HITACHI

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Ltr. No. DRK-2013-06

Subject: Annual Report, 2012 Effluent Monitoring and Environmental Surveillance Programs

Enclosed is the Annual Report for Effluent Monitoring and Environmental Surveillance Programs at the Vallecitos Nuclear Center (VNC). VNC is a GE-Hitachi Nuclear Energy facility located in Sunol, California.

This report includes parameters monitored to demonstrate compliance with US NRC licenses and California Department of Health Services license and the underlying regulations.

If you have questions regarding this request or additional information is required, please contact me at (925) 862-4360 or use the contact information above.

Sincerely,

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EFFLUENT MONITORING AND ENVIRONMENTAL SURVEILLANCE PROGRAMS

ANNUAL REPORT

2012

GE Hitachi Nuclear Energy, LLC

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ABSTRACT

Annual, 2012

This report presents the data collected for the calendar year of 2012. The original copies of all laboratory reports are on file at VNC.

All treated sanitary and industrial wastewater was disposed of on-site by an irrigation system. No surface runoff of sanitary or industrial wastes was observed during the report period.

Based on the analytical results of non-radiological samples collected from locations on- site during the reporting period, VNC was in compliance with the limitations set in the Waste Water Permit No. GE-R2-2008-0079.

Based on the analytical results of radiological samples collected from locations on- and off-site during the reporting period, VNC was in compliance with all licenses issued by the U.S. Nuclear Regulatory Commission and California Department of Health, Radiologic Health Branch.

1.0 INTRODUCTION

This report summarizes activities performed and data collected for the Water Monitoring Program at Vallecitos Nuclear Center (VNC). This section presents background information about the Programs. Data collected during the reporting period are presented in Section 4.0. This report has been prepared in compliance with Waste Water Permit requirements.

The VNC site is 1,594 acres in size. It is located on the northern side of Vallecitos Valley as shown in Figure 1, a topographic map of VNC and the surrounding area. The majority of the site is undeveloped with hills ranging in elevation from 1,000 to 1,300 feet above mean sea level. Approximately 135 acres in the southwest corner and situated between the 400- and 600-foot topographic contours are developed. The ground surface of this portion of the site slopes to the southwest.

VNC utilizes three drainage systems: industrial, sanitary, and storm. The industrial and sanitary systems discharge effluent into one of four 50,000-gallon retention basins located in the southwest corner of the site (Figure 2). The storm drainage system, essentially natural ditches, discharges storm water into a ditch parallel with Vallecitos Road (State Route 84). Storm drains from Buildings 103, 104 and 106 discharge to the west drainage ditch, while some storm drains in the Building 102, 105, 200 and 300 areas discharge to the east drainage ditch. As shown in Figures 2 and 3, these ditches merge prior to exiting the site.

Groundwater levels of the developed site vary from 2 to 3 feet (during winter near Retention Basins 2 and 3) to 30 to 40 feet (during the summer northwest of the road leading to the water tank). A USGS geology study shows that groundwater generally flows toward the southwest. The velocity of groundwater is estimated by USGS to be about 0.01 ft/day in clays to 8 ft/day in gravels. In areas where gravels with a considerable mixture of clay (most of developed site) are saturated close to the land surface, southwesterly movement would occur at an average rate of approximately 2 ft/day[1].

1.1 Effluent Monitoring Program

The purpose of the Effluent Monitoring Program is to ensure that VNC site release limits for effluent are not exceeded. The Program includes measuring radioactive and non-radioactive constituents in water discharged through the site sanitary and industrial wastewater systems. Measurements are determined by collecting samples of influent and effluent. The schedule of sample collection is presented in Table 1.

The California Regional Water Quality Control Board (CRWQCB) has established release limits for numerous non-radiological constituents through Waste water Permit No. R2-2008-0079. A copy of the 2008 permit is on file at VNC and CRWQCB. The California State Department of Health Services (CSDHS) and the United States Nuclear Regulatory Commission (NRC) have established radiological release limits. These limits are listed in 10CFR20, Appendix B.

Influent Characteristics

Influent water is comprised of potable water piped from a municipal source (ultimately, the Hetch-Hetchy Reservoir) to an on-site collection tank. In order to monitor the quality of the incoming potable water, a sample from the tank is collected periodically. Samples can also be collected at the pumps, which supply water from the Hetch-Hetchy system. There are no compliance limits for this sample; it is collected for background information.

Effluent Characteristics

Effluent discharge from VNC is made up of industrial wastewater and clean water. Discharges of industrial wastewater consist primarily of non-contact cooling water. The discharges are either held in one of three available 50,000-gallon retention basins or used for non-potable purposes, such as landscape watering. After July 1st, 2003 no discharges to surface waters have been made. Samples are collected from each basin prior to discharge to on site irrigation. In addition, samples from all basin discharges are accumulated and analyzed at specified intervals for a variety of constituents.

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[1] A delay of over 2 years from the nearest postulated spill point to the site boundary.

Discharges of clean water consist of storm water runoff and small quantities of water known to contain no contaminants (such as irrigation runoff). These waters flow directly to drainage ditches that enter Vallecitos Creek.

Sanitary Waste Handling

Discharges of sanitary waste are collected in an Imhoff tank before undergoing sand filtration and chlorination (by addition of sodium hypochlorite solution). Samples of sanitary waste are collected once per discharge. Processed sanitary waste is sprayed onto VNC property by an irrigation system in a designated area (Figure 2). The procedure is monitored so that no surface runoff occurs.

1.2 Environmental Surveillance Program

The purpose of the Environmental Surveillance Program is to determine if discharges from VNC are detectable in the environment. The Program includes measuring both radioactive and non-radioactive constituents in neighboring streams, wells, and soils at locations near or beyond the site perimeter. Samples of receiving water (if discharge occurs,) groundwater, stream bottom sediments, and vegetation are collected. The schedule of sample collection is presented in Table 1.

Receiving Water Monitoring

Receiving water originates from a location upstream from the retention basin outlet where natural drainage flows from the site (see Figure 2). The location, designated as C-4, is a drainage ditch crossing the south boundary of site (see Figure 3). It is monitored on a quarterly basis by visual inspection and is typically dry. However, if water is present, a sample is collected and analyzed. Samples are not required during periods where no discharge of type E-002-SW (Surface Water Discharge) occurs.

Groundwater Monitoring

Groundwater is monitored by collecting and analyzing samples from ten wells located on or near VNC. Samples are analyzed for State water permit Effluents parameters as well as radiological contaminants. Well identification numbers, corresponding California State Well Numbers, and descriptions of locations are listed in Table 2. The locations of the original three on-site and nearby wells are shown in Figure 3.

Vegetation Monitoring

Vegetation is monitored by collecting and analyzing samples of vegetation at two locations designated V-2 and Val-IV. The locations are shown in Figure 3.

Stream Bottom Sediment Monitoring

Stream bottom sediment is monitored by collecting and analyzing samples at one location designated as S-4. The location is at the outfall of the retention basins at south boundary of site, which is the same as for receiving water shown in Figure 3.

Air Monitoring

There are four air monitoring stations, designated as A-1 through A-4, across the site. The stations are positioned approximately 90° apart around the operating facilities of the site. The locations of the stations are shown in Figure 4.

To collect samples, each station is equipped with a membrane filter and an activated charcoal cartridge. The filter is changed weekly[2] and counted for gross alpha and gross beta-gamma radiation. The cartridge is removed and analyzed only in the event of a suspected radioactive iodine release.

Gamma Monitoring

There are 31 monitoring stations on site for measuring gamma radiation in the environment. Each station is constructed of a steel mailbox and equipped with a dosimeter. The dosimeter is sealed in plastic. Additionally,

[2] During dusty conditions, the filters are changed as determined by the RMT, Facilities Protection.

Station 4 is equipped with a CaSO4:Dy dosimeter. The dosimeters are exchanged annually, with the exception of the CaSO4:Dy dosimeter which is exchanged quarterly. The locations of the stations are shown in Figure 4.

For reporting purposes, the dosimeters are distributed as follows:

- South Boundary - Stations 1, 2, 3, 8, 9, 31
- East Boundary - Stations 10, 11, 12, 13, 14, 15
- North Boundary - Stations 16, 17, 18, 19, 23, 24
- West Boundary - Stations 25, 26, 27, 28, 29, 30
- Centrally Located - Stations 4, 5, 6, 7, 20, 21, 22

The dosimeter vendor reports the measurements of each dosimeter and determines the background measurement. Background is determined by using a dosimeter that has been exposed to background radiation at this facility and is from the same batch of TLD material as the dosimeters exposed at VNC.

Gaseous Effluent Monitoring

Several operations at the site utilize exhaust stacks. Air is collected from single or multiple operating areas via a ventilation system. The ventilation system is generally comprised of ductwork, particulate filtration systems, blowers, and an exhaust stack. The gaseous effluent is monitored. The specifications of each stack are listed in Table 3.

The various site operating licenses (SNM-960, R-33, and State 0017-01) and federal regulations require that the gaseous effluents released to unrestricted areas be limited and controlled to maintain the concentrations of radioactive material in the unrestricted area as low as reasonably achievable but at least no greater than the values in Appendix B, Table II of 10CFR20.

The method by which releases are determined to be within these limits is to establish average release limits and control values for each stack and then measure the average releases through monitoring and/or sampling of the effluents. The control values are, in general, established as 10% of the license release limits.

Both sampling and monitoring techniques are used to determine gaseous effluent releases. Release results reported to regulatory agencies for particulates and halogens are obtained from sampling systems. Noble gas results are obtained from charts or electronic integrators on monitoring equipment.

The COMPLY computer code is run to determine the dose at the site boundary from annual airborne effluents. This evaluation was formerly required when 40CFR61 Subpart I applied to NRC licensees, which included VNC. The regulation was amended to exclude NRC licensees. However, VNC has continued to run the COMPLY code to demonstrate compliance with the constraint rule per Regulatory Guide 4.20 and 10CFR20.1101d. Verifying compliance with annual public dose per 10CFR20.1301, "Dose limits for individual members of the Public'.

1.3 Laboratory Analyses

On-site and external laboratories perform the analyses of samples collected at VNC as required for the programs. Samples analyzed by the on-site laboratory are reported as measured value or less than minimum detectable activity (MDA) values, while samples analyzed by the external laboratories are reported as actual measured values. Values within the statistical background may be listed as zero or as a positive or negative numbers. All analyses are performed using approved USEPA methodology with minimum sensitivities equal to or less than permit limits. All records of analytical results are maintained at VNC.

On-site Laboratory Analyses

The following list of analyses are performed by the on-site laboratory:

- pH
- Dissolved Oxygen
- Temperature
- Conductivity
- Total Alpha-Emitting Radioactivity
- Total Beta-Gamma-Emitting Radioactivity

Off-site Laboratory Analyses

The two external State-certified laboratories that have been contracted to analyze samples collected for the program are Test America Analytical Testing Corporation (formerly known as Sequoia Analytical (Sequoia)) and Davi Lab. Test America, located in Pleasanton, California, performs Total Ammonia (as N), Nitrates (as NO3) Total Dissolved Solids, total coliform, and analyses of water samples as required. Davi Lab, located in Hercules, California, performs most radiological analyses on samples of water, stream bottom and vegetation.

2.0 INFLUENT AND EFFLUENT MONITORING DATA

This section presents the discharge information and analytical results for samples collected for the Effluent Monitoring Program during the reporting period.

2.1 Influent Data

A summary of data relating to influent parameters is given in Table 11.

2.2 Effluent Data

Compliance Summary

All required samples were collected during the reporting period and the analytical results of tests did not exceed Permit limits. All treated sanitary and industrial wastewater was disposed of on-site by an irrigation system. No surface runoff of sanitary or industrial wastes was observed during the report period.

Based on the analytical results of non-radiological samples collected from locations on-site during the reporting period, VNC was in compliance with the limitations set in the Waste Water Permit No. GE-R2-2008-0079.

Based on the analytical results of radiological samples collected from locations on and off-site during the reporting period, VNC was in compliance with all licenses issued by the U.S. Nuclear Regulatory Commission and California Department of Health, Radiologic Health Branch.

Discharge Volume Data

Industrial and sanitary wastewater discharge volumes are summarized in Table 4.

Non-radiological Analytical Results

Summaries of data relating to non-radioactive effluent parameters are given in Table 5 through 9. The results indicate that no constituent was released equal to or greater than regulatory limits.

Radiological Analytical Results

Radioactivity measurements for effluent waters are summarized in Table 10. The data 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 as "less than" numbers necessarily include the summation of these detection limits (i.e., a summation of "less than" numbers) and represent maximum possible values for the sample analyses. The results indicate that no radiological material was released equal to or greater than regulatory limits.

3.0 ENVIRONMENTAL SURVEILLANCE DATA

This section presents the analytical results for samples of receiving water, ground water, stream bottom sediments, and vegetation collected for the Environmental Surveillance Program during the reporting period.

3.1 Receiving Water

Receiving waters were not sampled since no process discharges occurred.

3.2 Groundwater

Analytical results of groundwater samples collected from the designated wells during the reporting period are listed in Table 12.

3.3 Stream Bottom Sediments

Analytical results of stream bottom sediment samples collected during the reporting period are listed in Table 13.

3.4 Vegetation

Analytical results of vegetation samples collected during the reporting period are listed in Table 14.

3.5 Gamma Monitoring

The results of gamma monitoring during the reporting period are listed in Table 15.

3.6 Ambient Air Monitoring

Analytical results of environmental air samples collected during the reporting period are graphically presented in Figure 5, data in Table 16.

3.7 Gaseous Effluent Monitoring

Stack Monitoring

Analytical results of gaseous effluent samples collected for stack monitoring during the reporting period are graphically presented in Figures 6 through 9.

Effective Dose Equivalent

The calculated Effective Dose Equivalent at Screening Level 2 resulting from the annual measured releases, as calculated by the Comply Code, are:

Property Line

- 1.1 mRem/year due to all emissions, and
- 1.7e-03 mRem/year from iodine.

Industrial Area Boundary

- 7.0 mRem/year due to all emissions, and
- 1.2E-02 mRem/year from iodine.

These numbers are less than the EPA emission standards[3] of 10 mRem/year total dose and 3 mRem/year due to iodine.

[3] Established in 40CFR61.102

4.0 METEOROLOGY

This section presents meteorological data collected during the reporting period. Meteorological data are collected using a weather station manufactured by Davis Instruments of Hayward, California. The station is located on a knoll southeast of the main site area. A portion of the meteorological data collection system is computerized. Software provided by the manufacturer is used to build a database of meteorological data, specifically the amount of rainfall over time.

4.1 Rainfall Data

Rainfall data collected at VNC since October 1, 1996 are presented in Table 17.

5.0 SUMMARY

This section presents a summary of the results of the water Monitoring Program for the reporting period.

The analytical results of non-radiological samples collected during the reporting period indicate that all effluent discharges were within Waste Water Permit limits.

The analytical results of radiological samples collected during the reporting period indicate that all effluent discharges from VNC were in compliance with Water Permit limits and all airborne releases were in compliance with all licenses issued by the U.S. Nuclear Regulatory Commission.

Additionally, neither surface runoff of processed sanitary wastewater, nor industrial wastewater was observed. The Effluent Monitoring and Environmental Surveillance Programs continue to be effective.

TABLE 1. SAMPLE COLLECTION SCHEDULE

Designation Location	Constituent	Sample Type	Frequency
E-001 and E-002 From Basin 1 - 4	Gross Alpha,	Grab	As Released
	Gross Beta/Gamma	Grab	As Released
	Gross Alpha,	Composite	Monthly
	Gross Beta/Gamma	Composite	Monthly
E-001 Basin 1	Flow(1)	Measurement	Each discharge
	Total Coliform(3)	Grab	Each discharge
	PH	Grab	Each discharge
	Dissolved Oxygen	Grab	Each discharge
	Total Dissolved Solids	Grab	Each discharge
	Nitrate (as NO_3)	Grab	Monthly
	Ammonia as N	Grab	Monthly
	Standard observations	Grab	Each discharge
E-002-L Basin 2, 3 or 4	Flow	Measurement	Each discharge
	PH	Grab	Each discharge
	Total Dissolved Solids	Grab	Monthly
	Nitrate (as NO_3)	Grab	Monthly
	Standard observations	Grab	Each
Station E-003 Storm Water (Reported in Annual Stormwater Report)	Flow	Measurement	Each occurrence
	PH	Grab	Each occurrence
	Total Organic Carbon	Grab	Twice each wet weather season
	Oil & Grease	Grab	Twice each wet weather season
	Specific Conductance	Grab	Twice each wet weather season
	Total Suspended Solids	Grab	Twice each wet weather season
	Gross Alpha	Grab	Twice each wet weather season
	Gross Beta/Gamma	Grab	Twice each wet weather season
	Standard observations	Grab	Each

TABLE 1. SAMPLE COLLECTION SCHEDULE
(continued)

Designation Location	Constituent	Sample Type	Frequency
WT Influent	Total Coliform	Grab	None required
	Gross Alpha,	Grab	
	Gross Beta/Gamma	Grab	
C Receiving Waters (Samples required coincident with samples for E-002-SW)	Dissolved Oxygen	Grab	1st week of 2nd month of each quarter
	PH	Grab	1st week of 2nd month of each quarter
	Un-ionized Ammonia (as N)	Grab	1st week of 2nd month of each quarter
	Standard observations	Grab	1st week of 2nd month of each quarter
	Gross Alpha	Grab	1st week of 2nd month of each quarter
	Gross Beta/Gamma	Grab	1st week of 2nd month of each quarter
S-4 Stream Bottom Sediments –	Gross Alpha	Grab	First week in May
	Gross Beta/Gamma	Grab	First week in May
V-2 & VAL IV Vegetation	Gross Alpha	Grab	First week in April
	Gross Beta/Gamma	Grab	First week in April

FOOTNOTES FOR TABLE 1

[1] Flow Monitoring: The volume of each basin discharge shall be recorded. The following information shall also be recorded daily for the quarterly report:

Average Daily Flow	(mgd)
Maximum Daily Flow	(mgd)
Minimum Daily Flow	(mgd)

[2] Grab samples of receiving water stations shall be collected on days coincident with samples collected for the analysis of regulated parameters. Sampling is required only when there is sufficient natural flow in the unnamed ditch or Vallecitos Creek to enable collection of samples.

[3] The discharge flow rate for the storm water discharge (Waste 003) shall be estimated at the time of sample collection. The Discharger shall also report the total volume of discharge for each month. The Discharger may calculate storm water volumes by using an appropriate site runoff coefficient, area of drainage, and precipitation records or measurements. Samples are required for each constituent twice during each wet weather period (October 1 through April 30) in accordance with Part A Section C.3 of the self-monitoring program. For safety reasons, the Discharger may choose to sample only storms occurring during daylight hours. The Discharger shall collect grab samples during the first 30 minutes of discharge unless it can explain why this was not possible. In such cases, the Discharger must collect samples within the first hour of discharge. The Discharger shall also conduct visual observations at least monthly during the wet weather period and at least twice during the dry weather period.

TABLE 2 – GROUNDWATER WELL INFORMATION

Site Well No.	California State Well No.	Location Description
G-2N1	4S/1E-2N1	Southeast of Building 105
G-10A1	4S/1E-10A1	southwest of Building 102
G-10P3	4S/1E-10P3	0.6 miles southwest of site entrance on private property
MW-1	4S/1E3R2	Bldg. 102 Parking Lot
MW-2	4S/1E-10A2	North Side of Sanitary Discharge Field
MW-3	4S/1E-10A3	West side of Sanitary Discharge Field
MW-4	4S/1E-10A4	South Side of Sanitary Discharge Field
MW-5	4S/1E-10H2	West side of Industrial Discharge Field
MW-6	4S/1E-10H3	South side of Industrial Discharge Field
MW-7	4S/1E-10G3	Southwest from Basins

TABLE 3 – STACK SPECIFICATIONS

Stack Number	Location	Components Serviced	Height (feet ags)	Diameter (inches)	Flow Rate (cfm)
4	Bldg. 102A	Remote Handling Operation, Isotope Production Facility, Radiochemistry, Remote Handling Operations Radioactive Materials Storage Room	75	66	40,154.4
12	Bldg 103	Metallurgy and Ceramics Laboratories, Chemistry Laboratories	48	60	33,051.7
16	Bldg. 105	Nuclear Test Reactor	45	13.5x13.5	1,337.6
30	Waste Evaporator	Liquid Waste Evaporator	25	13x17.75	3,203.2
34	Waste Storage	Waste Storage Facility	25	13x17.75	2,221.8
37	HSF Bunker	Bunker Area of Hillside Storage Facility	40	35	21,146.8

Notes:
ags – above ground surface
cfm – cubic feet per minute

TABLE 4 – EFFLUENT VOLUMES

(gallons)

Month	Sanitary Discharge Volumes (gallons)		Industrial Discharge Volumes (gallons)		Sanitary & Industrial Total Discharges On-site Irrigation	
	Monthly Total	Daily Average	Monthly Total	Daily Average	Monthly Total	Daily Average
January	5.00E+04	1.61E+03	3.55E+05	1.15E+04	4.05E+05	1.31E+04
February	5.00E+04	1.79E+03	2.85E+05	9.83E+03	3.35E+05	1.16E+04
March	5.00E+04	1.61E+03	4.40E+05	1.42E+04	4.90E+05	1.58E+04
April	7.50E+04	2.50E+03	5.50E+05	1.83E+04	6.25E+05	2.08E+04
May	2.50E+04	8.06E+02	3.60E+05	1.16E+04	3.85E+05	1.24E+04
June	4.00E+04	1.33E+03	5.05E+05	1.68E+04	5.45E+05	1.82E+04
July	1.50E+04	4.84E+02	5.25E+05	1.69E+04	5.40E+05	1.74E+04
August	1.80E+04	5.81E+02	5.90E+05	1.90E+04	6.08E+05	1.96E+04
September	2.00E+04	6.67E+02	7.30E+05	2.43E+04	7.50E+05	2.50E+04
October	4.50E+04	1.45E+03	5.55E+05	1.79E+04	6.00E+05	1.94E+04
November	7.00E+04	2.33E+03	5.60E+05	1.87E+04	6.30E+05	2.10E+04
December	2.08E+05	6.71E+03	6.55E+05	2.11E+04	8.63E+05	2.78E+04
Annual Totals:	6.66E+05	1.82E+03	6.11E+06	1.67E+04	6.78E+06	1.85E+04

TABLE 5 – DISSOLVED OXYGEN

(E-001 [Sanitary]

Parameter requirement is for sample to be >1 mg/l dissolved oxygen.

Month	E-001(Min) DO	Lower Limit
January	12	>1
February	8.2	>1
March	10.7	>1
April	7.9	>1
May	8.9	>1
June	9.4	>1
July	11.2	>1
August	11.2	>1
September	9.4	>1
October	9.8	>1
November	9.8	>1
December	10.2	>1

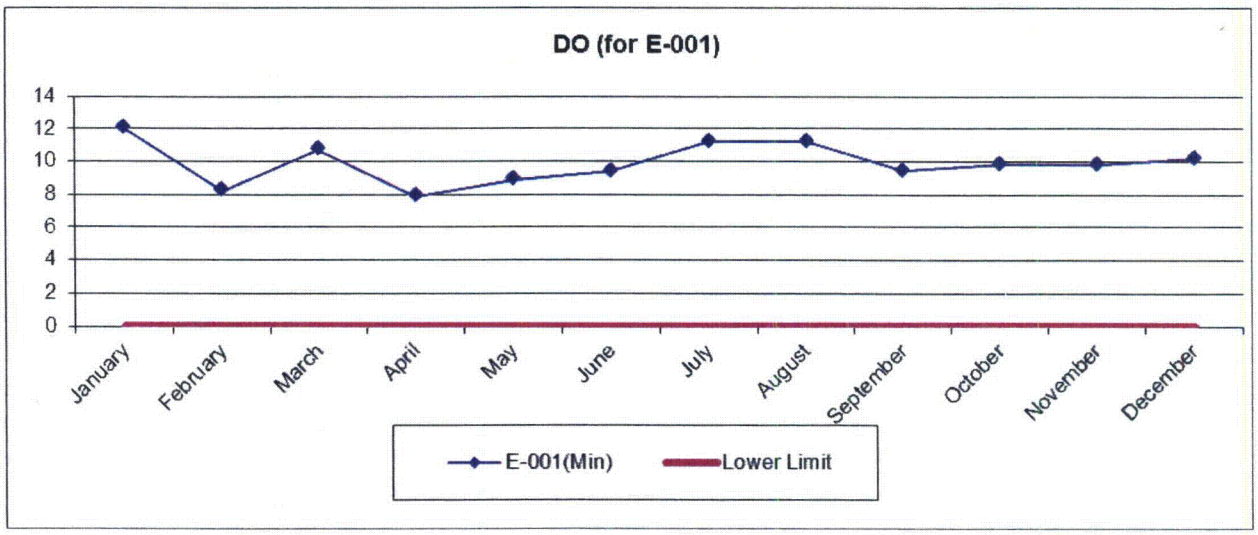
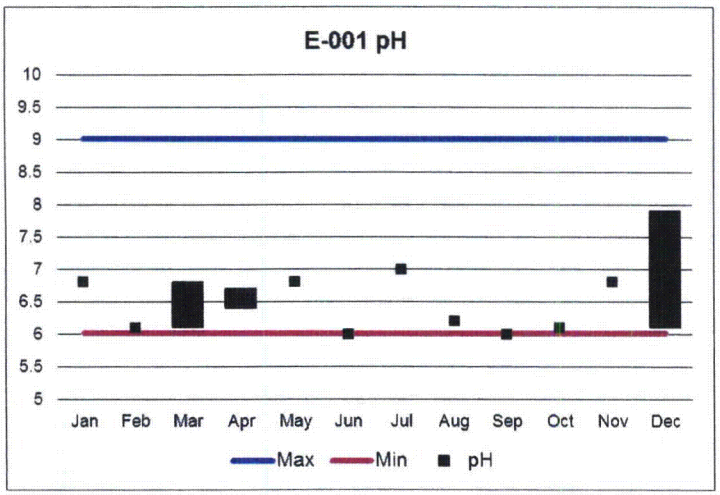


TABLE 6 – WASTEWATER pH SAMPLES

Parameter requirements ≥6 and ≤9 PH

	E-001			E-002-L		
Date	No. Samples	pH Max	pH Min	No. Samples	pH Max	pH Min
Jan	1	6.8	6.8	0	10	7.3
Feb	1	6.1	6.1	0	7	7.8
Mar	2	6.8	6.1	0.7	16	8.2
Apr	2	6.7	6.4	0.3	10	7.3
May	1	6.8	6.8	0	7	7.8
Jun	1	6.0	6.0	0	10	8.1
Jul	1	7.0	7.0	0	10	8.7
Aug	1	6.2	6.2	0	11	8.7
Sep	1	6.0	6.0	0	14	7.9
Oct	1	6.1	6.1	0	11	8
Nov	1	6.8	6.8	0	11	6.8
Dec	4	7.9	6.1	1.8	12	7.6



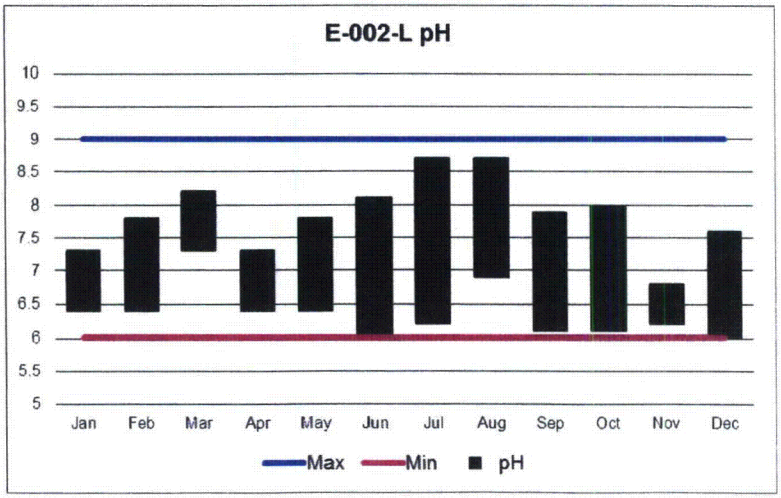


TABLE 7 – FECAL COLIFORM

(Maintain the limit of two consecutive samples ≤ 240 mpn/100ml
or 7 sample median ≤ 23 mpn/100ml)

(mpn/100ml)

Date	Sample	Median	2-Sample
1/4/2012	2	2	2
2/17/2012	2	2	2
3/7/2012	2	2	2
4/5/2012	2	2	2
5/2/2012	2	2	2
6/22/2012	2	2	2
7/11/2012	2	2	2
8/1/2012	2	2	2
9/6/2012	2	2	2
10/11/2012	2	2	2
11/7/2012	2	2	2
12/4/2012	2	2	2

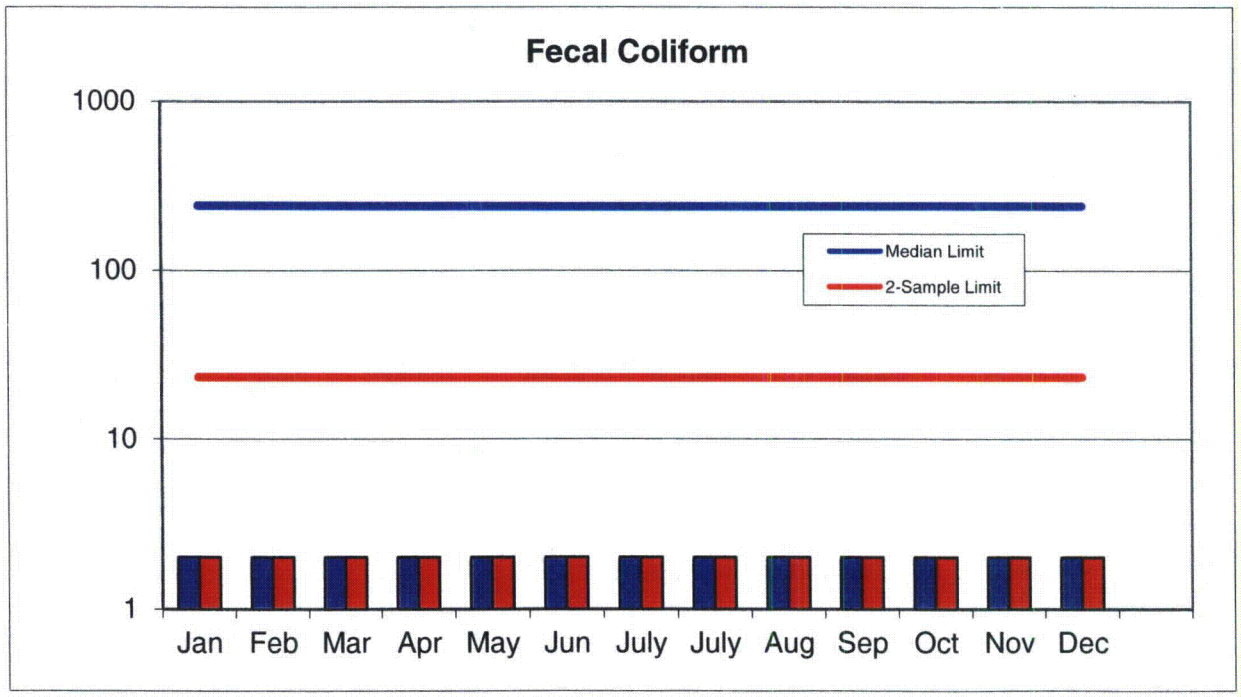


TABLE 8 – TOTAL DISSOLVED SOLIDS – COMBINED LAND DISCHARGE

(Parameter ≤ 500 mg/l)

(Average weighted by volume of E-001 and E-002-L)

Month	Average TDS
Jan-12	321.7
Feb-12	172.0
Mar-12	251.7
Apr-12	101.9
May-12	189.7
Jun-12	181.2
Jul-12	93.3
Aug-12	110.8
Sep-12	101.8
Oct-12	135.9
Nov-12	110.0
Dec-12	71.3

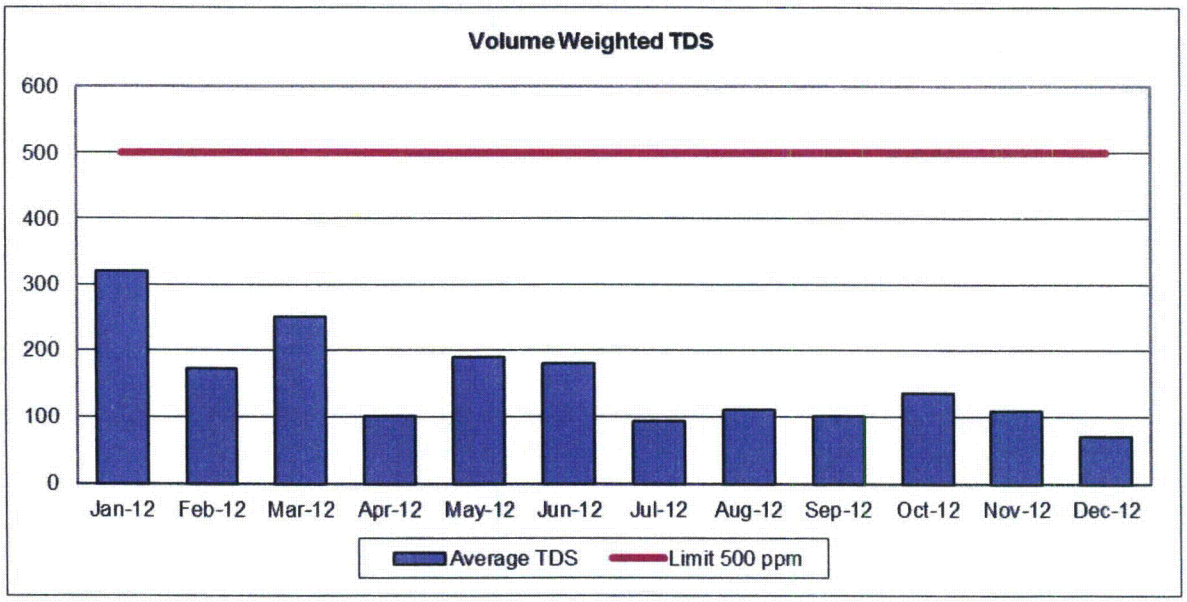


TABLE 9 – NITRATES (as NO_3) – COMBINED LAND DISCHARGE

(Parameter ≤ 45 mg/L)

(Average weighted by volume of E-001 and E-002-L)

Month	Average NO_3
Jan-12	24.5
Feb-12	30.5
Mar-12	18.2
Apr-12	14.2
May-12	19.0
Jun-12	13.7
Jul-12	8.7
Aug-12	8.2
Sep-12	7.0
Oct-12	23.3
Nov-12	19.3
Dec-12	17.0

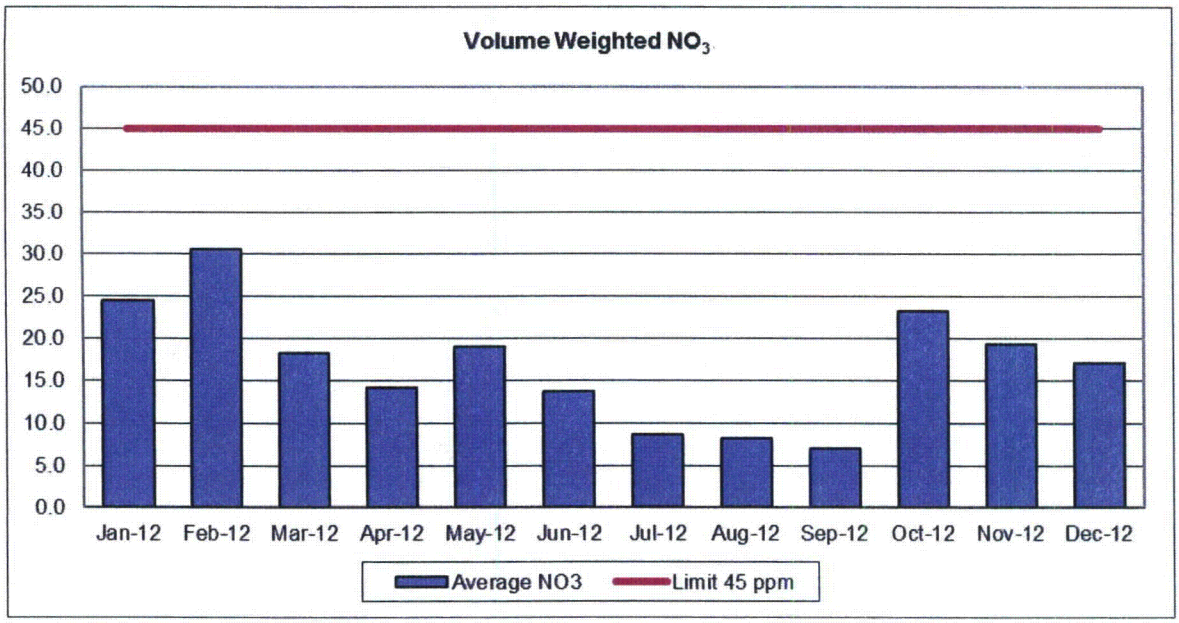


TABLE 10 – MONTHLY RADIOLOGICAL EFFLUENT SAMPLES, E-002-L

	Contract Service Data			Internal Data						
	Monthly Effluent Composite Sample (pCi/L)			Daily Basin Samples (pCi/L)						
				No. of	α			β–γ		
Month	α	β–γ	Tritium	Samples	Max.	Min.	Ave.	Max.	Min.	Ave.
January	2.05	2.61	227	7	<20	<20	<20	<50	<50	<50
February	0.69	4.17	218	6	<20	<20	<20	<50	<50	<50
March	2.26	4.41	946	8	<20	<20	<20	<50	<50	<50
April	0.43	8.18	244	10	<20	<20	<20	<50	<50	<50
May	1.79	0.81	437	7	<20	<20	<20	<50	<50	<50
June	1.57	1.4	232	10	<20	<20	<20	<50	<50	<50
July	2.17	4.74	208	10	<20	<20	<20	<50	<50	<50
August *	6.06	171.3	310	11	<20	<20	<20	<50	<50	<50
September *	33.1	0	926	14	<20	<20	<20	<50	<50	<50
October	1.5	5.12	1080	11	<20	<20	<20	<50	<50	<50
November	0.97	4.39	257	11	<20	<20	<20	<50	<50	<50
December	2.16	4.5	677	12	<20	<20	<20	<50	<50	<50

*Unusual composite sample results investigated and thought to be container cross contamination. Daily basin sample (each discharge) results all showed minimal activities

TABLE 11 – RADIOLOGICAL INFLUENT CONSTITUENTS

Month	Gross α (pCi/l)	Gross B–γ (pCi/l)
February	1.15	2.35
May	5.81	1.64
August	2.59	2.48
November	0.00	0.59

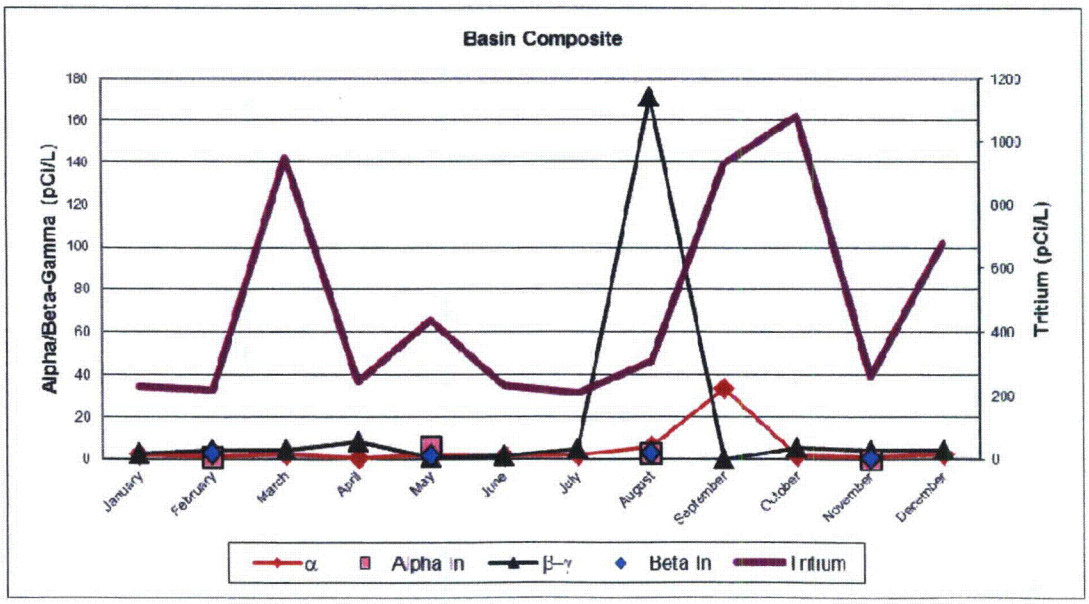
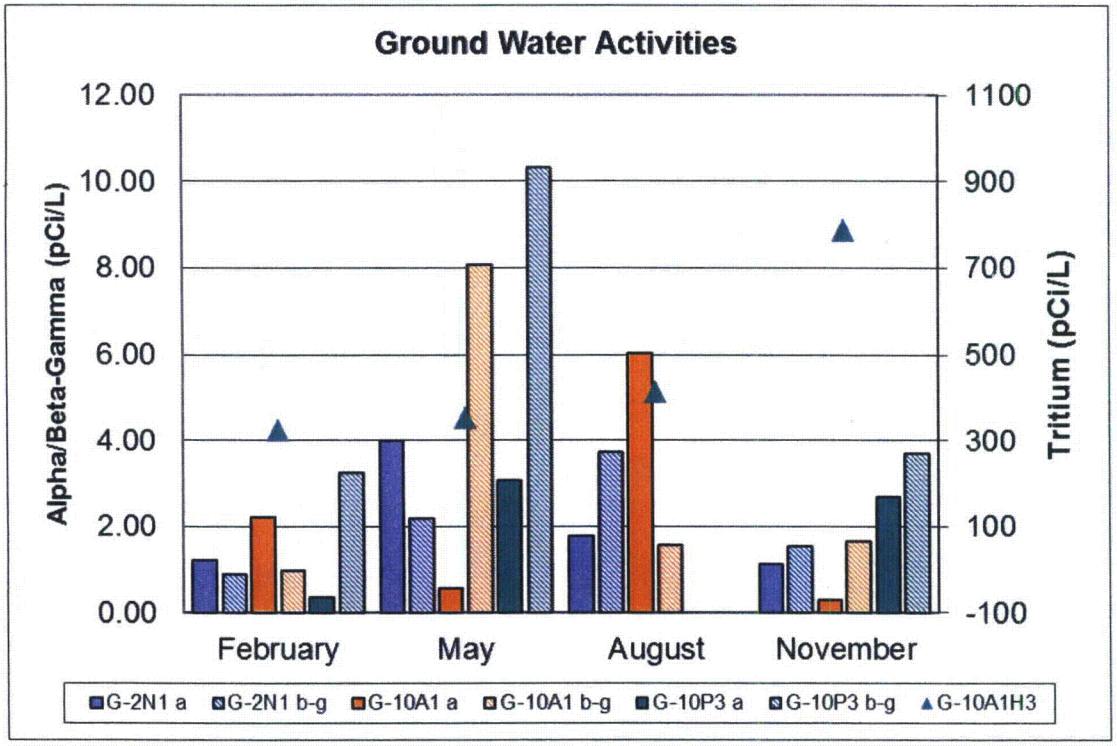


TABLE 12 – QUARTERLY RADIOLOGICAL GROUND WATER SAMPLES

	Well ID						
	G-2N1		G-10A1			G-10P3	
	(pCi/l)	(pCi/l)	(pCi/l)	(pCi/l)	(pCi/l)	(pCi/l)	(pCi/l)
Month	G-2N1 a	G-2N1 b-g	G-10A1 a	G-10A1 b-g	G-10A1H^{3} (Tritium)	G-10P3 a	G-10P3 b-g
February	1.21	0.87	2.22	0.95	321	0.35	3.24
May	4.00	2.18	0.55	8.07	352	3.07	10.30
August	1.78	3.70	6.03	1.56	412	N/A	N/A
November	1.12	1.52	0.29	1.63	787	2.68	3.68
Annual Average	2.03	2.07	2.27	3.05	468.00	1.71	6.77



*August Sample of G-10P3 missing due to no access to collection point.

TABLE 12 – CONTINUED- QUARTERLY RADIOLOGICAL GROUND WATER SAMPLES

	MW-1 (1E-3R2)			MW-2 (1E-10A2)			MW-3 (1E-10A3)			MW-4 (1E-10A4)		
	(pCi/l) a	(pCi/l) b-g	(pCi/l) H3	(pCi/l) a	(pCi/l) b-g	(pCi/l) H3	(pCi/l) a	(pCi/l) b-g	(pCi/l) H3	(pCi/l) a	(pCi/l) b-g	(pCi/l) H3
Month	Gross Alpha	Gross Beta	Tritium	Gross Alpha	Gross Beta	Tritium	Gross Alpha	Gross Beta	Tritium	Gross Alpha	Gross Beta	Tritium
March	**6.91**	**4.06**	**884**	**1.78**	**0.00**	**981**	**3.41**	**2.58**	**627**	**5.45**	**4.80**	**439**
June	**8.66**	**3.77**	**631**	**2.66**	**4.72**	**485**	**1.67**	**7.52**	**510**	**3.68**	**7.71**	**138**
September	**1.99**	**3.38**	**802**	**3.51**	**2.58**	**495**	**2.95**	**5.96**	**487**	**2.17**	**3.43**	**841**
December	**2.91**	**4.28**	**592**	**2.50**	**4.25**	**1114**	**2.78**	**4.33**	**720**	**5.68**	**3.18**	**26**
Annual Average	5.12	3.87	727	2.61	2.89	769	2.70	5.10	586	4.25	4.78	361

	MW-5 (1E-10H2)			MW-6 (1E-10H3)			MW-7 (1E-10G3)		
	(pCi/l) a	(pCi/l) b-g	(pCi/l) H3	(pCi/l) a	(pCi/l) b-g	(pCi/l) H3	(pCi/l) a	(pCi/l) b-g	(pCi/l) H3
Month	Gross Alpha	Gross Beta	Tritium	Gross Alpha	Gross Beta	Tritium	Gross Alpha	Gross Beta	Tritium
March	**1.24**	**4.05**	**742**	**0.31**	**6.76**	**191**	**2.86**	**4.03**	**599**
June	**4.04**	**2.15**	**541**	**2.18**	**2.78**	**964**	**4.53**	**1.74**	**905**
September	**1.84**	**5.28**	**586**	**2.99**	**1.49**	**710**	**4.59**	**2.13**	**915**
December	**2.96**	**2.55**	**170**	**2.28**	**3.42**	**3.16**	**3.36**	**2.16**	**489**
Annual Average	2.52	3.51	510	1.94	3.61	467.04	3.84	2.52	727

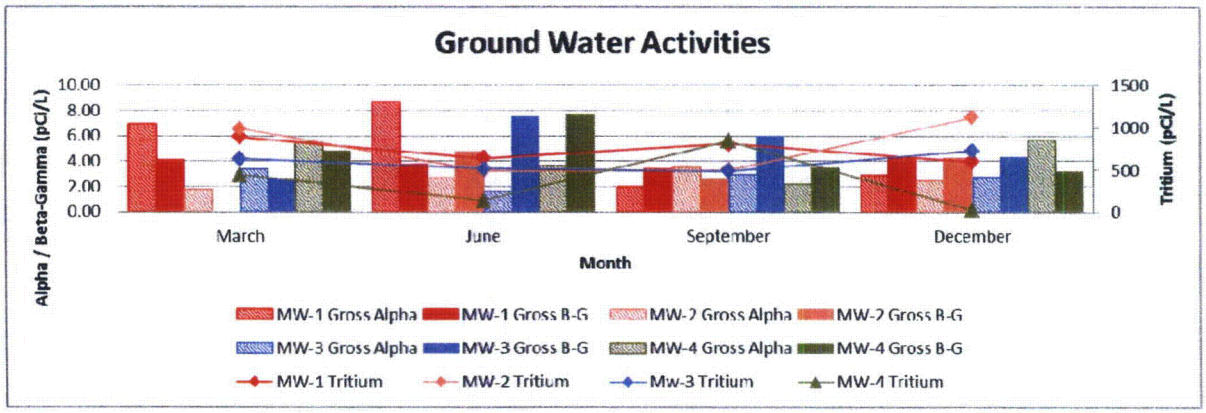


TABLE 13 – RADIOLOGICAL STREAM BOTTOM SEDIMENT SAMPLES

Sample Number	Date Collected	Gross α (pCi/g)	Gross β/γ (pCi/g)	Co-60 (pCi/g)	Cs-137 (pCi/g)
S-4	5/02/2012	6.18	12.30	0.00	0.00

TABLE 14 – RADIOLOGICAL VEGETATION SAMPLES

Sample Number	Date Collected	Gross α (pCi/g)	Gross β/γ (pCi/g)
V-2	4/18/2012	0.21	2.03
	4/18/2012	0.21	3.25
Val-IV	4/18/2012	0.72	3.26
	4/18/2012	0.41	1.14

TABLE 15 – DOSIMETRY RESULTS
GAMMA MONITORING
2012

South Boundary		East Boundary		West Boundary		North Boundary		Centrally Located	
Station No.	(mRem/yr)	Station No.	(mRem/yr)	Station No.	(mRem/yr)	Station No.	(mRem/yr)	Station No.	(mRem/yr)
1	69.8	10	69.7	25	70.8	16	71.1	4	65.0
2	72.9	11	Missing	26	74.1	17	75.1	5	72.9
3	70.8	12	65.9	27	73.6	18	72.1	6	71.2
8	70.3	13	68.9	28	74.9	19	76.1	7	72.0
9	66.4	14	71.5	29	70.1	23	Missing	20	70.8
31	66.6	15	Missing	30	67.7	24	75.3	21	73.5
								22	75.4

Notes: * Dose > Control Dosimeter
See Figure 4 for location, zones demarcated by red lines.
The dosimeters at each station were collected on December 7, 2012.
Gross Values Represented (No background subtracted from control readings).
Control Dosimeter reads 89.2 mRem/yr (Control Badge is located in building 102B).
Missing dosimeters lost due environmental conditions.

TABLE 16 – RADIOLOGICAL AMBIENT AIR MONITORING

$1x10^{-14}$ uci/ml

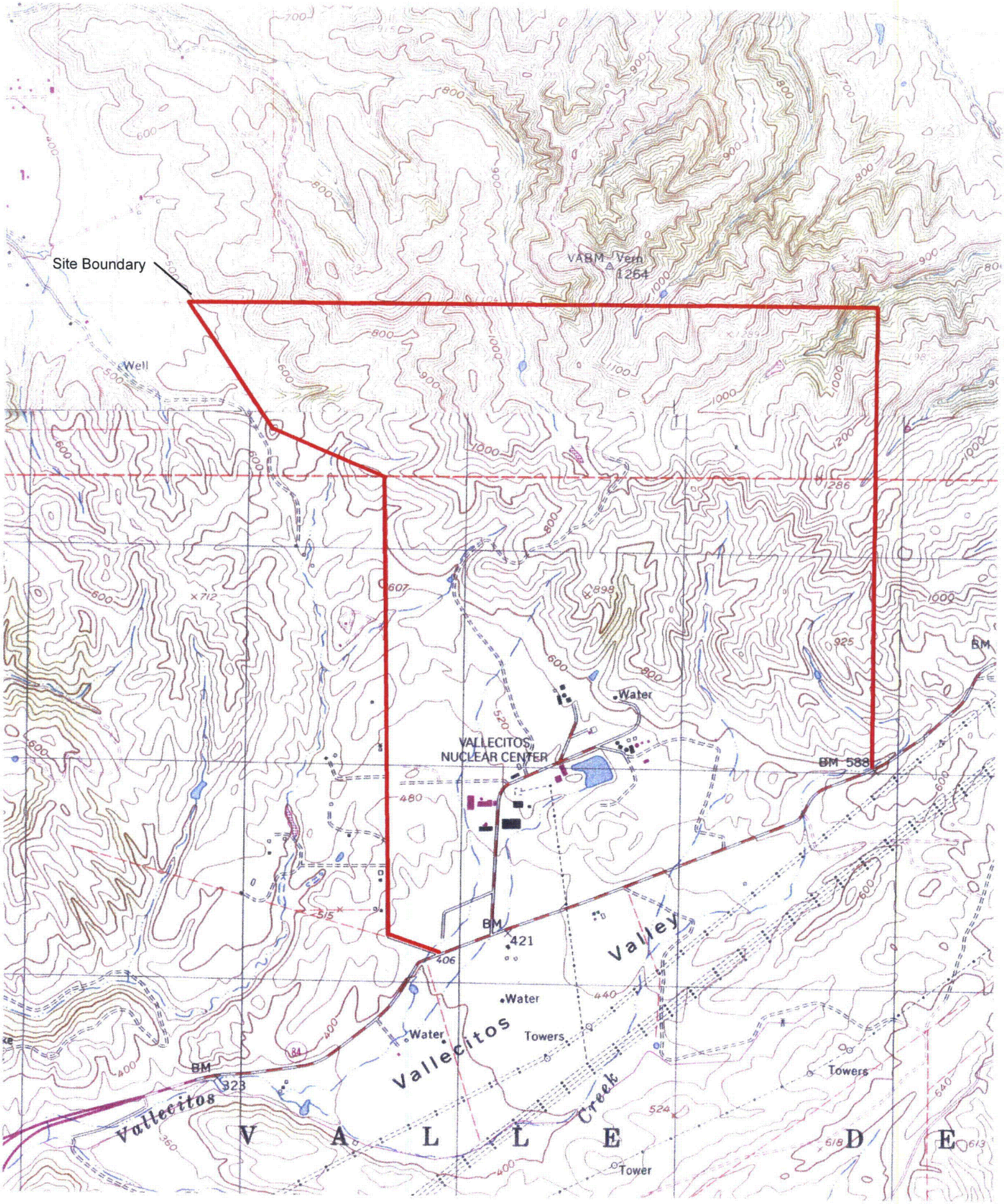
MONTH	STATION ONE		STATION TWO		STATION THREE		STATION FOUR	
	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA	BETA	ALPHA
JAN	0.10	3.11	0.18	2.43	0.14	1.55	0.27	2.06
FEB	1.02	1.85	1.23	1.61	1.30	1.20	1.18	1.34
MAR	1.47	2.13	1.45	2.24	0.74	0.92	0.97	1.42
APR	1.29	1.05	1.39	1.39	1.88	0.85	1.77	1.58
MAY	0.76	2.00	0.80	2.46	0.96	2.18	1.60	1.61
JUN	0.38	3.90	0.49	3.06	0.32	3.01	0.76	3.00
JUL	0.59	1.91	1.49	1.44	1.13	1.33	1.45	1.71
AUG	0.76	1.90	0.19	3.18	0.19	2.36	0.23	3.33
SEP	0.18	3.23	0.16	2.98	0.16	3.47	0.96	1.88
OCT	0.65	2.99	0.28	2.39	0.70	3.18	0.82	2.76
NOV	0.96	1.71	0.18	2.78	0.66	1.95	0.93	2.18
DEC	0.80	0.70	1.49	0.53	1.07	0.43	0.34	0.67
Average	0.75	2.21	0.78	2.21	0.77	1.87	0.94	1.96

Notes: See Figure 4 for location, zones demarcated by red lines.
See Figure 5 for graphical representation

TABLE 17 – RAINFALL DATA

Period	Rainfall Amount (Inches)
October 1996 to October 1997	14.25
October 1997 to October 1998	25.25
October 1998 to October 1999	9.75
October 1999 to October 2000	6.24
October 2000 to October 2001	7.27
October 2001 to December 2001	7.80*
January 2002 to December 2002	14.7
January 2003 to December 2003	15.3
January 2004 to December 2004	15.65
January 2005 to December 2005	26.50
January 2006 to December 2006	20.10
January 2007 to December 2007	11.90
January 2008 to December 2008	12.65
January 2009 to December 2009	13.40
January 2010 to December 2010	21.40
January 2011 to December 2011	14.50
January 2012 to December 2012	20.40

* 4th quarter data reported separately to switch data reporting to calendar year.



1 Mile Scale 1:24,000

Countour Interval 10'

based on USGS Maps, Lacosta Valley and Livermore, CA

Figure 1 Topograghic Map of GE Vallecitos Nuclear Center

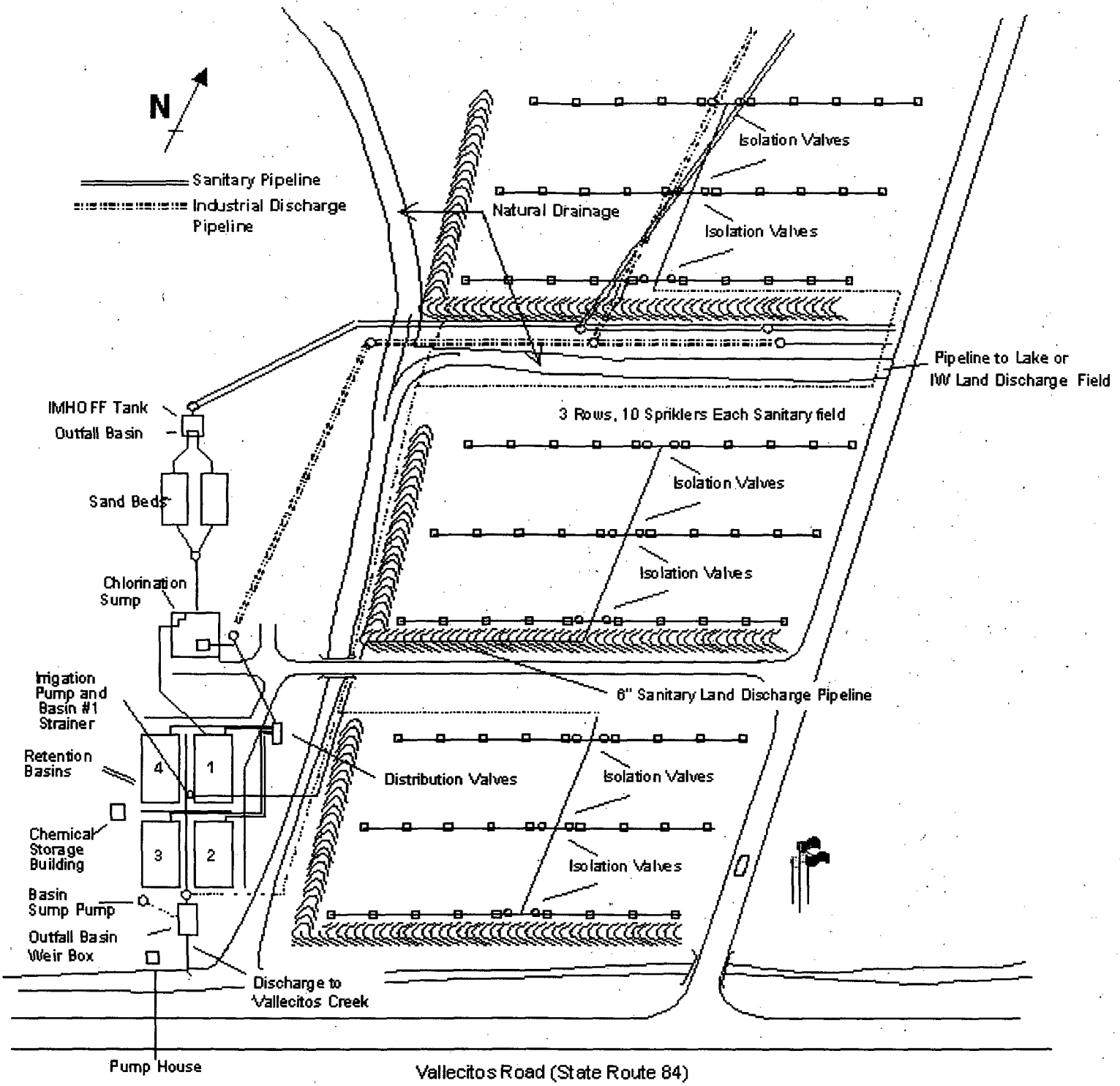


Figure 2 Sanitary and Industrial Discharge Treatment Facility

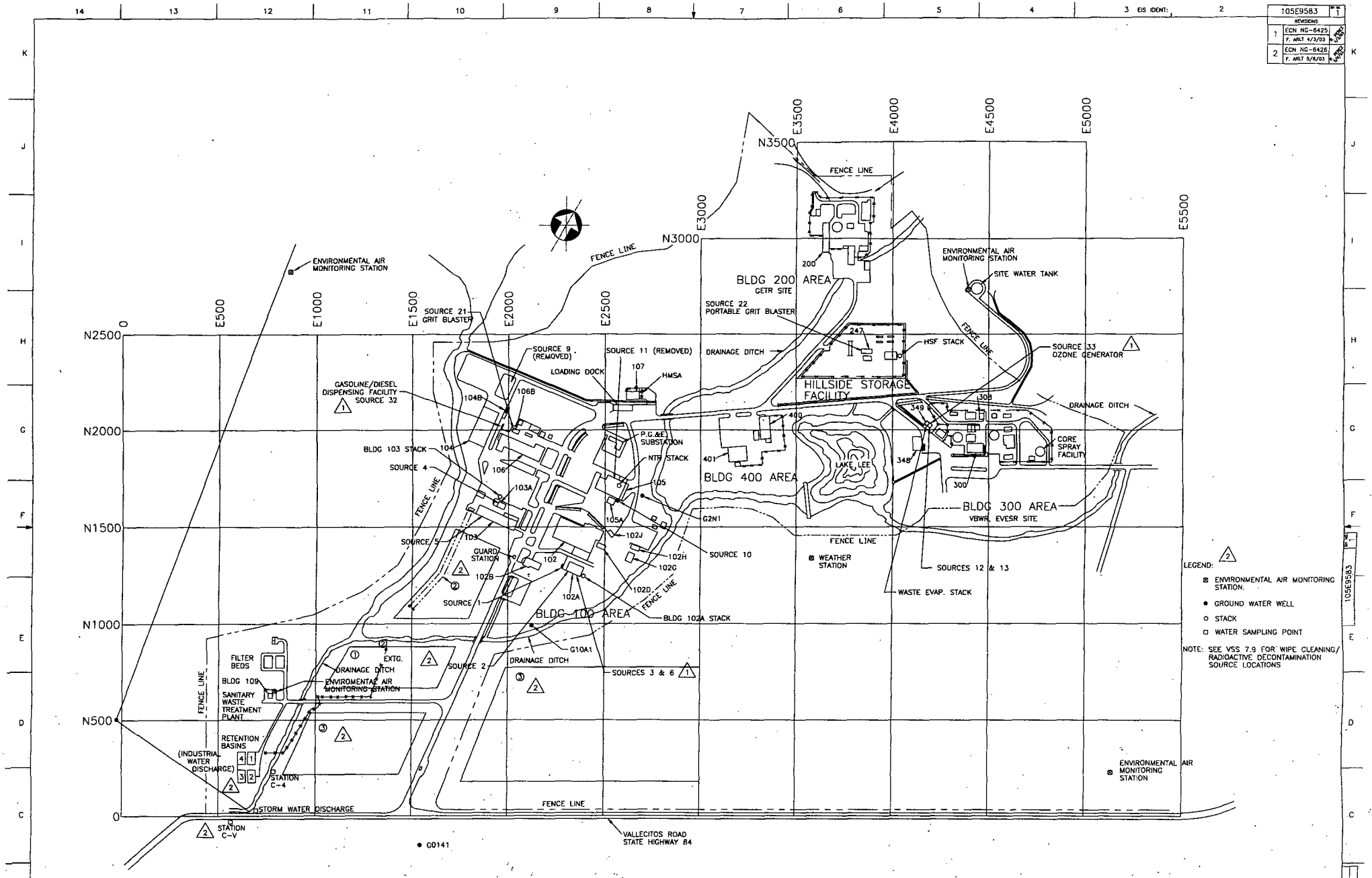


Figure 3. Sampling Locations

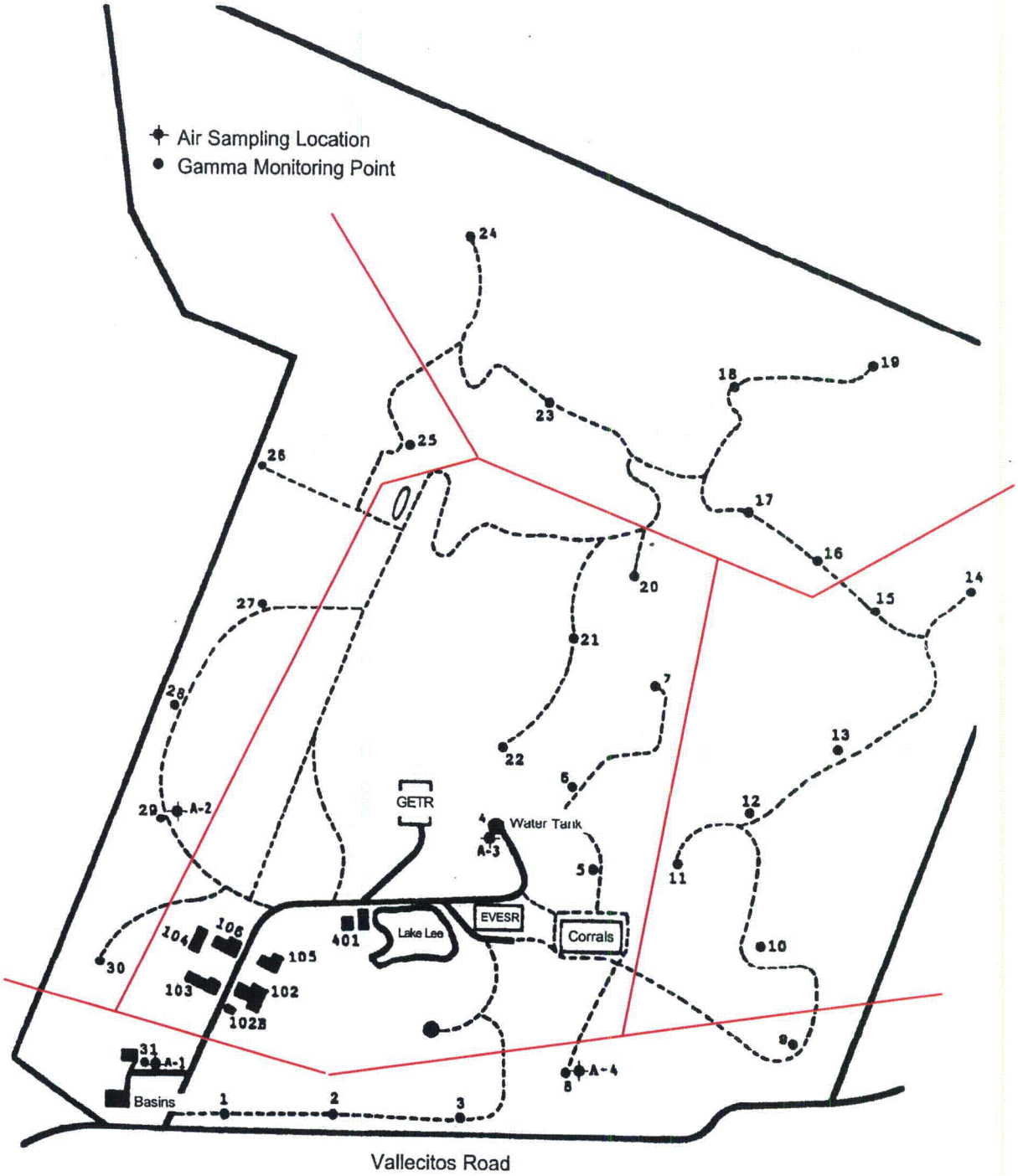
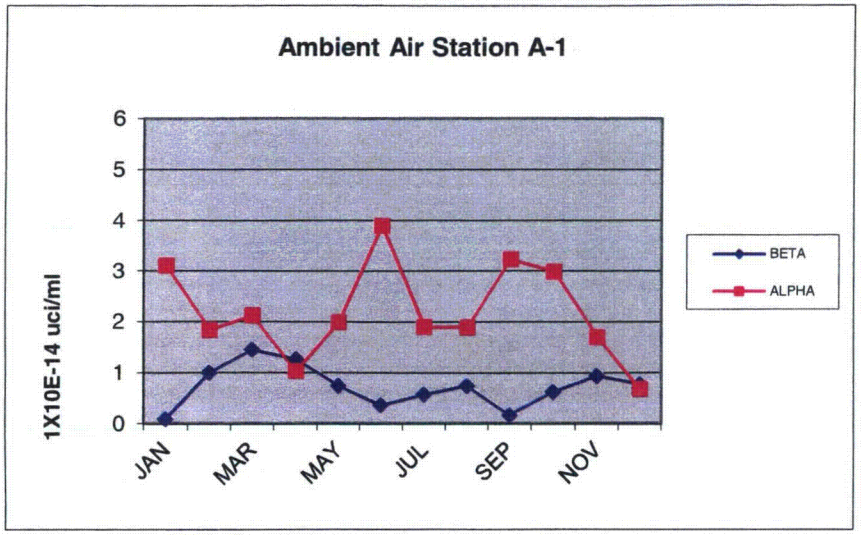
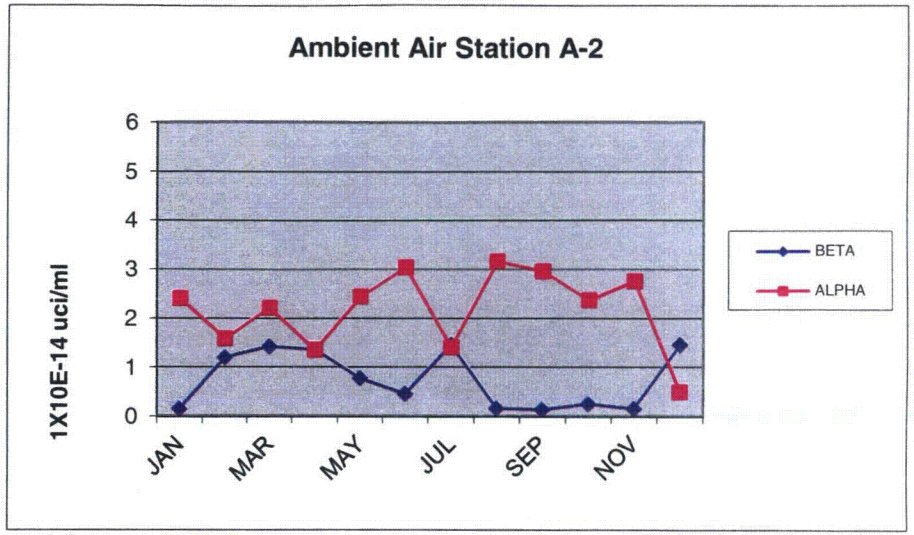
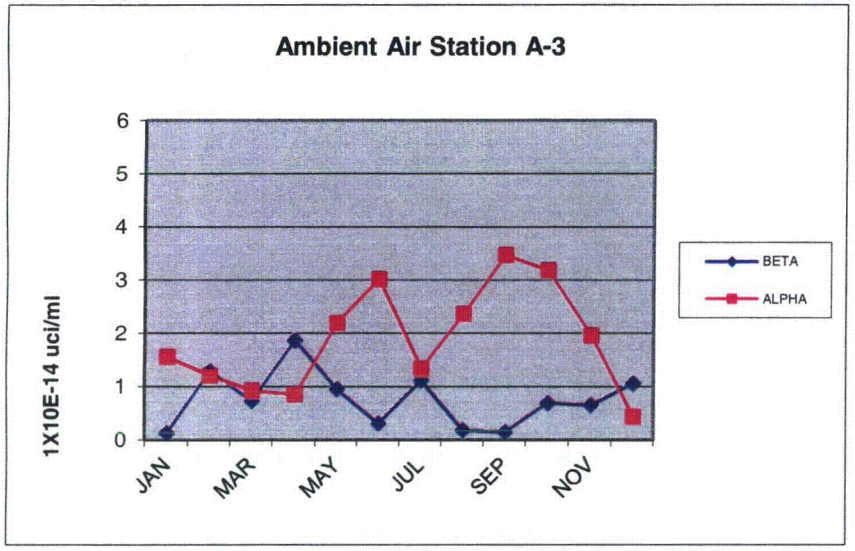


Figure 4. Air Sampling Locations and Gamma Monitoring Points

2009 Environmental Air Sampler Results







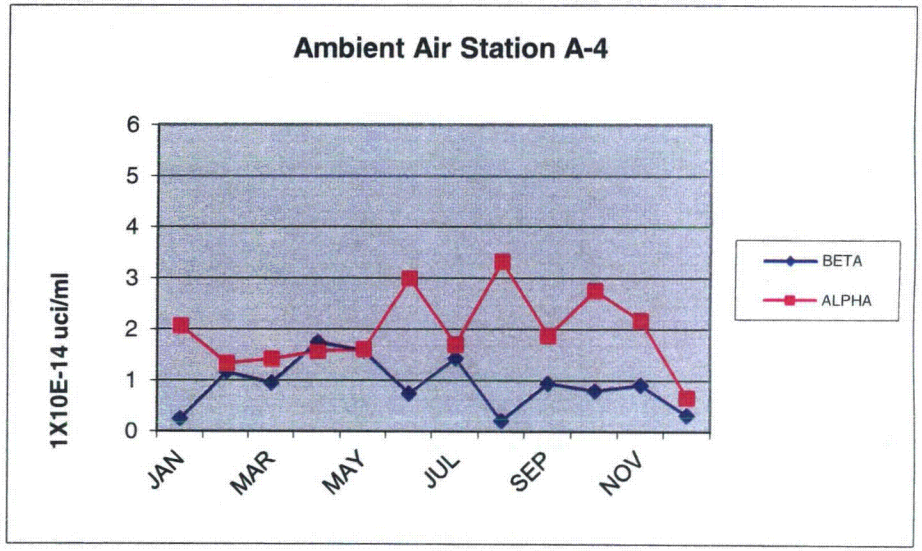
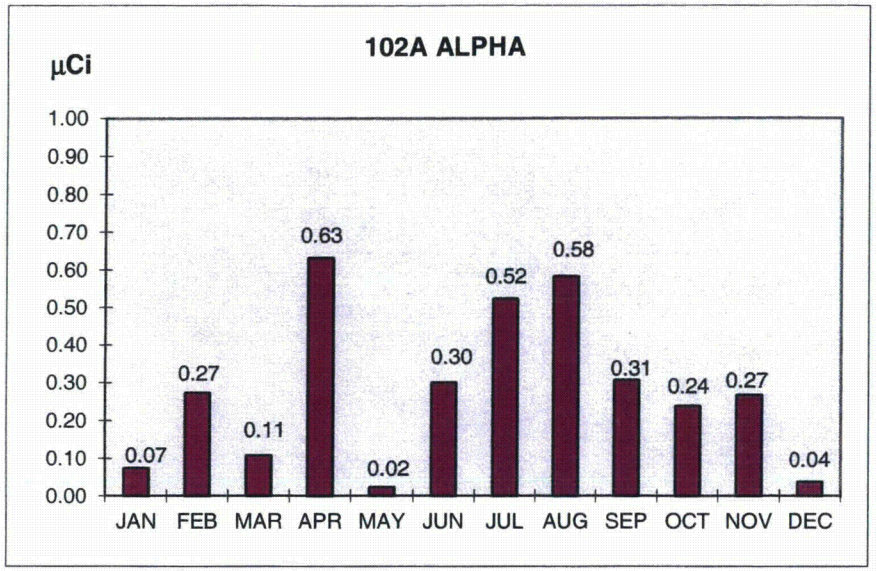
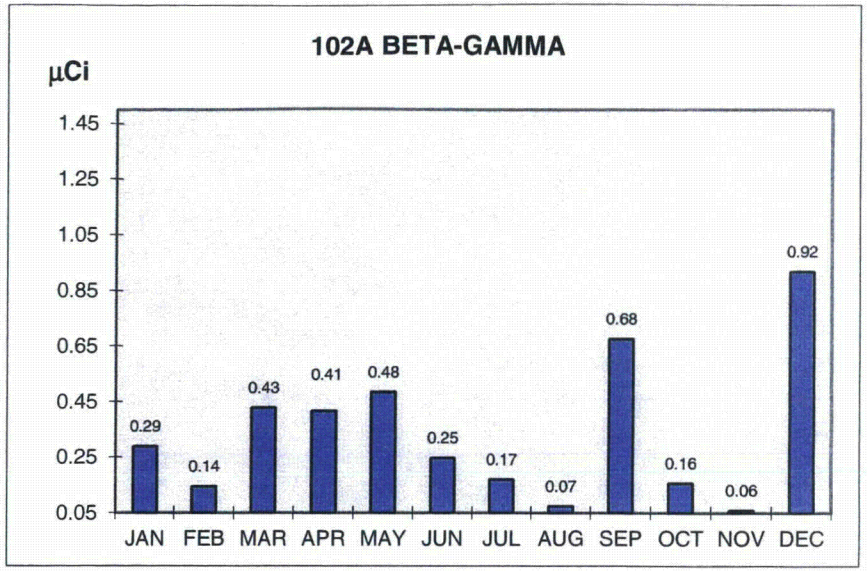


Figure 5, Analytical Results, Environmental Air Station Particulates 2009 Environmental Reports



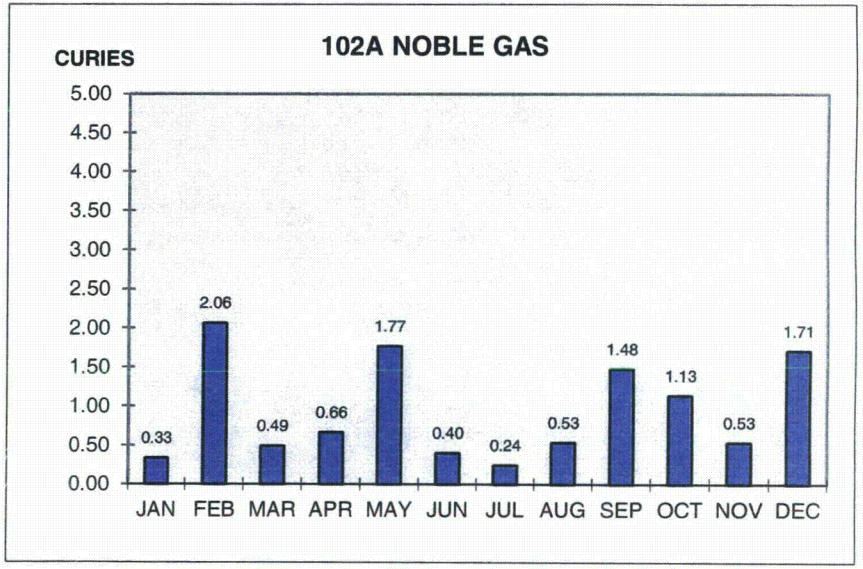
Limit = 3.6 µCi / Week



Limit = 360 µCuries / Week

All results for I-131 are less than or equal to Minimum Detectable Concentration (MDC) approximately 5.04E-14 µCi/cc (5.78E-4 mCi/week)

Limit = 73 mCi / Week



Limit = 180 Curies / Week

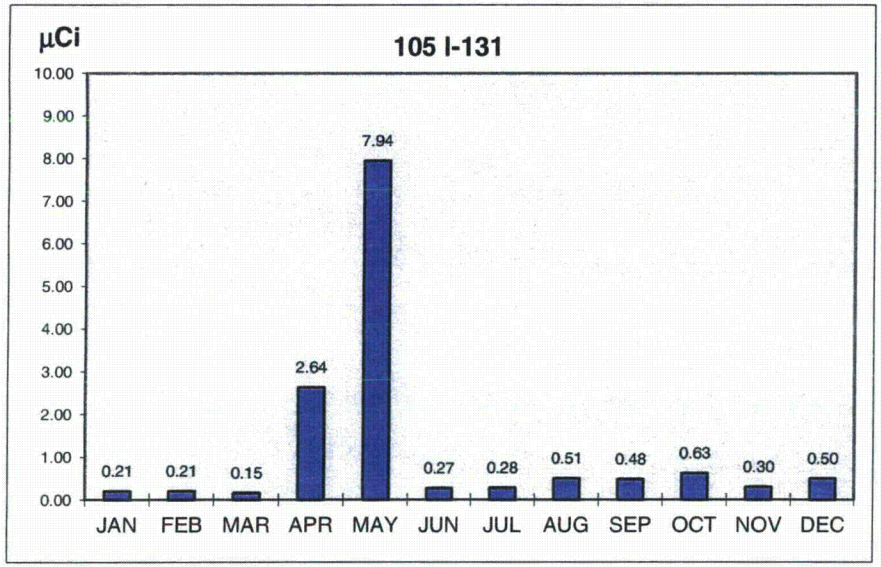
Figure 6. Analytical Results, Stack monitoring (Stack 4, Bldg. 102)

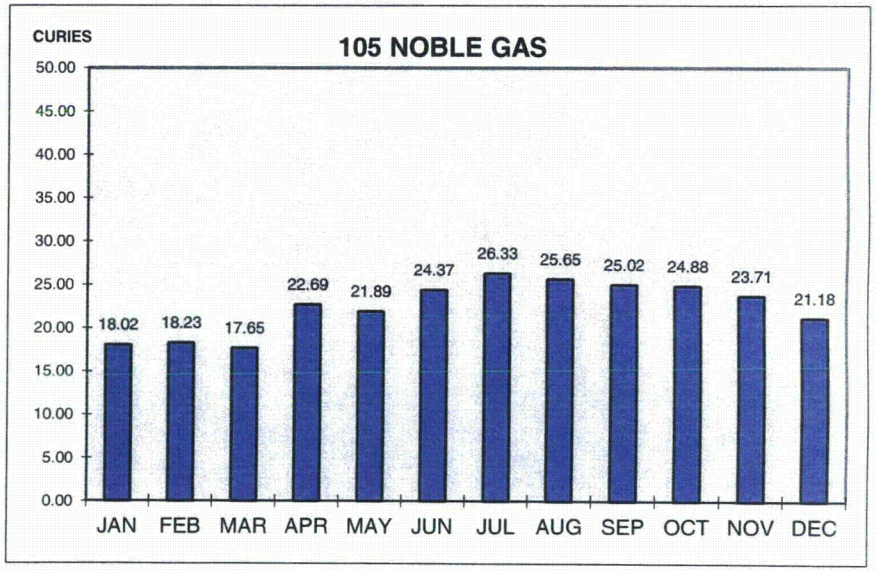
All results for building 105 Alpha Activity are less than 0.2 µCi/week

All results for building 105 Beta-Gamma Activity are less than 0.1 µCi/week

Limit = 8.6 µCi / Week

Limit = 860 µCi / Week

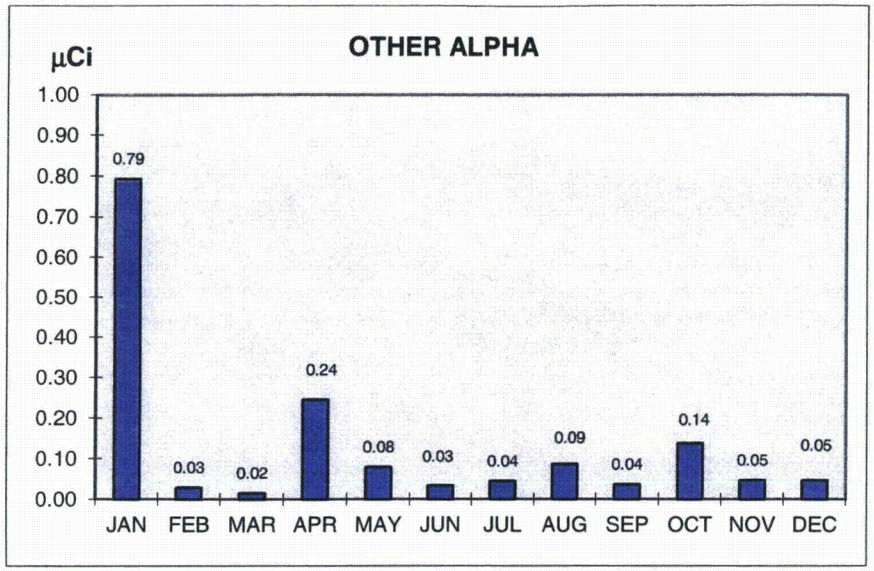




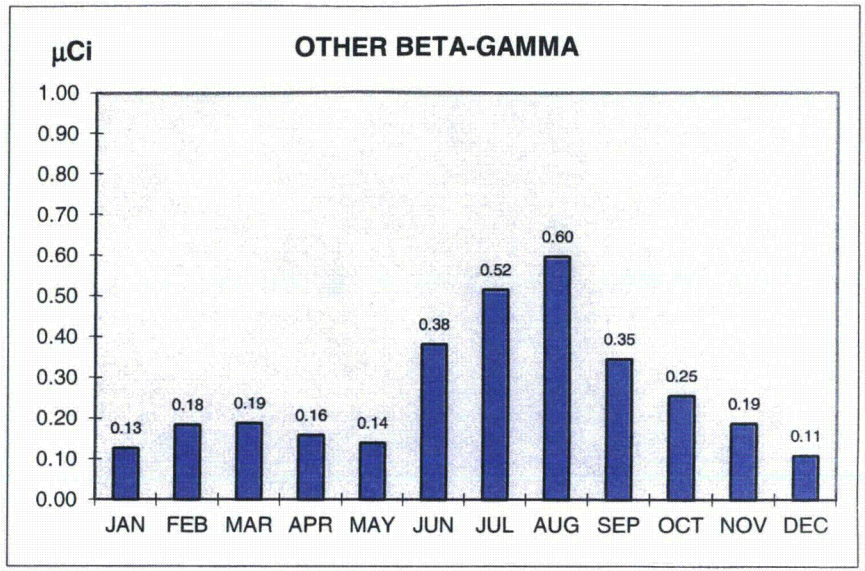
Limit = 170 mCi / Week

Limit = 18 Curies / Week

Figure 7. Analytical results, Stack Monitoring (Stack 16, NTR)



Limit = 3.6 µCi / Week

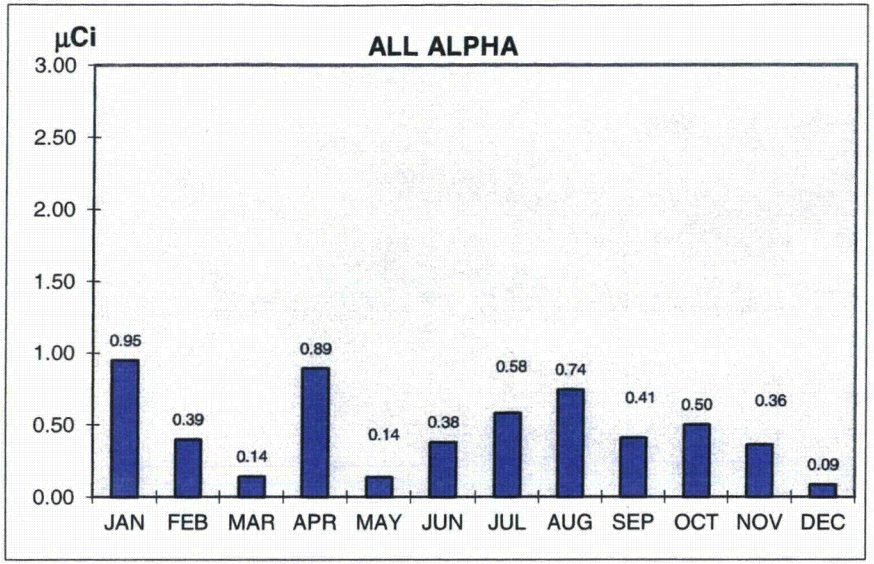


Limit = 360 µCuries / Week

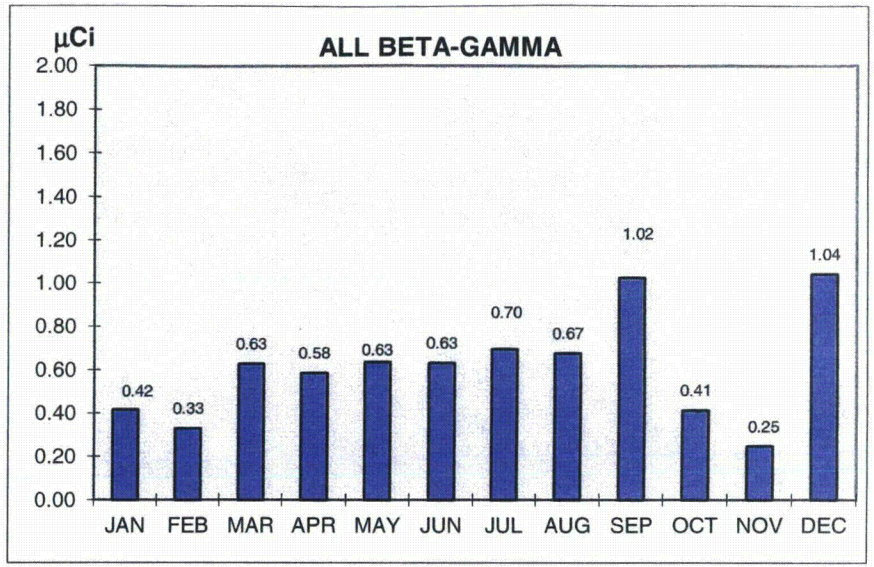
All results for I-131 are less than or equal to Minimum Detectable Concentration (MDC) approximately 5.04E-14 µCi/cc (4.76E-4 mCi/week)

Limit = 73 mCi / Week

Figure 8. Analytical Results, Stack Monitoring Composite (All except Stacks 4 and 16)



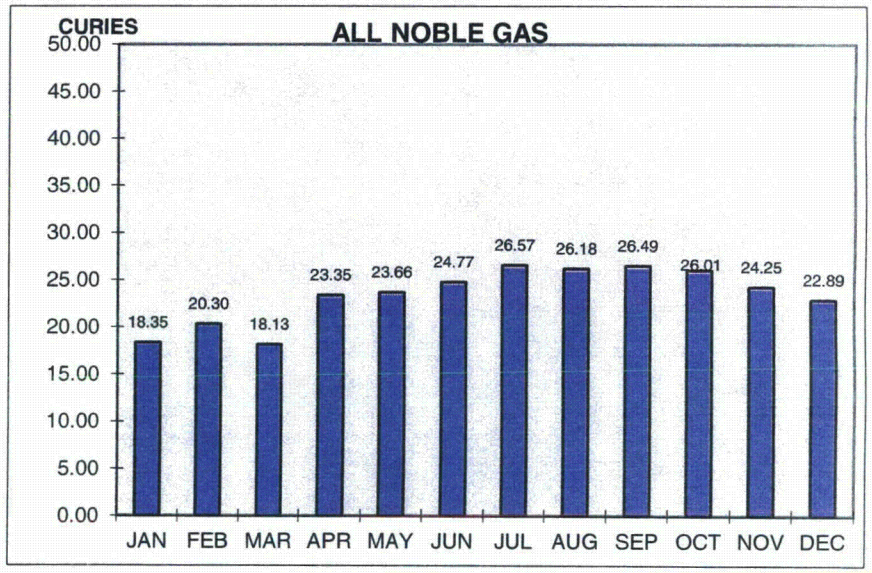
Limit = 19.4 µCi / Week



Limit = 1940 µCuries / Week

All results for I-131 are less than or equal to Minimum Detectable Concentration (MDC) approximately 5.04E-14 µCi/cc (1.05E-3 mCi/week)

Limit = 316 mCi / Week



Limit = 198 Curies / Week

Figure 9. Analytical Results, Stack Monitoring Composite (All Stacks)