	Site lake near dam	x	
G-11V	Southeast of Building 105		x
G-12V	East of EVESR cooling tower		x
G-13V	Off-site near southeast corner of site		x
G-14V	Southernmost stream crossing western boundary of site		x
VA-1V	Vineyard Avenue, 1.8 miles north of Vallecitos Road	x	
VA-2V	Vineyard Avenue, 0.9 miles north of Vallecitos Road	x	
VA-3V	Vineyard Avenue, 0.3 miles north of Vallecitos Road	x	
VAL-1V	1650 ft west of site entrance on Alpha Lane	x	
VAL-2V	1000 ft east of site entrance at perimeter fence	x	
GETR-1V	500 ft northeast of General Electric Test Reactor	x	
GETR-2V	1000 ft northeast of General Electric Test Reactor	x	
GETR-3V	1500 ft northeast of General Electric Test Reactor	x	
GETR-4V	2000 ft northeast of General Electric Test Reactor	x	

[a] "V" denotes land vegetation; "AV" denotes aquatic vegetation.

TABLE 49. Annual Vegetation Sample Analytical Results (pCi/gram)**

Sample Number	Gross α *	Gross β,γ	Sr-90*	I-131*	Cs-137*	Co-60*	K-40
G-6V	0.0047	5.34	0.00093	0.037	0.016	0.02	4.01
G-7V	0.0036	4.09	0.022	0.030	0.022	0.022	4.14
G-8AV	0.0030	0.88	0.024	0.025	-0.028	0.0241	4.45
G-10V	0.0092	4.42	0.0034	0.070	0.033	0.046	4.28
G-11V	0.00	2.51	0.013	0.012	-0.040	0.072	7.47
G-12V	0.0053	2.63	0.016	0.055	-0.037	0.010	3.68
G-13V	0.00	3.77	0.021	0.18	-0.051	0.098	5.16
G-14V	0.0009	0.54	0.015	0.091	-0.041	0.061	4.43
VA-1V	0.0019	5.72	0.031	0.038	0.018	0.040	5.07
VA-2V	0.0038	5.03	0.011	-0.003	0.026	0.0040	4.52
VA-3V	0.010	4.62	-	0.014	0.034	0.012	5.30
VAL-1V	0.0022	1.71	0.0031	0.055	0.091	0.0099	3.60
VAL-2V	0.0074	4.35	0.0078	0.074	0.021	0.0047	3.54
GETR-1V	0.0024	4.50	0.011	0.067	0.013	0.041	3.90
GETR-2V	0.0059	6.14	0.0037	0.045	0.017	0.011	4.85
GETR-3V	0.0035	4.12	0.067	0.081	0.028	0.029	4.7
GETR-4V	0.00012	7.75	0.038	0.054	0.019	0.022	5.44

* Less than the detection limit for the method of measurement

** Requirements changed effective June, 1980.

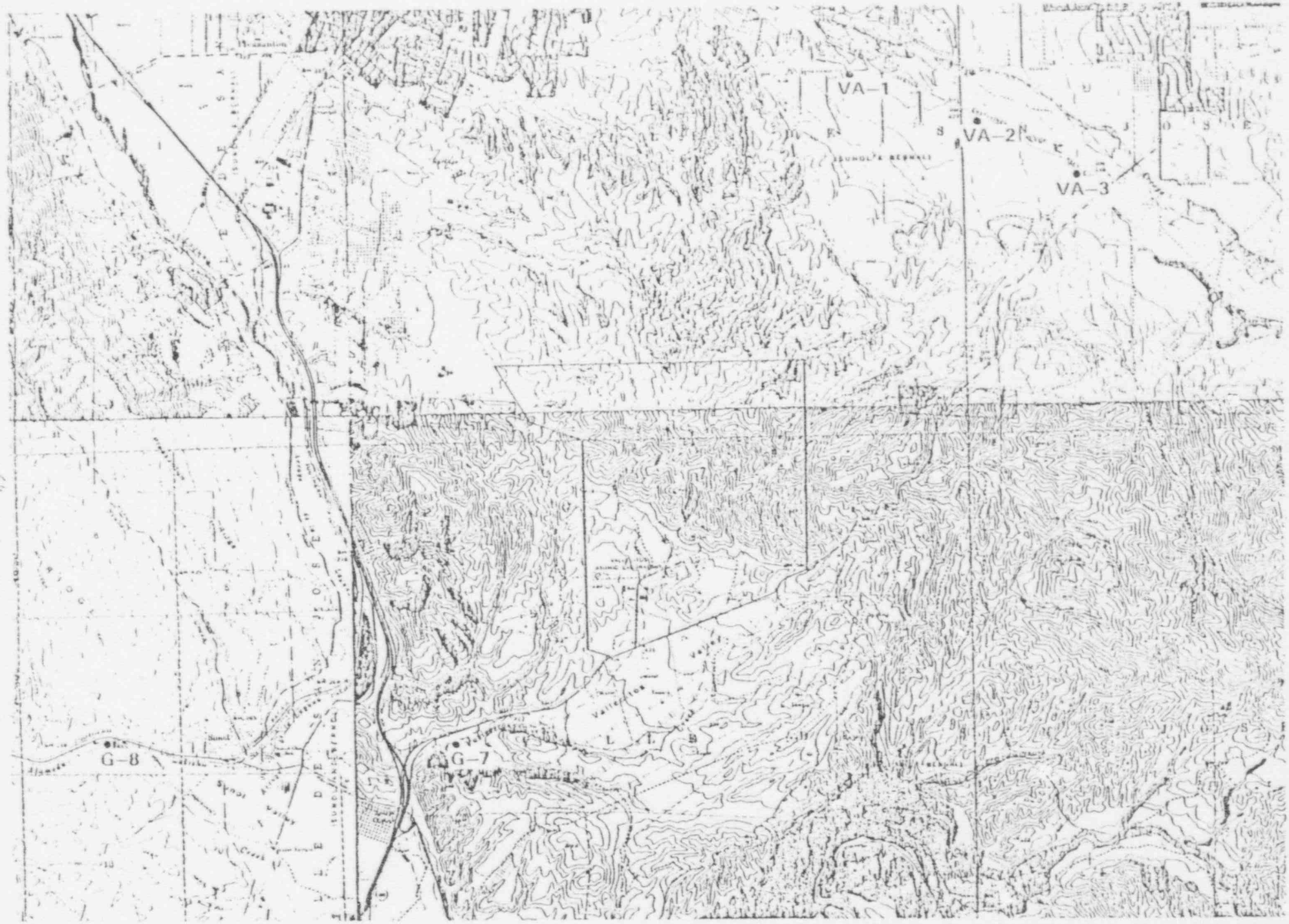


FIGURE 18. VEGETATION SAMPLE LOCATIONS

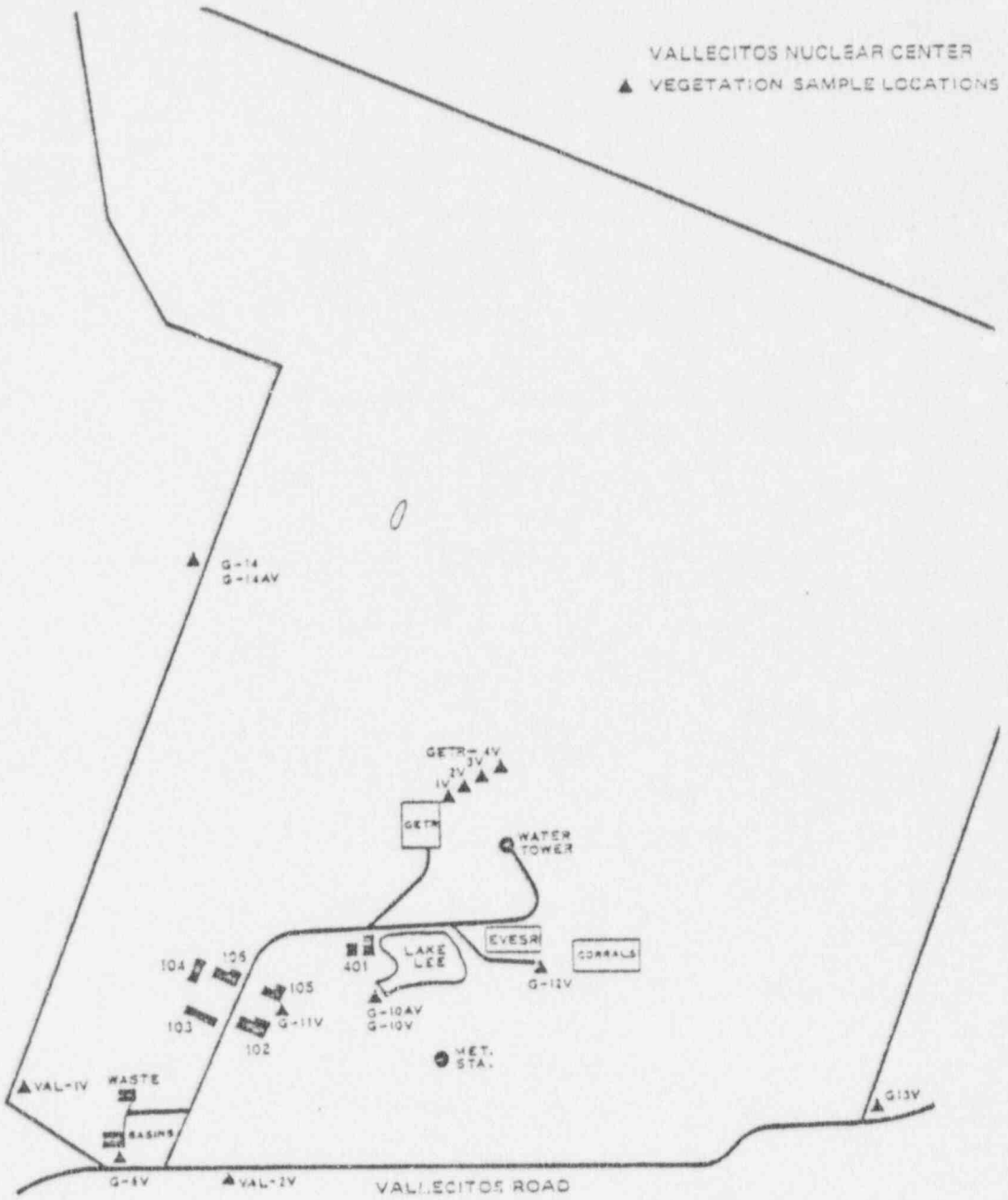


FIGURE 19. VEGETATION SAMPLE LOCATIONS

(Results in picocuries per gram)

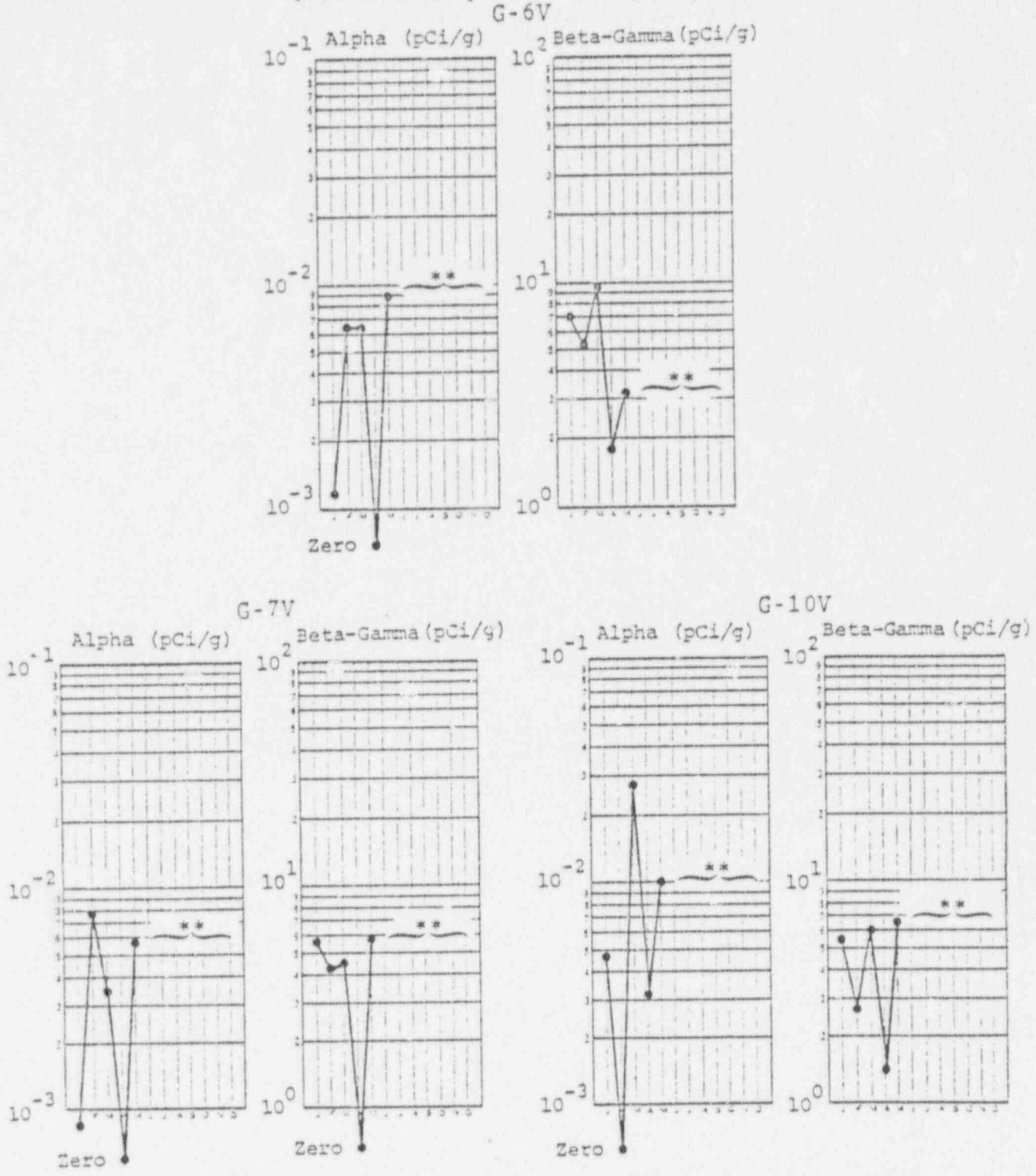
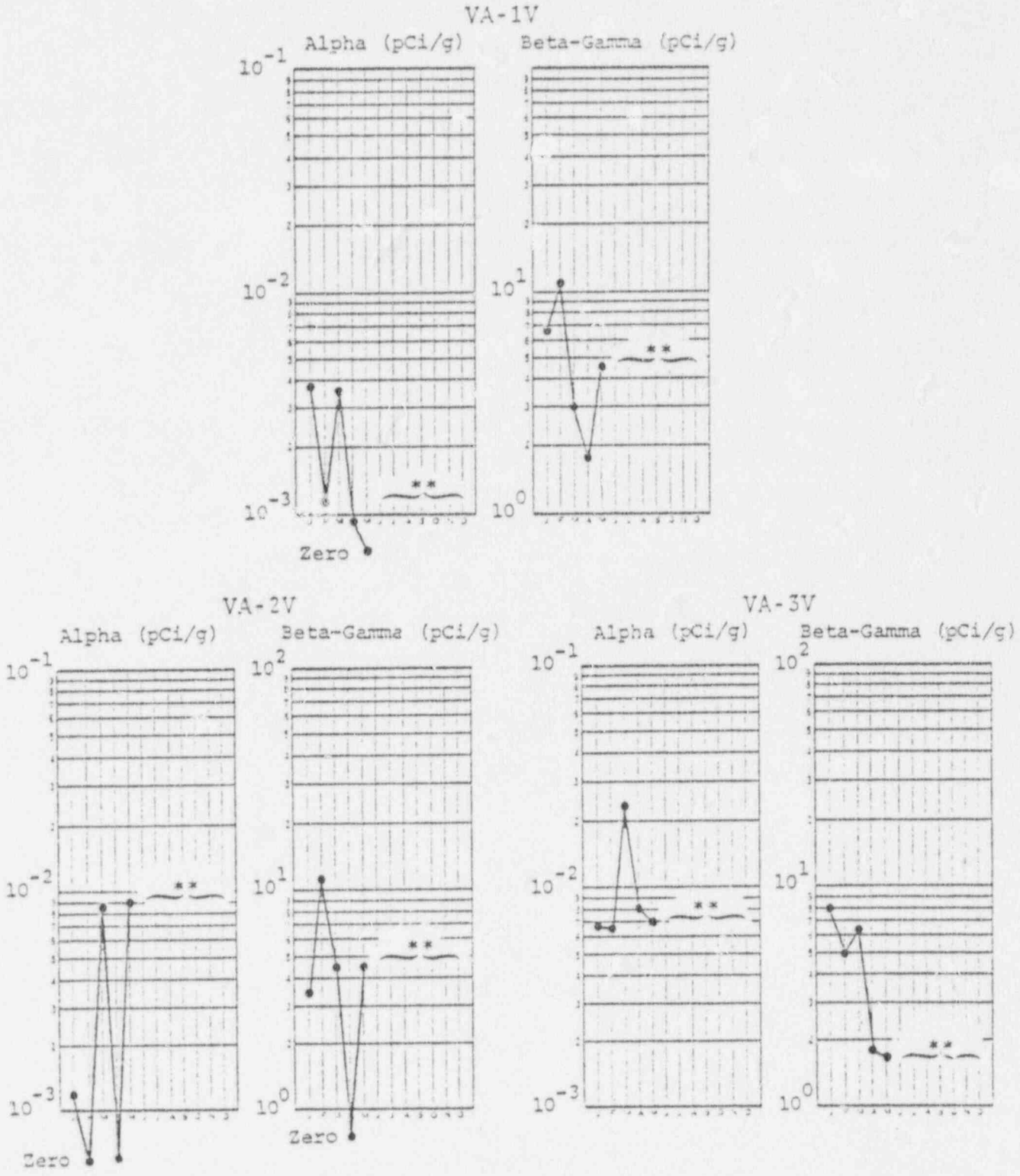


FIGURE 20. VEGETATION ANALYSES FOR GROSS RADIOACTIVITY, G-6V, G-7V, G-10V (pCi/g-Ashed)

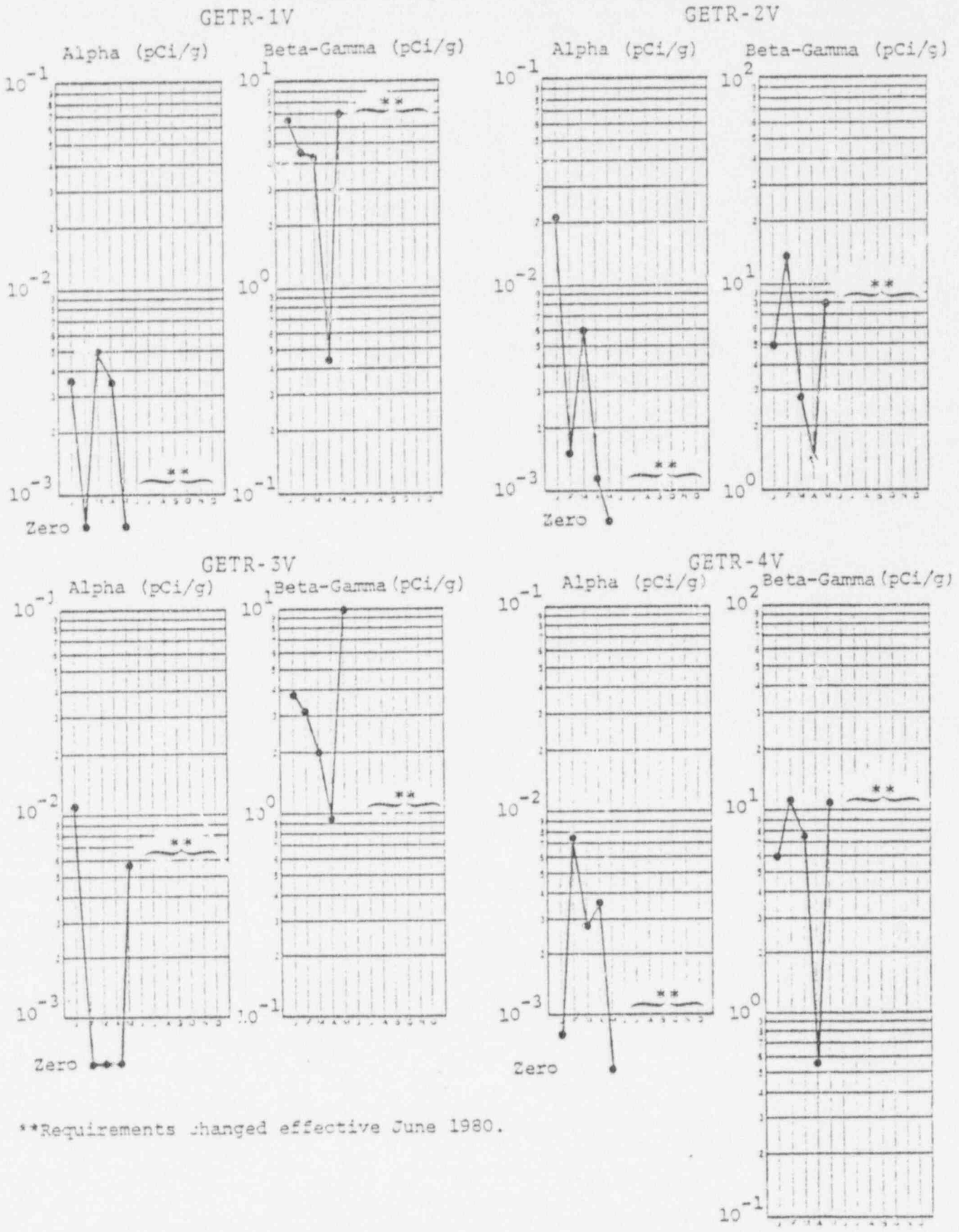
VEGETATION
(Results in picocuries per gram)



**Requirements changed effective June 1980.

FIGURE 21. VEGETATION ANALYSES FOR GROSS RADIOACTIVITY, VA-1V, VA-2V, VA-3V (pCi/g-Ashed)

VEGETATION
(Results in picocuries per gram)



**Requirements changed effective June 1980.

FIGURE 22. VEGETATION ANALYSES FOR GROSS RADIOACTIVITY, GETR-1V, GETR-2V, GETR-3V, GETR-4V (pCi/g-Ashed)

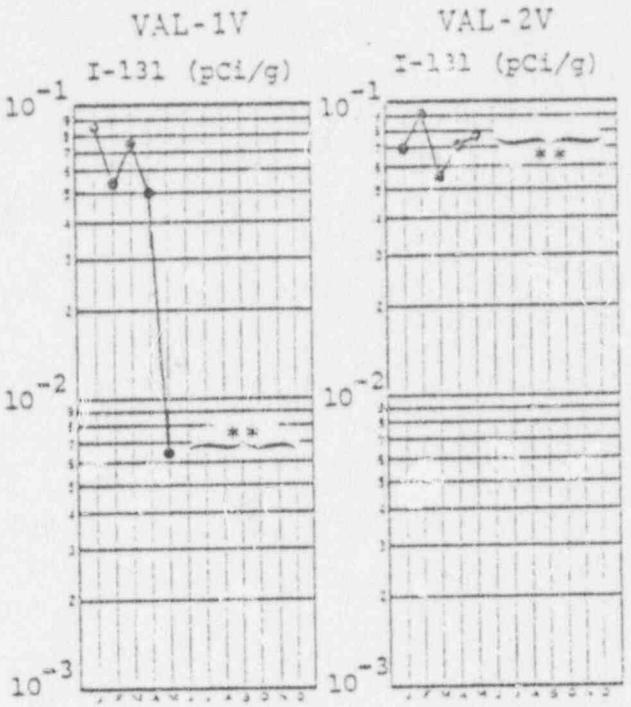
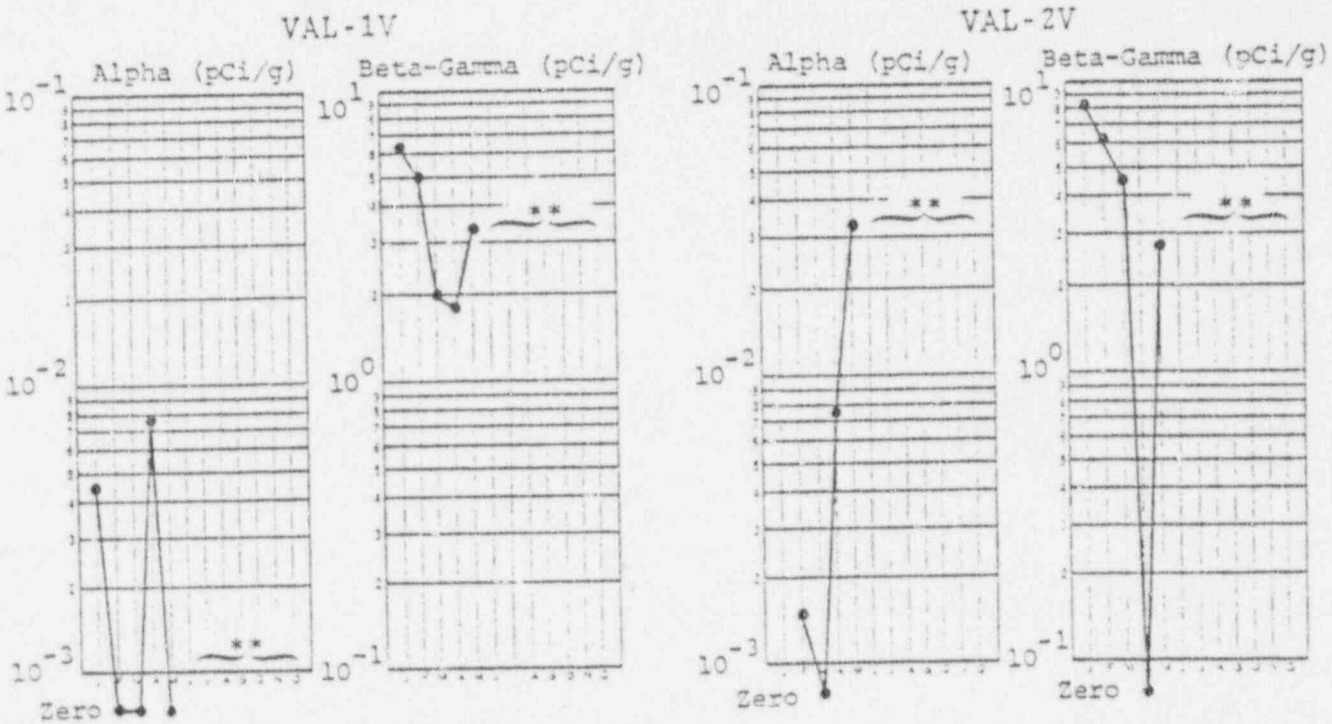


FIGURE 23. VEGETATION ANALYSES FOR I-131, VAL-1V, VAL-2V (pCi/g)



**Requirements changed effective June 1980.

FIGURE 24. VEGETATION ANALYSES FOR GROSS RADIOACTIVITY, VAL-1V, VAL-2V (pCi/g-Ashed)

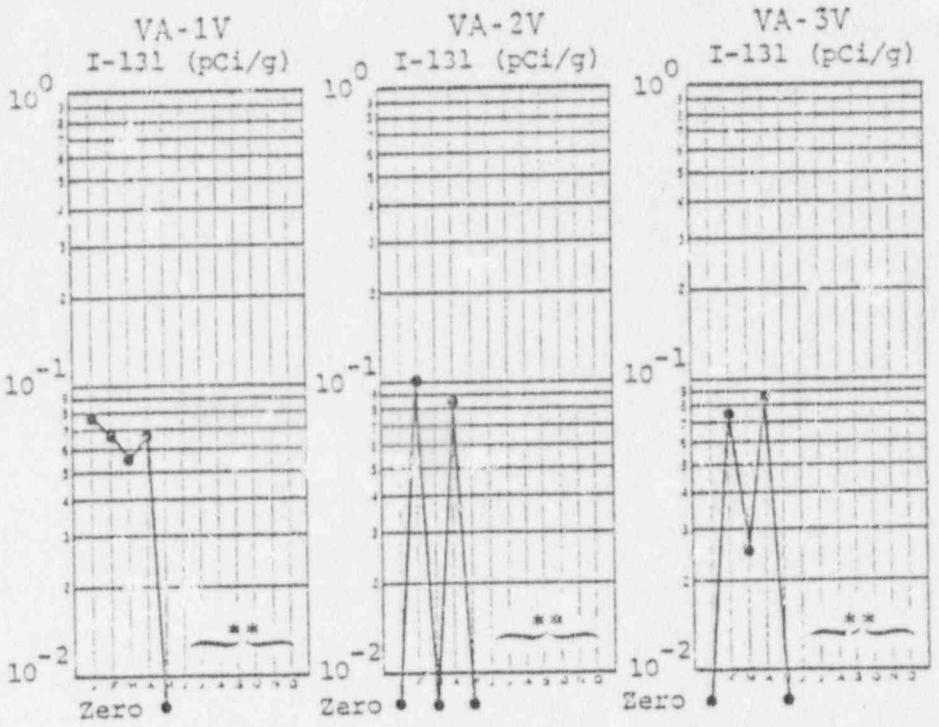
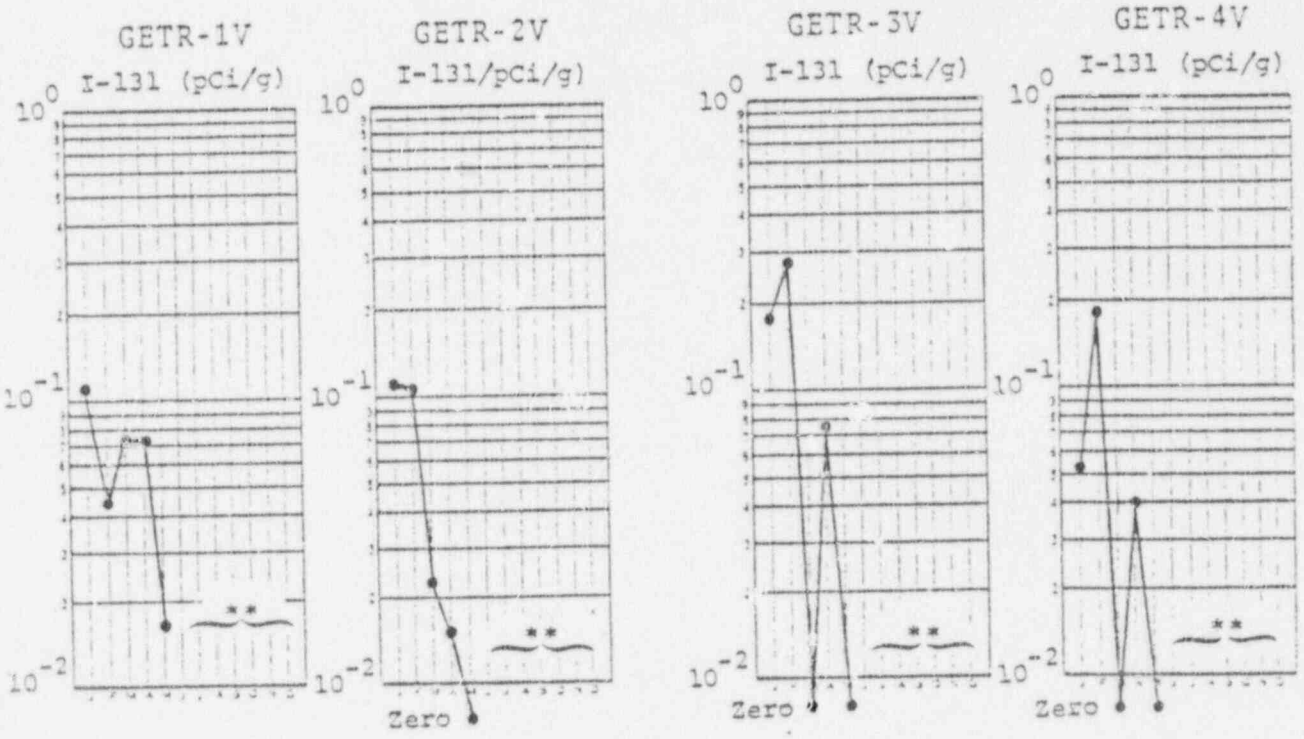
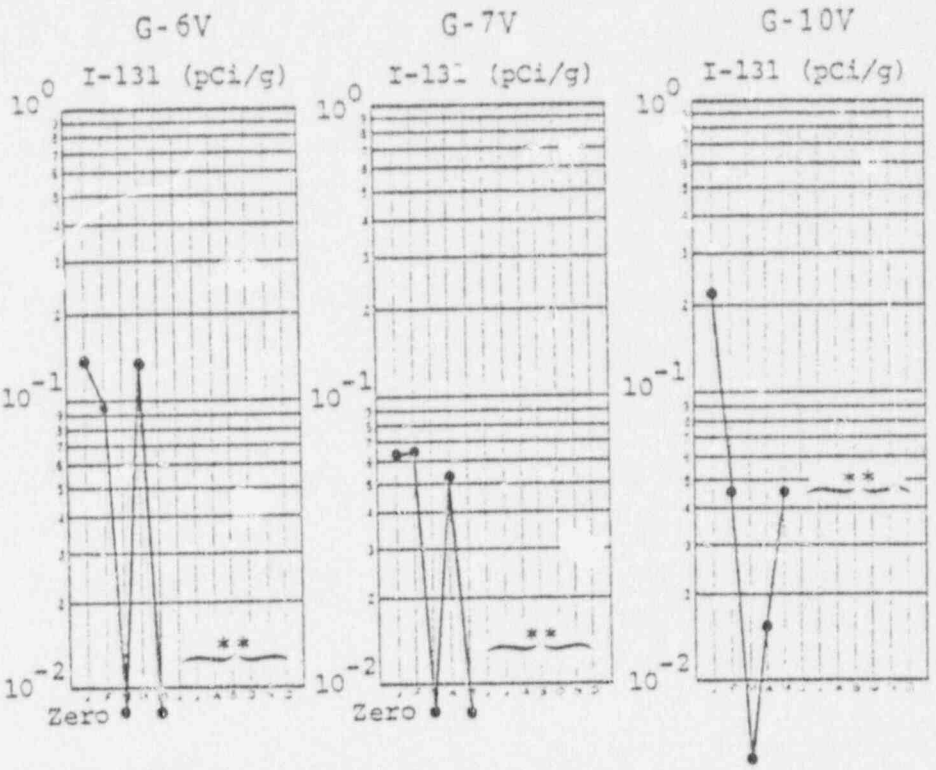


FIGURE 25. VEGETATION ANALYSES FOR I-131, VA-1V, VA-2V, VA-3V (pCi/g)



** Requirements changed effective June 1980.

FIGURE 26. VEGETATION ANALYSES FOR I-131, GETR-1V, GETR-2V, GETR-3V, GETR-4V (pCi/g)



**Requirements changed effective June 1980.

FIGURE 27. VEGETATION ANALYSES FOR I-131, G-6V, G-7, G-10V (pCi/g)

V. METEOROLOGY

A meteorology station is maintained on site and provides data relative to temperatures, wind speed and direction, relative humidity, and rain quantity. In past years this data has been used to prepare a formal report. Further information is obtainable in the 1975 Environmental Information Report, NEDO-21158. Raw data was obtained during 1980 but has not been processed for final presentation.

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