

# *Additional Soil and Water Sampling*

McLaren/Hart Project No. 03.0600829.013

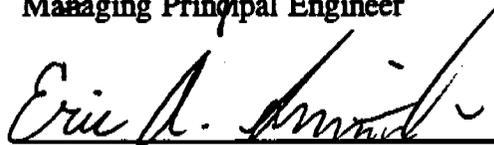
## **The Brandeis-Bardin Institute and Santa Monica Mountains Conservancy**

January 19, 1995

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BRANDEIS-BARDIN INSTITUTE AND  
SANTA MONICA MOUNTAINS CONSERVANCY**

## TABLE OF CONTENTS

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<b>Section</b>	<b>Page</b>
EXECUTIVE SUMMARY .....	ix
1.0 INTRODUCTION .....	1-1
1.1 Background .....	1-1
1.2 Scope of Work .....	1-6
2.0 SAMPLING APPROACH .....	2-1
2.1 Sampling Areas .....	2-1
2.1.1 Sampling Areas .....	2-2
2.1.2 Background Sampling Areas .....	2-3
2.2 Sampling Approach Overview .....	2-4
2.2.1 Soil .....	2-4
2.2.2 Surface Water .....	2-5
3.0 SAMPLING METHODOLOGY AND QUALITY ASSURANCE PROGRAM ..	3-1
3.1 Decontamination Procedures .....	3-1
3.1.1 Disposal .....	3-2
3.2 Sample Identification and Labeling .....	3-2
3.2.1 Sample Identification .....	3-2
3.2.2 Sample Labeling .....	3-4
3.2.3 Sample Documentation .....	3-5
3.3 Soil Sampling .....	3-6
3.3.1 Soil Sampling Strategy .....	3-6
3.3.2 Soil Sample Location Identification .....	3-8

---

TABLE OF CONTENTS (continued)

---

3.3.3	Soil Sampling Procedure . . . . .	3-11
3.3.3.1	Surface Soil Sampling Procedure . . . . .	3-11
3.3.3.2	Subsurface Soil Sampling Procedures . . . . .	3-12
3.3.4	Split Samples . . . . .	3-14
3.3.5	Soil Sampling Documentation . . . . .	3-15
3.3.6	Soil Sample Handling, Shipping, and Storage . . . . .	3-15
3.4	Surface Water Sampling . . . . .	3-16
3.4.1	Surface Water Sampling Procedure . . . . .	3-17
3.4.2	Split Samples . . . . .	3-18
3.4.3	Surface Water Sample Documentation . . . . .	3-18
3.4.4	Surface Water Sample Handling, Shipping, and Storage . . . . .	3-19
3.5	Quality Assurance/Quality Control (QA/QC) . . . . .	3-19
3.5.1	Field Documentation . . . . .	3-19
3.5.2	QA/QC Sampling . . . . .	3-20
3.5.2.1	Field Rinsate Blanks . . . . .	3-20
3.5.2.2	Blind Field Duplicate Samples . . . . .	3-21
3.5.2.3	Trip Blanks . . . . .	3-22
3.5.2.4	Field Blanks . . . . .	3-22
3.5.2.5	Pre-spiked Blind Duplicate Samples . . . . .	3-22
3.5.2.6	Matrix Spike/Matrix Spike Duplicate (MS/MSD) Samples . . . . .	3-23
3.5.2.7	Split Samples . . . . .	3-23
3.6	Laboratory Analysis . . . . .	3-24
4.0	QUALITY ASSURANCE/QUALITY CONTROL SAMPLING RESULTS . . . . .	4-1
4.1	Quality Assurance/Quality Control Results Summarized by Sample Type . . . . .	4-1
4.1.1	Trip Blanks . . . . .	4-2
4.1.2	Field Rinsate Samples . . . . .	4-2
4.1.3	Field Blanks . . . . .	4-2
4.1.4	Laboratory Control Blanks . . . . .	4-2
4.1.5	Matrix Spike/Matrix Spike Duplicate Samples . . . . .	4-2
4.1.6	Laboratory Duplicates . . . . .	4-3

TABLE OF CONTENTS (continued)

---

4.1.7	Pre-spiked Blind Duplicate Samples	4-4
4.1.8	Blind Field Duplicate and Split Samples	4-6
4.2	QA/QC Results Summarized by Analysis Type	4-8
4.2.1	Metals (Mercury)	4-8
4.2.2	Radionuclides	4-8
4.2.2.1	Strontium-90	4-9
4.2.2.2	Tritium	4-9
4.2.2.3	Gross Alpha and Gross Beta Analysis	4-9
4.2.2.4	Isotopic Plutonium	4-9
4.2.2.5	Gamma Scan	4-10
4.3	Conclusion	4-10
5.0	STATISTICAL ANALYSIS OF SAMPLE RESULTS	5-1
5.1.	Statistical Evaluation of Background Soil Samples	5-2
5.2	Statistical Evaluation of Sampling Areas	5-5
6.0	SAMPLING RESULTS FROM BACKGROUND AREAS	6-1
6.1	Background Area Descriptions	6-1
6.1.1	Rocky Peak (BG-01)	6-2
6.1.2	Santa Susana Park (BG-02)	6-2
6.1.3	Happy Camp (BG-05)	6-3
6.1.4	Wildwood Regional Park (BG-09)	6-3
6.1.5	Wildwood Regional Park Ravine (BG-10)	6-4
6.1.6	Tapia County Park (BG-11)	6-5
6.1.7	Tapia County Park Ravine (BG-12)	6-5
6.1.8	Rocky Peak Ravine (BG-14)	6-6
6.2	Background Analysis Summary	6-6
6.3	Summary of Background Results	6-7
6.3.1	Cesium-137	6-8
6.3.2	Strontium-90	6-8
6.3.3	Tritium	6-9

**TABLE OF CONTENTS (continued)**

---

7.0	SAMPLING RESULTS FROM OFF-SITE LOCATIONS	7-1
7.1	Dormitory Area (BB-02)	7-2
7.2	Campsite Area 1 (BB-03)	7-2
7.3	Campsite Area 2 (BB-04)	7-3
7.4	Picnic Area (BB-05)	7-4
7.5	House of the Book (BB-06)	7-5
7.6	Main House Orchard (BB-12)	7-5
7.7	Avocado Grove (BB-13)	7-6
7.8	Old Well Campsite (BB-14)	7-6
7.9	Former Rocketdyne Employee Shooting Range (SM-03)	7-7
7.10	RD-51 Watershed (BB-15)	7-7
7.11	Radioactive Materials Disposal Facility Watershed (BB-16)	7-8
7.12	Building 59 Watershed (BB-17)	7-10
7.13	Sodium Burn Pit Watershed (BB-18)	7-13
7.14	Sodium Reactor Experiment Watershed (BB-19)	7-14
7.15	Campsite Area 1 Drainage (BB-20)	7-15
8.0	DISCUSSION OF RESULTS	8-1
8.1	Quality Assurance/Quality Control	8-1
8.2	Results by Analysis	8-3
8.2.1	Mercury	8-3
8.2.2	Tritium	8-3
8.2.3	Strontium-90	8-4
8.2.4	Cesium-137	8-5
8.2.5	Plutonium-238	8-6
9.0	CONCLUSIONS	9-1

**TABLE OF CONTENTS (continued)**

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**TABLES**

Table 1	Summary of Soil Sampling
Table 2	Sample Container and Preservation Specifications
Table 3	Field Quality Assurance Control Sample Requirements
Table 4	QA/QC Soil Sample Locations
Table 5	Matrix Spike/Matrix Spike Duplicate Data
Table 6	Radioanalytical Results of Pre-spiked Blind Duplicate Samples
Table 7	Significant Difference Between Duplicate Soil/Sediment Samples
Table 8	Withdrawn Tritium Data Summary
Table 9	Soil Sample QA/QC Summary
Table 10	Water Sample QA/QC Summary
Table 11	Radionuclide Results for Soil Samples at Rocky Peak (BG-01)
Table 12	Radionuclide Results for Soil Samples at Santa Susana Park (BG-02)
Table 13	Radionuclide Results for Soil Samples at Happy Camp (BG-05)
Table 14	Radionuclide Results for Soil Samples at Wildwood Regional Park (BG-09)
Table 15	Radionuclide Results for Sediment Samples at Wildwood Regional Park Ravine (BG-10)
Table 16	Radionuclide Results for Soil Samples at Tapia County Park (BG-11)
Table 17	Radionuclide Results for Sediment Samples at Tapia County Park Ravine (BG-12)
Table 18	Radionuclide Results for Sediment Samples at Rocky Peak Ravine (BG-14)
Table 19	Summary of the Results of the Analysis of Variance (ANOVA) and Tukey Honest Significant Difference (HSD) Test for the Background Sample Areas
Table 20	Background Levels of Radionuclides in Soil
Table 21	Radionuclide Results for Soil Samples at the Dormitory Area (BB-02)
Table 22	Radionuclide Results for Soil Samples at Campsite Area 1 (BB-03)
Table 23	Radionuclide Results for Soil Samples at Campsite Area 2 (BB-04)
Table 24	Radionuclide Results for Surface Water Samples at Campsite Area 2 (BB-04)
Table 25	Radionuclide Results for Soil Samples at the Picnic Area (BB-05)
Table 26	Radionuclide Results for Soil Samples at the House of the Book (BB-06)
Table 27	Radionuclide Results for Soil Samples at the Main House Orchard (BB-12)

**TABLE OF CONTENTS (continued)**

---

Table 28	Avocado Grove (BB-13)
Table 29	Radionuclide Results for Soil Samples at the Old Well Campsite (BB-14)
Table 30	Radionuclide Results for Soil Samples at the Former Rocketdyne Employee Shooting Range (SM-03)
Table 31	Radionuclide Results for Sediment Samples at the RD-51 Watershed (BB-15)
Table 32	Radionuclide Results for Sediment Samples at the Radioactive Materials Disposal Facility (RMDF) Watershed (BB-16)
Table 33	Radionuclide Results for Sediment Samples at the Building 59 Watershed (BB-17)
Table 34	Mercury Results for Sediment Samples at the Sodium Burn Pit Watershed (BB-18)
Table 35	Radionuclide Results for Sediment Samples at the Sodium Reactor Experiment (SRE) Watershed (BB-19)
Table 36	Radionuclide Results for Sediment Samples at the Campsite Area 1 - Drainage (BB-20)
Table 37	Radionuclide Results for Surface Water Samples at the Campsite Area 1 - Drainage (BB-20)
Table 38	Comparison of Statistical Results for Background Sample Data

**FIGURES**

Figure 1	Summary of Previous Multi-Media Sampling
Figure 2	Additional Sample Areas: Brandeis-Bardin Institute and Santa Monica Mountains Conservancy
Figure 3	Previous and Additional Background Sample Areas
Figure 4	Register Label Example
Figure 5	QA/QC Soil/Sediment Sample Summary
Figure 6	QA/QC Water Sample Summary
Figure 7	Rocky Peak (BG-01) Sample Locations
Figure 8	Santa Susana Park (BG-02) Sample Locations
Figure 9	Happy Camp (BG-05)
Figure 10	Wildwood Regional Park (BG-09) Sample Locations

**TABLE OF CONTENTS (continued)**

---

- Figure 11 Wildwood Regional Park Ravine (BG-10) Sample Locations
- Figure 12 Tapia County Park (BG-11) Sample Locations
- Figure 13 Tapia County Park Ravine (BG-12) Sample Locations
- Figure 14 Rocky Peak Ravine (BG-14) Sample Locations
- Figure 15 Dormitory Area (BB-02) Sample Locations
- Figure 16 Campsite Area 1 (BB-03) Sample Locations
- Figure 17 Campsite Area 2 (BB-04) Sample Locations
- Figure 18 Picnic Area (BB-05) Sample Locations
- Figure 19 House of the Book (BB-06) Sample Locations
- Figure 20 Main House Orchard (BB-12) Sample Locations
- Figure 21 Avocado Grove (BB-13) Sample Locations
- Figure 22 Old Well Campsite (BB-14) Sample Locations
- Figure 23 Former Rocketdyne Employee Shooting Range (SM-03) Sample Locations
- Figure 24 RD-51 Watershed (BB-15) Sample Locations
- Figure 25 Radioactive Materials Disposal Facility (RMDF) Watershed (BB-16) Sample Locations
- Figure 26 Radioactive Materials Disposal Facility (BB-16) and Building 59 (BB-17) Watersheds Sample Locations
- Figure 27 Building 59 Watershed (BB-17) Sample Locations
- Figure 28 Sodium Burn Pit Watershed (BB-18) Sample Locations
- Figure 29 Sodium Reactor Experiment (SRE) Watershed (BB-19) Sample Locations
- Figure 30 Campsite Area 1 - Drainage (BB-20) Sample Locations
- Figure 31 Summary of Sampling

**TABLE OF CONTENTS (continued)**

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**APPENDICES**

- Appendix A USEPA Comments Letter
- Appendix B Grid Random Number Tables
- Appendix C Random Number Tables for Blind Field Duplicates
- Appendix D Summary of Analytical Results by Analysis
- Appendix E Data Comment Letters from Teledyne Isotopes Laboratory and  
Brandeis-Bardin Consultant
- Appendix F Graphical Evaluation of Results
- Appendix G Radiation Survey Results
- Appendix H Written Comments to Draft Report, November 18, 1994

## **EXECUTIVE SUMMARY**

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This document presents the results of the Additional Off-Site Soil and Water Sampling at the Brandeis-Bardin Institute and Santa Monica Mountains Conservancy. This additional sampling was conducted in 1994 as a follow-up to the multi-media sampling program conducted in 1992. This program was conducted to determine if chemicals or radionuclides had migrated or had been deposited on two properties adjacent to the north/northwest property line of Rockwell International Corporation, Rocketdyne Division's Santa Susana Field Laboratory (SSFL). The two properties (referred to as study areas) were the Brandeis-Bardin Institute and the Santa Monica Mountains Conservancy. Results from this 1992 investigation indicated that additional sampling would be required to try to address a number of issues.

The issues that were recommended to be addressed, and their action items, are the following:

- 1) Re-evaluation of tritium in areas where the original data were analyzed by the gas counting method and later withdrawn by the laboratory because the laboratory could not validate the data. Ten areas were resampled and samples were analyzed for tritium.
- 2) Confirmation of the State of California Department of Health Services laboratory reported values of  $2,470 \pm 197$  and  $392 \pm 153$  picocuries per liter (pCi/L) for tritium at Campsite Area 2. The area was resampled.
- 3) Remediation of mercury from the Sodium Burn Pit Watershed. The site containing mercury-bearing sediment, identified in 1992, was excavated and resampled after excavation to confirm the removal of sediment containing mercury.

- 4) Determination whether the plutonium-238 reported in the vicinity of the RD-51 and Building 59 Watersheds is statistically different from background. Additional samples were collected in the watersheds and results were statistically compared to background.
- 5) Determination whether the strontium-90 and cesium-137 reported in the Sodium Reactor Experiment Watershed is statistically different from background. Additional samples were collected in the watershed and results were statistically compared to background.
- 6) Determination whether the concentrations of tritium, cesium-137, and strontium-90 reported at Radioactive Materials Disposal Facility (RMDF) Watershed are greater than background. Additional samples were collected in the watershed and the results were compared to background.
- 7) Further characterization of tritium and cesium-137 at the Building 59 Watershed to determine if tritium and cesium-137 concentrations were greater than background. Additional samples were collected in the watershed and the results were compared to background.
- 8) Characterization of the distribution of tritium, strontium-90, and cesium-137 in the drainages between the RMDF/Building 59 Watersheds and Campsite Area 1. Samples were collected in the drainages and the results were evaluated.
- 9) Collection of additional background data, at the request of the Work Group, from sites away from the SSFL.

*Number and Types of Analyses.* To address these issues 40 soil/sediment samples were collected from background areas and 124 soil/sediment samples were collected from the study areas. All the background area samples were analyzed for tritium, strontium-90, isotopic plutonium, and gamma emitting radionuclides. The samples collected in the study areas were primarily analyzed for tritium with additional analyses for strontium-90, isotopic plutonium, and gamma emitting radionuclides conducted to address the issues listed above. In addition seven soil samples collected in the Sodium Burn Pit Watershed were analyzed for mercury.

Two surface water samples were collected from the Campsite Area 1 and Campsite Area 2 - Drainage. The surface water samples were analyzed for tritium and for gross alpha and gross beta radiation.

*Quality Assurance/Quality Control.* A rigorous quality assurance/quality control (QA/QC) program was implemented during the sampling to assure that the data are valid. Comparison of the QA/QC samples (blind field duplicates, pre-spiked blind duplicates, laboratory duplicates, field splits samples, rinsate samples, and matrix spike samples) to their respective scheduled sample showed an overall agreement of approximately 94 percent. This level of agreement demonstrated that the data are valid.

*Data Evaluation.* Soil radionuclide data from the study areas were evaluated statistically by comparing to background data. Surface water samples were not evaluated statistically because there were no background data points.

*Radionuclide Results and Conclusions.* The investigation was conducted during March 4 and March 15 of 1994 and revealed that with the exception the Building 59 and RMDF Watersheds, none of the other sites had radionuclides present at concentrations statistically higher than background values. Tritium was found at concentrations significantly above background values in sediment samples collected from the ravine of the Building 59 Watershed. Cesium-137 concentrations in samples collected from the Building 59 Watershed are statistically different from background levels established for this study. However the cesium-137 levels are below the literature values for background cesium (see Table 20).

Strontium-90 concentrations measured in sediment samples collected from the RMDF Watershed are statistically different from background values established for this study. However, the level of strontium-90 is below literature values for background level (see Table 20).

Plutonium-238 was not detected in any samples collected in RD-51 and Building 59 watersheds in 1994. The 1994 study results therefore do not confirm 1992 study results and plutonium-238 is therefore not a concern.

*Mercury Results and Conclusions.* Based on the sample results from the four sediment samples collected within the excavation area within the Sodium Burn Pit Watershed, mercury present in the watershed ( 0.35 mg/kg detected during the 1992 study) was removed during the excavation. Mercury was not detected (<0.1 mg/kg) in the four samples collected within the excavation area. A concentration of 0.12 mg/kg of mercury, slightly above the detection limit, was reported in one of the samples upgradient from the excavation. Analysis of a laboratory duplicate of the sample and analysis of an interlaboratory duplicate by USEPA were below the detection limit. Analysis of the interlaboratory duplicate by Brandeis-Bardin indicated a concentration of 0.14 mg/kg. Thus, the mercury (0.35 mg/kg) detected in the Sodium Burn Pit Watershed in 1992 was removed by excavation. Mercury at near detection level may be present upgradient from the excavation.

The Study Participants would like to acknowledge the accomplishments of Dennis Dineen, draft author of this report. Dennis put a great deal of effort into this project by contributing his expertise, organizational, logistical, and report preparational skills. The spirit of cooperation he showed during the preparation of the first report and this report coordinating the many comments and changes suggested by study participants and the SSFL Work Group kept this study together.



## **1.0 INTRODUCTION**

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On March 10, 1993, the results of the investigation at the Brandeis-Bardin Institute (Brandeis-Bardin) and the Santa Monica Mountains Conservancy (Conservancy) were presented to the Santa Susana Field Laboratory (SSFL) Work Group public meeting at the Simi Valley Public Library. The results of the multi-media sampling were described in a report entitled "Multi-Media Sampling Report for the Brandeis-Bardin Institute and the Santa Monica Mountains Conservancy", March 10, 1993. Section 1.1 summarizes the results of the March 10, 1993 report.

Upon the review of the results reported, further work was determined to be justified by Rockwell International Corporation, Rocketdyne Division and the SSFL Work Group and McLaren/Hart was instructed to carry out the recommendations. Section 1.2 and the rest of this document describes the additional sampling performed at Brandeis-Bardin, the Conservancy, and three background locations as a follow-up to this earlier work.

### **1.1 BACKGROUND**

A multi-media sampling program was conducted in 1992 to determine if chemicals or radionuclides had migrated or had been deposited on two properties adjacent to the north/northwest property line of Rockwell International Corporation, Rocketdyne Division's Santa Susana Field Laboratory (SSFL). The two properties (referred to as study areas) were the Brandeis-Bardin Institute and the Santa Monica Mountains Conservancy (hereafter, Brandeis-Bardin and the Conservancy, respectively). In addition to the study areas, six background locations between 1.5 to 12.5 miles from the SSFL were sampled to provide data on background concentrations of chemicals and radionuclides.

*Number and Types of Analyses.* Eighteen soil samples were collected from background areas and 118 soil/sediment samples were collected from the study areas in 1992. All soil/sediment

samples were analyzed for: 37 volatile organic compounds (VOCs), 67 semi-volatile organic compounds (SVOCs), 13 priority pollutant metals, 75 naturally occurring and man made radionuclides as a gamma scan<sup>1</sup> as well as, tritium, isotopic plutonium (*i.e.*, plutonium-238 and plutonium-239), iodine-129, and strontium-90. One surface water sample was collected from a background area and seven surface water samples were collected from the study areas. All surface water samples were analyzed for the same chemicals and radionuclides cited for soils/sediments as well as for gross alpha and gross beta radioactivity. Groundwater was sampled from two private wells, owned and operated by the Conservancy, (a minimum of two times each) and analyzed for the same analytes as surface water except for metals. Fifteen fruit samples were collected from background areas. Nine fruit samples were collected from the study areas. All fruit samples were analyzed for the full suite of radionuclides listed above.

*Quality Assurance/Quality Control.* A rigorous quality assurance/quality control (QA/QC) program was implemented during sampling to produce valid data or to allow the identification of suspect data. Comparison of the QA/QC samples (blind field duplicates, field split samples, and interlaboratory split samples) to their respective scheduled sample showed an overall agreement of approximately 97 percent. This level of agreement demonstrated that the data were valid and acceptable for use in this analysis.

*Data Evaluation.* Radionuclide and heavy metal data from soil samples in the human use areas were evaluated statistically by comparison to background data. Sediment data from the Watersheds were not evaluated statistically because they were not randomly selected. All chemical and radionuclides measured above background concentrations are shown in Figure 1. Organic chemical data were not compared to background because organic chemicals are generally not naturally occurring. Fruit and water samples were not evaluated statistically because there were not enough background data points.

*Results of Chemical Analyses.* No VOCs or SVOCs associated with activities at the SSFL were detected in any of the 118 soil/sediment samples collected in the study areas.

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<sup>1</sup> Cesium-137 was the only man-made gamma-emitting radionuclide detected in the samples; thus, only Cesium-137 was reported in tabular form in the report.

Groundwater at an irrigation well (the Well by the Gate at the Conservancy, located approximately 800 feet north of the SSFL property line) had trichloroethene (TCE) in both samples at 10 micrograms per liter of water ( $\mu\text{g/L}$ ) and  $9 \mu\text{g/L}$ . It appears that the source of the TCE is located at SSFL because elevated levels have also been detected beneath the SSFL and no other likely sources are currently known to exist between SSFL and the irrigation well in question. The Well by the Gate has been added to Rocketdyne's on-going groundwater monitoring program. No other chemicals which are known to be associated with Rocketdyne's activities were detected in the surface water or groundwater samples collected.

Some organic chemicals that were not associated with Rocketdyne activities were reported in this study. Toluene was detected in two soil samples at the Visitor Center Parking Lot at the Conservancy at 7 and 9 micrograms per kilogram of soil ( $\mu\text{g/kg}$ ). Toluene is a component of gasoline and is found in partially combusted gasoline such as car exhaust.

At Brandeis-Bardin, 4-methylphenol, a chemical found in disinfectants and pesticides, was detected in one soil sample at the Dormitory Area at  $670 \mu\text{g/kg}$ ; bis(2-ethylhexyl)phthalate, one of the most abundantly produced plasticizers, was found in five soil samples at the Counselor-in-Training Area ranging from 370 to  $8,500 \mu\text{g/kg}$ ; and 4,4'-dichlorodiphenyl-dichloroethene (4,4'-DDE), a breakdown product of the pesticide 4,4'-dichlorodiphenyl-dichloroethane (4,4'-DDT), was detected in one soil sample at the Vegetable Garden at  $340 \mu\text{g/kg}$ .

Heavy metals above background and associated with Rocketdyne's activities were reported at two locations: lead in all five soil samples taken from the Former Rocketdyne Employee Shooting Range at the Conservancy ranging from 59 to 280 milligrams per kilogram of soil ( $\text{mg/kg}$ ) and mercury in one of nine sediment samples at the Sodium Burn Pit Watershed at Brandeis-Bardin (located approximately 230 feet from the SSFL property line) at  $0.35 \text{ mg/kg}$ . The Former Rocketdyne Employee Shooting Range was previously used for skeet and trap shooting practice and lead shot was visible on the ground throughout the area. Rocketdyne began cleanup of the lead shot on October 19, 1992. Mercury was known to be contained in the former Sodium Burn Pit, which is currently undergoing excavation, cleanup and closure.

Zinc was detected in one of six sediment samples taken at the Radioactive Materials Disposal Facility (RMDF) Watershed at a concentration of 120 mg/kg, which was greater than the ninety-fifth percentile<sup>2</sup> of the measured background concentration for zinc of 112 mg/kg. Although this value was outside of the criteria established in the report, the concentration was the same as two soil samples collected at one of the background areas.

*Radionuclide Results.* Four radionuclides were detected in sediment samples in the watersheds at Brandeis-Bardin which exceeded the ninety-fifth percentile of the measured background concentrations (*i.e.*, above measured background) in soil: tritium, strontium-90, cesium-137, and plutonium-238. Two radionuclides were detected above measured background in two surface water samples from the RMDF Watershed: tritium and strontium-90. Radionuclide data from the fruit from the study areas were not above background. No radionuclides were detected above measured background in any of the human activity areas at either the Conservancy or Brandeis-Bardin. Radionuclides were not detected in groundwater in the two private wells that were sampled.

Tritium exceeded the ninety-fifth percentile of the measured background [552 picocuries per liter of water (pCi/L)] in seven of the 118 soil/sediment samples. Tritium concentrations in these sediment samples were: 1,100  $\pm$  100 pCi/L, 990  $\pm$  150 pCi/L, 1,300  $\pm$  300 pCi/L, 1,300  $\pm$  200 pCi/L, and 1,500  $\pm$  200 pCi/L in the RMDF Watershed and 10,800  $\pm$  300 pCi/L and 9,810  $\pm$  330 pCi/L in the Building 59 Watershed. Of the seven surface water samples, tritium was detected in one sample from the RMDF Watershed at a concentration of 1,500  $\pm$  100 pCi/L. [The maximum contaminant limit (MCL) for tritium in drinking water is 20,000 pCi/L.] It was concluded that the tritium was from off-site migration from the SSFL.

Of the 118 soil/sediment samples collected, strontium-90 was detected above the ninety-fifth percentile of the measured background [0.07 pCi/g(dry)] in three sediment samples at the RMDF Watershed [0.08  $\pm$  0.01 pCi/g(dry), 0.09  $\pm$  0.01 pCi/g(dry), and 0.15  $\pm$  0.02 pCi/g(dry)] and two sediment samples at the Sodium Reactor Experiment Watershed [0.08  $\pm$  0.002 pCi/g(dry) and 0.09  $\pm$  0.02 pCi/g(dry)]. Strontium-90 was also detected in two

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<sup>2</sup> The ninety-fifth percentile is equal to the mean of all background area samples plus two times the standard deviation.

associated surface water samples at the RMDF Watershed at  $1.1 \pm 0.03$  pCi/L and  $1.8 \pm 0.05$  pCi/L. (The MCL for strontium-90 in drinking water is 8.0 pCi/L).

Cesium-137 and plutonium-238 were also detected in the Brandeis-Bardin Watersheds along the SSFL property line at concentrations above the ninety-fifth percentile of the measured background [0.21 pCi/g(dry) for cesium-137 and 0.10 pCi/g(dry) for plutonium-238]. Cesium-137 was detected in four of the 118 soil/sediment samples collected in this study at a concentration of  $0.34 \pm 0.04$  pCi/g(dry) in the RMDF Watershed,  $0.24 \pm 0.06$  pCi/g(dry) and  $0.30 \pm 0.05$  pCi/g(dry) in the Sodium Reactor Experiment Watershed, and  $0.23 \pm 0.03$  pCi/g(dry) in the Building 59 Watershed. Plutonium-238 was detected in two of the 118 soil/sediment samples at  $0.19 \pm 0.06$  pCi/g(dry) and  $0.22 \pm 0.07$  pCi/g(dry) in the Building 59 and RD-51 Watersheds, respectively. Because the data from the ravines<sup>3</sup> were not statistically evaluated, it could not be determined if the presence of strontium-90, cesium-137 and plutonium-238 in the sediment at concentrations above the ninety-fifth percentile of the measured background were due to off-site migration or can be attributed to background. When the t-tests were run (statistical comparisons of the area samples to background), the concentrations of these radionuclides in the ravines appear similar to background levels and therefore may be present at naturally occurring levels.

*Conclusions.* The purpose of the 1992-93 study was to assess whether chemicals and/or radionuclides were present on Brandeis-Bardin or the Conservancy as a result of activities at the SSFL. The study identified the following chemicals and radionuclides at the study site which may be attributed to past SSFL activities:

- ▶ Trichloroethene (TCE) in the groundwater at the Well by the Gate at the Conservancy;
- ▶ Lead in the Former Rocketdyne Employee Shooting Range at the Conservancy;
- ▶ Mercury in one sediment sample at the Sodium Burn Pit Watershed at Brandeis-Bardin; and
- ▶ Tritium in the Radioactive Materials Disposal Facility Watershed and in the Building 59 Watershed at Brandeis-Bardin.

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<sup>3</sup> Ravines, watersheds, and drainage ways are used synonymously throughout this workplan.

*Recommendations.* It was recommended that the sediment deposit containing the mercury be removed by Rocketdyne and properly disposed. Additional sampling was recommended to monitor the RMDF and Building 59 Watersheds. Recommendations were obtained from the regulatory agencies, the SSFL Work Group, and the public after the release of the March 10 report. The following section describes the follow-up activities formulated with the input from these groups.

## 1.2 SCOPE OF WORK

This section describes the additional sampling that was proposed to follow up on the March 10, 1993 results. Recommendations were received from the USEPA, the consultant for the Brandeis-Bardin Institute and other(s) in their report and in a letter dated March 26, 1993 (Appendix A). Based on the March 10 report and input from the participating groups, the following issues or questions were identified to be addressed by follow-up activities.

- 1) Re-evaluation of tritium in areas where the original data were analyzed by the gas counting method and later withdrawn by the laboratory because the laboratory could not validate the data. Ten areas were resampled and samples were analyzed for tritium.
- 2) Confirmation of the State of California Department of Health Services laboratory reported values of  $2,470 \pm 197$  and  $392 \pm 153$  picocuries per liter (pCi/L) for tritium at Campsite Area 2. The area was resampled.
- 3) Remediation of mercury from the Sodium Burn Pit Watershed. The site identified in 1992 to be with mercury-bearing sediment was excavated and resampled after excavation to confirm the removal of sediment containing mercury.
- 4) Determination whether the plutonium-238 reported in the vicinity of the RD-51 and Building 59 Watersheds is statistically different from background. Additional samples were collected in the watersheds and results were statistically compared to background.

- 5) Determination whether the strontium-90 and cesium-137 reported in the Sodium Reactor Experiment Watershed is statistically different from background. Additional samples were collected in the watershed and results were statistically compared to background.
- 6) Determination whether the concentrations of tritium, cesium-137, and strontium-90 reported at Radioactive Materials Disposal Facility (RMDF) Watershed were greater than background. Additional samples were collected in the watershed and the results were compared to the background.
- 7) Further characterization of tritium and cesium-137 at the Building 59 Watershed to determine if tritium and cesium-137 concentrations were greater than background. Additional samples were collected in the watershed and the results were compared to background.
- 8) Characterization of the distribution of tritium, strontium-90, and cesium-137 in the drainages between the RMDF/Building 59 Watersheds and Campsite Area 1. Samples were collected in the drainages and the results were evaluated.
- 9) Collection of additional background data, at the request of the Work Group, from sites away from the SSFL.

A description of the procedures used to conduct the additional work required to address the issues listed above are in the Work Group approved workplan, dated October, 1993. This report describes how these recommendations were carried out. Figure 2 shows the current sample locations in the study areas. Figure 3 shows the original and the current sample locations for the background areas.

The additional sampling work is summarized below:

- 1) Additional tritium samples - A total of 50 soil samples were collected from the areas where the original tritium results that were analyzed by the gas counting method (Section 2.0, Table 1) and later withdrawn by the laboratory.

- 2) Campsite Area 1 and 2 - Seven new samples were randomly taken from Campsite Area 2 and analyzed for tritium.
- 3) Sodium Burn Pit Watershed - Four samples were taken from the Sodium Burn Pit Watershed for mercury analysis. These samples were collected after the sediments containing mercury were removed.
- 4) Plutonium-238 reported in the RD-51 and Building 59 Watersheds - Twenty-seven additional soil samples were taken from the runoff channels and the results were statistically analyzed to evaluate whether the findings exceeded background levels.
- 5) Strontium-90 and cesium-137 reported in the Sodium Reactor Experiment Watershed - Five additional soil samples were taken from the runoff channel in the watershed and the significance of the results compared against background levels was determined.
- 6) Tritium, strontium-90, and cesium-137 in the RMDF Watershed - Five additional soil sample locations were selected for sampling in the runoff channels. Subsurface samples were collected from five locations along the property boundary. A statistical analysis was performed to evaluate whether the reported concentrations were significantly above background levels.
- 7) Tritium and cesium-137 in the Building 59 Watershed - As a follow-up to the finding of tritium in the Building 59 Watershed, additional characterization of tritium in the watershed was accomplished by collecting 22 additional soil samples within the watershed. The samples were also analyzed for cesium-137 to evaluate whether the cesium-137 detected in 1992 was statistically significant above background concentrations.
- 8) Campsite Area 1 Drainage way - Ten new samples were taken from the drainage way between Campsite Area 1 and the RMDF/Building 59 Watersheds and analyzed for tritium, strontium-90, and cesium-137.

- 9) Additional background data - Ten additional samples were taken from each of two new background sites (Wildwood Regional Park and Tapia County Park) and seven samples from Happy Camp. The background samples were collected both from areas with a relatively flat slope, similar to the original study area and from ravines similar to those found on Brandeis-Bardin near the SSFL. Samples from these areas were analyzed for radionuclides.

In addition, up to five additional samples were collected from each of the ravines if the study participants encountered obvious sediment deposits that might suggest that radionuclides could have been deposited in that location. The procedure for identifying additional sample locations in the field was based on a consensus of the work group participants. This was the same procedure used in the initial sampling.

Soil samples were analyzed only for those radionuclides specified. Surface water samples were analyzed for gross alpha and beta emitting radionuclides, strontium-90, tritium, and gamma emitting radionuclides. Strontium-90, tritium, and cesium-137 (a gamma emitter) isotopes are generally from man-made sources (*e.g.*, nuclear fission, neutron activation, and weapons test fallout), but all had a history of usage/production at the Rocketdyne-Santa Susana Field Laboratory facility.



## 2.0 SAMPLING APPROACH

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This section presents the sample locations, sample analyses, and the sampling protocols for soil/sediment (hereafter referred to as soil) and surface water.

### 2.1 SAMPLING AREAS

This section describes the areas sampled within Brandeis-Bardin and the Conservancy and the background sampling areas.

For the purposes of clarity in this discussion, the following terms are used:

Study Participants: This term is used to refer to those parties which were actively involved in the field activities and sample analysis, which include Rocketdyne, USEPA, California Department of Health Services, and the consultant for the Brandeis-Bardin Institute.

Study Areas: This term is used to refer to Brandeis-Bardin and the Conservancy.

Background Areas: This term is used to refer to the locations which were sampled to establish background levels of the radionuclides (*i.e.*, Wildwood Regional Park, Tapia County Park, Happy Camp, and Santa Susana Park).

Sampling Area: This term refers to an area within one of the study areas or background areas from which samples were collected (*e.g.*, the Building 59 Watershed at Brandeis-Bardin).

Sampling Block: This term refers to the randomly selected blocks within a sampling area grid (refer to Section 3.3.1 for a complete description) from which discrete soil samples were collected.

**Sampling Location:** This term refers to a specific point within a sampling block or at a designated location in a drainage sampling area where a soil or surface water sample was collected.

**Scheduled Sample:** This term refers to the primary sample collected, analyzed and reported. All other sample descriptions refer to QA/QC samples further described in Section 3.6.2.

### 2.1.1 Sampling Areas

Sampling areas described in Section 1.0 were selected based on the results of the March 10 report and subsequent input from the USEPA and discussion at the March 10, 1993 SSFL Work Group public meeting. The sampling areas in this study used the same designations as the original study. (The italicized sample areas were resampled for tritium only):

#### Background (BG):

- ▶ Santa Susana Park (BG-02)
- ▶ Happy Camp (BG-05)

#### Brandeis-Bardin Institute (BB):

- ▶ *Dormitory Area (BB-02)*
- ▶ *Campsite Area 1 (BB-03)*
- ▶ *Campsite Area 2 (BB-04)*
- ▶ *Picnic Area (BB-05)*
- ▶ *House of the Book (BB-06)*
- ▶ *Main House Orchard (BB-12)*
- ▶ *Avocado Grove (BB-13)*
- ▶ *Old Well Campsite (BB-14)*
- ▶ RD-51 Watershed (BB-15)
- ▶ Radioactive Materials Disposal Facility Watershed (BB-16)
- ▶ Building 59 Watershed (BB-17)
- ▶ Sodium Burn Pit Watershed (BB-18)
- ▶ Sodium Reactor Experiment Watershed (BB-19)
- ▶ Campsite Area 1 Drainage Way (BB-20)

**Santa Monica Mountains Conservancy (SM):**

- ▶ *Former Rocketdyne Employee Shooting Range (SM-03)*

Five additional sample areas were also sampled during this study and have the following designations:

**Background (BG):**

- ▶ Wildwood Regional Park (BG-09)
- ▶ Wildwood Regional Park - Ravine (BG-10)
- ▶ Tapia County Park (BG-11)
- ▶ Tapia County Park - Ravine (BG-12)
- ▶ Rocky Peak - Ravine (BG-14)

The sample locations and the analyses performed at each location are discussed in Section 2.2.

**2.1.2 Background Sampling Areas**

The statistical analysis of the original background data showed the original background locations were not statistically different from each other. At the request of the SSFL Work Group, two additional background areas at least 10 miles from the SSFL were also sampled to provide additional documentation of background radionuclide concentrations. The new locations include ravine areas as well as level areas similar to the original background sampling areas. The new background areas are:

- 1) Wildwood Regional Park (located 13 miles west of the SSFL)
- 2) Tapia County Park (located 10 miles south of the SSFL)

These additional background areas were selected for their distance from the SSFL (at least 10 miles from the SSFL were specified by the SSFL Public Work Group) and because these areas exhibit topographic characteristics similar to the topography of the SSFL/Brandeis-Bardin

ravine areas (Figure 3). Additionally, soil samples were collected from the ravine at Rocky Peak, (from which surface water samples were collected in the previous study).

To reduce confounding factors, reasonable judgement was used to collect samples from areas that did not appear disturbed by human activities. Only soil samples were collected from the background areas. Surface water was not observed at Wildwood Regional Park, Tapia County Park, or Rocky Peak during sampling in 1994.

## 2.2 SAMPLING APPROACH OVERVIEW

The additional off-site sampling was limited to those areas where chemicals or radionuclides were documented (*e.g.*, tritium in the Building 59 Watershed and mercury in the Sodium Burn Pit Watershed), where individual radionuclide samples were higher than the ninety-fifth percentile of the measured background (*e.g.*, Sr-90 and Cs-137 in the RMDF Watershed), where tritium samples were withdrawn by the laboratory (*e.g.*, House of the Book) or where the duplicate tritium analysis was significantly higher than the original sample result (Campsite Area 2).

This section provides a brief overview of the sampling approach used to collect the soil and surface water samples. The sample locations, analyses conducted for each sample, and the rationale for the selections of the sample locations are summarized in Table 1. A technical description of the sampling methods is provided in Section 3.0 (Sampling Methodology and Quality Assurance Program). The USEPA, the California Environmental Protection Agency (Cal-EPA), the California Department of Health Services (DHS), the Conservancy, and Brandeis-Bardin participated in this joint sampling effort to collect split samples.

### 2.2.1 Soil

Soil samples for the reanalysis of tritium were collected from areas where previous samples could not be validated by the laboratory and which were subsequently withdrawn due to the use of the gas counting method. The original randomly selected grid blocks were resampled one foot towards the SSFL from the original sampling locations (the XY coordinates). These tritium sample locations are located in grid areas consisting of numerous sample blocks of

equal size. In most cases, some of the stakes denoting the sampling grid or location were still in place and were successfully used to closely relocate the original sample locations. Discrete, undisturbed soil samples were collected from the designated sample locations. The new sample locations are considered closely representative of the original sampling locations.

Soil samples were purposefully collected in ravine areas and drainage ways. Each ravine and drainage way area was sampled at a minimum of five locations. Samples were taken from the soil surface to a depth of approximately 6 inches and analyzed as shown on Table 1.

The new background sampling locations were collected from ravines as well as from a relatively undisturbed flat area similar in topography to the locations from which the original background samples were collected. Wildwood Regional Park and Tapia County Park were sampled at five locations in the ravines and in five undisturbed flat areas using a grid system. Five soil samples, from two additional and three at previous sample locations, were collected from the original sampling area at Happy Camp and Santa Susana Park using the random number table generated during the original sampling. Five soil samples, from five additional sample locations, were also collected at Rocky Peak using the next five random blocks on the random number table generated during the original sampling (Appendix B). In addition, five locations were sampled in the ravine at Rocky Peak, where a surface water sample had previously been collected. Soil samples were collected from each location as described in Section 3.3.2.

### **2.2.2 Surface Water**

Surface water was sampled only at Campsite 1 and Campsite 2 where a sufficient flow of surface water was present. All other sites were either dry or did not contain enough running water to collect a representative sample from the location.

3.0  
SAMPLING METHODOLOGY  
& QUALITY ASSURANCE  
PROGRAM

### **3.0 SAMPLING METHODOLOGY AND QUALITY ASSURANCE PROGRAM**

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This section provides an outline of each of each sampling protocol and the associated quality assurance procedures.

#### **3.1 DECONTAMINATION PROCEDURES**

All sampling equipment in direct contact with soil or surface water was decontaminated prior to use in the field to prevent or minimize cross-contamination between field samples and external sources, in accordance with the following procedure:

- 1) Scrub equipment in non-phosphate detergent
- 2) Rinse or soak in 10% nitric acid (trace metal or higher grade nitric acid diluted with distilled/deionized water)
- 3) Rinse in distilled/deionized water
- 4) Air dry

In the areas where subsurface samples were collected using a drill rig, the hollow-stem drilling augers were steam cleaned between each boring or sampling location.

Sampling equipment was generally used immediately after decontamination to avoid cross-contamination during storage. If decontaminated sampling equipment was transported between locations, the equipment was wrapped in aluminum foil so no portion was exposed.

Disposable gloves were worn when handling cleaned sampling equipment. Soil sampling equipment was not decontaminated between soil sample collections at the same depth at a

single sample location, because these samples are taken adjacent to each other and represent a single sample.

Decontamination waste water was placed in 5-gallon buckets and transported to the SSFL where the water was transferred to 55-gallon Department of Transportation approved drums. A drum inventory was maintained containing information on drum contents and date. Drum inventory information was written on the drum labels with indelible ink. All drums were sampled and held at the SSFL until analytical results were available.

### 3.1.1 Disposal

Since other chemicals were not detected above background concentrations during the Brandeis-Bardin and Santa Monica Mountains Conservancy multi-media sampling investigation, March-April in 1992, the decontamination waste water contained in the two 55-gallon drums generated during the 1994 sampling event, were only analyzed for radionuclides to determine appropriate methods of disposal. Results of the analyses indicated that tritium, gross alpha radiation, Strontium-90, isotopic plutonium, and cesium-137 were not detected in the samples collected from each drum. Gross beta radioactivity was detected at a level of  $40 \pm 9$  pCi/L and  $13 \pm 7$  pCi/L from Drums 1 and 2, respectively. These levels are below the MCL for Gross Beta radioactivity (50 pCi/L). Rocketdyne subsequently disposed of the drums in an appropriate manner.

## 3.2 SAMPLE IDENTIFICATION AND LABELING

### 3.2.1 Sample Identification

Soil and surface water samples were identified using an appropriate site-specific sample identification code as described below.

The site-specific sample identification code is a 9-digit code designed to provide a clear indication of the location from which the sample was collected and the intended analysis. An identical, preprinted label and a photocopy of the label were generated to identify each specific site and maintained in a sample label binder (Figure 4). The label was affixed to the sample

container and covered with clear plastic tape. The photocopy served as a record to identify the sample location and description. The site-specific sample identification codes consists of the following components:

Digit 1 and 2: A two-letter code describes the facility of the samples' origin:

BG: Background Sampling Area

BB: Brandeis-Bardin Institute

SM: Santa Monica Mountains Conservancy

Digit 3 and 4: A two-digit number describes the sampling area of its origin (Table 1).

Digit 5, 6, and 7: A three digit code, further describing sample location which vary depending on the matrix being sampled:

Soil - code indicates the sampling block number.

Surface water - code indicates the number of the sample in the order of collection (i.e., 001, 002, 003, etc.)

Blind Field Duplicates - blind field duplicates were designated by successive numbers reflecting the order in which they were collected. The relationship to the original sample was documented in the field label book. The purpose of blind field duplicate samples is discussed in Section 3.5 (Quality Assurance/Quality Control).

Digits 8 and 9: This two letter code indicates the medium sampled and the analysis conducted.

Soil - SS = strontium-90  
SP = isotopic plutonium  
SG = gamma scan  
ST = tritium  
SM = mercury

Surface water - WS = strontium-90  
WG = gamma scan  
WA = gross alpha and beta scans  
WT = tritium

Pre-Spiked Samples - PS = strontium-90  
PP = isotopic plutonium  
PG = gamma scan  
PT = tritium

Subsurface samples have two additional numbers at the end of the sample code to distinguish the depth from which the sample was collected:

Digits 10 and 11: This two letter code indicates the depth in feet at which the soil sample was collected from subsurface sample locations. All surface samples that are collected at these locations have a two digit number code of "00".

### 3.2.2 Sample Labeling

All samples received a descriptive site-specific sample label which along with identifying the sample location and intended analysis also included the following information:

- ▶ Project name,
- ▶ Date and time of collection,
- ▶ Requested analytical method, and
- ▶ Sampler's initials.

This same information was recorded in the field label book for all samples.

### **3.2.3 Sample Documentation**

A bound field log book was maintained by the sampling team leader. Daily entries were made in ink to document the following:

- ▶ the date,
- ▶ the names of the field teams,
- ▶ weather conditions,
- ▶ location-specific entries for grid setup and sample locations, and
- ▶ sample area-specific entries for sample collection activities.

The field log book remained in the possession of the sampling team leader at all times. At the end of each day's activities, the sampling team leader reviewed all of the day's entries for accuracy and completeness. Each day's entries were photocopied and retained in a file at the McLaren/Hart office. This precaution was taken to provide backup should the field log book be lost or destroyed.

All corrections in the field log book observed the followed guidelines:

- ▶ Under no circumstances was "white out" or other correction materials used.
- ▶ A single line was drawn through the incorrect information and the corrected statement or information was written in the next available space. Both were initialed and dated by the person making the entry. Notations running along the margins were not acceptable.
- ▶ If there was insufficient space to place the correction at the point of the deletion, then a reference was provided to the location where the corrected information was presented.
- ▶ If a correction was made after the file photocopies had been made, copies of the corrected pages were appended to the original file copy.

### 3.3 SOIL SAMPLING

Soil samples were collected from 14 areas at Brandeis-Bardin, from one area at the Conservancy, and from eight background areas (Table 1). This section presents the protocols for the grid and random sampling, as well as the protocol for the collection, handling, and documentation of soil samples. Soil sample containers, container size, sample handling procedures, appropriate preservatives, and holding times are presented in Table 2.

#### 3.3.1 Soil Sampling Strategy

This section presents the methods used for identifying the soil sampling locations at all sampling areas. Samples collected from the human activity areas in 1994 utilized the same grids designated in the March 10, 1993 report.

The random grid sampling protocol used a measure of the mean radioactivity level in an area and is appropriate for the purposes of comparing these levels to background levels.

Predetermined sampling grids were originally described in the March 1993 report contained randomly selected sampling blocks and locations (X- and Y-coordinates). The random number tables from the March 1993 report were reused as necessary in this study and are included in Appendix B.

The generic sampling grids are 10,000 square feet in area and divided into 100 sampling blocks, each 100 square feet in area (10 feet by 10 feet), wherever possible. Site specific sampling grids may be smaller in size if the sample area could not accommodate a 100 foot by 100 foot grid. In general, the grid sampling blocks had assigned numbers starting with the number "001" in the southwest corner and numbered sequentially to the east, then north in rows so that the lowest number in any given row is always in the western end of the row. The only exception is the grid sampling block for the Dormitory Area (Figure 15) where the "001" corner originates in the southeast corner. Random numbers for each grid sampling area were used to identify the blocks to be sampled. Tables containing the randomly generated sample block numbers and X and Y coordinates for the specific sample locations, for the areas sampled during this investigation are presented in Appendix B.

Figures showing sampling areas are presented in the Figures Section for the background areas and study areas. Selected sample locations within the grid areas were resampled. At Campsite Areas 1 and 2 (BB-03 and BB-04), samples were collected from original locations and from five additional locations. At Rocky Peak (BG-01), five additional samples were collected within the original sampling grid area and combined with the original data. At Happy Camp (BG-05) and Santa Susana Park (BG-02), two additional samples were collected and the original sample locations were resampled. These additional randomly generated sampling locations in each grid were selected from the random number tables in Appendix B. The sample locations were determined from the next random block numbers and X-Y coordinates that followed the random block numbers that were selected for the original investigation.

Ravines were sampled using a non-randomized sampling approach. The ravines at RD-51 (BB-15) and the RMDF (BB-16) were sampled at intervals of approximately 50 feet beginning at the last location sampled in the original sampling (*i.e.*, at the location furthest downstream from the Rocketdyne property line) and continuing down the ravine. Additional samples were taken from locations closer to the Rocketdyne property line (*i.e.*, within the area previously sampled) in the Building 59 Watershed (BB-17), the Sodium Burn Pit Watershed (BB-18), and in the Sodium Reactor Experiment (SRE) Watershed (BB-19). Ten samples in the Campsite Area 1 Drainage Way (BB-20) were collected at approximately 250-foot intervals between Campsite Area 1 and the previously sampled ravine areas.

Sampling points for all ravine samples met the following criteria:

- ▶ The sampling point was a point of potential soil deposition,
- ▶ The sampling point contained enough soil to supply all of the soil necessary for the analytical requirements without compromising the sampling method,
- ▶ The sampling point was accessible with the required sampling equipment and without exceptional risk to the sampling crew.

In sample areas where these criteria could not be met, alternate locations, which met the above mentioned criteria, were sampled. At the Building 59 Watershed (BB-17) additional soil samples were also collected on both sides of the drainage way to further characterize tritium, cesium-137, and plutonium-238.

The sampling crew collected soil samples from the designated locations within each of the designated blocks or at locations within the ravines agreed upon by the study participants as described in Section 3.3.3. Prior to beginning each day's field operations, the sampling team leader was responsible for having all of the necessary equipment available and functioning properly.

### 3.3.2 Soil Sample Location Identification

The following procedure were followed to reestablish the previous grid locations. The sampling team upon arriving at a sampling area examined the sample area and determined if the marked sample stakes placed during the original investigation were still present. At most areas, one or more stakes were present facilitating the reidentification of all previous sampling locations.

In areas where the grid sample stakes were absent from locations at which resampling was required, the sampling crew conducted the following procedures to establish the sampling grid and mark the appropriate sampling locations.

- 1) Using the existing sample grid diagrams (generated during the original investigation), the southwest corner of the sampling area was remarked. The southwest corner was generally the starting point for sampling grids and the origin of the X and Y axes for locating the sample locations within the sample blocks.
- 2) The four corners of the predetermined sampling grid were measured and marked with stakes tied with colored tape. The stakes were marked with their orientation to the origin (*e.g.*, northeast, northwest, southeast, or southwest). A compass was used to ensure the grid was square. The sample team leader noted any changes to the sampling grid map and attached a copy to the field map book.

- 3) Each of the predetermined (randomly identified) sampling blocks that were sampled during this investigation, were located on the ground by measuring the appropriate footage along the X and Y axes starting at the grid origin. A compass was used to ensure the blocks were located in the appropriate orientation to the grid. The southwest corner of each block was marked with a stake labeled with the appropriate block number and tied with colored tape.
- 4) Each predetermined (randomly identified) sampling location within a sampling block was located using the values for the X and Y coordinates (increments of 1 foot). The sample location were measured and marked with a stake, labeled with the block number and the location coordinates (*i.e.*, block number, X-coordinate, Y-coordinate) and tied with colored tape.
- 5) If the sampling location fell on an obstruction, the sample was collected at the nearest point south of the obstruction, towards the SSFL.
- 6) The placement of the grid and the sampling locations was documented photographically, and an entry in the field log book was made describing each photograph.
- 7) Before leaving a sampling area, the sample team leader verified the following information was recorded in the field log book:
  - ▶ Sample area name and location
  - ▶ Date and time
  - ▶ Team personnel
  - ▶ Sketch of grid location and layout, including the blocks and sample locations clearly marked
  - ▶ Documentation of the bearings and landmarks used to establish the grid
  - ▶ Documentation of the random numbers, bearings and coordinates used to locate the predetermined sampling blocks and locations
  - ▶ Documentation for all photographs taken.

For the additional soil locations which were collected at Campsite Area 1 and 2 and the background areas, the sample crew followed Steps 3 through 8 to mark the additional sample locations.

The following procedure were followed to implement the ravine sampling at the designated sampling areas. The sampling team upon arriving at a sampling area walked the ravine to determine the locations of the previous ravine sampling.

After the location of the furthest downgradient sample was identified, the sampling crew conducted the following procedures to establish and mark the appropriate sampling locations:

- 1) The drainage ways were marked approximately every fifty feet with a stake to designate the sample locations. If the specific block location did not contain soil or was inaccessible, that specific location was not marked. At the Campsite Area 1 Ravine, sample locations were marked every 250 feet.
- 2) The sampling team proceeded to the first downstream sample location, and collected the appropriate soil samples.
- 3) Soil samples were collected as described in Section 3.3.3.
- 4) The location of the sample collected was documented in the field log book and photographed.
- 5) Before leaving a sampling location, the sample team leader verified the following information was recorded in the field log book:
  - ▶ Sample area name and the area and location numbers
  - ▶ Date and time of sampling
  - ▶ A sketch of the sampling location depicting the soil sampling points.
  - ▶ Documentation of the bearings and landmarks used to establish the location.
  - ▶ Documentation of photographs taken.

### 3.3.3 Soil Sampling Procedure

#### 3.3.3.1 *Surface Soil Sampling Procedure*

The sampling team leader was responsible for the availability and decontamination of the necessary equipment before entering the field. The sampling team leader consulted the sampling workplan for the locations, maps and coordinates for the sampling areas which were sampled each day. The procedures described below were followed for soil sampling, sample identification and documentation, and shipping and handling. Prior to collecting soil samples from an area, the EPA's consultant conducted a radiation survey using a Ludlum Model 19 Micro-R meter.

The volume of material collected at each sample location was adequate for radionuclide or mercury analysis for the specified locations. The soil samples were analyzed for one or more of the following radionuclides: strontium-90, isotopic plutonium, tritium, and gamma emitting radionuclides. At the Sodium Burn Pit Watershed, samples were analyzed only for mercury. One sample volume was required for each analysis.

Soil samples were collected using an impact driven hand-coring sampler at specific grid locations. The coring head was fitted with a 6-inch long brass tube. Soil samples were collected in the following manner:

- 1) A pre-cleaned coring head and brass tube were assembled and connected to the coring device. Clean latex gloves were worn at all times.
- 2) The sampling location was cleared of surface rocks, sticks and other loose debris. The sample location stake were not removed.
- 3) The cutting head was placed directly on the surface soil and the impact hammer was dropped on the coring head repeatedly until the top of the coring head was flush with the soil surface.
- 4) The corer was pulled from the ground and the coring head disassembled.

- 5) For surface samples, the brass tube was removed, a Teflon sheet and plastic end caps were placed at the end of each tube. The end caps were taped to the brass tube using duct tape or plastic tape.
- 6) The laboratory was directed to analyze the soil as marked. For tritium samples, the soil was to be extruded from the brass tube into a glass jar, closed and sealed with custody tape. If split samples were requested, the soil from the necessary number of cores was to be placed into a resealable plastic bag and mixed for one minute. The mixed soil was then divided and placed into the appropriate number of brass tubes (or jars for tritium) with a Teflon sheet and a plastic end cap placed on each end of the brass tube.
- 7) A label was filled out for each sample as described in Section 3.2.2 and placed on the plastic bag or jar. Clear plastic label tape was placed over the label to protect against water damage. The surface soil samples were put into clean, resealable plastic bags and placed in a cooler for the appropriate laboratory.

The sample identification number, the location, time, date, depth of sampling, analyses requested and name of sampler was recorded in the McLaren/Hart field log book.

At ravine locations the same sampling procedure was used with the exception that a drive sampler was not always used to collect the soil samples. In the ravines a trowel was used to scoop the surficial soil into the sample containers. All other procedures were followed as described above.

### 3.3.3.2 *Subsurface Soil Sampling Procedures*

Subsurface soil samples were collected at eight locations between the Building 59 and RMDF watersheds. Because of the rugged terrain in the ravine areas, three sampling methods were employed during the course of this investigation.

Five locations (B001 through B005) were sampled in the RMDF watershed using an all-terrain drill rig. Soil samples were collected at the surface at all five locations using sampling method described in Section 3.3.3.1.

Following surface sample collection a borehole was drilled to a depth of five feet. Soil samples were collected at a depth of 5 feet at all five RMDF watershed boring locations. The subsurface soil samples collected in the RMDF watershed were collected using three methods as a result of subsurface conditions at each boring location. The three sample collection methods were as follows:

- 1) Soil was collected off the end of the drill bit. The drill bit was advanced to a depth of five feet then retrieved out of the borehole. The soil material on the end of the drill bit consisted of soil from the bottom of the borehole (five feet). This method was employed at sample location B001 where the subsurface soil was too hard for a sampling device to penetrate.
- 2) Undisturbed samples were collected at B003 and B005 using a 12-inch long split-spoon sampler. The sampler was fitted with two 6-inch long brass tubes and driven into the subsurface using a hydraulic hammer mounted on the drill rig.
- 3) Soil samples were collected using a hand auger at B002 and B004. A hand auger was lowered down the borehole to collect soil from a depth of five feet. The soil material within the bucket of the hand auger was then manually transferred into the appropriate sample containers.

Three subsurface soil locations (B001 through B003) were sampled in the Building 59 watershed. Soil samples were initially collected at the surface at all three locations using sampling method described in Section 3.3.3.1. Three subsurface soil samples collected in the Building 59 watershed were all collected using a hand auger. A drill rig was not used as a result of the steep terrain at the subsurface sample locations in the Building 59 watershed and also due to the shallow depth to bedrock at these sample locations. The subsurface samples were collected at different depths at each location due to the varying depth to bedrock

conditions. Soil samples were collected at depths of 2.5, 1.5, and 3.5 feet at sample locations B001, B002, and B003, respectively.

All samples collected at the subsurface sample locations in the RMDf and Building 59 watersheds were prepared and labeled per the procedures described in Section 3.3.3.1. The boreholes generated from drilling and hand auguring activities were backfilled with the excavated soil.

### 3.3.4 Split Samples

The USEPA, the California Department of Health Services (DHS), the California Environmental Protection Agency (Cal-EPA), the Santa Monica Mountains Conservancy, and the Brandeis-Bardin Institute were invited to analyze split samples. McLaren/Hart collected all samples and split the samples with the study participants as requested. True split samples were collected, *i.e.*, the medium being sampled was mixed prior to being placed in the appropriate sample container so that subsamples could be sent to different laboratories for analysis. Ideally, the results of these analyses can be compared to give an indication of the variability between laboratories on the same sample. However, environmental media, especially soil, are very difficult to homogenize and the results may differ due to the variability of the media, rather than the laboratories. In the event that the field split or adjacent sample results appear different, the blind duplicates, the laboratory spikes and the statistical variability of the data were evaluated to determine whether the apparent difference in split or adjacent samples is real.

The study participants determined the number and locations of the split samples they received. For all split samples collected, the location, date, time, depth of sampling, sample identification number, analyses requested and name of sampler was recorded in the McLaren/Hart field log book.

It was strongly recommended that all participants used the same analytical methodologies for duplicate samples so that the results could be compared to the scheduled samples. Since the results for tritium had the most methodological variability in the original off-site sampling, the

methodology that was considered standard for this project was included in Appendix E of the Workplan (October 1993).

### 3.3.5 Soil Sampling Documentation

It was the responsibility of the sampling team leader to have appropriate information recorded in the field log book or field label book. Upon completion of soil sampling, the field log book and field label book contained:

- ▶ Project name
- ▶ Date and time of sample collection
- ▶ Sample location description
- ▶ Sample method description
- ▶ Description of sample conditions (*e.g.*, depth, unified soil classification, percentage of gravel, sand, silt or clay, color using Munsell number, plasticity, grain size, grading, density, and moisture). This information was only recorded at new locations in the ravines that were not described in 1992 investigation.
- ▶ Personnel collecting samples
- ▶ Description of environmental conditions
- ▶ Sample handling, containers, and preservation methods, register numbers and site-specific sample identification codes, and corresponding chain-of-custody numbers.
- ▶ Split sample documentation (*e.g.*, identification numbers and methods).

It was also the responsibility of the sampling team leader to ensure that the chain-of-custody forms were appropriately filled out and in complete agreement with the field log book.

### 3.3.6 Soil Sample Handling, Shipping, and Storage

Soil samples that had been sealed, labeled, and placed in appropriate containers were placed into the cooler without ice (with the exception of samples analyzed for mercury), for shipment to the laboratory. The chain of custody forms were placed in a sealed plastic bag and placed inside the cooler. All samples were shipped for overnight delivery.

It was the responsibility of the sampling team leader for the following:

- ▶ The chain-of-custody forms were properly filled out and accounted for every sample contained in the cooler.
- ▶ The samples and documentation being shipped coincided with the information contained in the field log book.
- ▶ The samples contained in the cooler were destined for the appropriate laboratory and that all of the samples were destined for the same laboratory.
- ▶ The samples were securely packed and no empty space remains within the cooler.
- ▶ The cooler was appropriately addressed and sealed with duct tape.

Appropriate QA/QC samples were shipped with the field samples. The protocols for the collection, shipping, and handling of QA/QC samples are presented in Section 3.5.

### **3.4 SURFACE WATER SAMPLING**

Surface water grab samples were collected from surface water sources where possible (Campsite Area 1 and 2). Surface water is seasonal in the Simi Valley area and was only collected in areas where running water was present in sufficient quantities to collect the volume of sample required for all analyses. One round of sampling was conducted at each surface water source. Surface water samples were analyzed for the following radionuclides:

- ▶ strontium-90
- ▶ gamma scan
- ▶ tritium
- ▶ gross alpha and beta scan

Surface water sample containers, container size, sample handling procedures, appropriate preservatives, and holding time are presented in Table 2.

### 3.4.1 Surface Water Sampling Procedure

In general, when sampling surface waters, every reasonable effort was made to not disturb the bottom sediments in the water sample collection area or upstream from that area. As such, surface water samples were collected before sediment samples. The exact location of the sampling location was at the discretion of the sampling team and study participants, and its selection was based primarily on the need to submerge the sampling equipment. The location was marked with a stake tied with a colored ribbon, and its proximity to nearby landmarks recorded in the field log book. Upon arriving at the surface water sampling point, the appropriate sample bottles were set aside and labels prepared. Care was taken to approach each sampling location from below that point (*i.e.*, downstream). The following procedures were used for the collection of surface water samples.

- 1) Use a clean stainless-steel bucket to collect all surface water samples being analyzed for radionuclides.
- 2) Rinse the bucket thoroughly with sampling source water and discard the rinse water away from the sampling point.
- 3) Place a clean 0.45 micron Whatman glassfiber filter into the filter apparatus. Apply a small quantity (5 milliliters) of distilled/deionized water to the filter. Apply suction to seat the filter. Discard the rinse water from the filtrate flask.
- 4) Collect the surface water sample in the bucket.
- 5) Shake or swirl the sample and then pour it slowly into the filter funnel. Apply and maintain suction on the filter until the water has passed through the filter and the filter appears to be drying out.
- 6) Turn off the suction and disconnect the filtrate flask from the filter apparatus. Transfer the sample filtrate from the flask to an appropriate, labeled sample bottle (*i.e.*, a 1-liter glass bottle for tritium or a 1-liter plastic bottle for the other radionuclide analyses) with preservative as required (see Table 2).

- 7) Cap the sampling bottles and seal the lid with Teflon and clear plastic tape. Place a chain-of-custody sticker across the seal.
- 8) The filtration apparatus and the collection buckets were decontaminated between sampling areas. The filtration apparatus and the collection bucket were not decontaminated between samples at the same location.
- 9) Discard the used filter, and repeat steps 1 through 8 for the remaining samples from the same location.

The sample identification number, the location, time, date, analyses requested and the name of the sampler was recorded in the McLaren/Hart field log book.

#### **3.4.2 Split Samples**

Some study participants requested split samples for analysis at some or all of the surface water sampling locations. The filtrate was transferred to a large, clean stainless steel bucket and mixed. The contents were then divided between McLaren/Hart and the person or persons requesting a split sample. Notation of all split samples collected was recorded in the field label book.

#### **3.4.3 Surface Water Sample Documentation**

The following information was recorded in the field log book for each surface water sample collected.

- ▶ Project name
- ▶ Date and time of sample collection
- ▶ Sample area description
- ▶ Sample method description
- ▶ Surface water sample identification numbers and corresponding site-specific sample identification codes (see Section 3.2.2)
- ▶ Chain-of-custody reference numbers

- ▶ Filtered and preserved samples
- ▶ Location where the sample was collected on the sample area diagram
- ▶ Split sample documentation (*e.g.*, identification numbers and methods)
- ▶ Pertinent field notes (*e.g.*, weather conditions)
- ▶ Personnel collecting samples
- ▶ Description of sample conditions

It was also the responsibility of the sampling team leader that the chain-of-custody forms were appropriately filled out and in agreement with the field log book.

#### **3.4.4 Surface Water Sample Handling, Shipping, and Storage**

Surface water samples both in glass and plastic containers were sealed in resealable plastic bags and encased in bubble wrap to prevent breakage. All radionuclide samples were placed in a cooler without ice and shipped to the laboratory via overnight courier. The chain-of-custody documentation was sealed inside a plastic bag taped to the underside of the cooler lid.

Appropriate QA/QC samples were shipped with the field samples. The protocols for the collection, shipping and handling of QA/QC samples are presented in Section 3.5.

### **3.5 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)**

Quality assurance and quality control (QA/QC) samples were included in the sampling program to provide quality control over the collection of environmental measurements and their subsequent review, interpretation and validation of the field collection methodologies and radionuclide measurements conducted by the analytical laboratories.

#### **3.5.1 Field Documentation**

Field documentation and quality control checks were made by the sampling team leader. At the end of each day's field activities, all of the day's field log book entries were reviewed for completeness, accuracy, reporting format, and thoroughness. The team leader initialed the last page of each day's entry as an indication that this review had been undertaken and that the

entries in the log book were acceptable. It was the responsibility of the team leader to check that the chain-of-custody documentation agreed with the field log book entries.

### 3.5.2 QA/QC Sampling

The types, frequency, and numbers of QA/QC samples were collected during the field sampling are shown in Table 3. The specific sample block where QA/QC samples were collected is presented in Table 4. Several different types of QA/QC samples were used to account for variability and sources of contamination in various stages of the sampling and analytical process. The objectives and purpose of the sample types are outlined in the following sections.

#### 3.5.2.1 *Field Rinsate Blanks*

Field rinsate blanks provided a check on contamination from various sources and from sampling instruments used to collect and transfer samples from the point of collection into sample containers. Field rinsate blank samples were collected following the decontamination procedure for field sampling equipment. A field rinsate blank was collected at a rate of one per 20 sampling events. A sampling event is defined to be the sampling that occurs for a medium at a single sampling block for soil or sampling location for water. The field rinsate blanks were prepared with analyte free distilled/deionized water. The field rinsate blank samples were collected in the required sample bottles for each analytical method. The following protocol was implemented to collect field rinsate blanks:

- 1) Decontaminate all sampling equipment.
- 2) Prior to any sampling, pour the required volume of analyte-free distilled/deionized water (*i.e.*, 5.5 liters for a soil field rinsate blank) over the precleaned sampling equipment into a precleaned (*i.e.*, decontaminated) basin. Split the sample into the appropriate 0.5-liter and 1-liter containers, each containing the appropriate preservative for the specific analyte group.

- 3) Affix a label to each rinsate container and assign a water sample register sample identification number. Seal the bottles with custody tape and store in cooler without ice.
- 4) Note in the field log book the date and the register sample number for each of the rinsate samples. Ship samples consistently with the methods for other field samples.

### 3.5.2.2 *Blind Field Duplicate Samples*

The collection of blind field duplicate samples provides for the evaluation of the laboratory's performance by comparing analytical results for two identical or nearly identical samples. As such, all blind field duplicate samples were taken as described for split samples in the previous sections. The blind samples were placed in separate containers and given distinct sample numbers to allow for "blind" receipt by the analytical laboratory. The true identity was concealed from the laboratory, but the identity of the samples was thoroughly documented in the field label book.

Blind field duplicates were collected at a target rate of one per 20 samples sent for laboratory analysis on a radionuclide group-specific basis. The total number of blind field duplicates prepared is summarized in Table 3. Blind field duplicates were designated by the number "00" in the 3rd and 4th digit of the site-specific sample identification code. Blind field duplicates were numbered successively in the 5th, 6th, and 7th digits as they were collected from new sampling areas.

Blind field duplicates were collected from randomly chosen sampling locations. For example, a total of 147 soil samples were taken and analyzed for tritium (see Table 1). This represents seven groups of 20 and one group of 7 samples. As shown in Table 3, eight blind field duplicates were submitted for the tritium analysis. For each group of samples, a computer generated random number table was used to select the location for each blind field duplicate. For example, if the random number generator produced the number "6" for tritium, then the location at which the sixth sample taken within this group of twenty samples was used for the corresponding blind field duplicate. A summary of the computer generated random numbers used for blind field duplicates is presented in Appendix C.

### 3.5.2.3 *Trip Blanks*

Trip blanks were not collected. Trip blanks were collected during the previous sample investigation (1992) to evaluate the cross-contamination of volatile organic compound samples during transport. Since volatile organic compounds were not analyzed during this investigation, trip blanks were not necessary.

### 3.5.2.4 *Field Blanks*

Field blanks are used to evaluate the cleanliness of the sample collection bottles and possible sources of contamination related to the field sampling environment. Field blanks consist of sample bottles that are filled with analyte-free distilled/deionized water in the field. The samples are then capped, sealed, and shipped to each of the appropriate analytical laboratories along with the other field samples. Field blanks were collected for radionuclide groups for which sample bottles are required (*i.e.*, surface water samples analyzed for the radionuclides of concern). Field blanks were collected at a rate of one per 20 samples surface water samples. Field blanks were assigned a site-specific sample identification code.

### 3.5.2.5 *Pre-spiked Blind Duplicate Samples*

Pre-spiked blind duplicate samples are QA/QC samples that were used to test the accuracy of the laboratory by submitting samples with known concentrations. The pre-spiked sample contains a known level of one or more of the radionuclides of concern which is added to the sample by another analytical laboratory. The spiked samples were sent back to the sampling crew then sent on with the other collected samples at a rate of one per 20 samples sent for laboratory analysis on a radionuclide group-specific basis. The total number of pre-spiked blind duplicates prepared is summarized in Table 3. Pre-spiked blind duplicates were designated by the number "00" in the 3rd and 4th digit of the site-specific sample identification code and a "P" in the 8th digit. Pre-spiked blind field duplicates were numbered successively in the 5th, 6th, and 7th digits as they were collected from new sampling areas. Only pre-spiked water samples were sent to the laboratory for gamma scan, tritium, gross alpha and beta radiation, strontium, and isotopic plutonium analyses because the study participants agreed that soil samples could not be effectively homogenized. Pre-spiked soil and water

samples were submitted for tritium analyses. All study participants analyzed at least one pre-spiked sample for each analysis and media.

### 3.5.2.6 *Matrix Spike/Matrix Spike Duplicate (MS/MSD) Samples*

Matrix spike and matrix spike duplicate samples are QA/QC analyses performed by the analytical laboratory. The matrix spike is a sample to which one or more of the radionuclides of potential concern or a surrogate (spike) is added to an aliquot of the sample by the analytical laboratory. The matrix spike duplicate is an analysis of a second aliquot, spiked separately, of the original sample. The results of the spike analyses are expressed in terms of the percent recovery with regard to the amount of chemical added, and the results of the duplicate analyses are expressed in relative percent difference from the original sample. These results are used to evaluate the laboratory's precision in the analysis of that sample and to determine whether the sample matrix interfered with the extraction or analyses. The MS/MSD samples were collected at a rate of one per 20 samples (including other QA/QC samples) on an analyte-specific basis (Table 3). MS/MSD samples were assigned a site-specific sample identification code. For the purposes of conducting these analyses, the laboratories require a complete set of sample volumes. Therefore, soil samples were collected specifically for the purpose of running the MS/MSD analyses.

### 3.5.2.7 *Split Samples*

The USEPA, the DHS, Cal-EPA, and Brandeis-Bardin were present to observe the collection of split samples for QA/QC purposes. True split samples were collected by McLaren/Hart, *i.e.*, the medium being sampled was mixed so that subsamples were given to those requesting split samples and then were sent to different laboratories for analysis.

As noted previously, the results of the analyses from split samples can be compared to provide an indication of the variability between laboratories on the same sample. However, since environmental media, especially soil, are very difficult to homogenize, the results may differ due to variability of the media rather than in the laboratories. In the event that the field split or adjacent sample results appear to be different, the laboratory duplicates, the laboratory

spikes, and the statistical variability of the data were evaluated to determine whether the apparent difference in split or adjacent samples is real.

### **3.6 LABORATORY ANALYSIS**

Soil and water samples were analyzed for all radionuclides of concern (gamma-emitting radionuclides, tritium, isotopic plutonium, strontium-90) were submitted to Teledyne Isotopes.

Teledyne Isotopes  
50 Van Buren Avenue  
Westwood, New Jersey 07675  
1-201-664-7070

Soil samples from the Sodium Burn Pit Watershed were analyzed for mercury at MBT Environmental Laboratories.

MBT Environmental Laboratories  
3083 Gold Canal Drive  
Rancho Cordova, CA 95670  
1-916-852-6600

All adjacent/split samples taken were sent to certified laboratories identified by the study participants, independently.



#### **4.0 QUALITY ASSURANCE/QUALITY CONTROL SAMPLING RESULTS**

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The following sections discuss the results of the Quality Assurance/Quality Control (QA/QC) sampling. The results are presented in separate sections for each QA/QC sample type and a summary section presents conclusions regarding the validity of data presented in this report.

The QA/QC sampling was designed to validate the analytical results and to identify discrepancies within the data set. When anomalous results were identified, the source of the anomaly was determined. Samples with inexplicable anomalies were identified and reanalyzed, as necessary, to locate the source or cause of the anomaly.

#### **4.1 QUALITY ASSURANCE/QUALITY CONTROL RESULTS SUMMARIZED BY SAMPLE TYPE**

The results for the QA/QC samples collected in 1994 are summarized in the following sections. Seven of the eight sample types were also collected in 1992. Pre-spiked duplicate samples were only used in 1994. The QA/QC samples included in this phase of work and discussed in this section include:

- ▶ Trip Blanks
- ▶ Field Rinsate Samples
- ▶ Field Blanks
- ▶ Laboratory Control Blanks
- ▶ Matrix Spike/Matrix Spike Duplicates
- ▶ Laboratory Duplicates
- ▶ Pre-spiked Duplicate Samples
- ▶ Blind Field Duplicate and Split Samples

#### 4.1.1 Trip Blanks

Trip blanks were collected during previous 1992 sampling to evaluate potential cross-contamination of volatile organic compound samples during shipment to the laboratory. No samples were analyzed for volatile organic compounds during this sampling; therefore, no trip blanks were collected.

#### 4.1.2 Field Rinsate Samples

Field rinsate samples contained distilled water used to rinse the sampling equipment after the decontamination procedure. No rinsate samples contained a reportable level of radionuclides or mercury. The rinsate analytical results can be found in Appendix D.

#### 4.1.3 Field Blanks

Field blanks were used to evaluate the cleanliness of the water sample collection bottles and possible sources of contamination related to the field sampling environment. One field blank sample was collected and analyzed for mercury and the appropriate radionuclides. No mercury or radionuclides were found in the field blanks (only one field blank was taken in 1994). The field blank analytical results can be found in Appendix D.

#### 4.1.4 Laboratory Control Blanks

Laboratory blank samples contained deionized water used at the time the samples were analyzed and measure whether the laboratory equipment contributed to concentrations of detectable mercury or radionuclides. Laboratory blank samples were run by the laboratory concurrently with soil/sediment and water samples. No mercury or radionuclides were detected in the laboratory blanks.

#### 4.1.5 Matrix Spike/Matrix Spike Duplicate Samples

Matrix spike and matrix spike duplicates (MS/MSD) are QA/QC samples used to determine whether the sample matrix (*i.e.*, the soil/sediment or water) interfered with the extraction or

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analysis. MS/MSD samples were prepared in the laboratory by injecting a known amount of a mercury or radionuclide into the sample matrix and measuring how much of the injected mercury or radionuclide was recovered in the analysis. The matrix spike is an original sample aliquot from the original spiked sample; the matrix spike duplicate is a second aliquot of the same sample matrix, spiked separately. The results of the spike analyses are expressed as percent recovery of the added chemical. The results of the MS and the MSD are indicators of accuracy (how closely the results reflect the actual amount of the mercury(s) or radionuclide(s) injected). The results of the MS and the MSD analyses are compared and expressed as the relative percent difference (RPD). The RPD is then used to evaluate the precision (consistency) of a particular analysis. The MS/MSD samples were collected at a rate of one per 20 samples (including other QA/QC samples) for each analyte group.

Each analyte has an acceptable range of recovery (for both mercury and radionuclide analyses) and an acceptable RPD (for mercury analyses only). All but one of the radionuclide analyses were within the acceptable percent recovery. Sample number BG-20 010-MG analyzed for Cesium-137 exhibited a high recovery (128 percent) in the MSD sample. This is slightly above the MSDs upper control limit of 125 percent. Laboratory blank samples MS/MSD data is presented in Table 5. The MS/MSD analytical results can be found in Appendix D.

Matrix interference in soil/sediment and water samples is not uncommon due to the effects of the media on the analysis. Because matrix interference is the result of highly variable soil/sediment and water chemistry, the sample results reported by the laboratory were not adjusted to account for the interference measured in the one plutonium-238 sample. It would not be appropriate to assume that the percent recovery for one sample would be applicable to a second sample. Since the percent recoveries are within an order of magnitude of the control limit, the conclusions of this study would remain the same if the sample results were adjusted to account for the recovery outside the control range.

#### **4.1.6 Laboratory Duplicates**

Laboratory Duplicates consist of extracting a second aliquot from the original sample and analyzing for the same analyte. This is an internal laboratory duplicate analysis conducted to measure the reproducibility of the laboratory method. Results from the laboratory duplicates

were below the reporting limits similar to the original sample or contained levels of radionuclides in the same range as the original sample levels (see Table 9).

#### 4.1.7 Pre-spiked Blind Duplicate Samples

Pre-spiked blind duplicate samples consist of local soil from a background location or deionized water spiked with a known amount of a radionuclide. These samples are then submitted to participating laboratories to assess and compare the analyte recoveries. Pre-spiked blind duplicate sample results may indicate if a particular laboratory method generates results inconsistent with the actual spiked amount. The pre-spiked samples were prepared at the NAREL by the USEPA consultant. The samples were placed in identical containers and labeled similarly to other field samples so that the samples would be blind to the analyzing laboratories. Pre-spiked water samples were spiked and analyzed for gross alpha/gross beta radiation, tritium, plutonium-239, strontium-90, and gamma emitting radionuclides (cadmium-109, cobalt-57, cerium-139, mercury-203, tin-113, cesium-137, yttrium-88, and cobalt-60). Pre-spiked soil samples were spiked and analyzed for tritium. The results of the pre-spiked samples are presented in Table 6. For the purpose of comparison, a 25 percent deviation or less between the measured concentration and the pre-spiked concentration was considered acceptable. The pre-spiked blind duplicate analytical results for the samples analyzed by McLaren/Hart can be found in Appendix D.

As shown in Table 6, positive (containing analyte) tritium results were not erroneously reported in the five blank samples analyzed. Although detected amounts varied between the spiked amount and the analytical results, erroneous negative results were not reported. Based on this information, it is unlikely that a sample result was incorrectly identified as positive or below the method detection limit. Except one, all USEPA results were within the acceptance limit of 25 percent difference. The one exception was a deviation of 27.7 percent below the actual spiked amount for gross alpha radiation.

Recoveries for 19 out of 21 McLaren/Hart samples analyzed by Teledyne Isotopes for gross, alpha/gross beta radiation, tritium, plutonium-239 and strontium-90 were within the acceptance limit. One out of four samples spiked with tritium was below the spiked amount by 38.6 percent. Strontium-90 was initially reported below detection limits in all four pre-spiked

samples. McLaren/Hart contacted Teledyne Isotopes to determine why strontium-90 was not detected since the spiked samples contained a level of 2.2 pCi/L. Teledyne indicated in a letter that the initial results indicated concentrations of strontium-90 at 2.2 to 2.3 pCi/L in three of the four samples. Since the concentrations were near the detection limits the samples were reanalyzed which produced the reported non-detectable results. The initial detectable concentrations of strontium-90 which are in agreement with the spiked concentration are presented in Table 6. The Teledyne Isotopes letter discussing the pre-spiked strontium-90 results is presented in Appendix E.

Only two (cesium-137 and cobalt-57) of the eight gamma emitting radionuclides spiked in the sample were initially identified and reported by Teledyne Isotopes. These analytes were not initially reported since these specific radionuclides are not part of Teledyne's standard suite of analytes reported for gamma scan. The Teledyne Isotopes' letter discussing the pre-spiked gamma scan results is presented in Appendix E. The complete pre-spiked gamma scan results are listed in Table 6. All four samples analyzed for gamma emitting radionuclides contained amounts of one or more of the eight radionuclides above or below a 25 percent deviation of the spiked amounts. The results for the gamma scan analysis with greater than 25 percent deviations were: cadmium-109, two of the four sample results were above the spiked amount by 29.2 and 31.5 percent; cobalt-57, one of the four sample results were 35.7 percent above the spiked amount; cerium-139, one of the four sample results were 27 percent above the spiked amounts; tin-113 of four sample results were below the spiked amount by 28.9 percent; cesium-137, one of four sample results were below the spiked amount by 31.7 percent.

The initial gamma-emitting radionuclide results reported by Brandeis-Bardin's consultant were in error as a result of a calculation error at the lab resulting in isotopic concentrations being under reported by a factor of two. After the error was identified, the values were corrected. The corrected values for Brandeis-Bardin pre-spiked results for gamma-emitting radionuclides are presented in Table 6. A letter discussing this revision is included in Appendix E. One of the two samples analyzed for gamma-emitting radionuclides contained two radionuclides outside the acceptance limit (25 percent deviation between measured and pre-spiked concentrations). The recovery of mercury-203 was 54.3 percent above the spiked amount and the recovery of yttrium-88 was 48.5 percent below the spiked amount. The other six gamma-emitting radionuclides reported for this sample were within the acceptance limit. One sample

also contained an amount of strontium-90 below the spiked amount by 25.9 percent.

DHS analytical results were consistent with the spiked amount and within the acceptance limit for the isotopic plutonium analysis. For tritium the percent deviation for both of the water samples was 40.6 and 41.1 percent, which is outside the acceptance limit. For strontium-90 the percent deviation for both samples were 66.4 and 81.1 percent, which is outside the acceptance limit. One of the two samples analyzed for gamma-emitting radionuclides contained radionuclides outside the acceptance limit. Cadmium-109, cobalt-57, and yttrium-88 were 36.1 percent, 26.4 percent, and 36.1 percent above the spiked amount. The other five gamma-emitting radionuclides reported for this sample were within the acceptance limit.

#### 4.1.8 Blind Field Duplicate and Split Samples

Blind field duplicate samples were evaluated by comparing the results of the duplicate sample with the scheduled sample. Split samples collected by the USEPA, the consultant to Brandeis-Bardin, and the DHS were evaluated in the same manner as blind field duplicate samples. The values for radionuclide analyses were not in agreement if the difference between the two sample results was greater than the sum of the standard deviations for the analyses (*i.e.*, if the range  $[\pm]$  of the two results did not overlap). The values for the mercury analyses were not in agreement if the sample results differed by greater than 50 percent. Table 7 summarizes the results of the blind field duplicates and split samples that were not in agreement with the scheduled sample for soil/sediment. The blind field duplicate analytical results can be found in Appendix D.

Differences between duplicate soil/sediment samples were observed in 5 samples for tritium, 4 samples for cesium-137, and one sample for strontium-90. (Table 7). (It should be noted that isotopic plutonium was not detected by any lab in this round of sampling and that the detection limits for strontium by USEPA and Brandeis-Bardin were above those for Teledyne Isotopes. This resulted in agreement between samples although the analytes were not detected.) Three of the tritium differences (BG-02-074, BB-17-006, and BB-17-007) and two of the cesium-137 differences (BB-17-005, and BB-16-007) were only slightly (less than 10 percent) beyond the acceptance criteria. In one of the remaining sample sets (BB-20-001), both cesium-137 results are below background and, therefore, unlikely to impact the

conclusions from the results. In two of the instances where differences in results were above (greater than 10 percent) the acceptance criteria (BB-17-008 and BB-17-009), both results indicate an impact from tritium above background levels and are not likely to change conclusions from the study.

An additional QA/QC comparison for tritium at BG-12-005 (background, split sample with Brandeis-Bardin) was not in agreement. The scheduled tritium result at BG-12-005 contained a high result with associated high uncertainty ( $1200 \pm 600$  pCi/L). The entire data set was reviewed for similar instances where a high uncertainty (greater than 30 percent the value of the result) was associated with a result, particularly for background samples. Four similar additional occurrences were identified although there were no associated QA/QC samples for these results (BG-12-001, BG-14-003, BG-14-004, and BG-14-005). McLaren/Hart reviewed the analytical data with the laboratory to attempt to determine the source of these anomalous readings. The results of that review are shown in Table 8. Two possible causes were evaluated: cross-contamination by a previous sample and low water yield (less than 3 ml). As shown in Table 8, low yield seems to have consistently occurred with these samples resulting in a high degree of uncertainty in the analytical result. A separate aliquot from sample BG-14-003 was reanalyzed for tritium, and the result was  $< 300$  pCi/L. Other sample tritium results where yields were below 3 ml, were withdrawn from the study by the laboratory (BG-2-001, BG-12-005, BG-14-004, and BG-14-005). A letter from Teledyne Isotopes Laboratory documenting the withdrawal of these samples is included in Appendix E.

Only one significant difference was observed between duplicate surface water samples. Surface water results from Campsite 1 Drainage (BB-20-002) were different for gross beta radiation between the McLaren/Hart sample ( $15 \pm 3$  pCi/L) and the USEPA sample ( $< 9.6$  pCi/L). These results are below drinking water Maximum Contaminant Limit (MCL) of 50 pCi/L for gross beta radiation and do not impact the study results.

One hundred and ninety-seven of the 208 blind field duplicate, interlaboratory duplicate, and split sample results for all compounds confirmed the scheduled sample laboratory results. Many of the comparisons were made between as many as four different laboratories each with different equipment, technicians, and other variables, yet the interlaboratory results were comparable for 93 percent of the duplicate samples. Additionally, the comparison criteria

used for this report for radionuclides are considered conservative because the standard deviation only accounts for the error in the counting statistics. Other sources of error, including sample preparation, sample weight, and technician variance, are not accounted for in the standard deviation of the counting statistics.

#### **4.2 QA/QC RESULTS SUMMARIZED BY ANALYSIS TYPE**

In this section, the results of the QA/QC samples are organized and discussed by analysis to evaluate whether any trends were evident in the QA/QC for individual analyses.

##### **4.2.1 Metals (Mercury)**

QA/QC samples were not collected for metals analysis as only seven soil samples were collected during the 1994 sampling investigation. The seven soil samples were collected from the Sodium Burn Pit Watershed (BB-18) and only analyzed for mercury. A concentration of 0.12 mg/kg of mercury, slightly above the detection limit (0.1 mg/kg), was measured in one (BB-18-006B) of the seven samples. This result prompted some limited QA/QC analysis in the form of analysis of a lab duplicate of this sample and submitting interlaboratory duplicates to the USEPA and the consultant for the Brandeis-Bardin Institute for mercury analysis. Results of these QA/QC analyses indicated that mercury was not detected in the laboratory duplicate or the USEPA interlaboratory duplicate ( $<0.1$  and  $<0.09$ , respectively). Mercury was detected at a concentration of 0.14 mg/kg in the Brandeis-Bardin interlaboratory duplicate sample. These QA/QC results for mercury are in agreement (the difference between the scheduled sample results and the QA/QC results was less than 50 percent). Since only limited QA/QC analysis was conducted for mercury the results are not summarized in Table 9 or illustrated in Figures 5.

##### **4.2.2 Radionuclides**

The QA/QC data for the radionuclide analyses conducted by the Teledyne Isotopes Laboratory (New Jersey and Illinois) are discussed in this section. A summary of the results are presented in Table 9 (soil samples) and Table 10 (surface water samples), and Figures 5 (soil samples) and 6 (surface water samples).

#### 4.2.2.1 *Strontium-90*

QA/QC results for strontium-90 were in agreement in 97 percent of all the duplicate and split soil/sediment samples and in three of four of the pre-spiked water samples. All other QA/QC results, *e.g.*, matrix spikes, and field rinsate blanks were consistent and met the acceptance criteria for soil/sediment and water.

#### 4.2.2.2 *Tritium*

QA/QC results for tritium in soil/sediment samples were in agreement 94 percent of the time. Of the five samples that were not in agreement, three differed greater than 10 percent from the acceptance criteria. In four of these cases, the conclusion that the Building 59 Watershed was impacted with tritium holds in spite of the differences in the sample results. In two of the five samples, the concentration of tritium detected by Teledyne Isotopes was less than that measured by USEPA.

All other QA/QC results for tritium, *e.g.*, matrix spikes and field rinsate blanks, were consistent and considered acceptable for soil/sediment and water.

#### 4.2.2.3 *Gross Alpha and Gross Beta Analysis*

One of the two split water samples analyzed for alpha- and beta-emitting radionuclides was not in agreement with the sample results for beta-emitting radionuclides. Alpha- and beta-emitting radionuclides were not detected in the water rinsate sample indicating that sampling methods did not affect the analytical results. Matrix spike samples were within control limits.

#### 4.2.2.4 *Isotopic Plutonium*

All duplicate and split soil/sediment and water samples analyzed for isotopic plutonium (Pu-238 and Pu-239) were all in agreement. Isotopic plutonium was not detected in any of the field samples collected during the study. Matrix spike samples were within control limits. Plutonium-238 and plutonium-239 was not detected in field rinsate blanks.

#### 4.2.2.5 Gamma Scan

Cesium-137 was the only analyte detected in the gamma scan analysis that was not naturally occurring and, therefore, the only radionuclide from the gamma scan analysis evaluated in this study. Naturally occurring radionuclides (*i.e.*, potassium-40, and radium-226, and thorium-228) were detected in most of the soil samples, but are not discussed.

Four out of thirty-five (11 percent) QA/QC split/duplicate samples for soil/sediment were not in agreement with their respective scheduled sample. The split or duplicate soil/sediment samples not in agreement were at Wildwood Regional Park Ravine (BG-10-004), the Building 59 watershed (BB-17-005), the Campsite 1 drainage (BB-20-001) and the Radioactive Materials Disposal Facility (BB-16-007). Although these sample results were 3 to 40 percent outside the acceptance criteria, the results are within the range considered representative of background and the criteria do not impact the conclusions from the study. These results are consistent with the pre-spiked sample results where Teledyne Isotopes generally obtained greater sample recoveries than the original spiked amount.

Matrix spike, field rinsates and field blanks for all other soil/sediment and water samples were within control limits.

#### 4.3 CONCLUSION

Overall agreement (based on the acceptance criteria described in Section 4.1) for this project for the primary QA/QC soil samples (*i.e.*, blind field duplicates, interlaboratory split duplicates, split samples, and pre-spiked samples) was 96 percent for the following analyses: tritium, cesium-137, plutonium-238, plutonium-239, and strontium-90. The overall agreement is based on all QA/QC results including results that were reported as less than the detection limit. The overall agreement for the primary QA/QC water samples was 88 percent. However, this agreement percentage is due to small number of QA/QC samples for water and one split sample analyzed for beta-emitting radiation. Beta-emitting radiation was not detected in field samples above background levels. Thus, the results of the water QA/QC samples are acceptable and support the conclusions from the field data.



## **5.0 STATISTICAL ANALYSIS OF SAMPLE RESULTS**

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This section discusses the statistical evaluation methods used in this study. Because radionuclides are naturally occurring and because certain radionuclides are deposited throughout the world as a result of nuclear weapons testing, the goal of the statistical evaluation was to determine whether chemicals or radionuclides in the study areas were different from background concentrations. The statistical evaluation of the background areas and the study areas was conducted in three steps. First, the background area data were evaluated to determine the background concentration range and mean. Second, the study area data were evaluated relative to background to determine whether the study areas were different from background. Finally, if a study area had a concentration that was statistically higher than background, possible explanations for the elevated concentrations were evaluated. Section 5.1 describes the methods used to analyze the background sampling areas and to develop the range of naturally occurring levels of radionuclides. Section 5.2 discusses the methods used to compare analytical results for each sampling area to the results of the statistical analysis of the background samples.

Mercury was not evaluated statistically because the majority of background values were below the detection limit, and, thus, there were insufficient positive numbers on which to perform meaningful statistical analyses. The majority of background samples for tritium and isotopic plutonium were also below detection limits; statistical analysis was not used to evaluate concentrations of these radionuclides. However, twice the maximum detection limit was used as a benchmark to assess concentrations of tritium detected in 1994. This benchmark was established for tritium to account for laboratory variability before declaring a sample above background.

Surface water data were not evaluated statistically because there was only one background sample from both rounds of sampling.

Since the sample grids or the ravine sampling were considered to be representative of an entire area and since the sample locations were randomly selected, it was assumed that if the mean concentration of all samples from a sampling area was statistically at or below the mean concentration of the background areas, then the area had not been impacted by activities at the SSFL. If radionuclides were below the detection limit, a value of one-half the detection limit was used to calculate the mean and standard deviation for that area. The use of one-half the detection limit is based on the conservative assumption that some level of the chemical is present throughout the area and is consistent with USEPA's Risk Assessment Guidance for Superfund (United States Environmental Protection Agency, 1989).

### 5.1. STATISTICAL EVALUATION OF BACKGROUND SOIL SAMPLES

In accordance with the Workplan, an analysis of variance (ANOVA) was used to evaluate whether all of the eleven background soil sampling areas (six from 1992 and five from 1994) were representative of general background levels of the radionuclides of interest. Using the ANOVA results, any background areas where the levels of radionuclides in soil were significantly different from the other background area soils could be identified. If an area was identified as different, the appropriateness of including the sample area in the group of background sample areas was further evaluated.

The purpose of collecting background samples was to determine the range and distribution of metals and radionuclides in soil that was similar to the soil in the study areas (*i.e.*, of similar geologic origin and composition) but that was physically removed from the SSFL. Because all background were a minimum of 1.5 miles from the SSFL and none of the background locations were in the predominant wind direction (based on a windrose for the SSFL), it was assumed that soils should not have been measurably impacted by activities at the SSFL. Background locations were also chosen to have no impact from surface water runoff from SSFL.

The eleven background sample areas within a 1.5 to 12.5-mile radius of the SSFL were selected as representative of the background. In some cases, a background area was sampled in both 1992 and 1994. In these cases, data from 1994 was used whenever available for a specific location. If the location was not sampled in 1994, the 1992 data was used.

A Type I (random effects) ANOVA was used to evaluate background sample areas for each analyte. A separate ANOVA was calculated for the following radionuclides:

- ▶ Cesium-137
- ▶ Strontium-90

Each of the background areas was treated as a separate sample set for each analyte. A computer program, *Systat* (Systat, Inc., 1989), was used to perform the ANOVA calculations. The Type I (fixed effects) ANOVA was used to determine whether all eleven background areas were from the same population (*i.e.*, general background) or whether one or more of the six sample sets was statistically different from the others. The hypothesis being tested in this analysis is that the sample sets have the same mean concentration as background. A significance probability (p-value) less than 0.05 indicates that under the hypothesis that all background sample areas are from the same population, the chance of seeing differences as great as those observed between sample areas is less than 5 percent. Therefore, when the p-value calculated in the ANOVA was less than or equal to 0.05, the hypothesis was rejected and the eleven background areas were considered not to have the same mean. When the p-value was greater than 0.05, the hypothesis that the eleven background areas were from the same population was accepted.

To determine if and which of the background sample areas was different, the results of the Tukey "honest significant difference" (HSD) output (part of the *Systat* ANOVA output) were evaluated. In the Tukey HSD, each of the background sample areas was compared to the other background sample areas resulting in 55 comparisons. Each comparison was characterized by a p-value. As with the ANOVA for the group of background sample areas, if p-values were greater than 0.05, the hypothesis that the sample areas were from the same population was accepted. If the p-value is less than or equal to 0.05, the chance of seeing differences as great as those observed between sample groups is less than 5 percent and the hypothesis is rejected.

To further evaluate the appropriateness of deleting a background location based on the statistical results, Dr. Max Layard of Layard Associates, was consulted. According to Dr. Layard, an "appropriate benchmark (for background) would be the overall average from all the

sites, and this average would be interpreted as an estimate of the average in all possible background sites. This assumes that there are no identifiable reasons for considering the measurements from any location to be nonrepresentative, such as known analytical errors" (personal communication, 1992). In other words, because the background sites were specifically identified to be representative of the general area and if there were no identifiable reasons for considering measurements at any background area to be nonrepresentative of the full spectrum of possible background measurements, all six 1992 background sites were considered representative and used to evaluate the results at the sampling areas. Dr. Layard also indicated that the fixed effects ANOVA would not adequately represent the variability of the overall mean because it does not account for variability between sample areas. Because the sampling areas were relatively small (*i.e.*, 10,000 square feet) when compared with the entire background area population (*i.e.*, all soil within a 12.5 mile radius of the SSFL), the variance between background sample areas would be expected to be larger than the variance within background sample areas. If the variance within a sample area and the variance between sample areas differed substantially, the ANOVA would result in a p-value less than 0.05 when in actuality the sample areas are all representative of background. Based on this analysis in the 1992 report, all sample areas were retained as representative of the full range of background levels of metals and radionuclides, based on Dr. Layard's recommendation and with the consensus of the USEPA representative and the consultant for Brandeis-Bardin.

However, in evaluating the more robust data set from the 1992 and 1994 data, one area for cesium-137 and one area for strontium-90 appeared to be different from the general background areas. For cesium-137, Wildwood Regional Park Ravine (BG-10) was shown to be statistically different from the other background areas. A reevaluation of the cesium-137 data without including the Wildwood Regional Park Ravine, resulted in the acceptance of the hypothesis that the remaining areas were from the same population. For strontium-90, Wildwood Regional Park (BG-09) was shown to be statistically different from the other background areas. A reevaluation of the strontium-90 data without including the Wildwood Regional Park data, resulted in the acceptance of the hypothesis that the remaining areas were from the same population. As a result, Wildwood Regional Park Ravine data was excluded from the cesium-137 analysis, and the Wildwood Regional Park data was excluded from the strontium-90 analysis. By excluding these two background data sets (cesium-137: Wildwood Regional Park Ravine, and strontium-90: Wildwood Regional Park) more conservative

background values were established. A graphical evaluation of cesium-137 and strontium-90 background results from sample areas distinguishable from background is presented on Figures 1 through 9 in Appendix F.

## **5.2 STATISTICAL EVALUATION OF SAMPLING AREAS**

Due to the more robust data set including the 1992 and 1994 data, all sampling data, including ravine data, was assessed as randomly collected data. Each area sampled was statistically evaluated on an area-by-area basis because it was assumed that the sampling area represented a separate and distinct "population". The sample results from the randomly sampled areas were described by a mean, range, and a standard deviation.

Initial comparisons between the randomly sampled areas and background data were made using the Behrens-Fisher t-Test. This test provides a statistical comparison of the means between two data sets assuming the data are normally distributed. The t-Test is an appropriate procedure because the test is known to be only slightly affected by departures from normality. The data at a sample area were considered to be the same as background if the p-value was greater than 0.05. A p-value less than 0.05 indicated that, assuming the sample area is within the range of background, the probability of seeing a difference as great as those observed between the sample area and background is less than 5 percent.

Dr. Layard was also contacted regarding the appropriateness of using the Behrens-Fisher t-Test to identify when a sample area was different from background. Dr. Layard indicated that the use of the Behrens-Fisher t-Test may be overly conservative since the variance within the background sample areas is not considered.



## 6.0 SAMPLING RESULTS FROM BACKGROUND AREAS

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This section presents the results of the multi-media sampling program at the Background Areas. The results are presented in two parts. Section 6.1 describes the sites and sampling locations and Section 6.2 describes the statistical data analysis.

### 6.1 BACKGROUND AREA DESCRIPTIONS

Eight background areas were sampled.

- ▶ BG-01: Rocky Peak
- ▶ BG-02: Santa Susana Park
- ▶ BG-05: Happy Camp
- ▶ BG-09: Wildwood Regional Park
- ▶ BG-10: Wildwood Regional Park Ravine
- ▶ BG-11: Tapia County Park
- ▶ BG-12: Tapia County Park Ravine
- ▶ BG-14: Rocky Peak Ravine

This section is a brief description of the Background Areas sampled in 1994 (Figure 3). The analytical results for each sample area are presented in the form of tables and figures. The table summarizes the results for the radionuclide analyses. The detection limit preceded by a "less than" symbol (<) is used to represent radionuclide results below detection limits<sup>4</sup>. The figure is used to present all the data above the detection limit. The sample grid and sample locations as well as relevant landmarks are noted on the figures. Only the original sample results (the scheduled sample, not QA/QC results) collected by McLaren/Hart (the scheduled sample) above background levels for metals and radionuclides are shown on these figures. In

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<sup>4</sup>Minimum detectable activity.

some cases, all the results for a particular analyte are presented on a figure, although some of those results are not considered representative of background, to show the trend in that particular area. Results of splits, duplicate counts, and interlaboratory samples are only reported in the tables as they were used solely for quality assurance/quality control (QA/QC) purposes.

#### **6.1.1 Rocky Peak (BG-01)**

The Rocky Peak background sample area is approximately 4.9 miles northeast of the SSFL, north of the 118 Freeway, at the Rocky Peak exit. The sample grid was located along the north side of a fire road directly above the parking area. The grid was on a steeply sloping area near the northern edge of the grid and on a more level area along the southern margin of the grid. The grid was partially covered by grasses with some shrubs. Numerous sandstone outcroppings and boulders were also present along the slope. The grid location was originally selected in 1992 because the distance and height above the freeway was considered sufficient to avoid the majority of the chemical deposition from freeway traffic.

Soil samples were collected on March 15, 1994 at five sampling locations, in addition to the three locations sampled in 1992, from the grid according to the approved Workplan. Four blind field duplicate samples were collected: isotopic plutonium at Block 087, gamma scan at Block 090, strontium-90 at Block 016, and tritium at Block 034. In addition, three rinsate blanks were collected at this location. The sampling grid is shown on Figure 7. Summaries of radionuclide analytical results for the soil samples are presented in Table 11.

#### **6.1.2 Santa Susana Park (BG-02)**

Santa Susana Park is located approximately 2 miles south of the 118 Freeway and approximately 3 miles north of the SSFL main gate. The area that was sampled was a plateau south of the main park area. The plateau was bounded on the north by a short slope and to the south by a gradual hill leading to a steeper hill. The area was partially devoid of grass or plants except around the perimeter; several trees were present. A small drainage area from the eastern slope appeared to run through the center of the sampling area, which was dry at the time of sampling.

On March 10, 1994, five locations were sampled from the grid according to the approved Workplan. Three areas were previously sampled in 1992 and two additional blocks were identified based on the random number tables. In addition one rinsate sample and one matrix spike sample was collected at Block 017 and Block 085, respectively. A sample split with Brandeis-Bardin was collected at Block 074. The radiation survey of the area by the USEPA showed an ambient radiation field of 12 (micro Roentgen/hr [ $\mu\text{R/hr}$ ] is a unit of exposure rate of X-ray or gamma radiation). Results from all radiation surveys conducted by the USEPA at each sample area are presented in Appendix F. The sampling grid is shown on Figure 8. A summary of the radionuclide analytical results for soil samples are presented in Table 12.

### **6.1.3 Happy Camp (BG-05)**

The Happy Camp background area is located in Moorpark approximately 12.5 miles northwest of the SSFL. The sampling area was a relatively flat area located between two plateaus seemingly created by erosion off the Middle Ridge Fire Road approximately one mile from the main gate. A stream bed cuts through the center of the Happy Camp Area and west of the sampling area (the stream bed was dry during the sampling). The northeast corner of the sampling grid was located 60 feet west of a large double-trunked oak tree. The area was sparsely covered by grasses and small shrubs.

On March 11, 1994, five sets of soil samples were collected from the grid according to the approved Workplan. Based on stakes still in place at the sampling location, the sample identified as BG-05-026 in 1992 was actually collected at BG-05-027. The sample collected in 1994 was appropriately labeled as BG-05-027. A blind field duplicate sample for gamma scan was collected at Block 017. A split sample with USEPA was collected at Block 056. In addition, a matrix spike was collected at Block 050. The radiation survey of the area by the USEPA showed an ambient radiation field of 16  $\mu\text{R/hr}$ . The sampling grid is shown on Figure 9. A summary of the radionuclide analytical results for soil samples is presented in Table 13.

### **6.1.4 Wildwood Regional Park (BG-09)**

The Wildwood Regional Park background area is located approximately 2 miles north of Highway 101 and approximately 12.5 miles west of the SSFL facility. The sampling area was

a large open field located west of the main parking lot. The sampling area was adjacent to and south of a dirt access road and northwest of a dirt hiking trail. The sampling grid was located on a flat area covered by grasses and forbs. A few shrubs were located west of the sampling area.

On March 11, 1994, five sets of soil samples were collected from the grid according to the approved Workplan. Blind field duplicates were collected at Block 003 for isotopic plutonium and at Block 013 for strontium-90. A split sample with USEPA was collected at Block 003. A split sample with DHS was collected at Block 005. Three rinsate blanks were collected at this site. The radiation survey of the area by USEPA showed an ambient radiation field of 12  $\mu$ R/hr. The sampling grid is shown on Figure 10. A summary of the radionuclide analytical results for soil samples is presented in Table 14.

#### **6.1.5 Wildwood Regional Park Ravine (BG-10)**

The Wildwood Regional Park Ravine background area is located approximately 2 miles north of Highway 101 and approximately 12.5 miles west of the SSFL facility. The sampling area was a ravine located adjacent to the Santa Rosa trail. Both the Santa Rosa trail and the ravine cross the dirt access road that leads from the main road. The ravine had a shallow grade and spanned approximately 750 feet. The ravine was covered with grasses and contained large rocks at various locations along the ravine.

On March 14, 1994, five sets of soil samples were collected from the ravine, randomly spaced approximately 150 feet apart according to the approved Workplan. A blind field duplicate sample was collected at Block 002 for gamma scan. A split sample with USEPA was collected at Block 003. A split sample with DHS was collected at Block 004. A split sample with Brandeis-Bardin was collected at Block 001. One rinsate blank was collected at this sampling area. The radiation survey of the area by USEPA showed an ambient radiation field of 12  $\mu$ R/hr. The sampling grid is shown on Figure 11. A summary of the radionuclide analytical results for soil samples is presented in Table 15.

#### **6.1.6 Tapia County Park (BG-11)**

The Tapia County Park background area is located in Malibu Canyon approximately 4 miles south of Highway 101 and approximately 10 miles south of the SSFL facility. The sampling area was a large open field adjacent to a dirt road. The western edge sloped to a creek located below. The area was bordered to the north and the south by trees and shrubs. The sampling grid was located on a flat, sloping area covered by grasses and forbs.

On March 14, 1994, five sets of soil samples were collected from the sampling grid according to the approved Workplan. A blind field duplicate sample was collected at Block 036 for strontium-90. A split sample with USEPA was collected at Block 011. A matrix spike sample was collected at Block 010 and Block 031. The radiation survey of the area by USEPA showed an ambient radiation field of 7  $\mu$ R/hr. The sampling grid is shown on Figure 12. A summary of the radionuclide analytical results for soil samples is presented in Table 16.

#### **6.1.7 Tapia County Park Ravine (BG-12)**

The Tapia County Park Ravine background area is located approximately 4 miles north of Highway 101 and approximately 10 miles south of the SSFL facility. The sampling area was a ravine that crosses the Tapia Spur Trail approximately 450 feet from the intersection of the trail with the paved road. Sample locations 003, 004, and 005 were south of the trail, approximately 50 feet apart. Samples locations 001 and 002 were approximately 25 feet apart; Sample location 002 was approximately 60 feet from the trail. The ravine had a steep grade above the trail and a more shallow grade below the trail. The steep section of the ravine was divided into two arms. One arm of this section of the ravine exhibited signs of soil disturbance (rock slides), therefore; the undisturbed arm of the ravine was selected for sampling.

On March 14, 1994, five sets of soil samples were collected from the ravine according to the approved Workplan. A split sample with USEPA was collected at Block 003. A split sample with Brandeis-Bardin was collected at Block 005. A matrix spike sample was collected at Block 001 and Block 004. The radiation survey of the area by USEPA showed an ambient

radiation field of 7  $\mu$ R/hr. The sampling grid is shown on Figure 13. A summary of the radionuclide analytical results for soil samples is presented in Table 17.

#### **6.1.8 Rocky Peak Ravine (BG-14)**

The Rocky Peak Ravine background area is located approximately 4.9 miles northeast of the SSFL, north of the 118 Freeway, at the Rocky Peak exit. Sample location 005 in the ravine was located approximately 165 feet northeast of the grid location. The ravine began as a steep slope amidst very narrow rocky terrain. Sample locations 001 and 002 were in the steep section of the ravine. From sample location 003 to 004, the terrain became broader, but remained rocky. The ravine gently sloped from sample location 004 toward a culvert below sample location 005 and was less rocky.

On March 14, 1994, five sets of soil samples were collected from the ravine according to the approved Workplan. A matrix spike sample was collected at Blocks 001 and 003. One rinsate sample was also collected at this sample location. The sampling grid is shown on Figure 14. A summary of the radionuclide analytical results for soil samples is presented in Table 18.

## **6.2 BACKGROUND ANALYSIS SUMMARY**

Soil/sediment samples were collected to provide data on the naturally occurring levels of radionuclides in the soil within a fifteen-mile radius of the SSFL. These data were compared to the data from the Brandeis-Bardin Institute and the Santa Monica Mountains Conservancy to determine whether these sites had significantly higher radionuclide concentrations, which may have been due to activities at the SSFL. The measured data were tabulated for all of the background areas. A complete summary of all the data by analysis is included in Appendix D.

Low levels of radionuclides are ubiquitous as a result of two sources: naturally occurring radionuclides such as radon and uranium and fallout from atmospheric testing of nuclear weapons since 1945.

The radionuclides that were evaluated and discussed are limited to the following man-made radionuclides detected in the samples:

- ▶ Cesium-137 (Cs-137)
- ▶ Strontium-90 (Sr-90)
- ▶ Tritium (H-3) (also naturally produced in the upper atmosphere)

Plutonium-238 and plutonium-239 man-made radionuclides were not detected in any of the samples and, therefore, are not discussed.

### **6.3 SUMMARY OF BACKGROUND RESULTS**

The measured background data sets for metals and radionuclides were evaluated using analysis of variance (ANOVA) and Tukey's "honest significant difference" (HSD) statistical methods to determine if all of the background data sets had the same mean and therefore considered to be from the same population. The ANOVA was used to indicate whether or not any of the data sets were different and Tukey's HSD was used, if necessary, to indicate which sample area(s) was significantly different.

As the majority of the background sample results for tritium were below the detection limit, an analysis of variance was not conducted on the data. Site samples were compared with a background concentration near the detection limits of 100 to 400 pCi/L.

As discussed previously, the significance probability (p-value) was used to determine if one or more background sample areas were different from the other background sample areas. As shown in Table 19, the p-values for cesium-137 and strontium-90 were less than 0.05. Upon review of Tukey's HSD, Wildwood Regional Park Ravine (BG-10) was the source of the significant differences between mean background concentrations of cesium-137. Reanalysis of the remaining data was consistent with the hypothesis that remaining Background Areas were not from different populations. Therefore, the statistical comparison of the sampling areas to background was based on all samples from 10 of the 11 background areas for cesium-137. Upon review of Tukey's HSD, Wildwood Regional Park (BG-09) was the source of the significant differences between mean background concentrations of strontium-90. Reanalysis

of the remaining data was consistent with the hypothesis that remaining Background Areas were not from different populations. Therefore, the statistical comparison of the sampling areas to background was based on all samples from 10 of the 11 background areas for strontium-90.

The following sections describe the background results for cesium-137 and strontium-90 for soil/sediment samples. Table 20 summarizes the statistical parameters (mean, standard deviation, and range) defining measured background for each analyte as well as background values found in the literature for soil samples.

### 6.3.1 Cesium-137

Cesium-137 in the 1994 background soil samples 10 of 11 Background Areas ranged from less than 0.03 picocuries per gram of soil dried [pCi/g(dry)] at several background locations to  $0.213 \pm 0.072$  pCi/g(dry) at Santa Susana Park (BG-02) with an arithmetic mean concentration of approximately  $0.087 \pm 0.062$  pCi/g(dry). [Background cesium-137 concentrations at Wildwood Regional Park Ravine ranged from  $0.215 \pm 0.039$  to  $0.456 \pm 0.052$  pCi/g(dry), but were not included in the background statistical analysis.] Their exclusion resulted in the lowering of the Cesium-137 background and a bias toward a lower background concentration. Cesium-137 in all Background Areas was well within the background cesium-137 range from published reports, which range from 0.001 pCi/g(dry) (Layton, 1990) to 1.3 pCi/g(dry) (Ritchie and McHenry, 1977 and 1982).

### 6.3.2 Strontium-90

Strontium-90 in the measured background soil samples ranged from  $<0.01$  pCi/g(dry) at several background locations to  $0.13 \pm 0.1$  pCi/g(dry) at Santa Susana Park (BG-02) with an arithmetic mean concentration of approximately  $0.052 \pm 0.031$  pCi/g(dry). [Background strontium-90 concentrations at Wildwood Regional Park ranged from  $<0.1$  to  $0.13 \pm 0.05$  pCi/g(dry). The strontium-90 in the Background Areas was less than the published background levels of strontium-90 in soil [0.16-0.32 pCi/g(dry), which were calculated based on inventories from above-ground nuclear weapons testing through 1965 (Eisenbud, 1987).

### 6.3.3 Tritium

Tritium in the measured background soil samples ranged from less than 100 picocuries per liter of water (pCi/L) at several background locations to  $750 \pm 200$  pCi/L at the Western site (BG-04). Scheduled results for tritium in background soil samples BG-12-001, BG-12-005, BG-14-004, and BG-14-005 indicated high levels with associated uncertainty greater than 50 percent of the sample result uncertainty. These samples also had low water yield (3 ml or less) and the results were subsequently withdrawn by the laboratory. A level of  $2000 \pm 700$  pCi/l also measured at BG-14-003. This sample also contained a water yield of 1 ml and a separate aliquot was reanalyzed and the result was  $< 300$  pCi/L. Background levels of tritium in soil were not available in the literature.

7.0  
SAMPLING RESULTS  
FROM OFF-SITE LOCATIONS

## **7.0 SAMPLING RESULTS FROM OFF-SITE LOCATIONS**

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Fifteen off-site locations were sampled during the sampling program, nine human activity areas and six Watershed (ravine) areas. Eight of the human activity areas were located at the Brandeis-Bardin Institute and one was located at the Santa Monica Mountains Conservancy. All six of the Watershed areas were along the Brandeis-Bardin/Rocketdyne property boundary. The sampling locations were shown on Figure 2. The results from each location are discussed in the following sections. A summary of all data from the off-site locations is presented in Appendix D.

The nine human activity sampling areas were resampled for tritium only to supplement 1992 sampling results. As 76 percent (including 1992 data) of tritium results for the background areas were below detection limits an analysis of variance was not conducted on the data. Therefore, a statistical comparison of the data to measured background concentrations would not be appropriate. The concentrations detected in sampling areas were compared with the range of concentrations detected in the background areas. Isotopic plutonium (plutonium-238 and 239) and mercury were not detected in background areas. For this reason, 1994 sampling results in the off-site areas were noted when above the detection limit. Gamma scan and strontium-90 results were evaluated using the statistical criteria described in Section 5.0.

The analytical results for each sample area are presented in the form of tables and figures. The tables summarize the results for radionuclide analyses. The detection limit preceded by a "less than" (<) symbol is used to represent radionuclide results at or below detection limits. The sample grid and sample locations are noted on the figures as well as relevant landmarks. Buildings and areas on the Rocketdyne property are referenced as landmarks only and are not intended to suggest a source of any chemicals detected. Sample results from 1992 and only 1994 results distinguishable from background are shown on each figure. Only the original sample results (from 1992 and/or 1994) are presented on each figure because the duplicate split and confirmatory samples were used for QA/QC purposes.

## **7.1 DORMITORY AREA (BB-02)**

The Dormitory area is approximately 7,000 feet north of the Rocketdyne property line. The area to be sampled was located between dormitory buildings to the north and the creek (partially dry) to the south. The sampling area was nearly level and the top layer of soil was a silty sand. Many boulders and rocks were present leading to the assumption that the area had been washed out by the creek during heavy storms in February 1994. The area was surrounded by trees, but was devoid of other vegetation.

On March 7, 1994, five soil samples were collected at the previously sampled grid locations according to the approved Workplan. The five locations were resampled for tritium. The Brandeis-Bardin consultant collected a split sample at Block 075. The USEPA radiation survey of the area ranged from 15 to 16  $\mu\text{R/hr}$ . The sampling locations are shown on Figure 15.

Tritium was below detection limits in all ten samples collected at the Dormitory Area in 1994. Table 21 summarizes the radionuclide results for soil.

## **7.2 CAMPSITE AREA 1 (BB-03)**

Campsite Area 1 is approximately 3,500 feet northwest of the Rocketdyne property line and is connected by stream beds to the runoff from the Building 59, RMDF, and the Sodium Burn Pit watersheds. Samples were taken from a relatively flat area approximately 250 feet north/northeast of a large red water tank. A creek ran through the center of the sampling area and a water sample was collected downstream. The access road ran along the southwest side of the sampling area. The area was covered with grasses and forbs, including abundant growth of poison oak. Several trees were located on both sides of the creek; three trees were used as landmarks to anchor the grid. Several of the stakes from the previous sampling round were relocated when the grid was reestablished.

On March 8, 1994, ten soil samples were collected from the grid according to the approved Workplan. Four samples were collected from locations sampled in 1992, and six samples were collected from the next five sampling locations in the random number table. Block 092

was not resampled due to growth of poison ivy making access extremely difficult. All samples were analyzed for tritium. Split samples were collected by the Brandeis-Bardin consultant at Block 025 and Block 081. A lab duplicate was analyzed at BB-03. The radiation survey of the area by the USEPA showed an ambient radiation field of 15 to 16  $\mu\text{R/hr}$ . The sampling grid is shown on Figure 16. The relationship of Campsite Area 1 to the watersheds is shown in Figure 30.

Tritium was below detection limits in all ten samples collected at Campsite Area 1 in 1994. Table 22 summarize the radionuclide data for soil samples.

### **7.3 CAMPSITE AREA 2 (BB-04)**

Campsite Area 2 was an amphitheater with concrete bleachers in the center of the hillside soil. Samples were collected from the level area in front of the bleachers in an area with picnic benches and fire pits. One area in the center of the amphitheater was used for camp fires. A small creek ran along the north side of the sampling area and a larger stream ran down from the RD-51 Watershed on the south side. The area was sparsely vegetated and trees were present to the north and northwest.

Campsite Area 2 is approximately 2,400 feet north of the Rocketdyne property line, near the vicinity of the RD-51 Watershed (BB-15). Campsite Area 2 is hydrologically connected to the RD-51 Watershed by the stream that passes through the southwest portion of the area approximately 150 feet from the grid which potentially carries runoff from the SSFL.

On March 4, 1994, five soil samples were collected from the grid according to the approved Workplan. Five samples were collected from locations sampled in 1992, and five samples were collected from the next five sampling locations in the random number table. All samples were analyzed for tritium. The radiation survey of the area by the USEPA showed an ambient radiation field of 16 to 18  $\mu\text{R/hr}$ . The USEPA collected split samples at Blocks 021, 023, 078, 082, and 097. The Brandeis-Bardin consultant collected split samples at Blocks 084 and 097. A rinsate blank was collected at Block 021. The sampling grid is shown on Figure 17.

Tritium was below detection limits in all ten samples collected at Campsite Area 2 in 1994. Radionuclide analytical results for soil samples are presented in Table 23.

A surface water sample was collected from the creek approximately 500 feet upstream from the sampling grid. Water collected for the gross alpha radiation, gross beta radiation, and tritium analyses was filtered prior to placement in the sample bottle. The USEPA collected a split of the surface water at this location and also analyzed the sample for gamma radiation. The Brandeis-Bardin consultant collected a split sample, which was analyzed for tritium. A rinsate sample was also collected at this location. Gross beta activity was  $12 \pm 4$  picocuries per liter of water (pCi/L) for the scheduled sample and  $< 10$  for the USEPA split. Cesium-137 was below detection limits in the USEPA sample analyzed for gamma radiation. Table 24 summarizes the radionuclide data for surface water samples at Campsite Area 2.

#### 7.4 PICNIC AREA (BB-05)

The Picnic Area is approximately 7,000 feet north of the Rocketdyne property line. The sampling area was located on a sloped area under several trees. Picnic tables, a fire pit, a sink, and a drinking fountain were located in the area. An amphitheater was located to the west. The sampling area was generally devoid of vegetation at the southern end of the slope and was sparsely vegetated at the top. Stakes from the 1992 round of sampling were identified when reestablishing the grid.

On March 7, 1994, five soil samples were collected from the previously sampled grid locations according to the approved Workplan. All samples were analyzed for tritium. A blind field duplicate sample was collected at Block 089. The Brandeis-Bardin consultant collected a split sample at Block 057. The radiation survey of the area by the USEPA showed an ambient radiation field of 15 to 16  $\mu\text{R/hr}$ . The sampling grid is shown on Figure 18.

Tritium was below detection limits in all five samples collected at the Picnic Area in 1994. Radionuclide analytical data for soil samples is summarized in Table 25.

## **7.5 HOUSE OF THE BOOK (BB-06)**

The House of the Book is approximately 6,500 feet north of the Rocketdyne property line. The area sampled was a flat grassy area located across the parking lot north of the House of the Book. The sampling area was bordered by an access road to the south. One tree was present in a depression west of the sampling grid. The area was uniformly covered with annual grasses and forbs. Several stakes from the 1992 round of sampling were identified while reestablishing the grid.

On March 7, 1994, five soil samples were collected from previously sampled grid locations according to the approved Workplan. All samples were analyzed for tritium. The Brandeis-Bardin consultant collected a split sample at Block 066. The USEPA radiation survey of the area was 16  $\mu$ R/hr. The sampling grid is shown on Figure 19.

Tritium was below detection limits in all five samples collected at House of the Book in 1994. Radionuclide analytical results are summarized in Table 26.

## **7.6 MAIN HOUSE ORCHARD (BB-12)**

The Main House Orchard is approximately 9,800 feet north of the Rocketdyne property line. The sampling area encompassed the entire orchard and extended slightly beyond on the northwestern side. Several trees had fruit (lemons, tangerines and grapefruit) while others were barren. There were large gaps between adjacent trees. A house was located to the south of the sampling area. The main road ran alongside the northern edge of the sampling area. The soil was devoid of vegetation. Several stakes from the 1992 round of sampling were identified while reestablishing the grid.

On March 7, 1994, five soil samples were collected from previously sampled grid locations according to the approved Workplan. The Brandeis-Bardin consultant collected a split soil sample at Block 023. A lab duplicate was analyzed at Block 023. All samples were analyzed for tritium. The radiation survey of the area by the USEPA showed an ambient radiation field of 14 to 15  $\mu$ R/hr. The sampling grid is shown on Figure 20.

Tritium was below detection limits in all five samples collected at the Main House Orchard in 1994. Radionuclide analytical results for soil samples are included in Table 25.

#### **7.7 AVOCADO GROVE (BB-13)**

The Avocado Grove is approximately 7,100 feet north of the Rocketdyne property line. The sampling area encompassed the southeastern portion of the avocado grove, that was ten trees long and three trees wide. A wire hutch was located near Block 034. Samples were collected from the soil underneath the trees (within the drip line). A production bee hive was located adjacent to the road leading up to the southeastern part of the grove. The area between the trees was vegetated with grasses and forbs. Several stakes from 1992 round of sampling were identified while reestablishing the grid.

On March 7, 1994, five soil samples were collected from previously sampled grid locations according to the approved Workplan. All samples were analyzed for tritium. The Brandeis-Bardin consultant collected a split sample at Block 039. A rinsate sample was also collected. The radiation survey of the area by the USEPA showed an ambient radiation field of 13 to 15  $\mu$ R/hr. The sampling grid is shown on Figure 21.

Tritium was below detection limits in all five samples collected at the Avocado Grove in 1994. A summary of radionuclide analytical results is presented in Table 28.

#### **7.8 OLD WELL CAMPSITE (BB-14)**

The Old Well Campsite is approximately 4,200 feet north of the Rocketdyne property line. The sampling area was located adjacent to, but at least 10 feet above, the run-off creek bed. An old pump house was located in the center of the sampling area. Stagnant, standing water surrounding the pump house on the southern, western, and eastern sides that had been present in 1992 was not present. The southern side of the sampling area was located on a steeply sloping hill. Oak trees and other trees and shrubs surrounded the sampling area; two trees were selected for use as landmarks in addition to the fixed piping. Grasses of various heights were present in areas. Several stakes from the 1994 round of sampling were identified when reestablishing the grid.

On March 7, 1994, five soil samples were collected from previously sampled grid locations according to the approved Workplan. The USEPA collected a split sample at Block 094. The Brandeis-Bardin consultant collected a split sample at Block 079. The radiation survey of the area by the USEPA showed an ambient radiation field of 15 to 17  $\mu\text{R/hr}$ . The sampling grid is shown on Figure 22.

Tritium was below detection limits in all five samples collected at the Old Well Campsite in 1994. Radionuclide data for soil samples is summarized in Table 29.

#### 7.9 FORMER ROCKETDYNE EMPLOYEE SHOOTING RANGE (SM-03)

The Former Rocketdyne Employee Shooting Range was approximately 1,700 feet west of the main Rocketdyne gate, bordering the property line. The soil sampling grid was located on a level area on the north/northeast side of the dirt road where lead shot was observed and was only one block wide. The area had moderate growth of annual grasses and forbs. Several stakes from the 1992 round of sampling were identified when reestablishing the grid.

On March 7, 1994, five soil samples were collected from previously sampled grid locations according to the approved Workplan. A lab duplicate was analyzed from the sample collected at Block 012. A rinsate sample was also collected at Block 012. The radiation survey of the area by the USEPA showed an ambient radiation field of 15  $\mu\text{R/hr}$ . The sampling grid is shown on Figure 23.

Tritium was below detection limits in all five samples collected at the Former Rocketdyne Employee Shooting Range in 1994. A summary of the analytical results is presented in Table 30.

#### 7.10 RD-51 WATERSHED (BB-15)

The RD-51 Watershed is approximately 4,800 to 5,600 feet northeast of Building 59. This area represents the watershed northwest of the well WS-13. The sampled area was a narrow creek bed that connected to the main ravine which appeared to be connected to the stream bed near Campsite 2.

The drainage area was vegetated with tall grasses and some woody scrub. The drainage channel was followed from the top of the hill (near the east end of the parking lot where the cluster wells RD-51 A, B, and C are located) to the edge of the cliff where the water falls off into the main ravine that originates to the northwest of WS-13. An attempt was made to locate the property line from tanks on the Rocketdyne facility and the fence. The tanks were not always visible and the location of the sample points relative to the fence line is only an approximation. Some stakes from the 1992 round of sampling were identified when reestablishing the grid.

On March 10, 1994, ten sediment samples were collected from the creek bed according to the approved Workplan. Five samples were collected from locations 001 through 005, which were previously sampled in 1992, and reanalyzed for tritium. Five new locations upgradient from the 1992 samples (closer to the Rocketdyne property boundary) were sampled for isotopic plutonium. In addition, location 001 was resampled for isotopic plutonium because plutonium-238 was detected at location 001 at 0.22 picocuries per gram of dry soil [pCi/g(dry)] in 1992. A split sediment sample was collected for the USEPA at location 001 and location 007 for isotopic plutonium. The USEPA also collected a split sediment sample at location 001 for tritium. A split sediment sample was collected for the Brandeis-Bardin consultant at location 006 and 009 for isotopic plutonium. A field duplicate sample was collected at location 009 for isotopic plutonium. A rinsate sample for isotopic plutonium was also collected. The radiation survey of the area by the USEPA showed an ambient radiation field of 16 to 17  $\mu$ R/hr. The sample locations and the results are shown on Figure 24.

Tritium was below detection limits in all five samples collected at the RD-51 Watershed in 1994. One split sample collected at location 003 and analyzed by the Brandeis-Bardin consultant indicated a tritium level of  $550 \pm 350$  pCi/l. Isotopic plutonium was below detection limits in all six samples collected at the RD-51 Watershed in 1994. Radionuclide analytical results for the sediment samples are summarized in Table 31.

#### **7.11 RADIOACTIVE MATERIALS DISPOSAL FACILITY WATERSHED (BB-16)**

The Radioactive Materials Disposal Facility (RMDF), consists of Buildings 075, 621, 021, 022, 044, and 034. The watershed was sampled approximately 200 feet north of the north-

west corner of the RMDF, immediately below the Rocketdyne property line. The sediment samples were collected in the creek bed directly downstream from the RD-30 well, located on Rocketdyne property, and the cluster wells RD-34, A, B, and C (hereafter RD-34 located on Brandeis-Bardin). The RMDF is on the top of a hill overlooking the ravine.

Downstream from RD-34 was heavily vegetated with woody scrub, trees, and intermittent areas of thick growths of poison ivy and poison oak. A path was made along the more level southern side of the creek bed with sample points at turns in the stream where sediments had accumulated. The property line at this location was clearly marked with surveyor stakes. Some stakes from the 1992 round of sampling were identified when reestablishing the sample locations.

On March 9, 1994, five sediment samples were collected from the creek bed downstream of RD-34 and the 1992 sample locations according to the approved Workplan. The samples (locations 006 through 010) were analyzed for tritium, strontium-90, and gamma scan. A split sediment sample was collected at locations 007 and 010 for the USEPA. A split sediment sample was collected at locations 008 and 009 for the Brandeis-Bardin consultant. A split sediment sample was collected from locations 008 and 010 for the DHS. Field duplicate samples were collected at location 007 (tritium and strontium-90) and at Block 006 (gamma scan). A lab duplicate sample was analyzed for gamma scan at location 008. The radiation survey of the area by the USEPA showed an ambient radiation field of 17 to 18  $\mu$ R/hr. The sample locations and all the 1992 results and the 1994 results distinguishable from background are shown on Figure 25.

Tritium was detected in the five sediment samples from the ravine at concentrations ranging from  $< 100$  to  $230 \pm 100$  picocuries per liter of water (pCi/L). Tritium had been detected in five of the six samples collected in 1992 at concentrations from 990 to 1,500 pCi/L.

Strontium-90 was detected in the RMDF Watershed in all five of the 1994 sediment samples at  $0.08 \pm 0.044$ ,  $0.11 \pm 0.05$ ,  $0.15 \pm 0.09$ ,  $0.24 \pm 0.04$ , and  $0.14 \pm 0.07$  pCi/g(dry) at locations 006 through 010, respectively. (Location 010 is the furthest sample down gradient from the Rocketdyne property border.) The USEPA and the consultant for Brandeis-Bardin were not able to detect strontium-90 at these levels as their detection limits were in the range of 0.5 to 0.74 pCi/g(dry). Strontium-90 had been detected in three of the six samples collected in 1992

at concentrations from 0.08 to 0.15 pCi/g(dry). Cesium-137 was detected in three of three of the five samples collected. The concentrations were  $0.046 \pm 0.022$  at location 006,  $0.199 \pm 0.044$  at location 009, and  $0.075 \pm 0.028$  at location 010. Cesium-137 was detected in one of the six samples previously collected in 1992 at 0.34 pCi/g(dry). Radionuclide sediment sample results are presented in Table 32. Sample results are further discussed in Section 8.0.

On March 9, 1994, samples were also collected from five boring locations along the Rocketdyne property boundary at surface and at five feet below ground surface. The borings were designated as BB-16-B001 through B005. These samples were also analyzed for tritium, strontium-90, and gamma scan. The Brandeis-Bardin consultant collected split samples at B002 at surface and B002 at 5 feet. A lab duplicate was analyzed for tritium at B004 at approximately 5 feet below ground surface. The sample locations and results distinguishable from background are shown on Figure 26 and Table 32.

Tritium was detected at one of the five boring locations. The only tritium concentration reported was at B004 at 5 feet below ground surface. The concentration was  $270 \pm 150$  pCi/L. This result was confirmed by lab duplicate result. Tritium was not detected in the sample collected at B004 at the surface. Strontium-90 was detected at 5 feet below surface in one of the five boring locations. The strontium-90 concentration reported at B001 was  $0.093 \pm 0.042$  pCi/g(dry). Strontium-90 was not detected in the sample collected at B001 at the surface. Cesium-137 was detected at three of the five boring locations. The cesium-137 concentrations reported were  $0.147 \pm 0.051$  pCi/g(dry) at B001 at the surface,  $0.109 \pm 0.044$  pCi/g(dry) at B002 at the surface, and  $0.087 \pm 0.0415$  pCi/g(dry) at B003 at the surface. The Brandeis-Bardin consultant's result at B002 at the surface was  $< 0.07$  pCi/g(dry). Cesium-137 was not detected in the samples collected at 5 feet below ground surface at these locations. Radionuclide sediment sample results are presented in Table 32. The results distinguishable from the background are in Figure 26. Sample results are further discussed in Section 8.0.

#### 7.12 BUILDING 59 WATERSHED (BB-17)

In 1992, four samples were collected from the Building 59 Watershed. The 1992 sample locations (Block 001, 002, 003 and 004) was approximately 200 to 400 feet north of Building

59. There were two arms of drainage in this area. Block 001 was located closest to Building 59, within 20 feet of a sample collected during a previous study (Cehn, 1991) by the Brandeis-Bardin consultant. The block was in the arm of drainage originating north of Building 59. Additional samples were not collected here because of heavy growth of poison oak in the drainage. A second arm originated northeast of Building 59 and more approximate to Building 012. Block 003 and 004 were located beyond the confluence of the two drainages just below where emergent water appeared. The area downstream of Block 004 could not be sampled due to thick vegetation (mostly poison oak) and a steep drop. Some stakes from the 1992 sampling round were identified when the sampling locations were reestablished.

On March 9, 1994, sixteen additional samples were collected from the Building 59 Watershed to further evaluate locations where tritium, cesium-137, and plutonium-238 were detected and to collect samples further down gradient from previous sampling. One sample was collected at location 001 (named 010 in 1994). The remaining fifteen samples were collected in five sets of three across the ravine. The primary sample (locations 006 through 009) were collected down the center of the ravine. Samples were collected at all three 1992 locations (002 through 004). Two additional locations down gradient were also sampled. Two additional samples were collected at each location approximately five feet on either side of the ravine on the embankment. Samples designated as "A" were collected on the east side of the ravine, and samples designated as "B" were collected on the west side of the ravine. Sample location 009 was approximately 150 feet down gradient of sample location 004.

Several QA/QC samples were collected from the Building 59 Watershed. Split sediment samples were collected at locations 005, 006, 007, 008, and 009 for the USEPA. A split sediment sample was collected at location 010 for the Brandeis-Bardin consultant. A field duplicate sample for tritium was collected at location 008A. A matrix spike sample was collected at location 009. Two rinsate samples were collected. Lab duplicate samples for plutonium-238 were analyzed at locations 006 and 010. A lab duplicate sample for tritium was analyzed at 009A. The radiation survey of the area by the USEPA showed an ambient radiation field of 18  $\mu$ R/hr. The sample locations and the results distinguishable from background are shown on Figure 27.

Tritium was not detected in the sediment at locations 005, 005A, 005B, or 010, which is consistent with previous non-detect results at location 002. Tritium was not detected ( $< 100$  pCi/l) at 010, which was collected at the former location of 001 (1992), which contained  $130 \pm 80$  pCi/L. Tritium was detected at the four remaining locations within the ravine:  $3,500 \pm 200$  pCi/L at 006 ( $10,800 \pm 300$  pCi/L was detected in 1992 at 003);  $2,900 \pm 200$  pCi/L at 007 ( $9,810 \pm 330$  pCi/L was detected in 1992 at 004);  $5,400 \pm 200$  pCi/L at 008 (not previously sampled); and  $3,900 \pm 200$  pCi/L at 009. Tritium was below detection limits in all samples on either side of the ravine. USEPA split samples at locations 005, 006, 007, 008, and 009 confirmed these results although USEPA's results at 008 and 009 were approximately 1,000 pCi/L greater.

Cesium-137 was detected at the following sample locations in pCi/g(dry): 005 ( $0.22 \pm 0.04$ ), 005A ( $0.15 \pm 0.05$ ), 005B ( $0.39 \pm 0.05$ ), 006 ( $0.19 \pm 0.03$ ), 006A ( $0.16 \pm 0.04$ ), 006B ( $0.23 \pm 0.06$ ), 007 ( $0.22 \pm 0.04$ ), 007A ( $0.12 \pm 0.04$ ), 007B ( $0.30 \pm 0.05$ ), 008 ( $0.12 \pm 0.05$ ), 008A ( $0.25 \pm 0.05$ ), 008B ( $0.24 \pm 0.02$ ), 009 ( $0.15 \pm 0.02$ ), 009A ( $0.19 \pm 0.04$ ), and 009B ( $0.36 \pm 0.05$ ). These results were consistent with USEPA's results and with results of sampling in 1992.

Plutonium-238 and plutonium-239 were below detection limits in all samples analyzed in 1994. The plutonium-238 result of  $0.19 \pm 0.06$  pCi/g(dry) at location 001 (location 010 in 1994) was not confirmed.

Radionuclide sample results are summarized in Table 33. Sample results are discussed further in Section 8.0.

On March 9, 1994, samples were also collected from three boring locations along the Rocketdyne property boundary at surface and at 2.5 feet below ground surface. The borings were designated as BB-17-B001 through B003. These samples were also analyzed for tritium, strontium-90, and gamma scan. A field duplicate sample was collected at B003 at surface for isotopic plutonium. USEPA collected split samples at B001 at the surface and at 2.5 feet below ground surface. A lab duplicate for tritium was analyzed of a sample collected from B003 at 2.5 feet below ground surface. The sample locations and results distinguishable from background are shown on Figure 26.

Tritium was detected at  $7,600 \pm 300$  pCi/L in sample B002 at 2.5 feet below ground surface. Tritium was not detected in the surface sample at B002. Tritium was also detected at  $300 \pm 110$  pCi/L in sample B001 at 2.5 feet below ground surface. This result was confirmed by the USEPA result. Tritium was not detected in the surface sample at B001. Tritium was not detected in either sample at B003. Cesium-137 was detected at  $0.12 \pm 0.04$  pCi/g(dry) in the surface sample at B001 and at  $0.13 \pm 0.04$  pCi/g(dry) in the surface sample at B002. Cesium-137 was below detection limits in all samples at 2.5 feet below ground surface and in the surface sample at B003. Isotopic plutonium was below detection limits at all boring sample locations.

Sampling results are discussed further in Section 8.0. Radionuclide results are summarized in Table 33.

### **7.13 SODIUM BURN PIT WATERSHED (BB-18)**

In 1992, the former Sodium Burn Pit Watershed was sampled approximately 600 to 1,300 feet north/northeast of the former Sodium Burn Facility. The sampled area was directly down stream of two run-off channels from the Facility. The natural drainage slopes away from the Sodium Burn Facility toward the north (toward the Brandeis-Bardin Institute); any runoff would collect into one of two channels. The first runs from the center of the former Sodium Burn Pit Facility and crosses the property line approximately 400 feet toward the north/northeast. The initial sampling location (Block 001B) in this channel was approximately 150 feet beyond the Rocketdyne property line. The second channel collects runoff from the eastern area of the former Sodium Burn Facility and crosses the property line approximately 650 feet towards the northeast. The initial sampling location (Block 001A) in this channel was approximately 25 feet beyond the Rocketdyne property line. At the location where these two channels converged on the Brandeis-Bardin property, the initial sediment sample was collected at Block 001. These drainage channels are hydrologically connected to Campsite Area 1 (located downgradient).

Leg B of the drainage area (Blocks 001B, 002B, and 003B) was a very narrow channel with relatively steep rock outcrops on either side. Leg A (Blocks 001A, 002A, and 003A) was less narrow but heavily vegetated with woody scrub, trees, and poison oak. The area around

Block 001 was the most level and open, and below this point, the ravine narrowed again (Blocks 002 and 003).

Samples were collected in 1994 to confirm that mercury detected in the 1992 round of sampling had been removed from the area where legs A and B of the drainage converged. In January and February 1994, the area was excavated and soil was collected in three 55-gallon drums. (The drums were observed during the sampling in 1994.) Several stakes from the 1992 round of sampling were identified when identifying sampling locations.

On March 10, 1994, seven sediment samples were collected from the watershed in the vicinity of the excavation according to the approved Workplan. Three samples, two upgradient (006A and 006B) and one downgradient (004), were collected beyond the limits of the excavation. Four samples (005, 005A, 005B, and 005C) were collected within the excavated area and near sample location 001 where mercury was previously detected at 0.35 mg/kg. USEPA and the Brandeis-Bardin consultant analyzed sample 006B for mercury. The sample locations and the results are shown on Figure 28.

Mercury was not detected in the samples within the excavated area. Mercury was detected at 0.12 mg/kg at Block 006B, which was beyond the limits of the excavated area. A laboratory duplicate of the sample was analyzed by the McLaren/Hart laboratory was below detection limits (0.10 mg/kg). A split sample from Block 006B were analyzed by the USEPA and Brandeis-Bardin. The result from the USEPA analysis indicated mercury was below detection limits (0.09 mg/kg). Mercury was detected in the split sample analyzed by the Brandeis-Bardin consultant at a concentration of 0.14 mg/kg. (See Section 8.0 for further discussion.) Mercury results are summarized in Table 34.

#### **7.14 SODIUM REACTOR EXPERIMENT WATERSHED (BB-19)**

Building 143, the Sodium Reactor Experiment (SRE) Watershed was sampled immediately below the Rocketdyne property line. The sampled area was directly downstream from the SRE in the run-off creek bed. The SRE is surrounded on three sides by rock outcrops and any surface runoff from the area drained to the northeast.

The drainage area was heavily vegetated with woody scrub and large areas of poison oak. A path was made along the less vegetated western side of the ravine until the property line was reached. A path was cut along the creek bed between the property line and the cliff dropping off toward Brandeis-Bardin Institute. The sample locations relative to the property line were only an approximation, since the actual property line was not easy to ascertain from this area. Samples were collected in 1994 to assess the strontium-90 and cesium-137 previously detected in two samples in the watershed. Several stakes from the 1992 round of sampling were identified when identifying sample locations.

On March 10, 1994, five sediment samples were collected along the creek bed according to the approved Workplan. Samples collected in 1994 were approximately from the same locations as 1992, with the addition of one sample approximately 100 feet upgradient (closer to the Rocketdyne property) from the previous upgradient sample. Samples were analyzed for strontium-90 and gamma scan. The USEPA collected split sediment samples at locations 005 and 006. The Brandeis-Bardin consultant collected a split sediment sample at location 007. Rinsate samples were collected at locations 005 and 006. The radiation survey of the area by the USEPA showed an ambient radiation field of 16 to 17  $\mu\text{R/hr}$ . The sample locations and the results distinguishable from background are shown on Figure 29.

Cesium-137 was detected in three samples (005, 006, and 008) at concentrations of 0.045 to 0.056 pCi/g(dry). The USEPA split samples confirmed these results ( $0.05 \pm 0.01$  pCi/g(dry) at 005 and  $0.06 \pm 0.02$  pCi/g(dry) at 006). These 1994 results did not match the concentrations detected in 1992 ( $0.30 \pm 0.05$  pCi/g(dry) at 001 and  $0.24 \pm 0.06$  pCi/g(dry) at 002). Strontium-90 was detected at  $0.12 \pm 0.08$  pCi/g(dry) at 006 and  $0.061 \pm 0.041$  pCi/g(dry) at 009. These results are consistent with concentrations detected in 1992.

Sample results are discussed further in Section 8.0. Radionuclide results are summarized in Tables 35.

#### **7.15 CAMPSITE AREA 1 DRAINAGE (BB-20)**

The Campsite Area 1 Drainage is a continuation of the drainage from the Building 59 Watershed to Campsite Area 1. (Originally it was believed to be continuous with the

Radioactive Materials Disposal Facility (RMDF) Watershed, but a separate drainage to Campsite Area 1 from the RMDF was identified during sampling. Accessibility to the entire drainage was impeded by steep slopes; sampling in the drainage was initiated approximately 1200 feet downgradient of the northern-most sample in the Building 59 Watershed. Sample 001 was collected adjacent to an abandoned water tank. From sample locations 001 to 003, the drainage channel flows to the west. A second drainage joined the main drainage between location 001 and 002. At location 003 a third drainage (which was sampled at location 004) joined the main drainage channel and the drainage turned sharply to the north. The drainage from the RMDF joined the main drainage approximately 50 feet south of location 009. Samples were collected from the Campsite Area 1 Drainage to evaluate whether radionuclides detected in the Building 59 Watershed were present further downgradient on the Brandeis-Bardin property.

On March 8, 1994, ten sediment samples were collected along the drainage area leading to Campsite Area 1 according to the approved Workplan. Samples were spaced approximately 250 feet apart, except when conditions prohibited collecting a sample at that distance. Samples were analyzed for tritium, gamma scan, and strontium-90. The USEPA collected split sediment samples at locations 001, 003, 004, 006, and 007. The Brandeis-Bardin consultant collected split sediment samples at locations 001, 003, and 009. Field duplicate samples were collected at locations 003 (tritium) and 005 (gamma scan). A matrix spike sample was collected at 010 for gamma scan and at 008 for strontium-90. Rinsate samples were collected at locations 001, 002, and 006. Lab duplicate samples were analyzed at 004 (strontium-90), 005 (tritium), and 010 (strontium-90). The radiation survey of the area by the USEPA showed an ambient radiation field of 17 to 20  $\mu$ R/hr. The sample locations are shown on Figure 30.

Tritium results in the Campsite Area 1 Drainage were all below detection limits. Cesium-137 was detected at location 001 at  $0.11 \pm 0.037$  pCi/g(dry) and at 009 at  $0.076 \pm 0.036$  pCi/g(dry). The cesium-137 results were confirmed by the Brandeis-Bardin consultant results at both locations. Strontium-90 was detected at one location 004 at 0.18 pCi/g(dry). Sample results are further discussed in Section 8.0. Radionuclide results are summarized in Table 36.

A surface water sample was collected from a pool of running water near sample location 010. The water flowed along the rock and collected in a pool at the point where the samples were

collected. Samples were analyzed for gross alpha/beta activity and tritium. USEPA collected a split sample which they also analyzed for gamma scan. Gross beta activity was detected at  $15 \pm 3$  pCi/L. Tritium and gross alpha activity was below detection limits in the sample collected, which was confirmed by the USEPA results. Cesium-137 results for USEPA were also below detection limits. Radionuclide results are summarized in Table 37.



## 8.0 DISCUSSION OF RESULTS

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In Section 4.0, the quality assurance/quality control (QA/QC) results were presented, and in Sections 6.0 and 7.0, the sampling results were discussed by Sampling Area. After summarizing the results of the QA/QC samples, a generalized discussion of all the results by analysis and sampling media is presented in this section.

### 8.1 QUALITY ASSURANCE/QUALITY CONTROL

As discussed in Section 3.0, quality assurance/quality control (QA/QC) samples were collected throughout the project so that the results of the study represent the concentrations of chemicals and radionuclides in the sampling areas. Although six types of QA/QC samples were collected and analyzed, the blind field duplicates and split samples (including interlaboratory split samples) are key representations of data quality because the samples were analyzed blindly as if they came from different sources and, in the case of split samples, were analyzed by entirely different laboratories. Laboratory duplicate samples, while not analyzed blindly, also provide perspective on the consistency of the data. A summary of the percentage that blind field duplicate, split samples, pre-spiked samples, and laboratory duplicates were in agreement<sup>5</sup> or not in agreement with the respective scheduled sample for each analyte is presented in Figure 5 for soil/sediment samples and Figure 6 for surface water samples.

As shown in Figure 5, the soil/sediment samples were in 100 percent agreement for plutonium-238 and plutonium-239. For the strontium-90 analysis, the detection limits used by USEPA and the Brandeis-Bardin consultant were approximately an order of magnitude greater than that used by Teledyne Isotopes, resulting in the Teledyne results being below the detection limits reported for the split samples. One split sample analyzed by DHS for

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<sup>5</sup> In agreement for samples analyzed for radionuclides means that the difference between the scheduled sample results and the QA/QC results was less than the sum of the standard deviations of the sample results.

strontium-90 was not in agreement with the Teledyne Isotopes result. Strontium-90 samples were in agreement 98 percent of the time. For plutonium-239 and plutonium-239, DHS was the only lab to detect plutonium-238 in two split samples, but, due to DHS's low detection limit, their results were below the detection limit of the Teledyne Isotopes results. Tritium samples were in agreement 94 percent of the time. Cesium-137 samples were in agreement 91 percent of the time.

As shown in Figure 6, the surface water samples were in 100 percent agreement for tritium, gross alpha radioactivity scan, plutonium-238, and plutonium-239. Plutonium-238 was in 100 percent agreement as results at all labs were below detection limits. Gross beta radioactivity and strontium-90 samples were 83 percent in agreement, and gamma scan samples were 82 percent in agreement.

As shown in Figure 5, 96 percent of the QA/QC soil/sediment samples, *i.e.*, field duplicates, rinsate samples, split samples, pre-spiked samples, and lab duplicates compared to their respective scheduled sample, were in agreement. Matrix spike/matrix spike duplicates (MS/MSD) indicated that matrix interferences did not impact sample results. Equipment rinsates indicated that cross contamination between samples analyzed did not occur. The QA/QC soil/sediment samples validate the data.

As shown in Figure 6, 88 percent of the QA/QC water samples compared to their respective scheduled sample were in agreement. The QA/QC water samples validate the data.

The tritium results presented in this report were validated by the laboratory and by the QA/QC protocol established for this project. Four of the original 147 soil/sediment samples at the study areas and background areas analyzed for tritium, were withdrawn by the laboratory because the laboratory could not validate the tritium concentration as a low yield of water (2 ml or less) had been extracted from the original sample. The low yield of water impacted the reported value and associated error. An adjacent sample to one of the four samples was reanalyzed and a significantly better yield was obtained. The result of this reanalysis was used in this report upon the consensus of the representative of the USEPA, the DHS, and the consultant to Brandeis-Bardin.

## **8.2 RESULTS BY ANALYSIS**

### **8.2.1 Mercury**

Mercury was below detection limits in the four sediment samples collected from the area of Sodium Burn Pit Watershed (BB-18) that had been excavated following the results of sampling in 1992. Mercury was found in one (0.12 mg/kg) of the three sediment samples collected outside but in the vicinity of the excavated area. The results from this sample were not confirmed by an analysis of a laboratory duplicate of the sample or by interlaboratory split samples with the USEPA. The interlaboratory split with the Brandeis-Bardin consultant indicated a concentration of 0.14 mg/kg.

### **8.2.2 Tritium**

Tritium was not detected in any of the 50 samples collected in the human activity areas in 1994. Tritium samples were collected in four ravine/drainage areas in 1994. Tritium was not detected in samples collected from the RD-51 Watershed or Campsite Area 1 Drainage. The majority of tritium concentrations in background samples were below detection limits. For this reason, twice the maximum detection limit was used as a benchmark to assess concentrations of tritium detected in 1994 to account for laboratory variability before declaring a sample above background. The detection limit for tritium ranged from less than 100 to 300 pCi/L, therefore; the background concentration used to assess the tritium detected in 1994 was 600 pCi/L.

Sample results in the Radioactive Materials Disposal Facility (RMDF) Watershed (BB-16) sediments indicated that concentrations of tritium were not present further downgradient from the RMDF than previously detected in 1992. Concentrations in the RMDF Watershed in 1994 ranged from less than 100 to  $230 \pm$  pCi/L. Tritium was only detected one order of magnitude above the detection limits in the Building 59 Watershed (BB-17) and borings located upgradient from the watershed. Concentrations of tritium in the Building 59 Watershed in 1994 ranged from less than 100 to  $5,400 \pm 200$  pCi/L. Tritium was only detected in samples in the ravine and not on either side as indicated by the results from the samples that spanned the ravine five feet on either side. In a boring located above the Building 59 Watershed,

tritium was detected at  $7,600 \pm 300$  pCi/L. Because tritium was not detected in samples in the Campsite Area 1 Drainage, which is directly downgradient of the Building 59 Watershed, the impact of tritium in the Building 59 Watershed is limited to the area sampled near Rocketdyne property boundary. The results in these Watersheds were confirmed by split samples by the USEPA, the DHS, and the Brandeis-Bardin consultant.

Tritium was not detected above the detection limits in the surface water samples collected at Campsite Area 2 and at the Campsite Area 1 Drainage. The California drinking water standard for tritium is 20,000 pCi/L (22 California Code of Regulations (CCR) 64443).

### 8.2.3 Strontium-90

Strontium-90 samples were collected in three of the ravine/drainage sampling areas. The results in these Watersheds were confirmed by split samples by the USEPA, the DHS, and the Brandeis-Bardin consultant. Strontium-90 results from 1994 and 1992 (one result for each unique sampling location) were compared statistically to background results using the Behrens-Fisher t-Test for each of the three ravines. As a result of the analysis, the strontium-90 results at the Sodium Reactor Watershed Building 59 Watershed and Campsite Area 1 Drainage were not identified as statistically different from the background sampling results. The strontium-90 results for the borings at the RMDF Watershed were also not identified as statistically different from the background sampling results. The strontium-90 results for the RMDF Watershed were considered statistically different with a mean of 0.103 pCi/g(dry) compared to the mean of strontium-90 in background samples of 0.052 pCi/g(dry). A summary of background versus sample areas that are statistically different is presented in Table 38. Strontium-90 was detected in all five of the samples collected in 1994 and five of the six samples collected in 1992. A graphical evaluation of the strontium-90 data obtained from samples collected in the RMDF Watershed is presented in Figure 8 of Appendix F. However, strontium-90 was not detected in the samples collected by the USEPA or the Brandeis-Bardin consultant because the detection levels used ranged from 0.5 to 0.74 pCi/g(dry), values two to three times higher than the highest concentration of strontium-90 detected in soil or sediment in the RMDF watershed. Strontium-90 concentrations were detected in one of the DHS split samples in the same range as the scheduled result.

It should also be noted that had the Wildwood Regional Park Strontium-90 results been included in the aggregate background data, the RMDF Watershed results would have become statistically insignificant. It may be noted that a cleanup of a spill of Strontium-90 bearing radioactive materials near RMDF Watershed was completed in 1978. Potential exposure pathways and doses were evaluated and the results summarized in an environmental evaluation report in February, 1982. The evaluation concluded that the potential doses of residual radionuclides in the soil were orders-of-magnitude lower than the release limits for unrestricted use.

#### 8.2.4 Cesium-137

Four of the ravines/drainages were sampled and a gamma scan analysis conducted. The results in these Watersheds were confirmed by split samples by the USEPA, the California Department of Health Services (DHS), and the Brandeis-Bardin consultant. Cesium-137 results from 1994 and 1992 (one result for each unique sampling location) were compared statistically to background results using the Behrens-Fisher t-Test for each of the three ravines. As a result of the analysis, the cesium-137 results at the Radioactive Materials Disposal Facility (RMDF) Watershed, the Sodium Reactor Experiment, and Campsite Area 1 Drainage were not identified as statistically different from the background sampling results. The cesium-137 results for the borings above the RMDF and Building 59 Watersheds were also not statistically different from the background sampling results. The cesium-137 results in the Building 59 Watershed were considered statistically different with a mean of 0.20 pCi/g(dry) compared to the mean of cesium-137 in background samples of 0.087 pCi/g(dry). A summary of background versus sample areas that are statistically different is presented in Table 38. Cesium-137 was detected in all sixteen of the samples collected in 1994 and in all five of the samples collected in 1992. Unlike tritium, concentrations of cesium-137 in the 1994 samples spanned an approximately 10-foot cross-section of the ravine in five locations. Concentrations of cesium-137 in samples on the southwest side of the ravine (designated with a "B") were consistently higher than samples in the center of the ravine (no designation) or northeast of the ravine (designated "A"). Concentrations of cesium-137 detected at the top of the ravine were consistent with comparable samples (*i.e.*, samples on the same side) at the bottom of the ravine. Because concentrations of cesium-137 in the Campsite Area 1 Drainage, which is directly downgradient of the Building 59 Watershed, were not significantly different than

background, the impact of cesium-137 in the Building 59 Watershed is limited to the area sampled near the Rocketdyne property boundary. A graphical evaluation of the cesium-137 data collected in the Building 59 Watershed is presented in Figure 9 of Appendix F. It should also be noted that all cesium-137 values are within the range of cesium-137 found at Wildwood Park Ravine background location.

#### **8.2.5 Plutonium-238**

Isotopic plutonium samples were collected in two ravines during the 1994 sampling. Plutonium-238 and plutonium-239 were below detection limits in all samples collected in 1994. Thus, the plutonium-238 results from the 1992 study were not confirmed indicating that plutonium-238 is not an issue in these ravines. The results in these Watersheds were confirmed by split samples by the USEPA, the California Department of Health Services (DHS), and the Brandeis-Bardin consultant.



## 9.0 CONCLUSIONS

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In this study, soil/sediment and surface water samples were collected from nine human activity areas and six ravines/drainages at the Brandeis-Bardin Institute or the Santa Monica Mountains Conservancy. The sample locations and analyses were selected to address specific issues or questions raised after completion of the original study in 1992. Samples were also collected from five additional background areas to provide a more robust data set for the comparison of sample results. The soil/sediment samples were analyzed for tritium, isotopic plutonium (plutonium-238 and plutonium-239), strontium-90, and a gamma scan which measured 75 other radionuclides, both naturally occurring (*e.g.*, potassium-40) and man made (*e.g.*, cesium-137). Surface water was analyzed for the tritium and for gross alpha/beta radioactivity, which would serve as an indicator for the other radionuclides. The 1992 and 1994 soil/sediment results at the designated sampling areas were compared to the results from 11 background areas (sampled in 1992 and 1994) to determine if the values in the Study Areas exceeded the values in the Background Areas.

In reviewing QA/QC results, there was a high agreement between blind field duplicates, split samples, pre-spiked samples, and the laboratory duplicate samples with their respective scheduled sample. A comparison of the split samples, the blind field duplicates, the pre-spiked samples and the laboratory duplicates with the scheduled samples indicated that the overall agreement of these QA/QC samples with the scheduled samples was 96 percent (soil/sediment) and 88 percent (water). The data in this report, thus, were determined to be valid and representative.

The issues raised following the 1992 sampling activity and which were addressed by the additional 1994 sampling and the conclusions based on the data in this report are summarized in the rest of this chapter. The data presented are illustrated on Figure 31.

**Issue 1. Re-evaluation of locations for which tritium results were withdrawn or dried by the Teledyne Isotopes laboratory. Results of resampling and analyses.**

Tritium samples were collected in nine human activity areas and one ravine to replace the 1992 data withdrawn by Teledyne Isotopes. All tritium results in the nine human activity areas and one ravine were below detection limits.

**Issue 2. Confirmation of the 1992 DHS sample result of  $2,470 \pm 197$  pCi/L at Campsite Area 2. Results of resampling.**

Tritium in all samples collected at Campsite Area 2 in 1994, was below detection limits.

**Issue 3. Remediation of mercury present in the Sodium Burn Pit Watershed (BB-18) at Brandeis-Bardin in the vicinity of previously detected mercury. Results of excavation and follow-up sampling.**

Based on the sample results within the excavation, mercury previously measured in the watershed (0.35 mg/kg) has been removed within the area subsequently excavated. Mercury was not detected ( $<0.1$  mg/kg) in the four samples collected from within the excavation area. A concentration of 0.12 mg/kg of mercury, slightly above the detection limit, was reported in one of the samples upgradient from the excavation. However, an analysis of a laboratory duplicate of the sample and analysis of an interlaboratory duplicate by the USEPA were below the detection limit ( $<0.1$  and  $<0.09$  mg/kg, respectively). Analysis of the interlaboratory duplicate by Brandeis-Bardin indicated a concentration of 0.14 mg/kg. Thus, the mercury (0.35 mg/kg) detected in the Sodium Burn Pit Watershed in 1992 was removed by excavation. Mercury at near detection level may be present upgradient from the excavation.

**Issue 4. Determination whether the plutonium-238 detected in 1992 in the RD-51 and Building 59 Watersheds is representative of a concentration distinguishable from background plutonium-238. Results of additional sampling and statistical comparison.**

Plutonium-238 was not detected in any samples collected in either watershed in 1994. The results of the 1992 study were not confirmed by 1994 study results.

**Issue 5. Determination whether strontium-90 in the Sodium Reactor Experiment Watershed is statistically different than background. Results of additional sampling and statistical comparison.**

The collection of additional data in 1994 allowed for a statistical comparison of strontium-90 concentrations in the Sodium Reactor Experiment Watershed. Based on these results, watershed concentrations were not considered statistically different than background.

**Issue 6. Determination whether concentrations of tritium, cesium-137, and strontium-90 in the Radioactive Materials Disposal Facility Watershed are greater than background. Results of additional sampling and comparison of the results with the background data.**

Since a significant number of background results for tritium were below the detection limit, an analysis of variance for tritium was not conducted on the data set. Tritium results for the RMDF watershed samples collected in 1994 indicate that the RMDF is not significantly different from background results. Strontium-90 results are statistically different from the background results. Cs-137 results were not statistically different from background results.

**Issue 7. Determination whether concentrations of tritium and cesium-137 in the Building 59 Watershed are greater than background. Results of additional sampling and comparison of the results with the background data.**

Since significant number of background results for tritium were below the detection limit an analysis of variance for tritium was not conducted on the data set. Tritium at elevated levels, but about 50 percent or more below the MCL for drinking water (20,000 pCi/l), was measured in the samples collected in the ravine of the Building 59 Watershed. These elevated tritium levels were confirmed by split samples by the USEPA and the Brandeis-Bardin consultant, and are significantly different than background. Based on results using the Behrens-Fisher t-Test cesium-137 results are statistically different from background sampling.

**Issue 8. Determination of whether tritium, cesium-137, or strontium-90 impacted the Campsite Area 1 Drainage Area leading to Campsite Area 1. Results of additional sampling in the drainage and comparison of results with the background data.**

Tritium was not detected in samples collected in the Campsite Area 1 Drainage Area. Cesium-137 and strontium-90 was detected in two of the 10 samples collected in the Campsite Area 1 Drainage Area. The results were compared statistically to background results using the Behrens-Fisher t-Test. Cesium-137 and strontium-90 results were not statistically different from background sampling results. A 1,200-foot section of drainageway from the lowest sampling point of the Building 59 Watershed (009, Figure 27) and the uppermost sample (001, Figure 30) of the Campsite Area 1 Drainage was not sampled due to the steepness of the terrain and vegetation constraints.



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## *Tables*

TABLE 1

## SUMMARY OF ADDITIONAL (1994) SOIL SAMPLING

Sample Area	Analysis	Number of Samples	Rationale
<b>Background Areas</b>			
Rocky Peak (BG-01)	Tritium Strontium-90 Gamma Scan Isotopic Plutonium	5 5 5 5	Background site located 2 miles from SSFL. Five additional locations were sampled in the original gridded area. Both the original and new data are used as background.
Santa Susana Park (BG-02)	Tritium Strontium-90 Gamma Scan Isotopic Plutonium	5 5 5 5	Background site located 1.5 miles from SSFL. Original tritium data analyzed by the gas counting method were withdrawn by the laboratory in 1992. Two additional locations and three of the original locations were sampled in the original gridded area.
Happy Camp (BG-05)	Tritium Strontium-90 Gamma Scan Isotopic Plutonium	5 5 5 5	Background site located 12.5 miles from the SSFL. Two additional locations were sampled in the original gridded area. Both the original and new data are used as background.
Wildwood Regional Park (BG-09)	Tritium Strontium-90 Gamma Scan Isotopic Plutonium	5 5 5 5	Background site located 13 miles from the SSFL to indicate background levels of radionuclides in an undisturbed flat area.
Wildwood Regional Park - Ravine (BG-10)	Tritium Strontium-90 Gamma Scan Isotopic Plutonium	5 5 5 5	Background site located 13 miles from the SSFL to indicate background levels of radionuclides in a ravine.
Tapia County Park (BG-11)	Tritium Strontium-90 Gamma Scan Isotopic Plutonium	5 5 5 5	Background site located 10 miles from the SSFL to indicate background levels of radionuclides in an undisturbed flat area.
Tapia County Park - Ravine (BG-12)	Tritium Strontium-90 Gamma Scan Isotopic Plutonium	5 5 5 5	Background site located 10 miles from the SSFL to indicate background levels of radionuclides in a ravine.
Rocky Peak Ravine (BG-14)	Tritium Strontium-90 Gamma Scan Isotopic Plutonium	5 5 5 5	Background site located 2 miles from the SSFL to indicate background levels of radionuclides in a ravine.
<b>Brandeis-Bardin Institute</b>			
Dormitory Area (BB-02)	Tritium	5	Original tritium data analyzed by the gas counting method were withdrawn by the laboratory in 1992.
Campsite Area 1 (BB-03)	Tritium	5	Original tritium data analyzed by the gas counting method were withdrawn by the laboratory in 1992.
	Tritium	5	Five additional blocks were selected to provide additional characterization.

**TABLE 1 (continued)**  
**SUMMARY OF SOIL SAMPLING**

Sample Area	Analysis	Number of Samples	Rationale
Campsite Area 2 (BB-04)	Tritium	5	Original sample blocks were resampled to evaluate the validity of the 1992 DHS sample result. Five additional blocks were selected to evaluate the validity of the 1992 DHS sample result.
	Tritium	5	
Picnic Area (BB-05)	Tritium	5	Original tritium data analyzed by the gas counting method were withdrawn by the laboratory in 1992.
House of the Book (BB-06)	Tritium	5	Original tritium data analyzed by the gas counting method were withdrawn by the laboratory in 1992.
Main House Orchard (BB-12)	Tritium	5	Original tritium data analyzed by the gas counting method were withdrawn by the laboratory in 1992.
Avocado Grove (BB-13)	Tritium	5	Original tritium data analyzed by the gas counting method were withdrawn by the laboratory in 1992.
Old Well Campsite (BB-14)	Tritium	5	Original tritium data analyzed by the gas counting method were withdrawn by the laboratory in 1992.
RD-51 Watershed (BB-15)	Tritium	5	Original tritium data analyzed by the gas counting method were withdrawn by the laboratory in 1992. Five samples were collected to determine whether plutonium-238 reported in the vicinity of the RD-51 watershed is statistically different from background.
	Isotopic Plutonium	5	
Radioactive Materials Disposal Facility Watershed (BB-16)	Tritium	15	Five samples collected to determine whether tritium, strontium-90, and cesium-137 reported in the vicinity of the RMDF Watershed are statistically different from background. Five samples were collected at surface and at depth at locations between the RMDF and Building 59 watersheds.
	Strontium-90	15	
	Gamma Scan	15	
Building-59 Watershed (BB-17)	Tritium	22	Sixteen samples collected to characterize tritium in the soil in the Building-59 Watershed. Sixteen samples collected to determine whether cesium-137 and plutonium-238 reported in the vicinity of the Building-59 Watershed are statistically different from background. Three additional samples were collected at the surface and at depth at locations between the RMDF and Building 59 watersheds.
	Gamma Scan	22	
	Isotopic Plutonium	22	
Sodium Burn Pit Watershed (BB-18)	Mercury	7	Seven samples were collected to document that mercury within the Sodium Burn Pit Watershed was removed.
Sodium Reactor Experiment Watershed (BB19)	Gamma Scan	5	Five samples were collected to determine whether strontium-90, and cesium-137 reported in the vicinity of the Sodium Reactor Experiment Watershed are statistically different from background.
	Strontium-90	5	
Campsite-1 Drainage Way (BB-20)	Tritium	10	Ten sample locations within the drainage way between Campsite Area 1 and the Building 59/RMDF Watersheds to determine potential impact below the areas documented in 1992.
	Strontium-90	10	
	Gamma Scan	10	

**TABLE 1 (continued)**  
**SUMMARY OF SOIL SAMPLING**

Sample Area	Analysis	Number of Samples	Rationale
<b>Santa Monica Mountains Conservancy</b>			
Former Rocketdyne Employee Shooting Range (SM-03)	Tritium	5	Original tritium data analyzed by the gas counting method were withdrawn by the laboratory in 1992.

TABLE 2

SAMPLE CONTAINER AND PRESERVATION SPECIFICATIONS

Analytical Parameter	Container Size	Container Type	Sample Handling	Preservative	Holding Time <sup>a</sup>
<b>Soil Samples</b>					
Mercury	6-inch	brass tube <sup>b</sup>	N/A	none	28 days
Strontium-90	6-inch	brass tube <sup>b</sup>	N/A	none	N/A
Isotopic Plutonium	6-inch	brass tube <sup>b</sup>	N/A	none	N/A
Gamma Scan	6-inch	brass tube <sup>b</sup>	N/A	none	N/A
Tritium	1 quart	glass jar	N/A	none	N/A
<b>Water Samples</b>					
Strontium-90	1 liter	plastic bottle	filtered <sup>c</sup>	4 ml HNO <sub>3</sub> <sup>d</sup>	N/A
Gamma Scan	1 liter	plastic bottle	filtered <sup>c</sup>	4 ml HNO <sub>3</sub> <sup>d</sup>	N/A
Tritium	1 liter	glass bottle	filtered <sup>c</sup>	none	N/A
Gross alpha and beta scan	1 liter	plastic bottle	filtered <sup>c</sup>	2 ml HNO <sub>3</sub> <sup>d</sup>	N/A

N/A = Not Applicable

- a Holding time from day of collection to extraction.
- b A 1-gallon resealable plastic bag was used for split samples.
- c Samples are filtered in the field using a 0.45 micron Whatman glass fiber filter.
- d 1:1 solution of 16 molar nitric acid and distilled/deionized water.

TABLE 3

FIELD QUALITY ASSURANCE CONTROL SAMPLE REQUIREMENTS\*

Analytical Parameter	Field Rinsate Blank		Blind Field Duplicate	Field Blanks	Pre-spiked Blind Duplicate	MS/MSD
	Required Volume	No. of Analyses	No. of Analyses	No. of Analyses	No. of Analyses	No. of Analyses
<b>Soil Samples</b>						
Strontium-90	2 liters	4	4	N/A	0	4
Isotopic Plutonium	2 liters	4	4	N/A	0	4
Gamma Scan	2 liters	5	4	N/A	0	5
Tritium	1 liter	8	8	N/A	7	8
<b>Water Samples</b>						
Isotopic Plutonium	2 liters	0	0	0	4	0
Strontium-90	2 liters	1	0	1	4	0
Gamma Scan	2 liters	1	0	1	4	0
Tritium	1 liter	1	0	1	2	0
Gross alpha and beta scan	1 liter	1	0	1	4	0

N/A = Not Applicable (Field blanks are for water samples only and consist of distilled water placed in sample containers at a field location)

MS/MSD = Matrix Spike/Matrix Spike Duplicate

\* = Based on the following number of soil analyses

- Tritium - 147
- Strontium-90 - 70
- Cesium-137 - 92
- Isotopic Plutonium - 67

**TABLE 4**  
**QUALITY ASSURANCE/QUALITY CONTROL SOIL/  
 SEDIMENT SAMPLE LOCATIONS**

Sample Location	Sample Block Number	Field Rinsate Blank	Blind Field Duplicate	Matrix Spike/Matrix Spike Duplicate
Dormitory Area (BB-02)	045			Tritium
Campsite 1 (BB-03)	026			Tritium
Campsite 2 (BB-04)	021	Tritium	Tritium	
Picnic Area (BB-05)	089		Tritium	
House of the Book (BB-06)	092			Tritium
Avocado Grove (BB-13)	024	Tritium		
RD-51 Watershed (BB-15)	001			Tritium
	006	Pu		
	009		Pu	
RMDF Watershed (BB-16)	006		Cs-137	
	007		Tritium, Sr-90	
Building 59 Watershed (BB-17)	B001-Surface	Tritium		
	B003-Surface		Pu	
	005	Pu		
	006A			Tritium
	007B			Pu
	008A	Cs-137	Tritium	
Sodium Reactor Experiment Watershed (BB-1)	009A			Cs-137
	005	Sr-90		
Campsite 1 Drainage (BB-20)	006	Cs-137		
	001	Sr-90		
	002	Cs-137	Tritium	
	005		Cs-137	
	006	Tritium		
	008			Sr-90
Shooting Range (SM-03)	010			Cs-137
	012	Tritium		
Rocky Peak (BG-01)	016	Pu	Sr-90	
	034		Tritium	
	082			
	087	Cs-137	Pu	
	090	Sr-90	Cs-137	
Santa Susana Park (BG-02)	017			Cs-137
	076	Tritium		
	085			Pu
Happy Camp (BG-05)	017		Cs-137	
	027			Tritium
	050			Sr-90

Pu - Isotopic Plutonium (Plutonium-238 and -239)  
 Sr-90 - Strontium-90  
 Cs-137 - Cesium-137

**TABLE 4 (continued)**  
**QUALITY ASSURANCE/QUALITY CONTROL SOIL/  
 SEDIMENT SAMPLE LOCATIONS**

Sample Location	Sample Block Number	Field Rinsate Blank	Blind Field Duplicate	Matrix Spike/Matrix Spike Duplicate
Wildwood Regional Park (BG-09)	003		Sr-90, Pu	
	005	Cs-137		
	013		Sr-90	
	057	Pu	Tritium	
	096	Sr-90		
Wildwood Regional Park Ravine (BG-10)	001	Tritium		
	002		Cs-137	
Tapia County Park (BG-11)	010			Sr
	031			Tritium
	036		Tritium	
Tapia County Park Ravine (BG-12)	001			Pu
	004			Cs-137
Rocky Peak Ravine (BG-14)	001	Tritium		Sr-90
	002			Pu
	003			Cs-137
	005			Tritium

Pu - Isotopic Plutonium (Plutonium-238 and -239)

Sr-90 - Strontium-90

Cs-137 - Cesium-137

**TABLE 5  
MATRIX SPIKE/MATRIX SPIKE DUPLICATE DATA**

	Spike Identification	Spike Concentration (pCi/g)	1st Run (pCi/g)	2nd Run (pCi/g)	3rd Run (pCi/g)	Spike Recovery	Spike Duplicate Recovery	Relative Percentage Difference
	BB-17-009A-MG	0.56	0.199	0.715	0.764	92	101	7
	BB-20-010-MG	0.64	<0.005	0.746	0.822	117	128	10
	BG-02-017-MG	0.62	0.168	0.877	0.866	114	113	1
	BG-12-004-MG	0.7	0.0741	0.943	0.949	124	125	1
	BG-14-003-MG	0.58	0.0846	0.57	0.761	84	117	29
	BB-17-007B-MP	0.33	<0.008	0.35	0.31	106	94	12
	BG-02-085-MP	0.66	<0.02	0.63	0.58	95	85	8
	BG-12-001-MP	0.33	<0.006	0.32	0.29	97	88	10
	BG-14-002-MP	0.33	<0.001	0.31	0.32	94	97	3
	BB-20-008-MS	3.8	0.11	3.9	3.9	100	100	0
	BG-05-050-MS	3.8	<0.2	3.8	3.9	100	103	3
	BG-11-010-MS	3.8	0.099	3.9	4.1	100	105	5
	BG-14-001-MS	3.8	<0.07	4	4	105	105	0
	BB-02-045-MT	2700	<200	3100	2900	114	107	7
	BB-03-026-MT	14000	<100	15000	17000	107	121	13
	BB-06-092	2700	<100	3000	3300	111	122	10
	BB-15-001-MT	3500	<300	3300	3800	94	109	14
	BB-17-006A-MT	1400	<100	1400	1700	100	121	19
	BG-05-027-MT	3500	<300	3500	3700	100	106	6
	BG-11-031-MT	7000	<700	7900	8400	113	120	6
	BG-14-005-MT	14000	1300	16000	15000	105	98	6

Spike Recovery = (2nd run - 1st run/spike amount x 100)

Spike Duplicate Recovery = (3rd run - 1st run/spike amount) x 100

Relative Percent Difference = (2nd run - 3rd run / (2nd run + 3rd run) x .50) x 100

1st Run: Aliquot from original sample analysed prior to spiking sample.

2nd Run: Additional aliquot extracted from original sample and spiked with specified concentration of analyte.

3rd Run: Third aliquot extracted from original sample and spiked with specified concentration of analyte.

TABLE 6

## PRE-SPIKED BLIND DUPLICATE SAMPLE RESULTS

Radionuclide*	True Value pCi/L	USEPA Results		McLaren/Hart Results		Brandeis-Bardin Results		California Department of Health Services Results	
		Activity pCi/L	% Deviation	Activity pCi/L	% Deviation	Activity pCi/L	% Deviation	Activity pCi/L	% Deviation
Gross Alpha Radiation	43.7	38.1 ± 8.1	-12.8	41 ± 5	-6.2	NR		79.8 ± 6.7	82.6
		31.6 ± 7.5	-27.7	41 ± 5	-6.2	NR		41.6 ± 3.7	-4.8
Gross Beta Radiation	84.0	94.1 ± 11.1	12.1	100 ± 10	19.1	NR		114.8 ± 5.4	36.7
		81.7 ± 10.5	-2.7	96 ± 5	14.3	NR		75.7 ± 5.5	-9.9
Tritium in Soil	Blank	< 260	0	< 200	0	< 400	0	NS	
		NS	--	< 200	0	NS	--	NS	
		NS	--	< 100	0	NS	--	NS	
Tritium in Soil	1953	1600 ± 210	-18.1	1700 ± 200	-13.0	1600 ± 340	-18.1	NS	
		NS	--	1700 ± 200	-13.0	NS	--	NS	
		NS	--	1200 ± 100	-38.6	NS	--	NS	
		NS	--	1500 ± 200	-23.2	NS	--	NS	
Tritium in Water	1953	1800 ± 210	-7.8	1700 ± 100	-13.0	2000 ± 300	2.4	1160 ± 140	-40.6
		1900 ± 210	-2.7	1800 ± 200	-7.8	1900 ± 300	-2.7	1150 ± 140	-41.1

\* - Radionuclides were spiked into water samples unless otherwise noted.

NS - Not sampled, NR - Not reported, NI - Not Identified

USEPA - United States Environmental Protection Agency

< - Less than the minimum detectable concentration (MDC) (i.e., the detection limit (DL)).

% Deviation - The percent variance from the true value.

Values in ( ) indicate a second result reported by the study participant after the source of error in the initial result was determined.

TABLE 6 (continued)  
PRE-SPIKED BLIND DUPLICATE SAMPLE RESULTS

Radionuclide*	True Value pCi/L	USEPA Results		McLaren/Hart Results		Brandis-Baron Results		California Department of Health Services Results	
		Activity pCi/L	% Deviation	Activity pCi/L	% Deviation	Activity pCi/L	% Deviation	Activity pCi/L	% Deviation
Plutonium-239	2.88	3.1 ± 0.42	7.6	2.9 ± 0.7	0.7	3.02 ± 0.43	4.9	3.178 ± 0.338	10.3
		3.0 ± 0.33	4.2	3.3 ± 0.8	14.6	2.43 ± 0.36	-15.6	3.143 ± 0.254	9.13
		NS	-	2.5 ± 0.7	-13.2	NS	-	NS	-
		NS	-	2.6 ± 0.7	-9.7	NS	-	NS	-
Strontium-90	2.2	2.1 ± 0.94	-4.	<2 (2.2 ± 1.0)	(0)	1.63 ± 0.78	-25.9	3.66 ± 0.73	66.4
		2.4 ± 0.59	9.1	<1 (2.2 ± 1.6)	(0)	2.62 ± 0.94	19.1	4.06 ± 0.60	81.1
		NS	-	<1	(-54.5)	NS	-	NS	-
		NS	-	<3 (2.3 ± 1.2)	(4.5)	NS	-	NS	-
Cadmium-109	7377	6860 ± 150	-7.0	NI (9530 ± 250)	(29.2)	8200 ± 230	11.2	8211 ± 266	11.3
		7040 ± 190	-4.6	NI (7970 ± 240)	(8.0)	4100 ± 160 (8200 ± 320)	-44.4 (11.2)	10040 ± 134	36.1
		NS	-	NI (8510 ± 170)	(13.4)	NS	-	NS	-
		NS	-	NI (9700 ± 310)	(31.5)	NS	-	NS	-

\* - Radionuclides were spiked into water samples unless otherwise noted.

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% Deviation - The percent variance from the true value.

Values in ( ) indicate a second result reported by the study participant after the source of error in the initial result was determined.

TABLE 6 (continued)  
PRE-SPIKED BLIND DUPLICATE SAMPLE RESULTS

Radionuclide*	True Value pCi/L	USEPA Results		McLaren/Hart Results		Brandeis-Bardin Results		California Department of Health Services Results	
		Activity pCi/L	% Deviation	Activity pCi/L	% Deviation	Activity pCi/L	% Deviation	Activity pCi/L	% Deviation
Cobalt-57	168	163 ± 4.55	-3.0	209 ± 21	24.4	187.8 ± 5.8	11.8	177.5 ± 7.2	5.7
		157 ± 5.59	-6.5	194 ± 19	15.5	97.8 ± 7.9 (196 ± 16)	-41.8 (16.7)	212.4 ± 5.2	26.4
		NS	--	210 ± 21	25.0	NS	--	NS	--
		NS	--	228 ± 23	35.7	NS	--	NS	--
Cesium-139	163	156 ± 4.66	-4.3	NI (207 ± 7)	(27)	180.1 ± 8.4	10.5	162 ± 7.5	-0.6
		166 ± 6.05	1.8	NI (167 ± 7)	(2.5)	89.9 ± 8.9 (180 ± 18)	-44.8 (10.4)	182.3 ± 4.6	11.8
		NS	--	NI (200 ± 6)	(22.7)	NS	--	NS	--
		NS	--	NI (199 ± 8)	(22.1)	NS	--	NS	--
Mercury-203	162	158 ± 6.1	-2.5	NI (186 ± 7)	(14.8)	250 ± 13	54.3	153 ± 9.2	-5.5
		155 ± 8.34	-4.3	NI (169 ± 7)	(4.3)	87 ± 12 (174 ± 24)	-46.3 (7.4)	171.2 ± 5.5	5.7
		NS	--	NI (188 ± 7)	(16.0)	NS	--	NS	--
		NS	--	NI (185 ± 8)	(14.2)	NS	--	NS	--

\* - Radionuclides were spiked into water samples unless otherwise noted.

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% Deviation - The percent variance from the true value.

Values in ( ) indicate a second result reported by the study participant after the source of error in the initial result was determined.

TABLE 6 (continued)  
PRE-SPIKED BLIND DUPLICATE SAMPLE RESULTS

Radionuclide*	True Value pCi/L	USEPA Results		McLaren/Hart Results		Brandeis-Bardin Results		California Department of Health Services Results	
		Activity pCi/L	% Deviation	Activity pCi/L	% Deviation	Activity pCi/L	% Deviation	Activity pCi/L	% Deviation
Tin-113	308	302 ± 8.1	-1.9	NI (240 ± 6)	(-22.1)	330 ± 17	7.1	323.3 ± 12.8	5.0
		292 ± 12.3	-5.2	NI (219 ± 8)	(-28.9)	170 ± 15 (340 ± 30)	-44.8 (10.4)	349.3 ± 8.8	13.4
		NS	-	NI (236 ± 7)	(-23.4)	NS	-	NS	-
		NS	-	NI (232 ± 8)	(-24.7)	NS	-	NS	-
Cesium-137	221	211 ± 7.47	-4.5	291 ± 29	31.7	250 ± 13	13.1	237.2 ± 12.7	7.3
		220 ± 12.5	-0.5	261 ± 26	18.1	110 ± 12 (220 ± 24)	-50.2 (-0.5)	235.7 ± 8.0	6.7
		NS	-	250 ± 28	13.1	NS	-	NS	-
		NS	-	264 ± 26	19.5	NS	-	NS	-
Yttrium-88	544	513 ± 8.75	-5.7	NI (661 ± 13)	(21.5)	280 ± 26	-48.5	664.6 ± 18.5	22.2
		515 ± 14.9	-5.3	NI (606 ± 20)	(11.4)	290 ± 24 (580 ± 48)	-46.7 (6.6)	740.4 ± 16.7	36.1
		NS	-	NI (680 ± 18)	(25.0)	NS	-	NS	-
		NS	-	NI (650 ± 21)	(19.5)	NS	-	NS	-

\* - Radionuclides were spiked into water samples unless otherwise noted.

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USEPA - United States Environmental Protection Agency

< - Less than the minimum detectable concentration (MDC) [i.e., the detection limit (DL)].

% Deviation - The percent variance from the true value.

Values in ( ) indicate a second result reported by the study participant after the source of error in the initial result was determined.

TABLE 6 (continued)  
PRE-SPIKED BLIND DUPLICATE SAMPLE RESULTS

Radionuclide*	True Value pCi/L	USEPA Results		McLaren/Hart Results		Brandeis-Bardin Results		California Department of Health Services Results	
		Activity pCi/L	% Deviation	Activity pCi/L	% Deviation	Activity pCi/L	% Deviation	Activity pCi/L	% Deviation
Cobalt-60	302	294 ± 6.42	-6.0	386 ± 39	27.8	340 ± 18	12.6	278.9 ± 11.3	-7.6
		295 ± 10.9	-2.3	229 ± 34	12.3	160 ± 15 (320 ± 30)	-47 (6.0)	315.4 ± 9.5	4.4
		NS	--	376 ± 38	24.5	NS	--	NS	--
		NS	--	370 ± 37	22.5	NS	--	NS	--

\* - Radionuclides were spiked into water samples unless otherwise noted.

NS - Not sampled, NR - Not reported, NI - Not Identified

USEPA - United States Environmental Protection Agency

< - Less than the minimum detectable concentration (MDC) [i.e., the detection limit (DL)].

% Deviation - The percent variance from the true value.

Values in ( ) indicate a second result reported by the study participant after the source of error in the initial result was determined.

TABLE 7

**SIGNIFICANT<sup>1</sup> DIFFERENCES BETWEEN THE SCHEDULED SAMPLE AND THE  
RESPECTIVE DUPLICATE  
AND/OR SPLIT SOIL/SEDIMENT SAMPLE**

Sample Location	Grid Block	Laboratory	Radionuclide	Quantity
Santa Susana Park	BG-02-074	Brandeis-Bardin Teledyne	Tritium Tritium	430 ± 150 pCi/L < 200 pCi/L
Wildwood Regional Park	BG-09-005	DHS Teledyne	Strontium-90 Strontium-90	0.20 ± 0.04 pCi/g < 0.1 pCi/g
Wildwood Regional Park Ravine	BG-10-004	DHS Teledyne	Cesium-137 Cesium-137	0.147 ± 0.014 pCi/g 0.215 ± 0.039 pCi/g
Radioactive Materials Disposal Facility Watershed	BB-16-007	USEPA Teledyne	Cesium-137 Cesium-137	0.06 ± 0.01 pCi/g < 0.04 pCi/g
Campsite 1	BB-20-001	USEPA Teledyne	Cesium-137 Cesium-137	0.04 ± 0.01 pCi/g 0.11 ± 0.037 pCi/g
Building 59 Watershed	BB-17-005	USEPA Teledyne	Cesium-137 Cesium-137	0.15 ± 0.02 pCi/g 0.218 ± 0.043 pCi/g
	BB-17-006	USEPA Teledyne	Tritium Tritium	3970 ± 262 pCi/L 3500 ± 200 pCi/L
	BB-17-007	USEPA Teledyne	Tritium Tritium	3360 ± 253 pCi/L 2900 ± 200 pCi/L
	BB-17-008	USEPA Teledyne	Tritium Tritium	6700 ± 316 pCi/L 5400 ± 200 pCi/L
	BB-17-009	USEPA Teledyne	Tritium Tritium	4790 ± 282 pCi/L 3900 ± 200 pCi/L

pCi/g - Picocuries per gram

pCi/l - Picocuries per liter

DHS - Department of Health Services

Teledyne - Teledyne Isotopes (New Jersey)

USEPA - United States Environmental Protection Agency

<sup>1</sup>Significant means that the sum of the standard error did not account for the difference between the two analytical values for radionuclide samples.

± - Plus or minus

< - Less than

TABLE 8

## WITHDRAWN TRITIUM DATA SUMMARY

Sample Location (sequence order for analysis)	Sample Type	Tritium (pCi/L)	Water Yield (ml)
BG-11-031	Matrix Spike (1st Run)	< 700	2
BG-11-031	Matrix Spike (2nd Run)	7900 ± 600	1
BG-11-031	Matrix Spike (3rd Run)	8400 ± 600	1
BG-12-001*	Sample	720 ± 340	2
BG-12-005*	Sample	1200 ± 600	1
FB-00-001	Field Blank-Water	< 100	10
BG-11-010	Sample	< 100	10
BG-11-075	Sample	< 200	10
BG-01-016	Sample	< 100	10
BG-01-034	Sample	< 100	9
BG-01-082	Sample	< 200	5
BG-14-005*	Sample	370 ± 220	3
BG-14-005	Matrix Spike (1st Run)	1300 ± 600	1
BG-14-005	Matrix Spike (2nd Run)	16000 ± 1000	1
BG-14-005	Matrix Spike (3rd Run)	15000 ± 1000	1
BG-14-003**	Sample	2000 ± 700	1
BG-14-004*	Sample	520 ± 320	2
BG-14-001	Sample	< 100	10
BG-14-001	Rinsate	< 100	10
BG-14-002	Sample	< 100	10

\* Withdrawn tritium results

\*\* Second aliquot of sample (5 ml) reanalyzed, result concentration was below detection limits (<300)

ml milliliters

< less than

**TABLE 9**  
**ROCKETDYNE**  
**SOIL/SEDIMENT SAMPLE QA/QC SUMMARY**

	Tritium		Cesium-137		Plutonium-238*		Plutonium-239*		Stontium-90	
	meet criteria	total	meet criteria	total	meet criteria	total	meet criteria	total	meet criteria	total
RINSATE	8	8	5	5	4	4	4	4	4	4
MATRIX SPIKE	8	8	4	5	4	4	4	4	4	4
BLIND FIELD DUPLICATE	8	8	5	5	4	4	4	4	4	4
LABORATORY DUPLICATE	10	10	4	4	6	6	6	6	4	4
SPLIT SAMPLES	37	42	31	35	22	22	22	22	25	26
PRE-SPIKED	7	7	0	0	0	0	0	0	0	0
BLIND DUPLICATE										
<b>TOTAL</b>	<b>78</b>	<b>83</b>	<b>49</b>	<b>54</b>	<b>40</b>	<b>40</b>	<b>40</b>	<b>40</b>	<b>41</b>	<b>42</b>
<b>PERCENT IN AGREEMENT</b>	<b>94%</b>		<b>91%</b>		<b>100%</b>		<b>100%</b>		<b>98%</b>	

"In agreement" for samples analyzed for radionuclides means that the difference between the sample results was less than the sum of the standard deviations of the sample results. For pre-spiked samples a result of 25 percent deviation or less from the spiked value were considered "in agreement". All "less than" values were considered "in agreement".

\* All sample results were below method detection limits.

**TABLE 10**  
**ROCKETDYNE**  
**WATER SAMPLES QA/QC SUMMARY**

	Tritium		Gamma Scan		Gross alpha		Gross beta		Plutonium-238		Plutonium-239		Stontium-90	
	meet criteria	total												
RINSATE	1	1	1	1	1	1	1	1	1	1	1	1	1	1
PRE-SPIKED BLIND DUPLICATE	2	2	26	32	2	2	2	2	0	0	4	4	3	4
SPLIT SAMPLES	2	2	0	0	2	2	1	2	0	0	0	0	0	0
FIELD BLANKS	1	1	1	1	1	1	1	1	1	1	1	1	1	1
TOTAL	6	6	28	34	6	6	5	6	2	2	6	6	5	6
PERCENT IN AGREEMENT	100%		82%		100%		83%		100%		100%		83%	

"In agreement" for samples analyzed for radionuclides means that the difference between the sample results was less than the sum of the standard deviations of the sample results. For pre-spiked samples a result of 25 percent deviation or less from the spiked value were considered "in agreement". All "less than" values were considered "in agreement".

Matrix spike and blind field duplicates not collected for water samples.

Gamma Scan: Cadmium-109, Cobalt-57, Cerium-139, Mercury-203, Tin-113, Cesium-137, Yttrium-88, and Cobalt-60.

**TABLE 11**  
**Radionuclide Results for Soil Samples at Rocky Peak (BG-01)**

	Cesium-137 [pCi/g(dry)]	Plutonium-238 [pCi/g(dry)]	Plutonium-239 [pCi/g(dry)]	Strontium-90 [pCi/g(dry)]	Iodine-129 [pCi/g(dry)]	Tritium (pCi/L)
BG-01-005 Sample*	0.092 +/- 0.027	< 0.07	< 0.01	0.03 +/- 0.01	< 0.2	220 +/- 80
BG-01-008 Sample*	< 0.04	< 0.04	< 0.01	0.01 +/- 0.01	< 0.2	< 100
BG-01-016 Sample Field Duplicate*	< 0.04	< 0.03	< 0.01	< 0.09 < 0.09		< 100
BG-01-034 Sample Field Duplicate*	0.1 +/- 0.032	< 0.01	< 0.01	< 0.1		< 100 < 200
BG-01-082 Sample*	< 0.04	< 0.01	< 0.01	< 0.08		< 200
BG-01-087 Sample Field Duplicate Lab Duplicate*	0.158 +/- 0.038	< 0.007 < 0.02	< 0.01 < 0.02	< 0.07		< 200 < 200
BG-01-090 Sample Field Duplicate*	0.175 +/- 0.026 0.209 +/- 0.03	< 0.009	< 0.009	< 0.1		< 200
BG-01-109 Sample*	0.18 +/- 0.04	< 0.02	< 0.01	0.05 +/- 0.01	< 0.1	380 +/- 100

pCi/g(dry) -- Picocuries per gram of undried sample  
pCi/L -- Picocuries per liter of water  
< -- Less than

\* -- 1992 Sample  
^ -- 1994 Sample  
Blank -- Not analyzed  
+/- -- Plus or minus

BBI -- Brandeis-Bardin Institute split sample  
DHS -- Department of Health Services split sample  
USEPA -- United States Environmental Protection Agency  
split sample

Field Duplicate -- A duplicate sample is collected in the field and submitted under an anonymous sample identifier.  
Lab Duplicate -- A reanalysis of the sample including extraction and counting.

Cesium-137 was the only man-made radionuclide detected in the gamma scan analysis.

**TABLE 12**  
**Radionuclide Results for Soil Samples at Santa Susana Park (BG-02)**

	Cesium-137 [pCi/g(dry)]	Plutonium-238 [pCi/g(dry)]	Plutonium-239 [pCi/g(dry)]	Strontium-90 [pCi/g(dry)]	Iodine-129 [pCi/g(dry)]	Tritium (pCi/L)
BG-02-007 Sample* Interlab Duplicate* USEPA* Sample^	0.17 +/- 0.04 0.19 +/- 0.01 < 0.06	< 0.02 0.05 +/- 0.05 < 0.007	< 0.01 0.06 +/- 0.06 < 0.007	0.02 +/- 0.01 < 0.68 0.13 +/- 0.08	< 0.1 < 0.37	360 +/- 90 170 +/- 90 < 200 < 100
BG-02-017 Sample^	0.213 +/- 0.04	< 0.007	< 0.007	0.12 +/- 0.05		< 200
BG-02-074 Sample* Sample^ BBI	< 0.04 < 0.05 < 0.07	< 0.01 < 0.01 < 0.05	< 0.007 < 0.01 < 0.05	< 0.01 < 0.08 < 0.5	< 0.3	W < 200 430 +/- 150
BG-02-076 Sample* Sample^ Lab Duplicate^	0.099 +/- 0.032 < 0.04	< 0.02 < 0.01	< 0.01 < 0.01	0.03 +/- 0.01 < 0.09	< 0.1	420 +/- 90 < 200 < 200
BG-02-085 Sample^	< 0.04	< 0.007	< 0.007	0.13 +/- 0.1		< 200

pCi/g(dry) -- Picocuries per gram of undried sample  
pCi/L -- Picocuries per liter of water  
< -- Less than

W -- Samples results could not be verified by the laboratory and subsequently were withdrawn by the laboratory.  
Lab Duplicate -- A reanalysis of the sample including extraction and counting.

Cesium-137 was the only man-made radionuclide detected in the gamma scan analysis.

\* -- 1992 Sample  
^ -- 1994 Sample  
Blank -- Not analyzed  
+/- -- Plus or minus

BBI -- Brandeis-Bardin Institute split sample  
DHS -- Department of Health Services split sample  
USEPA -- United States Environmental Protection Agency  
split sample

**TABLE 13**  
**Radionuclide Results for Soil Samples at Happy Camp (BG-05)**

	Cesium-137 [pCi/g(dry)]	Plutonium-238 [pCi/g(dry)]	Plutonium-239 [pCi/g(dry)]	Strontium-90 [pCi/g(dry)]	Iodine-129 [pCi/g(dry)]	Tritium (pCi/L)
BG-05-016 Sample*	0.074 +/- 0.029	< 0.02	< 0.005	0.05 +/- 0.01	< 0.2	260 +/- 160
BG-05-017 Sample* Field Duplicate*	0.147 +/- 0.033 0.1 +/- 0.035	< 0.02	< 0.02	0.088 +/- 0.056		< 200
BG-05-026 Sample* Interlab Duplicate*	0.067 +/- 0.025	< 0.03	< 0.006	0.08 +/- 0.02	< 0.2	380 +/- 160 200 +/- 70
BG-05-027 Sample*	0.099 +/- 0.0214	< 0.01	< 0.01	0.1 +/- 0.04		< 200
BG-05-050 Sample*	0.101 +/- 0.022	< 0.02	< 0.02	0.069 +/- 0.046		< 200
BG-05-056 Sample* USEPA*	0.148 +/- 0.028 0.08 +/- 0.04	< 0.01 < 0.06	< 0.01 < 0.03	0.097 +/- 0.055 < 0.79		< 200 < 270
BG-05-074 Sample* Field Duplicate* Sample* Lab Duplicate*	0.10 +/- 0.03 0.073 +/- 0.026 0.153 +/- 0.028	< 0.02 < 0.02	< 0.005 < 0.02	0.05 +/- 0.01 0.084 +/- 0.04	< 0.3	490 +/- 180 140 +/- 80 < 500 < 500

pCi/g(dry) -- Picouries per gram of undried sample  
pCi/L -- Picouries per liter of water  
< -- Less than

\* -- 1992 Sample  
^ -- 1994 Sample  
Blank -- Not analyzed  
+/- -- Plus or minus

BBJ -- Brandeis-Bardin Institute split sample  
DHS -- Department of Health Services split sample  
USEPA -- United States Environmental Protection Agency  
split sample

Lab Duplicate -- A reanalysis of the sample including extraction and counting.

Cesium-137 was the only man-made radionuclide detected in the gamma scan analysis.

TABLE 14

Radionuclide Results for Soil Samples at Wildwood Regional Park (BG-09)

	Cesium-137 [pCi/g(dry)]	Plutonium-238 [pCi/g(dry)]	Plutonium-239 [pCi/g(dry)]	Strontium-90 [pCi/g(dry)]	Tritium (pCi/L)
BG-09-003 Sample <sup>^</sup> Field Duplicate <sup>^</sup> USEPA <sup>^</sup>	< 0.05 0.05 +/- 0.04	< 0.008 < 0.006 < 0.04	< 0.008 < 0.006 < 0.04	0.13 +/- 0.05 < 0.69	< 200 < 270
BG-09-005 Sample <sup>^</sup> Lab Duplicate <sup>^</sup> DHS <sup>^</sup>	0.188 +/- 0.061 0.116 +/- 0.014	< 0.01 < 0.01 < 0.0019	< 0.01 < 0.01 0.0069 +/- 0.0016	< 0.1 0.2 +/- 0.04	< 200
BG-09-013 Sample <sup>^</sup> Field Duplicate <sup>^</sup> Lab Duplicate <sup>^</sup>	0.198 +/- 0.072 0.088 +/- 0.0421	< 0.008	< 0.008	0.12 +/- 0.05 0.14 +/- 0.06	< 200
BG-09-057 Sample <sup>^</sup> Field Duplicate <sup>^</sup>	< 0.06	< 0.008	< 0.008	0.11 +/- 0.05	< 200 < 200
BG-09-096 Sample <sup>^</sup>	0.079 +/- 0.0296	< 0.02	< 0.02	0.12 +/- 0.05	< 200

pCi/g(dry) -- Picouries per gram of undried sample  
pCi/L -- Picouries per liter of water  
< -- Less than

<sup>^</sup> -- 1994 Sample  
Blank -- Not analyzed  
+/- -- Plus or minus

BBI -- Brandeis-Bardin Institute split sample  
DHS -- Department of Health Services split sample  
USEPA -- United States Environmental Protection Agency  
split sample

Field Duplicate -- A duplicate sample is collected in the field and submitted under an anonymous sample identifier.  
Lab Duplicate -- A reanalysis of the sample including extraction and counting.

Cesium-137 was the only man-made radionuclide detected in the gamma scan analysis.

**TABLE 15**

**Radionuclide Results for Soil Samples at Wildwood Regional Park Ravine (BG-10)**

	Cesium-137 [pCi/g(dry)]	Plutonium-238 [pCi/g(dry)]	Plutonium-239 [pCi/g(dry)]	Strontium-90 [pCi/g(dry)]	Tritium (pCi/L)
BG-10-001 Sample <sup>^</sup> Lab Duplicate <sup>^</sup> BBI <sup>^</sup>	0.245 +/- 0.037 0.21 +/- 0.08	< 0.01 < 0.009 < 0.05	< 0.01 < 0.01 < 0.05	0.098 +/- 0.048 < 0.5	< 100 < 700
BG-10-002 Sample <sup>^</sup> Field Duplicate <sup>^</sup>	0.276 +/- 0.029 0.306 +/- 0.041	< 0.008	< 0.008	< 0.09	< 100
BG-10-003 Sample <sup>^</sup> USEPA <sup>^</sup>	0.257 +/- 0.034 0.29 +/- 0.02	< 0.007 < 0.05	< 0.01 < 0.02	< 0.09 < 0.60	< 100 < 270
BG-10-004 Sample <sup>^</sup> DHS <sup>^</sup>	0.215 +/- 0.039 0.147 +/- 0.014	< 0.009 < 0.0015	< 0.009 0.0051 +/- 0.0012	< 0.04 0.07 +/- 0.03	< 100
BG-10-005 Sample <sup>^</sup>	0.456 +/- 0.052	< 0.01	< 0.01	< 0.09	< 100

pCi/g(dry) -- Picouries per gram of undried sample  
pCi/L -- Picouries per liter of water  
< -- Less than

<sup>^</sup> -- 1994 Sample  
Blank -- Not analyzed  
+/- -- Plus or minus

BBI -- Brandeis-Bardin Institute split sample  
DHS -- Department of Health Services split sample  
USEPA -- United States Environmental Protection Agency  
split sample

Field Duplicate -- A duplicate sample is collected in the field and submitted under an anonymous sample identifier.  
Lab Duplicate -- A reanalysis of the sample including extraction and counting.

Cesium-137 was the only man-made radionuclide detected in the gamma scan analysis.

**TABLE 16**  
**Radionuclide Results for Soil Samples at Tapia County Park (BG-11)**

	Cesium-137 [pCi/g(dry)]	Plutonium-238 [pCi/g(dry)]	Plutonium-239 [pCi/g(dry)]	Strontium-90 [pCi/g(dry)]	Tritium (pCi/L)
BG-11-010 Sample <sup>^</sup>	0.158 +/- 0.035	< 0.01	< 0.01	0.089 +/- 0.041	< 200
BG-11-011 Sample <sup>^</sup> USEPA <sup>^</sup>	0.109 +/- 0.029 0.14 +/- 0.01	< 0.006 < 0.03	< 0.006 < 0.02	< 0.1 < 0.61	< 100 < 270
BG-11-031 Sample <sup>^</sup> Lab Duplicate <sup>^</sup>	0.059 +/- 0.0234	< 0.007 < 0.03	< 0.009 < 0.03	< 0.09	< 1000
BG-11-036 Sample <sup>^</sup> Field Duplicate <sup>^</sup>	0.067 +/- 0.0338	< 0.008	< 0.008	< 0.1	< 100 < 100
BG-11-075 Sample <sup>^</sup>	0.113 +/- 0.043	< 0.006	< 0.009	< 0.09	< 200

pCi/g(dry) -- Picocuries per gram of undried sample  
pCi/L -- Picocuries per liter of water  
< -- Less than

<sup>^</sup> -- 1994 Sample  
Blank -- Not analyzed  
+/- -- Plus or minus

BBI -- Brandeis-Bardin Institute split sample  
DHS -- Department of Health Services split sample  
USEPA -- United States Environmental Protection Agency  
split sample

Field Duplicate -- A duplicate sample is collected in the field and submitted under an anonymous sample identifier.  
Lab Duplicate -- A reanalysis of the sample including extraction and counting.

Cesium-137 was the only man-made radionuclide detected in the gamma scan analysis.

**TABLE 17**

**Radionuclide Results for Soil Samples at Tapia County Park Ravine (BG-12)**

	Cesium-137 [pCi/g(dry)]	Plutonium-238 [pCi/g(dry)]	Plutonium-239 [pCi/g(dry)]	Strontium-90 [pCi/g(dry)]	Tritium (pCi/L)
BG-12-001 Sample <sup>^</sup>	< 0.03	< 0.006	< 0.006	< 0.08	W
BG-12-002 Sample <sup>^</sup> Lab Duplicate <sup>^</sup>	0.031 +/- 0.018	< 0.02 < 0.008	< 0.02 < 0.008	< 0.09	< 100
BG-12-003 Sample <sup>^</sup> USEPA <sup>^</sup>	0.042 +/- 0.016 0.04 +/- 0.01	< 0.007 < 0.03	< 0.007 < 0.01	< 0.09 < 0.70	< 100 < 270
BG-12-004 Sample <sup>^</sup>	0.097 +/- 0.0202	< 0.008	< 0.01	< 0.09	< 100
BG-12-005 Sample <sup>^</sup> Lab Duplicate <sup>^</sup> BBI <sup>^</sup>	< 0.03 < 0.02 < 0.07	< 0.007 < 0.05	< 0.007 < 0.05	< 0.05 < 0.5	W < 380

pCi/g(dry) -- Picouries per gram of undried sample  
pCi/L -- Picouries per liter of water  
< -- Less than

<sup>^</sup> -- 1994 Samples<sup>^</sup> -- 1994 Sample  
Blank -- Not analyzed  
+/- -- Plus or minus

BBI -- Brandeis-Bardin Institute split sample  
DHS -- Department of Health Services split sample  
USEPA -- United States Environmental Protection Agency  
split sample

W -- Samples results could not be verified by the laboratory and subsequently were withdrawn by the laboratory.  
Lab Duplicate -- A reanalysis of the sample including extraction and counting.

Cesium-137 was the only man-made radionuclide detected in the gamma scan analysis.

**TABLE 18**

**Radionuclide Results for Soil Samples at Rocky Peak Ravine (BG-14)**

	Cesium-137 [pCi/g(dry)]	Plutonium-238 [pCi/g(dry)]	Plutonium-239 [pCi/g(dry)]	Strontium-90 [pCi/g(dry)]	Tritium (pCi/L)
BG-14-001 Sample <sup>^</sup>	< 0.04	< 0.009	< 0.009	0.082 +/- 0.043	< 100
BG-14-002 Sample <sup>^</sup>	0.085 +/- 0.0426	< 0.01	< 0.01	< 0.09	< 100
BG-14-003 Sample <sup>^</sup>	0.080 +/- 0.0375	< 0.007	< 0.007	< 0.08	< 300
BG-14-004 Sample <sup>^</sup> Lab Duplicate <sup>^</sup>	< 0.03	< 0.008	< 0.008	< 0.07 0.093 +/- 0.051	W
BG-14-005 Sample <sup>^</sup> Lab Duplicate <sup>^</sup>	< 0.04 < 0.03	< 0.008	< 0.008	< 0.05	W

pCi/g(dry) -- Picocuries per gram of undried sample  
 pCi/L -- Picocuries per liter of water  
 < -- Less than

<sup>^</sup> -- 1994 Sample  
 Blank -- Not analyzed  
 +/- -- Plus or minus

BBI -- Brandeis-Bardin Institute split sample  
 DHS -- Department of Health Services split sample  
 USEPA -- United States Environmental Protection Agency  
 split sample

W -- Samples results could not be verified by the laboratory and subsequently were withdrawn by the laboratory.  
 Lab Duplicate -- A reanalysis of the sample including extraction and counting.

Cesium-137 was the only man-made radionuclide detected in the gamma scan analysis.

**TABLE 19**

**Summary of the Results of the Analysis of Variance (ANOVA)  
and the Tukey Honest Significant Difference (HSD) Test  
for the Background Sample Areas**

<b>Radionuclides<sup>3</sup> (Soil)</b>	<b>Significance Probability (P value)<sup>1</sup></b>	<b>Background Areas<sup>2</sup> Differing from More Than Two Other Background Locations</b>
Cesium-137	0.024	BG-10
Strontium-90	0.031	BG-09

<sup>1</sup> P values less than 0.05 indicate At least one background sample area differs from the others

<sup>2</sup> BG-09 – Wildwood Regional Park

BG-10 – Wildwood Regional Park Ravine

<sup>3</sup> The majority of background samples for tritium and plutonium-238 were below detection limits; statistical analysis was not used to evaluate concentrations of these radionuclides

TABLE 20

Background Levels of Radionuclides in Soil

Radionuclides <sup>3</sup> (pCi/g(dry))	Measured Background Areas				Literature Values			Reference
	Range	Arithmetic Mean	SD	5 <sup>th</sup> to 95 <sup>th</sup> Percentile <sup>2</sup>	Range	Arithmetic Mean	Geometric Mean $\pm$ SD	
Cesium-137	< 0.03-0.213	0.087	0.062	< 0.03-0.21	0.1-0.8 <sup>1</sup> 0.01-0.39 0.024-0.253 0.005-0.24 0.3-1.3	0.5 0.09 0.10 0.8	0.5	Gustafson, 1969 and 1070 Eisenbud, 1987 Layton, 1990 Dinnel, 1985 USEPA, 1992a Ritchie and McHenry, 1977 and 1982
Strontium-90	< 0.005-0.13	0.052	0.031	< 0.005-0.11	0.16-0.32 <sup>1</sup>	0.24 0.27		Eisenbud, 1987 UNSCEAR, 1969 and 1972 Ritchie and McHenry, 1977 and 1982

<sup>1</sup> Adjusted for decay over-time.

<sup>2</sup> The fifth percentile equals the mean minus two times the standard deviation (mean-2 SD)

The ninety-fifth percentile equals the mean plus two times the standard deviation (mean + 2 SD).

<sup>3</sup> The majority of background samples for tritium and plutonium-238 were below detection limits; statistical analysis was not used to evaluate concentrations of these radionuclides

pCi/g(dry) - Pico-curies per gram of dried sample water

SD - Standard deviation

< - less than

$\pm$  - Plus or minus

**TABLE 21**  
**Radionuclide Results for Soil Samples at the Dormitory Area (BB-02)**

	Cesium-137 [pCi/g(dry)]	Plutonium-238 [pCi/g(dry)]	Plutonium-239 [pCi/g(dry)]	Strontium-90 [pCi/g(dry)]	Iodine-129 [pCi/g(dry)]	Trifluoride (pCi/L)
BB-02-045 Sample* Sample*	< 0.05	< 0.01	< 0.004	< 0.01	< 0.2	W < 200
BB-02-068 Sample* Field Duplicate* Sample*	< 0.05 < 0.05	< 0.02	< 0.006	0.01 +/- 0.01	< 0.2	< 200 < 200 < 200
BB-02-071 Sample* BB1* Sample*	0.058 +/- 0.032 < 0.3	< 0.01	< 0.003	0.01 +/- 0.01 < 1.2	< 0.3	W < 200
BB-02-075 Sample* Sample* BB1*	0.048 +/- 0.025	< 0.03	< 0.007	0.01 +/- 0.01	< 0.3	< 200 < 200 < 750
BB-02-078 Sample* Sample*	0.10 +/- 0.04	< 0.05	< 0.02	0.02 +/- 0.01	< 0.3	< 200 < 200

pCi/g(dry) -- Picocuries per gram of undried sample  
pCi/L -- Picocuries per liter of water  
< -- Less than

\* -- 1992 Sample  
^ -- 1994 Sample  
Blank -- Not analyzed  
+/- -- Plus or minus

BB1 -- Brandeis-Bardin Institute split sample  
DHS -- Department of Health Services split sample  
USEPA -- United States Environmental Protection Agency  
split sample

W -- Samples results could not be verified by the laboratory and subsequently were withdrawn by the laboratory.

Cesium-137 was the only man-made radionuclide detected in the gamma scan analysis.

**TABLE 22**  
**Radionuclide Results for Soil Samples at Campsite Area 1 (BB-03)**

	Cesium-137 [pCi/g(dry)]	Plutonium-238 [pCi/g(dry)]	Plutonium-239 [pCi/g(dry)]	Strontium-90 [pCi/g(dry)]	Iodine-129 [pCi/g(dry)]	Tritium (pCi/L)
BB-03-003 Sample <sup>^</sup>						< 200
BB-03-005 Sample* USEPA* Sample <sup>^</sup>	0.20 +/- 0.04 0.26 +/- 0.02	< 0.08 0.04 +/- 0.05	< 0.02 < 0.023	0.06 +/- 0.01 < 0.66	< 0.2 < 0.28	< 200 < 209 < 200
BB-03-017 Sample* Field Duplicate* Sample <sup>^</sup>	0.085 +/- 0.038 0.057 +/- 0.028	< 0.007	< 0.007	0.05 +/- 0.01	< 0.3	< 300 < 400 < 200
BB-03-025 Sample* Interlab Duplicate* Sample <sup>^</sup> BBI	0.20 +/- 0.05	< 0.2	< 0.05	0.09 +/- 0.01	< 0.2	340 +/- 120 240 +/- 120 < 200 < 710
BB-03-026 Sample* Lab Duplicate <sup>^</sup>						< 100 < 100
BB-03-029 Sample <sup>^</sup>						< 100

pCi/g(dry) -- Picocuries per gram of undried sample  
 pCi/L -- Picocuries per liter of water  
 < -- Less than

<sup>^</sup> -- 1994 Sample  
 Blank -- Not analyzed  
 +/- -- Plus or minus

BBI -- Brandeis-Bardin Institute split sample  
 DHS -- Department of Health Services split sample  
 USEPA -- United States Environmental Protection Agency  
 split sample

Lab Duplicate -- A reanalysis of the sample including extraction and counting.

Cesium-137 was the only man-made radionuclide detected in the gamma scan analysis.

**TABLE 22 (continued)**  
**Radionuclide Results for Soil Samples at Campsite Area 1 (BB-03)**

	Cesium-137 [pCi/g(dry)]	Plutonium-238 [pCi/g(dry)]	Plutonium-239 [pCi/g(dry)]	Strontium-90 [pCi/g(dry)]	Iodine-129 [pCi/g(dry)]	Tritium (pCi/L)
BB-03-079 Sample* Sample^	< 0.04	< 0.01	< 0.01	0.03 +/- 0.01	< 0.2	< 200 < 100
BB-03-081 Sample^ BBI^						< 100 < 920
BB-03-092 Sample*	0.38 +/- 0.06	< 0.1	< 0.04	0.04 +/- 0.01	< 0.2	< 200
BB-03-096 Sample^						< 100
BB-03-097 Sample^						< 100

pCi/g(dry) -- Picouries per gram of undried sample  
 pCi/L -- Picouries per liter of water  
 < -- Less than

\* -- 1992 Sample  
 ^ -- 1994 Sample  
 Blank -- Not analyzed  
 +/- -- Plus or minus

BBI -- Brundels-Bardin Institute split sample  
 DHS -- Department of Health Services split sample  
 USEPA -- United States Environmental Protection Agency  
 split sample

Cesium-137 was the only man-made radionuclide detected in the gamma scan analysis.

**TABLE 23**  
**Radionuclide Results for Soil Samples at Campsite Area 2 (BB-04)**

	Cesium-137 [pCi/g(dry)]	Plutonium-238 [pCi/g(dry)]	Plutonium-239 [pCi/g(dry)]	Strontium-90 [pCi/g(dry)]	Iodine-129 [pCi/g(dry)]	Tritium (pCi/L)
BB-04-021 Sample* USEPA* Sample* Field Duplicate* USEPA*	< 0.05 0.034 +/- 0.018	< 0.02 0.025 +/- 0.020	< 0.007 < 0.016	0.03 +/- 0.01 < 0.71	< 0.2 < 0.29	390 +/- 200 < 200 < 100 < 100 < 260
BB-04-023 Sample* Interlab Duplicate* Sample* USEPA*	0.099 +/- 0.040	< 0.01	< 0.006	0.02 +/- 0.01	< 0.3	310 +/- 160 230 +/- 90 < 100 < 260
BB-04-026 Sample* Sample*	0.15 +/- 0.03	< 0.009	< 0.006	0.03 +/- 0.01	< 0.2	660 +/- 210 < 100
BB-04-049 Sample*						< 100
BB-04-062 Sample*						< 100
BB-04-078 Sample* USEPA*						< 100 < 260
BB-04-079 Sample*						< 100

pCi/g(dry) -- Pico-curies per gram of undried sample  
pCi/L -- Pico-curies per liter of water  
< -- Less than

\* -- 1992 Sample  
^ -- 1994 Sample  
Blank -- Not analyzed  
+/- -- Plus or minus

BB1 -- Brandeis-Bardin Institute split sample  
DHS -- Department of Health Services split sample  
USEPA -- United States Environmental Protection Agency  
split sample

Field Duplicate -- A duplicate sample is collected in the field and submitted under an anonymous sample identifier.

Cesium-137 was the only man-made radionuclide detected in the gamma scan analysis.

\* A second analysis was conducted three months later by DHS with the result of the 392 +/- 153 pCi/L, which was lower than the initial analysis. The DHS attributed this to loss during long-term storage.

**TABLE 23(continued)**  
**Radionuclide Results for Soil Samples at Campsite Area 2 (BB-04)**

	Cesium-137 [pCi/g(dry)]	Plutonium-238 [pCi/g(dry)]	Plutonium-239 [pCi/g(dry)]	Strontium-90 [pCi/g(dry)]	Iodine-129 [pCi/g(dry)]	Tritium (pCi/L)
BB-04-082 Sample* Field Duplicate* Sample^ USEPA^	< 0.03	< 0.02	< 0.007	0.01 +/- 0.01 0.04 +/- 0.01	< 0.3 < 0.3	510 +/- 180 < 100 < 260
BB-04-084 Sample* BBI^						< 100 < 500
BB-04-097 Sample* DHS* USEPA* Sample^ BBI^ USEPA^	< 0.03 0.03 +/- 0.01	< 0.02	< 0.005	0.01 +/- 0.01	< 0.3	< 200 2470 +/- 197 < 192 < 100 < 430 < 260

pCi/g(dry) -- Picocuries per gram of undried sample  
pCi/L -- Picocuries per liter of water  
< -- Less than

\* -- 1992 Sample  
^ -- 1994 Sample  
Blank -- Not analyzed  
+/- -- Plus or minus

BBI -- Brandeis-Burdin Institute split sample  
DHS -- Department of Health Services split sample  
USEPA -- United States Environmental Protection Agency  
split sample

Cesium-137 was the only man-made radionuclide detected in the gamma scan analysis.  
\* A second analysis was conducted three months later by DHS with the result of the 392 +/- 153 pCi/L, which was lower than the initial analysis. The DHS attributed this to loss during long-term storage.

TABLE 24

Radionuclide Results for Surface Water Samples at Campsite Area 2 (BB-04)

	Cesium-137 (pCi/L)	Plutonium-238 (pCi/L)	Plutonium-239 (pCi/L)	Strontium-90 (pCi/L)	Iodine-129 (pCi/L)	Tritium (pCi/L)	Gross Alpha (pCi/L)	Gross Beta (pCi/L)
BB-04-001								
Sample*	< 4	< 0.2	< 0.2	< 0.4	< 0.8	< 100	< 3	< 4
USEPA*	< 8.1	< 0.027	< 0.016	< 0.99	< 3.3	< 200	< 1.6	4.2 +/- 1.5
Sample^						< 200	< 4	12 +/- 4
BBI^						< 300	< 7.8	
USEPA^	< 5.90					< 260		< 10

pCi/L -- Picocuries per liter of water  
 < -- Less than  
 +/- -- Plus or minus

\* -- 1992 Sample  
 ^ -- 1994 Sample  
 Blank -- Not analyzed

BBI -- Brandeis-Bardin Institute split sample  
 DHS -- Department of Health Services split sample  
 USEPA -- United States Environmental Protection Agency  
 split or interlaboratory duplicate sample

Cesium-137 was the only man-made radionuclide detected in the gamma scan analysis.

**TABLE 25**  
**Radionuclide Results for Soil Samples at the Picnic Area (BB-05)**

	Cesium-137 [pCi/g(dry)]	Plutonium-238 [pCi/g(dry)]	Plutonium-239 [pCi/g(dry)]	Strontium-90 [pCi/g(dry)]	Iodine-129 [pCi/g(dry)]	Tritium (pCi/L)
BB-05-003 Sample* Field Duplicate* Sample*	0.22 +/- 0.03	< 0.01 < 0.02	< 0.005 < 0.02	0.02 +/- 0.01	< 0.2	280 +/- 130 < 100
BB-05-006 Sample* Sample*	0.11 +/- 0.02	< 0.03	< 0.008	0.02 +/- 0.01	< 0.2	200 +/- 110 < 100
BB-05-057 Sample* Sample* BBI†	0.052 +/- 0.030	< 0.006	< 0.006	0.03 +/- 0.01	< 0.2	< 200 < 100 < 700
BB-05-077 Sample* USEPA* Sample*	0.16 +/- 0.04 0.086 +/- 0.014	< 0.008 0.03 +/- 0.03	< 0.01 0.015 +/- 0.02	0.06 +/- 0.01 < 0.71	< 0.2 < 0.23	< 200 < 200 < 100
BB-05-089 Sample* Sample* Field Duplicate*	0.14 +/- 0.04	< 0.03	< 0.02	0.02 +/- 0.01	< 0.2	< 200 < 100 < 100

pCi/g(dry) -- Picocuries per gram of undried sample  
pCi/L -- Picocuries per liter of water  
\* -- 1992 Sample  
^ -- 1994 Sample  
Blank -- Not analyzed  
+/- -- Plus or minus  
BBI -- Brandeis-Bardin Institute split sample  
DHS -- Department of Health Services split sample  
USEPA -- United States Environmental Protection Agency  
split sample

Cesium-137 was the only man-made radionuclide detected in the gamma scan analysis.

**TABLE 26**  
**Radionuclide Results for Soil Samples at the House of the Book (BB-06)**

	Cesium-137 [pCi/g(dry)]	Plutonium-238 [pCi/g(dry)]	Plutonium-239 [pCi/g(dry)]	Strontium-90 [pCi/g(dry)]	Iodine-129 [pCi/g(dry)]	Tritium (pCi/L)
BB-06-007 Sample* Interlab Duplicate* Sample^	< 0.05	< 0.02	< 0.004	< 0.01	< 0.3	480 +/- 90 < 100
BB-06-013 Sample* Sample^	< 0.05	< 0.02	< 0.01	0.01 +/- 0.01	< 0.2	< 300 < 200
BB-06-017 Sample* Lab Duplicate* Sample^	< 0.03 < 0.04	< 0.01	< 0.004	0.01 +/- 0.01	< 0.2	W < 200
BB-06-066 Sample* Sample^ BBI^	< 0.04	< 0.01	< 0.009	< 0.01	< 0.2	< 300 < 200 < 480
BB-06-092 Sample* USEPA* Sample^	< 0.04 < 0.033	< 0.006 0.031 +/- 0.05	< 0.006 < 0.022	< 0.01 < 0.70	< 0.2 < 0.28	190 +/- 100 < 210 < 100

pCi/g(dry) -- Picocuries per gram of undried sample  
pCi/L -- Picocuries per liter of water  
< -- Less than

\* -- 1992 Sample  
^ -- 1994 Sample  
Blank -- Not analyzed  
+/- -- Plus or minus

BBI -- Brandeis-Bardin Institute split sample  
DHS -- Department of Health Services split sample  
USEPA -- United States Environmental Protection Agency  
split sample

W -- Samples results could not be verified by the laboratory and subsequently were withdrawn by the laboratory.

Cesium-137 was the only man-made radionuclide detected in the gamma scan analysis.

**TABLE 27**  
**Radionuclide Results for Soil Samples at the Main House Orchard (BB-12)**

	Cesium-137 [pCi/g(dry)]	Plutonium-238 [pCi/g(dry)]	Plutonium-239 [pCi/g(dry)]	Strontium-90 [pCi/g(dry)]	Iodine-129 [pCi/g(dry)]	Tritium (pCi/L)
BB-12-003 Sample* Sample*	< 0.04	< 0.08	< 0.03	0.01 +/- 0.01	< 0.2	< 200 < 200
BB-12-006 Sample* Sample*	0.091 +/- 0.027	< 0.07	< 0.02	0.03 +/- 0.01	< 0.2	< 100 < 200
BB-12-019 Sample* BBI*	0.15 +/- 0.03	< 0.1	< 0.09	0.04 +/- 0.01 < 1.1	< 0.2	< 200 < 200
BB-12-020 Sample* Lab Duplicate* Interlab Duplicate* USEPA* Sample*	0.15 +/- 0.03 0.091 +/- 0.030 0.084 +/- 0.017	< 0.1	< 0.04	0.03 +/- 0.01 < 0.74	< 0.2 < 0.23	W < 200 < 200 < 200 < 200
BB-12-023 Sample* BBI* USEPA* Sample* Lab Duplicate* BBI*	0.12 +/- 0.03 < 0.3 0.130 +/- 0.016	< 0.07	< 0.02	0.02 +/- 0.01	< 0.3	< 200 < 200 < 200 < 700

pCi/g(dry) -- PicoCuries per gram of undried sample  
pCi/L -- PicoCuries per liter of water  
< -- Less than

\* -- 1992 Sample  
^ -- 1994 Sample  
Blank -- Not analyzed  
+/- -- Plus or minus

BBI -- Brandeis-Bardin Institute split sample  
DHS -- Department of Health Services split sample  
USEPA -- United States Environmental Protection Agency  
split sample

W -- Samples results could not be verified by the laboratory and subsequently were withdrawn by the laboratory.

Cesium-137 was the only man-made radionuclide detected in the gamma scan analysis.

**TABLE 28**  
**Radionuclide Results for Soil Samples at the Avocado Grove (BB-13)**

	Cesium-137 [pCi/g(dry)]	Plutonium-238 [pCi/g(dry)]	Plutonium-239 [pCi/g(dry)]	Strontium-90 [pCi/g(dry)]	Iodine-129 [pCi/g(dry)]	Tritium (pCi/L)
BB-13-010 Sample* Sample*	< 0.05	< 0.05	< 0.01	< 0.01	< 0.2	< 200 < 200
BB-13-011 Sample* Sample*	0.098 +/- 0.039	< 0.05	< 0.02	0.01 +/- 0.01	< 0.2	520 +/- 110 < 200
BB-13-024 Sample* Field Duplicate* Interlab Duplicate* USEPA* Sample*	< 0.05  0.030 +/- 0.011	< 0.09 < 0.05 < 0.03	< 0.02 < 0.01 < 0.021	0.01 +/- 0.01  < 0.65	< 0.2  < 0.29	760 +/- 200 120 +/- 70 < 206 < 200
BB-13-037 Sample* Sample*	0.10 +/- 0.04	< 0.03	< 0.01	0.01 +/- 0.01	< 0.2	400 +/- 130 < 200
BB-13-039 Sample* Lab Duplicate* Interlab Duplicate* Sample* BBI	0.077 +/- 0.018 0.059 +/- 0.033	< 0.1	< 0.04	0.01 +/- 0.01	< 0.2	< 200 < 200 170 +/- 60 < 200 < 590

pCi/g(dry) -- Picocuries per gram of undried sample  
pCi/L -- Picocuries per liter of water  
< -- Less than

\* -- 1992 Sample  
^ -- 1994 Sample  
Blank -- Not analyzed  
+/- -- Plus or minus

BBI -- Brandeis-Bardin Institute split sample  
DHS -- Department of Health Services split sample  
USEPA -- United States Environmental Protection Agency  
split sample

Cesium-137 was the only man-made radionuclide detected in the gamma scan analysis.

**TABLE 29**  
**Radionuclide Results for Soil Samples at the Old Well Campsite (BB-14)**

	Cesium-137 [pCi/g(dry)]	Plutonium-238 [pCi/g(dry)]	Plutonium-239 [pCi/g(dry)]	Strontium-90 [pCi/g(dry)]	Iodine-129 [pCi/g(dry)]	Tritium [pCi/L]
BB-14-004 Sample* Field Duplicate* Sample^	0.20 +/- 0.04	< 0.07	< 0.02	0.05 +/- 0.01 0.06 +/- 0.01	< 0.3 < 0.2	< 200 < 200
BB-14-037 Sample* Sample^	0.17 +/- 0.04	< 0.01	< 0.009	0.02 +/- 0.01	< 0.2	W < 100
BB-14-041 Sample* Sample^	0.27 +/- 0.05	< 0.06	< 0.008	0.06 +/- 0.01	< 0.2	W < 100
BB-14-079 Sample* Lab Duplicate* Duplicate Count* USEPA* Sample^ BBI^	< 0.04  0.015 +/- 0.008	0.12 +/- 0.03 < 0.08 0.10 +/- 0.03 < 0.02	< 0.006 < 0.011	0.03 +/- 0.01 < 0.71	< 0.3 < 0.28	140 +/- 80  < 200 < 100 < 420
BB-14-094 Sample* Sample^ USEPA^	< 0.04	< 0.05	< 0.01	0.02 +/- 0.01	< 0.2	W < 100 < 280

\* -- 1992 Sample  
^ -- 1994 Sample  
Blank -- Not analyzed  
+/- -- Plus or minus

pCi/g(dry) -- Picocuries per gram of undried sample  
pCi/L -- Picocuries per liter of water  
< -- Less than

BB1 -- Brandeis-Bardin Institute split sample  
DHS -- Department of Health Services split sample  
USEPA -- United States Environmental Protection Agency  
split sample

W -- Samples results could not be verified by the laboratory and subsequently were withdrawn by the laboratory.

Cesium-137 was the only man-made radionuclide detected in the gamma scan analysis.

**TABLE 30**  
**Radionuclide Results for Soil Samples at the Former Rocketdyne Employee Shooting Range (SM-03)**

	Cesium-137 [pCi/g(dry)]	Plutonium-238 [pCi/g(dry)]	Plutonium-239 [pCi/g(dry)]	Strontium-90 [pCi/g(dry)]	Iodine-129 [pCi/g(dry)]	Tritium (pCi/L)
SM-03-001 Sample* USEPA* Sample*	0.19 +/- 0.05 0.17 +/- 0.02	< 0.02 < 0.029	< 0.02 < 0.027	0.07 +/- 0.01 < 0.69	< 0.2 < 0.27	< 100 < 200 < 100
SM-03-009 Sample* Sample*	0.13 +/- 0.04	< 0.02	< 0.005	0.03 +/- 0.01	< 0.2	< 100 < 100
SM-03-012 Sample* Sample* Lab Duplicate*	0.13 +/- 0.03	< 0.02	< 0.004	0.02 +/- 0.01	< 0.1	< 100 < 100 < 200
SM-03-014 Sample* Field Duplicate* Sample*	0.10 +/- 0.03 0.083 +/- 0.026	< 0.02	< 0.005	0.02 +/- 0.01	< 0.1	< 100 < 100 < 100
SM-03-015 Sample* Interlab Duplicate* Sample*	0.27 +/- 0.04	< 0.04	< 0.01	0.05 +/- 0.01	< 0.1	< 200 < 869 < 100

pCi/g(dry) -- PicoCuries per gram of undried sample  
 pCi/L -- PicoCuries per liter of water  
 < -- Less than

\* -- 1992 Sample  
 ^ -- 1994 Sample  
 Blank -- Not analyzed  
 +/- -- Plus or minus

BBJ -- Brandeis-Bardin Institute split sample  
 DHS -- Department of Health Services split sample  
 USEPA -- United States Environmental Protection Agency  
 split sample

Lab Duplicate -- A reanalysis of the sample including extraction and counting.

Cesium-137 was the only man-made radionuclide detected in the gamma scan analysis.

**TABLE 31**  
**Radionuclide Results for Sediment Samples at the RD-51 Watershed (BB-15)**

	Cesium-137 [pCi/g(dry)]	Plutonium-238 [pCi/g(dry)]	Plutonium-239 [pCi/g(dry)]	Strontium-90 [pCi/g(dry)]	Iodine-129 [pCi/g(dry)]	Tritium (pCi/L)
BB-15-001 Sample* Field Duplicate* DHS* Sample* USEPA*	0.045 +/- 0.026 0.04 +/- 0.01	0.22 +/- 0.07 < 0.01 < 0.03	< 0.01 < 0.01 < 0.03	0.01 +/- 0.01 0.02 +/- 0.02	< 0.3 < 0.3	W 316 +/- 152 < 200 < 270
BB-15-002 Sample* Field Duplicate* Sample* BBI*	0.044 +/- 0.022 < 0.04	0.067 +/- 0.025	< 0.005	< 0.01	< 0.3	< 200 < 100 < 200 550 +/- 350
BB-15-003 Sample* Interlab Duplicate* Sample*	0.039 +/- 0.020	< 0.05	< 0.01	0.01 +/- 0.01	< 0.3	< 200 < 200
BB-15-004 Sample* BBI* Sample* BBI*	0.043 +/- 0.025 < 0.3	< 0.05	< 0.01	< 0.01 < 0.6	< 0.2	W < 200 < 400
BB-15-005 Sample* USEPA* Sample*	0.052 +/- 0.025 0.041 +/- 0.013	0.055 +/- 0.042 < 0.02	< 0.01 < 0.011	< 0.01 < 0.73	< 0.2 < 0.17	W < 171 < 200

pCi/g(dry) -- Picocuries per gram of undried sample  
pCi/L -- Picocuries per liter of water  
< -- Less than

\* -- 1992 Sample  
^ -- 1994 Sample  
Blank -- Not analyzed  
+/- -- Plus or minus

BBI -- Braudis-Bardin Institute split sample  
DHS -- Department of Health Services split sample  
USEPA -- United States Environmental Protection Agency  
split sample

W -- Samples results could not be verified by the laboratory and subsequently were withdrawn by the laboratory.

Cesium-137 was the only man-made radionuclide detected in the gamma scan analysis.

**TABLE 31 (continued)**  
**Radionuclide Results for Sediment Samples at the RD-51 Watershed (BB-15)**

	Cesium-137 [pCi/g(dry)]	Plutonium-238 [pCi/g(dry)]	Plutonium-239 [pCi/g(dry)]	Strontium-90 [pCi/g(dry)]	Iodine-129 [pCi/g(dry)]	Tritium (pCi/L)
BB-15-006 Sample* BBI†		< 0.01 < 0.05	< 0.01 < 0.05			
BB-15-007 Sample* USEPA‡		< 0.01 < 0.04	< 0.01 < 0.03			
BB-15-008 Sample*		< 0.01	< 0.01			
BB-15-009 Sample* Field Duplicate* BBI†		< 0.009 < 0.008 < 0.1	< 0.009 < 0.01 < 0.05			
BB-15-010 Sample*		< 0.009	< 0.009			

pCi/g(dry) -- Picocuries per gram of undried sample  
 pCi/L -- Picocuries per liter of water  
 < -- Less than

\* -- 1992 Sample  
 † -- 1994 Sample  
 ‡ -- Not analyzed  
 +/- -- Plus or minus

BBI -- Brandeis-Bardin Institute split sample  
 DHS -- Department of Health Services split sample  
 USEPA -- United States Environmental Protection Agency  
 split sample

Field Duplicate -- A duplicate sample is collected in the field and submitted under an anonymous sample identifier.

Cesium-137 was the only man-made radionuclide detected in the gamma scan analysis.

**TABLE 32**  
**Radionuclide Results for Sediment Samples at Radioactive Materials Disposal Facility Watershed (BB-16)**

	Cesium-137 [pCi/g(dry)]	Plutonium-238 [pCi/g(dry)]	Plutonium-239 [pCi/g(dry)]	Strontium-90 [pCi/g(dry)]	Iodine-129 [pCi/g(dry)]	Tritium (pCi/L)
BB-16-001A Sample* Interlab Duplicate*	0.070 +/- 0.028	< 0.04	< 0.008	0.08 +/- 0.01	< 0.3	990 +/- 150 955 +/- 100
BB-16-001B Sample* Interlab Duplicate* USEPA*	< 0.04 < 0.017	< 0.03 < 0.02	< 0.01 < 0.019	0.03 +/- 0.01 < 0.63	< 0.3 < 0.17	< 200 220 +/- 120 < 190
BB-16-002 Sample* Field Duplicate* Lab Duplicate* Interlab Duplicate*	< 0.04	0.066 +/- 0.061 < 0.04	< 0.02	0.09 +/- 0.01 0.12 +/- 0.02	< 0.3 < 0.2	1100 +/- 100 710 +/- 120
BB-16-003 Sample* Interlab Duplicate* USEPA*	< 0.03 0.0078 +/- 0.0008	< 0.02	< 0.009	0.02 +/- 0.01	< 0.3	1300 +/- 300 1500 +/- 200
BB-16-004 Sample* Interlab Duplicate* DHS*	0.34 +/- 0.04 0.60 +/- 0.03	< 0.07	< 0.03	0.15 +/- 0.02	< 0.3	1300 +/- 200 1600 +/- 200 1902 +/- 186
BB-16-005 Sample* Interlab Duplicate* BBI*	< 0.04 < 0.3	< 0.02	< 0.005	0.04 +/- 0.01 < 1	< 0.3	1500 +/- 200 1700 +/- 200

\* -- 1992 Sample  
 \* -- 1994 Sample  
 Blank -- Not analyzed  
 +/- -- Plus or minus

pCi/g(dry) -- Pico-curies per gram of undried sample  
 pCi/L -- Pico-curies per liter of water  
 < -- Less than

BBI -- Brandeis-Bardin Institute split sample  
 DHS -- Department of Health Services split sample  
 USEPA -- United States Environmental Protection Agency  
 split sample

Cesium-137 was the only man-made radionuclide detected in the gamma scan analysis.

**TABLE 32(continued)**  
**Radionuclide Results for Sediment Samples at Radioactive Materials Disposal Facility Watershed (BB-16)**

	Cesium-137 [pCi/g(dry)]	Plutonium-238 [pCi/g(dry)]	Plutonium-239 [pCi/g(dry)]	Strontium-90 [pCi/g(dry)]	Iodine-129 [pCi/g(dry)]	Tritium (pCi/L)
BB-16-006 Sample Field Duplicate <sup>a</sup> DHS <sup>a</sup>	0.046 +/- 0.0216 0.076 +/- 0.0315 0.034 +/- 0.01			0.08 +/- 0.044 < 0.06		< 100
BB-16-007 Sample <sup>a</sup> Field Duplicate <sup>a</sup> USEPA <sup>a</sup>	< 0.04 0.06 +/- 0.01			0.11 +/- 0.05 0.19 +/- 0.03 < 0.66		230 +/- 100 210 +/- 100 < 270
BB-16-008 Sample <sup>a</sup> Lab Duplicate <sup>a</sup> BBI <sup>a</sup> DHS <sup>a</sup>	< 0.04 < 0.05 < 0.07 0.034 +/- 0.01			0.15 +/- 0.09 < 0.5 < 0.06		< 100 < 390
BB-16-009 Sample <sup>a</sup> BBI <sup>a</sup>	0.199 +/- 0.044 0.14 +/- 0.04			0.24 +/- 0.04 < 0.5		< 100 < 2300
BB-16-010 Sample <sup>a</sup> DHS <sup>a</sup> USEPA <sup>a</sup>	0.075 +/- 0.0283 0.043 +/- 0.011 0.06 +/- 0.01			0.14 +/- 0.07 0.15 +/- 0.03 < 0.74		< 100 < 270

\* -- 1992 Sample  
 ^ -- 1994 Sample  
 Blank -- Not analyzed  
 +/- -- Plus or minus

pCi/g(dry) -- Picocuries per gram of undried sample  
 pCi/L -- Picocuries per liter of water  
 < -- Less than

Field Duplicate -- A duplicate sample is collected in the field and submitted under an anonymous sample identifier.  
 Lab Duplicate -- A reanalysis of the sample including extraction and counting.

Cesium-137 was the only man-made radionuclide detected in the gamma scan analysis.

BBI -- Brandeis-Bardin Institute split sample  
 DHS -- Department of Health Services split sample  
 USEPA -- United States Environmental Protection Agency split sample

**TABLE 32(continued)**  
**Radionuclide Results for Sediment Samples at Radioactive Materials Disposal Facility Watershed (BB-16)**

	Cesium-137 [pCi/g(dry)]	Plutonium-238 [pCi/g(dry)]	Plutonium-239 [pCi/g(dry)]	Strontium-90 [pCi/g(dry)]	Iodine-129 [pCi/g(dry)]	Tritium (pCi/L)
BB-16-B001/0.0 Sample <sup>a</sup>	0.147 +/- 0.051			< 0.05		< 200
BB-16-B001/5.0 Sample <sup>a</sup>	< 0.08			0.093 +/- 0.042		< 200
BB-16-B002/0.0 Sample <sup>a</sup> BB1	0.109 +/- 0.044 < 0.07			< 0.08 < 0.5		< 100 < 620
BB-16-B002/5.0 Sample <sup>a</sup> BB1	< 0.04 < 0.07			< 0.07 < 0.5		< 100 < 380
BB-16-B003/0.0 Sample <sup>a</sup>	0.087 +/- 0.0415			< 0.07		< 100
BB-16-B003/5.0 Sample <sup>a</sup>	< 0.05			< 0.07		< 100
BB-16-B004/0.0 Sample <sup>a</sup>	< 0.04			< 0.1		< 100
BB-16-B004/5.0 Sample <sup>a</sup> Lab Duplicate <sup>a</sup>	< 0.07			< 0.09		270 +/- 150 290 +/- 150
BB-16-B005/0.0 Sample <sup>a</sup>	< 0.05			< 0.05		< 100
BB-16-B005/5.0 Sample <sup>a</sup>	< 0.06			< 0.08		< 200

\* -- 1992 Sample  
 ^ -- 1994 Sample  
 Blank -- Not analyzed  
 +/- -- Plus or minus  
 BB1 -- Brandeis-Bardin Institute split sample  
 DHS -- Department of Health Services split sample  
 USEPA -- United States Environmental Protection Agency  
 split sample

pCi/g(dry) -- Picocuries per gram of undried sample  
 pCi/L -- Picocuries per liter of water  
 < -- Less than  
 Samples from boring locations (B001 through B005) were collected at the surface (0.0) or at a depth of 5 feet (5.0).

Cesium-137 was the only man-made radionuclide detected in the gamma scan analysis.

**TABLE 33**  
**Radionuclide Results for Sediment Samples at the Building 59 Watershed (BB-17)**

	Cesium-137 [pCi/g(dry)]	Plutonium-238 [pCi/g(dry)]	Plutonium-239 [pCi/g(dry)]	Strontium-90 [pCi/g(dry)]	Iodine-129 [pCi/g(dry)]	Tritium (pCi/L)
BB-17-001 Sample* Lab Duplicate* Duplicate Count* USEPA*	0.077 +/- 0.032  0.086 +/- 0.016	0.19 +/- 0.06 < 0.009 0.15 +/- 0.05 0.027 +/- 0.030	< 0.02	0.01 +/- 0.01  < 0.66	< 0.3  < 0.17	130 +/- 80  < 190
BB-17-002 Sample* Interlab Duplicate* USEPA*	0.16 +/- 0.04	0.055 +/- 0.024	< 0.005	0.02 +/- 0.01	< 0.2	< 100 < 100 < 200
BB-17-003 Sample* Duplicate Count* DHS* USEPA*	0.13 +/- 0.03  0.09 +/- 0.02	0.055 +/- 0.031	< 0.007	0.01 +/- 0.01	< 0.2	10800 +/- 300 11000 +/- 1000 10700 +/- 300 12380 +/- 371
BB-17-004 Sample* Field Duplicate* Lab Duplicate* Duplicate Count* BBI* USEPA*	0.23 +/- 0.03  < 0.3	< 0.04 0.33 +/- 0.08 < 0.06 0.27 +/- 0.07	< 0.007 < 0.01	0.03 +/- 0.01 0.02 +/- 0.01 < 0	< 0.2 < 0.2	9810 +/- 330  12720 +/- 4300 9855 +/- 325
BB-17-005 Sample* USEPA*	0.218 +/- 0.043 0.15 +/- 0.02	< 0.01 < 0.01	< 0.02 < 0.01			< 100 < 270

pCi/g(dry) -- Picouries per gram of undried sample  
pCi/L -- Picouries per liter of water  
\* -- 1992 Sample  
^ -- 1994 Sample  
Blank -- Not analyzed  
+/- -- Plus or minus  
split sample

BBI -- Brandeis-Bardin Institute split sample  
DHS -- Department of Health Services split sample  
USEPA -- United States Environmental Protection Agency

Cesium-137 was the only man-made radionuclide detected in the gamma scan analysis.

**TABLE 33(continued)**  
**Radionuclide Results for Sediment Samples at the Building 59 Watershed (BB-17)**

	Cesium-137 [pCi/g(dry)]	Plutonium-238 [pCi/g(dry)]	Plutonium-239 [pCi/g(dry)]	Strontium-90 [pCi/g(dry)]	Iodine-129 [pCi/g(dry)]	Tritium (pCi/L)
BB-17-005A Sample <sup>a</sup>	0.148 +/- 0.05	< 0.02	< 0.02			< 100
BB-17-005B Sample <sup>a</sup>	0.385 +/- 0.053	< 0.04	< 0.04			< 100
BB-17-006 Sample <sup>a</sup> Lab Duplicate <sup>a</sup> USEPA <sup>a</sup>	0.193 +/- 0.03 0.14 +/- 0.02	< 0.02 < 0.02 < 0.07	< 0.02 < 0.02 < 0.04			3500 +/- 200 3970 +/- 262
BB-17-006A Sample <sup>a</sup>	0.164 +/- 0.035	< 0.01	< 0.01			180 +/- 90
BB-17-006B Sample <sup>a</sup>	0.23 +/- 0.056	< 0.02	< 0.03			< 100
BB-17-007 Sample <sup>a</sup> USEPA <sup>a</sup>	0.22 +/- 0.04 0.19 +/- 0.02	< 0.02 0.05 +/- 0.03	< 0.02 < 0.04			2900 +/- 200 3360 +/- 253
BB-17-007A Sample <sup>a</sup>	0.123 +/- 0.041	< 0.01	< 0.02			230 +/- 100
BB-17-007B Sample <sup>a</sup>	0.299 +/- 0.051	< 0.02	< 0.02			220 +/- 100
BB-17-008 Sample <sup>a</sup> USEPA <sup>a</sup>	0.124 +/- 0.047 0.13 +/- 0.02	< 0.03 < 0.04	< 0.03 < 0.02			5400 +/- 200 6700 +/- 316

<sup>a</sup> -- 1992 Sample  
<sup>b</sup> -- 1994 Sample  
 Blank -- Not analyzed  
 +/- -- Plus or minus

pCi/g(dry) -- Picouries per gram of undried sample  
 pCi/L -- Picouries per liter of water  
 < -- Less than

Lab Duplicate -- A reanalysis of the sample including extraction and counting.  
 Cesium-137 was the only man-made radionuclide detected in the gamma scan analysis.

BBI -- Brandeis-Bardin Institute split sample  
 DHS -- Department of Health Services split sample  
 USEPA -- United States Environmental Protection Agency split sample

**TABLE 33(continued)**  
**Radionuclide Results for Sediment Samples at the Building 59 Watershed (BB-17)**

	Cesium-137 [pCi/g(dry)]	Plutonium-238 [pCi/g(dry)]	Plutonium-239 [pCi/g(dry)]	Strontium-90 [pCi/g(dry)]	Iodine-129 [pCi/g(dry)]	Tritium (pCi/L)
BB-17-008A Sample <sup>a</sup> Field Duplicate <sup>a</sup>	0.249 +/- 0.047	< 0.02	< 0.02			300 +/- 110 510 +/- 110
BB-17-008B Sample <sup>a</sup>	0.242 +/- 0.024	< 0.04	< 0.05			< 100
BB-17-009 Sample <sup>a</sup> USEPA <sup>a</sup>	0.149 +/- 0.018 0.12 +/- 0.02	< 0.03 < 0.04	< 0.03 < 0.03			3900 +/- 200 4790 +/- 282
BB-17-009A Sample <sup>a</sup> Lab Duplicate <sup>a</sup>	0.187 +/- 0.04	< 0.01	< 0.01			< 200 < 200
BB-17-009B Sample <sup>a</sup>	0.36 +/- 0.045	< 0.008	< 0.01			
BB-17-010 Sample <sup>a</sup> Lab Duplicate <sup>a</sup> BBJ <sup>b</sup>	0.116 +/- 0.046 0.15 +/- 0.07	< 0.01 < 0.02 < 0.05	< 0.01 < 0.02 < 0.05			< 100

pCi/g(dry) -- Picouries per gram of undried sample  
 pCi/L -- Picouries per liter of water  
 < -- Less than

♦ -- 1992 Sample  
 ^ -- 1994 Sample  
 Blank -- Not analyzed  
 +/- -- Plus or minus

BBJ -- Brandeis-Bardin Institute split sample  
 DHS -- Department of Health Services split sample  
 USEPA -- United States Environmental Protection Agency  
 split sample

Field Duplicate -- A duplicate sample is collected in the field and submitted under an anonymous sample identifier.  
 Lab Duplicate -- A reanalysis of the sample including extraction and counting.

Cesium-137 was the only man-made radionuclide detected in the gamma scan analysis.

**TABLE 33(continued)**  
**Radionuclide Results for Sediment Samples at the Building 59 Watershed (BB-17)**

	Cesium-137 [pCi/g(dry)]	Plutonium-238 [pCi/g(dry)]	Plutonium-239 [pCi/g(dry)]	Strontium-90 [pCi/g(dry)]	Iodine-129 [pCi/g(dry)]	Tritium (pCi/L)
BB-17-B001/0.0 Sample <sup>a</sup> USEPA <sup>a</sup>	0.115 +/- 0.041 0.13 +/- 0.02	< 0.01 < 0.05	< 0.01 < 0.02			< 200 < 270
BB-17-B001/2.5 Sample <sup>a</sup> USEPA <sup>a</sup>	< 0.03 < 0.02	< 0.008 < 0.03	< 0.008 < 0.02			300 +/- 110 480 +/- 180
BB-17-B002/0.0 Sample <sup>a</sup>	0.13 +/- 0.04	< 0.01	< 0.01			< 200
BB-17-B002/2.5 Sample <sup>a</sup>	< 0.05	< 0.009	< 0.009			7600 +/- 300
BB-17-B003/0.0 Sample <sup>a</sup> Field Duplicate <sup>a</sup>	< 0.05	< 0.01 < 0.009	< 0.02 < 0.009			< 200
BB-17-B003/2.5 Sample <sup>a</sup> Lab Duplicate <sup>a</sup>	< 0.05	< 0.01	< 0.01			< 200 < 200

pCi/g(dry) -- Picocuries per gram of undried sample  
pCi/L -- Picocuries per liter of water  
< -- Less than

Samples collected at boring locations (B001 through B003) were collected at the surface (0.0) or at a depth of 2.5 feet (2.5).  
Field Duplicate -- A duplicate sample is collected in the field and submitted under an anonymous sample identifier.  
Lab Duplicate -- A reanalysis of the sample including extraction and counting.

Cesium-137 was the only man-made radionuclide detected in the gamma scan analysis.

\* -- 1992 Sample  
^ -- 1994 Sample  
Blank -- Not analyzed  
+/- -- Plus or minus

BBJ -- Brandeis-Bardin Institute split sample  
DHS -- Department of Health Services split sample  
USEPA -- United States Environmental Protection Agency  
split sample

**TABLE 34****Mercury Results for Soil Samples at Sodium Burn Pit Watershed (BB-18)**

Sample Location	Mercury (mg/kg)
BB-18-004 Sample	< 0.1
BB-18-005 Sample	< 0.1
BB-18-005A Sample	< 0.1
BB-18-005B Sample	< 0.1
BB-18-005C Sample	< 0.1
BB-18-006A Sample	< 0.1
BB-16-006B Sample	0.12
Lab Duplicate	< 0.1
USEPA	< 0.09
BBI	0.14

< -- Less than 0.1 mg/kg

USEPA -- United States Environmental Protection Agency split sample

BBI -- Brandeis-Bardin Institute split sample

Lab Duplicate -- A reanalysis of the sample including extraction

**TABLE 35**  
**Radionuclide Results for Sediment Samples at the Sodium Reactor Experiment Watershed (BB-19)**

	Cesium-137 [pCi/g(dry)]	Plutonium-238 [pCi/g(dry)]	Plutonium-239 [pCi/g(dry)]	Strontium-90 [pCi/g(dry)]	Iodine-129 [pCi/g(dry)]	Tritium (pCi/L)
BB-19-001 Sample*	0.30 +/- 0.05	< 0.05	< 0.03	0.08 +/- 0.02	< 0.3	
BB-19-002 Sample* DHS*	0.24 +/- 0.06 0.28 +/- 0.03	< 0.06	< 0.01	0.09 +/- 0.02	< 0.3	< 100 444 +/- 153
BB-19-003 Sample* USEPA*	< 0.04 0.055 +/- 0.010	< 0.07 0.03 +/- 0.05	< 0.01 < 0.020	0.02 +/- 0.01 < 0.74	< 0.3 < 0.17	200 +/- 100 < 200
BB-19-004 Sample* Field Duplicate* BBI*	0.18 +/- 0.03 < 0.3	< 0.04 0.03 +/- 0.02	< 0.01 < 0.005	0.03 +/- 0.01 < 0.6	< 0.3	< 100 < 4500
BB-19-005 Sample Lab Duplicate* USEPA*	0.056 +/- 0.0258 0.05 +/- 0.01			< 0.08 < 0.08 < 0.78		
BB-19-006 Sample* USEPA*	0.051 +/- 0.028 0.06 +/- 0.02			0.12 +/- 0.08 < 0.62		

pCi/g(dry) -- Picocuries per gram of undried sample  
pCi/L -- Picocuries per liter of water  
< -- Less than

\* -- 1992 Sample  
^ -- 1994 Sample  
Blank -- Not analyzed  
+/- -- Plus or minus

BBI -- Brandeis-Bardin Institute split sample  
DHS -- Department of Health Services split sample  
USEPA -- United States Environmental Protection Agency  
split sample

Lab Duplicate -- A reanalysis of the sample including extraction and counting.  
Cesium-137 was the only man-made radionuclide detected in the gamma scan analysis.

**TABLE 35(continued)**  
**Radionuclide Results for Sediment Samples at the Sodium Reactor Experiment Watershed (BB-19)**

	Cesium-137 [pCi/g(dry)]	Plutonium-238 [pCi/g(dry)]	Plutonium-239 [pCi/g(dry)]	Strontium-90 [pCi/g(dry)]	Iodine-129 [pCi/g(dry)]	Tritium (pCi/L)
BB-19-007 Sample <sup>a</sup> BBI <sup>a</sup>	< 0.04 < 0.07			< 0.1 < 0.5		
BB-19-008 Sample <sup>a</sup> DHS <sup>a</sup>	0.045 +/- 0.0257 0.052 +/- 0.011			< 0.1 < 0.08		
BB-19-009 Sample <sup>a</sup>	< 0.03			0.061 +/- 0.041		

pCi/g(dry) -- Picouries per gram of undried sample  
 pCi/L -- Picouries per liter of water  
 < -- Less than

\* -- 1992 Sample  
 ^ -- 1994 Sample  
 Blank -- Not analyzed  
 +/- -- Plus or minus

BBI -- Brandeis-Bardin Institute split sample  
 DHS -- Department of Health Services split sample  
 USEPA -- United States Environmental Protection Agency  
 split sample

Cesium-137 was the only man-made radionuclide detected in the gamma scan analysis.

**TABLE 36**  
**Radionuclide Results for Sediment Samples at Campsite 1 Drainage (BB-20)**

	Cesium-137 [pCi/g(dry)]	Plutonium-238 [pCi/g(dry)]	Plutonium-239 [pCi/g(dry)]	Strontium-90 [pCi/g(dry)]	Iodine-129 [pCi/g(dry)]	Tritium (pCi/L)
BB-20-001 Sample <sup>a</sup> BBI <sup>a</sup> USEPA <sup>a</sup>	0.11 +/- 0.037 0.1 +/- 0.05 0.04 +/- 0.01			< 0.1 < 0.3 < 0.78		< 100 < 520 < 270
BB-20-002 Sample <sup>a</sup>	< 0.04			< 0.09		< 100
BB-20-003 Sample <sup>a</sup> Field Duplicate <sup>a</sup> BBI <sup>a</sup> USEPA <sup>a</sup>	< 0.04 < 0.07 0.04 +/- 0.02			< 0.06 < 0.3 < 0.64		< 100 < 100 < 180 < 270
BB-20-004 Sample <sup>a</sup> Lab Duplicate <sup>a</sup> USEPA <sup>a</sup>	< 0.04 < 0.04			0.18 +/- 0.04 0.088 +/- 0.036 < 0.71		< 100 < 270
BB-20-005 Sample <sup>a</sup> Field Duplicate <sup>a</sup> Lab Duplicate <sup>a</sup>	< 0.03 < 0.04			< 0.06		< 100 < 100
BB-20-006 Sample <sup>a</sup> USEPA <sup>a</sup>	< 0.05 0.02 +/- 0.01			< 0.05 < 0.75		< 100 < 270

pCi/g(dry) -- Picouries per gram of undried sample  
pCi/L -- Picouries per liter of water  
< -- Less than

\* -- 1992 Sample  
^ -- 1994 Sample  
Blank -- Not analyzed  
+/- -- Plus or minus

BBI -- Brandeis-Bardin Institute split sample  
DHS -- Department of Health Services split sample  
USEPA -- United States Environmental Protection Agency  
split sample

Field Duplicate -- A duplicate sample is collected in the field and submitted under an anonymous sample identifier.  
Lab Duplicate -- A reanalysis of the sample including extraction and counting.

Cesium-137 was the only man-made radionuclide detected in the gamma scan analysis.

**TABLE 36(continued)**  
**Radionuclide Results for Sediment Samples at Campsite 1 Drainage (BB-20)**

	Cesium-137 [pCi/g(dry)]	Plutonium-238 [pCi/g(dry)]	Plutonium-239 [pCi/g(dry)]	Strontium-90 [pCi/g(dry)]	Iodine-129 [pCi/g(dry)]	Tritium (pCi/L)
BB-20-007 Sample <sup>a</sup> USEPA <sup>a</sup>	< 0.05 0.04 +/- 0.02			< 0.05 < 0.65		< 100 < 270
BB-20-008 Sample <sup>a</sup>	< 0.05			< 0.06		< 100
BB-20-009 Sample <sup>a</sup> BBI <sup>b</sup>	0.076 +/- 0.0364 < 0.07			< 0.06 < 0.3		< 100 < 310
BB-20-010 Sample <sup>a</sup> Lab Duplicate <sup>a</sup>	< 0.05			< 0.1 < 0.06		< 100

pCi/g(dry) -- Picocuries per gram of undried sample  
pCi/L -- Picocuries per liter of water  
< -- Less than

\* -- 1992 Sample  
^ -- 1994 Sample  
Blank -- Not analyzed  
+/- -- Plus or minus

BBI -- Brandeis-Bardin Institute split sample  
DHS -- Department of Health Services split sample  
USEPA -- United States Environmental Protection Agency  
split sample

Lab Duplicate -- A reanalysis of the sample including extraction and counting.

Cesium-137 was the only man-made radionuclide detected in the gamma scan analysis.

**TABLE 37**  
**Radionuclide Results for Surface Water Samples at Campsite 1 Drainage (BB-20)**

	Cesium-137 (pCi/L)	Tritium (pCi/L)	Gross Alpha (pCi/L)	Gross Beta (pCi/L)
BB-20-002				
Sample <sup>^</sup>		< 200	< 6	15 +/- 3
BBI <sup>^</sup>		< 300	< 8.4	< 9.6
USEPA <sup>^</sup>	< 7.18	< 260		

pCi/L -- Picocuries per liter of water  
 < -- Less than  
 +/- -- Plus or minus  
 ^ -- 1994 Sample  
 Blank -- Not analyzed  
 BBI -- Brandeis-Bardin Institute split sample  
 DHS -- Department of Health Services split sample  
 USEPA -- United States Environmental Protection Agency  
 split or interlaboratory duplicate sample

Cesium-137 was the only man-made radionuclide detected in the gamma scan analysis.

TABLE 38

Sample Area Levels Statistically Different From Background Levels

Radionuclide <sup>1</sup> (pCi/g (dry))	Range	Arithmetic Mean	SD	5th to 95th Percentile <sup>2</sup>
Cesium-137 Background Areas Building 59 Watershed (BB-17)	<0.03-0.213 0.077-0.385	0.087 0.20	0.062 0.08	<0.03-0.21 0.04-0.36
Strontium-90 Background Areas RMDF Watershed (BB-16)	<0.005-0.13 0.02-0.24	0.052 0.103	0.031 0.62	<0.005-0.11 <0.005-0.227

1 The majority of the background samples for tritium and plutonium-238 were below detection limits; statistical analysis was not used to evaluate concentrations of these radionuclides.

2 The fifth percentile equals the mean minus two times the standard deviation (mean - 2 x SD)

The ninety-fifth percentile equals the mean plus two times the standard deviation (mean + 2 x SD)

*Figures*

FIGURE 1  
SUMMARY OF 1992  
MULTI-MEDIA SAMPLING

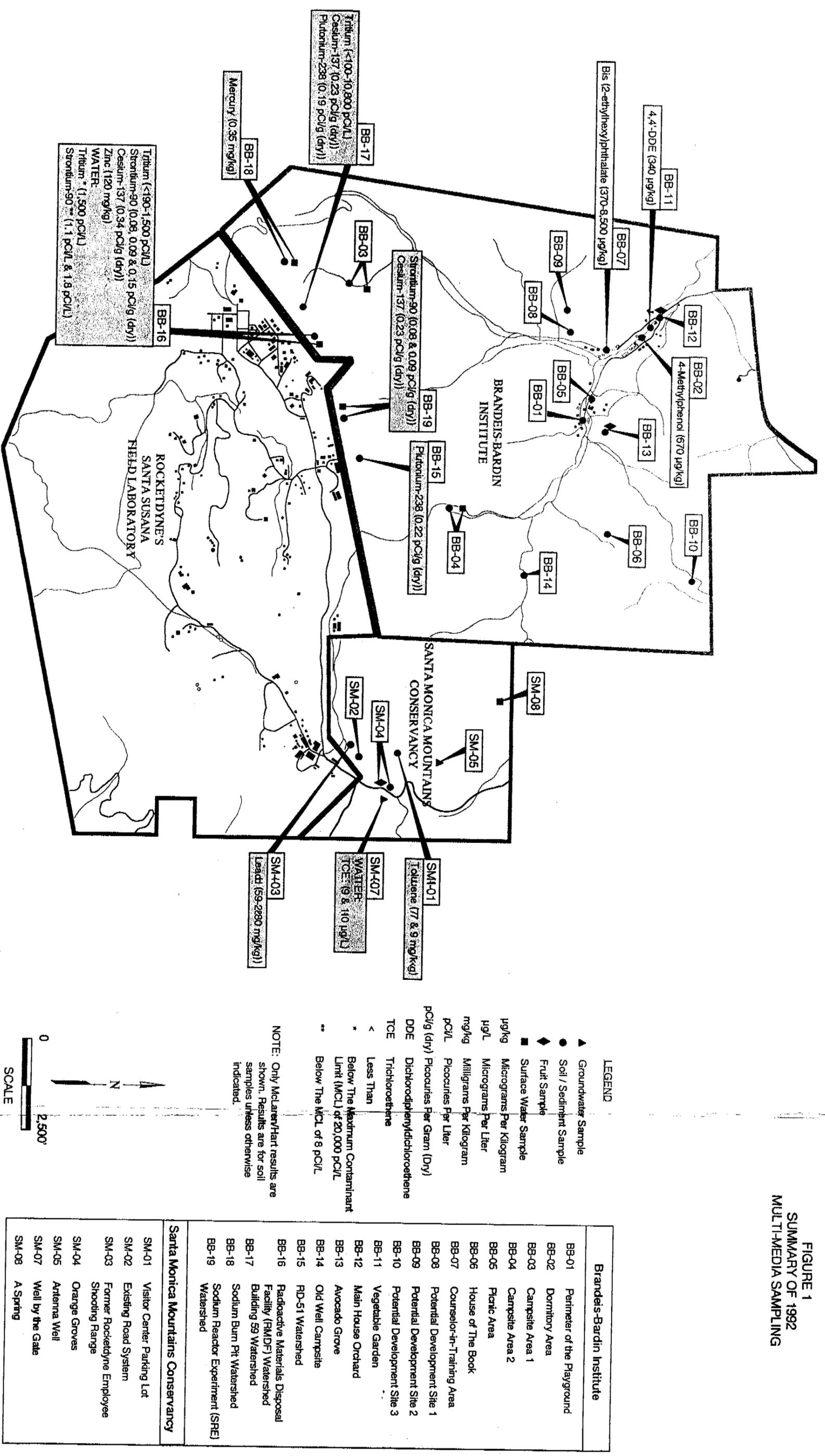
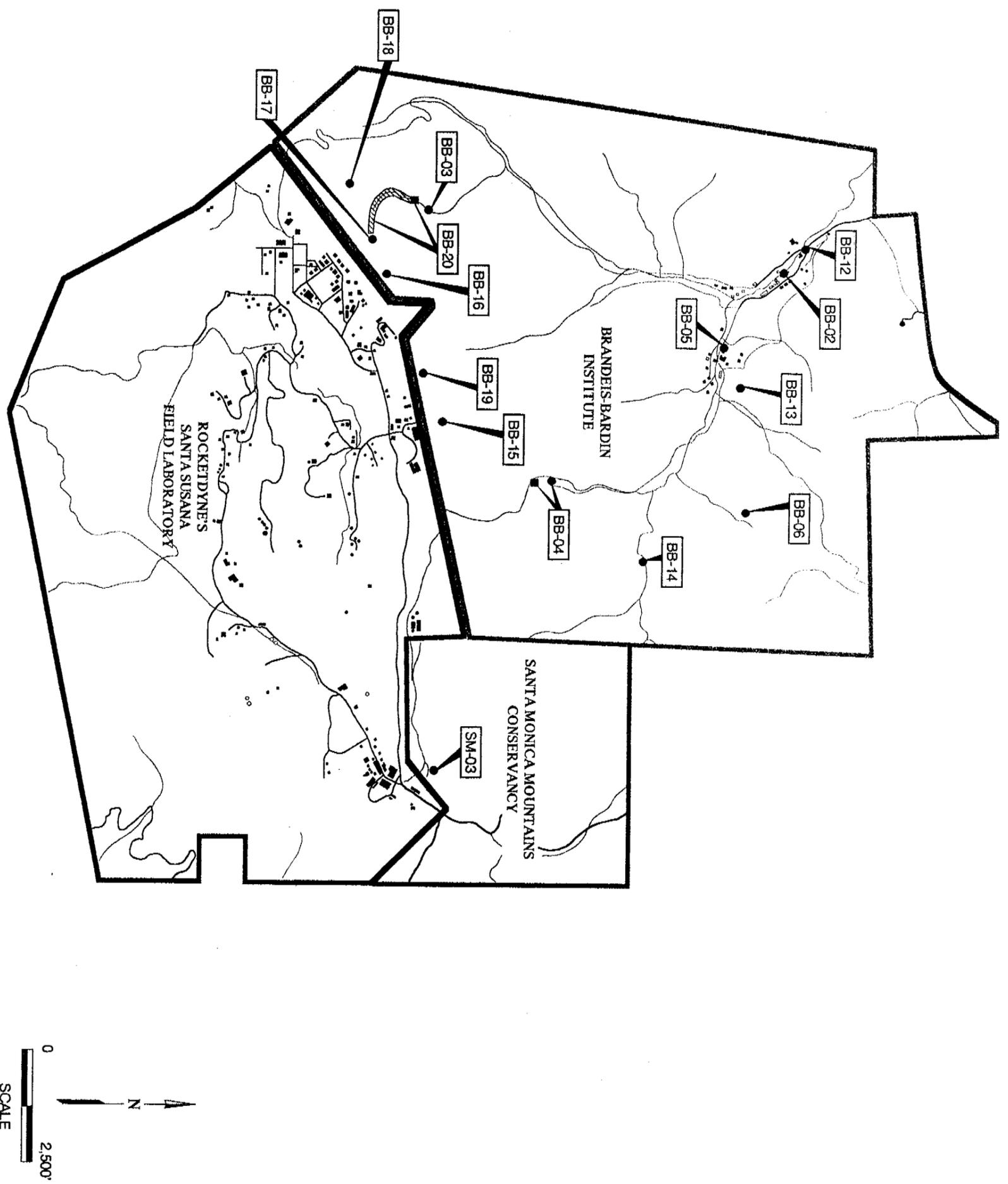


FIGURE 2  
 ADDITIONAL SAMPLE AREAS  
 BRANDEIS-BARDIN INSTITUTE AND  
 SANTA MONICA MOUNTAINS CONSERVANCY



LEGEND

- Soil / Sediment Sample
- Surface Water Sample

Brandeis-Bardin Institute	
BB-02	Dormitory Area
BB-03	Campsite Area 1
BB-04	Campsite Area 2
BB-05	Picnic Area
BB-06	House of The Book
BB-12	Main House Orchard
BB-13	Avocado Grove
BB-14	Old Well Campsite
BB-15	RD-51 Watershed
BB-16	Radioactive Materials Disposal Facility (RMDDF) Watershed
BB-17	Building 59 Watershed
BB-18	Sodium Burn Pit Watershed
BB-19	Sodium Reactor Experiment (SRE) Watershed
BB-20	Camp Site Area 1 - Drainage
Santa Monica Mountains Conservancy	
SM-03	Former Rocketdyne Employee Shooting Range





FIGURE 4  
REGISTER LABEL EXAMPLE



## Soils Label Register

# S- 80418

Project and Task #: \_\_\_\_\_

SB/MW#: \_\_\_\_\_ Field Log #: \_\_\_\_\_

HA#:

GS#:

Date: \_\_\_\_\_

Analysis: \_\_\_\_\_

Depth: \_\_\_\_\_

C-O-C #: \_\_\_\_\_

Initials: \_\_\_\_\_

Notes: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



11101 White Rock Road  
Rancho Cordova, CA 95670  
916.638.3696

#S- 80418

Project: \_\_\_\_\_ SB#: \_\_\_\_\_

Depth: \_\_\_\_\_ HA# \_\_\_\_\_

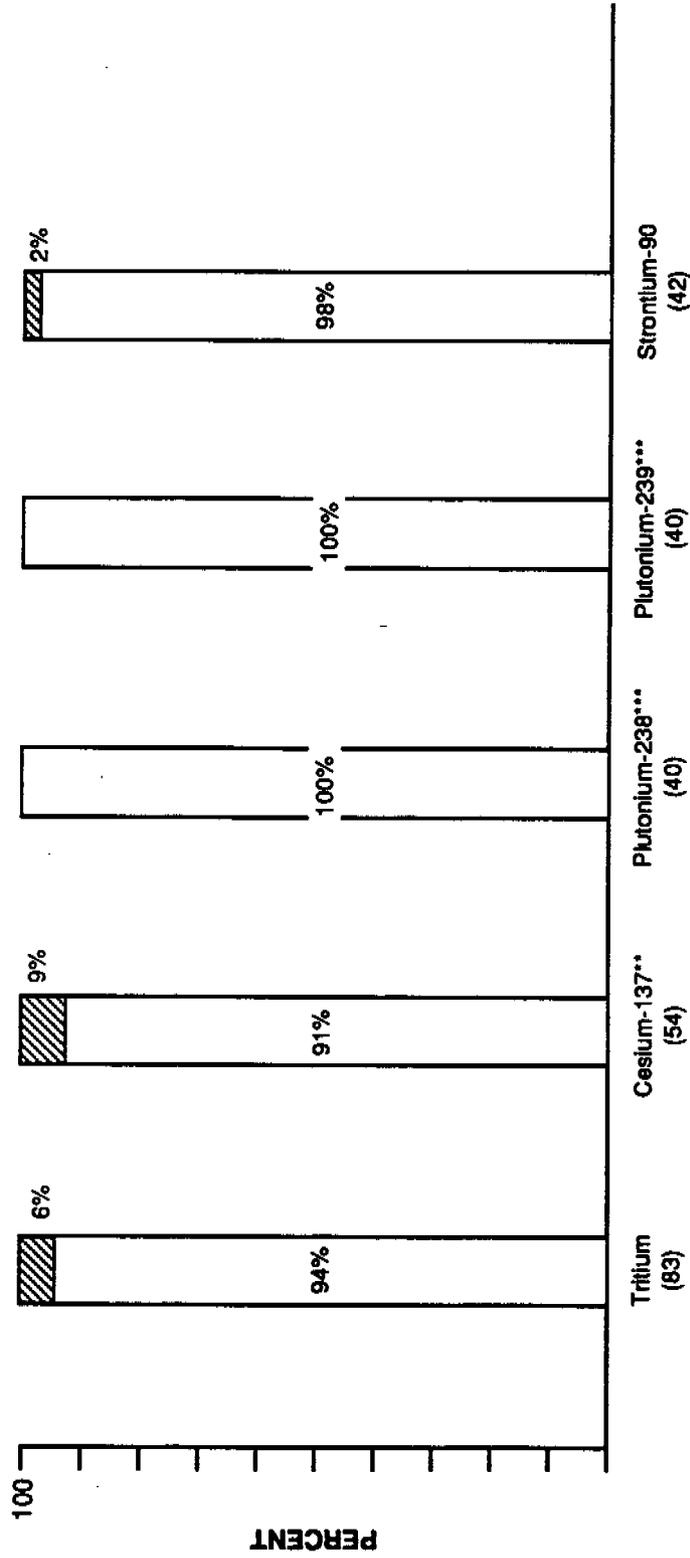
Date: \_\_\_\_\_ GS# \_\_\_\_\_

Analysis: \_\_\_\_\_

McLaren

DETACHABLE ADHESIVE LABEL FOR SAMPLE CONTAINER

Figure 5  
 Quality Assurance / Quality Control (QA/QC) Summary  
 (Soil/Sediment Samples)



**ANALYSIS**  
 (Number of QA/QC Samples)

□ In Agreement <sup>1</sup>  
 ▨ Not in Agreement

- \* Rinsate matrix spike, field duplicate, field split, and pre-spiked duplicate QA/QC samples compared to their respective scheduled sample.
- \*\* Cesium-137 was the only man-made radionuclide detected in the gamma-scan analysis.
- \*\*\* All values were below detection limits.

<sup>1</sup> "In agreement" for samples analyzed for radionuclides means that the difference between the sample results was less than the sum of the standard deviations of the sample results. For pre-spiked samples a result of 25 percent deviation or less from the spiked value were considered "in agreement". Matrix spike results were considered "in agreement" if they were within acceptable percent recovery. All "less than" values were considered "in agreement".

Figure 6  
 Quality Assurance / Quality Control (QA/QC) Summary  
 (Water Samples)\*\*



\* Includes surface water.

\*\* Rinsate, pre-spiked blind duplicate, field split, and field blank QA/QC samples compared to their respective scheduled sample.

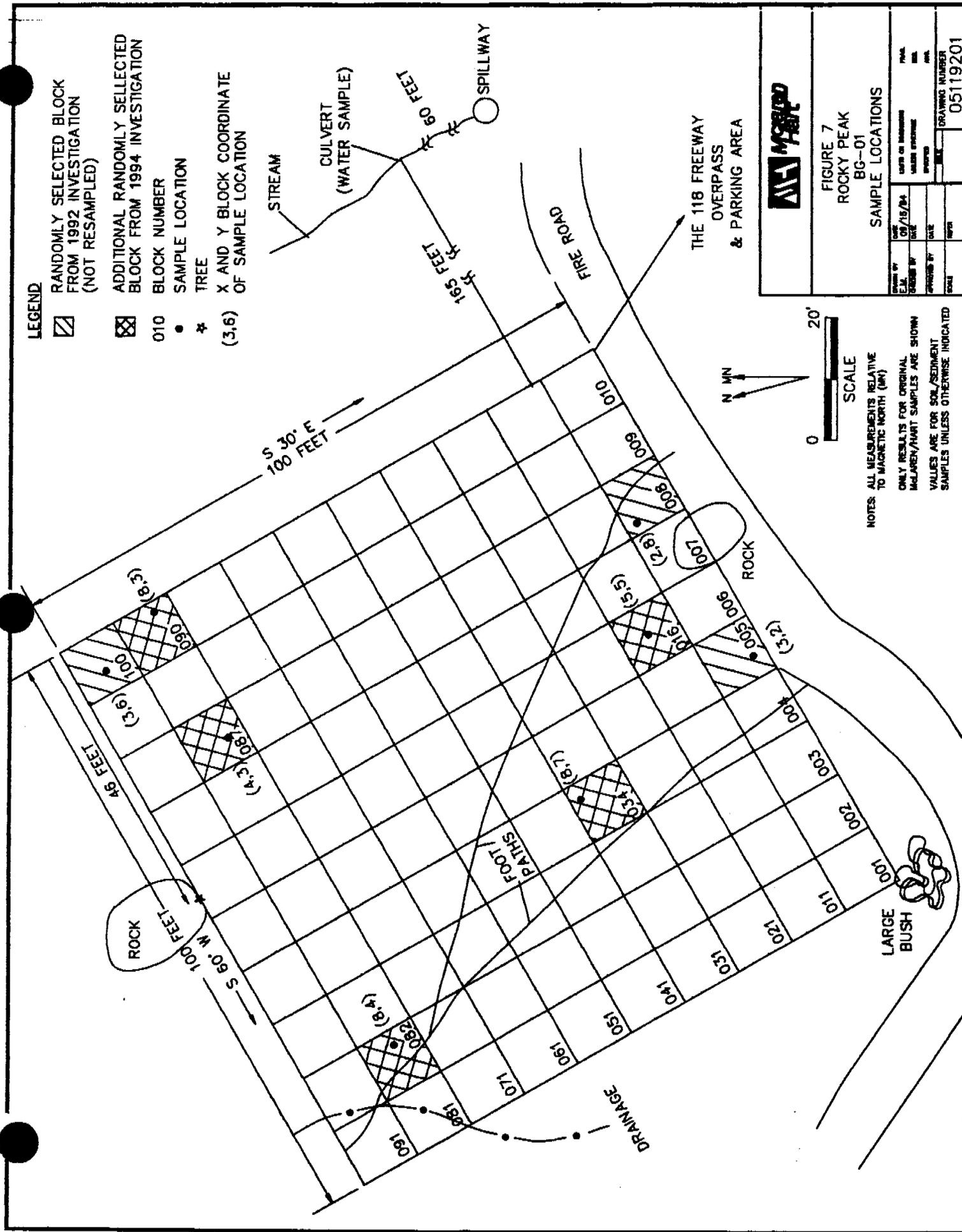
\*\*\* Gamma Scan: Cadmium-109, Cobalt-57, Cerium-139, Mercury-203, Tin-113, Cesium-137, Yttrium-88, and Cobalt-60.

<sup>1</sup> "in agreement" for samples analyzed for radionuclides means that the difference between the sample results was less than the sum of the standard deviations of the sample results. For pre-spiked samples a result of 25 percent deviation or less from the spiked value were considered "in agreement".

All "less than" values were considered "in agreement".

**LEGEND**

- ▨ RANDOMLY SELECTED BLOCK FROM 1992 INVESTIGATION (NOT RESAMPLED)
- ▩ ADDITIONAL RANDOMLY SELECTED BLOCK FROM 1994 INVESTIGATION
- 010 BLOCK NUMBER
- SAMPLE LOCATION
- \* TREE
- X AND Y BLOCK COORDINATE OF SAMPLE LOCATION (3,6)

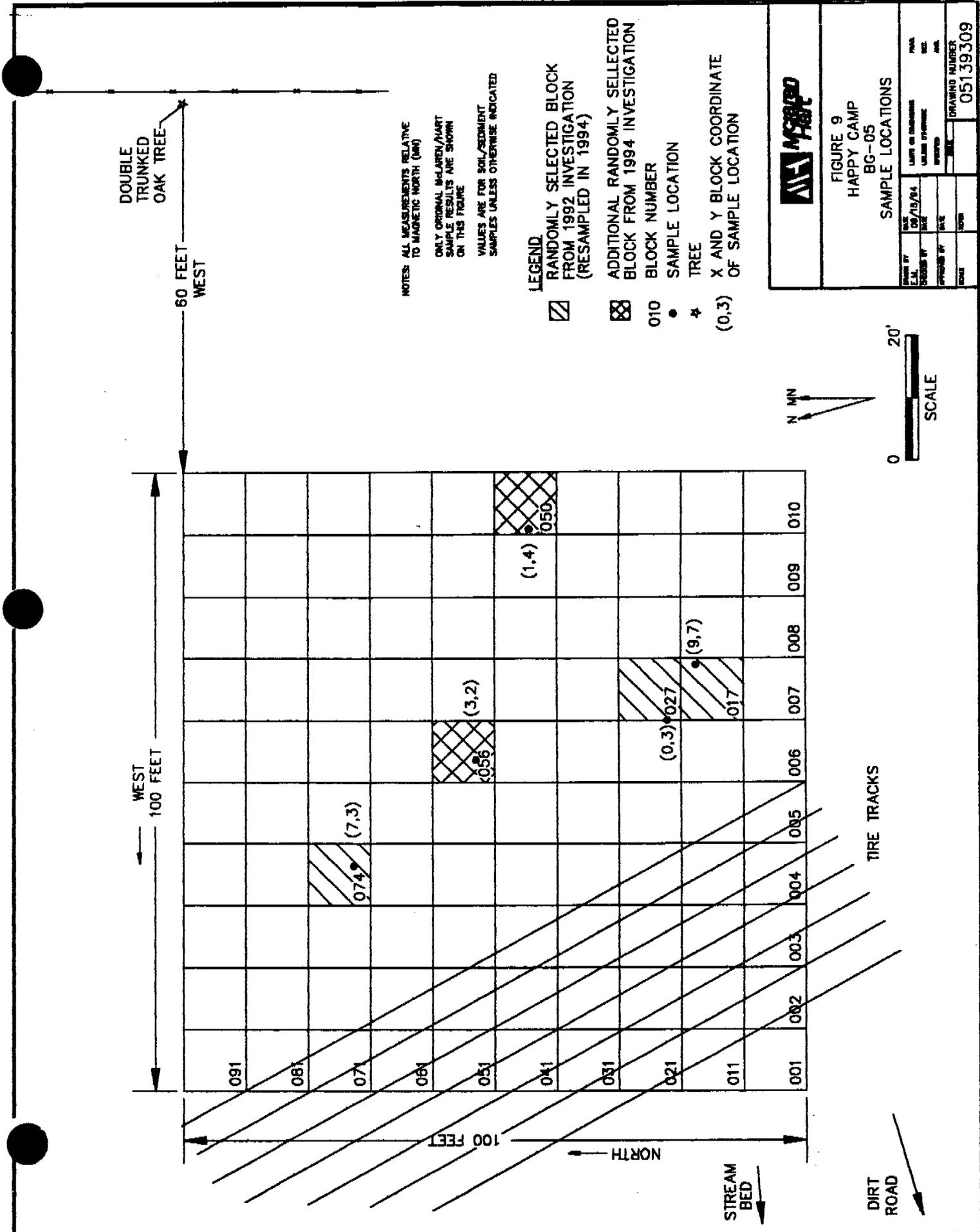


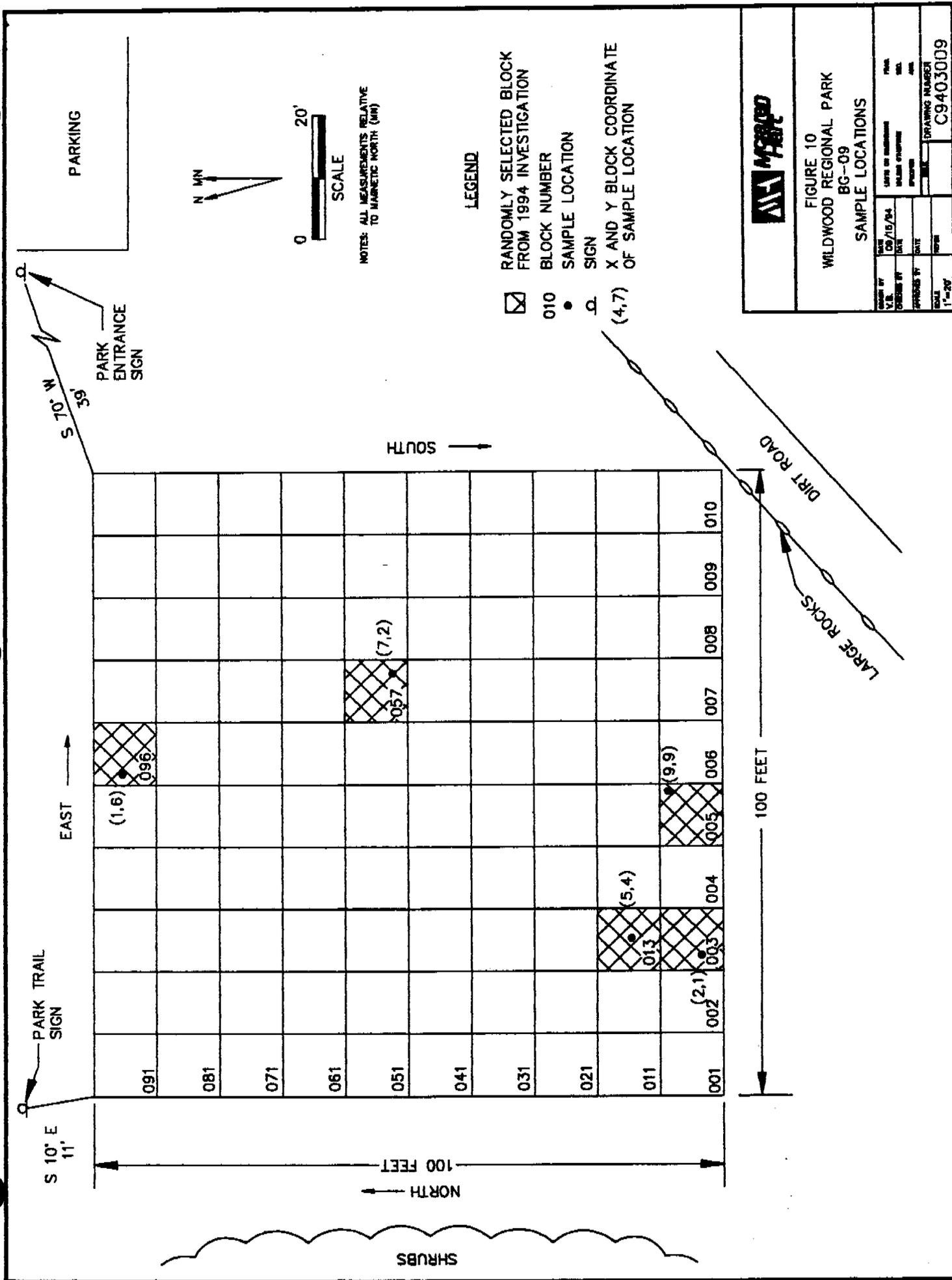
NOTES: ALL MEASUREMENTS RELATIVE TO MAGNETIC NORTH (MN)  
 ONLY RESULTS FOR ORIGINAL MEASUREMENT SAMPLES ARE SHOWN  
 VALUES ARE FOR SOIL/SEDIMENT SAMPLES UNLESS OTHERWISE INDICATED

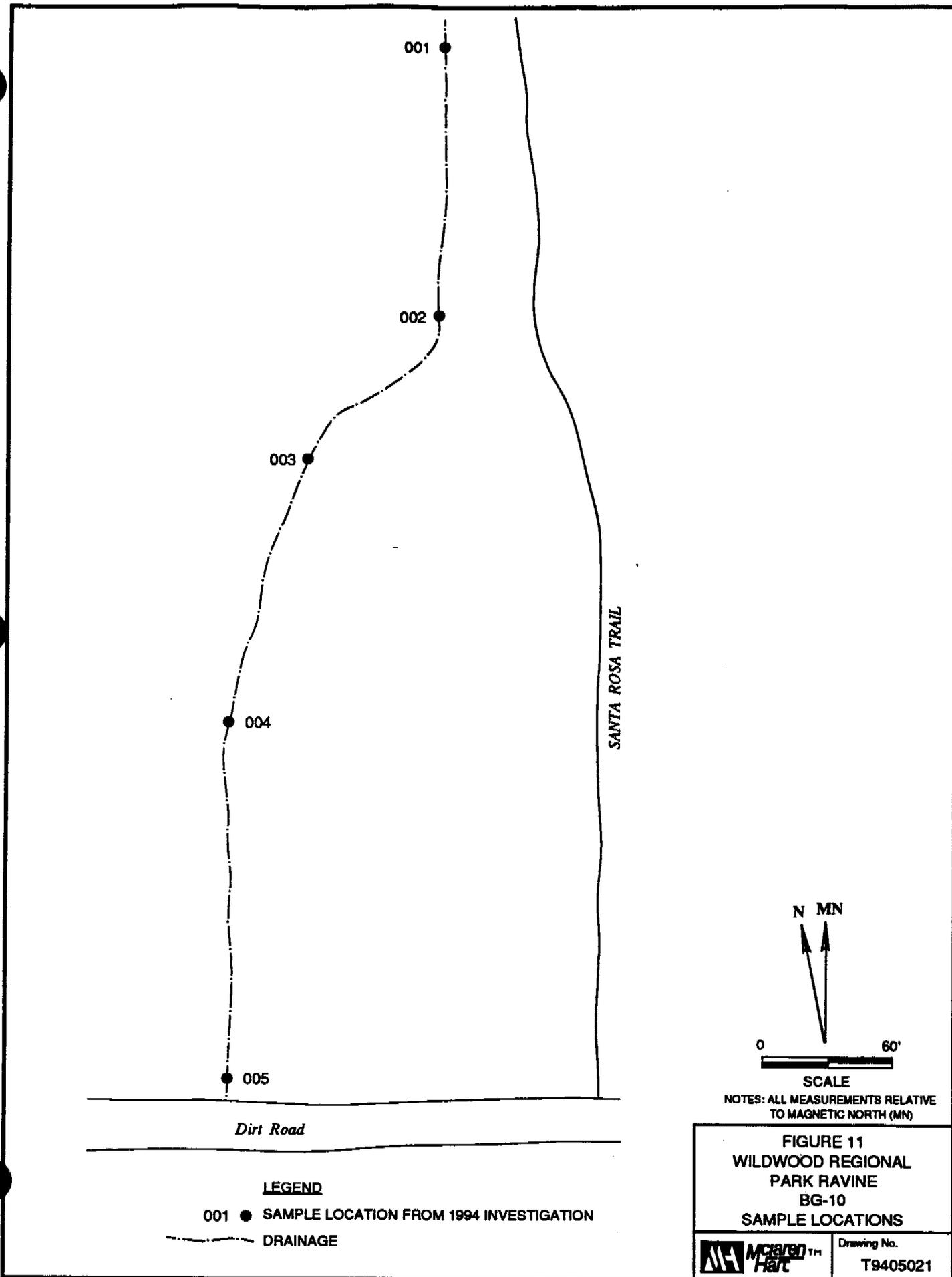
FIGURE 7  
 ROCKY PEAK  
 BG-01  
 SAMPLE LOCATIONS











001

002

003

004

005

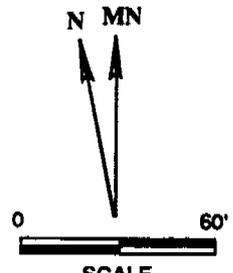
SANTA ROSA TRAIL

Dirt Road

**LEGEND**

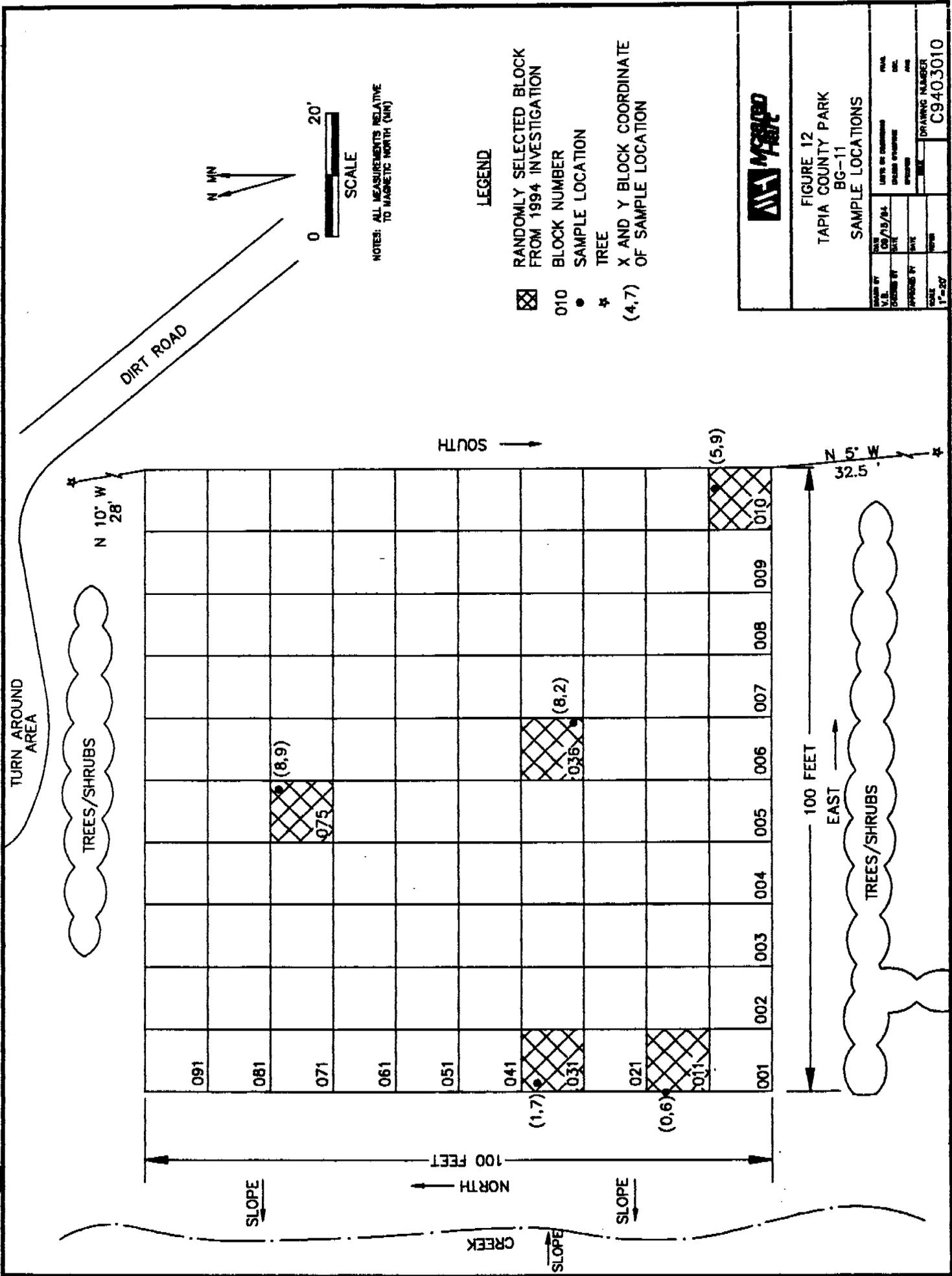
001 ● SAMPLE LOCATION FROM 1994 INVESTIGATION

--- DRAINAGE



NOTES: ALL MEASUREMENTS RELATIVE TO MAGNETIC NORTH (MN)

<p><b>FIGURE 11</b>  <b>WILDWOOD REGIONAL</b>  <b>PARK RAVINE</b>  <b>BG-10</b>  <b>SAMPLE LOCATIONS</b></p>	
	<p>Drawing No. T9405021</p>



TURN AROUND AREA

TREES/SHRUBS

N 10° W  
28'

DIRT ROAD

091

081

071

061

051

041

031

021

011

001

075

(8,9)

(1,7)

036

(8,2)

(0,6)

(5,9)

010

009

008

007

006

005

004

003

002

100 FEET

EAST

TREES/SHRUBS

N 5° W

32.5'

100 FEET

NORTH

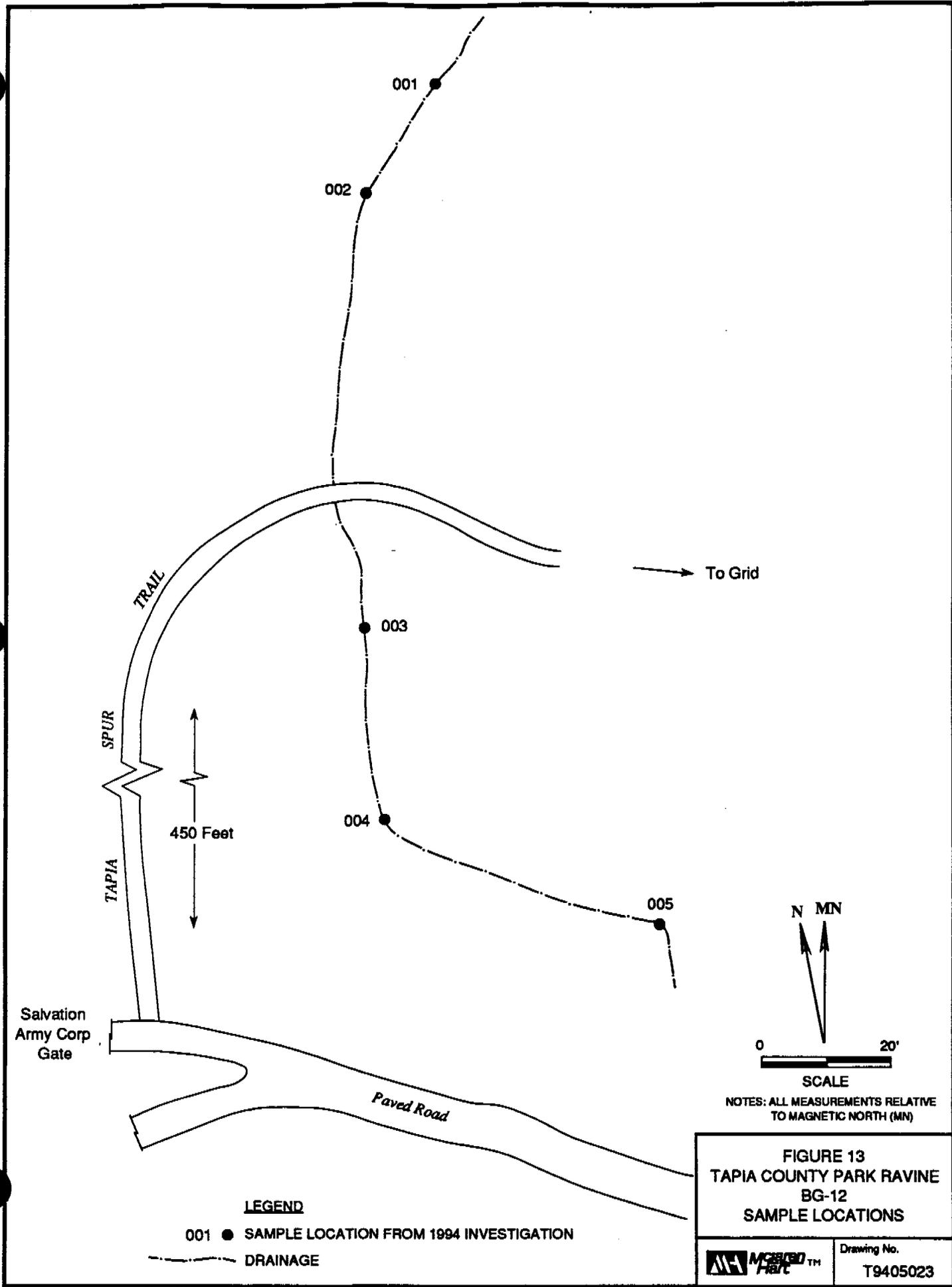
CREEK

SLOPE

SLOPE

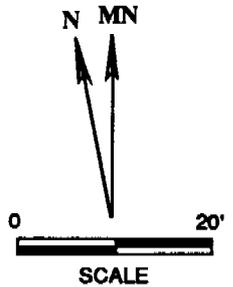
SLOPE

HLNOS SOUTH



**LEGEND**

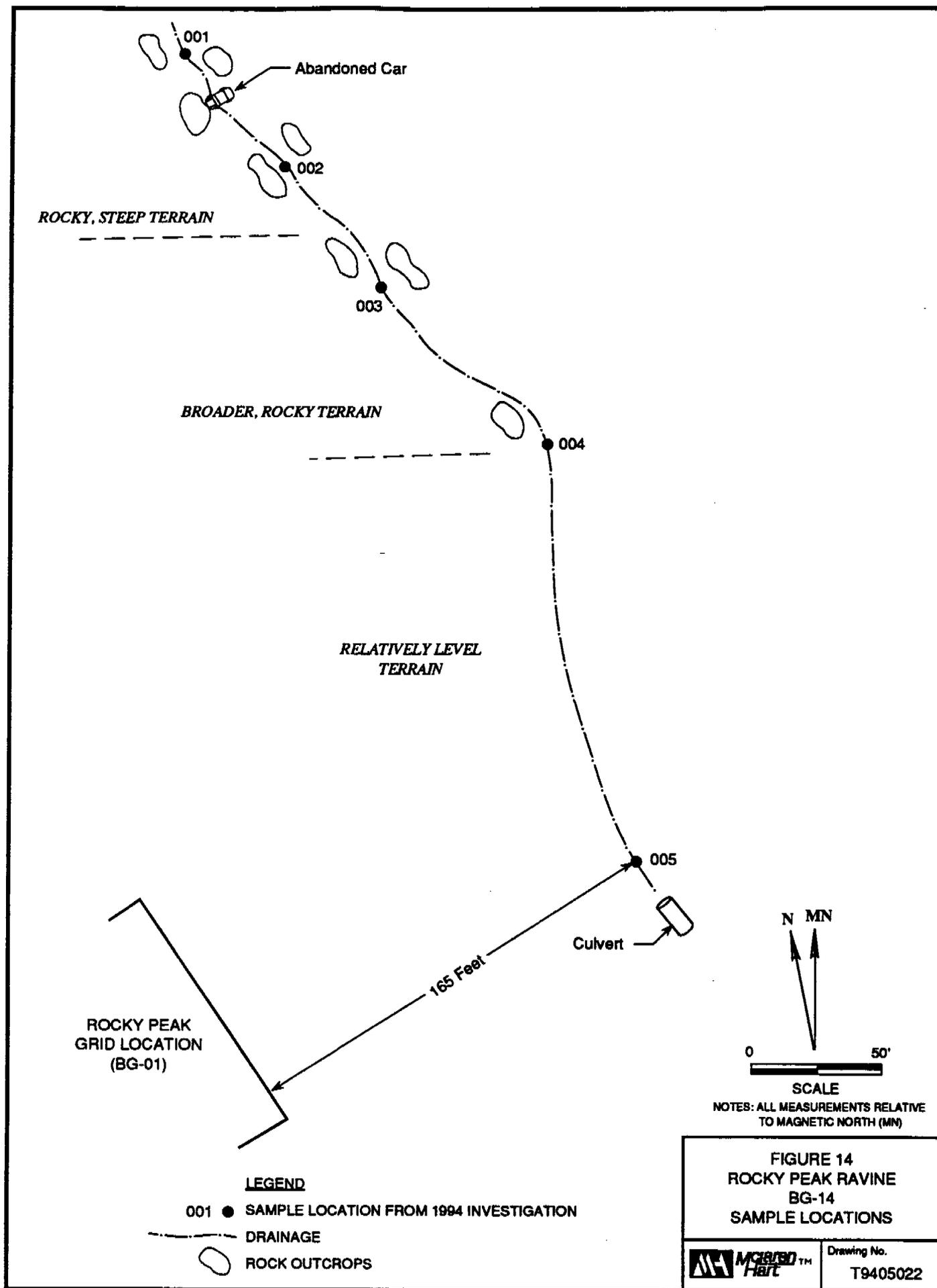
- 001 ● SAMPLE LOCATION FROM 1994 INVESTIGATION
- DRAINAGE



NOTES: ALL MEASUREMENTS RELATIVE TO MAGNETIC NORTH (MN)

**FIGURE 13**  
**TAPIA COUNTY PARK RAVINE**  
**BG-12**  
**SAMPLE LOCATIONS**

	Drawing No. <b>T9405023</b>
---	--------------------------------

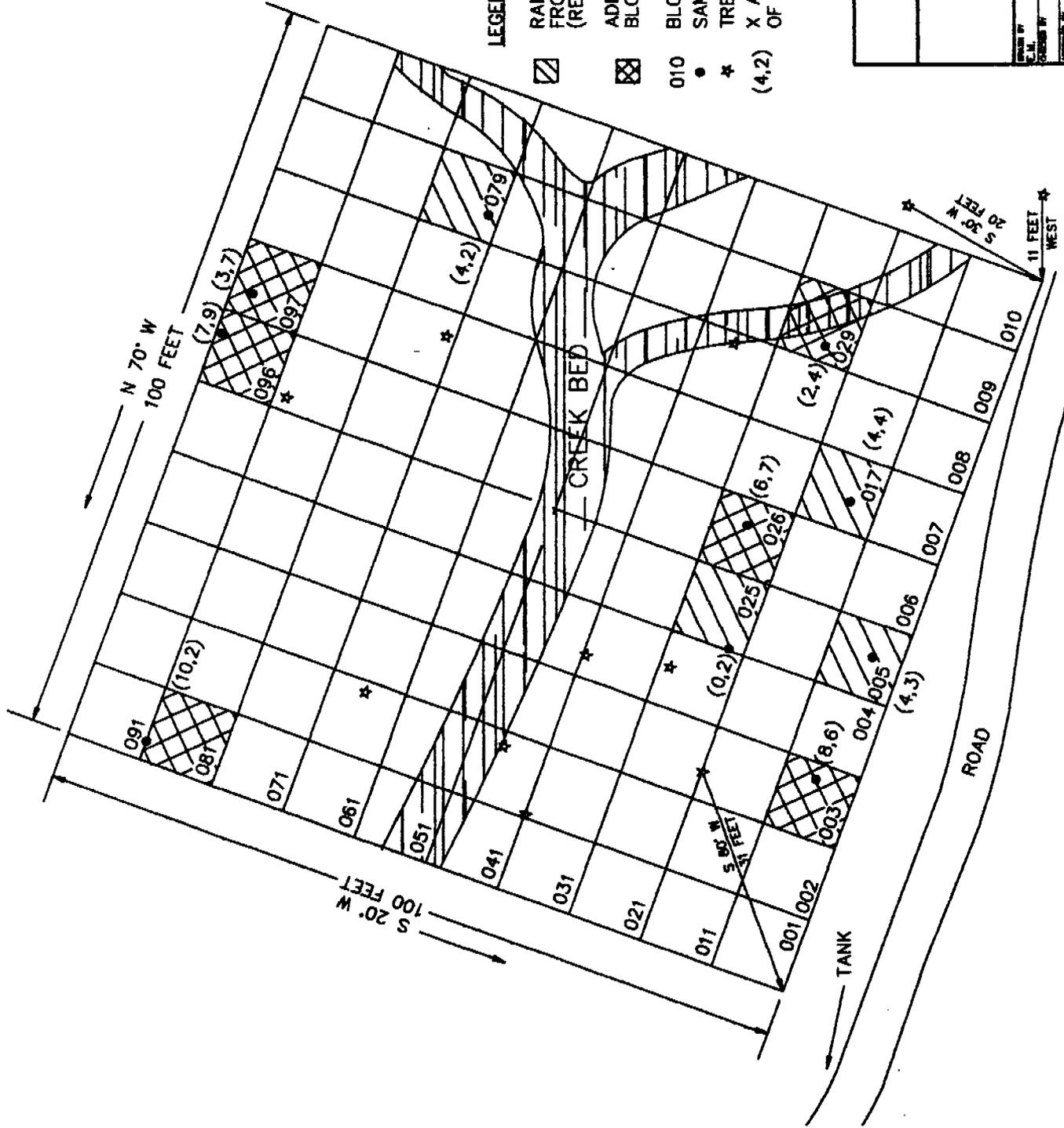






SCALE

NOTE: ALL MEASUREMENTS RELATIVE TO MAGNETIC NORTH (MN)



LEGEND



RANDOMLY SELECTED BLOCK FROM 1992 INVESTIGATION (RESAMPLED IN 1994)



ADDITIONAL RANDOMLY SELECTED BLOCK FROM 1994 INVESTIGATION

010

BLOCK NUMBER



SAMPLE LOCATION



TREE

(4,2)

X AND Y BLOCK COORDINATE OF SAMPLE LOCATION



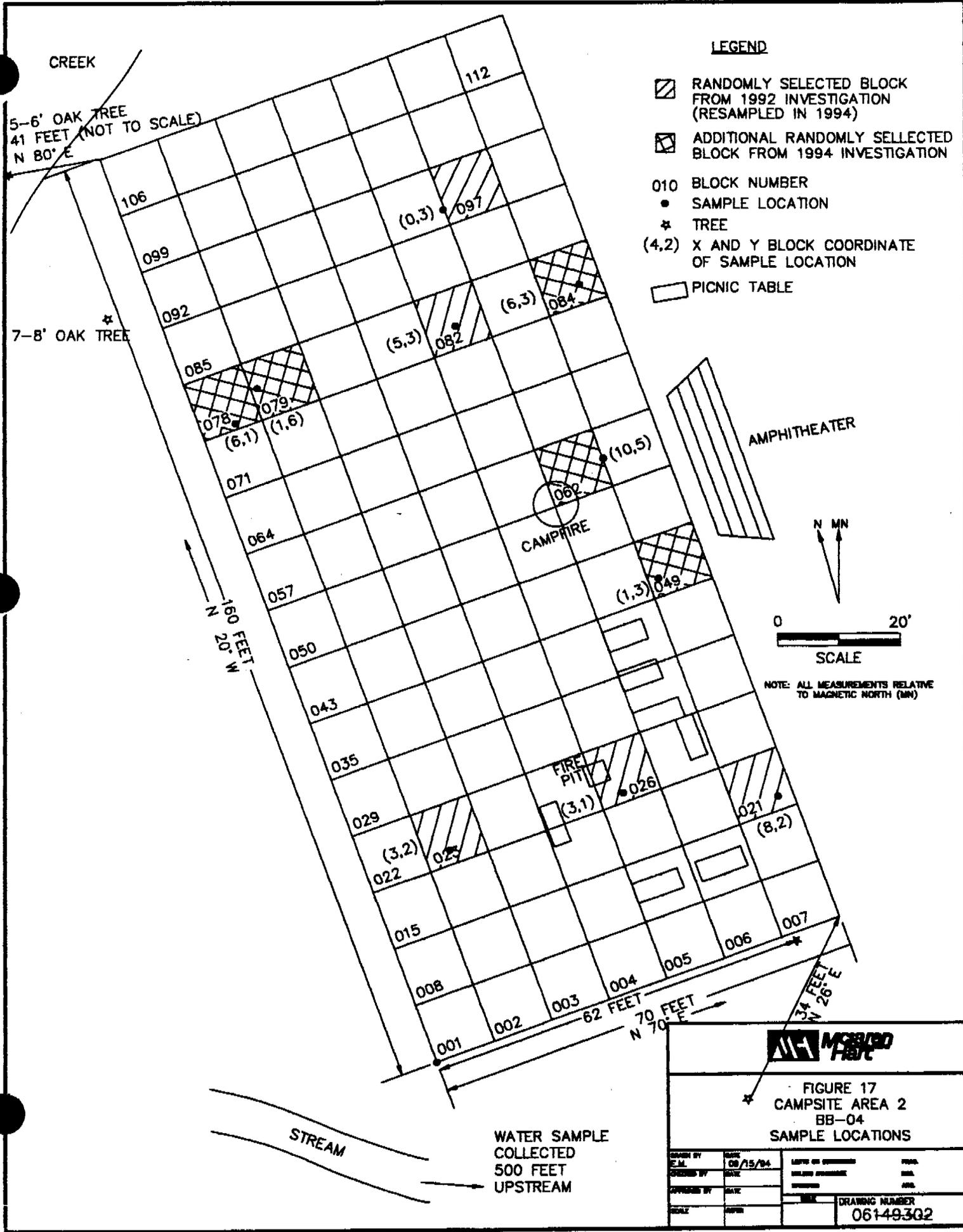
FIGURE 16  
CAMPSITE AREA 1  
BB-03

SAMPLE LOCATIONS

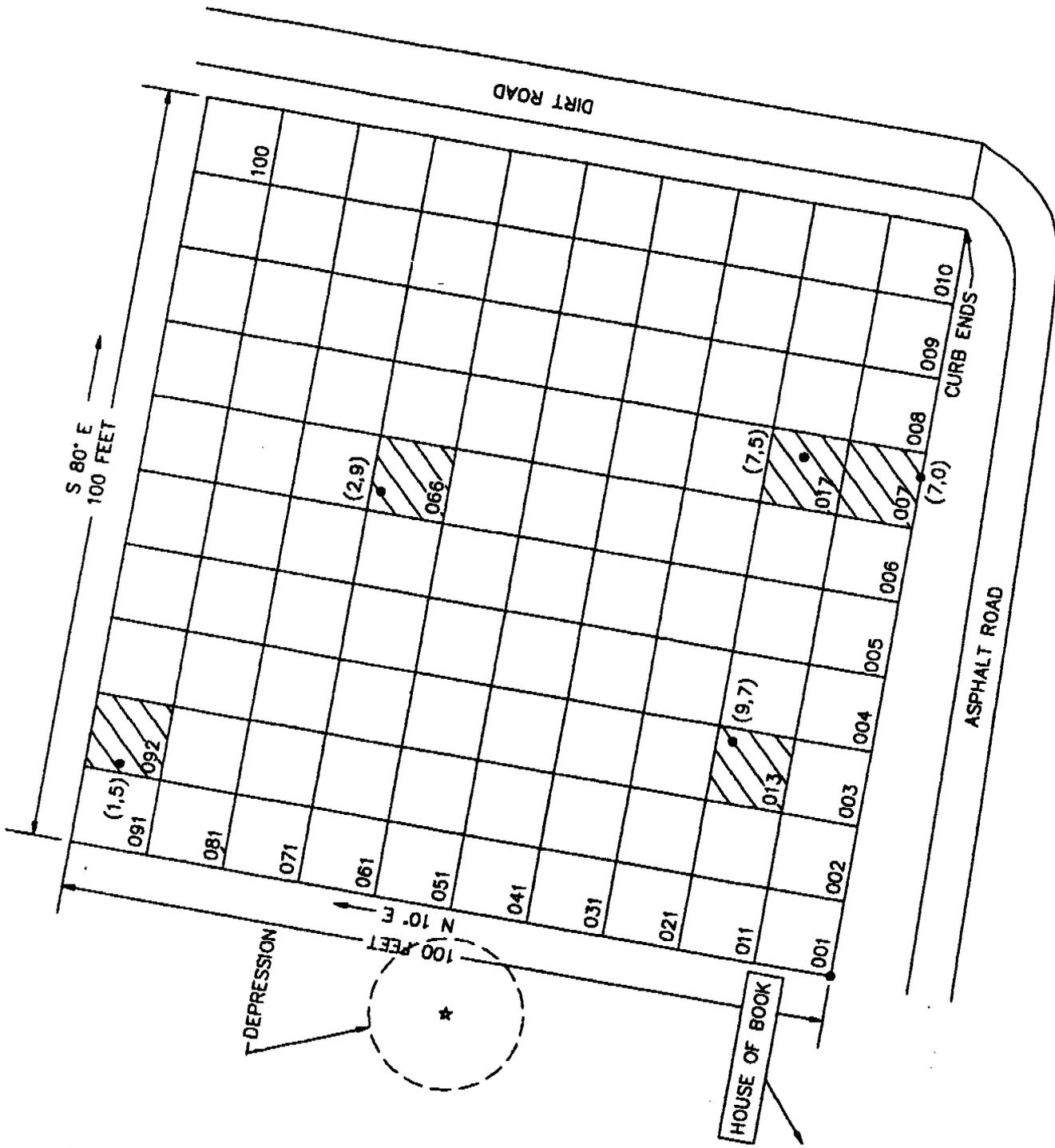
DATE	06/19/94	DATE	06/19/94
DESIGNED BY	DAVID R. HARRIS	CHECKED BY	DAVID R. HARRIS
APPROVED BY	DAVID R. HARRIS	SCALE	AS SHOWN
DRAWING NUMBER			06259301

**LEGEND**

-  RANDOMLY SELECTED BLOCK FROM 1992 INVESTIGATION (RESAMPLED IN 1994)
-  ADDITIONAL RANDOMLY SELECTED BLOCK FROM 1994 INVESTIGATION
- 010 BLOCK NUMBER
- SAMPLE LOCATION
- \* TREE
- (4,2) X AND Y BLOCK COORDINATE OF SAMPLE LOCATION
-  PICNIC TABLE







NOTES: ALL MEASUREMENTS RELATIVE TO MAGNETIC NORTH (MIN)

LEGEND

- ▨ RANDOMLY SELECTED BLOCK FROM 1992 INVESTIGATION (RESAMPLED IN 1994)
- 010 BLOCK NUMBER
- SAMPLE LOCATION
- \* TREE
- (4,2) X AND Y BLOCK COORDINATE OF SAMPLE LOCATION



FIGURE 19  
HOUSE OF THE BOOK  
BB-06

SAMPLE LOCATIONS

DATE BY	DATE	DATE ON RECORD	DATE
E.M.	08/15/94	08/15/94	08/15/94
SCALE BY	DATE	SCALE	SCALE
APPROVED BY	DATE	APPROVED BY	DATE
SCALE		SCALE	
DRAWING NUMBER			08069303







NOTE: ALL MEASUREMENTS RELATIVE TO MAGNETIC NORTH (MIN)

LEGEND



RANDOMLY SELECTED BLOCK FROM 1992 INVESTIGATION (RESAMPLED IN 1994)

010 BLOCK NUMBER

● SAMPLE LOCATION

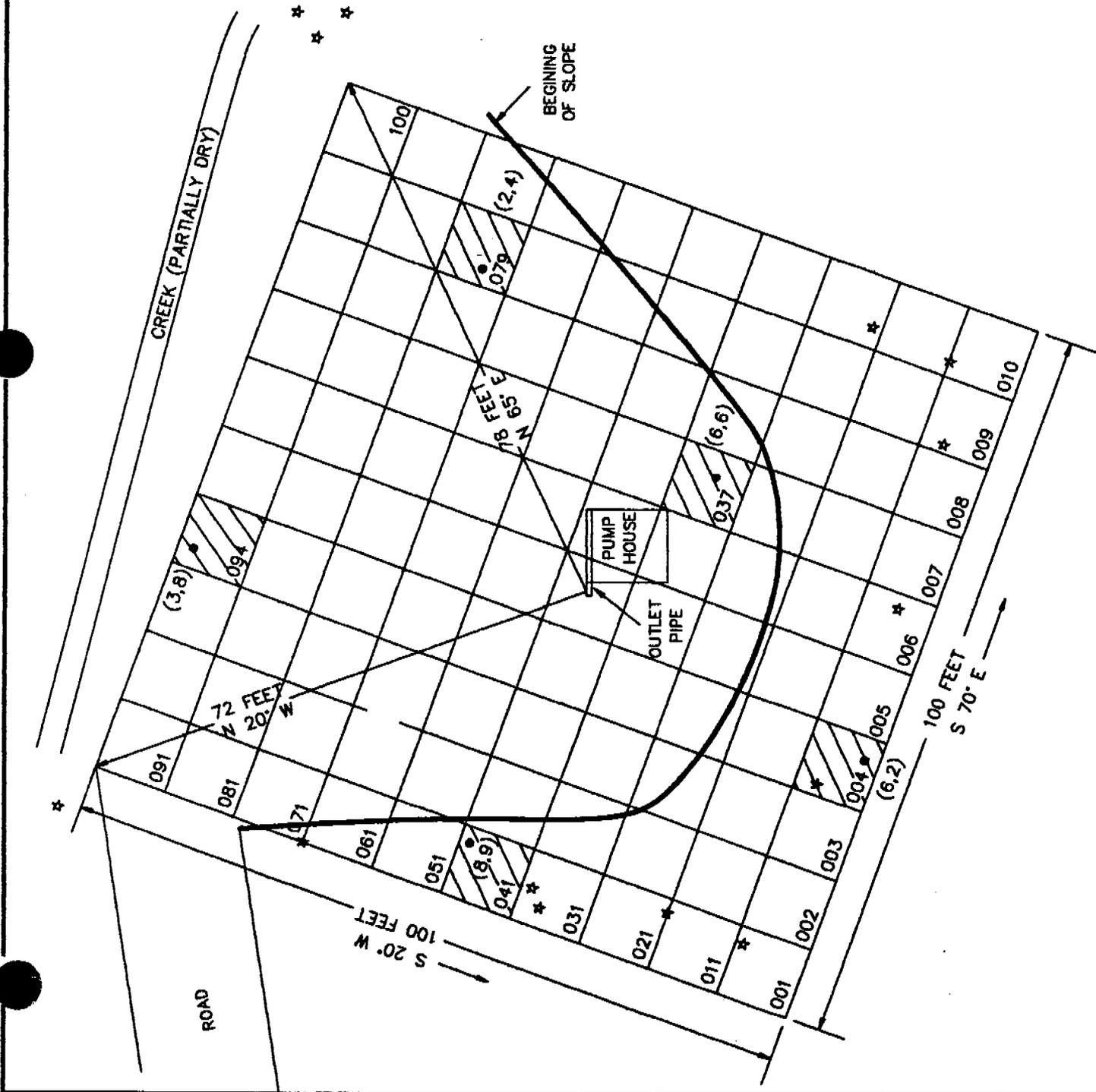
★ TREE

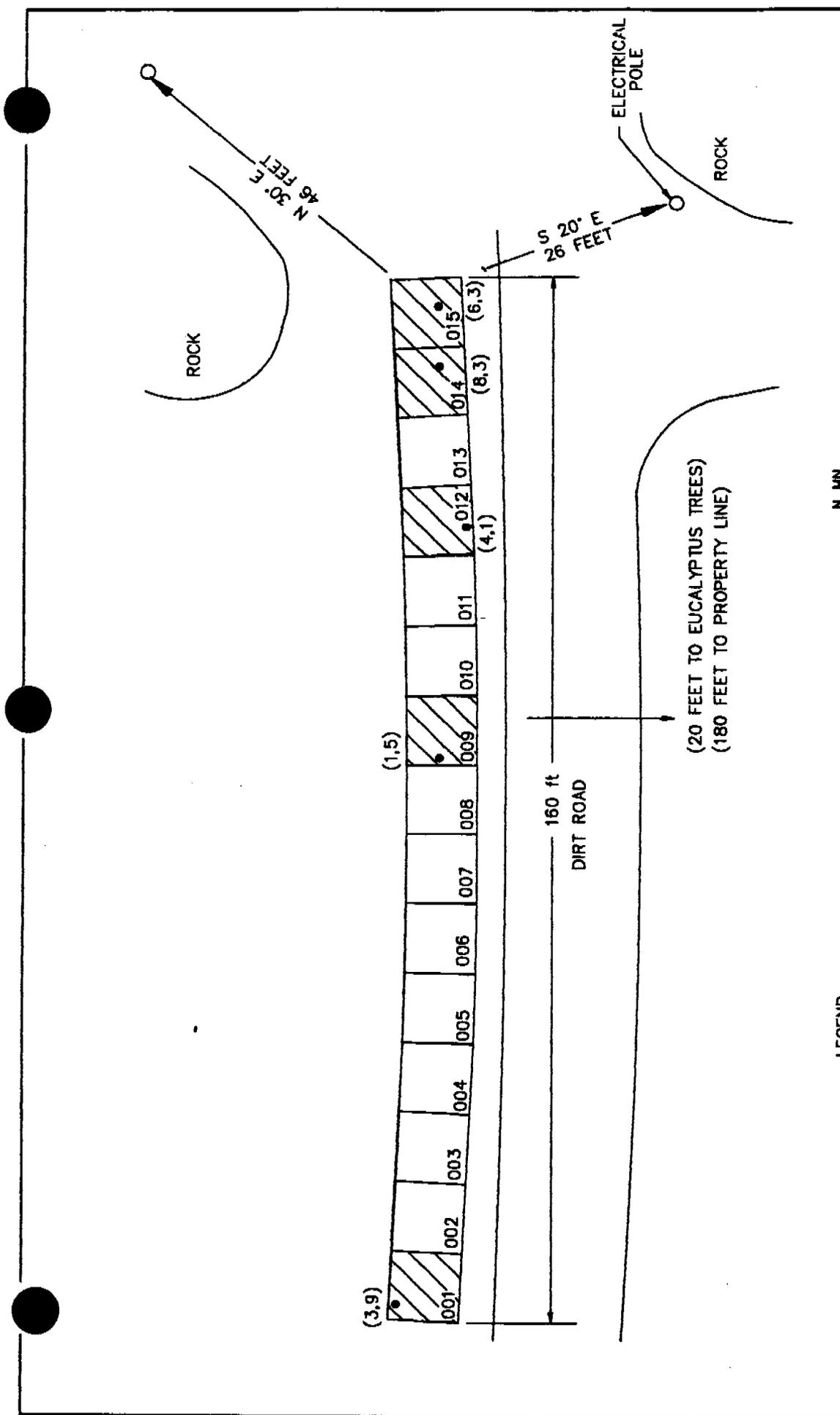
(4,2) X AND Y BLOCK COORDINATE OF SAMPLE LOCATION



FIGURE 22  
OLD WELL CAMPSITE  
BB-14  
SAMPLE LOCATIONS

DATE	08/18/94	DATE		DRAWING NUMBER	08069302
SCALE		DATE			
DESIGNED BY		DATE			
CHECKED BY		DATE			
APPROVED BY		DATE			
SCALE		DATE			

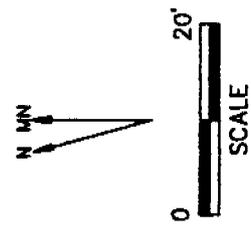




**LEGEND**

- ▨ RANDOMLY SELECTED BLOCKS (TO BE RESAMPLED)
- 010 BLOCK NUMBER
- SAMPLE LOCATION
- TELEPHONE POLE
- X AND Y BLOCK COORDINATE OF SAMPLE LOCATION

mg/kg milligram per kilogram



NOTES: ALL MEASUREMENTS RELATIVE TO MAGNETIC NORTH (MIN)  
 ONLY RESULTS FOR ORIGINAL MCLUREY/HART SAMPLES ARE SHOWN  
 VALUES ARE FOR SOIL/SEDIMENT SAMPLES UNLESS OTHERWISE INDICATED

		<b>FIGURE 23</b> FORMER ROCKETDYNE EMPLOYEE SHOOTING RANGE SM-03 SAMPLING LOCATIONS		DATE 09/15/94	UNITS ON INVENTORY SALES OTHERWISE PROVIDED	FINC D.D. A.W.
		DRAWN BY E.M.	CHECKED BY DATE	APPROVED BY DATE	SCALE	DRAWING NUMBER 05149315

NOTES: BUILDINGS SHOWN ON FIGURE  
ARE USED AS REFERENCE POINTS  
ONLY, AND ARE NOT INTENDED  
TO IDENTIFY POTENTIAL SOURCES.

ONLY RESULTS FOR ORIGINAL McLAREN/HART  
SAMPLES ARE SHOWN

VALUES ARE FOR SOIL/SEDIMENT  
SAMPLES UNLESS OTHERWISE INDICATED

TO CAMPSITE 2

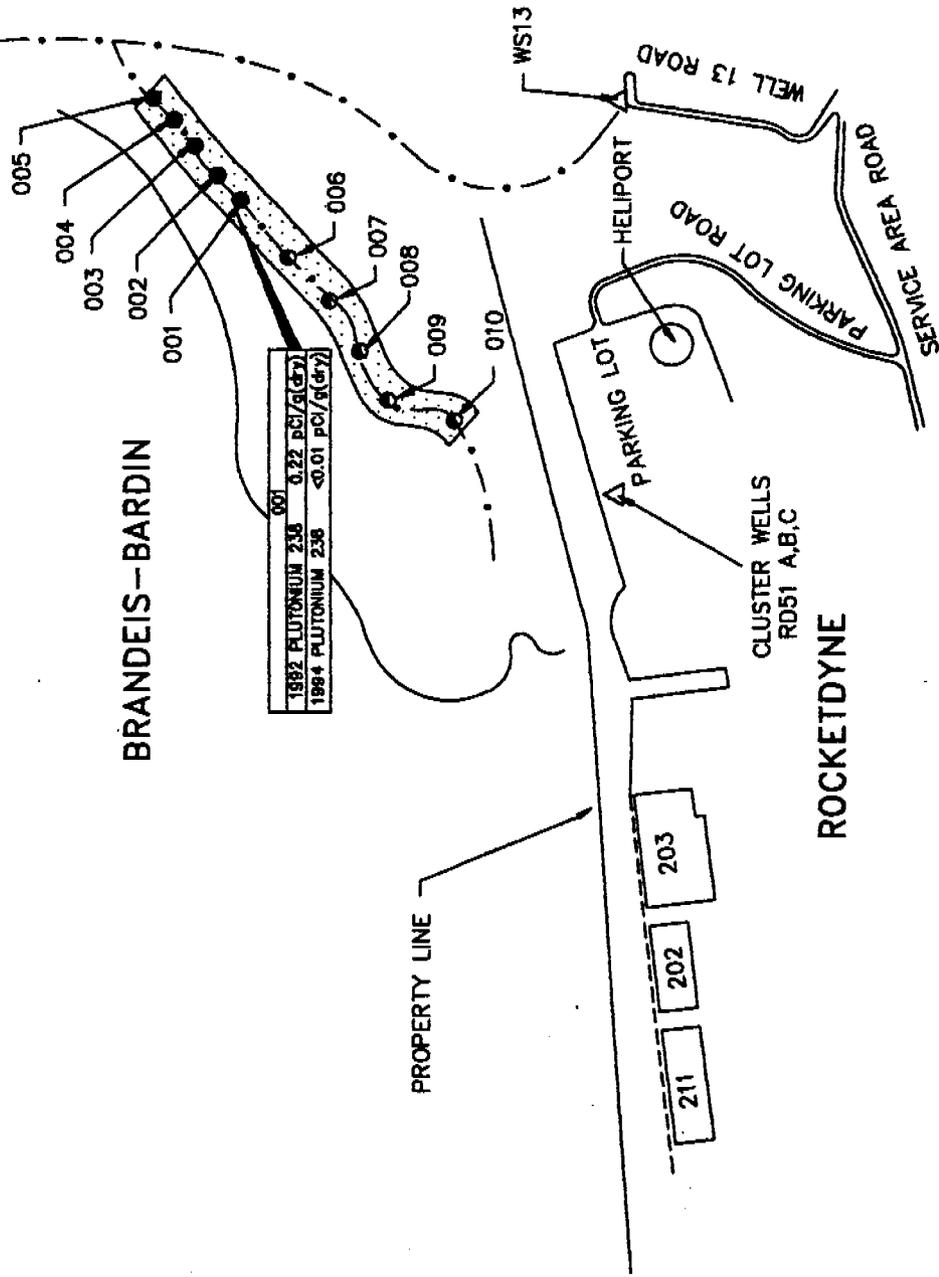
BRANDEIS-BARDIN

PROPERTY LINE

CLUSTER WELLS  
RD51 A,B,C

ROCKETDYNE

001	0.22 pCi/g (dry)
1992 PLUTONIUM 238	0.22 pCi/g (dry)
1994 PLUTONIUM 238	<0.01 pCi/g (dry)



**LEGEND**

● SAMPLE LOCATIONS FROM  
1992 INVESTIGATION  
(RESAMPLED FOR TRITIUM  
IN 1994)

● ADDITIONAL SAMPLE  
LOCATIONS FROM  
1994 INVESTIGATION

--- DRAINAGE

--- FENCE

☞ ROCK OUTCROPS

001 McLAREN/HART  
SAMPLE LOCATION

pCi/g (dry) picocurie per gram (dry)

SAMPLE AREA



SCALE 1" = 200'

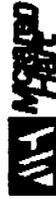


FIGURE 24  
RD-51 WATERSHED  
BB-15  
SAMPLE LOCATIONS

DATE	DATE OF MODIFICATION	PROJECT	DRAWING NUMBER
02/15/94			RD51-1
BY	BY	BY	
SCALE			

NOTES: BUILDINGS SHOWN ON FIGURE ARE USED AS REFERENCE POINTS ONLY, AND ARE NOT INTENDED TO IDENTIFY POTENTIAL SOURCES.

ALL McLAREN/HART 1992 RESULTS AND ONLY McLAREN/HART 1994 RESULTS DISTINGUISHABLE FROM BACKGROUND SHOWN

VALUES ARE FOR SOIL/SEDIMENT SAMPLES UNLESS OTHERWISE INDICATED

002 (1992)
TRITIUM 1100 pCi/L
STRONTIUM-90 0.09pCi/g(dry)

003 (1992)
TRITIUM 1300 pCi/L

004 (1992)
TRITIUM 1300 pCi/L
STRONTIUM-90 0.15pCi/g(dry)
CESIUM-137 0.34pCi/g(dry)

005 (1992)
TRITIUM 1500 pCi/L

008 (1994)
STRONTIUM-90 0.15 pCi/g(dry)

009 (1994)
STRONTIUM-90 0.24 pCi/g(dry)

001A (1992)
TRITIUM 980 pCi/L
STRONTIUM-90 0.08 pCi/g(dry)
(WATER)
TRITIUM 1,500 pCi/L **
STRONTIUM-90 1.1 pCi/L *

001B (WATER) (1992)
STRONTIUM-90 1.8 pCi/L *

### LEGEND

- SAMPLE LOCATION FROM 1992 INVESTIGATION
- ADDITIONAL SAMPLE LOCATION FROM 1994 INVESTIGATION

- SURFACE WATER SAMPLE
- - - DRAINAGE
- - - FENCE

☞ ROCK OUTCROPS

001 McLAREN/HART SAMPLE LOCATION

\* BELOW MAXIMUM CONTAMINANT LIMIT OF 8 pCi/L

\*\* BELOW MAXIMUM CONTAMINANT LIMIT OF 20,000 pCi/L

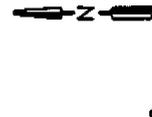
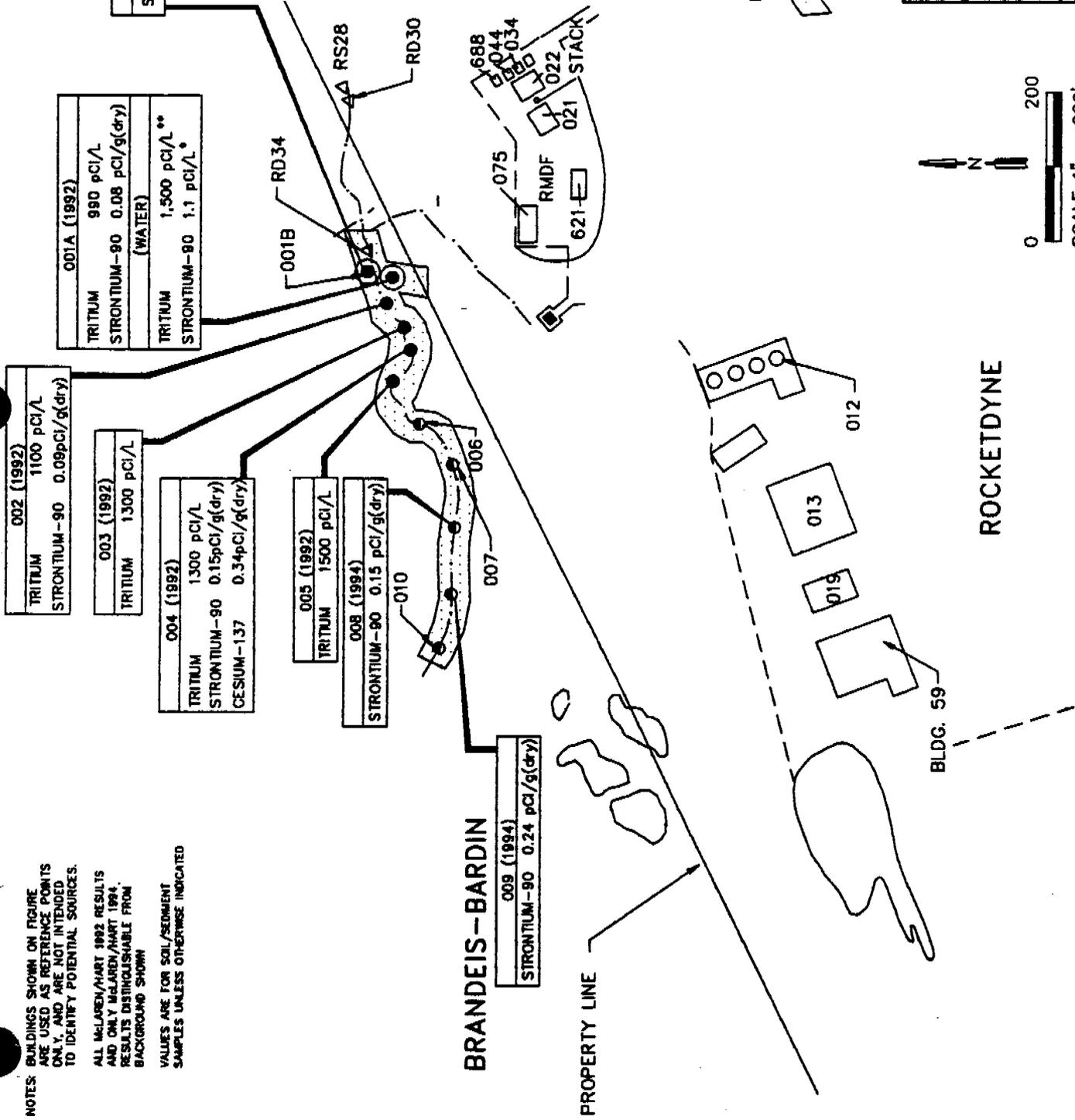
pCi/L picocurie per liter

ug/L microgram per liter

mg/kg milligram per kilogram

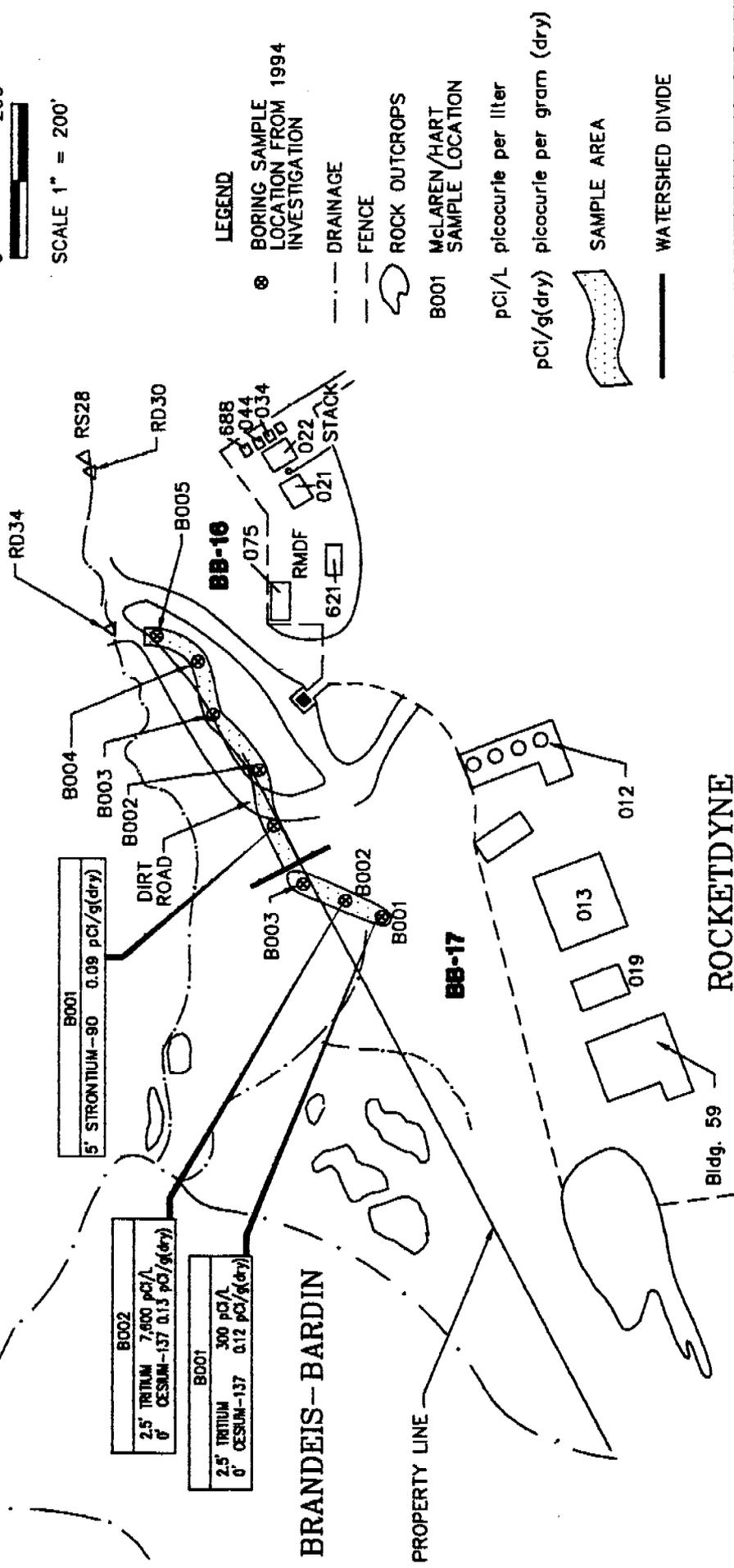
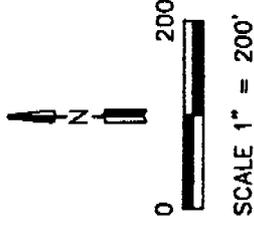
pCi/g(dry) picocurie per gram dry

SAMPLE AREA



<b>MS&amp;P</b>	
FIGURE 25	
RADIOACTIVE MATERIALS DISPOSAL FACILITY (RMDF) WATERSHED BB-16	
SAMPLE LOCATIONS	
DATE	DATE
10/25/84	1984
DESIGNED BY	INCHES DRAWING
DATE	PROJECT
DATE	DATE
SCALE	DRAWING NUMBER
	WSHED_1

NOTES: BUILDINGS SHOWN ON FIGURE ARE USED AS REFERENCE POINTS ONLY, AND ARE NOT INTENDED TO IDENTIFY POTENTIAL SOURCES. McLAREN/HART RESULTS DISTRINGUISHABLE FROM BACKGROUND SHOWN. VALUES ARE FOR SOIL/SEDIMENT SAMPLES UNLESS OTHERWISE INDICATED.



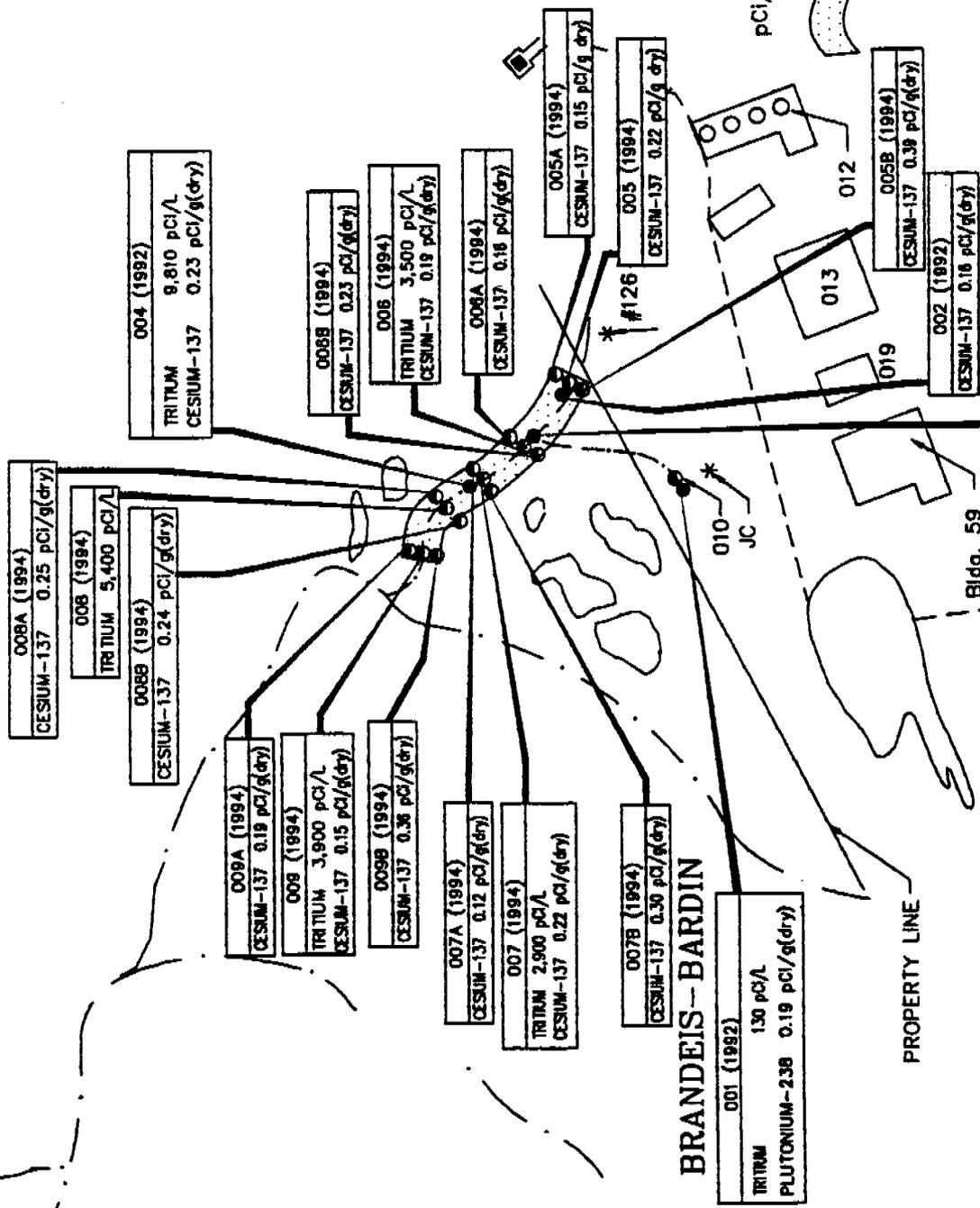
**LEGEND**

- ⊗ BORING SAMPLE LOCATION FROM 1994 INVESTIGATION
- - - DRAINAGE
- - - FENCE
- ⬭ ROCK OUTCROPS
- B001 McLAREN/HART SAMPLE LOCATION
- pCi/L picocurie per liter
- pCi/g(dry) picocurie per gram (dry)
- ▨ SAMPLE AREA
- WATERSHED DIVIDE



FIGURE 26  
RADIOACTIVE MATERIALS DISPOSAL FACILITY (BB-16) AND BUILDING 59 (BB-17) WATERSHEDS SAMPLE LOCATIONS

DATE	12/09/94	SCALE	AS SHOWN
BY	W. J. HART	DATE	12/09/94
APPROVED BY	W. J. HART	DATE	12/09/94
SCALE	AS SHOWN	DRAWING NUMBER	B59NEW



**LEGEND**

- SAMPLE LOCATION FROM 1992 INVESTIGATION
- ADDITIONAL SAMPLE LOCATION FROM 1994 INVESTIGATION
- \* NON McLAREN/HART SAMPLE
- DRAINAGE
- FENCE
- ☞ ROCK OUTCROPS
- JC JOEL CEHN'S PROPERTY MARKER (SAMPLE)
- #126 ROCKETDYNE SAMPLE LOCATION
- 001 McLAREN/HART SAMPLE LOCATION
- pCi/L picocurie per liter
- pCi/g(dry) picocurie per gram (dry)
- SAMPLE AREA

**MS&H**

FIGURE 27  
BUILDING 59 WATERSHED  
BB-17  
SAMPLE LOCATIONS

DATE	11/17/94	SCALE	1" = 200'
BY		DATE	
CHECKED BY		DATE	
APPROVED BY		DATE	
CAD		DRAWING NUMBER	B59-1



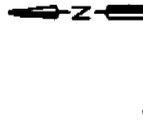
NOTE: BUILDINGS SHOWN ON FIGURE ARE USED AS REFERENCE POINTS ONLY, AND ARE NOT INTENDED TO IDENTIFY POTENTIAL SOURCES.

ALL McLAREN/HART 1982 RESULTS AND ONLY McLAREN/HART 1984 RESULTS DISTINGUISHABLE FROM BACKGROUND SHOWN.

VALUES ARE FOR SOIL/SEDIMENT SAMPLES UNLESS OTHERWISE INDICATED.

NOTES: BUILDINGS SHOWN ON FIGURE  
ARE USED AS REFERENCE POINTS  
ONLY, AND ARE NOT INTENDED  
TO IDENTIFY POTENTIAL SOURCES.

VALUES ARE FOR SOIL/SEDIMENT  
SAMPLES UNLESS OTHERWISE INDICATED



SCALE 1" = 200'

001  
MERCURY 0.35 mg/kg

008B  
MERCURY 0.12 mg/kg  
LAB  
DUPLICATE <0.10 mg/kg

BRANDEIS-BARDIN

ROCKETDYNE

SODIUM BURN PIT

PROPERTY LINE

LEGEND

- SAMPLE LOCATION FROM 1992 INVESTIGATION
- ADDITIONAL SAMPLE LOCATION FROM 1994 INVESTIGATION
- - - DRAINAGE
- - - FENCE
- ROCK OUTCROPS
- 001 MCLAREN/HART SAMPLE LOCATION
- SURFACE WATER
- mg/kg milligram/kilogram
- ug/kg microgram/kilogram
- ▨ APPROXIMATE AREA OF EXCAVATION



FIGURE 28  
SODIUM BURN PIT WATERSHED  
BB-18

SAMPLE LOCATIONS

DATE	BY	SCALE	DRAWING NUMBER
1/17/95			B_PIT
DATE	BY	SCALE	DRAWING NUMBER

NOTES: BUILDINGS SHOWN ON FIGURE  
ARE USED AS REFERENCE POINTS  
ONLY, AND ARE NOT INTENDED  
TO IDENTIFY POTENTIAL SOURCES.

ALL McLAREN/HART 1992 RESULTS  
AND ONLY McLAREN/HART 1994  
RESULTS DISTINGUISHABLE FROM  
BACKGROUND SHOWN

NO 1994 RESULTS STATISTICALLY  
DIFFERENT FROM BACKGROUND

VALUES ARE FOR SOL/SEDIMENT  
SAMPLES UNLESS OTHERWISE INDICATED

BRANDEIS-BARDIN

PROPERTY LINE

ROCKETDYNE

**LEGEND**  
● SAMPLE LOCATION FROM  
1992 INVESTIGATION  
● ADDITIONAL SAMPLE  
LOCATION FROM 1994  
INVESTIGATION  
--- DRAINAGE  
- - - FENCE  
☞ ROCK OUTCROPS  
001 McLAREN/HART  
SAMPLE LOCATION

pCi/g(dry) picocurie/gram(dry)

mg/kg milligram per kilogram

SAMPLE AREA

002 (1992)  
CESIUM-137 0.24 pCi/g(dry)

001 (1992)  
CESIUM-137 0.30 pCi/g(dry)  
STRONTIUM-90 0.08 pCi/g(dry)



SCALE 1" = 200'



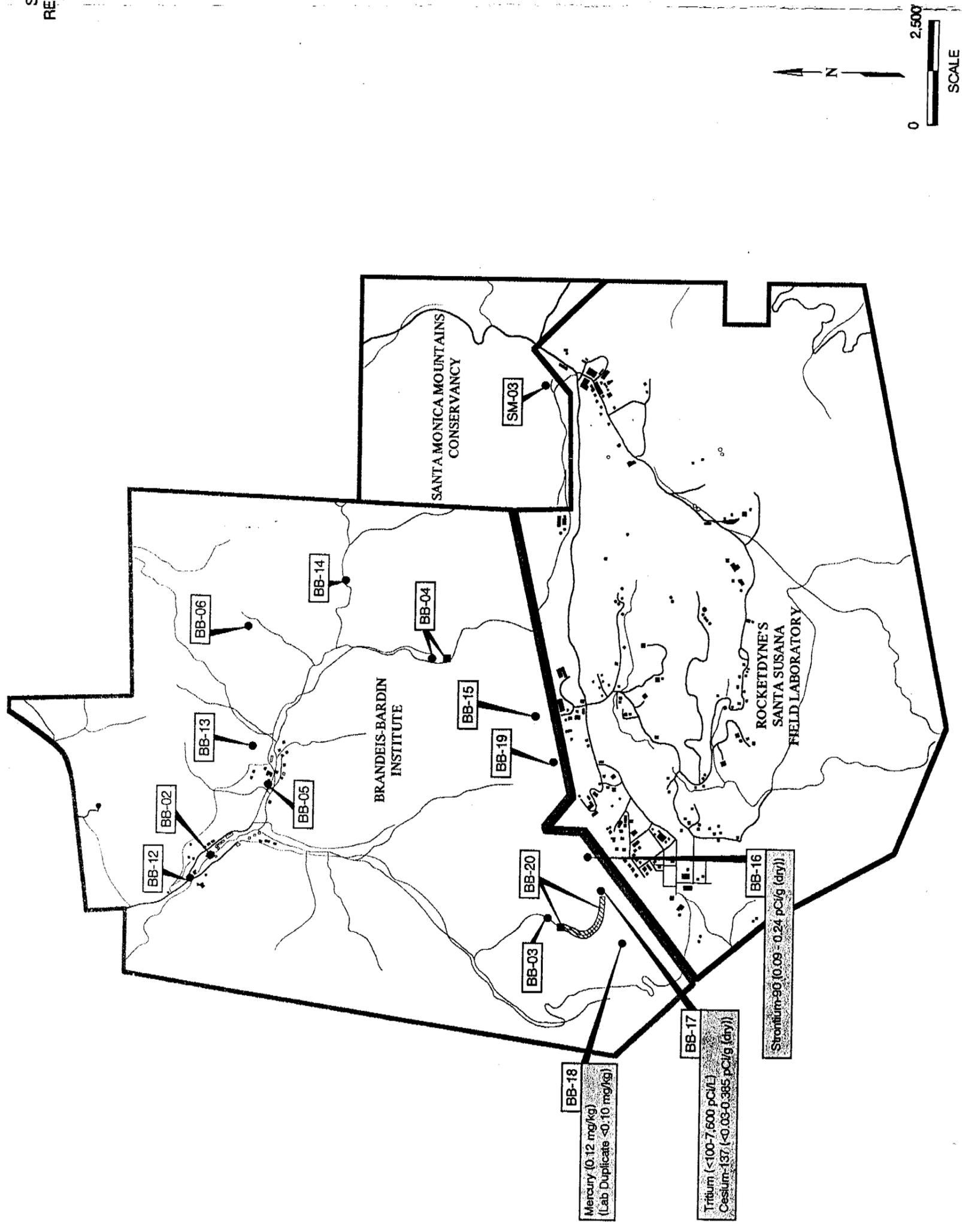
FIGURE 29  
SODIUM REACTOR EXPERIMENT (SRE)  
WATERSHED  
BB-19

SAMPLE LOCATIONS

DATE	12/20/94	DATE	12/20/94	DATE	12/20/94
DRAWN BY		CHECKED BY		APPROVED BY	
SCALE		DATE		DRAWING NUMBER	R_1



FIGURE 31  
SUMMARY OF 1994 RADIONUCLIDE SAMPLING  
RESULTS DISTINGUISHABLE FROM BACKGROUND  
AND MERCURY SAMPLING RESULTS



Brandeis-Bardin Institute	
BB-02	Dormitory Area
BB-03	Campsite Area 1
BB-04	Campsite Area 2
BB-05	Picnic Area
BB-06	House of The Book
BB-12	Main House Orchard
BB-13	Avocado Grove
BB-14	Old Well Campsite
BB-15	RD-51 Watershed
BB-16	Radioactive Materials Disposal Facility (RMDF) Watershed
BB-17	Building 59 Watershed
BB-18	Sodium Burn Pit Watershed
BB-19	Sodium Reactor Experiment (SRE) Watershed
BB-20	Camp Site Area 1 - Drainage
Santa Monica Mountains Conservancy	
SM-03	Former Rocketdyne Employee Shooting Range



APPENDIX C  
RANDOM NUMBER  
TABLES FOR  
BLEND FIELD DUPLICATES

**Appendix C**

***Random Number Tables  
for Blind Field Duplicates***

## RANDOM NUMBERS USED TO SELECT BLIND FIELD DUPLICATES

### SOIL SAMPLES

QA/QC Group	Sequential Number in QA/QC Group to be used for Blind Field Duplicate			
	Tritium	Gamma Scan	Strontium-90	Isotopic Plutonium
1 (n=20)	1	5	12	18
2 (n=20)	7	11	20	4
3 (n=20)	17	13	4	5
4 (n=20)	16	7	4	1
5 (n=20)	7	7	-	-
6 (n=20)	13	-	-	-
7 (n=20)	9	-	-	-
8 (n=7)	1	-	-	-

QA/QC = Quality Assurance/ Quality Control.

n = Number of samples in each group.

Note: As a result of only two water samples being collected during the 1994 sampling no blind field duplicate water samples were required.

APPENDIX D  
SUMMARY OF  
ANALYTICAL RESULTS  
BY ANALYSIS

**Appendix D**

**Summary of Analytical  
Results by Analysis**







TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

REPORT OF ANALYSIS

RUN DATE 06/03/94  
PAGE 3

WORK ORDER NUMBER 4-0472 CUSTOMER P.O. NUMBER 030225/030600829 DATE RECEIVED 03/21/94 DELIVERY DATE 04/23/94

ANN MARIE HOLBROW  
MCLAREN/HART  
16755 VON KARMAN AVE  
IRVINE CA 92714

S O I L

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP DATE	NUCLIDE	ACTIVITY ( PCI/LITER)	NUCL-UNIT-% U/M *	DATE RECEIVED	MID-COUNT TIME DATE	VOLUME - UNITS ASH-NGHT-% *	LAB.
45042	8G-01-016-ST		03/15 0841		H-3	L.T. 1. E 02			05/26		5
45043	8G-01-016-SS		03/15 0841		SR-90	L.T. 9. E-02 PCI/GM DRY *			04/28		3
45044	8G-01-016-SP		03/15 0841		PU-238	L.T. 3. E-02 PCI/GM DRY *			05/09		6
					U-234	2.7 +/-0.4 E-01 PCI/GM DRY *			05/10		6
					TH-230	3.0 +/-0.5 E-01 PCI/GM DRY *			05/13		6
					PU-239	L.T. 1. E-02 PCI/GM DRY *			05/09		6
					U-235	L.T. 1. E-02 PCI/GM DRY *			05/10		6
					U-238	3.1 +/-0.5 E-01 PCI/GM DRY *			05/10		6
					TH-232	4.4 +/-0.6 E-01 PCI/GM DRY *			05/13		6
					TH-228	4.1 +/-0.6 E-01 PCI/GM DRY *			05/13		6
45045	8G-01-016-SG		03/15 0841		BE-7	L.T. 4. E-01 PCI/GM DRY *			04/26		4
					K-40	2.23+-0.22E 01 PCI/GM DRY *			04/26		4
					MN-54	L.T. 3. E-02 PCI/GM DRY *			04/26		4
					CO-58	L.T. 4. E-02 PCI/GM DRY *			04/26		4
					FE-59	L.T. 1. E-01 PCI/GM DRY *			04/26		4
					CO-60	L.T. 3. E-02 PCI/GM DRY *			04/26		4
					ZN-65	L.T. 8. E-02 PCI/GM DRY *			04/26		4
					ZR-95	L.T. 5. E-02 PCI/GM DRY *			04/26		4
					RU-103	L.T. 6. E-02 PCI/GM DRY *			04/26		4
					RU-106	L.T. 3. E-01 PCI/GM DRY *			04/26		4
					I-131	L.T. 1. E 00 PCI/GM DRY *			04/26		4
					CS-134	L.T. 4. E-02 PCI/GM DRY *			04/26		4
					CS-137	L.T. 4. E-02 PCI/GM DRY *			04/26		4
					BA-140	L.T. 3. E-01 PCI/GM DRY *			04/26		4
					CE-141	L.T. 1. E-01 PCI/GM DRY *			04/26		4
					CE-144	L.T. 2. E-01 PCI/GM DRY *			04/26		4
					RA-226	1.99+-0.46E 00 PCI/GM DRY *			04/26		4
					TH-228	1.34+-0.13E 00 PCI/GM DRY *			04/26		4

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

REPORT OF ANALYSIS

RUN DATE 06/03/94

WORK ORDER NUMBER 4-0472 CUSTOMER P.O. NUMBER 030225/030600829 DATE RECEIVED 03/21/94 DELIVERY DATE 04/23/94 PAGE 4

ANN MARIE HOLBROW  
MCLAREN/HART  
16755 VON KARMAN AVE  
IRVINE CA 92714

SOIL

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP DATE	NUCLIDE	ACTIVITY ( PCI/LITER)	NUCL-UNIT-% U/M *	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-% *	LAB.
45047	86-01-034-ST		03/15 0908		H-3	L.T. 1. E 02		05/26		5
45048	86-01-034-SS		03/15 0908		SR-90	L.T. 1. E-01 PCI/GM DRY *		04/28		3
45049	86-01-034-SP		03/15 0908		PU-238	L.T. 1. E-02 PCI/GM DRY *		05/09		6
					U-234	3.5 +-0.5 E-01 PCI/GM DRY *		05/12		6
					TH-230	3.1 +-0.8 E-01 PCI/GM DRY *		05/13		6
					PU-239	L.T. 1. E-02 PCI/GM DRY *		05/09		6
					U-235	2.2 +-1.2 E-02 PCI/GM DRY *		05/12		6
					U-238	3.9 +-0.5 E-01 PCI/GM DRY *		05/12		6
					TH-232	3.7 +-0.9 E-01 PCI/GM DRY *		05/13		6
					TH-228	5.9 +-1.3 E-01 PCI/GM DRY *		05/13		6
45050	86-01-034-SG		03/15 0908		BE-7	L.T. 5. E-01 PCI/GM DRY *		04/26		4
					K-40	2.22+-0.22E 01 PCI/GM DRY *		04/26		4
					MN-54	L.T. 4. E-02 PCI/GM DRY *		04/26		4
					CO-58	L.T. 5. E-02 PCI/GM DRY *		04/26		4
					FE-59	L.T. 1. E-01 PCI/GM DRY *		04/26		4
					CO-60	L.T. 4. E-02 PCI/GM DRY *		04/26		4
					ZN-65	L.T. 1. E-01 PCI/GM DRY *		04/26		4
					ZR-95	L.T. 7. E-02 PCI/GM DRY *		04/26		4
					RU-103	L.T. 7. E-02 PCI/GM DRY *		04/26		4
					RU-106	L.T. 3. E-01 PCI/GM DRY *		04/26		4
					I-131	L.T. 1. E 00 PCI/GM DRY *		04/26		4
					CS-134	L.T. 5. E-02 PCI/GM DRY *		04/26		4
					CS-137	1.00+-0.32E-01 PCI/GM DRY *		04/26		4
					BA-140	L.T. 4. E-01 PCI/GM DRY *		04/26		4
					CE-141	L.T. 1. E-01 PCI/GM DRY *		04/26		4
					CE-144	L.T. 2. E-01 PCI/GM DRY *		04/26		4
					RA-226	2.05+-0.53E 00 PCI/GM DRY *		04/26		4
					TH-228	1.53+-0.15E 00 PCI/GM DRY *		04/26		4

## TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

## REPORT OF ANALYSIS

RUN DATE 06/03/94

PAGE 5

WORK ORDER NUMBER  
4-0472CUSTOMER P.O. NUMBER  
030225/030600829DELIVERY DATE  
04/23/94ANN MARIE HOLBROW  
MCLAREN/HART  
16755 VON KARMAN AVE  
IRVINE CA

92714

DATE RECEIVED  
03/21/94

## S O I L

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE		NUCLIDE	ACTIVITY ( PCI/LITER)	NUCL-UNIT-% U/M *	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-% *	LAB.
			START DATE	STOP DATE						
45051	BG-01-082-ST		03/15	0920	H-3	L.T. 2. E 02		05/26		5
45052	BG-01-082-SS		03/15	0920	SR-90	L.T. 8. E-02 PCI/GM DRY *		04/28		3
45053	BG-14-004-SG		03/15	1031	BE-7	L.T. 4. E-01 PCI/GM DRY *		04/26		4
					K-40	2.10+-0.21E 01 PCI/GM DRY *		04/26		4
					MN-54	L.T. 3. E-02 PCI/GM DRY *		04/26		4
					CO-58	L.T. 3. E-02 PCI/GM DRY *		04/26		4
					FE-59	L.T. 1. E-01 PCI/GM DRY *		04/26		4
					CO-60	L.T. 3. E-02 PCI/GM DRY *		04/26		4
					ZN-65	L.T. 8. E-02 PCI/GM DRY *		04/26		4
					ZR-95	L.T. 5. E-02 PCI/GM DRY *		04/26		4
					RU-103	L.T. 5. E-02 PCI/GM DRY *		04/26		4
					RU-106	L.T. 3. E-01 PCI/GM DRY *		04/26		4
					I-131	L.T. 9. E-01 PCI/GM DRY *		04/26		4
					CS-134	L.T. 3. E-02 PCI/GM DRY *		04/26		4
					CS-137	L.T. 3. E-02 PCI/GM DRY *		04/26		4
					BA-140	L.T. 2. E-01 PCI/GM DRY *		04/26		4
					CE-141	L.T. 9. E-02 PCI/GM DRY *		04/26		4
					CE-144	L.T. 2. E-01 PCI/GM DRY *		04/26		4
					RA-226	1.36+-0.40E 00 PCI/GM DRY *		04/26		4
					TH-228	9.72+-0.97E-01 PCI/GM DRY *		04/26		4
45054	BG-14-005-ST		03/15	1026	H-3	3.7 +-2.2 E 02		05/26		5
45055	BG-14-005-SS		03/15	1026	SR-90	L.T. 5. E-02 PCI/GM DRY *		04/28		3
45056	BG-14-005-SP		03/15	1026	PU-238	L.T. 8. E-03 PCI/GM DRY *		05/09		6
					U-234	1.4 +-0.3 E-01 PCI/GM DRY *		05/12		6
					TH-230	2.0 +-0.5 E-01 PCI/GM DRY *		05/18		6
					PU-239	L.T. 8. E-03 PCI/GM DRY *		05/09		6
					U-235	7.4 +-7.2 E-03 PCI/GM DRY *		05/12		6
					U-238	1.8 +-0.3 E-01 PCI/GM DRY *		05/12		6

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

REPORT OF ANALYSIS

RUN DATE 06/03/94

WORK ORDER NUMBER 4-0472

CUSTOMER P.O. NUMBER 030225/030600829

DELIVERY DATE 04/23/94

PAGE 12

ANN MARIE HOLBROW  
MCLAREN/HART  
16755 VON KARMAN AVE  
IRVINE CA 92714

S O I L

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE		NUCLIDE	ACTIVITY (PCI/GM DRY)	NUCL-UNIT-% U/M *	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-%	LAB.
			START DATE	STOP DATE						
45080	10635	BG-14-004-SP	03/15		PU-238	L.T. 8. E-03		05/10		6
					U-234	2.0 +-0.4 E-01		05/12		6
					TH-230	2.7 +-0.6 E-01		05/18		6
					PU-239	L.T. 8. E-03		05/10		6
					U-235	L.T. 5. E-03		05/12		6
					U-238	2.2 +-0.4 E-01		05/12		6
					TH-232	6.4 +-1.0 E-01		05/18		6
					TH-228	4.0 +-0.9 E-01		05/18		6
45081	10610	BG-01-082-SP	03/15	0920	PU-238	L.T. 1. E-02		05/09		6
					U-234	4.4 +-0.6 E-01		05/12		6
					TH-230	3.9 +-0.7 E-01		05/18		6
					PU-239	L.T. 1. E-02		05/09		6
					U-235	3.4 +-1.5 E-02		05/12		6
					U-238	4.3 +-0.6 E-01		05/12		6
					TH-232	7.5 +-1.0 E-01		05/18		6
					TH-228	8.2 +-1.2 E-01		05/18		6
45082	10612	BG-01-082-SG	03/15	0920	BE-7	L.T. 5. E-01		04/27		4
					K-40	1.99+-0.20E 01		04/27		4
					MN-54	L.T. 4. E-02		04/27		4
					CO-58	L.T. 5. E-02		04/27		4
					FE-59	L.T. 1. E-01		04/27		4
					CO-60	L.T. 3. E-02		04/27		4
					ZN-65	L.T. 1. E-01		04/27		4
					ZR-95	L.T. 6. E-02		04/27		4
					RU-103	L.T. 7. E-02		04/27		4
					RU-106	L.T. 3. E-01		04/27		4
					I-131	L.T. 1. E 00		04/27		4
					CS-134	L.T. 5. E-02		04/27		4
					CS-137	L.T. 4. E-02		04/27		4
					BA-140	L.T. 3. E-01		04/27		4
					CE-141	L.T. 1. E-01		04/27		4



SANTA SUSANA  
PARK (BG02)



TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

REPORT OF ANALYSIS

RUN DATE 05/12/94  
PAGE 2

WORK ORDER NUMBER 4-0409  
CUSTOMER P.O. NUMBER 030225/030600829  
DATE RECEIVED 03/14/94  
DELIVERY DATE 04/16/94

ANN MARIE HOLBROW  
MCLAREN/HART  
16755 VON KARMAN AVE  
IRVINE CA 92714

S O I L

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START TIME	STOP DATE	NUCLIDE	ACTIVITY (PCI/GM DRY)	NUCL-UNIT-% U/M #	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-% #	LAB.
44157	10347	8G-02-017-SG	03/10 1622		BE-7	L.T. 4. E-01		04/09		4
					K-40	2.14+-0.21E 01		04/09		4
					MN-54	L.T. 4. E-02		04/09		4
					CO-58	L.T. 4. E-02		04/09		4
					FE-59	L.T. 1. E-01		04/09		4
					CO-60	L.T. 4. E-02		04/09		4
					ZN-65	L.T. 1. E-01		04/09		4
					ZR-95	L.T. 6. E-02		04/09		4
					RU-103	L.T. 6. E-02		04/09		4
					RU-106	L.T. 3. E-01		04/09		4
					I-131	L.T. 5. E-01		04/09		4
					CS-134	L.T. 5. E-02		04/09		4
					CS-137	2.13+-0.40E-01		04/09		4
					BA-140	L.T. 2. E-01		04/09		4
					CE-141	L.T. 1. E-01		04/09		4
					CE-144	L.T. 2. E-01		04/09		4
					RA-226	1.51+-0.58E 00		04/09		4
					TN-228	1.35+-0.14E 00		04/09		4
44158	10326	8G-02-076-ST	03/10 1605		H-3	L.T. 2. E 02	PCI/LITER #	05/08		5
44160	10327	8G-02-076-SS	03/10 1605		SR-90	L.T. 9. E-02		04/16		3
44161	10328	8G-02-076-SP	03/10 1605		PU-238 PU-239	L.T. 1. E-02 L.T. 1. E-02		04/09 04/09		6 6
44162	10329	8G-02-076-SG	03/10 1605		GAMMA	NOT ANALYZED				4
44163	10330	8G-02-076-SG	03/10 1605		BE-7	L.T. 4. E-01		04/09		4
					K-40	2.09+-0.21E 01		04/09		4
					MN-54	L.T. 4. E-02		04/09		4
					CO-58	L.T. 4. E-02		04/09		4
					FE-59	L.T. 1. E-01		04/09		4

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

RUN DATE 05/12/94

REPORT OF ANALYSIS

PAGE 3

WORK ORDER NUMBER 4-0409  
 CUSTOMER P.O. NUMBER 030225/030600829  
 DATE RECEIVED 03/14/94  
 DELIVERY DATE 04/16/94

ANN MARIE HOLBROW  
 MCLAREN/HART  
 16755 VON KARMAN AVE  
 IRVINE CA 92714

SOIL

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP DATE	NUCLIDE	ACTIVITY (PCI/GM DRY)	NUCL-UNIT-% U/M *	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-% *	LAB.
44163	8G-02-076-SG		03/10	1605	CO-60	L.T. 4. E-02		04/09		4
					ZN-65	L.T. 1. E-01		04/09		4
					ZR-95	L.T. 6. E-02		04/09		4
					RU-103	L.T. 5. E-02		04/09		4
					RU-106	L.T. 3. E-01		04/09		4
					I-131	L.T. 4. E-01		04/09		4
					CS-134	L.T. 4. E-02		04/09		4
					CS-137	L.T. 4. E-02		04/09		4
					BA-140	L.T. 2. E-01		04/09		4
					CE-141	L.T. 1. E-01		04/09		4
					CE-144	L.T. 2. E-01		04/09		4
					RA-226	1.61+-0.55E 00		04/09		4
					TH-228	1.42+-0.14E 00		04/09		4
44164	8G-02-007-SS		03/10	1610	SR-90	1.3 +-0.8 E-01		04/16		3
44165	8G-02-007-SP		03/10	1610	PU-238	L.T. 7. E-03		04/14		6
					PU-239	L.T. 7. E-03		04/14		6
44166	8G-02-007-SG		03/10	1610	GAMMA	NOT ANALYZED				4
44167	8G-02-007-SG		03/10	1610	BE-7	L.T. 5. E-01		04/09		4
					K-40	2.15+-0.21E 01		04/09		4
					MN-54	L.T. 5. E-02		04/09		4
					CO-58	L.T. 5. E-02		04/09		4
					FE-59	L.T. 1. E-01		04/09		4
					CO-60	L.T. 5. E-02		04/09		4
					ZN-65	L.T. 1. E-01		04/09		4
					ZR-95	L.T. 6. E-02		04/09		4
					RU-103	L.T. 7. E-02		04/09		4
					RU-106	L.T. 4. E-01		04/09		4
					I-131	L.T. 6. E-01		04/09		4
					CS-134	L.T. 6. E-02		04/09		4





TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

RUN DATE 06/03/94

REPORT OF ANALYSIS

PAGE 14

WORK ORDER NUMBER 4-0472 CUSTOMER P.O. NUMBER 030225/030600829 DATE RECEIVED 03/21/94 DELIVERY DATE 04/23/94

ANN MARIE HOLBROM  
MCLAREN/HART  
16755 VON KARMAN AVE  
IRVINE CA 92714

SOIL

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP DATE	TIME	NUCLIDE	ACTIVITY (PCI/GM DRY)	NUCL-UNIT-% U/M *	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-% *	LAB.
45087	86-14-001-MS		03/15		1000	SR-90	L.T. 7. E-02		04/28		3
45088	86-14-001-MS		/			SR-90	4.0 +-0.3 E 00		05/02		3
45089	86-14-001-MS		/			SR-90	4.0 +-0.2 E 00		04/30		3
45090	86-14-002-ST		03/15		1000	H-3	L.T. 1. E 02	PCI/LITER *	05/27		5
45091	86-14-002-SS		03/15		1000	SR-90	L.T. 9. E-02		04/30		3
45092	86-14-002-SP		03/15		1000	PU-238 U-234 TH-230 PU-239 U-235 U-238 TH-232 TH-228	L.T. 1. E-02 3.1 +-0.4 E-01 3.8 +-0.5 E-01 L.T. 1. E-02 1.8 +-1.0 E-02 4.0 +-0.5 E-01 1.2 +-0.1 E 00 7.8 +-0.8 E-01		05/09 05/12 05/16 05/09 05/12 05/12 05/18 05/18		6 6 6 6 6 6 6 6
45114	86-00-004-FS		03/15		0841	SR-90	L.T. 9. E-02		04/30		3
45115	86-01-090-SS		03/15			SR-90	L.T. 1. E-01		04/30		3
45116	86-00-008-FT		03/15		0908	H-3	L.T. 2. E 02	PCI/LITER *	05/27		5
45117	86-14-001-SS		03/15		1000	SR-90	8.2 +-4.3 E-02		04/30		3
45490	86-02-007-ST		03/10		1610	H-3	L.T. 1. E 02	PCI/LITER *	05/27		5

910-10

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

REPORT OF ANALYSIS

RUN DATE 05/26/94

PAGE 2

ANN MARIE HOLBROW  
 MCLAREN/HART  
 16755 VON KARMAN AVE  
 IRVINE CA 92714

WORK ORDER NUMBER

4-1294

CUSTOMER P.O. NUMBER

030225/030600829

DELIVERY DATE

04/13/94

DATE RECEIVED

03/11/94

S O I L

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP DATE	NUCLIDE	ACTIVITY ( PCI/LITER)	NUCL-UNIT-% U/M *	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-% *	LAB.
44019	10302DUP88-17-B003-ST		03/09 1610		H-3	L.T. 2. E 02		05/03		5
44159	10326DUP8C-02-076 -ST		03/10 1605		H-3	L.T. 2. E 02		05/08		5
44180	10302DUP88-17-005 -SS		03/10 1136		SR-90	L.T. 8. E-02 PCI/GM DRY *		04/16		3

HAPPY CAMP  
(BG05)

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

REPORT OF ANALYSIS

RUN DATE 05/25/94

PAGE 24

WORK ORDER NUMBER 4-0514 CUSTOMER P.O. NUMBER 030225/030600829 DATE RECEIVED 03/15/94 DELIVERY DATE 04/17/94

ANN MARIE HOLBROV  
MCLAREN/HART  
16755 VON KARMAN AVE  
IRVINE CA 92714

S O I L

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE		NUCLIDE	ACTIVITY (PCI/GM DRY)	NUCL-UNIT-X U/M *	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-% *	LAB.
			START DATE	STOP DATE						
44715	86-09-057-SG		03/11	1404	I-131 CS-134 CS-137 8A-140 CE-141 CE-144 RA-226 TH-228	L.T. 2. E 00 L.T. 4. E-02 L.T. 6. E-02 L.T. 5. E-01 L.T. 2. E-01 L.T. 4. E-01 L.T. 1. E 00 3.85 +-0.55E-01		04/26 04/26 04/26 04/26 04/26 04/26 04/26 04/26		4 4 4 4 4 4 4 4
44716	86-00-006-FT		03/11	1404	H-3	L.T. 2. E 02	PCI/LITER *	05/23		5
44719	86-09-013-ST		03/11	1420	H-3	L.T. 2. E 02	PCI/LITER *	05/23		5
44720	86-09-013-SS		03/11	1420	SR-90	1.2 +-0.5 E-01		04/20		3
44721	86-09-013-SP		03/11	1420	PU-238 U-234 TH-230 PU-239 U-235 U-238 TH-232 TH-228	L.T. 8. E-03 1.3 +-0.3 E-01 2.3 +-0.4 E-01 L.T. 8. E-03 L.T. 7. E-03 1.3 +-0.3 E-01 2.0 +-0.4 E-01 2.1 +-0.5 E-01		05/02 05/02 05/07 05/02 05/02 05/02 05/07 05/07		6 6 6 6 6 6 6 6
44722	86-05-074-ST		03/11	1037	H-3	L.T. 5. E 02	PCI/LITER *	05/23		5
44723	86-05-074-ST		03/11	1037	H-3	L.T. 5. E 02	PCI/LITER *	05/23		5
44724	86-05-074-SS		03/11	1037	SR-90	8.4 +-4.0 E-02		04/20		3

LSO-50

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

REPORT OF ANALYSIS

RUN DATE 05/25/94

PAGE 25

WORK ORDER NUMBER 4-0514 CUSTOMER P.O. NUMBER 030225/030600829 DATE RECEIVED 03/15/94 DELIVERY DATE 04/17/94

ANN MARIE HOLBROW  
MCLAREN/HART  
16755 VON KARMAN AVE  
IRVINE CA 92714

SOIL

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE		NUCLIDE	ACTIVITY (PCI/GM DRY)	NUCL-UNIT-% U/M #	MID-COUNT		VOLUME - UNITS ASH-NIGHT-% #	LAB.
			START DATE	STOP DATE				DATE	TIME		
44725	8G-05-074-SG		03/11	1037	BE-7	L.T. 5. E-01		04/26			4
					K-40	2.02+-0.20E 01		04/26			4
					MN-54	L.T. 4. E-02		04/26			4
					CO-58	L.T. 6. E-02		04/26			4
					FE-59	L.T. 2. E-01		04/26			4
					CO-60	L.T. 4. E-02		04/26			4
					ZN-65	L.T. 1. E-01		04/26			4
					ZR-95	L.T. 7. E-02		04/26			4
					RU-103	L.T. 7. E-02		04/26			4
					RU-106	L.T. 3. E-01		04/26			4
					I-131	L.T. 2. E 00		04/26			4
					CS-134	L.T. 4. E-02		04/26			4
					CS-137	1.53+-0.28E-01		04/26			4
					BA-140	L.T. 4. E-01		04/26			4
					CE-141	L.T. 1. E-01		04/26			4
					CE-144	L.T. 3. E-01		04/26			4
					RA-226	2.04+-0.58E 00		04/26			4
					TH-228	L.T. 1. E-01		04/26			4
44726	8G-05-074-SP		03/11	1037	PU-238	L.T. 2. E-02		05/02			6
					U-234	7.3 +-0.8 E-01		05/02			6
					TH-230	6.3 +-0.8 E-01		05/09			6
					PU-239	L.T. 2. E-02		05/02			6
					U-235	3.6 +-1.5 E-02		05/02			6
					U-238	9.1 +-0.9 E-01		05/02			6
					TH-232	1.5 +-0.4 E-01		05/09			6
					TH-228	1.7 +-0.5 E-01		05/09			6
44727	8G-05-027-ST		03/11	1045	H-3	L.T. 2. E 02	PCI/LITER #	05/23			5











TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

REPORT OF ANALYSIS

RUN DATE 05/25/94

PAGE 32

WORK ORDER NUMBER 4-0514 CUSTOMER P.O. NUMBER C30225/030600829 DATE RECEIVED 03/15/94 DELIVERY DATE 04/17/94

ANN MARIE HOLBROW  
 MCLAREN/HART  
 16755 VON KARMAN AVE  
 IRVINE CA 92714

S O I L

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE		NUCLIDE	ACTIVITY (PCI/GM DRY)	NUCL-UNIT-X U/M	MID-COUNT		VOLUME - UNITS ASH-WGHT-X	LAB.
			START DATE	STOP DATE				TIME	DATE		
44758	10388	BG-05-056-SC	03/11	1105	CE-144	L.T. 2.0 E-01		04/25	04/25		4
					RA-226	2.45+-0.55E 00		04/25	04/25		4
					TH-228	7.30+-0.73E-01		04/25	04/25		4
44759	10386	BG-05-056-SP	03/11	1105	PU-238	L.T. 1.0 E-02		05/04	05/04		6
					U-234	7.4 +-0.8 E-01		05/05	05/05		6
					TH-230	5.2 +-0.8 E-01		05/10	05/10		6
					PU-239	L.T. 1.0 E-02		05/04	05/04		6
					U-235	3.7 +-1.5 E-02		05/05	05/05		6
					TH-232	9.2 +-0.8 E-01		05/05	05/05		6
					U-238	1.5 +-0.4 E-01		05/10	05/10		6
					TH-228	2.0 +-0.6 E-01		05/10	05/10		6











TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

REPORT OF ANALYSIS

RUN DATE 05/25/94

PAGE 24

WORK ORDER NUMBER 4-0514 CUSTOMER P.O. NUMBER 030225/030600829 DATE RECEIVED 03/15/94 DELIVERY DATE 04/17/94

ANN MARIE HOLBROW  
MCLAREN/HART  
16755 VON KARMAN AVE  
IRVINE CA 92714

SOIL

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE		NUCLIDE	ACTIVITY (PCI/GM DRY)	NUCL-UNIT-R U/M	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-R	LAB.
			START DATE	STOP DATE						
44715	86-09-057-SG		03/11	1404	I-131 CS-134 CS-137 BA-140 CE-141 CE-144 RA-226 TH-228	L.T. 2. E 00 L.T. 4. E-02 L.T. 6. E-02 L.T. 5. E-01 L.T. 2. E-01 L.T. 4. E-01 L.T. 1. E 00 3.05+-0.55E-01		04/26 04/26 04/26 04/26 04/26 04/26 04/26 04/26		4 4 4 4 4 4 4 4
44716	86-00-006-FT		03/11	1404	H-3	L.T. 2. E 02	PCI/LITER *	05/23		5
44719	86-09-013-ST		03/11	1420	H-3	L.T. 2. E 02	PCI/LITER *	05/23		5
44720	86-09-013-SS		03/11	1420	SR-90	1.2 +-0.5 E-01		04/20		3
44721	86-09-013-SP		03/11	1420	PU-238 U-234 TH-230 PU-239 U-235 U-238 TH-232 TH-228	L.T. 6. E-03 1.3 +-0.3 E-01 2.3 +-0.4 E-01 L.T. 8. E-03 L.T. 7. E-03 1.3 +-0.3 E-01 2.0 +-0.4 E-01 2.1 +-0.5 E-01		05/02 05/02 05/07 05/02 05/02 05/02 05/07 05/07		6 6 6 6 6 6 6 6
44722	86-05-074-ST		03/11	1037	H-3	L.T. 5. E 02	PCI/LITER *	05/23		5
44723	86-05-074-ST		03/11	1037	H-3	L.T. 5. E 02	PCI/LITER *	05/23		5
44724	86-05-074-SS		03/11	1037	SR-90	8.4 +-4.0 E-02		04/20		3

NO 50



TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

REPORT OF ANALYSIS

RUN DATE 05/25/94

PAGE 28

WORK ORDER NUMBER 4-0514  
 CUSTOMER P.O. NUMBER 030225/030600829  
 DATE RECEIVED 03/15/94  
 DELIVERY DATE 04/17/94

ANN MARIE HOLBROW  
 MCLAREN/HART  
 16755 VON KARMAN AVE  
 IRVINE CA 92714

S O I L

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP DATE	NUCLIDE	ACTIVITY (PCI/GM DRY)	NUCL-UNIT-% U/M *	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-% *	LAB.
44738	8G-09-096-SP		03/11 1329		TH-228	L.T. 2. E-01		05/09		6
44739	8G-09-005-ST		03/11 1320		H-3	L.T. 2. E 02	PCI/LITER *	05/24		5
44740	8G-09-005-SS		03/11 1320		SR-90	L.T. 1. E-01		04/23		3
44741	8G-09-005-SG		03/11 1320		BE-7	L.T. 9. E-01		04/26		4
					K-40	7.84+-0.83E 00		04/26		4
					MN-54	L.T. 6. E-02		04/26		4
					CO-58	L.T. 9. E-02		04/26		4
					FE-59	L.T. 2. E-01		04/26		4
					CO-60	L.T. 7. E-02		04/26		4
					ZN-65	L.T. 1. E-01		04/26		4
					ZR-95	L.T. 1. E-01		04/26		4
					RU-103	L.T. 1. E-01		04/26		4
					RU-106	L.T. 6. E-01		04/26		4
					I-131	L.T. 3. E 00		04/26		4
					CS-134	L.T. 7. E-02		04/26		4
					CS-137	1.88+-0.61E-01		04/26		4
					BA-140	L.T. 7. E-01		04/26		4
					CE-141	L.T. 2. E-01		04/26		4
					CE-144	L.T. 4. E-01		04/26		4
					RA-226	L.T. 1. E 00		04/26		4
					TH-228	5.03+-0.70E-01		04/26		4
44743	8G-09-005-SP		03/11 1320		PU-238	L.T. 1. E-02		05/02		6
					U-234	1.2 +-0.4 E-01		05/04		6
					TH-230	2.2 +-0.7 E-01		05/09		6
					PU-239	L.T. 1. E-02		05/02		6
					U-235	L.T. 1. E-02		05/04		6
					U-238	1.4 +-0.4 E-01		05/04		6
					TH-232	1.7 +-0.7 E-01		05/09		6
					TH-228	2.5 +-0.9 E-01		05/09		6









TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

REPORT OF ANALYSIS

RUN DATE 05/25/94

PAGE 3

WORK ORDER NUMBER

4-0514

CUSTOMER P.O. NUMBER

030225/030600829

DELIVERY DATE

04/17/94

DATE RECEIVED

03/15/94

ANN MARIE HOLBROM  
MCLAREN/HART  
16755 VON KARMAN AVE  
IRVINE CA 92714

SOIL

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE		NUCLIDE	ACTIVITY (PCI/GM DRY)	NUCL-UNIT-% U/M *	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-% *	LAB.
			START DATE	STOP DATE						
44624	BG-10-004-SG		03/14	0945	CS-137 BA-140 CE-141 CE-144 RA-226 TH-228	2.15+-0.39E-01 L.T. 4. E-01 L.T. 1. E-01 L.T. 2. E-01 L.T. 6. E-01 4.02+-0.54E-01		04/25 04/25 04/25 04/25 04/25 04/25		4 4 4 4 4 4
44625	BG-00-004-FG		03/14	0945	BE-7 K-40 MN-54 CO-58 FE-59 CO-60 ZN-65 ZR-95 RU-103 RU-106 I-131 CS-134 CS-137 BA-140 CE-141 CE-144 RA-226 TH-228	L.T. 5. E-01 6.33+-0.63E 00 L.T. 4. E-02 L.T. 4. E-02 L.T. 1. E-01 L.T. 3. E-02 L.T. 9. E-02 L.T. 6. E-02 L.T. 7. E-02 L.T. 4. E-01 L.T. 1. E 00 L.T. 4. E-02 3.06+-0.41E-01 L.T. 3. E-01 L.T. 1. E-01 L.T. 2. E-01 L.T. 7. E-01 L.T. 7. E-02		04/25 04/25 04/25 04/25 04/25 04/25 04/25 04/25 04/25 04/25 04/25 04/25 04/25 04/25 04/25 04/25 04/25 04/25		4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4
44626	BG-10-003-ST		03/14	1010	H-3	L.T. 1. E 02	PCI/LITTER *	05/21		5
44627	BG-10-003-SS		03/14	1010	SR-90	L.T. 9. E-02		04/16		3

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

RUN DATE 05/25/94

REPORT OF ANALYSIS

PAGE 4

WORK ORDER NUMBER 4-0514  
 CUSTOMER P.O. NUMBER 030225/030600829  
 DATE RECEIVED 03/15/94  
 DELIVERY DATE 04/17/94

ANN MARIE HOLBROW  
 MCLAREN/HART  
 16755 VON KARMAN AVE  
 IRVINE CA 92714

S O I L

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE		NUCLIDE	ACTIVITY (PCI/GM DRY)	NUCL-UNIT-% U/M #	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-%	LAB.
			START DATE	STOP DATE						
44628	10487	86-10-003-SP	03/14	1010	PU-238 U-234 TH-230 PU-239 U-235 U-238 TH-232 TH-228	L.T. 7. E-03 1.5 +-0.3 E-01 1.0 +-0.3 E-01 L.T. 1. E-02 L.T. 6. E-03 1.2 +-0.3 E-01 6.5 +-2.2 E-02 5.9 +-3.0 E-02		04/20 04/26 04/28 04/20 04/26 04/26 04/28 04/28		6 6 6 6 6 6 6 6
44629	10489	86-10-003-SG	03/14	1010	BE-7 K-40 MN-54 CO-58 FE-59 CO-60 ZN-65 ZR-95 RU-103 RU-106 I-131 CS-134 CS-137 BA-140 CE-141 CE-144 RA-226 TH-228	L.T. 4. E-01 3.53+-0.43E-00 L.T. 3. E-02 L.T. 3. E-02 L.T. 9. E-02 L.T. 3. E-02 L.T. 8. E-02 L.T. 4. E-02 L.T. 5. E-02 L.T. 2. E-01 L.T. 1. E-00 L.T. 3. E-02 2.57+-0.34E-01 L.T. 2. E-01 L.T. 9. E-02 L.T. 2. E-01 L.T. 5. E-01 2.49+-0.35E-01		04/25 04/25 04/25 04/25 04/25 04/25 04/25 04/25 04/25 04/25 04/25 04/25 04/25 04/25 04/25 04/25 04/25 04/25		4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4
44630	10490	86-10-002-ST	03/14	0945	H-3	L.T. 1. E-02	PCI/LITER *	05/21		5



TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

RUN DATE 05/25/94

REPORT OF ANALYSIS

PAGE 6

WORK ORDER NUMBER 4-0514  
 CUSTOMER P.O. NUMBER 030225/030600829  
 DATE RECEIVED 03/15/94  
 DELIVERY DATE 04/17/94

ANN MARIE HOLBROW  
 MCLAKEN/HART  
 16755 VON KARMAN AVE  
 IRVINE CA 92714

S O I L

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE		NUCLIDE	ACTIVITY ( PCI/LITER)	NUCL-UNIT-% U/M *	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-% *	LAB.
			START DATE	STOP DATE						
44634	86-10-005-ST		03/14	0925	H-3	L.T. 1. E 02		05/22		5
44635	86-10-005-SS		03/14	0925	SR-90	L.T. 9. E-02 PCI/GM DRY *		04/16		3
44636	86-12-002-ST		03/14	1150	H-3	L.T. 1. E 02		05/22		5
44637	86-12-002-SS		03/14	1150	SR-90	L.T. 9. E-02 PCI/GM DRY *		04/18		3
44638	86-12-002-SP		03/14	1150	PU-238 U-234 TH-230 PU-239 U-235 U-238 TH-232 TH-228	L.T. 2. E-02 PCI/GM DRY * 3.5 +-1.5 E-02 PCI/GM DRY * 2.7 +-1.4 E-02 PCI/GM DRY * L.T. 2. E-02 PCI/GM DRY * L.T. 6. E-03 PCI/GM DRY * 2.5 +-1.3 E-02 PCI/GM DRY * 2.3 +-1.3 E-02 PCI/GM DRY * L.T. 3. E-02 PCI/GM DRY *		04/20 04/26 05/04 04/20 04/26 04/26 05/04 05/04		6 6 6 6 6 6 6 6 6
44639	86-12-002-SP		03/14	1150	PU-238 U-234 TH-230 PU-239 U-235 U-238 TH-232 TH-228	L.T. 8. E-03 PCI/GM DRY * 1.5 +-1.1 E-02 PCI/GM DRY * 2.9 +-1.4 E-02 PCI/GM DRY * L.T. 8. E-03 PCI/GM DRY * L.T. 7. E-03 PCI/GM DRY * 2.0 +-1.3 E-02 PCI/GM DRY * 2.8 +-1.4 E-02 PCI/GM DRY * L.T. 4. E-02 PCI/GM DRY *		04/20 04/26 05/06 04/20 04/26 04/26 05/06 05/06		6 6 6 6 6 6 6 6 6
44640	86-12-002-SG		03/14	1150	BE-7 K-40 MN-54 CO-58 FE-59 CD-60 ZN-65	L.T. 3. E-01 PCI/GM DRY * 1.72+-0.29E 00 PCI/GM DRY * L.T. 2. E-02 PCI/GM DRY * L.T. 3. E-02 PCI/GM DRY * L.T. 7. E-02 PCI/GM DRY * L.T. 2. E-02 PCI/GM DRY * L.T. 5. E-02 PCI/GM DRY *		04/25 04/25 04/25 04/25 04/25 04/25 04/25		4 4 4 4 4 4 4

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

REPORT OF ANALYSIS

RUN DATE 05/25/94

PAGE 17

WORK ORDER NUMBER 4-0514  
 CUSTOMER P.O. NUMBER 030225/030600829  
 DATE RECEIVED 03/15/94  
 DELIVERY DATE 04/17/94

ANN MARIE HOLBROW  
 MCLAREN/HART  
 16755 VON KARMAN AVE  
 IRVINE CA 92714

SOIL

TELEDYNE  
 SAMPLE NUMBER 44680 10571 86-12-005-SG  
 CUSTOMER'S IDENTIFICATION 86-12-005-SG  
 STA NUM 92714  
 COLLECTION-DATE  
 START DATE 03/14 1245  
 STOP DATE

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP DATE	TIME	NUCLIOE	ACTIVITY (PCI/GM DRY)	NUCL-UNIT-% U/M *	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-% *	LAB.
						I-131	L.T. 9. E-01		04/26		4
						CS-134	L.T. 3. E-02		04/26		4
						CS-137	L.T. 3. E-02		04/26		4
						BA-140	L.T. 2. E-01		04/26		4
						CE-141	L.T. 8. E-02		04/26		4
						CE-144	L.T. 2. E-01		04/26		4
						RA-226	L.T. 4. E-01		04/26		4
						TH-228	L.T. 4. E-02		04/26		4
						BE-7	L.T. 3. E-01		04/27		4
						K-40	1.31+-0.22E 00		04/27		4
						MN-54	L.T. 2. E-02		04/27		4
						CO-58	L.T. 3. E-02		04/27		4
						FE-59	L.T. 7. E-02		04/27		4
						CO-60	L.T. 2. E-02		04/27		4
						ZN-65	L.T. 5. E-02		04/27		4
						ZR-95	L.T. 3. E-02		04/27		4
						RU-103	L.T. 4. E-02		04/27		4
						RU-106	L.T. 2. E-01		04/27		4
						I-131	L.T. 8. E-01		04/27		4
						CS-134	L.T. 2. E-02		04/27		4
						CS-137	L.T. 2. E-02		04/27		4
						BA-140	L.T. 2. E-01		04/27		4
						CE-141	L.T. 6. E-02		04/27		4
						CE-144	L.T. 1. E-01		04/27		4
						RA-226	L.T. 3. E-01		04/27		4
						TH-228	L.T. 3. E-02		04/27		4
						PU-238	L.T. 1. E-02		05/02		6
						U-234	1.3 +-0.3 E-01		05/02		6
						TH-230	1.6 +-0.5 E-01		05/06		6
						PU-239	L.T. 1. E-02		05/02		6
						U-235	L.T. 7. E-03		05/02		6

44685 10497 86-10-005-SP

03/14 0925

## TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

## REPORT OF ANALYSIS

RUN DATE 05/25/94

PAGE 10

WORK ORDER NUMBER

4-0514

CUSTOMER P.O. NUMBER

030225/030600829

DELIVERY DATE

04/17/94

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16755 VON KARMAN AVE  
IRVINE CA 92714

## S O I L

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE		NUCLIDE	ACTIVITY (PCI/GM DRY)	NUCL-UNIT-% U/M *	MID-COUNT TIME DATE	VOLUME - UNITS		LAB.
			START DATE	STOP DATE					ASH-WGHT-%	*	
44685	86-10-005-SP		03/14	0925	U-238	9.2 +-2.7 E-02		05/02			6
					TH-232	1.5 +-0.4 E-01		05/06			6
					TH-228	1.2 +-0.5 E-01		05/06			6
44686	86-10-005-SG		03/14	0925	BE-7	L.T. 6. E-01		04/26			4
					K-40	1.20+-0.12E 01		04/26			4
					MN-54	L.T. 5. E-02		04/26			4
					CO-58	L.T. 6. E-02		04/26			4
					FE-59	L.T. 2. E-01		04/26			4
					CO-60	L.T. 4. E-02		04/26			4
					ZN-65	L.T. 1. E-01		04/26			4
					ZR-95	L.T. 7. E-02		04/26			4
					RU-103	L.T. 9. E-02		04/26			4
					RU-106	L.T. 4. E-01		04/26			4
					I-131	L.T. 2. E 00		04/26			4
					CS-134	L.T. 5. E-02		04/26			4
					CS-137	4.56+-0.52E-01		04/26			4
					BA-140	L.T. 4. E-01		04/26			4
					CE-141	L.T. 1. E-01		04/26			4
					CE-144	L.T. 3. E-01		04/26			4
					RA-226	1.31+-0.60E 00		04/26			4
					TH-228	4.31+-0.49E-01		04/26			4
44687	86-11-010-ST		03/14	1310	H-3	L.T. 2. E 02	PCI/LITER *	05/23			5
44688	86-11-010-SS		03/14	1310	SR-90	8.9 +-4.1 E-02		04/16			3
44689	86-11-010-SP		03/14	1310	PU-238	L.T. 1. E-02		05/06			6
					U-234	3.3 +-1.8 E-02		05/02			6
					TH-230	3.3 +-2.0 E-02		05/06			6
					PU-239	L.T. 1. E-02		05/06			6
					U-235	L.T. 1. E-02		05/02			6
					U-238	2.2 +-1.5 E-02		05/02			6



TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

REPORT OF ANALYSIS

RUN DATE 05/25/94

PAGE 8

WORK ORDER NUMBER

4-0514

DELIVERY DATE

04/17/94

CUSTOMER P.O. NUMBER

030225/030600829

DATE RECEIVED

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MCLAREN/HART  
16755 VON KARMAN AVE  
IRVINE CA 92714

S O I L

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	TIME	NUCLIDE	ACTIVITY (PCI/GM DRY)	NUCL-UNIT-% U/M #	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-% #	LAB.
44644	86-12-003-SG		03/14	1210	RU-103	L.T. 4. E-02		04/25		4
					RU-106	L.T. 2. E-01		04/25		4
					I-131	L.T. 7. E-01		04/25		4
					CS-134	L.T. 2. E-02		04/25		4
					CS-137	4.19+-1.60E-02		04/25		4
					BA-140	L.T. 2. E-01		04/25		4
					CE-141	L.T. 8. E-02		04/25		4
					CE-144	L.T. 2. E-01		04/25		4
					RA-226	7.34+-4.21E-01		04/25		4
					TH-228	L.T. 5. E-02		04/25		4
44645	86-12-004-ST		03/14	1225	H-3	L.T. 1. E 02	PCI/LITER #	05/22		5
44646	86-12-004-SS		03/14	1225	SR-90	L.T. 9. E-02		04/16		3
44647	86-11-075-SG		03/14	1205	BE-7	L.T. 5. E-01		04/25		4
					K-40	4.03+-0.59E 00		04/25		4
					MN-54	L.T. 4. E-02		04/25		4
					CO-58	L.T. 5. E-02		04/25		4
					FE-59	L.T. 2. E-01		04/25		4
					CO-60	L.T. 4. E-02		04/25		4
					ZN-65	L.T. 9. E-02		04/25		4
					ZR-95	L.T. 7. E-02		04/25		4
					RU-103	L.T. 8. E-02		04/25		4
					RU-106	L.T. 4. E-01		04/25		4
					I-131	L.T. 1. E 00		04/25		4
					CS-134	L.T. 5. E-02		04/25		4
					CS-137	1.13+-0.43E-01		04/25		4
					BA-140	L.T. 4. E-01		04/25		4
					CE-141	L.T. 2. E-01		04/25		4
					CE-144	L.T. 4. E-01		04/25		4
					RA-226	L.T. 1. E 00		04/25		4
					TH-228	1.53+-0.56E-01		04/25		4



TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

REPORT OF ANALYSIS

RUN DATE 05/25/94

PAGE 10

WORK ORDER NUMBER

ANN MARIE HOLBROW  
MCLAREN/HART  
16755 VON KARMAN AVE  
IRVINE CA

4-0514

92714

CUSTOMER P.O. NUMBER

030225/030600829

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03/15/94

DELIVERY DATE

04/17/94

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE		NUCLIDE	ACTIVITY I PCI/LITERI	NUCL-UNIT-X U/M *	MID-COUNT TIME DATE	VOLUME - UNITS	
			START DATE	STOP DATE					ASH-WGHT-X *	LAB.
44652	86-00-007-FT		03/14	1215	H-3	L.T. 1. E 02		05/22		5
44653	86-11-011-ST		03/14	1230	H-3	L.T. 1. E 02		05/22		5
44654	86-11-011-SS		03/14	1230	SR-90	L.T. 1. E-01 PCI/GM DRY *		04/18		3
44655	86-11-011-SP		03/14	1230	PU-238 U-234 TH-230 PU-239 U-235 U-238 TH-232 TH-228	L.T. 6. E-03 PCI/GM DRY * 5.1 +-1.8 E-02 PCI/GM DRY * 3.1 +-2.2 E-02 PCI/GM DRY * L.T. 6. E-03 PCI/GM DRY * L.T. 6. E-03 PCI/GM DRY * 5.3 +-1.8 E-02 PCI/GM DRY * 2.6 +-2.3 E-02 PCI/GM DRY * L.T. 8. E-02 PCI/GM DRY *		04/20 04/26 05/04 04/20 04/26 04/26 05/04 05/04		6 6 6 6 6 6 6 6
44656	86-11-011-SG		03/14	1230	BE-7 K-40 MN-54 CO-58 FE-59 CO-60 ZN-65 ZR-95 RU-103 RU-106 I-131 CS-134 CS-137 BA-140 CE-141 CE-144 RA-226 TH-228	L.T. 4. E-01 PCI/GM DRY * 2.85+-0.35E 00 PCI/GM DRY * L.T. 3. E-02 PCI/GM DRY * L.T. 3. E-02 PCI/GM DRY * L.T. 8. E-02 PCI/GM DRY * L.T. 3. E-02 PCI/GM DRY * L.T. 6. E-02 PCI/GM DRY * L.T. 4. E-02 PCI/GM DRY * L.T. 5. E-02 PCI/GM DRY * L.T. 2. E-01 PCI/GM DRY * L.T. 9. E-01 PCI/GM DRY * L.T. 3. E-02 PCI/GM DRY * 1.09+-0.29E-01 PCI/GM DRY * L.T. 2. E-01 PCI/GM DRY * L.T. 8. E-02 PCI/GM DRY * L.T. 2. E-01 PCI/GM DRY * L.T. 5. E-01 PCI/GM DRY * 9.04+-2.40E-02 PCI/GM DRY *		04/25 04/25 04/25 04/25 04/25 04/25 04/25 04/25 04/25 04/25 04/25 04/25 04/25 04/25 04/25 04/25 04/25 04/25		4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4

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TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

REPORT OF ANALYSIS

RUN DATE 05/25/94

PAGE 12

WORK ORDER NUMBER

4-0514

DATE RECEIVED

03/15/94

CUSTOMER P.O. NUMBER

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DELIVERY DATE

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ANN MARIE HOLBROW  
MCLAREN/HART  
16755 VON KARMAN AVE  
IRVINE CA 92714

S O I L

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE		NUCLIDE	ACTIVITY (PCI/GM DRY)	NUCL-UNIT-% U/M *	MID-COUNT TIME DATE	VOLUME - UNITS		LAB.
			START DATE	STOP DATE					ASH-WGHT-% *		
44661	86-11-031-SG		03/14	1250	CS-134 CS-137 BA-140 CE-141 CE-144 RA-226 TH-228	L.T. 3. E-02 5.87+-2.34E-02 L.T. 3. E-01 L.T. 1. E-01 L.T. 2. E-01 L.T. 6. E-01 1.81+-0.45E-01		04/25 04/25 04/25 04/25 04/25 04/25		4 4 4 4 4 4	
44662	86-11-031-MT		03/14	1250	H-3	L.T. 7. E 02	PCI/LITER *	05/25		5	
44663	86-11-031-MT		03/14	1250	H-3	7.9 +-0.6 E 03	PCI/LITER *	05/22		5	
44664	86-11-031-MT		03/14	1250	H-3	8.4 +-0.6 E 03	PCI/LITER *	05/22		5	
44665	86-12-001-ST		03/14	1200	H-3	7.2 +-3.4 E 02	PCI/LITER *	05/22		5	
44666	86-12-001-SS		03/14	1200	SR-90	L.T. 8. E-02		04/16		3	
44667	86-12-001-SP		03/14	1200	PU-238 U-234 TH-230 PU-238 U-235 U-238 TH-232 TH-228	L.T. 6. E-03 8.9 +-7.8 E-03 2.2 +-1.7 E-02 L.T. 6. E-03 L.T. 6. E-03 3.3 +-1.4 E-02 2.4 +-1.5 E-02 L.T. 4. E-02		04/22 04/26 05/06 04/22 04/26 04/26 05/06 05/06		6 6 6 6 6 6 6 6	
44668	86-12-001-SG		03/14	1200	BE-7 K-40 MN-54 CO-58 FE-59 CO-60	L.T. 3. E-01 1.72+-0.26E 00 L.T. 3. E-02 L.T. 3. E-02 L.T. 9. E-02 L.T. 2. E-02		04/25 04/25 04/25 04/25 04/25 04/25		4 4 4 4 4 4	







TAPIA COUNTY  
PARK RAVINE (BG12)



TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

REPORT OF ANALYSIS

RUN DATE 05/25/94

PAGE 17

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44680	10571	BG-12-005-SG	03/14	1245	I-131	L.T. 9. E-01		04/26		4
					CS-134	L.T. 3. E-02		04/26		4
					CS-137	L.T. 3. E-02		04/26		4
					BA-140	L.T. 2. E-01		04/26		4
					CE-141	L.T. 8. E-02		04/26		4
					CE-144	L.T. 2. E-01		04/26		4
					RA-226	L.T. 4. E-01		04/26		4
					TH-228	L.T. 4. E-02		04/26		4
44681	10571DUP	BG-12-005-SG	03/14	1245	BE-7	L.T. 3. E-01		04/27		4
					K-40	1.31+-0.22E 00		04/27		4
					MN-54	L.T. 2. E-02		04/27		4
					CO-58	L.T. 3. E-02		04/27		4
					FE-59	L.T. 7. E-02		04/27		4
					CO-60	L.T. 2. E-02		04/27		4
					ZN-65	L.T. 5. E-02		04/27		4
					ZR-95	L.T. 3. E-02		04/27		4
					RU-103	L.T. 4. E-02		04/27		4
					RU-106	L.T. 2. E-01		04/27		4
					I-131	L.T. 8. E-01		04/27		4
					CS-134	L.T. 2. E-02		04/27		4
					CS-137	L.T. 2. E-02		04/27		4
					BA-140	L.T. 2. E-01		04/27		4
					CE-141	L.T. 6. E-02		04/27		4
					CE-144	L.T. 1. E-01		04/27		4
					RA-226	L.T. 3. E-01		04/27		4
					TH-228	L.T. 3. E-02		04/27		4
44685	10497	BG-10-005-SP	03/14	0925	PU-238	L.T. 1. E-02		05/02		6
					U-234	1.3 +-0.3 E-01		05/02		6
					TH-230	1.6 +-0.5 E-01		05/06		6
					PU-239	L.T. 1. E-02		05/02		6
					U-235	L.T. 7. E-03		05/02		6

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

REPORT OF ANALYSIS

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TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE		NUCLIDE	ACTIVITY ( PCI/LITER)	NUCL-UNIT-% U/M *	MID-COUNT TIME DATE	VOLUME - UNITS	
			START DATE	STOP DATE					ASH-WGHT-% *	LAB.
44634	8G-10-005-ST		03/14	0925	H-3	L.T. 1.0	E 02	05/22		5
44635	8G-10-005-SS		03/14	0925	SR-90	L.T. 9.0	E-02 PCI/GM DRY *	04/16		3
44636	8G-12-002-ST		03/14	1150	H-3	L.T. 1.0	E 02	05/22		5
44637	8G-12-002-SS		03/14	1150	SR-90	L.T. 9.0	E-02 PCI/GM DRY *	04/18		3
44638	8G-12-002-SP		03/14	1150	PU-238	L.T. 2.0	E-02 PCI/GM DRY *	04/20		6
					U-234	3.5 +-1.5	E-02 PCI/GM DRY *	04/26		6
					TH-230	2.7 +-1.4	E-02 PCI/GM DRY *	05/04		6
					PU-239	L.T. 2.0	E-02 PCI/GM DRY *	04/20		6
					U-235	L.T. 6.0	E-03 PCI/GM DRY *	04/26		6
					U-238	2.5 +-1.3	E-02 PCI/GM DRY *	04/26		6
					TH-232	2.3 +-1.3	E-02 PCI/GM DRY *	05/04		6
					TH-228	L.T. 3.0	E-02 PCI/GM DRY *	05/04		6
44639	10553DUP 8G-12-002-SP		03/14	1150	PU-238	L.T. 8.0	E-03 PCI/GM DRY *	04/20		6
					U-234	1.5 +-1.1	E-02 PCI/GM DRY *	04/26		6
					TH-230	2.9 +-1.4	E-02 PCI/GM DRY *	05/06		6
					PU-239	L.T. 8.0	E-03 PCI/GM DRY *	04/20		6
					U-235	L.T. 7.0	E-03 PCI/GM DRY *	04/26		6
					U-238	2.0 +-1.3	E-02 PCI/GM DRY *	04/26		6
					TH-232	2.8 +-1.4	E-02 PCI/GM DRY *	05/06		6
					TH-228	L.T. 4.0	E-02 PCI/GM DRY *	05/06		6
44640	10555 8G-12-002-SG		03/14	1150	BE-7	L.T. 3.0	E-01 PCI/GM DRY *	04/25		4
					K-40	1.72+-0.29E 00	PCI/GM DRY *	04/25		4
					MN-54	L.T. 2.0	E-02 PCI/GM DRY *	04/25		4
					CO-58	L.T. 3.0	E-02 PCI/GM DRY *	04/25		4
					FE-59	L.T. 7.0	E-02 PCI/GM DRY *	04/25		4
					CO-60	L.T. 2.0	E-02 PCI/GM DRY *	04/25		4
					ZN-65	L.T. 5.0	E-02 PCI/GM DRY *	04/25		4

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

REPORT OF ANALYSIS

RUN DATE 05/25/94

PAGE 7

WORK ORDER NUMBER

4-0514

CUSTOMER P.O. NUMBER

030225/030600829

DELIVERY DATE

04/17/94

DATE RECEIVED

03/15/94

ANN MARIE HOLBROW

MCLAREN/HART

16755 VON KARMAN AVE

IRVINE CA

92714

S O I L

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE		NUCLIDE	ACTIVITY (PCI/GM DRY)	NUCL-UNIT-X U/M *	MTD-COUNT TIME DATE	VOLUME - UNITS		LAB.
			START DATE	STOP DATE					ASH-WGHT-X *		
44640	10555	BG-12-002-SG	03/14	1150	ZR-95	L.T. 3. E-02		04/25			4
					RU-103	L.T. 4. E-02		04/25			4
					RU-106	L.T. 2. E-01		04/25			4
					1-131	L.T. 7. E-01		04/25			4
					CS-134	L.T. 2. E-02		04/25			4
					CS-137	3.13+-1.80E-02		04/25			4
					BA-140	L.T. 2. E-01		04/25			4
					CE-141	L.T. 8. E-02		04/25			4
					CE-144	L.T. 2. E-01		04/25			4
					RA-226	L.T. 4. E-01		04/25			4
					TH-228	L.T. 4. E-02		04/25			4
44641	10556	BG-12-003-ST	03/14	1210	H-3	L.T. 1. E 02	PCI/LITER *	05/22			5
44642	10557	BG-12-003-SS	03/14	1210	SR-90	L.T. 9. E-02		04/18			3
44643	10558	BG-12-003-SP	03/14	1210	PU-238	L.T. 7. E-03		04/20			6
					U-234	1.9 +-1.1 E-02		04/26			6
					TH-230	3.2 +-1.6 E-02		05/06			6
					PU-239	L.T. 7. E-03		04/20			6
					U-235	L.T. 6. E-03		04/26			6
					U-238	2.2 +-1.2 E-02		04/26			6
					TH-232	4.2 +-2.0 E-02		05/06			6
					TH-228	L.T. 3. E-02		05/06			6
44644	10560	BG-12-003-SG	03/14	1210	BE-7	L.T. 3. E-01		04/25			4
					K-40	1.62+-0.32E 00		04/25			4
					MN-54	L.T. 2. E-02		04/25			4
					CO-58	L.T. 2. E-02		04/25			4
					FE-59	L.T. 8. E-02		04/25			4
					CO-60	L.T. 2. E-02		04/25			4
					ZN-65	L.T. 5. E-02		04/25			4
					ZR-95	L.T. 3. E-02		04/25			4

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

REPORT OF ANALYSIS

RUN DATE 05/25/94

PAGE 8

WORK ORDER NUMBER 4-0514 CUSTOMER P.O. NUMBER 030225/030600829 DATE RECEIVED 03/15/94 DELIVERY DATE 04/17/94

ANN MARIE HOLBROW  
MCLAREN/HART  
16755 VON KARMAN AVE  
IRVINE CA 92714

S O I L

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE		NUCLIDE	ACTIVITY (PCT/GM DRY)	NUCL-UNIT-% U/M #	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-% #	LAB.
			START DATE	STOP DATE						
44644	86-12-003-SG		03/14	1210	RU-103	L.T. 4. E-02		04/25		4
					RU-106	L.T. 2. E-01		04/25		4
					I-131	L.T. 7. E-01		04/25		4
					CS-134	L.T. 2. E-02		04/25		4
					CS-137	4.19+-1.60E-02		04/25		4
					BA-140	L.T. 2. E-01		04/25		4
					CE-141	L.T. 8. E-02		04/25		4
					CE-144	L.T. 2. E-01		04/25		4
					RA-226	7.34+-4.21E-01		04/25		4
					TH-228	L.T. 5. E-02		04/25		4
44645	86-12-004-ST		03/14	1225	H-3	L.T. 1. E 02	PCI/LITER #	05/22		5
44646	86-12-004-SS		03/14	1225	SR-90	L.T. 9. E-02		04/16		3
44647	86-11-075-SG		03/14	1205	BE-7	L.T. 5. E-01		04/25		4
					K-40	4.03+-0.59E 00		04/25		4
					MN-54	L.T. 4. E-02		04/25		4
					CO-58	L.T. 5. E-02		04/25		4
					FE-59	L.T. 2. E-01		04/25		4
					CO-60	L.T. 4. E-02		04/25		4
					ZN-65	L.T. 9. E-02		04/25		4
					ZR-95	L.T. 7. E-02		04/25		4
					RU-103	L.T. 8. E-02		04/25		4
					RU-106	L.T. 4. E-01		04/25		4
					I-131	L.T. 1. E 00		04/25		4
					CS-134	L.T. 5. E-02		04/25		4
					CS-137	1.13+-0.43E-01		04/25		4
					BA-140	L.T. 4. E-01		04/25		4
					CE-141	L.T. 2. E-01		04/25		4
					CE-144	L.T. 4. E-01		04/25		4
					RA-226	L.T. 1. E 00		04/25		4
					TH-228	1.53+-0.56E-01		04/25		4

## TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

## REPORT OF ANALYSIS

RUN DATE 05/25/94

PAGE 12

WORK ORDER NUMBER

ANN MARIE HOLBROW  
MCLAREN/HART  
16755 VON KARHAN AVE  
IRVINE CA 92714

4-0514

CUSTOMER P.O. NUMBER

030225/030600829

DELIVERY DATE

04/17/94

DATE RECEIVED

03/15/94

## S O I L

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE		NUCLIDE	ACTIVITY (PCI/GM DRY)	NUCL-UNIT-% U/M #	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-% #	LAB.
			START DATE	STOP DATE						
44661	86-11-031-SG		03/14	1250	CS-134 CS-137 BA-140 CE-141 CE-144 RA-226 TH-228	L.T. 3. E-02 5.87+-2.34E-02 L.T. 3. E-01 L.T. 1. E-01 L.T. 2. E-01 L.T. 6. E-01 1.81+-0.45E-01		04/25 04/25 04/25 04/25 04/25 04/25 04/25		4 4 4 4 4 4 4
44662	86-11-031-MT		03/14	1250	H-3	L.T. 7. E 02	PCI/LITER #	05/25		5
44663	86-11-031-MT		03/14	1250	H-3	7.9 +-0.6 E 03	PCI/LITER #	05/22		5
44664	86-11-031-MT		03/14	1250	H-3	8.4 +-0.6 E 03	PCI/LITER #	05/22		5
44665	86-12-001-ST		03/14	1200	H-3	7.2 +-3.4 E 02	PCI/LITER #	05/22		5
44666	86-12-001-SS		03/14	1200	SR-90	L.T. 8. E-02		04/16		3
44667	86-12-001-SP		03/14	1200	PU-238 U-234 TH-230 PU-238 U-235 U-238 TH-232 TH-228	L.T. 6. E-03 8.9 +-7.8 E-03 2.2 +-1.7 E-02 L.T. 6. E-03 L.T. 6. E-03 3.3 +-1.4 E-02 2.4 +-1.5 E-02 L.T. 4. E-02		04/22 04/26 05/06 04/22 04/26 04/26 05/06 05/06		6 6 6 6 6 6 6 6
44668	86-12-001-SG		03/14	1200	BE-7 K-40 MN-54 CO-58 FE-59 CO-60	L.T. 3. E-01 1.72+-0.26E 00 L.T. 3. E-02 L.T. 3. E-02 L.T. 9. E-02 L.T. 2. E-02		04/25 04/25 04/25 04/25 04/25 04/25		4 4 4 4 4 4

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

REPORT OF ANALYSIS

RUN DATE 05/25/94

PAGE 13

WORK ORDER NUMBER

4-0514

DELIVERY DATE

04/17/94

CUSTOMER P.O. NUMBER

030225/0306000829

DATE RECEIVED

03/15/94

ANN MARIE HOLBROW  
MCLAREN/HART  
16755 VON KARMAN AVE  
IRVINE CA 92714

S O I L

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE		NUCLIDE	ACTIVITY (PCI/GM DRY)	NUCL-UNIT-% U/H *	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-% *	LAB.
			START DATE	STOP DATE						
44668	86-12-001-SG		03/14	1200	ZN-65	L.T. 6. E-02		04/25		4
					ZR-95	L.T. 4. E-02		04/25		4
					RU-103	L.T. 5. E-02		04/25		4
					RU-106	L.T. 2. E-01		04/25		4
					I-131	L.T. 9. E-01		04/25		4
					CS-134	L.T. 3. E-02		04/25		4
					CS-137	L.T. 3. E-02		04/25		4
					BA-140	L.T. 2. E-01		04/25		4
					CE-141	L.T. 7. E-02		04/25		4
					CE-144	L.T. 2. E-01		04/25		4
					RA-226	L.T. 4. E-01		04/25		4
					TH-228	L.T. 5. E-02		04/25		4
44669	86-12-001-MP		03/14	1200	PU-238	L.T. 6. E-03		04/22		6
					PU-239	L.T. 6. E-03		04/22		6
44670	86-12-001-MP		/	/	PU-239	3.2 +-0.4 E-01		04/22		6
44671	86-12-001-MP		/	/	PU-239	2.9 +-0.5 E-01		04/22		6
44672	86-12-004-SP		03/14	1225	PU-238	L.T. 8. E-03		04/23		6
					U-234	4.9 +-1.7 E-02		04/26		6
					TH-230	8.2 +-3.0 E-02		05/03		6
					PU-239	L.T. 1. E-02		04/23		6
					U-235	L.T. 6. E-03		04/26		6
					U-238	5.8 +-1.9 E-02		04/26		6
					TH-232	6.3 +-2.7 E-02		05/03		6
					TH-228	8.0 +-4.1 E-02		05/03		6

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

REPORT OF ANALYSTS

RUN DATE 05/25/94

PAGE 14

WORK ORDER NUMBER 4-0514

DATE RECEIVED 03/15/94

DELIVERY DATE 04/17/94

ANN MARIE HOLBROW  
MCLAREN/HART  
16755 VON KARMAN AVE  
IRVINE CA 92714

CUSTOMER P.O. NUMBER 030225/030600829

S O I L

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP DATE	NUCLIDE	ACTIVITY (PCI/GM DRY)	NUCL-UNIT-X U/M	MID-COUNT TIME DATE	VOLUME - UNITS ASH-MGHT-X	LAB.
44673	8G-12-004-SG		03/14	1225	BE-7	L.T. 3. E-01		04/26		4
					K-40	1.79+-0.32E 00		04/26		4
					MN-54	L.T. 2. E-02		04/26		4
					CO-58	L.T. 3. E-02		04/26		4
					FE-59	L.T. 9. E-02		04/26		4
					CO-60	L.T. 2. E-02		04/26		4
					ZN-65	L.T. 5. E-02		04/26		4
					ZR-95	L.T. 4. E-02		04/26		4
					RU-103	L.T. 5. E-02		04/26		4
					RU-106	L.T. 2. E-01		04/26		4
					I-131	L.T. 1. E 00		04/26		4
					CS-134	L.T. 2. E-02		04/26		4
					CS-137	9.71+-2.02E-02		04/26		4
					BA-140	L.T. 2. E-01		04/26		4
					CE-141	L.T. 8. E-02		04/26		4
					CE-144	L.T. 2. E-01		04/26		4
					RA-226	L.T. 5. E-01		04/26		4
					TH-228	1.16+-0.29E-01		04/26		4
44674	8G-12-004-MG		03/14	1225	BE-7	L.T. 4. E-01		04/26		4
					K-40	1.91+-0.29E 00		04/26		4
					MN-54	L.T. 3. E-02		04/26		4
					CO-58	L.T. 3. E-02		04/26		4
					FE-59	L.T. 9. E-02		04/26		4
					CO-60	L.T. 3. E-02		04/26		4
					ZN-65	L.T. 5. E-02		04/26		4
					ZR-95	L.T. 3. E-02		04/26		4
					RU-103	L.T. 5. E-02		04/26		4
					RU-106	L.T. 2. E-01		04/26		4
					I-131	L.T. 1. E 00		04/26		4
					CS-134	L.T. 3. E-02		04/26		4
					CS-137	7.41+-2.32E-02		04/26		4
					BA-140	L.T. 2. E-01		04/26		4

ROCKY PEAK  
RAVINE (BG19)











TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

REPORT OF ANALYSIS

REVISED 08/02/94  
RUN DATE 06/03/94

PAGE 9

WORK ORDER NUMBER 4-0472 CUSTOMER P.O. NUMBER 030225/030600829 DATE RECEIVED 03/21/94 DELIVERY DATE 04/23/94

ANN MARIE HOLBROW  
MCLAREN/HART  
16755 VON KARMAN AVE  
IRVINE CA 92714

S O I L

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE		NUCLIDE	ACTIVITY ( PCI/LITER)	NUCL-UNIT-% U/M *	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-% *	LAB.
			START DATE	STOP DATE						
45070	86-14-003-ST		03/15		H-3	L.T. 3. E 02		07/24		5
45071	86-14-003-SS		03/15		SR-90	L.T. 8. E-02 PCI/GM DRY *		04/28		3
45072	86-14-003-SP		03/15		PU-238	L.T. 7. E-03 PCI/GM DRY *		05/10		6
					U-234	2.7 +-0.4 E-01 PCI/GM DRY *		05/12		6
					TH-230	2.4 +-0.5 E-01 PCI/GM DRY *		05/18		6
					PU-239	L.T. 7. E-03 PCI/GM DRY *		05/10		6
					U-235	1.2 +-0.9 E-02 PCI/GM DRY *		05/12		6
					U-238	3.1 +-0.5 E-01 PCI/GM DRY *		05/12		6
					TH-232	5.6 +-0.9 E-01 PCI/GM DRY *		05/18		6
					TH-228	5.7 +-0.9 E-01 PCI/GM DRY *		05/18		6
45073	86-14-003-SG		03/15		BE-7	L.T. 6. E-01 PCI/GM DRY *		04/27		4
					K-40	2.03+-0.20E 01 PCI/GM DRY *		04/27		4
					MN-54	L.T. 5. E-02 PCI/GM DRY *		04/27		4
					CO-58	L.T. 5. E-02 PCI/GM DRY *		04/27		4
					FE-59	L.T. 1. E-01 PCI/GM DRY *		04/27		4
					CO-60	L.T. 4. E-02 PCI/GM DRY *		04/27		4
					ZN-65	L.T. 1. E-01 PCI/GM DRY *		04/27		4
					ZR-95	L.T. 7. E-02 PCI/GM DRY *		04/27		4
					RU-103	L.T. 8. E-02 PCI/GM DRY *		04/27		4
					RU-106	L.T. 3. E-01 PCI/GM DRY *		04/27		4
					I-131	L.T. 1. E 00 PCI/GM DRY *		04/27		4
					CS-134	L.T. 5. E-02 PCI/GM DRY *		04/27		4
					CS-137	7.99+-3.75E-02 PCI/GM DRY *		04/27		4
					BA-140	L.T. 4. E-01 PCI/GM DRY *		04/27		4
					CE-141	L.T. 1. E-01 PCI/GM DRY *		04/27		4
					CE-144	L.T. 3. E-01 PCI/GM DRY *		04/27		4
					RA-226	1.45+-0.52E 00 PCI/GM DRY *		04/27		4
					TH-228	1.37+-0.14E 00 PCI/GM DRY *		04/27		4

The reanalysis of Teledyne #45070 did not confirm the original result, thus this revision.

*J. Martin 8-1-94*

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

REPORT OF ANALYSIS

RUN DATE 06/03/94

PAGE 11

WORK ORDER NUMBER 4-0472

CUSTOMER P.O. NUMBER 030225/030600829

DELIVERY DATE 04/23/94

ANN MARIE HOLBROW  
MCLAREN/HART  
16755 VON KARMAN AVE  
IRVINE CA 92714

S O I L

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP DATE	NUCLIDE	ACTIVITY (PCI/GM DRY)	NUCL-UNIT-% U/M *	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-% *	LAB.
45075	10632MS 8G-14-003-MG		/		CE-141	L.T. 2. E-01		05/12		4
					CE-144	L.T. 3. E-01		05/12		4
					RA-226	2.08+-0.64E 00		05/12		4
					TH-228	1.41+-0.14E 00		05/12		4
45076	10632MSD 8G-14-003-MG		/		BE-7	L.T. 7. E-01		05/13		4
					K-40	2.07+-0.21E 01		05/13		4
					MN-54	L.T. 4. E-02		05/13		4
					CO-58	L.T. 6. E-02		05/13		4
					FE-59	L.T. 2. E-01		05/13		4
					CO-60	L.T. 4. E-02		05/13		4
					ZN-65	L.T. 1. E-01		05/13		4
					ZR-95	L.T. 8. E-02		05/13		4
					RU-103	L.T. 1. E-01		05/13		4
					RU-106	L.T. 4. E-01		05/13		4
					I-131	L.T. 6. E 00		05/13		4
					CS-134	L.T. 5. E-02		05/13		4
					CS-137	7.61+-0.76E-01		05/13		4
					BA-140	L.T. 8. E-01		05/13		4
					CE-141	L.T. 2. E-01		05/13		4
					CE-144	L.T. 3. E-01		05/13		4
					RA-226	1.56+-0.64E 00		05/13		4
					TH-228	1.42+-0.14E 00		05/13		4
45077	10633 8G-14-004-ST		03/15		H-3	5.2 +-3.2 E 02	PCI/LITER *	05/26		5
45078	10634 8G-14-004-SS		03/15		SR-90	L.T. 7. E-02		04/28		3
45079	10634DUP 8G-14-004-SS		03/15		SR-90	9.3 +-5.1 E-02		04/30		3

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

REPORT OF ANALYSIS

RUN DATE 06/03/94

WORK ORDER NUMBER 4-0472 CUSTOMER P.O. NUMBER 030225/030600829 DATE RECEIVED 03/21/94 DELIVERY DATE 04/23/94 PAGE 12

ANN MARIE HOLBROW  
MCLAREN/HART  
16755 VON KARMAN AVE  
IRVINE CA 92714

S O I L

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE		NUCLIDE	ACTIVITY (PCI/GM DRY)	NUCL-UNIT-% U/M *	MID-COUNT		VOLUME - UNITS ASH-NGHT-% *	LAB.
			START DATE	STOP DATE				DATE	TIME		
45080	BC-14-004-SP		03/15		PU-238	L.T. 8. E-03		05/10			6
					U-234	2.0 +-0.4 E-01		05/12			6
					TH-230	2.7 +-0.6 E-01		05/18			6
					PU-239	L.T. 8. E-03		05/10			6
					U-235	L.T. 5. E-03		05/12			6
					U-238	2.2 +-0.4 E-01		05/12			6
					TH-232	6.4 +-1.0 E-01		05/18			6
					TH-228	4.0 +-0.9 E-01		05/18			6
45081	BC-01-082-SP		03/15	0920	PU-238	L.T. 1. E-02		05/09			6
					U-234	4.4 +-0.6 E-01		05/12			6
					TH-230	3.9 +-0.7 E-01		05/18			6
					PU-239	L.T. 1. E-02		05/09			6
					U-235	3.4 +-1.5 E-02		05/12			6
					U-238	4.3 +-0.6 E-01		05/12			6
					TH-232	7.5 +-1.0 E-01		05/18			6
					TH-228	8.2 +-1.2 E-01		05/18			6
45082	BC-01-082-SG		03/15	0920	BE-7	L.T. 5. E-01		04/27			4
					K-40	1.99+-0.20E 01		04/27			4
					MN-54	L.T. 4. E-02		04/27			4
					CO-58	L.T. 5. E-02		04/27			4
					FE-59	L.T. 1. E-01		04/27			4
					CO-60	L.T. 3. E-02		04/27			4
					ZN-65	L.T. 1. E-01		04/27			4
					ZR-95	L.T. 6. E-02		04/27			4
					RU-103	L.T. 7. E-02		04/27			4
					RU-106	L.T. 3. E-01		04/27			4
					I-131	L.T. 1. E 00		04/27			4
					CS-134	L.T. 5. E-02		04/27			4
					CS-137	L.T. 4. E-02		04/27			4
					BA-140	L.T. 3. E-01		04/27			4
					CE-141	L.T. 1. E-01		04/27			4



TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

REPORT OF ANALYSIS

RUN DATE 06/03/94

PAGE 14

ANN MARIE HOLBROW  
MCLAREN/HART  
16755 VON KARMAN AVE  
IRVINE CA 92714

WORK ORDER NUMBER 4-0472

CUSTOMER P.O. NUMBER 030225/030600829

DELIVERY DATE 04/23/94

DATE RECEIVED 03/21/94

S O I L

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE		NUCLIDE	ACTIVITY (PCI/GM DRY)	NUCL-UNIT-% U/M	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-%	LAB.
			START DATE	STOP DATE						
45087	86-14-001-MS		03/15	1000	SR-90	L.T. 7. E-02		04/28		3
45088	86-14-001-MS	/			SR-90	4.0 +-0.3 E 00		05/02		3
45089	86-14-001-MS	/			SR-90	4.0 +-0.2 E 00		04/30		3
45090	86-14-002-ST		03/15	1000	H-3	L.T. 1. E 02	PCI/LITER *	05/27		5
45091	86-14-002-SS		03/15	1000	SR-90	L.T. 9. E-02		04/30		3
45092	86-14-002-SP		03/15	1000	PU-238 U-234 TH-230 PU-239 U-235 U-238 TH-232 TH-228	L.T. 1. E-02 3.1 +-0.4 E-01 3.8 +-0.5 E-01 L.T. 1. E-02 1.8 +-1.0 E-02 4.0 +-0.5 E-01 1.2 +-0.1 E 00 7.8 +-0.8 E-01		05/09 05/12 05/18 05/09 05/12 05/12 05/18 05/18		6 6 6 6 6 6 6 6
45114	86-00-004-FS		03/15	0841	SR-90	L.T. 9. E-02		04/30		3
45115	86-01-090-SS		03/15		SR-90	L.T. 1. E-01		04/30		3
45116	86-00-008-FT		03/15	0908	H-3	L.T. 2. E 02	PCI/LITER *	05/27		5
45117	86-14-001-SS		03/15	1000	SR-90	8.2 +-4.3 E-02		04/30		3
45490	86-02-007-ST		03/10	1610	H-3	L.T. 1. E 02	PCI/LITER *	05/27		5

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DORMITORY  
AREA (BB02)

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

REPORT OF ANALYSIS

RUN DATE 04/06/94

PAGE 3

WORK ORDER NUMBER 4-0185 CUSTOMER P.O. NUMBER 030225/030600829 DATE RECEIVED 03/08/94 DELIVERY DATE 03/18/94

ANN MARIE HOLBROM  
MCLAREN/HART  
16755 VON KARMAN AVE  
IRVINE CA 92714

S O I L

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP DATE	TIME	NUCLIDE	ACTIVITY ( PCI/LITER)	NUCL-UNIT-% U/M	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-%	LAB.
43203	88-06-066-ST		03/07	0926		H-3	L.T. 2. E 02		03/26		5
43204	88-06-017-ST		03/07	0910		H-3	L.T. 2. E 02		03/27		5
43205	88-06-013-ST		03/07	0930		H-3	L.T. 2. E 02		03/27		5
43206	88-12-006-ST		03/07	1308		H-3	L.T. 2. E 02		03/27		5
43207	88-12-019-ST		03/07	1311		H-3	L.T. 2. E 02		03/27		5
43208	88-12-023-ST		03/07	1313		H-3	L.T. 2. E 02		03/27		5
43209	88-12-020-ST		03/07	1320		H-3	L.T. 2. E 02		03/27		5
43210	88-12-003-ST		03/07	1326		H-3	L.T. 2. E 02		03/27		5
43212	88-13-011-ST		03/07	1018		H-3	L.T. 2. E 02		03/27		5
43213	88-13-010-ST		03/07	1023		H-3	L.T. 2. E 02		03/27		5
43214	88-13-037-ST		03/07	1007		H-3	L.T. 2. E 02		03/27		5
43215	88-13-039-ST		03/07	1010		H-3	L.T. 2. E 02		03/27		5
43216	88-13-024-ST		03/07	1004		H-3	L.T. 2. E 02		03/27		5
43217	88-02-071-ST		03/07	1131		H-3	L.T. 2. E 02		03/28		5
43218	88-02-045-ST		03/07	1133		H-3	L.T. 2. E 02		03/28		5

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

REPORT OF ANALYSIS

RUN DATE 04/06/94

PAGE 4

WORK ORDER NUMBER 4-0185 CUSTOMER P.O. NUMBER 030225/030600829 DATE RECEIVED 03/08/94 DELIVERY DATE 03/18/94

ANN MARIE HOLBROW  
MCLAREN/HART  
16755 VON KARMAN AVE  
IRVINE CA 92714

S O I L

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP DATE	NUCLIDE	ACTIVITY ( PCI/LITER)	NUCL-UNIT-% U/M	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-%	LAB.
43219	10051MS 88-02-045-MT		03/07 1133		H-3	3.1 +-0.3 E 03		03/30		5
43220	10052 88-02-060-ST		03/07 1134		H-3	L.T. 2. E 02		03/28		5
43221	10053 88-02-075-ST		03/07 1140		H-3	L.T. 2. E 02		03/28		5
43222	10055 88-02-078-ST		03/07 1139		H-3	L.T. 2. E 02		03/28		5
43262	10062DUP SM-03-012-ST		03/07 1422		H-3	L.T. 2. E 02		03/30		5
43263	10030MSD 88-06-092-MT		/		H-3	3.3 +-0.3 E 03		03/30		5
43264	10058DUP 88-12-023-ST		03/07 1313		H-3	L.T. 2. E 02		03/27		5
43265	10051MSD 88-02-045-MT		/		H-3	2.9 +-0.2 E 03		03/30		5
43368	10030 88-06-092-MT		03/07 0918		H-3	L.T. 1. E 02		03/30		5
43369	10051 88-02-045-MT		03/07 1133		H-3	2.3 +-1.4 E 02		03/30		5

H-3 activity added to prepare matrix spikes

Ti#	H-3 pCi/l
43202	2.7 +- 0.3 E 03
43263	2.7 +- 0.3 E 03
43219	2.7 +- 0.3 E 03
43265	2.7 +- 0.3 E 03

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

RUN DATE 04/20/94

REPORT OF ANALYSIS

PAGE 12

DELIVERY DATE

04/11/94

DATE RECEIVED

03/09/94

CUSTOMER P.O. NUMBER

030225/030600829

WORK ORDER NUMBER

4-0353

ANN MARIE HOLBROW  
 MCLAREN/HART  
 16755 VON KARMAN AVE  
 IRVINE CA 92714

SOIL

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP DATE	NUCLIDE	ACTIVITY (PCI/GM DRY)	NUCL-UNIT-% U/M *	MTU-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-% *	LAB.
43743	88-00-001-FG		03/08 1126		CS-137 BA-140 CE-141 CE-144 RA-226 TH-228	L.T. 4. L.T. 7. L.T. 2. 1.92+-0.54E 00 9.63+-0.96E-01	E-02 E-02 E-01	03/21 03/21 03/21 03/21 03/21		4 4 4 4 4
43796	88-03-081-ST		03/08 1421		H-3	L.T. 1.	E 02 PCI/LITER *	04/08		5
43797	88-03-029-ST		03/08 1415		H-3	L.T. 1.	E 02 PCI/LITER *	04/08		5

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

RUN DATE 04/20/94

REPORT OF ANALYSIS

PAGE 1

WORK ORDER NUMBER

CUSTOMER P.O. NUMBER

DELIVERY DATE

4-0353

030225/030800R29

04/11/94

ANN MARIE HOLBROW  
MCLAREN/HART  
16755 VON KARMAN AVE  
IRVINE CA

92714

DATE RECEIVED

03/09/94

SOIL

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP DATE	TIME	NUCLIDE	ACTIVITY (PCI/LITER)	NUCL-UNIT-% U/M #	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-% #	LAB.
43677	88-00-002-PT		03/08			H-3	1.7 +-0.2 E 03		04/03		5
43678	88-00-001-PT		03/08			H-3	L.T. 2. E 02		04/03		5
43684	88-00-004-PT		03/08			H-3	L.T. 2. E 02		04/03		5
43685	88-00-003-PT		03/08			H-3	1.7 +-0.2 E 03		04/04		5
43689	88-03-025-ST		03/08	1358		H-3	L.T. 2. E 02		04/04		5
43690	88-03-079-ST		03/08	1405		H-3	L.T. 1. E 02		04/04		5
43691	88-03-017-ST		03/08	1407		H-3	L.T. 2. E 02		04/04		5
43692	88-03-005-ST		03/08	1410		H-3	L.T. 2. E 02		04/04		5
43693	88-03-003-ST		03/08	1423		H-3	L.T. 1. E 02		04/04		5
43694	88-03-026-ST		03/08	1428		H-3	L.T. 1. E 02		04/07		5
43695	100810UP 88-03-026-ST		03/08	1428		H-3	L.T. 1. E 02		04/08		5
43696	11019		03/08	1359		H-3	L.T. 1. E 02		04/08		5
43697	11019MS 88-03-026-MT		/	/		H-3	1.5 +-0.1 E 04		04/08		5
43698	11019MSD 88-03-026-MT		/	/		H-3	1.7 +-0.1 E 04		04/08		5
43699	10070 88-03-096-ST		03/08	1400		H-3	L.T. 1. E 02		04/06		5

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

REPORT OF ANALYSIS

RUN DATE 04/20/94

PAGE 2

WORK ORDER NUMBER 4-0353

DATE RECEIVED 03/09/94

DELIVERY DATE 04/11/94

CUSTOMER P.O. NUMBER 030225/030600829

ANN MARIE HOLBROW  
MCLAREN/HART  
16755 VON KARMAN AVE  
IRVINE CA 92714

S O I L

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP DATE	TIME	NUCLIDE	ACTIVITY ( PCI/LITER)	NUCL-UNIT-X U/M *	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-X *	LAB.
43700	88-03-097-ST		03/08		1416	H-3	L.T. 1. E 02		04/06		5
43701	88-20-001-ST		03/08		1000	H-3	L.T. 1. E 02		04/07		5
43702	88-20-001-SS		03/08		1010	SR-90	L.T. 1. E-01 PCI/GM DRY *		03/28.		3
43703	88-20-001-SG		03/08		1010	BE-7	L.T. 4. E-01 PCI/GM DRY *		03/21		4
						K-40	2.08+-0.21E 01 PCI/GM DRY *		03/21		4
						MN-54	L.T. 4. E-02 PCI/GM DRY *		03/21		4
						CO-58	L.T. 4. E-02 PCI/GM DRY *		03/21		4
						FE-59	L.T. 1. E-01 PCI/GM DRY *		03/21		4
						CO-60	L.T. 4. E-02 PCI/GM DRY *		03/21		4
						ZN-65	L.T. 1. E-01 PCI/GM DRY *		03/21		4
						ZR-95	L.T. 5. E-02 PCI/GM DRY *		03/21		4
						RU-103	L.T. 4. E-02 PCI/GM DRY *		03/21		4
						RU-106	L.T. 3. E-01 PCI/GM DRY *		03/21		4
						I-131	L.T. 1. E-01 PCI/GM DRY *		03/21		4
						CS-134	L.T. 5. E-02 PCI/GM DRY *		03/21		4
						CS-137	1.10+-0.37E-01 PCI/GM DRY *		03/21		4
						BA-140	L.T. 7. E-02 PCI/GM DRY *		03/21		4
						CE-141	L.T. 7. E-02 PCI/GM DRY *		03/21		4
						CE-144	L.T. 2. E-01 PCI/GM DRY *		03/21		4
						RA-226	1.76+-0.58E 00 PCI/GM DRY *		03/21		4
						TH-228	8.10+-0.81E-01 PCI/GM DRY *		03/21		4
43705	88-20-002-ST		03/08		1030	H-3	L.T. 1. E 02		04/07		5
43706	88-20-002-SS		03/08		1030	SR-90	L.T. 9. E-02 PCI/GM DRY *		03/28		3

TELEDYNE BROWN ENGINEER ENVIRONMENTAL SERVICES  
 REPORT OF ANALYSIS

REVISED 03/21/94  
 RUN DATE 04/20/94

PAGE 12

WORK ORDER NUMBER 4-0353  
 CUSTOMER P.O. NUMBER 030225/030600829  
 DATE RECEIVED 03/09/94  
 DELIVERY DATE 04/11/94

ANN MARIE HOLBROW  
 MCCLAREN/HART  
 16755 VON KARMAN AVE  
 IRVINE CA 92714

S O I L

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP DATE	NUCLIDE	ACTIVITY (PCI/GM DRY)	NUCL-UNIT-% U/M *	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-% *	LAB.
43743	88-00-001-FG 11021		03/08 1126		CS-137 BA-140 CE-141 CE-144 RA-226 TH-228	L.T. 4. E-02 L.T. 7. E-02 L.T. 7. E-02 L.T. 2. E-01 1.92+-0.54E 00 9.63+-0.96E-01		03/21 03/21 03/21 03/21 03/21 03/21		4 4 4 4 4 4
43796	88-03-081-ST		03/08 1421		H-3	L.T. 1. E 02 PCI/LITER *		04/08		5
43797	88-03-029-ST		03/08 1415		H-3	L.T. 1. E 02 PCI/LITER *		04/08		5



TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

RUN DATE 04/06/94

REPORT OF ANALYSIS

PAGE 1

WORK ORDER NUMBER

DATE RECEIVED

DELIVERY DATE

ANN MARIE HOLBROW  
MCLAREN/HART  
16755 VON KARMAN AVE  
IRVINE CA

4-0185

CUSTOMER P.O. NUMBER

03/18/94

03/08/94

030225/030600829

92714

SOIL

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP DATE	TIME	NUCLIDE	ACTIVITY ( PCI/LITER)	NUCL-UNIT- U/M *	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-X *	LAB.
43169	10001	88-04-021-ST	03/04	1405		H-3	L.T. 1. E 02		03/19		5
43171	10004	88-04-021-FT	03/04	1405		H-3	L.T. 1. E 02		03/19		5
43172	10005	88-04-023-ST	03/04	1415		H-3	L.T. 1. E 02		03/20		5
43173	10007	88-04-097-ST	03/04	1415		H-3	L.T. 1. E 02		03/26		5
43174	10011	88-04-082-ST	03/04	1420		H-3	L.T. 1. E 02		03/26		5
43175	10013	88-04-026-ST	03/04	1435		H-3	L.T. 1. E 02		03/20		5
43176	11009	88-04-062-ST	03/04	1435		H-3	L.T. 1. E 02		03/20		5
43177	10015	88-04-079-ST	03/04	1445		H-3	L.T. 1. E 02		03/20		5
43178	10016	88-04-084-ST	03/04	1450		H-3	L.T. 1. E 02		03/20		5
43179	10018	88-04-078-ST	03/04	1500		H-3	L.T. 1. E 02		03/20		5
43180	10020	88-04-049-ST	03/04	1500		H-3	L.T. 1. E 02		03/20		5
43183	10021	88-14-037-ST	03/04	1603		H-3	L.T. 1. E 02		03/20		5
43184	10022	88-14-041-ST	03/04	1500		H-3	L.T. 1. E 02		03/20		5
43185	10023	88-14-079-ST	03/04	1605		H-3	L.T. 1. E 02		03/20		5
43186	10025	88-14-094-ST	03/04	1625		H-3	L.T. 1. E 02		03/20		5

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

REPORT OF ANALYSIS

RUN DATE 04/06/94  
PAGE 5

WORK ORDER NUMBER 4-0185 CUSTOMER P.O. NUMBER 030225/030600829 DATE RECEIVED 03/08/94 DELIVERY DATE 03/18/94

ANN MARIE HOLBROW  
MCLAREN/HART  
16755 VON KARMAN AVE  
IRVINE CA 92714

W A T E R

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUH	COLLECTION-DATE		NUCLIDE	ACTIVITY ( PCI/LITER)	NUCL-UNIT-% U/H #	MID-COUNT TIME DATE	VOLUME - UNITS ASH-HGHT-%	LAB.
			START DATE	STOP DATE						
43170	88-04-021-RT		03/04	1445	H-3	L.T. 1. E 02		03/20		5
43181	88-04-001-WT		03/04	1440	H-3	L.T. 2. E 02		03/21		5
43182	88-04-001-WA		03/04	1450	GR-A GR-B	L.T. 4. E 00 1.2 +-0.4 E 01		03/14 03/14		3 3
43189	SM-03-012-RT		03/07	1420	H-3	L.T. 2. E 02		03/21		5
43211	88-13-024-RT		03/07	1000	H-3	L.T. 2. E 02		03/27		5

*JM Martin*

LAST PAGE OF REPORT

APPROVED BY J. GUENTHER 04/06/94

SEND 1 COPIES TO MC4805 ANN MARIE HOLBROW

2 - GAS LAB. 3 - RADIO CHEMISTRY LAB. 4 - GE(LI) GAMMA SPEC LAB. 5 - TRITIUM GAS/L.S. LAB. 6 - ALPHA SPEC LAB.

PICNIC AREA  
(BB05)

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

REPORT OF ANALYSIS

RUN DATE 04/06/94

PAGE 2

WORK ORDER NUMBER 4-0185 CUSTOMER P.O. NUMBER 030225/030600829 DATE RECEIVED 03/08/94 DELIVERY DATE 03/18/94

ANN MARIE HOLBROW  
MCLAREN/HART  
16755 VON KARMAN AVE  
IRVINE CA 92714

S O I L

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE		NUCLIDE	ACTIVITY ( PCI/LITER)	NUCL-UNIT-% U/M *	MID-COUNT TIME DATE	VOLUME - UNITS ASH-HGHT-X †	LAB.
			START DATE	STOP DATE						
43187	88-14-004-ST		03/04	1625	H-3	L.T. 2. E 02		03/20		5
43188	SM-03-012-ST		03/07	1422	H-3	L.T. 1. E 02		03/30		5
43190	SM-03-015-ST		03/07	1420	H-3	L.T. 1. E 02		03/21		5
43191	SM-03-009-ST		03/07	1423	H-3	L.T. 1. E 02		03/21		5
43192	SM-03-001-ST		03/07	1425	H-3	L.T. 1. E 02		03/21		5
43193	SM-03-014-ST		03/07	1430	H-3	L.T. 1. E 02		03/21		5
43194	88-05-003-ST		03/07	1050	H-3	L.T. 1. E 02		03/30		5
43195	88-05-089-ST		03/07	1052	H-3	L.T. 1. E 02		03/21		5
43196	88-05-089FDT		03/07	1052	H-3	L.T. 1. E 02		03/21		5
43197	88-05-006-ST		03/07	1102	H-3	L.T. 1. E 02		03/21		5
43198	88-05-057-ST		03/07	1112	H-3	L.T. 1. E 02		03/21		5
43199	88-05-077-ST		03/07	1110	H-3	L.T. 1. E 02		03/21		5
43200	88-06-007-ST		03/07	0910	H-3	L.T. 1. E 02		03/21		5
43201	88-06-092-ST		03/07	0918	H-3	L.T. 1. E 02		03/21		5
43202	10030MS 88-06-092-MT		/		H-3	3.0 +-0.2 E 03		03/30		5

HOUSE OF THE BOOK  
(BB06)

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

REPORT OF ANALYSIS

RUN DATE 04/06/94

PAGE 2

WORK ORDER NUMBER 4-0185 CUSTOMER P.O. NUMBER 030225/030600829 DATE RECEIVED 03/08/94 DELIVERY DATE 03/18/94

ANN MARIE HOLBROW  
MCLAREN/HART  
16755 VON KARMAN AVE  
IRVINE CA 92714

S O I L

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	TIME	STOP DATE	NUCLIDE	ACTIVITY ( PCI/LITER)	NUCL-UNIT-% U/M	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-%	LAB.
43187	88-14-004-ST		03/04	1625		H-3	L.T. 2. E 02		03/20		5
43188	SM-03-012-ST		03/07	1422		H-3	L.T. 1. E 02		03/30		5
43190	SM-03-015-ST		03/07	1420		H-3	L.T. 1. E 02		03/21		5
43191	SM-03-009-ST		03/07	1423		H-3	L.T. 1. E 02		03/21		5
43192	SM-03-001-ST		03/07	1425		H-3	L.T. 1. E 02		03/21		5
43193	SM-03-014-ST		03/07	1430		H-3	L.T. 1. E 02		03/21		5
43194	88-05-003-ST		03/07	1050		H-3	L.T. 1. E 02		03/30		5
43195	88-05-089-ST		03/07	1052		H-3	L.T. 1. E 02		03/21		5
43196	88-05-089FDT		03/07	1052		H-3	L.T. 1. E 02		03/21		5
43197	88-05-006-ST		03/07	1102		H-3	L.T. 1. E 02		03/21		5
43198	88-05-057-ST		03/07	1112		H-3	L.T. 1. E 02		03/21		5
43199	88-05-077-ST		03/07	1110		H-3	L.T. 1. E 02		03/21		5
43200	88-06-007-ST		03/07	0910		H-3	L.T. 1. E 02		03/21		5
43201	88-06-092-ST		03/07	0918		H-3	L.T. 1. E 02		03/21		5
43202	88-06-092-MT		/			H-3	3.0 +-0.2 E 03		03/30		5

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

REPORT OF ANALYSIS

RUN DATE 04/06/94  
PAGE 3

WORK ORDER NUMBER 4-0185  
CUSTOMER P.O. NUMBER 030225/030600829  
DATE RECEIVED 03/08/94  
DELIVERY DATE 03/18/94

ANN MARIE HOLBROW  
MCLAREN/HART  
16755 VON KARMAN AVE  
IRVINE CA 92714

S O I L

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	TIME	STOP DATE	NUCLIDE	ACTIVITY ( PCI/LITER)	NUCL-UNIT-% U/M #	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-%	LAB.
43203	88-06-066-ST		03/07	0926		H-3	L.T. 2. E 02		03/26		5
43204	88-06-017-ST		03/07	0910		H-3	L.T. 2. E 02		03/27		5
43205	88-06-013-ST		03/07	0930		H-3	L.T. 2. E 02		03/27		5
43206	88-12-006-ST		03/07	1308		H-3	L.T. 2. E 02		03/27		5
43207	88-12-019-ST		03/07	1311		H-3	L.T. 2. E 02		03/27		5
43208	88-12-023-ST		03/07	1313		H-3	L.T. 2. E 02		03/27		5
43209	88-12-020-ST		03/07	1320		H-3	L.T. 2. E 02		03/27		5
43210	88-12-003-ST		03/07	1326		H-3	L.T. 2. E 02		03/27		5
43212	88-13-011-ST		03/07	1018		H-3	L.T. 2. E 02		03/27		5
43213	88-13-010-ST		03/07	1023		H-3	L.T. 2. E 02		03/27		5
43214	88-13-037-ST		03/07	1007		H-3	L.T. 2. E 02		03/27		5
43215	88-13-039-ST		03/07	1010		H-3	L.T. 2. E 02		03/27		5
43216	88-13-024-ST		03/07	1004		H-3	L.T. 2. E 02		03/27		5
43217	88-02-071-ST		03/07	1131		H-3	L.T. 2. E 02		03/28		5
43218	88-02-045-ST		03/07	1133		H-3	L.T. 2. E 02		03/28		5

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

REPORT OF ANALYSIS

RUN DATE 04/06/94  
PAGE 4

WORK ORDER NUMBER 4-0185  
CUSTOMER P.O. NUMBER 030225/030600829  
DATE RECEIVED 03/08/94  
DELIVERY DATE 03/18/94

ANN MARIE HOLBROW  
MCLAREN/HART  
16755 VON KARMAN AVE  
IRVINE CA 92714

S O I L

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP DATE	NUCLIDE	ACTIVITY ( PCI/LITER)	NUCL-UNIT-% U/M *	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-% *	LAB.
43219	10051MS BB-02-045-MT		03/07 1133		H-3	3.1 +-0.3 E 03		03/30		5
43220	10052 BB-02-060-ST		03/07 1134		H-3	L.T. 2. E 02		03/28		5
43221	10053 BB-02-075-ST		03/07 1140		H-3	L.T. 2. E 02		03/28		5
43222	10055 BB-02-078-ST		03/07 1139		H-3	L.T. 2. E 02		03/28		5
43262	10062DUP SM-03-012-ST		03/07 1422		H-3	L.T. 2. E 02		03/30		5
43263	10030MSD BB-06-092-MT		/		H-3	3.3 +-0.3 E 03		03/30		5
43264	10058DUP BB-12-023-ST		03/07 1313		H-3	L.T. 2. E 02		03/27		5
43265	10051MSD BB-02-045-MT		/		H-3	2.9 +-0.2 E 03		03/30		5
43368	10030 BB-06-092-MT		03/07 0918		H-3	L.T. 1. E 02		03/30		5
43369	10051 BB-02-045-MT		03/07 1133		H-3	2.3 +-1.4 E 02		03/30		5

H-3 activity added to prepare matrix spikes

TI#	H-3 pCi/l
43202	2.7 +- 0.3 E 03
43263	2.7 +- 0.3 E 03
43219	2.7 +- 0.3 E 03
43265	2.7 +- 0.3 E 03



TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

RUN DATE 04/06/94

REPORT OF ANALYSIS

PAGE 3

DELIVERY DATE 03/18/94

DATE RECEIVED 03/08/94

WORK ORDER NUMBER 4-0185

CUSTOMER P.O. NUMBER 030225/030600829

ANN MARIE HOLBROH  
 MCLAREN/HART  
 16755 VON KARMAN AVE  
 IRVINE CA 92714

S O I L

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP DATE	TIME	NUCLIDE	ACTIVITY ( PCI/LITER)	NUCL-UNIT-% U/M *	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-% *	LAB.
43203	88-06-066-ST		03/07	0926		H-3	L.T. 2. E 02		03/26		5
43204	88-06-017-ST		03/07	0910		H-3	L.T. 2. E 02		03/27		5
43205	88-06-013-ST		03/07	0930		H-3	L.T. 2. E 02		03/27		5
43206	88-12-006-ST		03/07	1308		H-3	L.T. 2. E 02		03/27		5
43207	88-12-019-ST		03/07	1311		H-3	L.T. 2. E 02		03/27		5
43208	88-12-023-ST		03/07	1313		H-3	L.T. 2. E 02		03/27		5
43209	88-12-020-ST		03/07	1320		H-3	L.T. 2. E 02		03/27		5
43210	88-12-003-ST		03/07	1326		H-3	L.T. 2. E 02		03/27		5
43212	88-13-011-ST		03/07	1018		H-3	L.T. 2. E 02		03/27		5
43213	88-13-010-ST		03/07	1023		H-3	L.T. 2. E 02		03/27		5
43214	88-13-037-ST		03/07	1007		H-3	L.T. 2. E 02		03/27		5
43215	88-13-039-ST		03/07	1010		H-3	L.T. 2. E 02		03/27		5
43216	88-13-024-ST		03/07	1004		H-3	L.T. 2. E 02		03/27		5
43217	88-02-071-ST		03/07	1131		H-3	L.T. 2. E 02		03/28		5
43218	88-02-045-ST		03/07	1133		H-3	L.T. 2. E 02		03/28		5

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

RUN DATE 04/06/94  
PAGE 5

REPORT OF ANALYSIS

WORK ORDER NUMBER 4-0185  
CUSTOMER P.O. NUMBER 030225/030600829  
DATE RECEIVED 03/08/94  
DELIVERY DATE 03/18/94

ANN MARIE HOLBROW  
MCLAREN/HART  
16755 VON KARMAN AVE  
IRVINE CA 92714

W A T E R

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP DATE	TIME	NUCLIDE	ACTIVITY ( PCI/LITER)	NUCL-UNIT-% U/M %	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-%	LAB.
43170	10003	88-04-021-RT	03/04	1445		H-3	L.T. 1. E 02		03/20		5
43181	11001	88-04-001-WT	03/04	1440		H-3	L.T. 2. E 02		03/21		5
43182	11002	88-04-001-WA	03/04	1450		GR-A GR-B	L.T. 4. E 00 1.2 +-0.4 E 01		03/14 03/14		3 3
43189	10063	SM-03-012-RT	03/07	1420		H-3	L.T. 2. E 02		03/21		5
43211	10036	88-13-024-RT	03/07	1000		H-3	L.T. 2. E 02		03/27		5

LAST PAGE OF REPORT

APPROVED BY J. GUENTHER 04/06/94

*JM Guenther*

SEND 1 COPIES TO MC480S ANN MARIE HOLBROW

2 - GAS LAB. 3 - RADIO CHEMISTRY LAB. 4 - GEIL(1) GAMMA SPEC LAB. 5 - TRITIUM GAS/L.S. LAB. 6 - ALPHA SPEC LAB.



TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

RUN DATE 04/06/94

PAGE 3

REPORT OF ANALYSIS

DELIVERY DATE

WORK ORDER NUMBER

CUSTOMER P.O. NUMBER

DATE RECEIVED

03/18/94

030225/030600829

03/08/94

4-0185

ANN MARIE HOLBROW

MCLAREN/HART

16755 VON KARMAN AVE

IRVINE CA

92714

S O I L

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP DATE	TIME	NUCLIDE	ACTIVITY ( PCI/LITER)	NUCL-UNIT-% U/M #	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-% #	LAB.
43203	88-06-066-ST		03/07	0926		H-3	L.T. 2. E 02		03/26		5
43204	88-06-017-ST		03/07	0910		H-3	L.T. 2. E 02		03/27		5
43205	88-06-013-ST		03/07	0930		H-3	L.T. 2. E 02		03/27		5
43206	88-12-006-ST		03/07	1308		H-3	L.T. 2. E 02		03/27		5
43207	88-12-019-ST		03/07	1311		H-3	L.T. 2. E 02		03/27		5
43208	88-12-023-ST		03/07	1313		H-3	L.T. 2. E 02		03/27		5
43209	88-12-020-ST		03/07	1320		H-3	L.T. 2. E 02		03/27		5
43210	88-12-003-ST		03/07	1326		H-3	L.T. 2. E 02		03/27		5
43212	88-13-011-ST		03/07	1018		H-3	L.T. 2. E 02		03/27		5
43213	88-13-010-ST		03/07	1023		H-3	L.T. 2. E 02		03/27		5
43214	88-13-037-ST		03/07	1007		H-3	L.T. 2. E 02		03/27		5
43215	88-13-039-ST		03/07	1010		H-3	L.T. 2. E 02		03/27		5
43216	88-13-024-ST		03/07	1004		H-3	L.T. 2. E 02		03/27		5
43217	88-02-071-ST		03/07	1131		H-3	L.T. 2. E 02		03/28		5
43218	88-02-045-ST		03/07	1133		H-3	L.T. 2. E 02		03/28		5

OLD WELL  
CAMPSITE (BB14)

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

RUN DATE 04/06/94

REPORT OF ANALYSIS

PAGE 1

DELIVERY DATE

DATE RECEIVED

03/18/94

03/08/94

WORK ORDER NUMBER

CUSTOMER P.O. NUMBER

030225/030600829

4-0185

ANN MARIE HOLBROW  
MCLAREN/HART  
16755 VON KARMAN AVE  
IRVINE CA 92714

S O I L

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP DATE	TIME	NUCLIDE	ACTIVITY ( PCI/LITER)	NUCL-UNIT-% U/M	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-%	LAB.
43169	88-04-021-ST		03/04	1405		H-3	L.T. 1. E 02		03/19		5
43171	88-04-021-FT		03/04	1405		H-3	L.T. 1. E 02		03/19		5
43172	88-04-023-ST		03/04	1415		H-3	L.T. 1. E 02		03/20		5
43173	88-04-097-ST		03/04	1415		H-3	L.T. 1. E 02		03/26		5
43174	88-04-082-ST		03/04	1420		H-3	L.T. 1. E 02		03/26		5
43175	88-04-026-ST		03/04	1435		H-3	L.T. 1. E 02		03/20		5
43176	88-04-062-ST		03/04	1435		H-3	L.T. 1. E 02		03/20		5
43177	88-04-079-ST		03/04	1445		H-3	L.T. 1. E 02		03/20		5
43178	88-04-084-ST		03/04	1450		H-3	L.T. 1. E 02		03/20		5
43179	88-04-078-ST		03/04	1500		H-3	L.T. 1. E 02		03/20		5
43180	88-04-049-ST		03/04	1500		H-3	L.T. 1. E 02		03/20		5
43183	88-14-037-ST		03/04	1603		H-3	L.T. 1. E 02		03/20		5
43184	88-14-041-ST		03/04	1500		H-3	L.T. 1. E 02		03/20		5
43185	88-14-079-ST		03/04	1605		H-3	L.T. 1. E 02		03/20		5
43186	88-14-094-ST		03/04	1625		H-3	L.T. 1. E 02		03/20		5

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

RUN DATE 04/06/94  
PAGE 2

REPORT OF ANALYSIS

WORK ORDER NUMBER 4-0185 CUSTOMER P.O. NUMBER 030225/030600829 DATE RECEIVED 03/08/94 DELIVERY DATE 03/18/94

ANN MARIE HOLBROW  
MCLAREN/HART  
16755 VON KARMAN AVE  
IRVINE CA 92714

S O I L

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	TIME	STOP DATE	NUCLIDE	ACTIVITY ( PCI/LITER)	NUCL-UNIT-% U/M #	MID-COUNT DATE	TIME	VOLUME - UNITS ASH-WGHT-X #	LAB.
43187	10027	BB-14-004-ST	03/04	1625		H-3	L.T. 2. E 02		03/20			5
43188	10062	SM-03-012-ST	03/07	1422		H-3	L.T. 1. E 02		03/30			5
43190	10064	SM-03-015-ST	03/07	1420		H-3	L.T. 1. E 02		03/21			5
43191	10065	SM-03-009-ST	03/07	1423		H-3	L.T. 1. E 02		03/21			5
43192	10066	SM-03-001-ST	03/07	1425		H-3	L.T. 1. E 02		03/21			5
43193	10067	SM-03-014-ST	03/07	1430		H-3	L.T. 1. E 02		03/21			5
43194	10047	BB-05-003-ST	03/07	1050		H-3	L.T. 1. E 02		03/30			5
43195	10043	BB-05-089-ST	03/07	1052		H-3	L.T. 1. E 02		03/21			5
43196	10042	BB-05-089FDT	03/07	1052		H-3	L.T. 1. E 02		03/21			5
43197	10048	BB-05-006-ST	03/07	1102		H-3	L.T. 1. E 02		03/21			5
43198	10044	BB-05-057-ST	03/07	1112		H-3	L.T. 1. E 02		03/21			5
43199	10046	BB-05-077-ST	03/07	1110		H-3	L.T. 1. E 02		03/21			5
43200	10028	BB-06-007-ST	03/07	0910		H-3	L.T. 1. E 02		03/21			5
43201	10029	BB-06-092-ST	03/07	0918		H-3	L.T. 1. E 02		03/21			5
43202	10030MS	BB-06-092-MT				H-3	3.0 +-0.2 E 03		03/30			5

RD-51 WATERSHED  
(BB15)



TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

RUN DATE 05/12/94

REPORT OF ANALYSIS

PAGE 11

WORK ORDER NUMBER 4-0409 CUSTOMER P.O. NUMBER 030225/030600829 DATE RECEIVED 03/14/94 DELIVERY DATE 04/16/94

ANN MARIE HOLBROW  
MCLAREN/HART  
16755 VON KARMAN AVE  
IRVINE CA 92714

S O I L

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE		NUCLIDE	ACTIVITY (PCI/GM DRY)	NUCL-UNIT-X U/M *	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-X *	LAB.
			START DATE	STOP DATE						
44206	88-15-009-SP		03/10	1025	PU-238 PU-239	L.T. 9. E-03 L.T. 9. E-03		04/09 04/09		6 6
44207	88-15-010-SP		03/10	1030	PU-238 PU-239	L.T. 9. E-03 L.T. 9. E-03		04/09 04/09		6 6
44208	88-00-002-FP		03/10	1025	PU-238 PU-239	L.T. 8. E-03 L.T. 1. E-02		04/09 04/09		6 6
44210	88-15-001-ST		03/10	0945	H-3	L.T. 2. E 02	PCI/LITER *	05/08		5
44211	88-15-001-MT		03/10	0945	H-3	L.T. 3. E 02	PCI/LITER *	05/09		5
44212	88-15-001-MT		/	/	H-3	3.3 +-0.3 E 03	PCI/LITER *	05/09		5
44213	88-15-001-MT		/	/	H-3	3.8 +-0.3 E 03	PCI/LITER *	05/09		5
44214	88-15-002-ST		03/10	0935	H-3	L.T. 2. E 02	PCI/LITER *	05/09		5
44215	88-15-003-ST		03/10	0915	H-3	L.T. 2. E 02	PCI/LITER *	05/09		5
44216	88-15-004-ST		03/10	0910	H-3	L.T. 2. E 02	PCI/LITER *	05/09		5
44217	88-15-005-ST		03/10	0910	H-3	L.T. 2. E 02	PCI/LITER *	05/09		5
44218	88-15-001-SP		03/10	0945	PU-238 PU-239	L.T. 1. E-02 L.T. 1. E-02		04/10 04/10		6 6

RADIOACTIVE MATERIALS  
DISPOSAL FACILITY  
WATERSHED (BB16)





TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

RUN DATE 05/04/94

REPORT OF ANALYSIS

PAGE 3

DELIVERY DATE

CUSTOMER P.O. NUMBER

DATE RECEIVED

04/13/94

WORK ORDER NUMBER

03/11/94

4-0354

030225/030600829

ANN MARIE HOLBROW  
MCLAREN/HART  
16755 VON KARMAN AVE  
IRVINE CA

92714

S O I L

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP DATE	NUCLIDE	ACTIVITY I PCI/LITERS	NUCL-UNIT-% U/M *	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-% *	LAB.
43904	BB-16-8004-ST		03/09 1410		H-3	L.T. 1. E 02		04/30		5
43905	BB-16-8004-SS		03/09 1410		SR-90	L.T. 1. E-01 PCI/GM DRY *		04/01		3
43906	BB-00-001-FS		03/09 1037		SR-90	1.9 +-0.3 E-01 PCI/GM DRY *		04/04		5
43907	BB-16-008-ST		03/09 1014		H-3	L.T. 1. E 02		04/30		3
43908	BB-16-008-SS		03/09 1014		SR-90	1.5 +-0.9 E-01 PCI/GM DRY *		04/04		4
43909	BB-16-008-SG		03/09 1014		BE-7	L.T. 4. E-01 PCI/GM DRY *		03/31		4
					K-40	2.39+-0.24E 01 PCI/GM DRY *		03/31		4
					MN-54	L.T. 3. E-02 PCI/GM DRY *		03/31		4
					CO-58	L.T. 4. E-02 PCI/GM DRY *		03/31		4
					FE-59	L.T. 1. E-01 PCI/GM DRY *		03/31		4
					CO-60	L.T. 4. E-02 PCI/GM DRY *		03/31		4
					ZN-65	L.T. 1. E-01 PCI/GM DRY *		03/31		4
					ZR-95	L.T. 4. E-02 PCI/GM DRY *		03/31		4
					RU-103	L.T. 4. E-02 PCI/GM DRY *		03/31		4
					RU-106	L.T. 3. E-01 PCI/GM DRY *		03/31		4
					I-131	L.T. 2. E-01 PCI/GM DRY *		03/31		4
					CS-134	L.T. 4. E-02 PCI/GM DRY *		03/31		4
					CS-137	L.T. 4. E-02 PCI/GM DRY *		03/31		4
					BA-140	L.T. 1. E-01 PCI/GM DRY *		03/31		4
					CE-141	L.T. 6. E-02 PCI/GM DRY *		03/31		4
					CE-144	L.T. 2. E-01 PCI/GM DRY *		03/31		4
					RA-226	1.50+-0.51E 00 PCI/GM DRY *		03/31		4
					TH-228	8.80+-0.88E-01 PCI/GM DRY *		03/31		4



TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

RUN DATE 05/04/94

PAGE 5

REPORT OF ANALYSIS

DATE RECEIVED 03/11/94  
 DELIVERY DATE 04/13/94

WORK ORDER NUMBER 4-0354  
 CUSTOMER P.O. NUMBER 030225/030600829

ANN MARIE HOLBROW  
 MCLAREN/HART  
 16755 VON KARMAN AVE  
 IRVINE CA 92714

SOIL

TELEDYNE SAMPLE NUMBER 43916 10242  
 CUSTOMER'S IDENTIFICATION 88-16-010-SG  
 STA NUM 88-17-005-ST  
 COLLECTION-DATE 03/09 0945  
 START DATE 03/09 1615  
 STOP DATE 03/09 1615

43918 10145 88-17-005-SP  
 43919 10146 88-17-005-SG

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE	START DATE	STOP DATE	NUCLIDE	ACTIVITY (PCI/GM DRY)	NUCL-UNIT-% U/M *	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-X *	LAB.
						ZN-65	L.T. 8. E-02		03/31		4
						ZR-95	L.T. 4. E-02		03/31		4
						RU-103	L.T. 4. E-02		03/31		4
						RU-106	L.T. 3. E-01		03/31		4
						I-131	L.T. 2. E-01		03/31		4
						CS-134	L.T. 4. E-02		03/31		4
						CS-137	7.54+-2.83E-02		03/31		4
						BA-140	L.T. 1. E-01		03/31		4
						CE-141	L.T. 7. E-02		03/31		4
						CE-144	L.T. 2. E-01		03/31		4
						RA-226	1.57+-0.45E 00		03/31		4
						TH-228	9.94+-0.99E-01		03/31		5
						H-3	L.T. 1. E 02	PCI/LITER *	04/30		6
43917	10144	88-17-005-ST	03/09	1615		PU-238	L.T. 1. E-02		03/29		6
43918	10145	88-17-005-SP	03/09	1615		PU-239	L.T. 2. E-02		03/29		6
43919	10146	88-17-005-SG	03/09	1615		BE-7	L.T. 5. E-01		03/31		4
						K-40	2.44+-0.24E 01		03/31		4
						MN-54	L.T. 5. E-02		03/31		4
						CO-58	L.T. 5. E-02		03/31		4
						FE-59	L.T. 1. E-01		03/31		4
						CG-60	L.T. 5. E-02		03/31		4
						ZN-65	L.T. 1. E-01		03/31		4
						ZR-95	L.T. 6. E-02		03/31		4
						RU-103	L.T. 4. E-01		03/31		4
						RU-106	L.T. 3. E-01		03/31		4
						I-131	L.T. 5. E-02		03/31		4
						CS-134	L.T. 5. E-02		03/31		4
						CS-137	2.18+-0.43E-01		03/31		4
						RA-140	L.T. 1. E-01		03/31		4
						CE-141	L.T. 8. E-02		03/31		4

WORK ORDER NUMBER 4-0354  
 CUSTOMER P.O. NUMBER 030225/030600829  
 DATE RECEIVED 03/11/94  
 DELIVERY DATE 04/13/94

ANN MARIE HOLBROM  
 MCCLAREN/HART  
 16755 VON KARMAN AVE  
 IRVINE CA 92714

S O I L

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE	START DATE	STOP DATE	NUCLIDE	ACTIVITY (PCI/GM DRY)	NUCL-UNIT-% U/M *	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-% *	LAB.
43949	10172 88-17-0078-SG		03/09 1401			BE-7	L.T. 4. E-01		04/01		4
						K-40	2.45+-0.24E 01		04/01		4
						MN-54	L.T. 4. E-02		04/01		4
						CO-58	L.T. 5. E-02		04/01		4
						FE-59	L.T. 1. E-01		04/01		4
						CO-60	L.T. 5. E-02		04/01		4
						ZN-65	L.T. 1. E-01		04/01		4
						ZR-95	L.T. 7. E-02		04/01		4
						RU-103	L.T. 6. E-02		04/01		4
						RU-106	L.T. 4. E-01		04/01		4
						I-131	L.T. 3. E-01		04/01		4
						CS-134	L.T. 5. E-02		04/01		4
						CS-137	2.99+-0.51E-01		04/01		4
						BA-140	L.T. 2. E-01		04/01		4
						CE-141	L.T. 9. E-02		04/01		4
						CE-144	L.T. 2. E-01		04/01		4
						RA-226	4.14+-0.74E 00		04/01		4
						TH-228	1.33+-0.13E 00		04/01		4
						BE-7	L.T. 4. E-01		04/01		4
						K-40	2.62+-0.26E 01		04/01		4
						MN-54	L.T. 4. E-02		04/01		4
						CO-58	L.T. 4. E-02		04/01		4
						FE-59	L.T. 1. E-01		04/01		4
						CO-60	L.T. 4. E-02		04/01		4
						ZN-65	L.T. 1. E-01		04/01		4
						ZR-95	L.T. 5. E-02		04/01		4
						RU-103	L.T. 3. E-01		04/01		4
						RU-106	L.T. 3. E-01		04/01		4
						I-131	L.T. 3. E-01		04/01		4
						CS-134	L.T. 5. E-02		04/01		4
						CS-137	L.T. 4. E-02		04/01		4
						BA-140	L.T. 2. E-01		04/01		4

03/09 1410

88-16-8004-SG

43950 10278

DATE

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

RUN DATE 05/04/94

REPORT OF ANALYSIS

PAGE 13

WORK ORDER NUMBER 4-0354  
 CUSTOMER P.O. NUMBER 030225/030600829

DATE RECEIVED 03/11/94  
 DELIVERY DATE 04/13/94

ANN MARIE HOLBROW  
 MCLAREN/HART  
 16755 VON KARMAN AVE 92714  
 IRVINE CA

S O I L

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP TIME	NUCLIDE	ACTIVITY (PCI/GM DRY)	NUCL-UNIT-X U/M #	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-% #	LAB.
43950	10278 88-16-B004-SG		03/09	1410	CE-141 CE-144 RA-226 TH-228	L.T. 1. E-01 L.T. 3. E-01 1.75+-0.56E 00 1.37+-0.14E 00		04/01 04/01 04/01 04/01		4 4 4 4
43951	11160 88-16-B004-ST		03/09	1420	H-3 SR-90	2.7 +-1.5 E 02 L.T. 9. E-02	PCI/LITER #	05/01 04/03		3 4
43953	11161 88-16-B004-SS		03/09	1420	BE-7 K-40 MN-54 CO-58	L.T. 6. E-01 2.95+-0.30E 01 L.T. 6. E-02 L.T. 6. E-02		04/01 04/01 04/01 04/01		4 4 4 4
43954	11162 88-16-B004-SG		03/09	1420	FE-59 CO-60 ZN-65 ZR-95 RU-103 RU-106 I-131 CS-134 CS-137 BA-140 CE-141 CE-144 RA-226 TH-228	L.T. 2. E-01 L.T. 5. E-02 L.T. 1. E-01 L.T. 8. E-02 L.T. 8. E-02 L.T. 5. E-01 L.T. 4. E-01 L.T. 7. E-02 L.T. 7. E-02 L.T. 2. E-01 L.T. 1. E-01 L.T. 3. E-01 3.55+-0.86E 00 1.82+-0.18E 00		04/01 04/01 04/01 04/01 04/01 04/01 04/01 04/01 04/01 04/01 04/01 04/01 04/01 04/01 04/01 04/01 04/01		4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4
43955	10279 88-16-B005-ST		03/09	1435	H-3	L.T. 1. E 02	PCI/LITER #	05/01		5

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

RUN DATE 05/04/94

REPORT OF ANALYSIS

PAGE 14

WORK ORDER NUMBER 4-0354

CUSTOMER P.O. NUMBER 030225/030600829

DELIVERY DATE 04/13/94

DATE RECEIVED 03/11/94

ANN MARIE HOLBROW  
 MCLAREN/HART  
 16755 VON KARMAN AVE  
 IRVINE CA 92714

S O I L

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP TIME	NUCLIDE	ACTIVITY (PCI/GH DRY)	NUCL-UNIT-% U/M	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-%	LAB.
43956	10280	88-16-8005-SS	03/09	1435	SR-90	L.T. 5. E-02		04/07		3
43957	11147	88-16-8005-SG	03/09	1435	BE-7	L.T. 6. E-01		04/01		4
					K-40	2.67+-0.27E 01		04/01		4
					MN-54	L.T. 5. E-02		04/01		4
					CO-58	L.T. 6. E-02		04/01		4
					FE-59	L.T. 1. E-01		04/01		4
					CO-60	L.T. 5. E-02		04/01		4
					ZN-65	L.T. 1. E-01		04/01		4
					ZR-95	L.T. 7. E-02		04/01		4
					RU-103	L.T. 7. E-02		04/01		4
					RU-106	L.T. 5. E-01		04/01		4
					I-131	L.T. 4. E-01		04/01		4
					CS-134	L.T. 7. E-02		04/01		4
					CS-137	L.T. 5. E-02		04/01		4
					BA-140	L.T. 2. E-01		04/01		4
					CE-141	L.T. 1. E-01		04/01		4
					CE-144	L.T. 3. E-01		04/01		4
					RA-226	2.54+-0.80E 00		04/01		4
					TH-228	1.70+-0.17E 00		04/01		5
					H-3	L.T. 2. E 02	PCI/LITER *	05/01		3
43958	11163	88-16-8005-ST	03/09	1440	SR-90	L.T. 8. E-02		04/07		4
43959	11164	88-16-8005-SS	03/09	1440	BE-7	L.T. 6. E-01		04/02		4
					K-40	2.96+-0.30E 01		04/02		4
43960	11165	88-16-8005-SG	03/09	1440	MN-54	L.T. 6. E-02		04/02		4
					CO-58	L.T. 7. E-02		04/02		4
					FE-59	L.T. 2. E-01		04/02		4
					CO-60	L.T. 6. E-02		04/02		4
					ZN-65	L.T. 2. E-01		04/02		4
					ZR-95	L.T. 8. E-02		04/02		4

5

5  
5  
5



TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

RUN DATE 05/04/94

PAGE 16

REPORT OF ANALYSIS

DELIVERY DATE

CUSTOMER P.O. NUMBER

DATE RECEIVED

WORK ORDER NUMBER

030225/030600829

03/11/94

04/13/94

4-0354

ANN MARIE HOLBROW  
MCLAREN/HART  
16755 VON KARMAN AVE  
IRVINE CA 92714

S O I L

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP TIME	NUCLIDE	ACTIVITY ( PCI/LITER)	NUCL-UNIT-% U/M *	HID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-% *	LAB.
			03/09 1300		H-3	L.T. 2. E 02		05/02		5
43964	88-16-8001-ST		03/09 1300		SR-90	9.3 +-4.2 E-02 PCI/GM DRY *		04/07		3
43965	88-16-8001-SS		03/09 1300		BE-7	L.T. 8. E-01 PCI/GM DRY *		04/02		4
43966	88-16-8001-SG		03/09 1300		K-40	3.00+-0.30E 01 PCI/GM DRY *		04/02		4
					MN-54	L.T. 8. E-02 PCI/GM DRY *		04/02		4
					CO-58	L.T. 2. E-01 PCI/GM DRY *		04/02		4
					FE-59	L.T. 7. E-02 PCI/GM DRY *		04/02		4
					CO-60	L.T. 2. E-01 PCI/GM DRY *		04/02		4
					ZN-65	L.T. 2. E-01 PCI/GM DRY *		04/02		4
					ZR-95	L.T. 1. E-01 PCI/GM DRY *		04/02		4
					RU-103	L.T. 7. E-01 PCI/GM DRY *		04/02		4
					RU-106	L.T. 6. E-01 PCI/GM DRY *		04/02		4
					I-131	L.T. 9. E-02 PCI/GM DRY *		04/02		4
					CS-134	L.T. 8. E-02 PCI/GM DRY *		04/02		4
					BA-140	L.T. 3. E-01 PCI/GM DRY *		04/02		4
					CE-141	L.T. 2. E-01 PCI/GM DRY *		04/02		4
					CE-144	L.T. 4. E-01 PCI/GM DRY *		04/02		4
					RA-226	2.86+-0.95E 00 PCI/GM DRY *		04/02		4
					TH-228	2.04+-0.20E 00 PCI/GM DRY *		04/02		5
					H-3	L.T. 1. E 02		05/02		3
43967	88-16-B002-ST		03/09 1320		SR-90	L.T. 8. E-02 PCI/GM DRY *		04/08		4
43968	88-16-B002-SS		03/09 1320		BE-7	L.T. 5. E-01 PCI/GM DRY *		04/02		4
43969	88-16-B002-SG		03/09 1320		K-40	3.12+-0.31E 01 PCI/GM DRY *		04/02		4
					MN-54	L.T. 5. E-02 PCI/GM DRY *		04/02		4
					CO-58	L.T. 5. E-02 PCI/GM DRY *		04/02		4
					FE-59	L.T. 1. E-01 PCI/GM DRY *		04/02		4
					CO-60	L.T. 5. E-02 PCI/GM DRY *		04/02		4









TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

REPORT OF ANALYSIS

RUN DATE 05/26/94

PAGE 1

WORK ORDER NUMBER

4-1294

CUSTOMER P.O. NUMBER

030225/030600829

DELIVERY DATE

04/13/94

PAGE 1

ANN MARIE HOLBROW  
MCLAREN/HART  
16755 VON KARMAN AVE  
IRVINE CA 92714

SOIL

TELEDYNE SAMPLE NUMBER 43910 10236DUP 88-16-008-SG

COLLECTION-DATE  
START DATE 03/09 1014  
STOP DATE

CUSTOMER'S IDENTIFICATION 88-16-008-SG

STA NUM

ACTIVITY (PCI/GM DRY) U/M \*

MID-COUNT TIME DATE

VOLUME - UNITS ASH-WGHT-% \*

LAB.

BE-7	L.T. 6. E-01	04/13			4
K-40	2.33+-0.23E-01	04/13			4
MN-54	L.T. 4. E-02	04/13			4
CO-58	L.T. 5. E-02	04/13			4
FE-59	L.T. 2. E-01	04/13			4
CO-60	L.T. 4. E-02	04/13			4
ZN-65	L.T. 1. E-01	04/13			4
ZR-95	L.T. 7. E-02	04/13			4
RU-103	L.T. 7. E-02	04/13			4
RU-106	L.T. 4. E-01	04/13			4
I-131	L.T. 8. E-01	04/13			4
CS-134	L.T. 5. E-02	04/13			4
CS-137	L.T. 5. E-02	04/13			4
BA-140	L.T. 3. E-01	04/13			4
CE-141	L.T. 1. E-01	04/13			4
CE-144	L.T. 3. E-01	04/13			4
RA-226	L.T. 8. E-01	04/13			4
TH-228	8.63+-0.06E-01	04/13			4
PU-239	L.T. 2. E-02	03/29			6
PU-238	L.T. 2. E-02	03/29			6
H-3	2.9 +-1.5 E 02	PCI/LITTER *	05/01		5
PU-239	L.T. 2. E-02		04/05		6
PU-238	L.T. 2. E-02		04/05		6
H-3	L.T. 2. E 02	PCI/LITTER *	05/02		5



TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

RUN DATE 05/04/94

REPORT OF ANALYSIS

PAGE 5

WORK ORDER NUMBER 4-0354

CUSTOMER P.O. NUMBER 030225/030600829

DELIVERY DATE 04/13/94

DATE RECEIVED 03/11/94

ANN MARIE HOLBROW  
MCLAREN/HART  
16755 VON KARMAN AVE  
IRVINE CA 92714

S O I L

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP TIME	NUCLIDE	ACTIVITY (PCI/GM DRY)	NUCL-UNIT-% U/M *	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-% *	LAB.
43916	10242	BB-16-010-SG	03/09	0945	ZN-65	L.T. 8. E-02		03/31		4
					ZR-95	L.T. 4. E-02		03/31		4
					RU-103	L.T. 4. E-02		03/31		4
					RU-106	L.T. 3. E-01		03/31		4
					I-131	L.T. 2. E-01		03/31		4
					CS-134	L.T. 4. E-02		03/31		4
					CS-137	7.54+-2.83E-02		03/31		4
					BA-140	L.T. 1. E-01		03/31		4
					CE-141	L.T. 7. E-02		03/31		4
					CE-144	L.T. 2. E-01		03/31		4
					RA-226	1.57+-0.45E 00		03/31		4
					TH-228	9.94+-0.99E-01		03/31		4
					H-3	L.T. 1. E 02	PCI/LITER *	04/30		5
43917	10144	BB-17-005-ST	03/09	1615	PU-238	L.T. 1. E-02		03/29		6
43918	10145	BB-17-005-SP	03/09	1615	PU-239	L.T. 2. E-02		03/29		6
43919	10146	BB-17-005-SG	03/09	1615	BE-7	L.T. 5. E-01		03/31		4
					K-40	2.44+-0.24E 01		03/31		4
					MN-54	L.T. 5. E-02		03/31		4
					CO-58	L.T. 5. E-02		03/31		4
					FE-59	L.T. 1. E-01		03/31		4
					CO-60	L.T. 5. E-02		03/31		4
					ZN-65	L.T. 1. E-01		03/31		4
					ZR-95	L.T. 6. E-02		03/31		4
					RU-103	L.T. 6. E-02		03/31		4
					RU-106	L.T. 4. E-01		03/31		4
					I-131	L.T. 3. E-01		03/31		4
					CS-134	L.T. 5. E-02		03/31		4
					CS-137	2.18+-0.43E-01		03/31		4
					BA-140	L.T. 1. E-01		03/31		4
					CE-141	L.T. 8. E-02		03/31		4



TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

RUN DATE 05/04/94

REPORT OF ANALYSIS

PAGE 7

DELIVERY DATE

DATE RECEIVED 03/11/94

CUSTOMER P.O. NUMBER

030225/030600829

WORK ORDER NUMBER

030225/030600829

4-0354

ANN MARIE HOLBROD

MCLAREN/HART

16755 VON KARMAN AVE

IRVINE CA

92714

S O I L

COLLECTION-DATE  
START DATE TIME DATE TIME STOP

TELEDYNE SAMPLE NUMBER 43926 10152 88-17-005B-SP  
CUSTOMER'S IDENTIFICATION 88-17-005B-SP  
STA NUM 88-17-005B-SG

03/09 1627

03/09 1627

ACTIVITY (PCI/GM DRY)

NUCL-UNIT-% U/M #

L.T. 4. E-02  
L.T. 4. E-02

L.T. 5. E-01

2.36+-0.24E 01

L.T. 5. E-02

L.T. 5. E-02

L.T. 1. E-01

L.T. 4. E-02

L.T. 1. E-01

L.T. 7. E-02

L.T. 7. E-02

L.T. 5. E-01

L.T. 3. E-01

L.T. 6. E-02

3.85+-0.53E-01

L.T. 1. E-01

L.T. 1. E-01

L.T. 3. E-01

1.49+-0.69E 00

1.53+-0.15E 00

3.5 +-0.2 E 03

L.T. 5. E-01

L.T. 2. E 00

L.T. 5. E-02

L.T. 1. E-01

L.T. 5. E-02

L.T. 1. E-01

L.T. 1. E-01

L.T. 6. E-02

L.T. 7. E-02

PCI/LITER #

03/09 1540

88-17-006-ST

43928 10154

03/09 1355

88-17-007A-SG

43929 10169

MID-COUNT TIME DATE TIME VOLUME - UNITS ASH-WGHT-% # LAB.

03/29

03/29

04/01

04/01

04/01

04/01

04/01

04/01

04/01

04/01

04/01

04/01

04/01

04/01

04/01

04/01

04/01

04/01

04/01

04/01

04/01

05/01

04/01

04/01

04/01

04/01

04/01

04/01

04/01

04/01

04/01

04/01

04/01

04/01



TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

RUN DATE 05/04/94

PAGE 9

REPORT OF ANALYSIS

DELIVERY DATE 04/13/94

CUSTOMER P.O. NUMBER 03/11/94

WORK ORDER NUMBER 030225/030600829

4-0354

ANN MARIE HOLBROW  
MCLAREN/HART  
16755 VON KARMAN AVE  
IRVINE CA 92714

SOIL

COLLECTION-DATE  
START STOP  
DATE TIME DATE TIME

TELEDYNE  
SAMPLE  
NUMBER

CUSTOMER'S  
IDENTIFICATION

STA  
NUM

NUCLIDE

ACTIVITY  
PCI/LITER

NUCL-UNIT-%  
U/M

MID-COUNT  
TIME  
DATE

VOLUME - UNITS  
ASH-WGHT-%

LAB.

H-3

03/09 1600

43933 10157 88-17-006A-ST

PU-238

03/09 1600

43934 10158 88-17-006A-SP

PU-239

43935 10159 88-17-006A-SG

03/09 1600

BE-7

L.T. 4.

E-01 PCI/GM DRY \*

04/01

4

K-40

L.T. 4.

E-02 PCI/GM DRY \*

04/01

4

MN-54

L.T. 4.

E-02 PCI/GM DRY \*

04/01

4

CO-58

L.T. 1.

E-01 PCI/GM DRY \*

04/01

4

FE-59

L.T. 4.

E-02 PCI/GM DRY \*

04/01

4

CO-60

L.T. 9.

E-02 PCI/GM DRY \*

04/01

4

ZN-65

L.T. 5.

E-02 PCI/GM DRY \*

04/01

4

ZR-95

L.T. 5.

E-02 PCI/GM DRY \*

04/01

4

RU-103

L.T. 3.

E-01 PCI/GM DRY \*

04/01

4

RU-106

L.T. 2.

E-01 PCI/GM DRY \*

04/01

4

I-131

L.T. 5.

E-02 PCI/GM DRY \*

04/01

4

CS-134

L.T. 1.64

+0.35E-01 PCI/GM DRY \*

04/01

4

CS-137

L.T. 1.

E-01 PCI/GM DRY \*

04/01

4

BA-140

L.T. 8.

E-02 PCI/GM DRY \*

04/01

4

CE-141

L.T. 2.

E-01 PCI/GM DRY \*

04/01

4

CE-144

L.T. 2.37

+0.51E 00 PCI/GM DRY \*

04/01

4

RA-226

L.T. 1.36

+0.14E 00 PCI/GM DRY \*

04/01

5

TH-228

L.T. 1.

E 02

05/01

5

H-3

03/09 1600

43936 10160 88-17-006A-MT

H-3

/

43937 10160MS 88-17-006A-MT

H-3

/

43938 10160MS08B-17-006A-MT

H-3

/



TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

RUN DATE 05/04/94

PAGE 11

REPORT OF ANALYSIS

DATE RECEIVED 03/11/94  
DELIVERY DATE 04/13/94

WORK ORDER NUMBER 4-0354  
CUSTOMER P.O. NUMBER 030225/030600829

ANN MARIE HOLBROW  
MCLAREN/HART  
16755 VON KARMAN AVE  
IRVINE CA 92714

SOIL

TELEDYNE SAMPLE NUMBER 43944 10166 BR-17-007-SG  
CUSTOMER'S IDENTIFICATION BR-17-007-SG  
STA NUM 17  
COLLECTION-DATE STOP  
START DATE 03/09 1340  
TIME 1340  
NUCLIDE

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE	STOP TIME	NUCLIDE	ACTIVITY (PCI/GM DRY)	NUCL-UNIT-% U/M *	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-% *	LAB.
					BE-7	L.T. 4. E-01		04/01		4
					K-40	2.34+-0.23E 01		04/01		4
					MN-54	L.T. 4. E-02		04/01		4
					CO-58	L.T. 4. E-01		04/01		4
					FE-59	L.T. 1. E-01		04/01		4
					CO-60	L.T. 4. E-02		04/01		4
					ZN-65	L.T. 9. E-02		04/01		4
					ZR-95	L.T. 5. E-02		04/01		4
					RU-103	L.T. 5. E-02		04/01		4
					RU-106	L.T. 4. E-01		04/01		4
					I-131	L.T. 3. E-01		04/01		4
					CS-134	L.T. 5. E-02		04/01		4
					CS-137	2.20+-0.40E-01		04/01		4
					BA-140	L.T. 1. E-01		04/01		4
					CE-141	L.T. 9. E-02		04/01		4
					CE-144	L.T. 3. E-01		04/01		4
					RA-226	3.36+-0.71E 00		04/01		4
					TH-228	1.51+-0.15E 00		04/01		5
					H-3	2.3 +-1.0 E 02	PCI/LITER *	05/01		6
43945	10167	BB-17-007A-ST	03/09	1355	PU-238	L.T. 1. E-02		04/05		6
43946	10168	BB-17-007A-SP	03/09	1355	PU-239	L.T. 2. E-02		04/05		6
43947	10170	BB-17-007B-ST	03/09	1401	H-3	2.2 +-1.0 E 02	PCI/LITER *	05/01		5
43948	10171	BB-17-007B-SP	03/09	1401	PU-238	L.T. 2. E-02		04/05		6
					PU-239	L.T. 2. E-02		04/05		6

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

RUN DATE 05/04/94  
PAGE 12

REPORT OF ANALYSIS

DELIVERY DATE 04/13/94  
DATE RECEIVED 03/11/94  
CUSTOMER P.O. NUMBER 030225/030600829

WORK ORDER NUMBER 4-0354

ANN MARIE HOLBROW  
MCLAREN/HART  
16755 VON KARMAN AVE  
IRVINE CA 92714

SOIL

COLLECTION-DATE STOP  
START TIME DATE TIME NUCLIDE

TELEDYNE STA  
SAMPLE CUSTOMER'S NUM  
NUMBER IDENTIFICATION

43949 10172 88-17-0078-SG  
03/09 1401

BE-7  
K-40  
MN-54  
CO-58  
FE-59  
CO-60  
ZN-65  
ZR-95  
PU-103  
RU-106  
I-131  
CS-134  
CS-137  
BA-140  
CE-141  
CE-144  
RA-226  
TH-228

03/09 1410

43950 10278 88-16-B004-SG

MID-COUNT VOLUME - UNITS  
TIME ASH-WGHT-% \* LAB.  
DATE TIME

NUCL-UNIT-%  
U/M \*

ACTIVITY  
(PCI/GM DRY)

L.T. 4. E-01  
2.45+-0.24E 01  
L.T. 4. E-02  
L.T. 5. E-02  
L.T. 1. E-01  
L.T. 5. E-02  
L.T. 1. E-01  
L.T. 7. E-02  
L.T. 6. E-02  
L.T. 4. E-01  
L.T. 3. E-01  
L.T. 5. E-02  
2.99+-0.51E-01  
L.T. 2. E-01  
L.T. 9. E-02  
L.T. 2. E-01  
4.14+-0.74E 00  
1.33+-0.13E 00  
L.T. 4. E-01  
2.62+-0.26E 01  
L.T. 4. E-02  
L.T. 4. E-02  
L.T. 1. E-01  
L.T. 4. E-02  
L.T. 1. E-01  
L.T. 5. E-02  
L.T. 3. E-01  
L.T. 3. E-01  
L.T. 5. E-02  
L.T. 4. E-02  
L.T. 2. E-01

BE-7  
K-40  
MN-54  
CO-58  
FE-59  
CO-60  
ZN-65  
ZR-95  
RU-103  
RU-106  
I-131  
CS-134  
CS-137  
BA-140

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

RUN DATE 05/04/94  
PAGE 17

REPORT OF ANALYSIS

DELIVERY DATE 04/13/94  
DATE RECEIVED 03/11/94  
CUSTOMER P.O. NUMBER 030225/030600829

WORK ORDER NUMBER 4-0354

ANN MARIE HOLBROW  
MCLAREN/HART  
16755 VON KARMAN AVE  
IRVINE CA 92714

S O I L

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START TIME DATE	STOP TIME DATE	NUCLIDE	ACTIVITY (PCI/GM DRY)	NUCL-UNIT-% U/M *	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-% *	LAB.
43969	10272	88-16-8002-SG	03/09 1320		ZN-65	L.T. 1. E-01		04/02		4
					ZR-95	L.T. 6. E-02		04/02		4
					RU-103	L.T. 7. E-02		04/02		4
					RU-106	L.T. 4. E-01		04/02		4
					I-131	L.T. 3. E-01		04/02		4
					CS-134	L.T. 6. E-02		04/02		4
					CS-137	1.09+-0.44E-01		04/02		4
					BA-140	L.T. 2. E-01		04/02		4
					CE-141	L.T. 1. E-01		04/02		4
					CE-144	L.T. 3. E-01		04/02		4
					RA-226	3.49+-0.79E 00		04/02		4
					TH-228	2.05+-0.21E 00		04/02		5
43970	11154	88-16-B002-ST	03/09 1330		H-3	L.T. 1. E 02	PCI/LITER *	05/02		5
43971	11135	88-17-010-ST	03/09 1650		H-3	L.T. 1. E 02	PCI/LITER *	05/02		6
43972	11137	88-17-010-SP	03/09 1650		PU-238	L.T. 1. E-02		04/05		6
					PU-239	L.T. 1. E-02		04/05		6
43974	11139	88-17-010-SG	03/09 1650		BE-7	L.T. 5. E-01		04/02		4
					K-40	2.04+-0.20E 01		04/02		4
					MN-54	L.T. 5. E-02		04/02		4
					CO-58	L.T. 6. E-02		04/02		4
					FE-59	L.T. 1. E-01		04/02		4
					CO-60	L.T. 5. E-02		04/02		4
					ZN-65	L.T. 1. E-01		04/02		4
					ZR-95	L.T. 7. E-02		04/02		4
					RU-103	L.T. 7. E-02		04/02		4
					RU-106	L.T. 4. E-01		04/02		4
					I-131	L.T. 4. E-01		04/02		4
					CS-134	L.T. 6. E-02		04/02		4
					CS-137	1.16+-0.46E-01		04/02		4















TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

RUN DATE 05/04/94

PAGE 21

REPORT OF ANALYSIS

DELIVERY DATE

CUSTOMER P.O. NUMBER

DATE RECEIVED

WORK ORDER NUMBER

04/13/94

03/11/94

4-0354

030225/030600829

ANN MARIE HOLBROW

MCLAREN/HART

16755 VON KARMAN AVE

IRVINE CA

92714

S O I L

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP TIME	NUCLIDE	ACTIVITY ( PCI/LITER)	NUCL-UNIT-% U/M *	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-X *	LAB.
			03/09 1600		H-3	7.6 +-0.3 E 03		05/03		5
44011	88-17-8002-ST		03/09 1600		PU-238	L.T. 9. E-03 PCI/GM DRY *		04/05		6
44012	88-17-8002-SP		03/09 1600		PU-239	L.T. 9. E-03 PCI/GM DRY *		04/05		6
44013	88-17-8002-SG		03/09 1600		BE-7	L.T. 5. E-01 PCI/GM DRY *		04/07		4
					K-40	1.82+-0.18E 01 PCI/GM DRY *		04/07		4
					MN-54	L.T. 5. E-02 PCI/GM DRY *		04/07		4
					CO-58	L.T. 5. E-02 PCI/GM DRY *		04/07		4
					FE-59	L.T. 1. E-01 PCI/GM DRY *		04/07		4
					CO-60	L.T. 4. E-02 PCI/GM DRY *		04/07		4
					ZN-65	L.T. 1. E-01 PCI/GM DRY *		04/07		4
					ZR-95	L.T. 6. E-02 PCI/GM DRY *		04/07		4
					RU-103	L.T. 7. E-02 PCI/GM DRY *		04/07		4
					RU-106	L.T. 4. E-01 PCI/GM DRY *		04/07		4
					I-131	L.T. 5. E-01 PCI/GM DRY *		04/07		4
					CS-134	L.T. 6. E-02 PCI/GM DRY *		04/07		4
					CS-137	L.T. 5. E-02 PCI/GM DRY *		04/07		4
					BA-140	L.T. 2. E-01 PCI/GM DRY *		04/07		4
					CE-141	L.T. 1. E-01 PCI/GM DRY *		04/07		4
					CE-144	L.T. 3. E-01 PCI/GM DRY *		04/07		4
					RA-226	3.37+-0.73E 00 PCI/GM DRY *		04/07		4
					TH-228	1.79+-0.18E 00 PCI/GM DRY *		04/07		5
					H-3	L.T. 2. E 02		05/03		6
44014	88-17-8003-ST		03/09 1600		PU-238	L.T. 1. E-02 PCI/GM DRY *		04/05		6
44015	88-17-8003-SP		03/09 1600		PU-239	L.T. 2. E-02 PCI/GM DRY *		04/05		6

44014  
44015









TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

RUN DATE 06/02/94

REPORT OF ANALYSIS

PAGE 1

WORK ORDER NUMBER 4-0595  
 CUSTOMER P.O. NUMBER 030225/030600829

DATE RECEIVED 04/01/94  
 DELIVERY DATE 05/04/94

ANN MARIE HOLBROW  
 MCLAREN/HART  
 16755 VON KARMAN AVE  
 IRVINE CA 92714

S O I L

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP DATE	TIME	NUCLIDE	ACTIVITY ( PCI/LITER)	NUCL-UNIT-X U/M *	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-% *	LAB.
46247	11046	88-00-005-PT	03/09	1200		H-3	1.2 +-0.1 E 03		05/28		5
46248	11047	88-00-006-PT	03/09	1200		H-3	L.T. 1.0 E 02		05/28		5
46249	11048	88-00-007-PT	03/09	1200		H-3	1.5 +-0.2 E 03		05/28		5
46250	11182	88-17-010-ST	03/09	1650		H-3	L.T. 1.0 E 02		05/28		5

LAST PAGE OF REPORT

APPROVED BY J. GUENTHER 06/02/94

SEND 1 COPIES TO MC4805 ANN MARIE HOLBROW

2 - GAS LAB. 3 - RADIO CHEMISTRY LAB.

4 - GE(LI) GAMMA SPEC LAB.

5 - TRITIUM GAS/L.S. LAB.

6 - ALPHA SPEC LAB.



TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

RUN DATE 05/26/94

PAGE 2

REPORT OF ANALYSIS

DELIVERY DATE

04/13/94

CUSTOMER P.O. NUMBER

03/11/94

WORK ORDER NUMBER

030225/030600829

4-1294

ANN MARIE HOLBROM  
 MCLAREN/HART  
 16755 VON KARMAN AVE  
 IRVINE CA 92714

S O I L

MID-COUNT  
 TIME DATE TIME  
 VOLUME - UNITS  
 ASH-WGHT-% # LAB.

TELEDYNE SAMPLE NUMBER	STA NUM	CUSTOMER'S IDENTIFICATION	COLLECTION-DATE START DATE	STOP DATE	TIME	NUCLIDE	ACTIVITY ( PCI/LITER)	NUCL-UNIT-% U/M #	MID-COUNT DATE	TIME	VOLUME - UNITS ASH-WGHT-% #	LAB.
44019	11183DUPBB-17-8003-ST		03/09	1610		H-3	L.T. 2. E 02		05/03			5
44159	10326DUPBG-02-076 -ST		03/10	1605		H-3	L.T. 2. E 02		05/08			5
44180	10302DUPBB-17-005 -SS		03/10	1136		SR-90	L.T. 8. E-02 PCI/GM DRY #		04/16			3



TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

RUN DATE 06/02/94

REPORT OF ANALYSIS

PAGE 1

WORK ORDER NUMBER

CUSTOMER P.O. NUMBER

DELIVERY DATE

030225/030600829

04/01/94

05/04/94

4-0595

ANN MARIE HOLBROW  
MCLAREN/HART  
16755 VON KARMAN AVE  
IRVINE CA 92714

S O I L

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP DATE	TIME	NUCLIDE	ACTIVITY ( PCI/LITER)	NUCL-UNIT-% U/M %	HID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-%	LAB.
46247	88-00-005-PT		03/09		1200	H-3	1.2 +-0.1 E 03		05/28		5
46248	88-00-006-PT		03/09		1200	H-3	L.T. 1. E 02		05/28		5
46249	88-00-007-PT		03/09		1200	H-3	1.5 +-0.2 E 03		05/28		5
46250	88-17-010-ST		03/09		1650	H-3	L.T. 1. E 02		05/28		5

LAST PAGE OF REPORT

APPROVED BY J. GUENTHER 06/02/94

*J. Guenther*

SEND 1 COPIES TO MC4805 ANN MARIE HOLBROW

2 - GAS LAB.

3 - RADIO CHEMISTRY LAB.

4 - GEILII GAMMA SPEC LAB.

5 - TRITIUM GAS/L.S. LAB.

6 - ALPHA SPEC LAB.



# METALS

Preparation Method: {a}

Project Name: *Rocketdyne-SSFL*

Sample Description: *BB-18-004-SM 0*

Sample Number: *11200*

Date Received: *03/16/94*

Project Number: *030600829003*

Lab Project-ID Number: *8918-7*

Date Sampled: *03/10/94*

Date Digested: *03/25/94*

Batch Number: *940325-2201*

Analyte (Symbol)/EPA Method

Mercury (Hg)/7471

Date Analyzed

*03/27/94*

Concentration mg/Kg (ppm)

*< 0.10*

Reporting Limit mg/Kg (ppm)

*0.10*

## Comments

*The cover letter and enclosures are integral parts of this report.*

*{a} EPA Method 7471 was used for digestion.*

Approved by: \_\_\_\_\_

*um*

Date: \_\_\_\_\_

*3-30-94*

Page 1

373

MBT Environmental  
Laboratories



Master Builders Technicians

# METALS

Preparation Method: {a}

Project Name: *Rocketdyne-SSFL*

Sample Description: *BB-18-005-SM 0*

Sample Number: *11193*

Date Received: *03/16/94*

Project Number: *030600829003*

Lab Project-ID Number: *8918-1*

Date Sampled: *03/10/94*

Date Digested: *03/25/94*

Batch Number: *940325-2201*

Analyte (Symbol)/EPA Method

Mercury (Hg)/7471

Date Analyzed

*03/27/94*

Concentration mg/Kg (ppm)

*< 0.10*

Reporting Limit mg/Kg (ppm)

*0.10*

## Comments

*The cover letter and enclosures are integral parts of this report.*

*{a} EPA Method 7471 was used for digestion.*

Approved by: \_\_\_\_\_

*um*

Date: \_\_\_\_\_

*3-30-94*

Page 1

373

MBT Environmental  
Laboratories



Master Europe's Technology

# METALS

Preparation Method: {a}

Project Name: Rocketdyne-SSFL

Sample Description: BB-18-005A-SM 0

Sample Number: 11195

Date Received: 03/16/94

Project Number: 030600829003

Lab Project-ID Number: 8918-3

Date Sampled: 03/10/94

Date Digested: 03/25/94

Batch Number: 940325-2201

Analyte (Symbol)/EPA Method

Mercury (Hg)/7471

Date Analyzed

03/27/94

Concentration mg/Kg (ppm)

< 0.10

Reporting Limit mg/Kg (ppm)

0.10

### Comments

The cover letter and enclosures are integral parts of this report.

{a} EPA Method 7471 was used for digestion.

Approved by: \_\_\_\_\_

UM

Date: \_\_\_\_\_

3-30-94

Page 1

373

MBT Environmental  
Laboratories



Master Builders Technicians

# METALS

Preparation Method: {a}

Project Name: *Rocketdyne-SSFL*

Sample Description: *BB-18-005B-SM 0*

Sample Number: *11194*

Date Received: *03/16/94*

Project Number: *030600829003*

Lab Project-ID Number: *8918-2*

Date Sampled: *03/10/94*

Date Digested: *03/25/94*

Batch Number: *940325-2201*

Analyte (Symbol)/EPA Method

Mercury (Hg)/7471

Date Analyzed

*03/27/94*

Concentration mg/Kg (ppm)

*< 0.10*

Reporting Limit mg/Kg (ppm)

*0.10*

## Comments

*The cover letter and enclosures are integral parts of this report.*

*{a} EPA Method 7471 was used for digestion.*

Approved by: \_\_\_\_\_

*um*

Date: *3-30-94*

Page 1

373

MBT Environmental  
Laboratories



Master Builders Technic Corp.

# METALS

Preparation Method: {a}

Project Name: Rocketdyne-SSFL

Sample Description: BB-18-005C-SM 0

Sample Number: 11197

Date Received: 03/16/94

Project Number: 030600829003

Lab Project-ID Number: 8918-5

Date Sampled: 03/10/94

Date Digested: 03/25/94

Batch Number: 940325-2201

Analyte (Symbol)/EPA Method

Mercury (Hg)/7471

Date Analyzed

03/27/94

Concentration mg/Kg (ppm)

< 0.10

Reporting Limit mg/Kg (ppm)

0.10

## Comments

The cover letter and enclosures are integral parts of this report.

{a} EPA Method 7471 was used for digestion.

Approved by: \_\_\_\_\_

um

Date: \_\_\_\_\_

3-30-94

Page 1

373

MBT Environmental  
Laboratories



Master Builders Technology Inc.

# METALS

## Preparation Method: {a}

Project Name: *Rocketdyne-SSFL*

Sample Description: *BB-18-006A-SM 0*

Sample Number: *11196*

Date Received: *03/16/94*

Project Number: *030600829003*

Lab Project-ID Number: *8918-4*

Date Sampled: *03/10/94*

Date Digested: *03/25/94*

Batch Number: *940325-2201*

Analyte (Symbol)/EPA Method

Mercury (Hg)/7471

Date Analyzed

*03/27/94*

Concentration mg/Kg (ppm)

*< 0.10*

Reporting Limit mg/Kg (ppm)

*0.10*

### Comments

*The cover letter and enclosures are integral parts of this report.*

*{a} EPA Method 7471 was used for digestion.*

Approved by: \_\_\_\_\_

*UM*

Date: \_\_\_\_\_

*3-30-94*

Page 1

373

MBT Environmental  
Laboratories



Master Builders Technology Co.

# METALS

Preparation Method: {a}

Project Name: *Rocketdyne-SSFL*

Sample Description: *BB-18-006B-SM 0*

Sample Number: *11198*

Date Received: *03/16/94*

Project Number: *030600829003*

Lab Project-ID Number: *8918-6*

Date Sampled: *03/10/94*

Date Digested: *03/25/94*

Batch Number: *940325-2201*

Analyte (Symbol)/EPA Method	Date Analyzed	Concentration mg/Kg (ppm)	Reporting Limit mg/Kg (ppm)
Mercury (Hg)/7471	03/27/94	0.12	0.10

### Comments

*The cover letter and enclosures are integral parts of this report.*

*{a} EPA Method 7471 was used for digestion.*

Approved by: \_\_\_\_\_

*UM*

Date: \_\_\_\_\_

*3-30-94*

Page 1

373

MBT Environmental  
Laboratories



Master Builders Technicians

# METALS

## Preparation Method: {a}

Project Name: *Rocketdyne-SSFL*

Sample Description: *BB-18-006B-SM*

Sample Number: *11198*

Date Received: *03/12/94*

Project Number: *030600829003*

Lab Project-ID Number: *9066-1*

Date Sampled: *03/10/94*

Date Digested: *04/25/94*

Batch Number: *940425-4304*

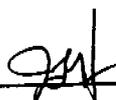
Analyte (Symbol)/EPA Method	Date Analyzed	Concentration mg/Kg (ppm)	Reporting Limit mg/Kg (ppm)
Mercury (Hg)/7471	04/25/94	BRL	0.10

### Comments

*The cover letter and enclosures are integral parts of this report.*

*{a} EPA Method 7471 was used for Mercury digestion.*

Approved by: \_\_\_\_\_



Date: 4-29-94

373

Page 1

MBT Environmental  
Laboratories



Master Builders Technologies





TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

RUN DATE 05/12/94

REPORT OF ANALYSIS

PAGE 8

DELIVERY DATE

DATE RECEIVED 03/14/94

04/16/94

CUSTOMER P.O. NUMBER

030225/030600829

WORK ORDER NUMBER

4-0409

ANN MARIE HOLBROW  
 MCLAREN/HART  
 16755 VON KARMAN AVE 92714  
 IRVINE CA

S O I L

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP TIME	NUCLIDE	ACTIVITY (PCI/GM DRY)	NUCL-UNIT-X U/M	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-X	LAB.
			03/10	1150	SR-90	1.2 +-0.8 E-01		04/16		3
44183	BB-19-006-SS		03/10	1150	BE-7	L.T. 5. E-01		04/15		4
44184	BB-19-006-SG				K-40	2.31+-0.23E 01		04/15		4
					MN-54	L.T. 4. E-02		04/15		4
					CO-58	L.T. 5. E-02		04/15		4
					FE-59	L.T. 1. E-01		04/15		4
					CO-60	L.T. 4. E-02		04/15		4
					ZN-65	L.T. 1. E-01		04/15		4
					ZR-95	L.T. 5. E-02		04/15		4
					RU-103	L.T. 5. E-02		04/15		4
					RU-106	L.T. 3. E-01		04/15		4
					1-131	L.T. 7. E-01		04/15		4
					CS-134	L.T. 5. E-02		04/15		4
					CS-137	5.11+-2.80E-02		04/15		4
					BA-140	L.T. 3. E-01		04/15		4
					CE-141	L.T. 1. E-01		04/15		4
					CE-144	L.T. 3. E-01		04/15		4
					RA-226	1.53+-0.55E 00		04/15		4
					TH-228	7.53+-0.75E-01		04/15		3
					SR-90	L.T. 1. E-01		04/16		4
44186	BB-19-007-SS		03/10	1205	BE-7	L.T. 5. E-01		04/15		4
44187	BB-19-007-SG		03/10	1205	K-40	2.13+-0.21E 01		04/15		4
					MN-54	L.T. 4. E-02		04/15		4
					CO-58	L.T. 5. E-02		04/15		4
					FE-59	L.T. 1. E-01		04/15		4
					CO-60	L.T. 4. E-02		04/15		4
					ZN-65	L.T. 1. E-01		04/15		4
					ZR-95	L.T. 5. E-02		04/15		4
					RU-103	L.T. 6. E-02		04/15		4
					RU-106	L.T. 3. E-01		04/15		4



TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

RUN DATE 05/12/94

REPORT OF ANALYSIS

PAGE 10

WORK ORDER NUMBER  
4-0409

CUSTOMER P.O. NUMBER  
030225/030600829

DELIVERY DATE  
04/16/94

DATE RECEIVED  
03/14/94

ANN MARIE HOLBROW  
MCLAREN/HART  
16755 VON KARMAN AVE  
IRVINE CA 92714

SOIL

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP TIME	NUCLIDE	ACTIVITY (PCI/GM DRY)	NUCL-UNIT-% U/M *	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-%	LAB.
			03/10	1228	SR-90	6.1 +-4.1 E-02		04/28		3
44190	88-19-009-SS		03/10	1228	RE-7	L.T. 3. E-01		04/15		4
					K-40	2.37+-0.24E 01		04/15		4
					MN-54	L.T. 3. E-02		04/15		4
					CO-58	L.T. 3. E-01		04/15		4
					FE-59	L.T. 1. E-01		04/15		4
					CD-60	L.T. 3. E-02		04/15		4
					ZN-65	L.T. 7. E-02		04/15		4
					ZR-95	L.T. 4. E-02		04/15		4
					RU-103	L.T. 4. E-01		04/15		4
					RU-106	L.T. 2. E-01		04/15		4
					I-131	L.T. 5. E-01		04/15		4
					CS-134	L.T. 3. E-02		04/15		4
					CS-137	L.T. 3. E-02		04/15		4
					BA-140	L.T. 2. E-01		04/15		4
					CE-141	L.T. 8. E-02		04/15		4
					CE-144	L.T. 2. E-01		04/15		4
					RA-226	1.00+-0.34E 00		04/15		4
					TH-228	6.60+-0.66E-01		04/15		4
44202	88-15-006-SP		03/10	0930	PU-238	L.T. 1. E-02		04/09		6
					PU-239	L.T. 1. E-02		04/09		6
44204	88-15-007-SP		03/10	1010	PU-238	L.T. 1. E-02		04/09		6
					PU-239	L.T. 1. E-02		04/09		6
44205	88-15-008-SP		03/10	1016	PU-238	L.T. 1. E-02		04/09		6
					PU-239	L.T. 1. E-02		04/09		6

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

RUN DATE 05/26/94

REPORT OF ANALYSIS

PAGE 2

WORK ORDER NUMBER 4-1294  
 CUSTOMER P.O. NUMBER 030225/030600829  
 DATE RECEIVED 03/11/94  
 DELIVERY DATE 04/13/94

ANN MARIE HOLBROW  
 MCLAREN/HART  
 16755 VON KARMAN AVE  
 IRVINE CA 92714

S O I L

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE		NUCLIDE	ACTIVITY ( PCI/LITER)	NUCL-UNIT-% U/M *	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-% *	LAB.
			START DATE	STOP DATE						
44019	11183DUPB8-17-8003-ST		03/09	1610	H-3	L.T. 2. E 02		05/03		5
44159	10326DUPB8-02-076 -ST		03/10	1605	H-3	L.T. 2. E 02		05/08		5
44180	10302DUPB8-17-005 -SS		03/10	1136	SR-90	L.T. 8. E-02 PCI/GH DRY *		04/16		3

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

RUN DATE 05/26/94

REPORT OF ANALYSIS

PAGE 3

WORK ORDER NUMBER

CUSTOMER P.O. NUMBER

DELIVERY DATE

4-1294

030225/030600R29

04/13/94

03/11/94

ANN MARIE HOLBROW  
MCLAREN/HART  
16755 VON KARMAN AVE  
IRVINE CA 92714

W A T E R

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE		NUCLIDE	ACTIVITY ( PCI/LITER)	NUCL-UNIT-% U/M #	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-% #	LAB.
			START DATE	STOP DATE						
43921	11127DUP 88-17-005-RP		03/09	0755	PU-239 PU-238	L.T. 2. E-01 L.T. 2. E-01		03/31 03/31		6 6
44201	11192DUP88-19-006 -RG		03/10	1050	BE-7 K-40 MN-54 CO-58 FE-59 CO-60 ZN-65 ZR-95 RU-103 RU-106 I-131 CS-134 CS-137 BA-140 CE-141 CE-144 RA-226 TH-228	L.T. 3. E 01 L.T. 7. E 01 L.T. 3. E 00 L.T. 3. E 00 L.T. 8. E 00 L.T. 3. E 00 L.T. 6. E 00 L.T. 4. E 00 L.T. 4. E 01 L.T. 3. E 01 L.T. 2. E 01 L.T. 3. E 00 L.T. 3. E 00 L.T. 9. E 00 L.T. 7. E 00 L.T. 2. E 01 L.T. 6. E 01 L.T. 5. E 00		04/01 04/01 04/01 04/01 04/01 04/01 04/01 04/01 04/01 04/01 04/01 04/01 04/01 04/01 04/01 04/01 04/01 04/01 04/01		4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4

LAST PAGE OF REPORT

APPROVED BY J. GUENTHER 05/26/94

*J. Guenther*

SEND 1 COPIES TO MC4805 ANN MARIE HOLBROW

5 - TRITIUM GAS/L.S. LAB. 6 - ALPHA SPEC LAB.

2 - GAS LAB. 3 - RADIO CHEMISTRY LAB.

4 - GE(LI) GAMMA SPEC LAB.

CAMPSITE 1  
DRAINAGE (BB20)

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

RUN DATE 04/20/94

REPORT OF ANALYSIS

PAGE 2

DELIVERY DATE

04/11/94

DATE RECEIVED

03/09/94

CUSTOMER P.O. NUMBER

030225/030600829

WORK ORDER NUMBER

4-0353

ANN MARIE HOLBROW  
 MCLAREN/HART  
 16755 VON KARMAN AVE  
 IRVINE CA 92714

S O I L

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP DATE	NUCLIDE	ACTIVITY ( PCI/LITER)	NUCL-UNIT-X U/M *	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-X *	LAB.
43700	88-03-097-ST		03/08 1416		H-3	L.T. 1. E 02		04/06		5
43701	88-20-001-ST		03/08 1000		H-3	L.T. 1. E 02		04/07		5
43702	88-20-001-SS		03/08 1010		SR-90	L.T. 1. E-01 PCI/GM DRY *		03/28		3
43703	88-20-001-SG		03/08 1010		0E-7	L.T. 4. E-01 PCI/GM DRY *		03/21		4
					K-40	2.08+-0.21E 01 PCI/GM DRY *		03/21		4
					MN-54	L.T. 4. E-02 PCI/GM DRY *		03/21		4
					CO-58	L.T. 4. E-02 PCI/GM DRY *		03/21		4
					FE-59	L.T. 1. E-01 PCI/GM DRY *		03/21		4
					CO-60	L.T. 4. E-02 PCI/GM DRY *		03/21		4
					ZN-65	L.T. 1. E-01 PCI/GM DRY *		03/21		4
					ZR-95	L.T. 5. E-02 PCI/GM DRY *		03/21		4
					RU-103	L.T. 4. E-02 PCI/GM DRY *		03/21		4
					RU-106	L.T. 3. E-01 PCI/GM DRY *		03/21		4
					I-131	L.T. 1. E-01 PCI/GM DRY *		03/21		4
					CS-134	L.T. 5. E-02 PCI/GM DRY *		03/21		4
					CS-137	1.10+-0.37E-01 PCI/GM DRY *		03/21		4
					BA-140	L.T. 7. E-02 PCI/GM DRY *		03/21		4
					CE-141	L.T. 7. E-02 PCI/GM DRY *		03/21		4
					CE-144	L.T. 2. E-01 PCI/GM DRY *		03/21		4
					RA-226	1.76+-0.58E 00 PCI/GM DRY *		03/21		5
					TH-228	8.10+-0.81E-01 PCI/GM DRY *		03/21		5
					H-3	L.T. 1. E 02		04/07		3
43705	88-20-002-ST		03/08 1030		SR-90	L.T. 9. E-02 PCI/GM DRY *		03/28		3
43706	88-20-002-SS		03/08 1030							



ADDITIONAL DATA 06/29/94  
 RUN DATE 04/20/94

TELEDYNE BROWN L. J. INC. RADIATION ENVIRONMENTAL SERVICES

PAGE 4

REPORT OF ANALYSIS

WORK ORDER NUMBER 4-0353  
 CUSTOMER P.D. NUMBER 030225/030600829  
 DATE RECEIVED 03/09/94  
 DELIVERY DATE 04/11/94

ANN MARIE HULBROH  
 MCCLAREN/HART  
 16755 VON KARMAN AVE 92714  
 IRVINE CA

S O I L

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP DATE	TIME	NUCLIDE	ACTIVITY (PCI/GM DRY)	NUCL-UNIT-% U/M *	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-% *	LAB.
43711	10094	68-20-003-SG	03/08	1048		1-131 CS-134 CS-137 BA-140 CE-141 CE-144 RA-226 TH-228	L.T. 1. E-01 L.T. 5. E-02 L.T. 4. E-02 L.T. 8. E-02 L.T. 6. E-02 L.T. 2. E-01 2.03+-0.52E 00 1.10+-0.11E 00		03/21 03/21 03/21 03/21 03/21 03/21 03/21		4 4 4 4 4 4 4 5
						H-3	L.T. 1. E 02	PCI/LITER *	04/07		3
43712	10095	88-20-004-ST	03/08	1115		Sr-90	1.8 +-0.4 E-01		03/29		4
43713	10096	88-20-004-SS	03/08	1115		BE-7 K-40 MN-54 CO-58 FE-59 CO-60 ZN-65 ZR-95 RU-103 RU-106 I-131 CS-134 CS-137 BA-140 CE-141 CE-144 RA-226 TH-228	L.T. 3. E-01 2.42+-0.24F 01 L.T. 4. E-02 L.T. 3. E-02 L.T. 9. E-02 L.T. 4. E-02 L.T. 1. E-01 L.T. 4. E-02 L.T. 4. E-02 L.T. 3. E-01 L.T. 9. E-02 L.T. 4. E-02 L.T. 4. E-02 L.T. 5. E-02 L.T. 6. E-02 L.T. 2. E-01 2.00+-0.56E 00 9.60+-0.96E-01		03/21 03/21 03/21 03/21 03/21 03/21 03/21 03/21 03/21 03/21 03/21 03/21 03/21 03/21 03/21 03/21 03/21 03/21 03/21		4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4
43714	10097	88-20-004-SG	03/08	1115							4

The second analysis of TI#43713 for Sr-90 gave result of 8.8 ± 3.6 E-02. *Polinton 6-29-94*

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

RUN DATE 04/20/94

PAGE 4

REPORT OF ANALYSIS

DELIVERY DATE

04/11/94

DATE RECEIVED

03/09/94

CUSTOMER P.O. NUMBER

030225/030600829

WORK ORDER NUMBER

4-0353

ANN MARIE HOLBROW  
 MCCLAREN/HART  
 16755 VON KARMAN AVE  
 IRVINE CA 92714

S O I L

COLLECTION-DATE  
 START DATE TIME STOP TIME NUCLEIDE

TELEDYNE  
 SAMPLE NUMBER

STA  
 NUM

CUSTOMER'S  
 IDENTIFICATION

BB-20-003-SG

03/08 1048

I-131

CS-134

CS-137

BA-140

CE-141

CE-144

RA-226

TH-228

H-3

SR-90

03/08 1115

BB-20-004-ST

43712 10095

03/08 1115

BB-20-004-SS

43713 10096

03/08 1115

BB-20-004-SG

43714 10097

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE TIME STOP TIME NUCLEIDE	ACTIVITY (PCI/GM DRY)	NUCL-UNIT-X U/M *	MID-COUNT TIME DATE TIME	VOLUME - UNITS ASH-WGHT-X *	LAB.
43711	10094	BB-20-003-SG	03/08 1048	L.T. 1. E-01		03/21		4
				L.T. 5. E-02		03/21		4
				L.T. 4. E-02		03/21		4
				L.T. 8. E-02		03/21		4
				L.T. 6. E-02		03/21		4
				L.T. 2. E-01		03/21		4
				2.03+-0.52E 00		03/21		5
				1.10+-0.11E 00		03/21		3
				L.T. 1. E 02	PCI/LITER *	04/07		
				1.8 +-0.4 E-01		03/29		
				L.T. 3. E-01		03/21		4
				2.42+-0.24E 01		03/21		4
				L.T. 4. E-02		03/21		4
				L.T. 3. E-02		03/21		4
				L.T. 9. E-02		03/21		4
				L.T. 4. E-02		03/21		4
				L.T. 1. E-01		03/21		4
				L.T. 4. E-02		03/21		4
				L.T. 4. E-02		03/21		4
				L.T. 3. E-01		03/21		4
				L.T. 9. E-02		03/21		4
				L.T. 4. E-02		03/21		4
				L.T. 4. E-02		03/21		4
				L.T. 5. E-02		03/21		4
				L.T. 6. E-02		03/21		4
				L.T. 2. E-01		03/21		4
				2.00+-0.56E 00		03/21		4
				9.60+-0.96E-01		03/21		4

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

RUN DATE 04/20/94

PAGE 5

REPORT OF ANALYSIS

DELIVERY DATE

04/11/94

DATE RECEIVED

03/09/94

CUSTOMER P.O. NUMBER

030225/030600829

WORK ORDER NUMBER

4-0353

ANN MARIE HOLBROM  
MCLAREN/HART  
16755 VON KARMAN AVE  
IRVINE CA

92714

S O I L

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP DATE	NUCLIDE	ACTIVITY (PCI/LITER)	NUCL-UNIT-% U/M #	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-% #	LAB #
43715	88-20-005-ST		03/08 1126		H-3	L.T. 1. E 02		04/07		5
43716	88-20-005-ST		03/08 1126		H-3	L.T. 1. E 02		04/07		5
43717	88-20-005-SS		03/08 1126		SR-90	L.T. 6. E-02 PCI/GM DRY #		03/26		3
43718	88-20-005-SG		03/08 1126		RE-7	L.T. 3. E-01 PCI/GM DRY #		03/21		4
					K-40	2.61+-0.26E 01 PCI/GM DRY #		03/21		4
					MN-54	L.T. 3. E-02 PCI/GM DRY #		03/21		4
					CO-58	L.T. 3. E-02 PCI/GM DRY #		03/21		4
					FE-59	L.T. 8. E-02 PCI/GM DRY #		03/21		4
					CO-60	L.T. 3. E-02 PCI/GM DRY #		03/21		4
					ZN-65	L.T. 7. E-02 PCI/GM DRY #		03/21		4
					ZR-95	L.T. 3. E-02 PCI/GM DRY #		03/21		4
					RU-103	L.T. 3. E-02 PCI/GM DRY #		03/21		4
					RU-106	L.T. 2. E-01 PCI/GM DRY #		03/21		4
					I-131	L.T. 8. E-02 PCI/GM DRY #		03/21		4
					CS-134	L.T. 4. E-02 PCI/GM DRY #		03/21		4
					CS-137	L.T. 3. E-02 PCI/GM DRY #		03/21		4
					BA-140	L.T. 6. E-02 PCI/GM DRY #		03/21		4
					CE-141	L.T. 5. E-02 PCI/GM DRY #		03/21		4
					CE-144	L.T. 2. E-01 PCI/GM DRY #		03/21		4
					RA-226	1.50+-0.36E 00 PCI/GM DRY #		03/21		4
					TH-228	1.13+-0.11E 00 PCI/GM DRY #		03/21		5
					H-3	L.T. 1. E 02		04/07		3
43719	88-20-006-ST		03/08		SR-90	L.T. 5. E-02 PCI/GM DRY #		03/26		
43720	88-20-006-SS		03/08 1142							





TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

RUN DATE 04/20/94

PAGE 8

REPORT OF ANALYSIS

DELIVERY DATE

04/11/94

DATE RECEIVED

03/09/94

CUSTOMER P.O. NUMBER

030225/030600829

WORK ORDER NUMBER

4-0353

ANN MARIE HOLBROW  
MCLAREN/HART  
16755 VON KARMAN AVE  
IRVINE CA 92714

S O I L

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP DATE	TIME	NUCLIDE	ACTIVITY (PCI/GM DRY)	NUCL-UNIT-X U/M *	MID-COUNT TIME	VOLUME - UNITS ASH-WGHT-X *	LAB.
43729	10111	88-20-008-MS	03/08	1316		SR-90	1.1 +-0.4 E-01		03/29		3
43730	10111MS	88-20-008-MS	/			SR-90	3.9 +-0.2 E 00		04/07		3
43731	10111MSD	88-20-008-MS	/			SR-90	3.9 +-0.2 E 00		04/07		3
43732	10112	88-20-009-ST	03/08	1326		H-3	L.T. 1. E 02	PCI/LITER *	04/07		3
43733	10113	88-20-009-SS	03/08	1326		SR-90	L.T. 6. E-02		03/30		4
43734	10114	88-20-009-SG	03/08	1326		BE-7	L.T. 4. E-01		03/21		4
						K-40	2.53+-0.25E 01		03/21		4
						MN-54	L.T. 4. E-02		03/21		4
						CO-58	L.T. 1. E-01		03/21		4
						FE-59	L.T. 4. E-02		03/21		4
						CO-60	L.T. 1. E-01		03/21		4
						ZN-65	L.T. 5. E-02		03/21		4
						ZR-95	L.T. 5. E-02		03/21		4
						RU-103	L.T. 3. E-01		03/21		4
						RU-106	L.T. 1. E-01		03/21		4
						I-131	L.T. 5. E-02		03/21		4
						CS-134	7.56+-3.64E-02		03/21		4
						CS-137	L.T. 7. E-02		03/21		4
						RA-140	L.T. 7. E-02		03/21		4
						CE-141	L.T. 2. E-01		03/21		4
						CE-144	1.54+-0.54E 00		03/21		4
						RA-226	1.41+-0.14E 00		03/21		4
						TH-228					4

DELIVERY DATE 04/11/94

DATE RECEIVED 03/09/94

CUSTOMER P.O. NUMBER 030225/030600829

WORK ORDER NUMBER 4-0353

ANN MARIE HOLBROW  
 MCLAREN/HART 92714  
 16755 VON KARMAN AVE  
 IRVINE CA

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP TIME	NUCLIDE	ACTIVITY (PCI/LITER)	NUCL-UNIT-% U/M	MID-COUNT DATE	TIME	VOLUME - UNITS ASH-WGHT-%	LAB.
43735	88-20-010-ST		03/08 1340		H-3	L.T. 1. E 02	E-01 PCI/GM DRY *	04/07			5
43736	88-20-010-SS		03/08 1340		SR-90	L.T. 1. E-01 PCI/GM DRY *	E-01 PCI/GM DRY *	04/01			3
43737	88-20-010-SS		03/08 1340		SR-90	L.T. 6. E-02 PCI/GM DRY *	E-02 PCI/GM DRY *	03/30			3
43738	88-20-010-SG		03/08 1340		BE-7	L.T. 3. E-01 PCI/GM DRY *	E-01 PCI/GM DRY *	03/21			4
					K-40	2.27+-0.23E 01 PCI/GM DRY *	E-01 PCI/GM DRY *	03/21			4
					MN-54	L.T. 4. E-02 PCI/GM DRY *	E-02 PCI/GM DRY *	03/21			4
					CO-58	L.T. 4. E-01 PCI/GM DRY *	E-01 PCI/GM DRY *	03/21			4
					FE-59	L.T. 1. E-02 PCI/GM DRY *	E-02 PCI/GM DRY *	03/21			4
					CO-60	L.T. 4. E-02 PCI/GM DRY *	E-02 PCI/GM DRY *	03/21			4
					ZN-65	L.T. 9. E-02 PCI/GM DRY *	E-02 PCI/GM DRY *	03/21			4
					ZR-95	L.T. 4. E-02 PCI/GM DRY *	E-02 PCI/GM DRY *	03/21			4
					RU-103	L.T. 4. E-01 PCI/GM DRY *	E-01 PCI/GM DRY *	03/21			4
					RU-106	L.T. 3. E-01 PCI/GM DRY *	E-01 PCI/GM DRY *	03/21			4
					I-131	L.T. 1. E-01 PCI/GM DRY *	E-01 PCI/GM DRY *	03/21			4
					CS-134	L.T. 4. E-02 PCI/GM DRY *	E-02 PCI/GM DRY *	03/21			4
					CS-137	L.T. 5. E-02 PCI/GM DRY *	E-02 PCI/GM DRY *	03/21			4
					BA-140	L.T. 8. E-02 PCI/GM DRY *	E-02 PCI/GM DRY *	03/21			4
					CE-141	L.T. 7. E-02 PCI/GM DRY *	E-02 PCI/GM DRY *	03/21			4
					CE-144	L.T. 2. E-01 PCI/GM DRY *	E-01 PCI/GM DRY *	03/21			4
					RA-226	1.46+-0.60E 00 PCI/GM DRY *	E-01 PCI/GM DRY *	03/21			4
					TH-228	9.71+-0.97E-01 PCI/GM DRY *	E-01 PCI/GM DRY *	03/21			4
					BE-7	L.T. 3. E-01 PCI/GM DRY *	E-01 PCI/GM DRY *	03/21			4
					K-40	2.42+-0.24E 01 PCI/GM DRY *	E-01 PCI/GM DRY *	03/21			4
					MN-54	L.T. 3. E-02 PCI/GM DRY *	E-02 PCI/GM DRY *	03/21			4
					CO-58	L.T. 3. E-02 PCI/GM DRY *	E-02 PCI/GM DRY *	03/21			4
					FE-59	L.T. 8. E-02 PCI/GM DRY *	E-02 PCI/GM DRY *	03/21			4
					CO-60	L.T. 3. E-02 PCI/GM DRY *	E-02 PCI/GM DRY *	03/21			4
					ZN-65	L.T. 8. E-02 PCI/GM DRY *	E-02 PCI/GM DRY *	03/21			4
					ZR-95	L.T. 4. E-02 PCI/GM DRY *	E-02 PCI/GM DRY *	03/21			4

03/08 1340

43739 10118 88-20-010-MG





FORMER ROCKEIDYNE  
EMPLOYEE SHOOTING  
RANGE (SM03)

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

RUN DATE 04/06/94  
PAGE 2

REPORT OF ANALYSIS

DELIVERY DATE  
03/18/94

DATE RECEIVED  
03/08/94

CUSTOMER P.O. NUMBER  
030225/030600829

WORK ORDER NUMBER  
4-0185

ANN MARIE HOLBROW  
MCLAREN/HART  
16755 VON KARMAN AVE 92714  
IRVINE CA

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP DATE	TIME	NUCLIDE	S O I L	ACTIVITY ( PCU/LITER)	NUCL-UNIT-% U/M *	MID-COUNT TIME	VOLUME - UNITS ASH-WGHT-% *	LAB.
43187	88-14-004-ST		03/04	1625		H-3		L.T. 2.0 E 02		03/20		5
43188	SM-03-012-ST		03/07	1422		H-3		L.T. 1.0 E 02		03/30		5
43190	SM-03-015-ST		03/07	1420		H-3		L.T. 1.0 E 02		03/21		5
43191	SM-03-009-ST		03/07	1423		H-3		L.T. 1.0 E 02		03/21		5
43192	SM-03-001-ST		03/07	1425		H-3		L.T. 1.0 E 02		03/21		5
43193	SM-03-014-ST		03/07	1430		H-3		L.T. 1.0 E 02		03/30		5
43194	BB-05-003-ST		03/07	1050		H-3		L.T. 1.0 E 02		03/21		5
43195	BB-05-089-ST		03/07	1052		H-3		L.T. 1.0 E 02		03/21		5
43196	BB-05-089FDT		03/07	1052		H-3		L.T. 1.0 E 02		03/21		5
43197	BB-05-006-ST		03/07	1102		H-3		L.T. 1.0 E 02		03/21		5
43198	BB-05-057-ST		03/07	1112		H-3		L.T. 1.0 E 02		03/21		5
43199	BB-05-077-ST		03/07	1110		H-3		L.T. 1.0 E 02		03/21		5
43200	BB-06-007-ST		03/07	0910		H-3		L.T. 1.0 E 02		03/21		5
43201	BB-06-092-ST		03/07	0918		H-3		L.T. 1.0 E 02		03/21		5
43202	10030MS					H-3		3.0 4-0.2 E 03		03/30		5

*Gamma Scan*



TELEDYNE BRCMN ENGINEERING ENVIRONMENTAL SERVICES

RUN DATE 04/20/94

REPORT OF ANALYSIS

PAGE 10

WORK ORDER NUMBER

4-0353

CUSTOMER P.O. NUMBER

030225/030600829

DELIVERY DATE

04/11/94

DATE RECEIVED

03/09/94

ANN MARIE HOLBROW  
MCLAREN/HART  
16755 VON KARMAN AVE  
IRVINE CA 92714

S O I L

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP DATE	NUCLIDE	ACTIVITY (PCI/GM DRY)	NUCL-UNIT-% U/M *	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-% *	LAB.
43739	10118	BB-20-010-MG	03/08	1340	RU-103	L.T. 3. E-02		03/21		4
					RU-106	L.T. 3. E-01		03/21		4
					I-131	L.T. 9. E-02		03/21		4
					CS-134	L.T. 4. E-02		03/21		4
					CS-137	L.T. 4. E-02		03/21		4
					BA-140	L.T. 6. E-02		03/21		4
					CE-141	L.T. 2. E-01		03/21		4
					CE-144	L.T. 2. E-01		03/21		4
					RA-226	1.07+-0.48E 00		03/21		4
					TH-228	9.80+-0.98E-01		03/21		4
43740	10118MS	BB-20-010-MG			BE-7	L.T. 5. E-01		04/14		4
					K-4C	2.34+-0.23E-01		04/14		4
					MN-54	L.T. 4. E-02		04/14		4
					CO-58	L.T. 5. E-02		04/14		4
					FE-59	L.T. 1. E-01		04/14		4
					CO-60	L.T. 4. E-02		04/14		4
					ZN-65	L.T. 1. E-01		04/14		4
					ZR-95	L.T. 6. E-02		04/14		4
					RU-103	L.T. 7. E-02		04/14		4
					RU-106	L.T. 4. E-01		04/14		4
					I-131	L.T. 9. E-01		04/14		4
					CS-134	L.T. 5. E-02		04/14		4
					CS-137	7.46+-0.75E-01		04/14		4
					RA-140	L.T. 3. E-01		04/14		4
					CE-141	L.T. 1. E-01		04/14		4
					CF-144	L.T. 2. E-01		04/14		4
					RA-226	1.14+-0.60E 00		04/14		4
					TH-228	9.39+-0.94E-01		04/14		4

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

RUN DATE 04/20/94

PAGE 11

REPORT OF ANALYSIS

WORK ORDER NUMBER 4-0353  
 CUSTOMER P.O. NUMBER 030225/030600829  
 DATE RECEIVED 03/09/94  
 DELIVERY DATE 04/11/94

ANN MARIE HOLBROW  
 MCLAREN/HART  
 16755 VON KARMAN AVE  
 IRVINE CA 92714

S O I L

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP DATE	NUCLIDE	ACTIVITY (PCI/GM DRY)	NUCL-UNIT-X U/M *	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-X *	LAB.
43741	10118MSD 88-20-010-MG		/		BE-7	L.T. 5. E-01		04/15		4
					K-40	2.50+-0.25E 01		04/15		4
					MN-54	L.T. 4. E-02		04/15		4
					CO-58	L.T. 5. E-02		04/15		4
					FE-59	L.T. 1. E-01		04/15		4
					CO-60	L.T. 4. E-02		04/15		4
					ZN-65	L.T. 1. E-01		04/15		4
					ZR-95	L.T. 6. E-02		04/15		4
					RU-103	L.T. 7. E-02		04/15		4
					RU-106	L.T. 4. E-01		04/15		4
					I-131	L.T. 9. E-01		04/15		4
					CS-134	L.T. 5. E-02		04/15		4
					BA-140	8.22+-0.82E-01		04/15		4
					CE-141	L.T. 2. E-01		04/15		4
					CE-144	L.T. 1. E-01		04/15		4
					RA-226	L.T. 2. E-01		04/15		4
					TH-228	1.69+-0.52E 00		04/15		4
						9.86+-0.99E-01		04/15		4
43742	11018 88-20-003-FT		03/08 1010		H-3	L.T. 1. E 02	PCI/LITER *	04/07		5
43743	88-00-001-FG		03/08 1126		BE-7	L.T. 4. E-01		03/21		4
					K-40	2.37+-0.24E 01		03/21		4
					MN-54	L.T. 4. E-02		03/21		4
					CO-58	L.T. 4. E-02		03/21		4
					FE-59	L.T. 1. E-01		03/21		4
					CO-60	L.T. 4. E-02		03/21		4
					ZN-65	L.T. 9. E-02		03/21		4
					ZR-95	L.T. 5. E-02		03/21		4
					RU-103	L.T. 4. E-02		03/21		4
					RU-106	L.T. 3. E-01		03/21		4
					I-131	L.T. 1. E-01		03/21		4
					CS-134	L.T. 5. E-02		03/21		4

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

REPORT OF ANALYSIS

RUN DATE 04/20/94

PAGE 10

WORK ORDER NUMBER

DATE RECEIVED

DELIVERY DATE

CUSTOMER P.O. NUMBER

4-0353

03/09/94

04/11/94

030225/030600829

ANN MARIE HOLBROW  
MCLAREN/HART  
16755 VON KARMAN AVE  
IRVINE CA

92714

S O I L

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP DATE	NUCLIDE	ACTIVITY (PCI/CM DRY)	NUCL-UNIT-% U/M *	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-% *	LAB.
43739	10118	88-20-010-MG	03/08	1340	RU-103	L.T. 3. E-02		03/21		4
					RU-106	L.T. 3. E-01		03/21		4
					I-131	L.T. 9. E-02		03/21		4
					CS-134	L.T. 4. E-02		03/21		4
					CS-137	L.T. 4. E-02		03/21		4
					BA-140	L.T. 6. E-02		03/21		4
					CE-141	L.T. 6. E-02		03/21		4
					CE-144	L.T. 2. E-01		03/21		4
					RA-226	1.07+-0.48E 00		03/21		4
					TH-228	9.80+-0.98E-01		03/21		4
43740	10118MS	88-20-010-MG	/		BE-7	L.T. 5. E-01		04/14		4
					K-4C	2.34+-0.23E 01		04/14		4
					MN-54	L.T. 4. E-02		04/14		4
					CO-58	L.T. 5. E-02		04/14		4
					FE-59	L.T. 1. E-01		04/14		4
					CO-60	L.T. 4. E-02		04/14		4
					ZN-65	L.T. 1. E-01		04/14		4
					ZR-95	L.T. 6. E-02		04/14		4
					RU-103	L.T. 7. E-02		04/14		4
					RU-106	L.T. 4. E-01		04/14		4
					J-131	L.T. 9. E-01		04/14		4
					CS-134	L.T. 5. E-02		04/14		4
					CS-137	7.46+-0.75E-01		04/14		4
					RA-140	L.T. 3. E-01		04/14		4
					CE-141	L.T. 1. E-01		04/14		4
					CF-144	L.T. 2. E-01		04/14		4
					RA-226	1.14+-0.60E 00		04/14		4
					TH-228	9.39+-0.94E-01		04/14		4



## TELEDYNE BROWN ENGINEER ENVIRONMENTAL SERVICES

REVISED 04/11/94  
RUN DATE 04/20/94

## REPORT OF ANALYSIS

PAGE 11

WORK ORDER NUMBER 4-0353  
CUSTOMER P.O. NUMBER 030225/030600829  
DATE RECEIVED 03/09/94  
DELIVERY DATE 04/11/94ANN MARIE HOLBROW  
MCLAREN/HART  
16755 VON KARMAN AVE  
IRVINE CA 92714

## SOIL

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP DATE	TIME	NUCLIDE	ACTIVITY (PCI/GM DRY)	NUCL-UNIT-% U/M *	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-% *	LAB.
43741	10118MSD 88-20-010-MG		/			BE-7	L.T. 5. E-01		04/15		4
						K-40	2.50+-0.25E 01		04/15		4
						MN-54	L.T. 4. E-02		04/15		4
						CO-58	L.T. 5. E-02		04/15		4
						FE-59	L.T. 1. E-01		04/15		4
						CO-60	L.T. 4. E-02		04/15		4
						ZN-65	L.T. 1. E-01		04/15		4
						ZR-95	L.T. 6. E-02		04/15		4
						RU-103	L.T. 7. E-02		04/15		4
						RU-106	L.T. 4. E-01		04/15		4
						I-131	L.T. 9. E-01		04/15		4
						CS-134	L.T. 5. E-02		04/15		4
						CS-137	8.22+-0.82E-01		04/15		4
						BA-140	L.T. 2. E-01		04/15		4
						CE-141	L.T. 1. E-01		04/15		4
						CE-144	L.T. 2. E-01		04/15		4
						RA-226	1.69+-0.52E 00		04/15		4
						TH-228	9.86+-0.99E-01		04/15		4
43742	11018 88-20-003-FT		03/08 1010			H-3	L.T. 1. E 02	PCI/LITER *	04/07		5
43743	88-00-001-FG 11021		03/08 1126			BE-7	L.T. 4. E-01		03/21		4
						K-40	2.37+-0.24E 01		03/21		4
						MN-54	L.T. 4. E-02		03/21		4
						CO-58	L.T. 4. E-02		03/21		4
						FE-59	L.T. 1. E-01		03/21		4
						CO-60	L.T. 4. E-02		03/21		4
						ZN-65	L.T. 9. E-02		03/21		4
						ZR-95	L.T. 5. E-02		03/21		4
						RU-103	L.T. 4. E-02		03/21		4
						RU-106	L.T. 3. E-01		03/21		4
						I-131	L.T. 1. E-01		03/21		4
						CS-134	L.T. 5. E-02		03/21		4

The customer's identification for Teledyne #43743 has been corrected.

*J. Martin* 4-11-94

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

REPORT OF ANALYSIS

RUN DATE 06/03/94  
PAGE 10

WORK ORDER NUMBER 4-0472  
CUSTOMER P.O. NUMBER 030225/030600829  
DATE RECEIVED 03/21/94  
DELIVERY DATE 04/23/94

ANN MARIE HOLBROW  
MCLAREN/HART  
16755 VON KARMAN AVE  
IRVINE CA 92714

S O I L

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP DATE	NUCLIDE	ACTIVITY (PCI/GM DRY)	NUCL-UNIT-X U/M	DATE	TIME	MTO-COUNT	VOLUME - UNITS ASH-WGHT-%	LAB.
45074	10632	BG-14-003-MG	03/15		BE-7	L.T. 7. E-01		04/27				4
					K-40	1.97+-0.20E 01		04/27				4
					MN-54	L.T. 5. E-02		04/27				4
					CO-58	L.T. 6. E-02		04/27				4
					FE-59	L.T. 2. E-01		04/27				4
					CO-60	L.T. 4. E-02		04/27				4
					ZN-65	L.T. 1. E-01		04/27				4
					ZR-95	L.T. 7. E-02		04/27				4
					RU-103	L.T. 9. E-02		04/27				4
					RU-106	L.T. 5. E-01		04/27				4
					I-131	L.T. 2. E 00		04/27				4
					CS-134	L.T. 6. E-02		04/27				4
					CS-137	8.46+-3.38E-02		04/27				4
					BA-140	L.T. 6. E-01		04/27				4
					CE-141	L.T. 2. E-01		04/27				4
					CE-144	L.T. 4. E-01		04/27				4
					RA-226	3.31+-0.92E 00		04/27				4
					TH-228	1.39+-0.14E 00		04/27				4
45075	10632MS	BG-14-003-MG	/		BE-7	L.T. 7. E-01		05/12				4
					K-40	2.14+-0.21E 01		05/12				4
					MN-54	L.T. 4. E-02		05/12				4
					CO-58	L.T. 6. E-02		05/12				4
					FE-59	L.T. 2. E-01		05/12				4
					CO-60	L.T. 4. E-02		05/12				4
					ZN-65	L.T. 1. E-01		05/12				4
					ZR-95	L.T. 8. E-02		05/12				4
					RU-103	L.T. 9. E-02		05/12				4
					RU-106	L.T. 4. E-01		05/12				4
					I-131	L.T. 5. E 00		05/12				4
					CS-134	L.T. 5. E-02		05/12				4
					CS-137	5.72+-0.57E-01		05/12				4
					BA-140	L.T. 8. E-01		05/12				4

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

REPORT OF ANALYSIS

RUN DATE 06/03/94

PAGE 11

WORK ORDER NUMBER 4-0472

DATE RECEIVED 03/21/94

CUSTOMER P.O. NUMBER 030225/030600829

DELIVERY DATE 04/23/94

ANN MARIE HOLBROW  
MCLAREN/HART  
16755 VON KARMAN AVE  
IRVINE CA 92714

S O I L

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP DATE	TIME	NUCLIDE	ACTIVITY (PCI/GM DRY)	NUCL-UNIT-% U/M *	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-% *	LAB.
45075	10632MS 86-14-003-MG		/			CE-141	L.T. 2. E-01		05/12		4
						CE-144	L.T. 3. E-01		05/12		4
						RA-226	2.08+-0.64E 00		05/12		4
						TH-228	1.41+-0.14E 00		05/12		4
45076	10632MSD 86-14-003-MG		/			BE-7	L.T. 7. E-01		05/13		4
						K-40	2.07+-0.21E 01		05/13		4
						MN-54	L.T. 4. E-02		05/13		4
						CO-58	L.T. 6. E-02		05/13		4
						FE-59	L.T. 2. E-01		05/13		4
						CO-60	L.T. 4. E-02		05/13		4
						ZN-65	L.T. 1. E-01		05/13		4
						ZR-95	L.T. 8. E-02		05/13		4
						RU-103	L.T. 1. E-01		05/13		4
						RU-106	L.T. 4. E-01		05/13		4
						I-131	L.T. 6. E 00		05/13		4
						CS-134	L.T. 5. E-02		05/13		4
						CS-137	7.61+-0.76E-01		05/13		4
						BA-140	L.T. 8. E-01		05/13		4
						CE-141	L.T. 2. E-01		05/13		4
						CE-144	L.T. 3. E-01		05/13		4
						RA-226	1.56+-0.64E 00		05/13		4
						TH-228	1.42+-0.14E 00		05/13		4
45077	10633 86-14-004-ST		03/15			H-3	5.2 +-3.2 E 02	PCI/LITER *	05/26		5
45078	10634 86-14-004-SS		03/15			SR-90	L.T. 7. E-02		04/28		3
45079	10634DUP 86-14-004-SS		03/15			SR-90	9.3 +-5.1 E-02		04/30		3

## TELEDYNE BROWN ENGINEER ENVIRONMENTAL SERVICES

REVISED 07/20/94  
RUN DATE 05/04/94

## REPORT OF ANALYSIS

PAGE 31

WORK ORDER NUMBER 4-0354 CUSTOMER P.O. NUMBER 030225/030600829 DATE RECEIVED 03/11/94 DELIVERY DATE 04/13/94

ANN MARIE HOLBROW  
MCLAREN/HART  
16755 VON KARMAN AVE  
IRVINE CA 92714

## S O I L

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP DATE	TIME	NUCLIDE	ACTIVITY (PCI/GM DRY)	NUCL-UNIT-% U/M *	MID-COUNT DATE	TIME	VOLUME - UNITS ASH-WGHT-% *	LAB.
44030	10200	8B-17-8002-SP	03/09	1355		PU-238	L.T. 1. E-02		04/05			6
						PU-239	L.T. 1. E-02		04/05			6
44031	10201	8B-17-8002-SG	03/09	1355		8E-7	L.T. 5. E-01		04/09			4
						K-40	2.28+-0.23E 01		04/09			4
						MN-54	L.T. 4. E-02		04/09			4
						CO-58	L.T. 5. E-02		04/09			4
						FE-59	L.T. 1. E-01		04/09			4
						CO-60	L.T. 4. E-02		04/09			4
						ZN-65	L.T. 9. E-02		04/09			4
						ZR-95	L.T. 6. E-02		04/09			4
						RU-103	L.T. 6. E-02		04/09			4
						RU-106	L.T. 4. E-01		04/09			4
						I-131	L.T. 5. E-01		04/09			4
						CS-134	L.T. 5. E-02		04/09			4
						CS-137	1.30+-0.40E-01		04/09			4
						BA-140	L.T. 2. E-01		04/09			4
						CE-141	L.T. 1. E-01		04/09			4
						CE-144	L.T. 3. E-01		04/09			4
						RA-226	2.04+-0.62E 00		04/09			4
						TH-228	1.16+-0.12E 00		04/09			4

## Activity added to spiked samples

TI#	Isotope	Activity
43937	H-3	1.4 E 03 pCi/l
43938	H-3	1.4 E 03 pCi/l
43994	Cs-137	5.6 E-01 pCi/g
43995	Cs-137	5.6 E-01 pCi/g
44000	Pu-239	3.3 E-01 pCi/g
44001	Pu-239	3.3 E-01 pCi/g

The exponent for the H-3 added to Teledyne #43937 and 43938 has been corrected.

*Milstein 7-20-94*

 **TELEDYNE**  
**BROWN ENGINEERING**  
**Environmental Services**

50 VAN BUREN AVENUE

P.O. BOX 1235

WESTWOOD, NEW JERSEY 07675-1235

(201) 664-7070 FAX (201) 664-5586

July 20, 1994

Ms. Ann Marie Holbrow  
ChemRisk  
A Division of McLaren/Hart  
16755 Von Karman Avenue  
Irvine, CA 92714

Reference: W.O. 4-0514

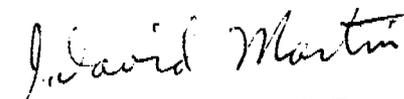
Dear Ms. Holbrow:

Activity added to spike samples:

<u>TELEDYNE #</u>	<u>ISOTOPE</u>	<u>ACTIVITY</u>
44663	H-3	7.0 E 03 pCi/l
44664	H-3	7.0 E 03 pCi/l
44729	H-3	3.5 E 03 pCi/l
44730	H-3	3.5 E 03 pCi/l
44670	Pu-239	0.33 pCi/g
44671	Pu-239	0.33 pCi/g
44692	Sr-90	3.8 pCi/g
44693	Sr-90	3.8 pCi/g
44752	Sr-90	3.8 pCi/g
44753	Sr-90	3.8 pCi/g
44675	Cs-137 (a)	0.70 pCi/g
44676	Cs-137 (a)	0.70 pCi/g

(a) The sample had 0.074 pCi/g of Cs-137 activity before the spike was added.

Sincerely,



J. David Martin, Ph.D.  
Manager, Environmental Analysis

JDM:cs

 **TELEDYNE  
BROWN ENGINEERING  
Environmental Services**

50 VAN BUREN AVENUE  
P.O. BOX 1235  
WESTWOOD, NEW JERSEY 07675-1235  
(201) 664-7070 FAX (201) 664-5586

July 20, 1994

Ms. Ann Marie Holbrow  
ChemRisk  
A Division of McLaren/Hart  
16755 Von Karman Avenue  
Irvine, CA 92714

Reference: W.O. 4-0409

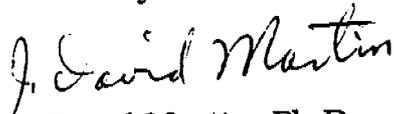
Dear Ms. Holbrow:

Activity added to spike samples:

<u>TELEDYNE #</u>	<u>ISOTOPE</u>	<u>ACTIVITY</u>
44212	H-3	3.5 E 03 pCi/l
44213	H-3	3.5 E 03 pCi/l
44177	Pu-239	0.33 pCi/g
44178	Pu-239	0.33 pCi/g
44169	Cs-137 (a)	0.62 pCi/g
44170	Cs-137 (a)	0.62 pCi/g

(a) The sample had 0.17 pCi/g of Cs-137 activity before the spike was added.

Sincerely,



J. David Martin, Ph.D.  
Manager, Environmental Analysis

JDM:cs

 **TELEDYNE**  
**BROWN ENGINEERING**  
**Environmental Services**

50 VAN BUREN AVENUE

P.O. BOX 1235

WESTWOOD, NEW JERSEY 07675-1235

(201) 664-7070 FAX (201) 664-5586

July 26, 1994

Ms. Ann Marie Holbrow  
ChemRisk  
A Division of McLaren/Hart  
16755 Von Karman Avenue  
Irvine, CA 92714

Reference: W.O. 4-0409

Dear Ms. Holbrow:

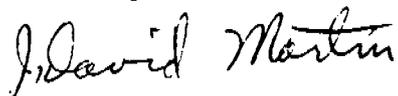
Activity added to spike samples:

<u>TELEDYNE #</u>	<u>ISOTOPE</u>	<u>ACTIVITY</u>
44212	H-3	3.5 E 03 pCi/l
44213	H-3	3.5 E 03 pCi/l
44177	Pu-239	0.66 pCi/g (b)
44178	Pu-239	0.66 pCi/g (b)
44169	Cs-137 (a)	0.62 pCi/g
44170	Cs-137 (a)	0.62 pCi/g

(a) The sample had 0.17 pCi/g of Cs-137 activity before the spike was added.

(b) The incorrect activity of 0.33 pCi/g was listed in the letter dated July 20, 1994.

Sincerely,



J. David Martin, Ph.D.  
Manager, Environmental Analysis

JDM:cm



*Gamma Scan*



TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

RUN DATE 05/12/94

PAGE 5

REPORT OF ANALYSIS

DELIVERY DATE

PAGE 5

DATE RECEIVED

04/16/94

CUSTOMER P.O. NUMBER

03/14/94

WORK ORDER NUMBER

030225/030600829

4-0409

ANN MARIE HOLBROW

MCLAREN/HART

16755 VON KARMAN AVE

IRVINE CA

92714

SOIL

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP DATE	TIME	NUCLIDE	ACTIVITY (PCI/GM DRY)	NUCL-UNIT-X U/M	MID-COUNT DATE	TIME	VOLUME - UNITS ASH-WGHT-X	LAB.
44169	10348MS	BG-02-017-MG				ZR-95	L.T. 7. E-02		04/14			4
						RU-103	L.T. 7. E-02		04/14			4
						RU-106	L.T. 3. E-01		04/14			4
						I-131	L.T. 7. E-01		04/14			4
						CS-134	L.T. 4. E-02		04/14			4
						CS-137	8.77+-0.88E-01		04/14			4
						BA-140	L.T. 2. E-01		04/14			4
						CE-141	L.T. 1. E-01		04/14			4
						CE-144	L.T. 3. E-01		04/14			4
						RA-226	2.36+-0.60E 00		04/14			4
						TH-228	1.57+-0.16E 00		04/14			4
44170	10348MSD	BG-02-017-MG				BE-7	L.T. 7. E-01		04/13			4
						K-40	2.06+-0.21E 01		04/13			4
						MN-54	L.T. 5. E-02		04/13			4
						CO-58	L.T. 6. E-02		04/13			4
						FE-59	L.T. 2. E-01		04/13			4
						CO-60	L.T. 5. E-02		04/13			4
						ZN-65	L.T. 1. E-01		04/13			4
						ZR-95	L.T. 7. E-02		04/13			4
						RU-103	L.T. 9. E-02		04/13			4
						RU-106	L.T. 4. E-01		04/13			4
						I-131	L.T. 9. E-01		04/13			4
						CS-134	L.T. 6. E-02		04/13			4
						CS-137	8.66+-0.87E-01		04/13			4
						BA-140	L.T. 3. E-01		04/13			4
						CE-141	L.T. 2. E-01		04/13			4
						CE-144	L.T. 4. E-01		04/13			4
						RA-226	2.25+-0.85E 00		04/13			4
						TH-228	1.24+-0.12E 00		04/13			4

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

RUN DATE 05/25/94

REPORT OF ANALYSIS

PAGE 14

WORK ORDER NUMBER 4-0514  
 CUSTOMER P.O. NUMBER 030225/030600829  
 DATE RECEIVED 03/15/94  
 DELIVERY DATE 04/17/94

ANN MARIE HOLBROW  
 MCLAREN/HART  
 16755 VON KARMAN AVE  
 IRVINE CA 92714

SOIL

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP DATE	NUCLIDE	ACTIVITY (PCI/GM DRY)	NUCL-UNIT-% U/M *	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-% *	LAB.
44673	10565	86-12-004-SG	03/14	1225	BE-7	L.T. 3. E-01		04/26		4
					K-40	1.79+-0.32E 00		04/26		4
					MN-54	L.T. 2. E-02		04/26		4
					CO-58	L.T. 3. E-02		04/26		4
					FE-59	L.T. 9. E-02		04/26		4
					CO-60	L.T. 2. E-02		04/26		4
					ZN-65	L.T. 5. E-02		04/26		4
					ZR-95	L.T. 4. E-02		04/26		4
					RU-103	L.T. 5. E-02		04/26		4
					RU-106	L.T. 2. E-01		04/26		4
					I-131	L.T. 1. E 00		04/26		4
					CS-134	L.T. 2. E-02		04/26		4
					CS-137	9.71+-2.02E-02		04/26		4
					BA-140	L.T. 2. E-01		04/26		4
					CE-141	L.T. 8. E-02		04/26		4
					CE-144	L.T. 2. E-01		04/26		4
					RA-226	L.T. 5. E-01		04/26		4
					TH-228	1.16+-0.29E-01		04/26		4
44674	10566	86-12-004-MG	03/14	1225	BE-7	L.T. 4. E-01		04/26		4
					K-40	1.91+-0.29E 00		04/26		4
					MN-54	L.T. 3. E-02		04/26		4
					CO-58	L.T. 3. E-02		04/26		4
					FE-59	L.T. 9. E-02		04/26		4
					CO-60	L.T. 3. E-02		04/26		4
					ZN-65	L.T. 5. E-02		04/26		4
					ZR-95	L.T. 3. E-02		04/26		4
					RU-103	L.T. 5. E-02		04/26		4
					RU-106	L.T. 2. E-01		04/26		4
					I-131	L.T. 1. E 00		04/26		4
					CS-134	L.T. 3. E-02		04/26		4
					CS-137	7.41+-2.32E-02		04/26		4
					BA-140	L.T. 2. E-01		04/26		4





TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

RUN DATE 05/04/94

PAGE 23

REPORT OF ANALYSIS

WORK ORDER NUMBER 4-0354  
 CUSTOMER P.O. NUMBER 030225/030600829  
 DATE RECEIVED 03/11/94  
 DELIVERY DATE 04/13/94

ANN MARIE HOLBROW  
 MCLAREN/HART  
 16755 VON KARMAN AVE  
 IRVINE CA 92714

SOIL

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE		NUCLIDE	ACTIVITY (PCI/GM DRY)	NUCL-UNIT-% U/M #	MID-COUNT		VOLUME - UNITS ASH-WGHT-% #	LAB.
			START DATE	STOP DATE				TIME	DATE		
43993	10191 88-17-009A-MT		03/09		BE-7	L.T. 5. E-01		05/02		4	
					K-40	2.31+-0.23E 01		05/02		4	
					MN-54	L.T. 3. E-02		05/02		4	
					CO-58	L.T. 5. E-02		05/02		4	
					FE-59	L.T. 1. E-01		05/02		4	
					CO-60	L.T. 3. E-02		05/02		4	
					ZN-65	L.T. 9. E-02		05/02		4	
					ZR-95	L.T. 6. E-02		05/02		4	
					RU-103	L.T. 7. E-02		05/02		4	
					RU-106	L.T. 3. E-01		05/02		4	
					I-131	L.T. 3. E 00		05/02		4	
					CS-134	L.T. 4. E-02		05/02		4	
					CS-137	1.99+-0.25E-01		05/02		4	
					BA-140	L.T. 5. E-01		05/02		4	
					CE-141	L.T. 1. E-01		05/02		4	
					CE-144	L.T. 2. E-01		05/02		4	
					RA-226	2.68+-0.48E 00		05/02		4	
					TH-228	1.14+-0.11E 00		05/02		4	
43994	10191MS 88-17-009A-MT		03/09		BE-7	L.T. 7. E-01		05/03		4	
					K-40	2.25+-0.22E 01		05/03		4	
					MN-54	L.T. 5. E-02		05/03		4	
					CO-58	L.T. 6. E-02		05/03		4	
					FE-59	L.T. 2. E-01		05/03		4	
					CO-60	L.T. 4. E-02		05/03		4	
					ZN-65	L.T. 1. E-01		05/03		4	
					ZR-95	L.T. 9. E-02		05/03		4	
					RU-103	L.T. 1. E-01		05/03		4	
					RU-106	L.T. 4. E-01		05/03		4	
					I-131	L.T. 5. E 00		05/03		4	
					CS-134	L.T. 5. E-02		05/03		4	
					CS-137	7.15+-0.72E-01		05/03		4	
					BA-140	L.T. 9. E-01		05/03		4	



*Isotopic Plutonium*







TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

RUN DATE 05/25/94

REPORT OF ANALYSIS

PAGE 13

WORK ORDER NUMBER 4-0514  
 CUSTOMER P.O. NUMBER 030225/030600829  
 DATE RECEIVED 03/15/94  
 DELIVERY DATE 04/17/94

ANN MARIE HOLBROW  
 MCLAREN/HART  
 16755 VON KARMAN AVE  
 IRVINE CA 92714

S O I L

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE		NUCLIDE	ACTIVITY (PCI/GM DRY)	NUCL-UNIT-X U/M *	MID-COUNT		LAB.
			START DATE	STOP DATE				TIME	DATE	
44668	8G-12-001-SG		03/14	1200	ZN-65 ZR-95 RU-103 RU-106 I-131 CS-134 CS-137 BA-140 CE-141 CE-144 RA-226 TH-228	L.T. 6. L.T. 4. L.T. 5. L.T. 2. L.T. 9. L.T. 3. L.T. 3. L.T. 2. L.T. 7. L.T. 2. L.T. 4. L.T. 5.	E-02 E-02 E-01 E-01 E-02 E-02 E-01 E-02 E-01 E-01 E-01 E-02	04/25 04/25 04/25 04/25 04/25 04/25 04/25 04/25 04/25 04/25 04/25 04/25		4 4 4 4 4 4 4 4 4 4 4 4
44669	8G-12-001-MP		03/14	1200	PU-238 PU-239	L.T. 6. L.T. 6.	E-03 E-03	04/22 04/22		6 6
44670	8G-12-001-MP		/	/	PU-239	3.2 +-0.4	E-01	04/22		6
44671	8G-12-001-MP		/	/	PU-239	2.9 +-0.5	E-01	04/22		6
44672	8G-12-004-SP		03/14	1225	PU-238 U-234 TH-230 PU-239 U-235 U-238 TH-232 TH-228	L.T. 8. 4.9 +-1.7 8.2 +-3.0 L.T. 1. L.T. 6. 5.8 +-1.9 6.3 +-2.7 8.0 +-4.1	E-03 E-02 E-02 E-02 E-03 E-02 E-02 E-02	04/23 04/26 05/03 04/23 04/26 04/26 05/03 05/03		6 6 6 6 6 6 6 6



REVISED 02/20/94  
 RUN DATE 05/04/94

PAGE 31

TELEDYNE BROWN ENGINEER ENVIRONMENTAL SERVICES

REPORT OF ANALYSIS

DELIVERY DATE

DATE RECEIVED

04/13/94

CUSTOMER P.O. NUMBER

03/11/94

WORK ORDER NUMBER

030225/030600829

4-0354

ANN MARIE HOLBROW  
 MCLAREN/HART  
 16755 VON KARMAN AVE  
 IRVINE CA

92714

S O I L

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE		NUCLIDE	ACTIVITY (PCI/GH DRY)	NUCL-UNIT-% U/M	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-%	LAB.
			START DATE	STOP DATE						
44030	10200	BB-17-B002-SP	03/09	1355	PU-238 PU-239	L.T. 1. E-02 L.T. 1. E-02		04/05 04/05		6
44031	10201	BB-17-B002-SG	03/09	1355	BE-7 K-40 MN-54 CO-58 FE-59 CO-60 ZN-65 ZR-95 RU-103 RU-106 I-131 CS-134 CS-137 BA-140 CE-141 CE-144 RA-226 TH-228	L.T. 5. E-01 2.28+-0.23E 01 L.T. 4. E-02 L.T. 5. E-02 L.T. 1. E-01 L.T. 4. E-02 L.T. 9. E-02 L.T. 6. E-02 L.T. 4. E-01 L.T. 4. E-01 L.T. 5. E-02 L.T. 5. E-02 1.30+-0.40E-01 L.T. 2. E-01 L.T. 1. E-01 L.T. 3. E-01 2.04+-0.62E 00 1.16+-0.12E 00		04/09 04/09 04/09 04/09 04/09 04/09 04/09 04/09 04/09 04/09 04/09 04/09 04/09 04/09 04/09 04/09 04/09 04/09 04/09		6 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4

Activity added to spiked samples

Ti#	Isotope	Activity
43937	H-3	1.4 E 03 pCi/l
43938	H-3	1.4 E 03 pCi/l
43994	Cs-137	5.6 E-01 pCi/g
43995	Cs-137	5.6 E-01 pCi/g
44000	Pu-239	3.3 E-01 pCi/g
44001	Pu-239	3.3 E-01 pCi/g

The exponent for the H-3 added to Teledyne #43937 and 43938 has been corrected.

*Martin* 7-20-94

**TELEDYNE  
BROWN ENGINEERING  
Environmental Services**

50 VAN BUREN AVENUE

P.O. BOX 1235

WESTWOOD, NEW JERSEY 07675-1235

(201) 664-7070 FAX (201) 664-5586

July 20, 1994

Ms. Ann Marie Holbrow  
ChemRisk  
A Division of McLaren/Hart  
16755 Von Karman Avenue  
Irvine, CA 92714

Reference: W.O. 4-0514

Dear Ms. Holbrow:

Activity added to spike samples:

<u>TELEDYNE #</u>	<u>ISOTOPE</u>	<u>ACTIVITY</u>
44663	H-3	7.0 E 03 pCi/l
44664	H-3	7.0 E 03 pCi/l
44729	H-3	3.5 E 03 pCi/l
44730	H-3	3.5 E 03 pCi/l
44670	Pu-239	0.33 pCi/g
44671	Pu-239	0.33 pCi/g
44692	Sr-90	3.8 pCi/g
44693	Sr-90	3.8 pCi/g
44752	Sr-90	3.8 pCi/g
44753	Sr-90	3.8 pCi/g
44675	Cs-137 (a)	0.70 pCi/g
44676	Cs-137 (a)	0.70 pCi/g

(a) The sample had 0.074 pCi/g of Cs-137 activity before the spike was added.

Sincerely,

*J. David Martin*

J. David Martin, Ph.D.  
Manager, Environmental Analysis

JDM:cs

 **TELEDYNE  
BROWN ENGINEERING  
Environmental Services**

50 VAN BUREN AVENUE

P.O. BOX 1235

WESTWOOD, NEW JERSEY 07675-1235

(201) 664-7070 FAX (201) 664-5586

July 20, 1994

Ms. Ann Marie Holbrow  
ChemRisk  
A Division of McLaren/Hart  
16755 Von Karman Avenue  
Irvine, CA 92714

Reference: W.O. 4-0409

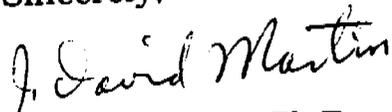
Dear Ms. Holbrow:

Activity added to spike samples:

<u>TELEDYNE #</u>	<u>ISOTOPE</u>	<u>ACTIVITY</u>
44212	H-3	3.5 E 03 pCi/l
44213	H-3	3.5 E 03 pCi/l
44177	Pu-239	0.33 pCi/g
44178	Pu-239	0.33 pCi/g
44169	Cs-137 (a)	0.62 pCi/g
44170	Cs-137 (a)	0.62 pCi/g

(a) The sample had 0.17 pCi/g of Cs-137 activity before the spike was added.

Sincerely,



J. David Martin, Ph.D.  
Manager, Environmental Analysis

JDM:cs

 **TELEDYNE  
BROWN ENGINEERING  
Environmental Services**

50 VAN BUREN AVENUE

P.O. BOX 1235

WESTWOOD, NEW JERSEY 07675-1235

(201) 664-7070 FAX (201) 664-5586

July 26, 1994

Ms. Ann Marie Holbrow  
ChemRisk  
A Division of McLaren/Hart  
16755 Von Karman Avenue  
Irvine, CA 92714

Reference: W.O. 4-0409

Dear Ms. Holbrow:

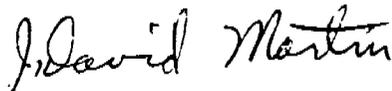
Activity added to spike samples:

<u>TELEDYNE #</u>	<u>ISOTOPE</u>	<u>ACTIVITY</u>
44212	H-3	3.5 E 03 pCi/l
44213	H-3	3.5 E 03 pCi/l
44177	Pu-239	0.66 pCi/g (b)
44178	Pu-239	0.66 pCi/g (b)
44169	Cs-137 (a)	0.62 pCi/g
44170	Cs-137 (a)	0.62 pCi/g

(a) The sample had 0.17 pCi/g of Cs-137 activity before the spike was added.

(b) The incorrect activity of 0.33 pCi/g was listed in the letter dated July 20, 1994.

Sincerely,



J. David Martin, Ph.D.  
Manager, Environmental Analysis

JDM:cm

*Strontium*

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

RUN DATE 04/20/94

REPORT OF ANALYSIS

PAGE 6

WORK ORDER NUMBER 4-0353  
 CUSTOMER P.O. NUMBER 030225/030600829  
 DATE RECEIVED 03/09/94  
 DELIVERY DATE 04/11/94

ANN MARIE HOLBROW  
 MCLAREN/HART  
 16755 VON KARMAN AVE  
 IRVINE CA 92714

SOIL

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP DATE	TIME	NUCLIDE	ACTIVITY (PCI/GM DRY)	NUCL-UNIT-% U/M *	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-% *	LAB.
43729	10111	88-20-008-MS	03/08	1316		SR-90	1.1 ±0.4 E-01		03/29		3
43730	10111MS	88-20-008-MS	/			SR-90	3.9 ±0.2 E 00		04/07		3
43731	10111MSD	88-20-008-MS	/			SR-90	3.9 ±0.2 E 00		04/07		3
43732	10112	88-20-009-ST	03/08	1326		H-3	L.T. 1. E 02	PCI/LITER *	04/07		5
43733	10113	88-20-009-SS	03/08	1326		SR-90	L.T. 6. E-02		03/30		3
43734	10114	88-20-009-SG	03/08	1326		BE-7	L.T. 4. E-01		03/21		4
						K-40	2.53 ±0.25E 01		03/21		4
						MN-54	L.T. 4. E-02		03/21		4
						CO-58	L.T. 4. E-02		03/21		4
						FE-59	L.T. 1. E-01		03/21		4
						CO-60	L.T. 4. E-02		03/21		4
						ZN-65	L.T. 1. E-01		03/21		4
						ZR-95	L.T. 5. E-02		03/21		4
						RU-103	L.T. 5. E-02		03/21		4
						RU-106	L.T. 3. E-01		03/21		4
						I-131	L.T. 1. E-01		03/21		4
						CS-134	L.T. 5. E-02		03/21		4
						CS-137	7.56 ±3.64E-02		03/21		4
						RA-140	L.T. 7. E-02		03/21		4
						CE-141	L.T. 7. E-02		03/21		4
						CE-144	L.T. 2. E-01		03/21		4
						RA-226	1.54 ±0.54E 00		03/21		4
						TH-228	1.41 ±0.14E 00		03/21		4



TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

REPORT OF ANALYSIS

RUN DATE 06/03/94  
PAGE 14

WORK ORDER NUMBER 4-0472  
CUSTOMER P.O. NUMBER 030225/030600829  
DATE RECEIVED 03/21/94  
DELIVERY DATE 04/23/94

ANN MARIE HOLBROW  
MCLAREN/HART  
16755 VON KARMAN AVE  
IRVINE CA 92714

S O I L

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP DATE	TIME	NUCLIDE	ACTIVITY (PCI/GM DRY)	NUCL-UNIT-% U/M *	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-% *	LAB.
45087	10619	BG-14-001-MS	03/15	1000		SR-90	L.T. 7. E-02		04/28		3
45088	10619MS	BG-14-001-MS	/			SR-90	4.0 +-0.3 E 00		05/02		3
45089	10619MSD	BG-14-001-MS	/			SR-90	4.0 +-0.2 E 00		04/30		3
45090	10620	BG-14-002-ST	03/15	1000		H-3	L.T. 1. E 02	PCI/LITER *	05/27		5
45091	10621	BG-14-002-SS	03/15	1000		SR-90	L.T. 9. E-02		04/30		3
45092	10622	BG-14-002-SP	03/15	1000		PU-238 U-234 TH-230 PU-239 U-235 U-238 TH-232 TH-228	L.T. 1. E-02 3.1 +-0.4 E-01 3.8 +-0.5 E-01 L.T. 1. E-02 1.8 +-1.0 E-02 4.0 +-0.5 E-01 1.2 +-0.1 E 00 7.8 +-0.8 E-01		05/09 05/12 05/18 05/09 05/12 05/12 05/18 05/18		6 6 6 6 6 6 6 6
45114	11225	BG-00-004-FS	03/15	0841		SR-90	L.T. 9. E-02		04/30		3
45115	11226	BG-01-090-SS	03/15			SR-90	L.T. 1. E-01		04/30		3
45116	11227	BG-00-008-FT	03/15	0908		H-3	L.T. 2. E 02	PCI/LITER *	05/27		5
45117	11229	BG-14-001-SS	03/15	1000		SR-90	8.2 +-4.3 E-02		04/30		3
45490	10332	BG-02-007-ST	03/10	1610		H-3	L.T. 1. E 02	PCI/LITER *	05/27		5



**TELEDYNE**  
**BROWN ENGINEERING**  
**Environmental Services**

50 VAN BUREN AVENUE

P.O. BOX 1235

WESTWOOD, NEW JERSEY 07675-1235

(201) 664-7070 FAX (201) 664-5586

July 20, 1994

Ms. Ann Marie Holbrow  
ChemRisk  
A Division of McLaren/Hart  
16755 Von Karman Avenue  
Irvine, CA 92714

Reference: W.O. 4-0514

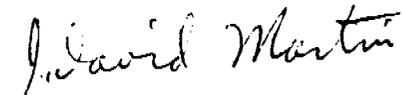
Dear Ms. Holbrow:

Activity added to spike samples:

<u>TELEDYNE #</u>	<u>ISOTOPE</u>	<u>ACTIVITY</u>
44663	H-3	7.0 E 03 pCi/l
44664	H-3	7.0 E 03 pCi/l
44729	H-3	3.5 E 03 pCi/l
44730	H-3	3.5 E 03 pCi/l
44670	Pu-239	0.33 pCi/g
44671	Pu-239	0.33 pCi/g
44692	Sr-90	3.8 pCi/g
44693	Sr-90	3.8 pCi/g
44752	Sr-90	3.8 pCi/g
44753	Sr-90	3.8 pCi/g
44675	Cs-137 (a)	0.70 pCi/g
44676	Cs-137 (a)	0.70 pCi/g

(a) The sample had 0.074 pCi/g of Cs-137 activity before the spike was added.

Sincerely,



J. David Martin, Ph.D.  
Manager, Environmental Analysis

JDM:cs

*Tritium*



TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

REPORT OF ANALYSIS

RUN DATE 05/25/94

PAGE 12

WORK ORDER NUMBER 4-0514 CUSTOMER P.O. NUMBER 030225/030600829 DATE RECEIVED 03/15/94 DELIVERY DATE 04/17/94

ANN MARIE HOLBROM  
MCLAREN/HART  
16755 VON KARMAN AVE  
IRVINE CA 92714

SOIL

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP DATE	NUCLIDE	ACTIVITY (PCI/GM DRY)	NUCL-UNIT-X U/M *	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-% *	LAB.
44661	86-11-031-SG		03/14	1250	CS-134 CS-137 BA-140 CE-141 CE-144 RA-226 TH-228	L.T. 3. E-02 5.87+-2.34E-02 L.T. 3. E-01 L.T. 1. E-01 L.T. 2. E-01 L.T. 6. E-01 1.81+-0.45E-01		04/25 04/25 04/25 04/25 04/25 04/25		4 4 4 4 4 4 4
44662	86-11-031-MT		03/14	1250	H-3	L.T. 7. E 02	PCI/LITER *	05/25		5
44663	86-11-031-MT		03/14	1250	H-3	7.9 +-0.6 E 03	PCI/LITER *	05/22		5
44664	86-11-031-MT		03/14	1250	H-3	8.4 +-0.6 E 03	PCI/LITER *	05/22		5
44665	86-12-001-ST		03/14	1200	H-3	7.2 +-3.4 E 02	PCI/LITER *	05/22		5
44666	86-12-001-SS		03/14	1200	SR-90	L.T. 8. E-02		04/16		3
44667	86-12-001-SP		03/14	1200	PU-238 U-234 TH-230 PU-238 U-235 U-238 TH-232 TH-228	L.T. 6. E-03 8.9 +-7.8 E-03 2.2 +-1.7 E-02 L.T. 6. E-03 L.T. 6. E-03 3.3 +-1.4 E-02 2.4 +-1.5 E-02 L.T. 4. E-02		04/22 04/26 05/06 04/22 04/26 04/26 05/06 05/06		6 6 6 6 6 6 6 6
44668	86-12-001-SG		03/14	1200	BE-7 K-40 MN-54 CO-58 FE-59 CO-60	L.T. 3. E-01 1.72+-0.26E 00 L.T. 3. E-02 L.T. 3. E-02 L.T. 9. E-02 L.T. 2. E-02		04/25 04/25 04/25 04/25 04/25 04/25		4 4 4 4 4 4



TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

REPORT OF ANALYSIS

RUN DATE 04/06/94

PAGE 4

WORK ORDER NUMBER 4-0185 CUSTOMER P.O. NUMBER 030225/030600829 DATE RECEIVED 03/08/94 DELIVERY DATE 03/18/94

ANN MARIE HOLBROW  
MCLAREN/HART  
16755 VON KARMAN AVE  
IRVINE CA 92714

S O I L

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP DATE	TIME	NUCLIDE	ACTIVITY ( PCI/LITER)	NUCL-UNIT-X U/M	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-X %	LAB.
43219	10051MS	BB-02-045-MT	03/07	1133		H-3	3.1 +-0.3 E 03		03/30		5
43220	10052	BB-02-060-ST	03/07	1134		H-3	L.T. 2. E 02		03/28		5
43221	10053	BB-02-075-ST	03/07	1140		H-3	L.T. 2. E 02		03/28		5
43222	10055	BB-02-078-ST	03/07	1139		H-3	L.T. 2. E 02		03/28		5
43262	10062DUP	SM-03-012-ST	03/07	1422		H-3	L.T. 2. E 02		03/30		5
43263	10030MSD	BB-06-092-MT	/			H-3	3.3 +-0.3 E 03		03/30		5
43264	10058DUP	BB-12-023-ST	03/07	1313		H-3	L.T. 2. E 02		03/27		5
43265	10051MSD	BB-02-045-MT	/			H-3	2.9 +-0.2 E 03		03/30		5
43368	10030	BB-06-092-MT	03/07	0918		H-3	L.T. 1. E 02		03/30		5
43369	10051	BB-02-045-MT	03/07	1133		H-3	2.3 +-1.4 E 02		03/30		5

H-3 activity added to prepare matrix spikes

TI#	H-3 pCi/l
43202	2.7 +- 0.3 E 03
43263	2.7 +- 0.3 E 03
43219	2.7 +- 0.3 E 03
43265	2.7 +- 0.3 E 03

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

REPORT OF ANALYSIS

RUN DATE 04/06/94

PAGE 2

WORK ORDER NUMBER 4-0185  
 CUSTOMER P.O. NUMBER 030225/030600829  
 DATE RECEIVED 03/08/94  
 DELIVERY DATE 03/18/94

ANN MARIE HOLBROW  
 MCLAREN/HART  
 16755 VON KARMAN AVE  
 IRVINE CA 92714

S O I L

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP DATE	TIME	NUCLIDE	ACTIVITY ( PCI/LITER)	NUCL-UNIT-% U/M *	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-% *	LAB.
43187	88-14-004-ST		03/04	1625		H-3	L.T. 2. E 02		03/20		5
43188	SM-03-012-ST		03/07	1422		H-3	L.T. 1. E 02		03/30		5
43190	SM-03-015-ST		03/07	1420		H-3	L.T. 1. E 02		03/21		5
43191	SM-03-009-ST		03/07	1423		H-3	L.T. 1. E 02		03/21		5
43192	SM-03-001-ST		03/07	1425		H-3	L.T. 1. E 02		03/21		5
43193	SM-03-014-ST		03/07	1430		H-3	L.T. 1. E 02		03/21		5
43194	88-05-003-ST		03/07	1050		H-3	L.T. 1. E 02		03/30		5
43195	88-05-089-ST		03/07	1052		H-3	L.T. 1. E 02		03/21		5
43196	88-05-089FDT		03/07	1052		H-3	L.T. 1. E 02		03/21		5
43197	88-05-006-ST		03/07	1102		H-3	L.T. 1. E 02		03/21		5
43198	88-05-057-ST		03/07	1112		H-3	L.T. 1. E 02		03/21		5
43199	88-05-077-ST		03/07	1110		H-3	L.T. 1. E 02		03/21		5
43200	88-06-007-ST		03/07	0910		H-3	L.T. 1. E 02		03/21		5
43201	88-06-092-ST		03/07	0918		H-3	L.T. 1. E 02		03/21		5
43202	10030MS 88-06-092-MT		/			H-3	3.0 +-0.2 E 03		03/30		5

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

REPORT OF ANALYSIS

RUN DATE 04/20/94  
PAGE 1

WORK ORDER NUMBER 4-0353  
CUSTOMER P.O. NUMBER 030225/030600R29  
DATE RECEIVED 03/09/94  
DELIVERY DATE 04/11/94

ANN MARIE HOLBROW  
MCLAREN/HART  
16755 VON KARMAN AVE  
IRVINE CA 92714

S O I L

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP DATE	TIME	NUCLIDE	ACTIVITY ( PCI/LITER)	NUCL-UNIT-% U/M *	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-%	LAB.
43677	88-00-002-PT		03/08			H-3	1.7 +-0.2 E 03		04/03		5
43678	88-00-001-PT		03/08			H-3	L.T. 2. E 02		04/03		5
43684	88-00-004-PT		03/08			H-3	L.T. 2. E 02		04/03		5
43685	88-00-003-PT		03/08			H-3	1.7 +-0.2 E 03		04/04		5
43689	88-03-025-ST		03/08	1358		H-3	L.T. 2. E 02		04/04		5
43690	88-03-079-ST		03/08	1405		H-3	L.T. 1. E 02		04/04		5
43691	88-03-017-ST		03/08	1407		H-3	L.T. 2. E 02		04/04		5
43692	88-03-005-ST		03/08	1410		H-3	L.T. 2. E 02		04/04		5
43693	88-03-003-ST		03/08	1423		H-3	L.T. 2. E 02		04/04		5
43694	88-03-026-ST		03/08	1428		H-3	L.T. 1. E 02		04/07		5
43695	88-03-026-ST		03/08	1428		H-3	L.T. 1. E 02		04/07		5
43696	88-03-026-MT		03/08	1359		H-3	L.T. 1. E 02		04/08		5
43697	88-03-026-MT		/			H-3	1.5 +-0.1 E 04		04/08		5
43698	88-03-026-MT		/			H-3	1.7 +-0.1 E 04		04/08		5
43699	88-03-096-ST		03/08	1400		H-3	L.T. 1. E 02		04/06		5

ANN MARIE HOLBROW  
 MCLAREN/HART  
 16755 VON KARMAN AVE  
 IRVINE CA 92714

WORK ORDER NUMBER 4-0409  
 CUSTOMER P.O. NUMBER 030225/030600829  
 DATE RECEIVED 03/14/94  
 DELIVERY DATE 04/16/94

S O I L

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP TIME	NUCLIDE	ACTIVITY (PCI/GM DRY)	NUCL-UNIT-X U/M *	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-% *	LAB.
44206	10292	EB-15-009-SP	03/10	1025	PU-238 PU-239	L.T. 9. E-03 L.T. 9. E-03		04/09 04/09		6 6
44207	11191	88-15-010-SP	03/10	1030	PU-238 PU-239	L.T. 8. E-03 L.T. 1. E-02		04/09 04/09		6 6
44208	11029	88-00-002-FP	03/10	1025	PU-238 PU-239	L.T. 2. E 02	PCI/LITER *	05/08		5
44210	10282	88-15-001-ST	03/10	0945	H-3	L.T. 3. E 02	PCI/LITER *	05/09		5
44211	10283	88-15-001-MT	03/10	0945	H-3	3.3 +-0.3 E 03	PCI/LITER *	05/09		5
44212	10283MS	BB-15-001-MT	/	/	H-3	3.8 +-0.3 E 03	PCI/LITER *	05/09		5
44213	10283MSD	BB-15-001-MT	/	/	H-3	L.T. 2. E 02	PCI/LITER *	05/09		5
44214	10284	88-15-002-ST	03/10	0935	H-3	L.T. 2. E 02	PCI/LITER *	05/09		5
44215	10285	88-15-003-ST	03/10	0915	H-3	L.T. 2. E 02	PCI/LITER *	05/09		5
44216	10286	88-15-004-ST	03/10	0910	H-3	L.T. 2. E 02	PCI/LITER *	05/09		5
44217	10287	88-15-005-ST	03/10	0910	H-3	L.T. 2. E 02	PCI/LITER *	05/09		6
44218	11190	88-15-001-SP	03/10	0945	PU-238 PU-239	L.T. 1. E-02 L.T. 1. E-02		04/10 04/10		6 6





 **TELEDYNE  
BROWN ENGINEERING  
Environmental Services**

50 VAN BUREN AVENUE

P.O. BOX 1235

WESTWOOD, NEW JERSEY 07675-1235

(201) 664-7070 FAX (201) 664-5586

July 20, 1994

Ms. Ann Marie Holbrow  
ChemRisk  
A Division of McLaren/Hart  
16755 Von Karman Avenue  
Irvine, CA 92714

Reference: W.O. 4-0514

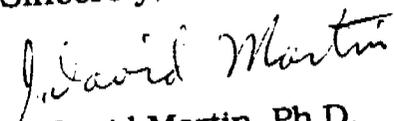
Dear Ms. Holbrow:

Activity added to spike samples:

<u>TELEDYNE #</u>	<u>ISOTOPE</u>	<u>ACTIVITY</u>
44663	H-3	7.0 E 03 pCi/l
44664	H-3	7.0 E 03 pCi/l
44729	H-3	3.5 E 03 pCi/l
44730	H-3	3.5 E 03 pCi/l
44670	Pu-239	0.33 pCi/g
44671	Pu-239	0.33 pCi/g
44692	Sr-90	3.8 pCi/g
44693	Sr-90	3.8 pCi/g
44752	Sr-90	3.8 pCi/g
44753	Sr-90	3.8 pCi/g
44675	Cs-137 (a)	0.70 pCi/g
44676	Cs-137 (a)	0.70 pCi/g

(a) The sample had 0.074 pCi/g of Cs-137 activity before the spike was added.

Sincerely,



J. David Martin, Ph.D.  
Manager, Environmental Analysis

JDM:cs

 **TELEDYNE  
BROWN ENGINEERING  
Environmental Services**

50 VAN BUREN AVENUE

P.O. BOX 1235

WESTWOOD, NEW JERSEY 07675-1235

(201) 664-7070 FAX (201) 664-5586

July 20, 1994

Ms. Ann Marie Holbrow  
ChemRisk  
A Division of McLaren/Hart  
16755 Von Karman Avenue  
Irvine, CA 92714

Reference: W.O. 4-0409

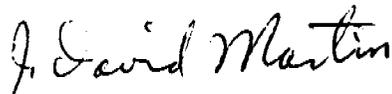
Dear Ms. Holbrow:

Activity added to spike samples:

<u>TELEDYNE #</u>	<u>ISOTOPE</u>	<u>ACTIVITY</u>
44212	H-3	3.5 E 03 pCi/l
44213	H-3	3.5 E 03 pCi/l
44177	Pu-239	0.33 pCi/g
44178	Pu-239	0.33 pCi/g
44169	Cs-137 (a)	0.62 pCi/g
44170	Cs-137 (a)	0.62 pCi/g

(a) The sample had 0.17 pCi/g of Cs-137 activity before the spike was added.

Sincerely,



J. David Martin, Ph.D.  
Manager, Environmental Analysis

JDM:cs

 **TELEDYNE**  
**BROWN ENGINEERING**  
**Environmental Services**

50 VAN BUREN AVENUE

P.O. BOX 1235

WESTWOOD, NEW JERSEY 07675-1235

(201) 664-7070 FAX (201) 664-5586

July 26, 1994

Ms. Ann Marie Holbrow  
ChemRisk  
A Division of McLaren/Hart  
16755 Von Karman Avenue  
Irvine, CA 92714

Reference: W.O. 4-0409

Dear Ms. Holbrow:

Activity added to spike samples:

<u>TELEDYNE #</u>	<u>ISOTOPE</u>	<u>ACTIVITY</u>
44212	H-3	3.5 E 03 pCi/l
44213	H-3	3.5 E 03 pCi/l
44177	Pu-239	0.66 pCi/g (b)
44178	Pu-239	0.66 pCi/g (b)
44169	Cs-137 (a)	0.62 pCi/g
44170	Cs-137 (a)	0.62 pCi/g

- (a) The sample had 0.17 pCi/g of Cs-137 activity before the spike was added.  
(b) The incorrect activity of 0.33 pCi/g was listed in the letter dated July 20, 1994.

Sincerely,

*J. David Martin*

J. David Martin, Ph.D.  
Manager, Environmental Analysis

JDM:cm



*Gamma Scan*



TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

RUN DATE 05/04/94  
PAGE 32

REPORT OF ANALYSIS

WORK ORDER NUMBER 4-0354  
 CUSTOMER P.O. NUMBER 030225/030600829  
 DATE RECEIVED 03/11/94  
 DELIVERY DATE 04/13/94

ANN MARIE HULBROW  
 MCLAREN/HART  
 16755 VON KARMAN AVE  
 IRVINE CA 92714

M A T E R

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP DATE	TIME	NUCLIDE	ACTIVITY (PCI/LITER)	NUCL-UNIT-% U/M #	MID-COUNT DATE	TIME	VOLUME - UNITS ASH-WGHT-%	LAB.
43920	10147	BB-17-005-RP	03/09	0755		PU-238	L.T. 2. E-01		03/31			6
						PU-239	L.T. 2. E-01		03/31			6
43985	10181	BR-17-008A-RG	03/09	0755		BE-7	L.T. 3. E 01		04/04			4
						K-40	L.T. 5. E 01		04/04			4
						MN-54	L.T. 3. E 00		04/04			4
						CO-58	L.T. 4. E 00		04/04			4
						FE-59	L.T. 1. E 01		04/04			4
						CO-60	L.T. 3. E 00		04/04			4
						ZN-65	L.T. 7. E 00		04/04			4
						ZR-95	L.T. 5. E 00		04/04			4
						RU-103	L.T. 5. E 01		04/04			4
						RU-106	L.T. 3. E 01		04/04			4
						I-131	L.T. 3. E 00		04/04			4
						CS-134	L.T. 3. E 00		04/04			4
						CS-137	L.T. 3. E 00		04/04			4
						BA-140	L.T. 1. E 01		04/04			4
						CE-141	L.T. 9. E 00		04/04			4
						CE-144	L.T. 2. E 01		04/04			4
						RA-226	L.T. 6. E 01		04/04			4
						TH-228	L.T. 6. E 00		04/04			4
						H-3	L.T. 2. F 02		05/03			5

44025 10198 88-17-8001-RT 03/09 1120  
 APPROVED BY J. GUENTHER 05/04/94  
*J. Guenther*

SEND 1 COPIES TO MC4805 ANN MARIE HULBROW  
 2 - GAS LAB. 3 - RADIO CHEMISTRY LAB. 4 - GE(LI) GAMMA SPEC LAB. 5 - TRITIUM GAS/L.S. LAB. 6 - ALPHA SPEC LAB.

LAST PAGE OF REPORT

RUN DATE 04/19/94  
PAGE 1

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

DELIVERY DATE  
04/18/94

DATE RECEIVED  
03/16/94

REPORT OF ANALYSIS

CUSTOMER P.O. NUMBER  
030225/030600829

WORK ORDER NUMBER  
4-0638

ANN MARIE HOLBROW  
MCLAREN/HART  
16755 VON KARMAN AVE  
IRVINE CA

92714

W A T E R

COLLECTION-DATE STOP  
START TIME DATE TIME NUCLEIDE

TELEDYNE STA CUSTOMER'S  
SAMPLE NUM IDENTIFICATION  
NUMBER

SR-90  
BE-7  
K-40  
MN-54  
CO-58  
FE-59  
CO-60  
ZN-65  
ZR-95  
RU-103  
RU-106  
I-131  
CS-134  
CS-137  
BA-140  
CE-141  
CE-144  
RA-226  
TH-228

GR-A  
GR-B  
H-3  
03/08 1400  
03/08 1400  
45717 11032 BB-20-002-WA  
45718 11126 BB-20-002-WT

ANN MARIE HOLBROW

SEND 1 COPIES TO MC4805  
3 - RADIO CHEMISTRY LAB.  
2 - GAS LAB.

4 - GEI(LI) GAMMA SPEC LAB.

LAST PAGE OF REPORT

5 - TRITIUM GAS/L-S. LAB.

6 - ALPHA SPEC LAB.

MID-COUNT VOLUME - UNITS  
TIME ASH-WGHT-X \* LAB.  
DATE TIME DATE TIME

NUCL-UNIT-X  
U/M \*

ACTIVITY  
( PCI/LITER)

L.T. 1. E 00  
L.T. 5. E 01  
L.T. 1. E 02  
L.T. 4. E 00  
L.T. 5. E 01  
L.T. 1. E 00  
L.T. 4. E 00  
L.T. 9. E 00  
L.T. 5. E 00  
L.T. 7. E 01  
L.T. 4. E 01  
L.T. 9. E 01  
L.T. 4. E 00  
L.T. 4. E 01  
L.T. 3. E 01  
L.T. 1. E 01  
L.T. 3. E 01  
L.T. 8. E 01  
L.T. 7. E 00  
L.T. 6. E 00  
1.5 +-0.3 E 01  
L.T. 2. E 02

*J. Guenther*  
APPROVED BY J. GUENTHER 04/19/94

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

RUN DATE 04/20/94

REPORT OF ANALYSIS

PAGE 17

WORK ORDER NUMBER

CUSTOMER P.O. NUMBER

DATE RECEIVED

DELIVERY DATE

ANN MARIE HOLBROW  
 MCLAREN/HART  
 16755 VON KARMAN AVE  
 IRVINE CA

4-0353

030225/030600829

04/11/94

92714

M A T E R

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP TIME	NUCLIDE	ACTIVITY (PCI/LITER)	NUCL-UNIT-% U/M	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-%	LAB.
43708	88-20-002-RG		03/08	0854	RA-226 TH-228	L.T. 6. E 01 L.T. 5. E 00		03/11 03/11		4 4
43722	88-20-006-RT		03/08	0854	H-3	L.T. 2. E 02		04/14		5

*J. Guenther*  
 APPROVED BY J. GUENTHER 04/20/94

LAST PAGE OF REPORT

SEND 1 COPIES TO MC4805 ANN MARIE HOLBROW

- 2 - GAS LAB. 3 - RADIO CHEMISTRY LAB. 4 - GEILII GAMMA SPEC LAB. 5 - TRITIUM GAS/L.S. LAB. 6 - ALPHA SPEC LAB.

Activity added to spiked samples

TIC#	Isotope	Activity
43697	H-3	1.4 E 04 pCi/l
43698	H-3	1.4 E 04 pCi/l
43730	Sr-90	3.8 pCi/g
43731	Sr-90	3.8 pCi/g
43740	Cs-137	0.64 pCi/g
43741	Cs-137	0.64 pCi/g

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

RUN DATE 05/12/94

REPORT OF ANALYSIS

PAGE 13

WORK ORDER NUMBER 4-0409  
 CUSTOMER P.O. NUMBER 030225/030600829  
 DATE RECEIVED 03/14/94  
 DELIVERY DATE 04/16/94

ANN MARIE HOLBROW  
 MCLAREN/HART  
 16755 VON KARMAN AVE 92714  
 IRVINE CA

W A T E R

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP TIME	NUCLIDE	ACTIVITY ( PCI/LITER)	NUCL-UNIT-X U/M	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-X	LAB.
44193	11192	BB-19-006-RG	03/10	1050	I-131	L.T. 2. E 01		03/29		4
					CS-134	L.T. 3. E 00		03/29		4
					CS-137	L.T. 3. E 00		03/29		4
					BA-140	L.T. 8. E 00		03/29		4
					CE-141	L.T. 6. E 00		03/29		4
					CE-144	L.T. 2. E 01		03/29		4
					RA-226	L.T. 6. E 01		03/29		4
					TH-228	L.T. 6. E 00		03/29		4
44203	10289	BB-15-006-RP	03/10	0755	PU-238	L.T. 4. E-01		04/09		6
					PU-239	L.T. 4. E-01		04/09		6
44209	11188	BB-15-006-RP	03/10	0755	PU-238	L.T. 2. E-01		04/09		6
					PU-239	L.T. 2. E-01		04/09		6

*J. Guenther*

APPROVED BY J. GUENTHER 05/12/94

LAST PAGE OF REPORT

SEND 1 COPIES TO MC4805 ANN MARIE HOLBROW  
 2 - GAS LAB. 3 - RADIO CHEMISTRY LAB. 4 - GE(LI) GAMMA SPEC LAB. 5 - TRITIUM GAS/L.S. LAB. 6 - ALPHA SPEC LAB.

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

REPORT OF ANALYSIS

RUN DATE 05/25/94

PAGE 34

WORK ORDER NUMBER 4-0514

DELIVERY DATE 04/17/94

CUSTOMER P.O. NUMBER 030225/010600829

DATE RECEIVED 03/15/94

04/17/94

ANN MARIE HOLBROW  
MCLAREN/HART  
16755 VON KARMAN AVE  
IRVINE CA 92714

M A T E R

TELEDYNE SAMPLE NUMBER 44700 11203

CUSTOMER'S IDENTIFICATION 86-09-005-RG

COLLECTION-DATE START DATE 03/11 1313

STOP DATE

NUCLIDE

ACTIVITY (PCI/LITER)

NUCL-UNIT-% U/M #

MID-COUNT TIME DATE

VOLUME - UNITS ASH-WGHT-% #

LAB.

44711	11202	86-09-096-RS	03/11 1313	SR-90	L.T. 1. E 00	04/21	3		
44717	10449	86-09-057-RP	03/11 1313	PU-238 PU-239	L.T. 3. E-01 L.T. 3. E-01	04/19 04/19	6 6		
44736	10436	86-09-096-RS	03/11 1313	SR-90	L.T. 1. E 00	04/21	3		
44742	10443	86-09-005-RG	03/11 1313	BE-7 K-40 MN-54 CO-58 FE-59 CD-60 ZN-65	L.T. 5. E 01 L.T. 5. E 01 L.T. 3. E 00 L.T. 4. E 00 L.T. 1. E 01 L.T. 3. E 00 L.T. 6. E 00	04/29 04/29 04/29 04/29 04/29 04/29 04/29	4 4 4 4 4 4 4		
				ZR-95 RU-103 RU-106 I-131 CS-134 CS-137 BA-140 CE-141 CE-144 RA-226 TH-228	L.T. 4. E 00 L.T. 6. E 00 L.T. 3. E 01 L.T. 2. E 02 L.T. 3. E 00 L.T. 3. E 00 L.T. 3. E 01 L.T. 1. E 01 L.T. 2. E 01 L.T. 5. E 01 L.T. 5. E 00	04/29 04/29 04/29 04/29 04/29 04/29 04/29 04/29 04/29 04/29 04/29	4 4 4 4 4 4 4 4 4 4 4		
				BE-7 K-40 MN-54 CO-58 FE-59 CD-60 ZN-65	L.T. 4. E 01 L.T. 6. E 01 L.T. 3. E 00 L.T. 4. E 00 L.T. 1. E 01 L.T. 3. E 00 L.T. 6. E 00	04/29 04/29 04/29 04/29 04/29 04/29 04/29	4 4 4 4 4 4 4		

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

REPORT OF ANALYSIS

RUN DATE 05/25/94

PAGE 35

WORK ORDER NUMBER 4-0514 CUSTOMER P.O. NUMBER 030225/030600829 DATE RECEIVED 03/15/94 DELIVERY DATE 04/17/94

ANN MARIE HOLBROM  
MCLAREN/HART  
16755 VON KARMAN AVE  
IRVINE CA 92714

W A T E R

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP DATE	NUCLIDE	ACTIVITY ( PCI/LITER)	NUCL-UNIT-% U/M	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-%	LAB.
44742	10443	BG-09-005-RG	03/11	1313	ZR-95	L.T. 4. E 00		04/29		4
					RU-103	L.T. 6. E 00		04/29		4
					RU-106	L.T. 3. E 01		04/29		4
					I-131	L.T. 2. E 02		04/29		4
					CS-134	L.T. 3. E 00		04/29		4
					CS-137	L.T. 3. E 00		04/29		4
					BA-140	L.T. 5. E 01		04/29		4
					CE-141	L.T. 1. E 01		04/29		4
					CE-144	L.T. 2. E 01		04/29		4
					RA-226	L.T. 6. E 01		04/29		4
					TH-228	L.T. 6. E 00		04/29		4

LAST PAGE OF REPORT

APPROVED BY *J. Guenther* J. GUENTHER 05/25/94

SEND 1 COPIES TO MC4805 ANN MARIE HOLBROM

2 - GAS LAB. 3 - RADIO CHEMISTRY LAB. 4 - GEILII GAMMA SPEC LAB. 5 - TRITIUM GAS/L.S. LAB. 6 - ALPHA SPEC LAB.





TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

REPORT OF ANALYSIS

RUN DATE 06/03/94

WORK ORDER NUMBER 4-0472 CUSTOMER P.O. NUMBER 030225/030600829 DATE RECEIVED 03/21/94 DELIVERY DATE 04/23/94 PAGE 17

ANN MARIE HOLBROW  
MCLAREN/HART  
16755 VON KARMAN AVE  
IRVINE CA 92714

W A T E R

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE		NUCLIDE	ACTIVITY ( PCI/LITER)	NUCL-UNIT-X U/M	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-X	LAB.
			START DATE	STOP DATE						
45104	88-04-001-RG		03/15	1057	RA-226 TH-228	L.T. 7. E 01 L.T. 6. E 00		04/04 04/04		4 4
45113	88-01-016-RP		03/15	0816	PU-238 PU-239	L.T. 2. E-01 L.T. 2. E-01		05/06 05/06		6 6
45118	88-04-001-RT		03/15	1057	H-3	L.T. 1. E 02		05/27		5
45119	88-04-001-RS		03/15	1057	SR-90	L.T. 2. E 00		05/06		3
45122	88-04-001-RP		03/15	1057	PU-238 PU-239	L.T. 1. E-01 L.T. 1. E-01		05/10 05/10		6 6
45489	88-02-076-RT		03/10	1558	H-3	L.T. 2. E 02		05/27		5

LAST PAGE OF REPORT

SEND 1 COPIES TO MC480S ANN MARIE HOLBROW

2 - GAS LAB. 3 - RADIO CHEMISTRY LAB. 4 - CELLII GAMMA SPEC LAB. 5 - TRITIUM GAS/L.S. LAB. 6 - ALPHA SPEC LAB.

APPROVED BY J. GUENTHER 06/03/94

*J. Guenther*

Activity added to spiked samples

Ti#	Isotope	Activity
45060	H-3	1.4 E 04 pCi/l
45061	H-3	1.4 E 04 pCi/l
45068	Pu-239	0.33 pCi/g
45069	Pu-239	0.33 "
45075	Cs-137	0.58 "
45076	Cs-137	0.58 "
45088	Sr-90	3.8 "
45089	Sr-90	3.8 "

***Gross Alpha/Beta Scan***



*Isotopic Plutonium*

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

RUN DATE 05/12/94  
PAGE 13

REPORT OF ANALYSIS

DATE RECEIVED 03/14/94  
DELIVERY DATE 04/16/94

CUSTOMER P.O. NUMBER 030225/030600829

ANN MARIE HOLBROW  
MCLAREN/HART  
16755 VON KARMAN AVE 92714  
IRVINE CA

W A T E R

COLLECTION-DATE  
START STOP

DATE TIME DATE TIME

NUCLIDE

ACTIVITY  
( PCI/LITER)

NUCL-UNIT-X  
U/M

MID-COUNT  
TIME  
DATE

VOLUME - UNITS  
ASH-WGHT-X

LAB.

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	START DATE	STOP DATE	TIME	NUCLIDE	ACTIVITY ( PCI/LITER)	NUCL-UNIT-X U/M	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-X	LAB.
44193	11192	88-19-006-RG	03/10	1050		I-131 CS-134 CS-137 BA-140 CE-141 CE-144 RA-226 TH-228	L.T. 2. E 01 L.T. 3. E 00 L.T. 3. E 00 L.T. 8. E 00 L.T. 6. E 00 L.T. 2. E 01 L.T. 6. E 01 L.T. 6. E 00		03/29 03/29 03/29 03/29 03/29 03/29 03/29		4 4 4 4 4 4 4 6 6
44203	10289	88-15-006-RP	03/10	0755		PU-238 PU-239	L.T. 4. E-01 L.T. 4. E-01		04/09 04/09		6 6
44209	11188	88-15-006-RP	03/10	0755		PU-238 PU-239	L.T. 2. E-01 L.T. 2. E-01		04/09 04/09		6 6

*J. Guenther*

APPROVED BY J. GUENTHER 05/12/94

LAST PAGE OF REPORT

SEND 1 COPIES TO MC4805 ANN MARIE HOLBROW  
2 - GAS LAB.  
3 - RADIO CHEMISTRY LAB.  
4 - GELI11 GAMMA SPEC LAB.  
5 - TRITIUM GAS/L.S. LAB.  
6 - ALPHA SPEC LAB.

DELIVERY DATE 04/13/94  
 DATE RECEIVED 03/11/94

CUSTOMER P.O. NUMBER 030225/030600B29

WORK ORDER NUMBER 4-0354

ANN MARIE HOLBROM  
 MCLAREN/HART  
 16755 VON KARMAN AVE 92714  
 IRVINE CA

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP TIME	NUCLIDE	WATER	ACTIVITY (PCI/LITER)	NUCL-UNIT-% U/M	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-%	LAB.
43920	10147	88-17-005-RP	03/09	0755	PU-238		L.T. 2. E-01		03/31		6
					PU-239		L.T. 2. E-01		03/31		6
43985	10181	88-17-008A-RG	03/09	0755	BE-7		L.T. 3. E 01		04/04		4
					K-40		L.T. 5. E 01		04/04		4
					MN-54		L.T. 3. E 00		04/04		4
					CO-58		L.T. 4. E 00		04/04		4
					FE-59		L.T. 1. E 01		04/04		4
					CO-60		L.T. 3. E 00		04/04		4
					ZN-65		L.T. 7. E 00		04/04		4
					ZR-95		L.T. 5. E 00		04/04		4
					RU-103		L.T. 5. E 01		04/04		4
					RU-106		L.T. 3. E 01		04/04		4
					I-131		L.T. 3. E 00		04/04		4
					CS-134		L.T. 3. E 00		04/04		4
					CS-137		L.T. 3. E 01		04/04		4
					BA-140		L.T. 1. E 00		04/04		4
					CE-141		L.T. 9. E 00		04/04		4
					CE-144		L.T. 2. E 01		04/04		4
					RA-226		L.T. 6. E 01		04/04		4
					TH-228		L.T. 6. E 00		04/04		4
					H-3		L.T. 2. E 02		05/03		5

APPROVED BY J. GUENTHER 05/04/94

LAST PAGE OF REPORT

44025 10198 88-17-0001-RT 03/09 1120

SEND 1 COPIES TO MC4805 ANN MARIE HOLBROM  
 2 - GAS LAB.  
 3 - RADIO CHEMISTRY LAB.  
 4 - GEILLI GAMMA SPEC LAB.  
 5 - TRITIUM GAS/L.S. LAB.  
 6 - ALPHA SPEC LAB.

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

RUN DATE 05/25/94  
PAGE 34

REPORT OF ANALYSIS

DATE RECEIVED 03/15/94  
DELIVERY DATE 04/17/94

WOPK ORDER NUMBER 4-0514  
CUSTOMER P.O. NUMBER 030225/030600829

ANN MARIE HOLBROM  
MCLAREN/HART  
16755 VON KARMAN AVE 92714  
IRVINE CA

W A T E R

COLLECTION-DATE STOP  
START TIME DATE TIME NUCLIDE  
03/11 1313

TELEDYNE STA  
SAMPLE CUSTOMER'S NUM  
NUMBER IDENTIFICATION 86-09-005-RG

MID-COUNT VOLUME - UNITS  
TIME ASH-WGHT-%  
DATE TIME LAD.

ACTIVITY NUCL-UNIT-%  
( PCI/LITER) U/M

TELEDYNE SAMPLE NUMBER	STA IDENTIFICATION	NUCLIDE	ACTIVITY ( PCI/LITER)	NUCL-UNIT-% U/M	MID-COUNT DATE TIME	VOLUME - UNITS ASH-WGHT-%	LAD.
44700	11203	86-09-005-RG	L.T. 4. E 01		04/29		4
		BE-7	L.T. 6. E 01		04/29		4
		K-40	L.T. 3. E 00		04/29		4
		MN-54	L.T. 4. E 00		04/29		4
		CO-58	L.T. 1. E 01		04/29		4
		FE-59	L.T. 3. E 00		04/29		4
		CO-60	L.T. 6. E 00		04/29		4
		ZN-65	L.T. 4. E 00		04/29		4
		ZR-95	L.T. 6. E 01		04/29		4
		RU-103	L.T. 3. E 02		04/29		4
		RU-106	L.T. 2. E 00		04/29		4
		I-131	L.T. 3. E 00		04/29		4
		CS-134	L.T. 3. E 00		04/29		4
		CS-137	L.T. 3. E 01		04/29		4
		BA-140	L.T. 1. E 01		04/29		4
		CE-141	L.T. 2. E 01		04/29		4
		CE-144	L.T. 5. E 01		04/29		3
		RA-226	L.T. 5. E 00		04/21		6
		TH-228	L.T. 1. E 00		04/19		6
		SR-90	L.T. 3. E-01		04/19		3
44711	11202	86-09-096-RS	L.T. 3. E-01		04/21		4
44717	10449	86-09-057-RP	L.T. 1. E 00		04/29		4
44736	10436	86-09-096-RS	L.T. 5. E 01		04/29		4
44742	10443	86-09-005-RG	L.T. 5. E 00		04/29		4
		BE-7	L.T. 3. E 00		04/29		4
		K-40	L.T. 3. E 00		04/29		4
		MN-54	L.T. 4. E 00		04/29		4
		CO-58	L.T. 1. E 01		04/29		4
		FE-59	L.T. 3. E 00		04/29		4
		CO-60	L.T. 6. E 00		04/29		4
		ZN-65	L.T. 4. E 00		04/29		4



TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

REPORT OF ANALYSIS

RUN DATE 06/03/94  
PAGE 17

WORK ORDER NUMBER 4-0472 CUSTOMER P.O. NUMBER 030225/030600829 DATE RECEIVED 03/21/94 DELIVERY DATE 04/23/94

ANN MARIE HOLBROM  
MCLAREN/HART  
16755 VON KARMAN AVE  
IRVINE CA 92714

W A T E R

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE		ACTIVITY ( PCI/LITER)	NUCL-UNIT-% U/M *	MID-COUNT TIME	VOLUME - UNITS ASH-WGHT-% *	LAB.
			START DATE	STOP DATE					
45104	88-04-001-RG		03/15	1057	L.T. 7. E 01 L.T. 6. E 00		04/04 04/04		4 4
45113	86-01-016-RP		03/15	0816	L.T. 2. E-01 L.T. 2. E-01		05/06 05/06		6 6
45118	88-04-001-RT		03/15	1057	L.T. 1. E 02		05/27		5
45119	88-04-001-RS		03/15	1057	L.T. 2. E 00		05/06		3
45122	88-04-001-RP		03/15	1057	L.T. 1. E-01 L.T. 1. E-01		05/10 05/10		6 6
45489	86-02-076-RT		03/10	1558	L.T. 2. E 02		05/27		5

*J. Guenther*

APPROVED BY J. GUENTHER 06/03/94

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2 - GAS LAB. 3 - RADIO CHEMISTRY LAB. 4 - GEILII GAMMA SPEC LAB. 5 - TRITIUM GAS/L.S. LAB. 6 - ALPHA SPEC LAB.

Activity added to spiked samples

TI#	Isotope	Activity
45060	H-3	1.4 E 04 pCi/l
45061	H-3	1.4 E 04 pCi/l
45068	Pu-239	0.33 pCi/g
45069	Pu-239	0.33 "
45075	Cs-137	0.58 "
45076	Cs-137	0.58 "
45088	Sr-90	3.8 "
45089	Sr-90	3.8 "

*Strontium*

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

RUN DATE 05/12/94

REPORT OF ANALYSIS

PAGE 12

WORK ORDER NUMBER 4-0409 CUSTOMER P.O. NUMBER 030225/030600829 DATE RECEIVED 03/14/94 DELIVERY DATE 04/16/94

ANN MARIE HOLBROM  
MCLAREN/HART  
16755 VON KARMAN AVE  
IRVINE CA 92714

W A T E R

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP DATE	NUCLIDE	ACTIVITY ( PCI/LITER)	NUCL-UNIT-X U/M *	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-X *	LAB.
44181	BB-19-005-RS		03/10	1150	SR-90	L.T. 1. E 00		04/08		3
44185	PB-19-006-RG		03/10	1050	BE-7	L.T. 5. E 01		04/19		4
					K-40	L.T. 5. E 01		04/19		4
					MN-54	L.T. 4. E 00		04/19		4
					CO-58	L.T. 5. E 00		04/19		4
					FE-59	L.T. 1. E 01		04/19		4
					CO-60	L.T. 4. E 00		04/19		4
					ZN-65	L.T. 7. E 00		04/19		4
					ZR-95	L.T. 5. E 00		04/19		4
					RU-103	L.T. 7. E 01		04/19		4
					RU-106	L.T. 3. E 01		04/19		4
					I-131	L.T. 1. E 02		04/19		4
					CS-134	L.T. 4. E 00		04/19		4
					CS-137	L.T. 4. E 00		04/19		4
					BA-140	L.T. 4. E 01		04/19		4
					CE-141	L.T. 1. E 01		04/19		4
					CE-144	L.T. 3. E 01		04/19		4
					RA-226	L.T. 2. E 01		04/19		4
					TH-228	L.T. 7. E 00		04/19		4
44192	BB-19-005-RS		03/10	1050	SR-90	L.T. 1. E 00		04/08		3
44193	BB-19-006-RG		03/10	1050	BE-7	L.T. 3. E 01		03/29		4
					K-40	L.T. 8. E 01		03/29		4
					MN-54	L.T. 3. E 00		03/29		4
					CO-58	L.T. 3. E 00		03/29		4
					FE-59	L.T. 7. E 00		03/29		4
					CO-60	L.T. 3. E 00		03/29		4
					ZN-65	L.T. 6. E 00		03/29		4
					ZR-95	L.T. 3. E 00		03/29		4
					KU-103	L.T. 4. E 00		03/29		4
					RU-106	L.T. 3. E 01		03/29		4



WORK ORDER NUMBER 4-0353

ANN MARIE HOLBROM  
 MCLAREN/HART  
 16755 VON KARMAN AVE 92714  
 IRVINE CA

CUSTOMER P.O. NUMBER 030225/030600829  
 DATE RECEIVED 03/09/94  
 DELIVERY DATE 04/11/94

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP DATE	NUCLIDE	W A T E R	ACTIVITY ( PCI/LITER)	NUCL-UNIT-2 U/M	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-X	LAB.
43681	86-00-002-PP	11091	03/08	03/08	PU-238 PU-239	SR-90	L.T. 2. E-01 2.6 +-0.7 E 00		03/23 03/23		6 6
43682	86-00-002-PS	11110	03/08	03/08	SR-90	SR-90	L.T. 3. E 00		04/06 04/06		3 3
43683	86-00-002-PS	11111	03/08	03/08	GR-A GR-B		4.1 +-0.5 E 01 9.6 +-0.5 E 01		04/04		5
43686	88-00-002-PA	11065	03/08	03/08	H-3		1.8 +-0.2 E 03		03/23 03/23		6 6
43687	88-00-002-PT	11057	03/08	03/08	PU-238 PU-239		L.T. 2. E-01 2.5 +-0.7 E 00		03/29		3
43688	86-00-002-PP	11090	03/08	03/08	SR-90		L.T. 2. E 00		03/11 03/11		4 4
43704	88-20-001-RS	10086	03/08	03/08	BE-7 K-40 MN-54 CO-58 FE-59 CO-60 ZN-65		L.T. 3. E 01 L.T. 8. E 01 L.T. 3. E 00 L.T. 3. E 00 L.T. 6. E 00 L.T. 3. E 00 L.T. 7. E 00		03/11 03/11 03/11 03/11 03/11 03/11 03/11		4 4 4 4 4 4 4
43708	88-20-002-RG	10090	03/08	03/08	ZR-95 RU-103 RU-106 I-131 CS-134 CS-137 BA-140 CE-141 CE-144		L.T. 3. E 00 L.T. 3. F 01 L.T. 4. E 00 L.T. 3. E 00 L.T. 3. E 00 L.T. 4. E 00 L.T. 5. E 00 L.T. 2.		03/11 03/11 03/11 03/11 03/11 03/11 03/11 03/11		4 4 4 4 4 4 4 4

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

RUN DATE 05/25/94

PAGE 34

REPORT OF ANALYSIS

WOPK ORDER NUMBER 4-0514  
 CUSTOMER P.O. NUMBER 030225/030600R29  
 DATE RECEIVED 03/15/94  
 DELIVERY DATE 04/17/94

ANN MARIE HOLBROW  
 MCLAREN/HART  
 16755 VON KARMAN AVE  
 IRVINE CA 92714

W A T E R

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP DATE	NUCLIDE
44700	86-09-005-RG		03/11	1313	BE-7 K-40 MN-54 CO-58 FE-59 CO-60 ZN-65 ZR-95 RU-103 RU-106 I-131 CS-134 CS-137 BA-140 CE-141 CE-144 RA-226 TH-228

ACTIVITY I PCI/LITER)	NUCL-UNIT-X U/M *	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-X *	LAB.
L.T. 4. E 01		04/29		4
L.T. 6. E 01		04/29		4
L.T. 3. E 00		04/29		4
L.T. 4. E 00		04/29		4
L.T. 1. E 01		04/29		4
L.T. 3. E 00		04/29		4
L.T. 6. E 00		04/29		4
L.T. 4. E 00		04/29		4
L.T. 6. E 00		04/29		4
L.T. 3. E 01		04/29		4
L.T. 2. E 02		04/29		4
L.T. 3. E 00		04/29		4
L.T. 3. E 01		04/29		4
L.T. 1. E 01		04/29		4
L.T. 2. E 01		04/29		4
L.T. 5. E 01		04/29		4
L.T. 5. E 00		04/29		3
L.T. 1. E 00		04/21		6
L.T. 3. E-01		04/19		6
L.T. 3. E-01		04/19		3
L.T. 1. E 00		04/21		4
L.T. 5. E 01		04/29		4
L.T. 5. E 01		04/29		4
L.T. 3. E 00		04/29		4
L.T. 4. E 00		04/29		4
L.T. 1. E 01		04/29		4
L.T. 3. E 00		04/29		4
L.T. 6. E 00		04/29		4

44711	11202	86-09-096-RS	03/11	1313	SR-90
44717	10449	86-09-057-RP	03/11	1313	PU-239 PU-239
44736	10436	86-09-096-RS	03/11	1313	SR-90
44742	10443	86-09-005-RG	03/11	1313	BE-7 K-40 MN-54 CO-58 FE-59 CO-60 ZN-65



TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

REPORT OF ANALYSIS

RUN DATE 06/03/94

PAGE 17

WORK ORDER NUMBER 4-0472 CUSTOMER P.O. NUMBER 030225/030600829 DATE RECEIVED 03/21/94 DELIVERY DATE 04/23/94

ANN MARIE HOLBROW  
MCLAREN/HART  
16755 VON KARMAN AVE  
IRVINE CA 92714

W A T E R

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP DATE	NUCLIDE	ACTIVITY (PCI/LITER)	NUCL-UNIT-% U/M #	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-%	LAB.
45104	11237	BB-04-001-RG	03/15	1057	RA-226 TH-228	L.T. 7. E 01 L.T. 6. E 00		04/04 04/04		4 4
45113	11224	BB-01-016-RP	03/15	0816	PU-238 PU-239	L.T. 2. E-01 L.T. 2. E-01		05/06 05/06		6 6
45116	11230	BB-04-001-RT	03/15	1057	H-3	L.T. 1. E 02		05/27		5
45119	11231	BB-04-001-RS	03/15	1057	SR-90	L.T. 2. E 00		05/06		3
45122	11233	BB-04-001-RP	03/15	1057	PU-238 PU-239	L.T. 1. E-01 L.T. 1. E-01		05/10 05/10		6 6
45489	10331	BB-02-076-RT	03/10	1558	H-3	L.T. 2. E 02		05/27		5

*J. Guenther*

APPROVED BY J. GUENTHER 06/03/94

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2 - GAS LAB. 3 - RADIO CHEMISTRY LAB. 4 - GEILLI GAMMA SPEC LAB. 5 - TRITIUM GAS/L.S. LAB. 6 - ALPHA SPEC LAB.

Activity added to spiked samples

TI#	Isotope	Activity
45060	H-3	1.4 E 04 pCi/l
45061	H-3	1.4 E 04 pCi/l
45068	Pu-239	0.33 pCi/g
45069	Pu-239	0.33 "
45075	Cs-137	0.58 "
45076	Cs-137	0.58 "
45088	Sr-90	3.8 "
45089	Sr-90	3.8 "

*Tritium*

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

RUN DATE 05/25/94

REPORT OF ANALYSIS

PAGE 33

WORK ORDER NUMBER 4-0514  
 CUSTOMER P.O. NUMBER 030225/030600829  
 DATE RECEIVED 03/15/94  
 DELIVERY DATE 04/17/94

ANN MARIE HOLBROU  
 MCLAREN/HART  
 16755 VON KARMAN AVE  
 IRVINE CA 92714

W A T E R

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP DATE	TIME	NUCLIDE	ACTIVITY (PCI/LITER)	NUCL-UNIT-% U/M	MID-COUNT DATE	TIME	VOLUME - UNITS ASH-WGHT-%	LAB.
44620	10477	BG-10-001-RT	03/14	0900		H-3	L.T. 1. E 02		05/21			5
44682	11215	FB-00-001-WT	03/14	1315		H-3	L.T. 2. E 02		05/23			5
44683	11216-17	FB-00-001-WS	03/14	1315		SR-90	L.T. 2. E 00		04/23			3
44684	11218-19	FB-00-001-MG	03/14	1315		BE-7	L.T. 4. E 01		04/29			4
						K-40	L.T. 5. E 01		04/29			4
						MN-54	L.T. 3. E 00		04/29			4
						CO-58	L.T. 3. E 00		04/29			4
						FE-59	L.T. 1. E 01		04/29			4
						CD-60	L.T. 3. E 00		04/29			4
						ZN-65	L.T. 7. E 00		04/29			4
						ZR-95	L.T. 4. E 00		04/29			4
						RU-103	L.T. 6. E 00		04/29			4
						RU-106	L.T. 3. E 01		04/29			4
						I-131	L.T. 2. E 02		04/29			4
						CS-134	L.T. 3. E 00		04/29			4
						CS-137	L.T. 3. E 00		04/29			4
						BA-140	L.T. 4. E 01		04/29			4
						CE-141	L.T. 1. E 01		04/29			4
						CE-144	L.T. 3. E 01		04/29			4
						RA-226	L.T. 7. E 01		04/29			4
						TH-228	L.T. 6. E 00		04/29			4
44697	11220-21	FB-00-001-MP	03/14	1315		PU-238	L.T. 6. E-01		04/18			6
						PU-239	L.T. 6. E-01		04/18			6
44698	11222	FB-00-001-WA	03/14	1315		GR-A	L.T. 1. E 00		05/19			3
						GR-B	5.0 +-2.3 E 00		05/19			3



TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

RUN DATE 06/03/94

PAGE 17

REPORT OF ANALYSIS

DELIVERY DATE 04/23/94

CUSTOMER P.O. NUMBER 030225/030600829

DATE RECEIVED 03/21/94

WORK ORDER NUMBER 4-0472

ANN MARIE HOLBROW

MCLAREN/HART

16755 VON KARMAN AVE

IRVINE CA

92714

W A T E R

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP DATE	TIME	NUCLIDE	ACTIVITY (PCI/LITER)	NUCL-UNIT-% U/M #	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-%	LAB.
45104	11237	8B-04-001-RG	03/15	1057		RA-226 TH-228	L.T. 7. E 01 L.T. 6. E 00		04/04 04/04		4 4
45113	11224	8G-01-016-RP	03/15	0816		PU-238 PU-239	L.T. 2. E-01 L.T. 2. E-01		05/06 05/06		6 6
45118	11230	8B-04-001-RT	03/15	1057		H-3	L.T. 1. E 02		05/27		5
45119	11231	8B-04-001-RS	03/15	1057		SR-90	L.T. 2. E 00		05/06		3
45122	11233	8B-04-001-RP	03/15	1057		PU-238 PU-239	L.T. 1. E-01 L.T. 1. E-01		05/10 05/10		6 6
45489	10331	8G-02-076-RT	03/10	1558		H-3	L.T. 2. E 02		05/27		5

*J. Guenther*

APPROVED BY J. GUENTHER 06/03/94

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2 - GAS LAB. 3 - RADIO CHEMISTRY LAB. 4 - GEL(L) GAMMA SPEC LAB. 5 - TRITIUM GAS/L.S. LAB. 6 - ALPHA SPEC LAB.

Activity added to spiked samples

TI#	Isotope	Activity
45060	H-3	1.4 E 04 pCi/l
45061	H-3	1.4 E 04 pCi/l
45068	Pu-239	0.33 pCi/g
45069	Pu-239	0.33 "
45075	Cs-137	0.58 "
45076	Cs-137	0.58 "
45088	Sr-90	3.8 "
45089	Sr-90	3.8 "

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

REPORT OF ANALYSIS

WORK ORDER NUMBER 4-0185

CUSTOMER P.O. NUMBER 030225/030600829

DATE RECEIVED 03/08/94

DELIVERY DATE 03/18/94

RUN DATE 04/06/94

PAGE 5

ANN MARIE HOLBROW  
MCLAREN/HART  
16755 VON KARMAN AVE  
IRVINE CA 92714

W A T E R

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE		NUCLIDE	ACTIVITY ( PCI/LITER)	NUCL-UNIT-X U/M φ	MID-COUNT TIME DATE	VOLUME - UNITS ASH-NIGHT-X φ	LAB.
			START DATE	STOP DATE						
43170	88-04-021-RT		03/04	1445	H-3	L.T. 1. E 02		03/20		5
43181	88-04-001-WT		03/04	1440	H-3	L.T. 2. E 02		03/21		5
43182	88-04-001-WA		03/04	1450	GR-A GR-B	L.T. 4. E 00 1.2 ←-0.4 E 01		03/14 03/14		3 3
43189	SM-03-012-RT		03/07	1420	H-3	L.T. 2. E 02		03/21		5
43211	88-13-024-RT		03/07	1000	H-3	L.T. 2. E 02		03/27		5

*J. Guenther*

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SEND 1 COPIES TO MC4805 ANN MARIE HOLBROW

2 - GAS LAB. 3 - RADIO CHEMISTRY LAB. 4 - GEILII GAMMA SPEC LAB. 5 - TRITIUM GAS/L.S. LAB. 6 - ALPHA SPEC LAB.

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

RUN DATE 05/04/94  
PAGE 32

REPORT OF ANALYSIS

WORK ORDER NUMBER 4-0354  
CUSTOMER P.O. NUMBER 030225/030600829  
DATE RECEIVED 03/11/94  
DELIVERY DATE 04/13/94

ANN MARIE HOLBROW  
MCLAREN/HART  
16755 VON KARMAN AVE  
IRVINE CA 92714

W A T E R

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP DATE	TIME	NUCLIDE	ACTIVITY (PCI/LITER)	NUCL-UNIT-% U/M	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-%	LAB.
43920	10147	BB-17-005-RP	03/09	0755		PU-238	L.T. 2. E-01		03/31		6
						PU-239	L.T. 2. E-01		03/31		6
43985	10181	BR-17-008A-RG	03/09	0755		BE-7	L.T. 3. E 01		04/04		4
						K-40	L.T. 5. E 01		04/04		4
						NN-54	L.T. 3. E 00		04/04		4
						CO-58	L.T. 4. E 00		04/04		4
						FE-59	L.T. 1. E 01		04/04		4
						CO-60	L.T. 3. E 00		04/04		4
						ZN-65	L.T. 7. E 00		04/04		4
						ZR-95	L.T. 5. E 00		04/04		4
						RU-103	L.T. 5. E 00		04/04		4
						RU-106	L.T. 3. E 01		04/04		4
						I-131	L.T. 3. E 01		04/04		4
						CS-134	L.T. 3. E 00		04/04		4
						CS-137	L.T. 3. E 00		04/04		4
						BA-140	L.T. 1. E 01		04/04		4
						CE-141	L.T. 9. E 00		04/04		4
						CE-144	L.T. 2. E 01		04/04		4
						RA-226	L.T. 6. E 01		04/04		4
						TH-228	L.T. 6. E 00		04/04		4
44025	10198	BB-17-8001-RT	03/09	1120		M-3	L.T. 2. F 02		05/03		5

APPROVED BY J. GUENTHER 05/04/94  
*J. Guenther*

LAST PAGE OF REPORT

SEND 1 COPIES TO MC4805 ANN MARIE HOLBROW  
2 - GAS LAB. 3 - RADIO CHEMISTRY LAB. 4 - GE(LI) GAMMA SPEC LAB. 5 - TRITIUM GAS/L.S. LAB. 6 - ALPHA SPEC LAB.

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

RUN DATE 04/20/94  
PAGE 17

REPORT OF ANALYSIS

WORK ORDER NUMBER 4-0353  
CUSTOMER P.O. NUMBER 030225/030600829  
DATE RECEIVED 03/09/94  
DELIVERY DATE 04/11/94

ANN MARIE HOLBROW  
MCLAREN/HART  
16755 VON KARMAN AVE  
IRVINE CA 92714

M A T E R

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP DATE	NUCLIDE	ACTIVITY ( PCI/LITER)	NUCL-UNIT-% U/M #	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-% #	LAB.
43708	10090	BB-20-002-RG	03/08	0854	RA-226 TH-228	L.T. 6. E 01 L.T. 5. E 00		03/11 03/11		4 4
43722	10104	BB-20-006-RT	03/08	0854	H-3	L.T. 2. E 02		04/14		5

APPROVED BY *J. Guenther*  
J. GUENTHER 04/20/94

LAST PAGE OF REPORT

SEND 1 COPIES TO MC4805 ANN MARIE HOLBROW  
2 - GAS LAB. 3 - RADIO CHEMISTRY LAB. 4 - GE(LI) GAMMA SPEC LAB. 5 - TRITIUM GAS/L.S. LAB. 6 - ALPHA SPEC LAB.

Activity added to spiked samples

TI#	ISOTOPE	Activity
43697	H-3	1.4 E 04 pCi/l
43698	H-3	1.4 E 04 pCi/l
43730	Sr-90	3.8 pCi/g
43731	Sr-90	3.8 pCi/g
43740	Cs-137	0.64 pCi/g
43741	Cs-137	0.64 pCi/g

*Gamma Scan*

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

REPORT OF ANALYSIS  
DATE RECEIVED 03/09/94  
DELIVERY DATE 04/11/94

CUSTOMER P.O. NUMBER 030225/030600829

WORK ORDER NUMBER 4-0353

ANN MARIE HOLBROW  
MCLAREN/HART  
16755 VON KARMAN AVE 92714  
IRVINE CA

SOIL

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE	STOP DATE	NUCLIDE
43741	10118MSD 88-20-010-MG				BE-7
					K-40
					MN-54
					CO-58
					FE-59
					CO-60
					ZN-65
					ZR-95
					RU-103
					RU-106
					I-131
					CS-134
					CS-137
					BA-140
					CE-141
					CE-144
					RA-226
					TH-228

43742 11018 88-20-003-FT 03/08 1010  
43743 88-00-001-FG 03/08 1126

88-20-005

ACTIVITY (PCI/GM DRY)	NUCL-UNIT-% U/M	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-%	LAB.
L.T. 5. E-01		04/15		4
2.50+-0.25E 01		04/15		4
L.T. 4. E-02		04/15		4
L.T. 5. E-01		04/15		4
L.T. 1. E-02		04/15		4
L.T. 4. E-01		04/15		4
L.T. 1. E-02		04/15		4
L.T. 6. E-02		04/15		4
L.T. 7. E-01		04/15		4
L.T. 4. E-01		04/15		4
L.T. 9. E-02		04/15		4
L.T. 5. E-02		04/15		4
L.T. 8.22+-0.82E-01		04/15		4
L.T. 2. E-01		04/15		4
L.T. 1. E-01		04/15		4
L.T. 2. E-01		04/15		4
L.T. 1.64+-0.52E 00		04/15		4
9.86+-0.99E-01		04/15		4
L.T. 1. E 02		04/07		5
L.T. 4. E-01		03/21		4
2.37+-0.24E 01		03/21		4
L.T. 4. E-02		03/21		4
L.T. 1. E-01		03/21		4
L.T. 4. E-02		03/21		4
L.T. 9. E-02		03/21		4
L.T. 5. E-02		03/21		4
L.T. 4. E-02		03/21		4
L.T. 3. E-01		03/21		4
L.T. 1. E-02		03/21		4
L.T. 5. E-02		03/21		4

PCI/LITER \*  
H-3  
BE-7  
K-40  
MN-54  
CO-58  
FE-59  
CO-60  
ZN-65  
ZR-95  
RU-103  
RU-106  
I-131  
CS-134



TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

REPORT OF ANALYSIS  
 DATE RECEIVED 03/11/94  
 DELIVERY DATE 04/13/94  
 CUSTOMER P.O. NUMBER 030225/030600829  
 WORK ORDER NUMBER 4-0354

ANN MARIE HOLBROW  
 MCLAREN/HART  
 16755 VON KARMAN AVE  
 IRVINE CA 92714

TELEDYNE SAMPLE NUMBER 43974 11139  
 CUSTOMER'S IDENTIFICATION 88-17-010-SG  
 STA NUM 92714  
 COLLECTION-DATE START TIME DATE STOP TIME DATE  
 03/09 1650  
 S O I L

43975 11025  
 88-00-002-FG  
 03/09 1100

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START TIME DATE STOP TIME DATE	NUCLIDE	ACTIVITY (PCI/GM DRY)	NUCL-UNIT-% U/M	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-%	LAB.
43974	11139	92714	03/09 1650	BA-140	L.T. 2. E-01		04/02		4
				CE-141	L.T. 1. E-01		04/02		4
				CE-144	L.T. 4. E-01		04/02		4
				RA-226	1.55+-0.86E 00		04/02		4
				TH-228	1.44+-0.14E 00		04/02		4
				BE-7	L.T. 4. E-01		04/02		4
				K-40	2.41+-0.24E 01		04/02		4
				MN-54	L.T. 4. E-02		04/02		4
				CO-58	L.T. 4. E-02		04/02		4
				FE-59	L.T. 1. E-01		04/02		4
				CO-60	L.T. 4. E-02		04/02		4
				ZN-65	L.T. 1. E-01		04/02		4
				ZR-95	L.T. 5. E-02		04/02		4
				RU-103	L.T. 5. E-02		04/02		4
				RU-106	L.T. 3. E-01		04/02		4
				I-131	L.T. 5. E-02		04/02		4
				CS-134	L.T. 5. E-02		04/02		4
				CS-137	7.64+-3.15E-02		04/02		4
				BA-140	L.T. 1. E-01		04/02		4
				CE-141	L.T. 9. E-02		04/02		4
				CE-144	L.T. 3. E-01		04/02		4
				RA-226	1.42+-0.57E 00		04/02		6
				TH-228	7.55+-0.76E-01		04/02		6
				PU-238	L.T. 8. E-03		04/14		4
				PU-239	L.T. 1. E-02		04/14		4
				BE-7	L.T. 4. E-01		04/02		4
				K-40	2.36+-0.24E 01		04/02		4
				MN-54	L.T. 4. E-02		04/02		4
				CO-58	L.T. 4. E-02		04/02		4
				FE-59	L.T. 4. E-02		04/02		4
				CO-60	L.T. 1. E-01		04/02		4

43976 10193 88-17-009B-SP 03/09 1420  
 43977 10194 88-17-009B-SG 03/09 1420



REPORT OF ANALYSIS  
 DATE RECEIVED 03/15/94  
 DELIVERY DATE 04/17/94  
 CUSTOMER P.O. NUMBER 030225/030600829  
 WORK ORDER NUMBER 4-0514

ANN MARIE HOLBROM  
 MCCLAREN/HART  
 16755 VON KARMAN AVE 92714  
 IRVINE CA

S O I L

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE	START DATE	STOP DATE	NUCLIDE
44710	BG-00-003-FG		03/11 1053			RU-106 I-131 CS-134 CS-137 BA-140 CE-141 CE-144 RA-226 TH-228

44712	BG-09-057-ST		03/11 1404			H-3 SR-90
44713	BG-09-057-SS		03/11 1404			PU-238 U-234 TH-230 PU-239
44714	BG-09-057-SP		03/11 1404			U-235 U-238 TH-232 TH-228

44715	BG-09-057-SG		03/11 1404			RE-7 K-40 MN-54 CO-58 FE-59 CO-60 ZN-65 ZR-95 RU-103 RU-106
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ACTIVITY (PCI/GM DRY)	NUCL-UNIT-# U/M #	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-# #	LAB.
L.T. 3. E-01		04/26		4
L.T. 2. E 00		04/26		4
L.T. 4. E-02		04/26		4
L.T. 1.00+-0.35E-01		04/26		4
L.T. 5. E-01		04/26		4
L.T. 1. E-01		04/26		4
L.T. 3. E-01		04/26		4
L.T. 1.52+-0.62E 00		04/26		5
8.44+-0.84E-01		04/26		3
L.T. 2. E 02	PCI/LITER #	05/23		6
L.T. 1.1 +-0.5 E-01		04/26		6
L.T. 8. E-03		05/02		6
L.T. 1.2 +-0.3 E-01		05/02		6
L.T. 1.9 +-0.4 E-01		05/02		6
L.T. 8. E-03		05/02		6
L.T. 7. E-03		05/02		6
L.T. 1.2 +-0.3 E-01		05/07		4
L.T. 1.7 +-0.4 E-01		05/07		4
L.T. 1.4 +-0.4 E-01		04/26		4
L.T. 5. E-01		04/26		4
5.81+-0.65E 00		04/26		4
L.T. 4. E-02		04/26		4
L.T. 5. E-02		04/26		4
L.T. 1. E-01		04/26		4
L.T. 3. E-02		04/26		4
L.T. 8. E-02		04/26		4
L.T. 6. E-02		04/26		4
L.T. 7. E-02		04/26		4
L.T. 3. E-01		04/26		4

REPORT OF ANALYSIS  
 DATE RECEIVED 03/15/94  
 DELIVERY DATE 04/17/94

CUSTOMER P.O. NUMBER 030225/030600829  
 WORK ORDER NUMBER 4-0514

ANN MARIE HOLBROM  
 MCLAREN/HART  
 16755 VON KARMAN AVE  
 IRVINE CA 92714

SOIL

TELEDYNE SAMPLE NUMBER 44624 10482  
 CUSTOMER'S IDENTIFICATION 86-10-004-SG  
 STA NUM 92714  
 COLLECTION-DATE 03/14 0945  
 START DATE 03/14 0945  
 STOP TIME 03/14 0945  
 NUCLIDE

44625 11036  
 CUSTOMER'S IDENTIFICATION 86-00-004-FG  
 STA NUM 92714  
 COLLECTION-DATE 03/14 0945  
 START DATE 03/14 0945  
 STOP TIME 03/14 0945  
 NUCLIDE

ACTIVITY (PCI/GM DRY)	NUCL-UNIT-% U/M	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-%	LAB.
2.15+-0.39E-01		04/25		
L.T. 4. E-01		04/25		
L.T. 1. E-01		04/25		
L.T. 2. E-01		04/25		
L.T. 6. E-01		04/25		
4.02+-0.54E-01		04/25		
L.T. 5. E-01		04/25		
6.33+-0.63E 00		04/25		
L.T. 4. E-02		04/25		
L.T. 4. E-02		04/25		
L.T. 1. E-01		04/25		
L.T. 3. E-02		04/25		
L.T. 9. E-02		04/25		
L.T. 6. E-02		04/25		
L.T. 7. E-01		04/25		
L.T. 1. E-00		04/25		
L.T. 4. E-02		04/25		
L.T. 4. E-02		04/25		
L.T. 1. E-01		04/25		
L.T. 4. E-02		04/25		
L.T. 3. E-01		04/25		
3.06+-0.41E-01		04/25		
L.T. 3. E-01		04/25		
L.T. 1. E-01		04/25		
L.T. 2. E-01		04/25		
L.T. 7. E-01		04/25		
L.T. 7. E-02		04/25		
L.T. 1. E 02		05/21		
L.T. 9. E-02		04/16		

PC1/LITER \* 05/21  
 PC1/LITER \* 04/16

44626 10485  
 44627 10486  
 BG-10-003-ST  
 BG-10-003-SS  
 03/14 1010  
 03/14 1010

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

RUN DATE 06/03/94

PAGE 7

REPORT OF ANALYSIS

DELIVERY DATE

04/23/94

DATE RECEIVED

03/21/94

CUSTOMER P.O. NUMBER

030225/030600829

WORK ORDER NUMBER

4-0472

ANN MARIE HOLBROW  
MCLAREN/HART  
16755 VON KARMAN AVE 92714  
IRVINE CA

S O I L

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE	STOP DATE	NUCLIDE
45050	10643DUP BG-14-005-SG		03/15 1026		CS-134 CS-137 BA-140 CE-141 CE-144 RA-226 TH-228

45059	10644		03/15 1026		H-3
45060	10644MS		/		H-3
45061	10644MSD		/		H-3
45063	11213		03/15 0841		BE-7 K-40 MN-54 CO-58 FE-59 CO-60 ZN-65 IR-95 RU-103 RU-106 I-131 CS-134 CS-137 BA-140 CE-141 CE-144 RA-226 TH-228

ACTIVITY (PCI/CM DRY)	NUCL-UNIT-% U/M	MID-COUNT TIME DATE	VOLUME - UNITS ASH-MGHT-%	LAB.
L.T. 4. E-02		04/28		4
L.T. 3. E-02		04/28		4
L.T. 3. E-01		04/28		4
L.T. 1. E-01		04/28		4
L.T. 2. E-01		04/28		4
L.T. 1.25+-0.43E 00		04/28		4
8.61+-0.86E-01				5
1.3 +-0.6 E 03	PCI/LITER *	05/26		5
1.6 +-0.1 E 04	PCI/LITER *	05/26		5
1.5 +-0.1 E 04	PCI/LITER *	05/26		4
L.T. 4. E-01		04/27		4
2.28+-0.23E 01		04/27		4
L.T. 3. E-02		04/27		4
L.T. 4. E-02		04/27		4
L.T. 1. E-01		04/27		4
L.T. 3. E-02		04/27		4
L.T. 7. E-02		04/27		4
L.T. 5. E-02		04/27		4
L.T. 6. E-02		04/27		4
L.T. 3. E-01		04/27		4
L.T. 1. E 00		04/27		4
L.T. 4. E-02		04/27		4
L.T. 2.09+-0.30E-01		04/27		4
L.T. 3. E-01		04/27		4
L.T. 1. E-01		04/27		4
L.T. 2. E-01		04/27		4
2.15+-0.42E 00		04/27		4
1.92+-0.19E 00		04/27		4

*Isotopic Plutonium*



REPORT OF ANALYSIS  
 DATE RECEIVED 04/16/94  
 DELIVERY DATE 04/16/94  
 CUSTOMER P.O. NUMBER 03/14/94  
 WORK ORDER NUMBER 030225/030600829  
 4-0409

ANN MARIE HOLBROW  
 MCLAREN/HART  
 16755 VON KARMAN AVE 92714  
 IRVINE CA

S O I L

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP DATE	NUCLIDE	ACTIVITY (PCI/GM DRY)	NUCL-UNIT-X U/M *	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-X *	LAB.
44206	10292	88-15-009-SP	03/10	1025	PU-238 PU-239	L.T. 9. E-03 L.T. 9. E-03		04/09 04/09		6 6
44207	11191	88-15-010-SP	03/10	1030	PU-238 PU-239	L.T. 8. E-03 L.T. 1. E-02		04/09 04/09		6 6
44208	11029	88-00-002-FP	03/10	1025	H-3	L.T. 2. E 02	PCI/LITER *	05/08		5
44210	10282	88-15-001-ST	03/10	0945	H-3	L.T. 3. E 02	PCI/LITER *	05/09		5
44211	10283	88-15-001-MT	03/10	0945	H-3	3.3 +-0.3 E 03	PCI/LITER *	05/09		5
44212	10283MS	88-15-001-MT	/	/	H-3	3.8 +-0.3 E 03	PCI/LITER *	05/09		5
44213	10283MSD	88-15-001-MT	/	/	H-3	L.T. 2. E 02	PCI/LITER *	05/09		5
44214	10284	88-15-002-ST	03/10	0935	H-3	L.T. 2. E 02	PCI/LITER *	05/09		5
44215	10285	88-15-003-ST	03/10	0915	H-3	L.T. 2. E 02	PCI/LITER *	05/09		5
44216	10286	88-15-004-ST	03/10	0910	H-3	L.T. 2. E 02	PCI/LITER *	05/09		6
44217	10287	88-15-005-ST	03/10	0910	H-3	L.T. 2. E 02	PCI/LITER *	05/09		6
44218	11190	88-15-001-SP	03/10	0945	PU-238 PU-239	L.T. 1. E-02 L.T. 1. E-02		04/10 04/10		6 6

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

RUN DATE 05/25/94

PAGE 22

REPORT OF ANALYSIS

DELIVERY DATE

DATE RECEIVED 03/15/94

CUSTOMER P.O. NUMBER

04/17/94

WORK ORDER NUMBER  
4-0514

030225/030600829

ANN MARIE HOLBROW  
MCLAREN/HART  
16755 VON KARMAN AVE 92714  
IRVINE CA

S O I L

MID-COUNT VOLUME - UNITS  
DATE TIME ASH-WGHT-X ° LAB.

COLLECTION-DATE  
START DATE STOP TIME

ACTIVITY (PCI/GM DRY)

NUCL-UNIT-X U/M °

NUCLIDE

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	START DATE	STOP TIME	NUCLIDE	ACTIVITY (PCI/GM DRY)	NUCL-UNIT-X U/M °	MID-COUNT DATE TIME	VOLUME - UNITS ASH-WGHT-X °	LAB.
44707	10460	86-09-003-SG	03/11	1430	BE-7	L.T. 5. E-01		04/26		4
					K-40	5.81+-0.64E-00		04/26		4
					MN-54	L.T. 4. E-02		04/26		4
					CO-58	L.T. 5. E-02		04/26		4
					FE-59	L.T. 2. E-01		04/26		4
					CO-60	L.T. 4. E-02		04/26		4
					ZN-65	L.T. 8. E-02		04/26		4
					ZR-95	L.T. 6. E-02		04/26		4
					RU-103	L.T. 8. E-02		04/26		4
					RU-106	L.T. 3. E-01		04/26		4
					I-131	L.T. 2. E-00		04/26		4
					CS-134	L.T. 4. E-02		04/26		4
					CS-137	L.T. 5. E-02		04/26		4
					BA-140	L.T. 6. E-01		04/26		4
					CE-141	L.T. 2. E-01		04/26		4
					CE-144	L.T. 3. E-01		04/26		4
					RA-226	L.T. 8. E-01		04/26		6
					TH-228	5.87+-0.76E-01		04/26		6
					PU-238	L.T. 6. E-03		04/22		3
					PU-239	L.T. 6. E-03		04/22		4
					SR-90	8.8 +-4.5 E-02		04/20		4
44708	11035	86-00-003-FP	03/11	1430	BE-7	L.T. 5. E-01		04/26		4
					K-40	2.11+-0.21E-01		04/26		4
44709	11032	86-00-002-SS	03/11	1053	MN-54	L.T. 4. E-02		04/26		4
					CO-58	L.T. 5. E-02		04/26		4
44710	11030	86-00-003-FG	03/11	1053	FE-59	L.T. 2. E-01		04/26		4
					CO-60	L.T. 4. E-02		04/26		4
					ZN-65	L.T. 1. E-01		04/26		4
					ZR-95	L.T. 7. E-02		04/26		4
					RU-103	L.T. 8. E-02		04/26		4

REPORT OF ANALYSIS  
 DATE RECEIVED 03/21/94  
 DELIVERY DATE 04/23/94

CUSTOMER P.O. NUMBER  
 030225/030600829

WORK ORDER NUMBER  
 4-0472

ANN MARIE HOLBROW  
 MCLAREN/HART  
 16755 VON KARMAN AVE 92714  
 IRVINE CA

SOIL

COLLECTION-DATE  
 START TIME DATE TIME NUCLEIDE  
 03/15 0905  
 PU-238  
 PU-239

TELEDYNE  
 SAMPLE NUMBER  
 45065 11223 BG-00-004-FP  
 45066 10624 BG-14-002-SG

MID-COUNT TIME DATE	NUCL-UNIT-X U/M	ACTIVITY (PCI/GM DRY)	NUCLEIDE	STATION NUMBER	DATE	TIME	VOLUME - UNITS	ASH-WGHT-X	LAB.
05/09		L.T. 2. E-02	BE-7						6
05/09		L.T. 2. E-02	K-40						6
04/27		L.T. 5. E-01	MN-54						4
04/27		2.03+-0.20E 01	CO-58						4
04/27		L.T. 4. E-02	FE-59						4
04/27		L.T. 2. E-01	CO-60						4
04/27		L.T. 4. E-02	ZN-65						4
04/27		L.T. 1. E-01	ZR-95						4
04/27		L.T. 7. E-02	RU-103						4
04/27		L.T. 8. E-02	RU-106						4
04/27		L.T. 4. E-01	I-131						4
04/27		L.T. 2. E 00	CS-134						4
04/27		L.T. 5. E-02	CS-137						4
04/27		8.45+-4.26E-02	BA-140						4
04/27		L.T. 4. E-01	CE-141						4
04/27		L.T. 1. E-01	CE-144						4
04/27		L.T. 3. E-01	RA-226						6
04/27		2.19+-0.67E 00	TH-228						6
04/27		1.51+-0.15E 00	PU-238						6
05/09		L.T. 1. E-02	PU-239						6
05/09		L.T. 1. E-02	PU-238						6
05/09		L.T. 9. E-03	PU-239						6
05/09		3.1 +-0.6 E-01	PU-239						6
05/09		L.T. 7. E-03	PU-238						6
05/09		3.2 +-0.5 E-01	PU-239						6

45067 10626 BG-14-002-MP 03/15  
 45068 10626MS BG-14-002-MP /  
 45069 10626MSD BG-14-002-MP /

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TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

REPORT OF ANALYSIS

DELIVERY DATE

04/13/94

DATE RECEIVED

03/11/94

WORK ORDER NUMBER

030225/030600829

CUSTOMER P.O. NUMBER

4-0354

ANN MARIE HOLBROW  
MCLAREN/HART  
16755 VON KARMAN AVE  
IRVINE CA

92714

S O I L

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP DATE	TIME	NUCLIDE	ACTIVITY (PCI/LITER)	NUCL-UNIT-% U/M *	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-% *	LAB.
43904	88-16-8004-ST		03/09 1410			H-3	L.T. 1. E 02	E-01 PCI/GM DRY *	04/01		3
43905	88-16-8004-SS		03/09 1410			SR-90	L.T. 1. E-01 PCI/GM DRY *	E-01 PCI/GM DRY *	04/04		5
43906	88-00-001-FS		03/09 1037			SR-90	L.T. 1. E 02	E-01 PCI/GM DRY *	04/30		3
43907	88-16-008-ST		03/09 1014			H-3	L.T. 1. E 02	E-01 PCI/GM DRY *	04/04		4
43908	88-16-008-SS		03/09 1014			SR-90	L.T. 4. E-01 PCI/GM DRY *	E-01 PCI/GM DRY *	03/31		4
43909	88-16-008-SG		03/09 1014			BE-7	L.T. 4. E-01 PCI/GM DRY *	E-01 PCI/GM DRY *	03/31		4
						K-40	2.39+-0.24E 01 PCI/GM DRY *	E-02 PCI/GM DRY *	03/31		4
						MN-54	L.T. 3. E-02 PCI/GM DRY *	E-02 PCI/GM DRY *	03/31		4
						CO-58	L.T. 4. E-02 PCI/GM DRY *	E-02 PCI/GM DRY *	03/31		4
						FE-59	L.T. 1. E-01 PCI/GM DRY *	E-01 PCI/GM DRY *	03/31		4
						CO-60	L.T. 4. E-02 PCI/GM DRY *	E-02 PCI/GM DRY *	03/31		4
						ZN-65	L.T. 1. E-01 PCI/GM DRY *	E-01 PCI/GM DRY *	03/31		4
						ZR-95	L.T. 4. E-02 PCI/GM DRY *	E-02 PCI/GM DRY *	03/31		4
						RU-103	L.T. 4. E-02 PCI/GM DRY *	E-02 PCI/GM DRY *	03/31		4
						I-131	L.T. 3. E-01 PCI/GM DRY *	E-01 PCI/GM DRY *	03/31		4
						CS-134	L.T. 2. E-01 PCI/GM DRY *	E-01 PCI/GM DRY *	03/31		4
						CS-137	L.T. 4. E-02 PCI/GM DRY *	E-02 PCI/GM DRY *	03/31		4
						BA-140	L.T. 4. E-02 PCI/GM DRY *	E-02 PCI/GM DRY *	03/31		4
						CE-141	L.T. 1. E-01 PCI/GM DRY *	E-01 PCI/GM DRY *	03/31		4
						CE-144	L.T. 6. E-02 PCI/GM DRY *	E-02 PCI/GM DRY *	03/31		4
						RA-226	L.T. 2. E-01 PCI/GM DRY *	E-01 PCI/GM DRY *	03/31		4
						TH-228	L.T. 1.50+-0.51E 00 PCI/GM DRY *	E-01 PCI/GM DRY *	03/31		4
							8.80+-0.88E-01 PCI/GM DRY *	E-01 PCI/GM DRY *	03/31		4



REPORT OF ANALYSIS  
 DATE RECEIVED 03/15/94  
 DELIVERY DATE 04/17/94

WORK ORDER NUMBER 4-0514  
 CUSTOMER P.O. NUMBER 030225/030600829

ANN MARIE HOLBROW  
 MCLAREN/HART  
 16755 VON KARMAN AVE 92714  
 IRVINE CA

S O I L

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP TIME	NUCLIDE
44707	10460	BG-09-003-SG	03/11	1430	BE-7 K-40 MN-54 CO-58 FE-59 CO-60 ZN-65 ZR-95 RU-103 RU-106 I-131 CS-134 CS-137 BA-140 CE-141 CE-144 RA-226 TH-228

ACTIVITY (PCI/GM DRY)	NUCL-UNIT-X U/M #	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-X #	LAB.
L.T. 5. E-01		04/26		4
5.81+-0.64E 00		04/26		4
L.T. 4. E-02		04/26		4
L.T. 5. E-01		04/26		4
L.T. 2. E-02		04/26		4
L.T. 4. E-02		04/26		4
L.T. 8. E-02		04/26		4
L.T. 6. E-02		04/26		4
L.T. 8. E-01		04/26		4
L.T. 3. E-01		04/26		4
L.T. 2. E 00		04/26		4
L.T. 4. E-02		04/26		4
L.T. 5. E-02		04/26		4
L.T. 6. E-01		04/26		4
L.T. 2. E-01		04/26		4
L.T. 3. E-01		04/26		4
L.T. 8. E-01		04/26		4
5.87+-0.76E-01		04/26		6
L.T. 6. E-03		04/22		6
L.T. 6. E-03		04/22		3
0.8 +-4.5 E-02		04/20		4
L.T. 5. E-01		04/26		4
2.11+-0.21E 01		04/26		4
L.T. 4. E-02		04/26		4
L.T. 5. E-02		04/26		4
L.T. 2. E-01		04/26		4
L.T. 4. E-02		04/26		4
L.T. 1. E-01		04/26		4
L.T. 7. E-02		04/26		4
L.T. 8. E-02		04/26		4

44708 11035 BG-00-003-FP 03/11 1430  
 44709 11032 BG-00-002-SG 03/11 1430  
 44710 11030 BG-00-003-FG 03/11 1053

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

RUN DATE 06/03/94

PAGE 14

REPORT OF ANALYSIS

DELIVERY DATE

CUSTOMER P.O. NUMBER

04/23/94

DATE RECEIVED

030225/030600829

WORK ORDER NUMBER

4-0472

ANN MARIE HOLBROW  
 MCLAREN/HART  
 16755 VON KARMAN AVE  
 IRVINE CA 92714

SOIL

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP DATE	NUCLIDE	ACTIVITY (PCI/GM DRY)	NUCL-UNIT-X U/M *	MID-COUNT DATE	TIME	VOLUME - UNITS ASH-WGHT-X *	LAB.
45087	86-14-001-MS		03/15 1000		SR-90	L.T. 7. E-02		04/28			3
45088	86-14-001-MS		/		SR-90	4.0 +-0.3 E 00		05/02			3
45089	86-14-001-MS		/		SR-90	4.0 +-0.2 E 00		04/30			3
45090	86-14-002-ST		03/15 1000		H-3	L.T. 1. E 02	PCI/LITER *	05/27			3
45091	86-14-002-SS		03/15 1000		SR-90	L.T. 9. E-02		04/30			6
45092	86-14-002-SP		03/15 1000		PU-238 U-234 TH-230 PU-239 U-235 U-238 TH-232 TH-228	L.T. 1. E-02 3.1 +-0.4 E-01 3.8 +-0.5 E-01 L.T. 1. E-02 1.8 +-1.0 E-02 4.0 +-0.5 E-01 1.2 +-0.1 E 00 7.8 +-0.8 E-01		05/09 05/12 05/16 05/09 05/12 05/12 05/18 05/18			6 6 6 6 6 6 6 6 3
45114	86-00-004-FS		03/15 0841		SR-90	L.T. 9. E-02		04/30			3
45115	86-01-090-SS		03/15		SR-90	L.T. 1. E-01		04/30			5
45116	86-00-008-FT		03/15 0908		H-3	L.T. 2. E 02	PCI/LITER *	05/27			3
45117	86-14-001-SS		03/15 1000		SR-90	8.2 +-4.3 E-02		04/30			5
45490	86-02-007-ST		03/10 1610		H-3	L.T. 1. E 02	PCI/LITER *	05/27			5

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TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

RUN DATE 05/25/94

REPORT OF ANALYSIS

PAGE 24

WORK ORDER NUMBER

CUSTOMER P.O. NUMBER

DELIVERY DATE

4-0514

030225/030600829

04/17/94

ANN MARIE HOLBROW  
MCLAREN/HART  
16755 VON KARMAN AVE  
IRVINE CA 92714

S O I L

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STDP TIME	NUCLIDE	ACTIVITY I(PCI/GM DRY)	NUCL-UNIT-X U/M *	MID-COUNT TIME DATE	VOLUME - UNITS ASH-NIGHT-X *	LAB.
44715	86-09-057-SG		03/11	1404	I-131 CS-134 CS-137 BA-140 CE-141 CE-144 RA-226 TH-228	L.T. 2. E 00 L.T. 4. E-02 L.T. 6. E-02 L.T. 5. E-01 L.T. 2. E-01 L.T. 4. E-01 L.T. 1. E 00 3.85+-0.55E-01		04/26 04/26 04/26 04/26 04/26 04/26 04/26 04/26		4 4 4 4 4 4 4 4
44716	86-00-006-FT		03/11	1404	H-3	L.T. 2. E 02	PCI/LITER *	05/23		5
44719	86-09-013-ST		03/11	1420	H-3	L.T. 2. E 02	PCI/LITER *	05/23		5
44720	86-09-013-SS		03/11	1420	SR-90	1.2 +-0.5 E-01		04/20		3
44721	86-09-013-SP		03/11	1420	PU-238 U-234 TH-230 PU-239 U-235 U-238 TH-232 TH-228	L.T. 8. E-03 L.T. 1.3 +-0.3 E-01 L.T. 2.3 +-0.4 E-01 L.T. 8. E-03 L.T. 7. E-03 L.T. 1.3 +-0.3 E-01 L.T. 2.0 +-0.4 E-01 L.T. 2.1 +-0.5 E-01		05/02 05/02 05/07 05/02 05/02 05/02 05/07 05/07		6 6 6 6 6 6 6 6
44722	86-05-074-ST		03/11	1037	H-3	L.T. 5. E 02	PCI/LITER *	05/23		5
44723	86-05-074-ST		03/11	1037	H-3	L.T. 5. E 02	PCI/LITER *	05/23		5
44724	86-05-074-SS		03/11	1037	SR-90	8.4 +-4.0 E-02		04/20		3

WORK ORDER NUMBER 4-0514  
 CUSTOMER P.O. NUMBER 030225/030600829  
 DATE RECEIVED 03/15/94  
 DELIVERY DATE 04/17/94

ANN MARIE HOLBROU  
 MCLAREN/HART  
 16755 VON KARMAN AVE 92714  
 IRVINE CA

S O I L

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE		NUCLIDE	ACTIVITY PCI/LITER	NUCL-UNIT-X U/M	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-X	LAB.
			START DATE	STOP DATE						
44652	8G-00-007-FT		03/14	1215	H-3	L.T. 1. E 02		05/22		5
44653	8G-11-011-ST		03/14	1230	H-3	L.T. 1. E 02		05/22		5
44654	8G-11-011-SS		03/14	1230	SR-90	L.T. 1. E-01 PCI/GM DRY *		04/18		3
44655	8G-11-011-SP		03/14	1230	PU-238	L.T. 6. E-03 PCI/GM DRY *		04/20		6
					U-234	5.1 +1.8 E-02 PCI/GM DRY *		04/26		6
					TH-230	3.1 +-2.2 E-02 PCI/GM DRY *		05/04		6
					PU-239	L.T. 6. E-03 PCI/GM DRY *		04/20		6
					U-235	L.T. 6. E-03 PCI/GM DRY *		04/26		6
					U-238	5.3 +-1.8 E-02 PCI/GM DRY *		04/26		6
					TH-232	2.6 +-2.3 E-02 PCI/GM DRY *		05/04		6
					TH-228	L.T. 8. E-02 PCI/GM DRY *		05/04		6
					8E-7	L.T. 4. E-01 PCI/GM DRY *		04/25		4
					K-40	2.85+-0.35E 00 PCI/GM DRY *		04/25		4
			03/14	1230	MN-54	L.T. 3. E-02 PCI/GM DRY *		04/25		4
44656	8G-11-011-SG				CO-58	L.T. 3. E-02 PCI/GM DRY *		04/25		4
					FE-59	L.T. 8. E-02 PCI/GM DRY *		04/25		4
					CO-60	L.T. 3. E-02 PCI/GM DRY *		04/25		4
					ZN-65	L.T. 6. E-02 PCI/GM DRY *		04/25		4
					ZR-95	L.T. 4. E-02 PCI/GM DRY *		04/25		4
					RU-103	L.T. 5. E-02 PCI/GM DRY *		04/25		4
					RU-106	L.T. 2. E-01 PCI/GM DRY *		04/25		4
					I-131	L.T. 9. E-01 PCI/GM DRY *		04/25		4
					CS-134	L.T. 3. E-02 PCI/GM DRY *		04/25		4
					CS-137	1.09+-0.29E-01 PCI/GM DRY *		04/25		4
					BA-140	L.T. 2. E-01 PCI/GM DRY *		04/25		4
					CE-141	L.T. 8. E-02 PCI/GM DRY *		04/25		4
					CE-144	L.T. 2. E-01 PCI/GM DRY *		04/25		4
					RA-226	L.T. 5. E-01 PCI/GM DRY *		04/25		4
					TH-228	9.04+-2.40E-02 PCI/GM DRY *		04/25		4

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

RUN DATE 06/03/94

PAGE 14

REPORT OF ANALYSIS

DELIVERY DATE 04/23/94

DATE RECEIVED 03/21/94

CUSTOMER P.O. NUMBER 030225/030600829

WORK ORDER NUMBER 4-0472

ANN MARIE HOLBROM  
 MCLAREN/HART  
 16755 VON KARMAN AVE  
 IRVINE CA 92714

S O I L

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP DATE	TIME	NUCLIDE	ACTIVITY (PCI/GM DRY)	NUCL-UNIT-% U/M *	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-% *	LAB.
45087	8G-14-001-MS		03/15	1000		SR-90	L.T. 7. E-02		04/28		3
45088	8G-14-001-MS		/			SR-90	4.0 +-0.3 E 00		05/02		3
45089	8G-14-001-MS		/			SR-90	4.0 +-0.2 E 00		04/30		3
45090	8G-14-002-ST		03/15	1000		H-3	L.T. 1. E 02	PCI/LITER *	05/27		5
45091	8G-14-002-SS		03/15	1000		SR-90	L.T. 9. E-02		04/30		3
45092	8G-14-002-SP		03/15	1000		PU-238 U-234 TH-230 PU-239 U-235 U-238 TH-232 TH-228	L.T. 1. E-02 3.1 +-0.4 E-01 3.8 +-0.5 E-01 L.T. 1. E-02 1.8 +-1.0 E-02 4.0 +-0.5 E-01 1.2 +-0.1 E 00 7.8 +-0.8 E-01		05/09 05/12 05/18 05/09 05/12 05/12 05/18 05/18		6 6 6 6 6 6 6 6
45114	8G-00-004-FS		03/15	0841		SR-90	L.T. 9. E-02		04/30		3
45115	8G-01-090-SS		03/15			SR-90	L.T. 1. E-01		04/30		3
45116	8G-00-008-FT		03/15	0906		H-3	L.T. 2. E 02	PCI/LITER *	05/27		5
45117	8G-14-001-SS		03/15	1000		SR-90	8.2 +-4.3 E-02		04/30		3
45490	8G-02-007-ST		03/10	1610		H-3	L.T. 1. E 02	PCI/LITER *	05/27		5

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

REPORT OF ANALYSIS

RUN DATE 04/06/94  
PAGE 2

WORK ORDER NUMBER

ANN MARIE HOLBROW  
MCLAREN/HART  
16755 VON KARMAN AVE  
IRVINE CA 92714

CUSTOMER P.O. NUMBER

030225/030600829

DELIVERY DATE

03/18/94

DATE RECEIVED

03/08/94

SOIL

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP DATE	TIME	NUCLIDE	ACTIVITY ( PCI/LITER)	NUCL-UNIT-% U/M *	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-%	LAB.
43187	88-14-004-ST		03/04		1625	H-3	L.T. 2. E 02		03/20		5
43188	SM-03-012-ST		03/07		1422	H-3	L.T. 1. E 02		03/30		5
43190	SM-03-015-ST		03/07		1420	H-3	L.T. 1. E 02		03/21		5
43191	SM-03-009-ST		03/07		1423	H-3	L.T. 1. E 02		03/21		5
43192	SM-03-001-ST		03/07		1425	H-3	L.T. 1. E 02		03/21		5
43193	SM-03-014-ST		03/07		1430	H-3	L.T. 1. E 02		03/21		5
43194	88-05-003-ST		03/07		1050	H-3	L.T. 1. E 02		03/30		5
43195	BB-05-089-ST		03/07		1052	H-3	L.T. 1. E 02		03/21		5
43196	BB-05-089FDT		03/07		1052	H-3	L.T. 1. E 02		03/21		5
43197	BB-05-006-ST		03/07		1102	H-3	L.T. 1. E 02		03/21		5
43198	BB-05-057-ST		03/07		1112	H-3	L.T. 1. E 02		03/21		5
43199	BB-05-077-ST		03/07		1110	H-3	L.T. 1. E 02		03/21		5
43200	BB-06-007-ST		03/07		0910	H-3	L.T. 1. E 02		03/21		5
43201	BB-06-092-ST		03/07		0918	H-3	L.T. 1. E 02		03/21		5
43202	88-06-092-MT		/			H-3	3.0 +-0.2 E 03		03/30		5

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TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

RUN DATE 05/25/94

REPORT OF ANALYSIS

PAGE 33

DELIVERY DATE

DATE RECEIVED

CUSTOMER P.O. NUMBER

WORK ORDER NUMBER

04/17/94

03/15/94

030225/030600829

4-0514

ANN MARIE HOLBRUM  
MCLAREN/HART  
16755 VON KARMAN AVE  
IRVINE CA 92714

M A T E R

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE		NUCLIDE	ACTIVITY ( PCI/LITER)	NUCL-UNIT-% U/M	MID-COUNT		LAB.
			START DATE	STOP DATE				TIME	DATE	
44620	BG-10-001-RT		03/14	0900	H-3	L.T. 1. E 02		05/21		5
44682	F8-00-001-WT		03/14	1315	H-3	L.T. 2. E 02		05/23		5
44683	11216-17 F8-00-001-WS		03/14	1315	SR-90	L.T. 2. E 00		04/23		3
44684	11218-19 F8-00-001-WG		03/14	1315	BE-7	L.T. 4. E 01		04/29		4
					K-40	L.T. 5. E 01		04/29		4
					MN-54	L.T. 3. E 00		04/29		4
					CO-58	L.T. 3. E 00		04/29		4
					FE-59	L.T. 1. E 01		04/29		4
					CO-60	L.T. 3. E 00		04/29		4
					ZN-65	L.T. 7. E 00		04/29		4
					ZR-95	L.T. 4. E 00		04/29		4
					RU-103	L.T. 6. E 00		04/29		4
					RU-106	L.T. 3. E 01		04/29		4
					I-131	L.T. 2. E 02		04/29		4
					CS-134	L.T. 3. E 00		04/29		4
					CS-137	L.T. 3. E 00		04/29		4
					BA-140	L.T. 4. E 01		04/29		4
					CE-141	L.T. 1. E 01		04/29		4
					CE-144	L.T. 3. E 01		04/29		4
					RA-226	L.T. 7. E 01		04/29		4
					TH-228	L.T. 6. E 00		04/29		4
44697	11220-21 F8-00-001-WP		03/14	1315	PU-238	L.T. 6. E-01		04/18		6
					PU-239	L.T. 6. E-01		04/18		6
44698	11222 F8-00-001-WA		03/14	1315	GR-A	L.T. 1. E 00		05/19		3
					GR-B	5.0 +-2.3 E 00		05/19		3

REPORT OF ANALYSIS  
 DATE RECEIVED 03/09/94  
 DELIVERY DATE 04/11/94

WORK ORDER NUMBER 4-0353  
 CUSTOMER P.O. NUMBER 030225/030600R29

ANN MARIE HOLBROM  
 MCLAREN/HART  
 16755 VON KARMAN AVE 92714  
 IRVINE CA

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP DATE	TIME	NUCLIDE	SOIL	ACTIVITY (PCI/LITER)	NUCL-UNIT-2 U/M	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-X	LAB.
43677	11043	88-00-002-PT	03/08			H-3		1.7 +-0.2 E 03		04/03		5
43678	11042	88-00-001-PT	03/08			H-3		L.T. 2. E 02		04/03		5
43684	11045	88-00-004-PT	03/08			H-3		L.T. 2. E 02		04/03		5
43685	11044	88-00-003-PT	03/08			H-3		1.7 +-0.2 E 03		04/04		5
43689	10068	88-03-025-ST	03/08	1358		H-3		L.T. 2. E 02		04/04		5
43690	10071	88-03-079-ST	03/08	1405		H-3		L.T. 1. E 02		04/04		5
43691	10072	88-03-017-ST	03/08	1407		H-3		L.T. 2. E 02		04/04		5
43692	10074	88-03-005-ST	03/08	1410		H-3		L.T. 2. E 02		04/04		5
43693	10078	88-03-003-ST	03/08	1423		H-3		L.T. 1. E 02		04/07		5
43694	10081	88-03-026-ST	03/08	1428		H-3		L.T. 1. E 02		04/08		5
43695	100810UP	88-03-026-ST	03/08	1428		H-3		L.T. 1. E 02		04/08		5
43696	11019	88-03-026-MT		/		H-3		1.5 +-0.1 E 04		04/08		5
43697	11019MS	88-03-026-MT		/		H-3		1.7 +-0.1 E 04		04/08		5
43698	11019MSD	88-03-026-MT	03/08	1400		H-3		L.T. 1. E 02		04/06		5
43699	10070	88-03-096-ST				H-3						

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES  
 REPORT OF ANALYSIS  
 RUN DATE 06/02/94  
 PAGE 1

DATE RECEIVED 04/01/94  
 DELIVERY DATE 05/04/94  
 CUSTOMER P.O. NUMBER 030225/030600829  
 WORK ORDER NUMBER 4-0595

ANN MARIE HOLBROW  
 MCLAREN/HART  
 16755 VON KARMAN AVE 92714  
 IRVINE CA

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP DATE	TIME	NUCLIDE	ACTIVITY (PCI/LITER)	NUCL-UNIT-# U/M #	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-X #	LAB.
46247	11046	88-00-005-PT	03/09	1200		H-3	1.2 +-0.1 E 03		05/28		5
46248	11047	88-00-006-PT	03/09	1200		H-3	L.T. 1.4 E 02		05/28		5
46249	11048	88-00-007-PT	03/09	1200		H-3	1.5 +-0.2 E 03		05/28		5
46250	11182	88-17-010-ST	03/09	1650		H-3	L.T. 1.0 E 02		05/28		5

*J. Guenther*  
 APPROVED BY J. GUENTHER 06/02/94

LAST PAGE OF REPORT

SEND 1 COPIES TO MC4805 ANN MARIE HOLBROW

3 - RADIO CHEMISTRY LAB.

2 - GAS LAB.

4 - GEILLI GAMMA SPEC LAB.

5 - TRITIUM GAS/L.S. LAB.

6 - ALPHA SPEC LAB.

REPORT OF ANALYSIS  
 DATE RECEIVED 03/09/94  
 DELIVERY DATE 04/11/94

WORK ORDER NUMBER 4-0353  
 CUSTOMER P.O. NUMBER 030225/030600829

ANN MARIE HOLBROW  
 MCLAREN/HART  
 16755 VON KARMAN AVE 92714  
 IRVINE CA

W A T E R

TELEDYNE SAMPLE NUMBER  
 STA NUM  
 CUSTOMER'S IDENTIFICATION  
 COLLECTION-DATE  
 START DATE  
 STOP DATE  
 TIME  
 NUCLIDE

43668 11056 96-00-001-PT  
 43669 11073 86-00-001-PCG

ACTIVITY PCI/LITER

NUCL-UNIT-% U/M

MID-COUNT TIME DATE  
 VOLUME - UNITS ASH-WEIGHT-%  
 LAB.

1.7 +-0.1 E 03

- L.T. 6. E 01
- L.T. 1. E 02
- L.T. 7. E 00
- L.T. 8. E 00
- L.T. 2. E 01
- 3.39+-0.14E 02
- L.T. 2. E 01
- L.T. 7. E 00
- L.T. 8. E 00
- L.T. 7. E 01
- L.T. 1. E 01
- L.T. 8. E 00
- 2.61+-0.26E 02
- L.T. 1. E 01
- L.T. 1. E 01
- L.T. 6. E 01
- L.T. 1. E 02
- L.T. 1. E 01
- 1.94+-0.19E 02

- L.T. 5. E 01
- L.T. 9. E 01
- L.T. 6. E 00
- L.T. 5. E 00
- L.T. 1. E 01
- 3.86+-0.39E 02
- L.T. 1. E 01
- L.T. 6. E 00
- L.T. 6. E 00
- L.T. 6. E 01
- L.T. 8. E 00

43670 11072 86-00-001-PC 03/08

- BE-7
- K-40
- MN-54
- CO-58
- FE-59
- CO-60
- ZN-65
- ZR-95
- RU-103
- RU-106
- I-131

REPORT OF ANALYSIS

DELIVERY DATE 04/11/94

DATE RECEIVED 03/09/94

CUSTOMER P.O. NUMBER 030225/030600829

WORK ORDER NUMBER 4-0353

ANN MARIE HOLBROW  
 MCLAREN/HART  
 16755 VON KARMAN AVE  
 IRVINE CA 92714

W A T E R

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE	START DATE	STOP DATE	NUCLIDE	ACTIVITY (PCI/LITER)	NUCL-UNIT-X U/M #	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-X #	LAB.
43670	11072	86-00-001-86	03/08			CS-134 CS-137 BA-140 CE-141 CE-144 RA-226 TH-228 CO-57	L.T. 6. E 00 2.91+-0.29E 02 L.T. 9. E 00 L.T. 9. E 00 L.T. 5. E 01 L.T. 1. E 02 L.T. 9. E 00 2.09+-0.21E 02		03/11 03/11 03/11 03/11 03/11 03/11 03/11		4 4 4 4 4 4 4 6 6
43671	11089	86-00-001-PP	03/08			PU-238 PU-239	L.T. 2. E-01 3.3 +-0.8 E 00		03/23 03/23		6 6
43672	11088	86-00-001-PP	03/08			PU-238 PU-239	L.T. 2. E-01 2.9 +-0.7 E 00		03/23 03/23		3 3
43673	11009	86-00-001-PS	03/08			SR-90	L.T. 1. E 00		04/06		3
43674	11009DUP	86-00-001-PS	03/08			SR-90	L.T. 4. E 00		04/08		3
43675	11108	86-00-001-PS	03/08			SR-90	L.T. 2. E 00		03/31		3
43676	11064	86-00-001-PA	03/08			GR-A GP-B	4.1 +-0.5 E 01 1.0 +-0.1 F 02		04/06 04/06		3 3
43679	11075	86-00-002-P6	03/08			BE-7 K-40 MN-54 CO-58 FE-59 CO-60 Zn-65 Zr-95 RU-103	L.T. 7. E 01 L.T. 9. E 01 L.T. 7. E 00 L.T. 8. E 00 L.T. 2. E 01 3.70+-0.37E 02 L.T. 2. E 01 L.T. 8. E 00 L.T. 8. E 00		03/11 03/11 03/11 03/11 03/11 03/11 03/11 03/11		4 4 4 4 4 4 4 4 4









TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

RUN DATE 04/14/94

REPORT OF ANALYSIS

PAGE 2

WORK ORDER NUMBER 4-0459  
 CUSTOMER P.O. NUMBER 030225/030600829  
 DATE RECEIVED 03/21/94  
 DELIVERY DATE 04/23/94

ANN MARIE HOLBROM  
 MCLAREN/HART  
 16755 VON KARMAN AVE  
 IRVINE CA 92714

W A T E R

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	STOP TIME	NUCLIDE	ACTIVITY (PCI/LITER)	NUCL-UNIT-X U/M #	MID-COUNT TIME DATE	VOLUME - UNITS ASH-WGHT-X #	LAB.
45106	WD1-WT		03/15	1050	H-3	L.T. 2. E 02		03/26		5
45107	WD1-WA		03/15	1150	GR-A GR-B	L.T. 2. E 01 4.0 +-0.9 E 01		03/28 03/28		3 3
45108	WD1-WS		03/15	1150	SR-90	L.T. 9. E-01		03/30		3
45110	WD1-WP		03/15	1150	PU-238 PU-239	L.T. 2. E-01 L.T. 2. E-01		04/10 04/10		6 6
45112	WD1-WG		03/15	1150	BE-7 K-40 MN-54 CO-58 FE-59 CO-60 ZN-65 ZR-95 RU-103 RU-106 I-131 CS-134 CS-137 BA-140 CE-141 CE-144 RA-226 TH-228	L.T. 1. E 02 L.T. 3. E 02 L.T. 1. E 01 L.T. 1. E 01 L.T. 2. E 01 L.T. 1. E 01 L.T. 2. E 01 L.T. 1. E 01 L.T. 1. E 01 L.T. 9. E 01 L.T. 3. E 01 L.T. 1. E 01 L.T. 1. E 01 L.T. 2. E 01 L.T. 2. E 01 L.T. 6. E 01 L.T. 2. E 02 L.T. 2. E 01			4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	

*J. Guenther*  
 APPROVED BY J. GUENTHER 04/14/94

LAST PAGE OF REPORT

SEND 1 COPIES TO MC6805 ANN MARIE HOLBROM  
 2 - GAS LAB. 3 - RADIO CHEMISTRY LAB. 4 - GEILII GAMMA SPEC LAB. 5 - TRITIUM GAS/L.S. LAB. 6 - ALPHA SPEC LAB.

**Appendix E**

***Data Comment Letters  
from Teledyne Isotopes  
Laboratory and  
Brandeis-Bardin Consultant***

 **TELEDYNE  
BROWN ENGINEERING  
Environmental Services**

50 VAN BUREN AVENUE

P.O. BOX 1236

WESTWOOD, NEW JERSEY 07675-1236

(201) 864-7070 FAX (201) 864-5588

September 7, 1994

Mr Eric Smith  
McLaren/Hart  
FAX: 714-756-8460

Attached are the data sheets for the four Sr-90 results of which you inquired. A brief discussion is provided in the letter to help decipher our reporting.

TI# 43673:

The first count gave result of 2.2 +-1.6. When we get a positive result we count it approximately two days later to check for the radioactive decay of Y-90. That gave L.T. 4. We then "remilked" which means we reprocessed it to separate Sr from Y and then recounted to try to improve the detection limit. That time the two counts did not show radioactive decay. Thus we reported a L.T. 1.

TI# 43675:

The first count gave result of 2.2 +-1.0. The activity was close to our detection limit so when we counted it two days later we got L.T. 2. which we reported.

TI# 43682:

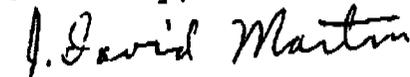
The first count gave result of L.T. 1. so we did not perform additional counts.

TI# 43683:

The first count gave result of 2.3 +-1.3. Upon recount we got L.T. 3. and reported that.

So you can see that we measured a result close to the spiked value on the first count of three out of four samples but did not report them because the second counts were below our detection limit.

Sincerely,



J. David Martin  
Manager, Environmental Analysis



RADIOCHEMICAL WORK SHEET

- Lemick -

CUSTOMER McLaren Hart COLLECTION DATE 3/8  
 MOUNTING DATE 4-5-94 SAMPLE TYPE 620  
 VOLUME \_\_\_\_\_ UNITS \_\_\_\_\_ ALIQUOT 300dals

NUCLIDE	
Y	910

SAMPLE NUMBER	
4	3673

YIELD 91.9 MICLIDE 90 ASH WT. \_\_\_\_\_ gms  
60.1 MICLIDE 89 NET WT. \_\_\_\_\_ gms  
 DECAY FACTOR 175 ASH WT. (100) = \_\_\_\_\_  
 (MILLI TO COUNT) 462 NET WT. \_\_\_\_\_

SCAVENGE DATE 3-28-94 TIME 0930  
 MTLING DATE 4-5-94 TIME 0940  
 ANALYST DCT INTEGRITY FACTOR SMY

DATE	COUNTING TIME	COUNTER	K (Counts)	AL (min)	$\frac{K}{\Delta t}$ (cpm)	SK. (cpm)	A (cpm)	E (eff.)	L.T. (E-00)
4/6	0800	E3	36	100	360	.14	100	30	2.95 ± 1.9 E-00 k=1.17
4/8	0830	E3	39	100	390	.14	125	30	5.4 ± 3.2 E-00 k=2.18

net  
 decay by  
 from  
 4-11

ACTIVITY OR MDL

L. T. I. . . . . E . . . . . 0 0

UNITS A CALC. BY KC DATE 4/8/94  
 ENTERED 4/11 CHECKED BY \_\_\_\_\_ FROM DATE 4-11

125  
 $\frac{125}{1.75} = 72$   
 - pop

Decay Factor	INTERVAL	
	Count to Count	Count to Count

RADIOCHEMICAL WORK SHEET

CUSTOMER McLaren Hart COLLECTION DATE 3/8  
 MOUNTING DATE 3-28-94 SAMPLE TYPE 620  
 VOLUME \_\_\_\_\_ UNITS \_\_\_\_\_ ALIQUOT 500als

YIELD 100.0 NUCLIDE <sup>90</sup>Y ASH WT. \_\_\_\_\_ PER  
 YIELD 67.6 NUCLIDE <sup>89</sup>Sr NET WT. \_\_\_\_\_ PER  
 DECAY FACTOR .774 ASH WT. (100) \_\_\_\_\_  
 (MULT. TO COUNT) .462 NET WT. \_\_\_\_\_

NUCLIDE			
Y	-	9	0

SAMPLE NUMBER			
4	3	6	75

SCAVENGE DATE 3-22-94 TIME 1315  
 MOUNTING DATE 3-28-94 TIME 0930  
 ANALYST AWA/DCT INCREMENT FACTOR .774

COUNTING DATE	TIME	COUNTER	N (COUNTS)	Δt (min)	$\frac{N}{\Delta t}$ (cpm)	Bkg. (cpm)	A (cpm)	E (eff.)	ACTIVITY OR MDL
3/29	0830	XQC	85	100	$\frac{85}{1.85}$	.38	.47	.48	$2.2 \pm 1.0 \text{ E } 00$ k=1.62
3/31	0830	XQC	56	100	.56	.38	.18	.48	L.T. 2. E 00 k=1.04

$\frac{.18}{.56} = .32$   
 $\frac{.38}{.56} = .68$

Decay Factor	INTERVAL	
	Ct to Ct	Ct to CE

UNITS A CALC. BY kc DATE 4/1/94  
 ENTERED 4/4 CHECKED BY AWA DATE 4-4

RADIOCHEMICAL WORK SHEET

SAMPLE NUMBER	
4	3682

NUCLIDE	
Y	90

CUSTOMER McLaren Hart COLLECTION DATE 3/8  
 MOUNTING DATE 3-28-94 SAMPLE TYPE 620  
 VOLUME \_\_\_\_\_ UNITS \_\_\_\_\_ ALIQUOT 500mls

SCAVENGE DATE 3-22-94 TIME 1315 YIELD 100.0 NUCLIDE Y<sup>90</sup> ASH WT. \_\_\_\_\_  
 MILKING DATE 3-28-94 TIME 0830 YIELD 70.4 NUCLIDE S<sup>89</sup> NET WT. \_\_\_\_\_  
 ANALYST AWA/DCI IMPURITY FACTOR 1.779 DECAY FACTOR 1.774 (MILLI TO COUNT) ASH WT. (100) \_\_\_\_\_  
 NET WT. \_\_\_\_\_

COUNTING Date	Time	COUNTER	K (Counts)	t <sub>c</sub> (min)	$\frac{K}{t_c}$ (cpm)	sk. (cpm)	A (cpm)	F (eff.)
3/29	0830	X20d	65	100	165	46	19	48

LT. 1. E 00  
 K= .60

Decay Factor	INTERVAL	
	Count to Ct	Ct to Ct

ACTIVITY OR MDL					
L	T	1	1	E	00
UNITS	A	CALC. BY	KQ	DATE	3/20/94
ENTR'D BY		CHECKED BY	fun	DATE	3-30

RADIOCHEMICAL WORK SHEET

SAMPLE NUMBER	
43683	

NUCLIDE	
Y-90	

CUSTOMER McLaren Hart COLLECTION DATE 3/8  
 MOUNTING DATE 3-28-94 SAMPLE TYPE W0  
 VOLUME \_\_\_\_\_ UNITS \_\_\_\_\_ ALIQUOT 500mls

YIELD 99.4 MUCLIDE Y-90 ASH WT. \_\_\_\_\_ gms  
 YIELD 58.7 MUCLIDE Y-89 NET WT. \_\_\_\_\_ gms

SCAVENGE DATE 3-22-94 TIME 1315  
 MILKING DATE 3-28-94 TIME 0930

ANALYST AWA/DCJ INGROWTH FACTOR .779 DECAY FACTOR .774 ASH WT. (100) - \_\_\_\_\_  
 (MILK TO COUNT) .462 NET WT. \_\_\_\_\_

COUNTING Date	Time	COUNTS	K (COUNTS)	AL (nls)	H AT (cpm)	111. (cpm)	A (cpm)	E (eff.)
3/29	0836	X39	87	100	.87	.47	.40	.45
								$2.3 \pm 1.3 \in 00$
								$k=1.48$
3/31	0830	X39	66	100	.66	.47	.19	.45
								$U.T. 3. \in 00$
								$k=1.18$

Decay Factor	INTERVAL
	Count to Ct

ACTIVITY OR MDL

U.T. 3. 0 0

UNITS A CALC. BY KE DATE 4/1/94

ENTERED 4/4 CHECKED BY pm DATE 4-4

$\frac{19}{151} = .32$   
 $\frac{151}{1000} = .151$

 **TELEDYNE**  
**BROWN ENGINEERING**  
**Environmental Services**

50 VAN BUREN AVENUE

P.O. BOX 1235

WESTWOOD, NEW JERSEY 07675-1235

(201) 884-7070 FAX (201) 884-5586

September 23, 1994

Mr. Eric Smith  
McLaren/Hart  
16755 Von Karman Avenue  
Irvine, California 92714

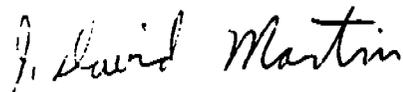
Dear Mr. Smith:

We did not initially report the isotopes listed below for four samples since the isotopes are not ones expected to be found (or requested to be analyzed for) in field samples but instead can be used for detector calibrations.

Our convention is to report the greater of 10% or two standard deviations of the counting statistics for gamma ray spectroscopy. All of the measurements listed below had two standard deviations (which are also listed) of less than 10%. Results are in pCi/l.

<u>Nuclide</u>	<u>TI# 43669</u>	<u>TI# 43670</u>	<u>TI# 43679</u>	<u>TI# 43680</u>
Y-88	606+-20	661+-13	650+-21	680+-18
Cd-109	7970+-240	9530+-250	9700+-310	8510+-170
Sn-113	219+-8	240+-6	232+-8	236+-7
Ce-139	167+-7	207+-7	199+-8	200+-6
Hg-203	169+-7	186+-7	185+-8	188+-7

Sincerely,



J. David Martin  
Manager, Environmental Analysis

**JOEL I. CEHN**  
**CERTIFIED HEALTH PHYSICIST**  
1030 HUBERT ROAD  
OAKLAND, CA 94610  
510 208-1571

August 26, 1994

Mr. Dennis Dineen  
McLaren/Hart  
16755 Von Karman Ave.  
Irvine, CA 92714

Dear Dennis;

I have some changes in results for one Brandeis QC sample. These are shown on the attached table. This table was prepared by Joe Stinson to summarize some of the laboratory quality control data. In case you are including this table in your report, I wanted you to have the corrected copy.

The correction was a result of a calculational error at the lab. Prior to gamma spec. analysis, water samples (2 only) were supposed to be evaporated from 1000 ml to 500 ml. The goal was to decrease the detection limit by a factor of 2. However, in the lab the evaporation wasn't done, but the factor of 2 was still applied (for sample BBG-00-002PG). This resulted in isotopic concentrations for that sample being reported too low, by a factor of 2.

Yours truly,



cc: Niel Mukherjee, Rockwell  
Joe Stinson, SC&A  
Mike McWilliams, SC&A

**TELEDYNE  
BROWN ENGINEERING  
Environmental Services**

80 VAN SUREN AVENUE

P.O. BOX 1235

WESTWOOD, NEW JERSEY 07075-1235

(201) 864-7070 FAX (201) 864-6288

To: Mr. Eric Smith

McLaren/Hart

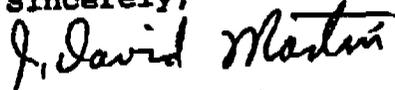
FAX: 714-756-8460

Sequence for Counting Some Tritium Samples

<u>Count Date</u>	<u>TI#</u>	<u>Water</u>	<u>Soil Mass</u>		
		<u>Volume (ml)</u>	<u>Wet (g)</u>	<u>Dry (g)</u>	
05-22-94	62	2			
	64	1			
	63	1			
	44665	2	314	300	
	44677	1	186	177	
	82	10			
	87	10			
	94	10			
	05-26-94	42	10		
		47	9		
51		5			
45054		3	321	315	
59		1			
60		1			
61		1			
45070		1	260	253	
45077		2	356	350	
83		10			
86	10				
90	10				

The five samples for which the entire five digit TI# is expressed are the ones requested by the customer for us to provide the samples counted before and after. The counting sequence seems to be unimportant. However, the volume of sample available and counted seems to be. After the water, removable by the procedure, was separated, the soil was further dried (and recorded in the event that later the results needed to be expressed on a dry mass basis). That mass is given in the right-hand column. The volume of water extracted is not known exactly but is close to the volume counted.

Sincerely,



J. David Martin

Manager, Environmental Analysis

 **TELEDYNE**  
**BROWN ENGINEERING**  
**Environmental Services**

50 VAN BUREN AVENUE

P.O. BOX 1235

WESTWOOD, NEW JERSEY 07675-1235

(201) 664-7070 FAX (201) 664-5586

September 14, 1994

Mr. Eric Smith  
McLaren/Hart  
16755 Von Karman Avenue  
Irvine, California 92714

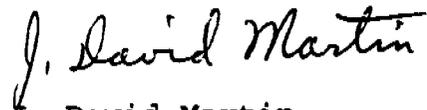
Dear Mr. Smith:

Upon review of the tritium data for this project we noticed that in a few cases we reported a relatively high tritium activity (also with a large counting error) for samples for which we extracted a relatively small quantity of water. For those samples we counted 1 or 2 ml of water. We now suspect that those results do not reflect the actual tritium activity and thus we retract those results. The phenomenon for causing this apparent activity is not known. An equivalent volume of water removed from a water sample does not exhibit this effect. The samples for which we are retracting the tritium results are identified by our numbering system as:

TI# 44665, 44677, 45054, 45070, and 45077.

If you have any questions please contact me.

Sincerely,



J. David Martin  
Manager, Environmental Analysis

**TELEDYNE  
BROWN ENGINEERING  
Environmental Services**

80 VAN BUREN AVENUE

P.O. BOX 1036

WESTWOOD, NEW JERSEY 07675-1236

(201) 684-7670 FAX (201) 684-3288

October 21, 1994

Mr. Eric Smith  
McLaren/Hart  
FAX: 714-756-8460

<u>TI#</u>	<u>Water Extracted (ml)</u>	<u>Water Counted (ml)</u>
44657	2.3	1.0
44722 & 44723	14.1	2.0 each TI#

TI# 44722 & 44723 were two aliquots from the same sample.  
There remains 10 ml of sample which could be counted to  
improve the reliability.

Sincerely,

*J. David Martin*J. David Martin  
Manager, Environmental Analysis

APPENDIX F  
GRAPHICAL EVALUATION  
OF RESULTS

**Appendix F**

***Graphical Evaluation of  
Results***

## APPENDIX F

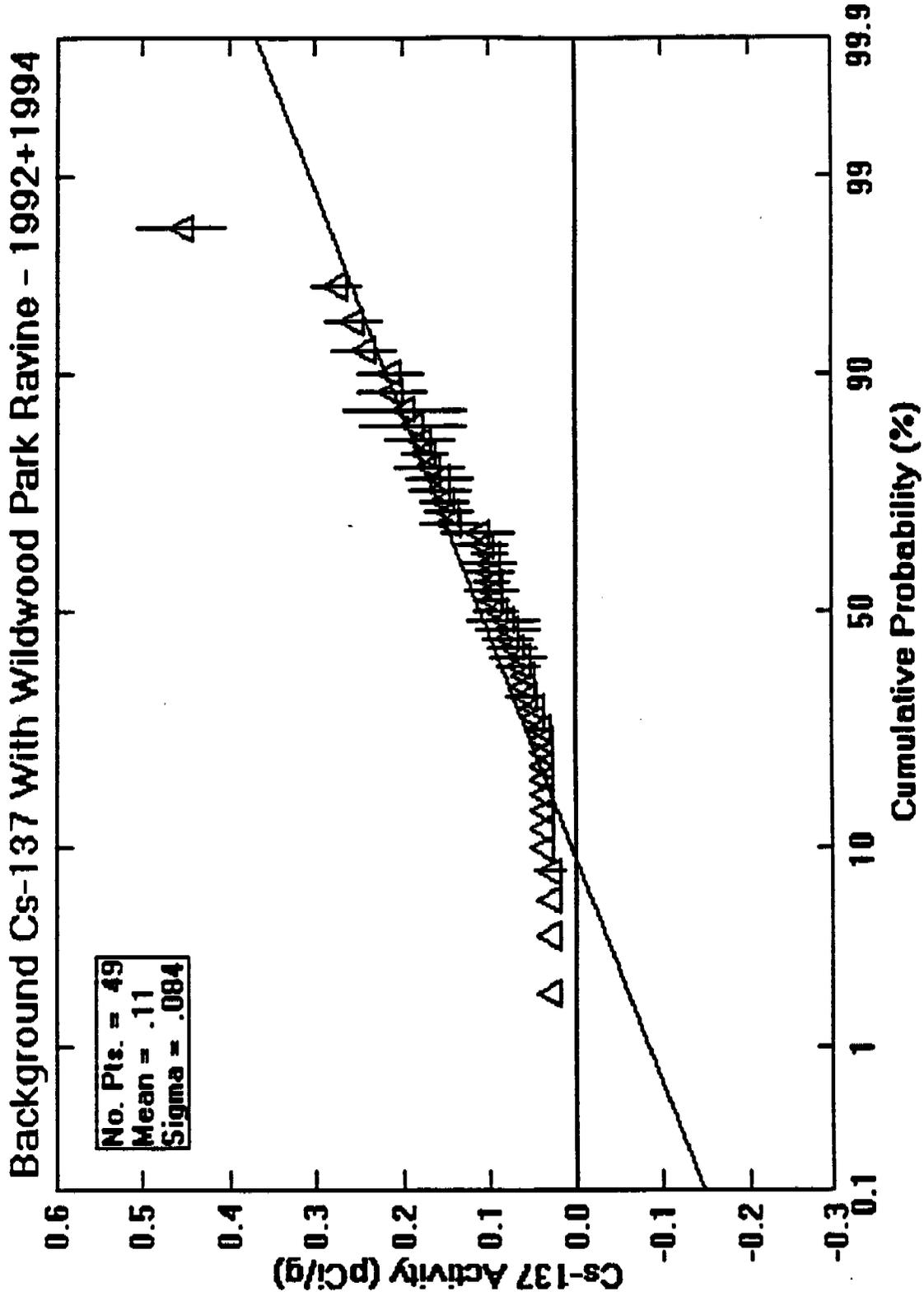
### GRAPHICAL EVALUATION OF RESULTS

Figures 1 to 4 illustrate the distribution of 1992 plus 1994 data for cesium-137 at Building 59 Watershed and at the background areas. The distributions have been linearized on a cumulative probability plot. Note that the range of the Building 59 Watershed cesium-137 is similar to the Wildwood park ravine cesium-137 (compare Figure 3 to Figure 4). Both Building 59 Watershed and Wildwood park ravine cesium-137 are statistically distinguishable from the other aggregate backgrounds.

Figures 6 to 8 illustrate the distribution of 1992 plus 1994 data for strontium-90 at the Radioactive Materials Disposal Facility (RMDF) Watershed and at the background areas. Note that removing the "Wildwood Park" background dataset from the aggregate background does not significantly change the mean or the standard deviation (compare Figures 6 to Figure 7). Even though the slope (standard deviation) of the RMDF Watershed data is larger than the background data of the aggregate background, the large error bars in the individual measurements overlap, suggesting comparable data.

Figures 5 and 9 compare the range of 1994, Cs-137 and strontium-90 data collected from background areas (including and excluding Wildwood), and sampled areas (McLaren/Hart, EPA, DHS, and BBI). All cesium-137 data is comparable with overlapping 2-sigma ranges. All measurements are significantly less than the proposed EPA soil cleanup standards for radiation site cleanup. This cleanup standard is based on a dosage rate of 50 mrems/year for residential area. Most strontium-90 data is comparable with overlapping 2-sigma ranges. Note that the EPA and BBI measurements were all "less than detect" at around 0.7 pCi/gm, far in excess of other measured data, and far in excess of differences between sampled areas and background areas. All measurements were significantly less than the proposed EPA soil cleanup standards for radiation site cleanup.

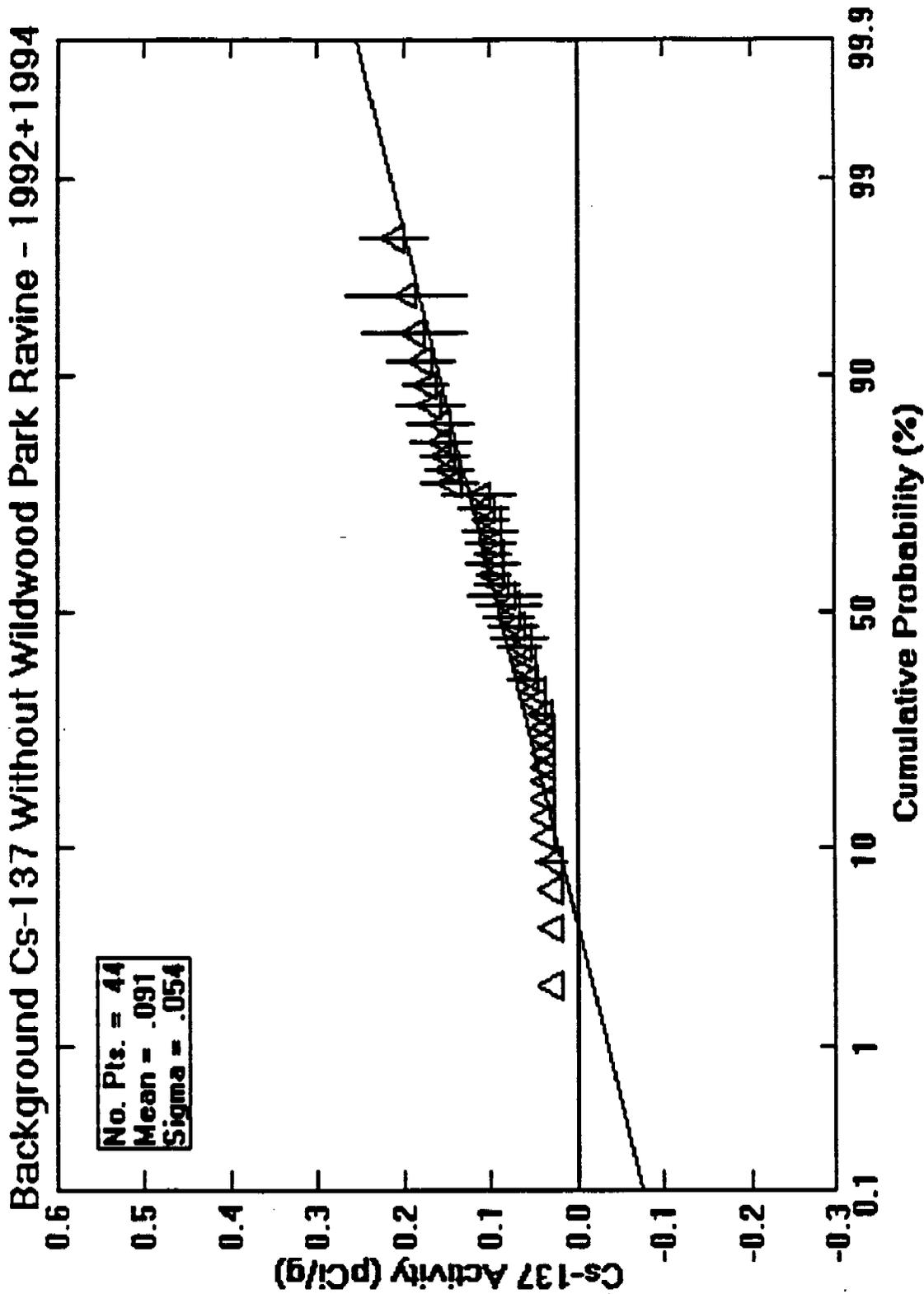
FIGURE 1



C:\EXCEL\DATA\BGCSYSWW.CSV

10-11-94

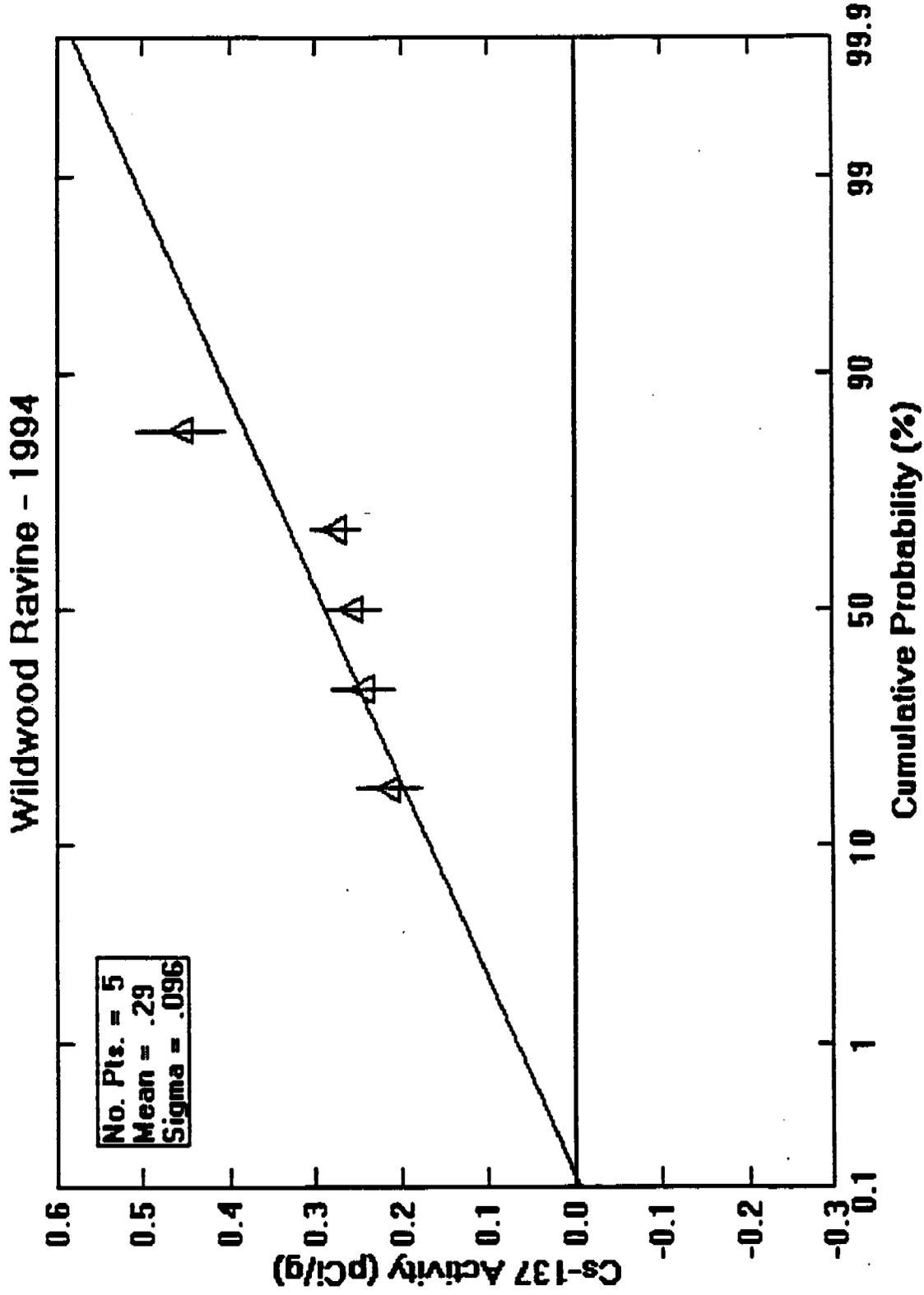
FIGURE 2



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10-11-94

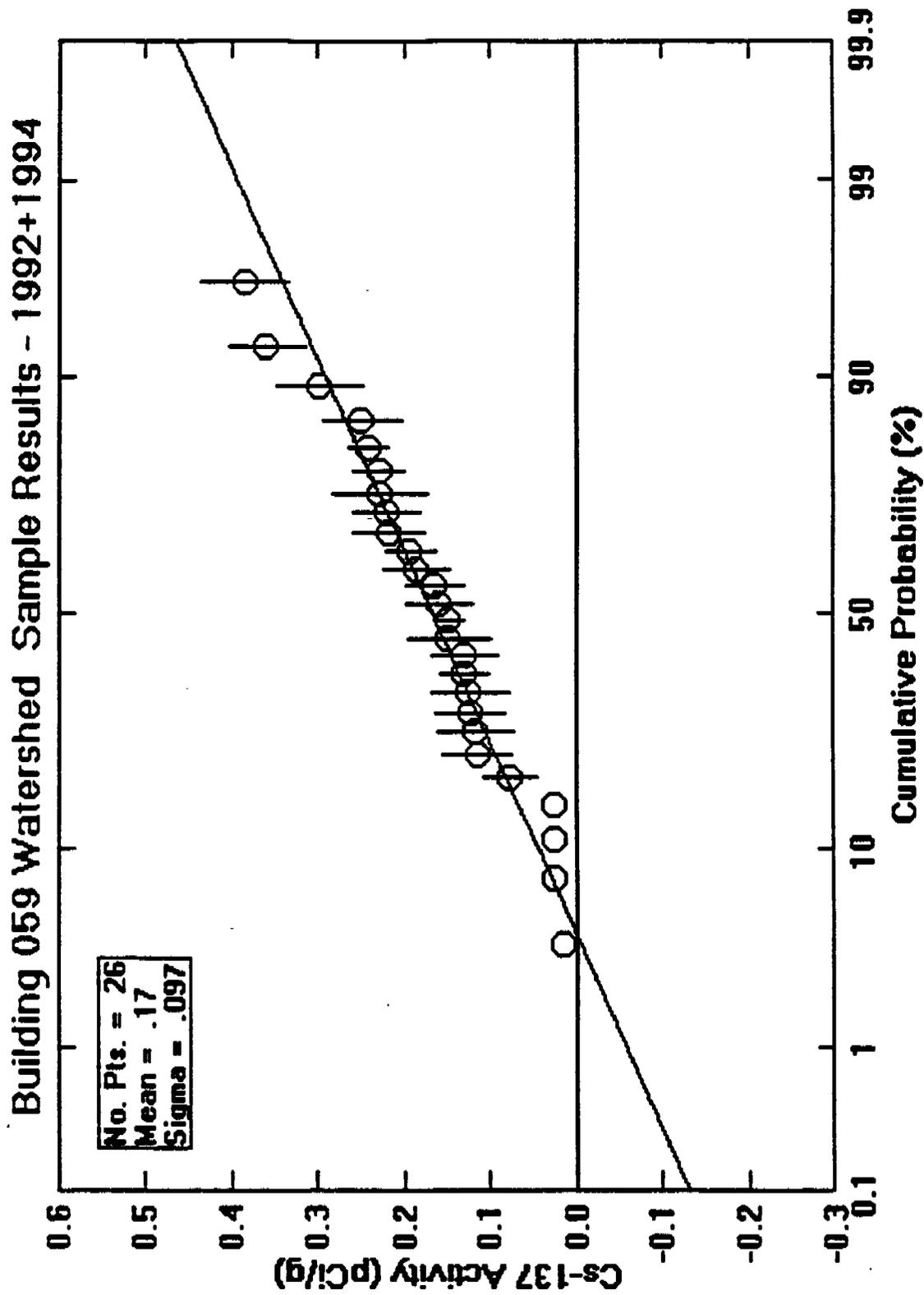
FIGURE 3



C:\EXCEL\DATA\WWRVINE.CSV

10-11-94

FIGURE 4



C:\EXCEL\DATA\B59CS.CSV

10-11-94

1994 Multimedia Results - Cesium-137 in Soil

FIGURE 5

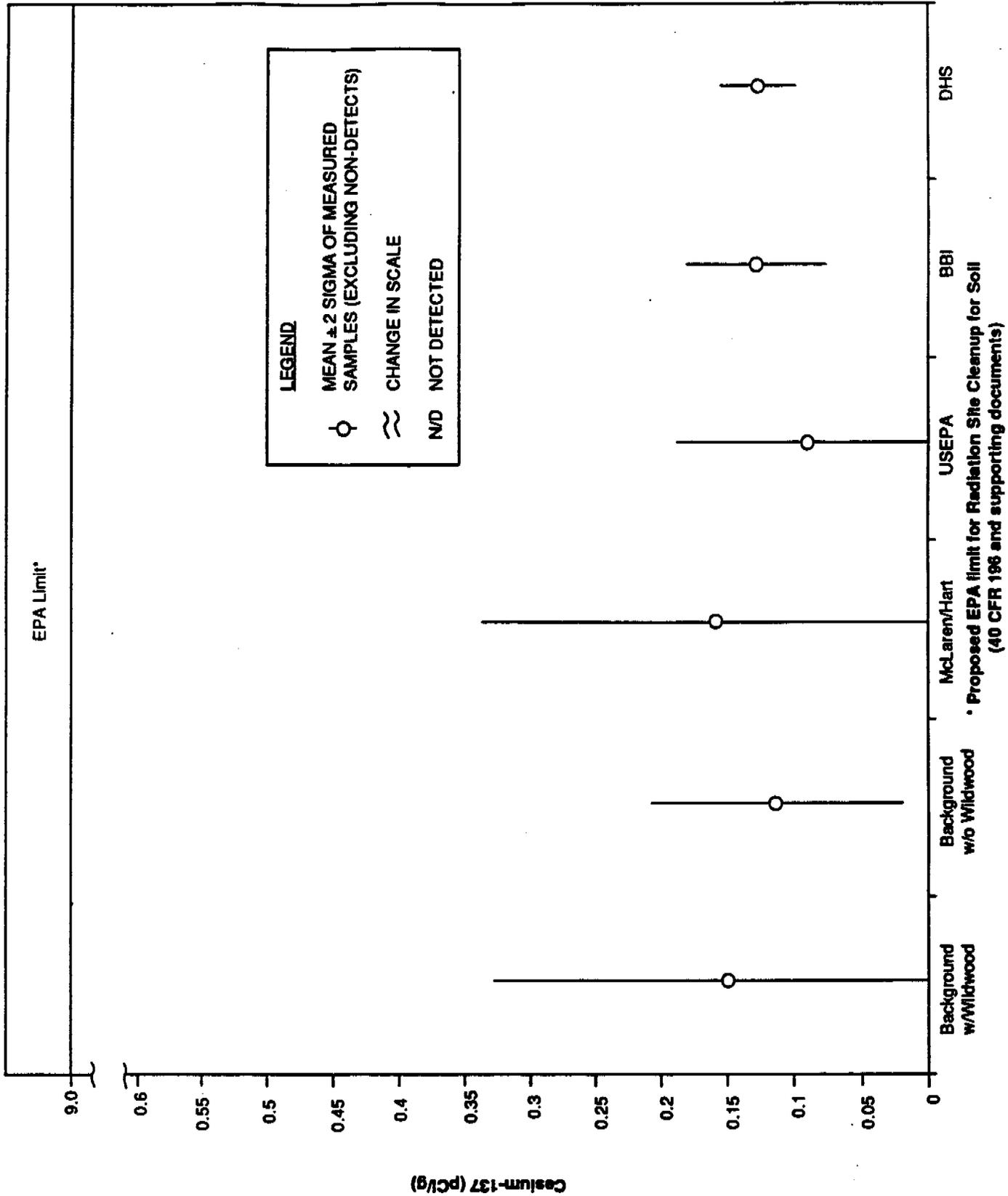
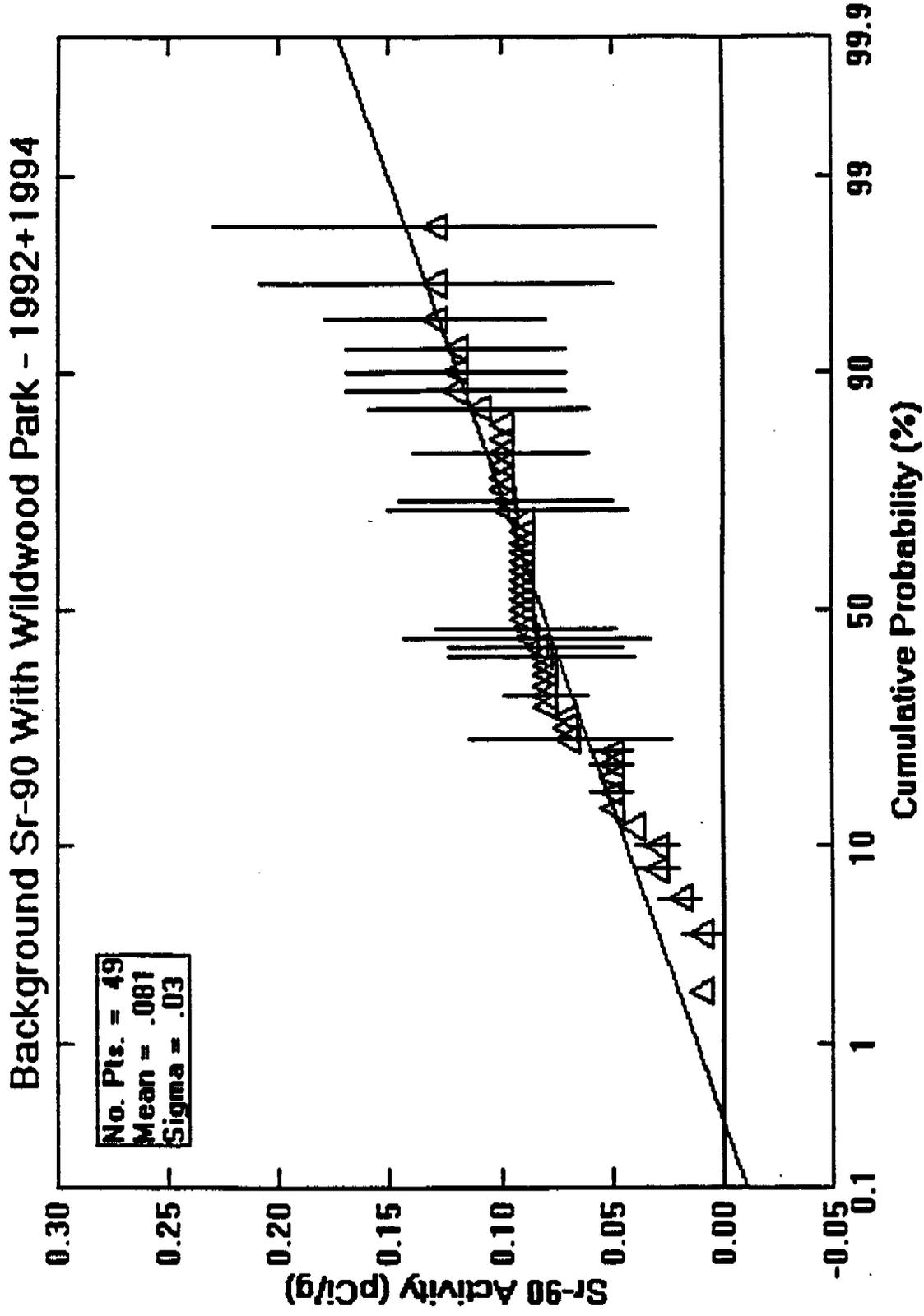


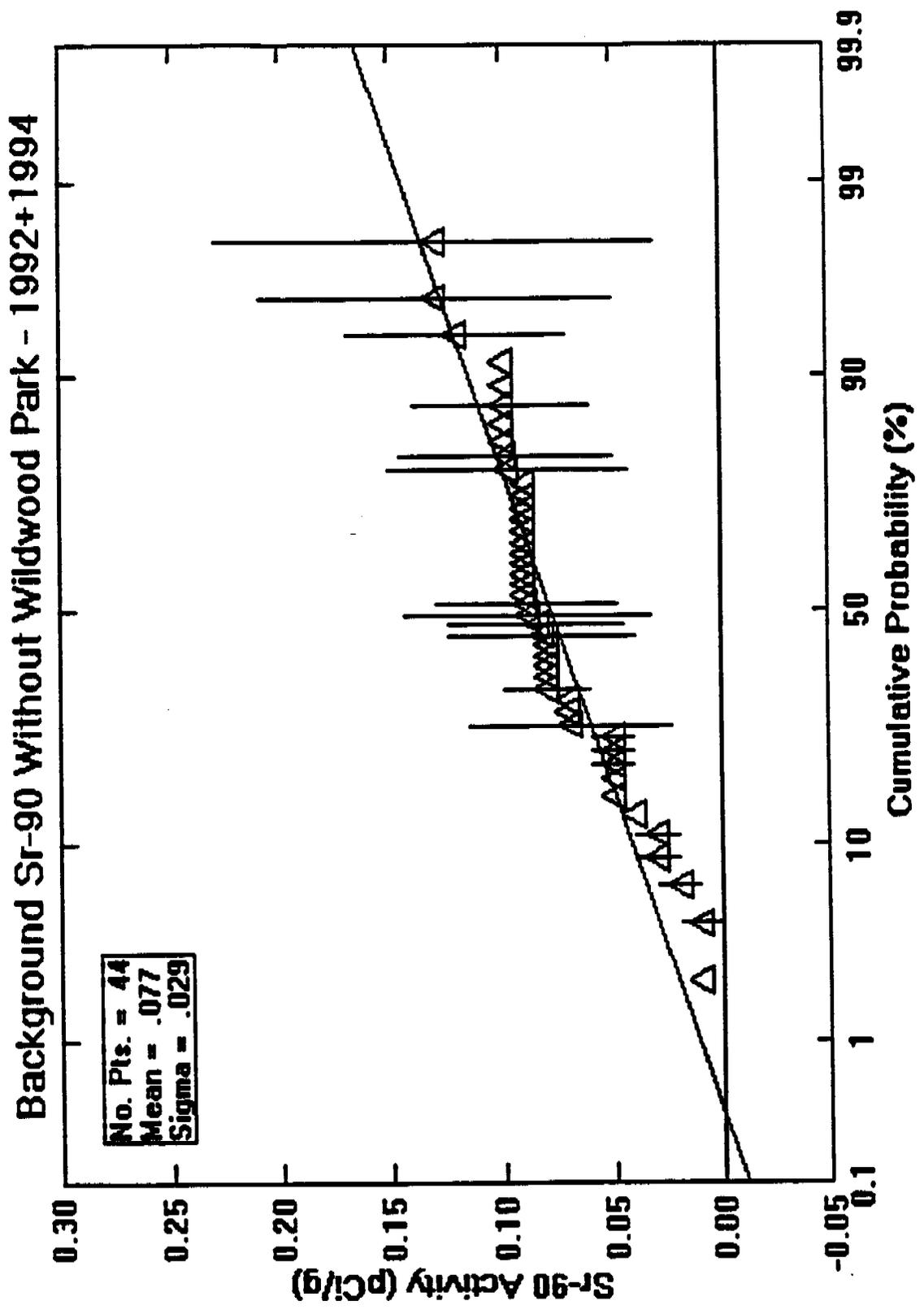
FIGURE 6



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10-11-94

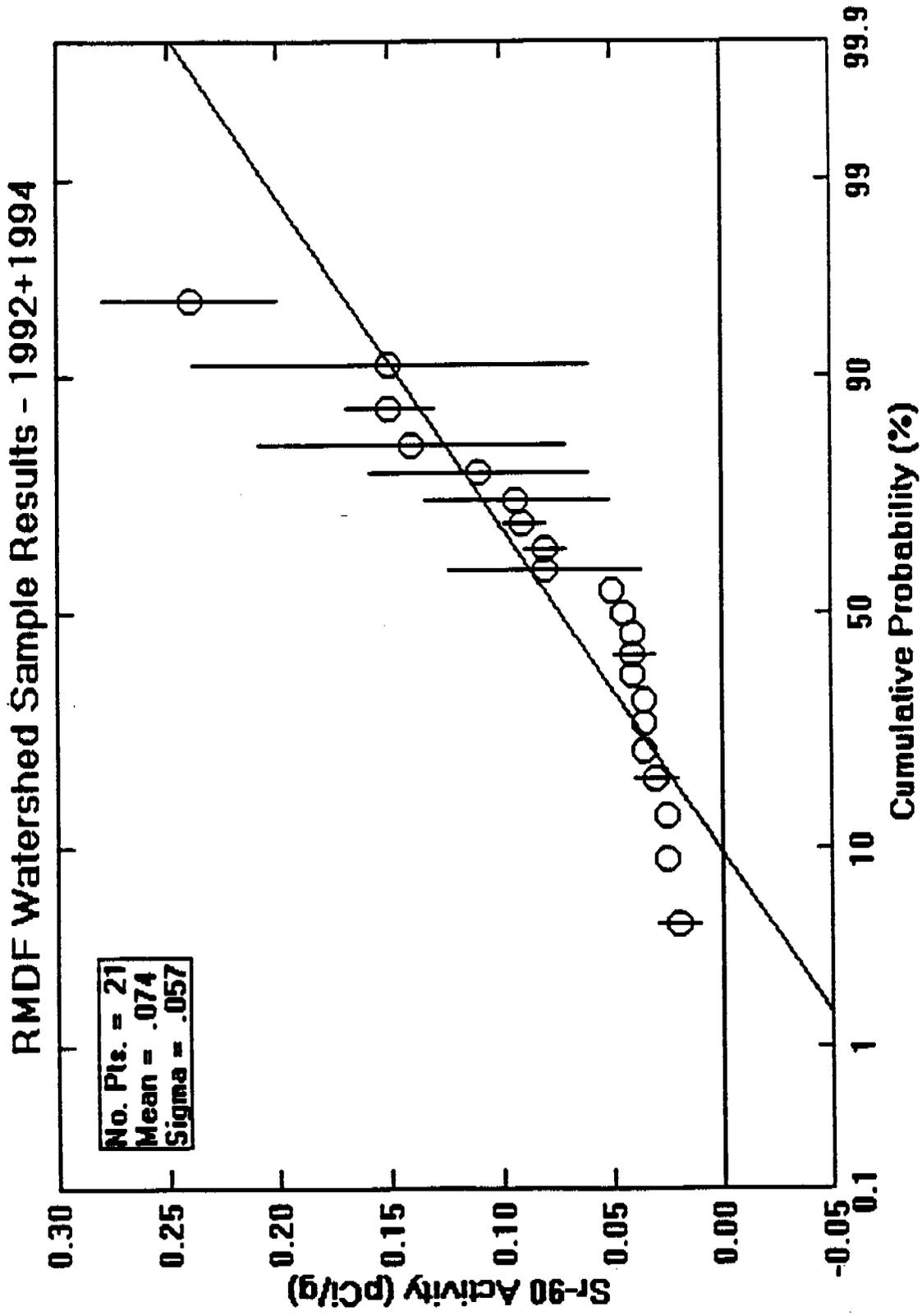
FIGURE 7

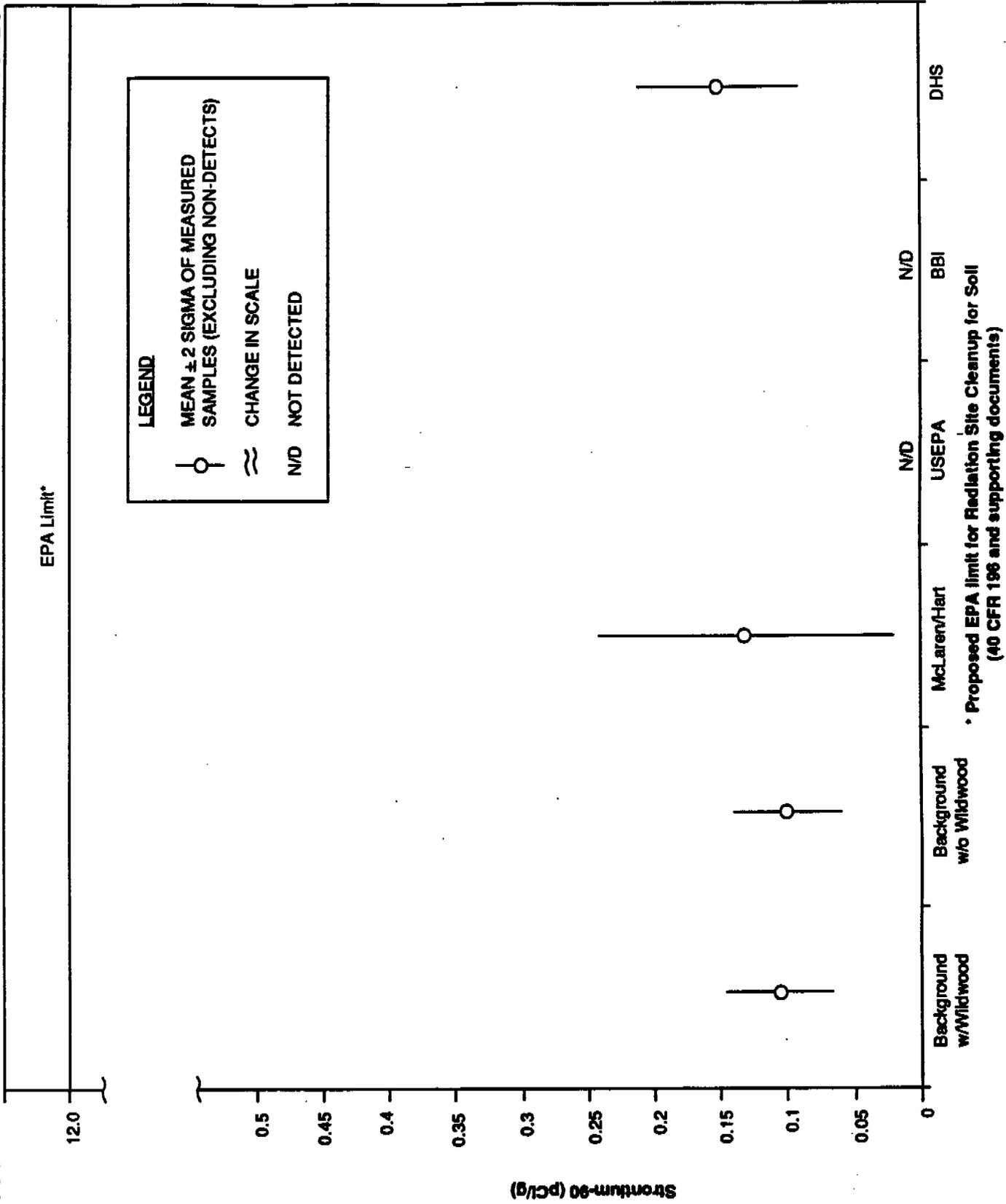


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10-11-94

FIGURE 8





APPENDIX G  
RADIATION  
SURVEY RESULTS

**Appendix G**

***Radiation Survey Results***

Table 6.1 Radiation Measurement Results

Survey Date	Sample Area	Sample Area Code	Block Number	Radiation Measurement (approximately 30 inches from the ground) $\mu\text{R}/\text{Hr}$
3/4/94	Campsite Area 2	04	21	18
		04	23	17
		04	26	18
		04	49	17
		04	62	17
		04	78	16
		04	79	16
		04	82	17
		04	84	17
		04	97	17
3/4/94	Old Well Campsite	14	04	17
		14	37	16
		14	79	15
		14	89	17
		14	94	17
3/7/94	House of The Book	06	07	16
		06	13	16
		06	17	16
		06	66	16
3/7/94	Avocado Grove	13	10	13
		13	11	14
		13	24	14
		13	37	14
		13	39	15
3/7/94	Picnic Area	05	03	15
		05	06	15
		05	57	15
		05	77	16
		05	89	16

Table 6.1 Radiation Measurement Results (continued)

Survey Date	Sample Area	Sample Area Code	Elect Number	Radiation Measurement (approximately 30 inches from the ground) $\mu\text{R}/\text{Hr}$
3/7/94	Dormitory Area	02	45	15
		02	60	15
		02	71	16
		02	75	15
		02	78	15
3/7/94	Main House Orchard	12	03	15
		12	03	15
		12	06	15
		12	19	15
		12	20	15
		12	23	14
3/7/94	Former Rocketdyne Employee Shooting Range	03	01	15
		03	04	15
		03	09	15
		03	14	15
		03	15	15
3/8/94	Campsite Area 1	03	03	15
		03	05	15
		03	17	16
		03	25	16
		03	26	15
		03	29	16
		03	79	15
		03	81	15
		03	96	16
		03	97	16

Table 6.1 Radiation Measurement Results (continued)

Survey Date	Sample Area	Sample Area Code	Block Number	Radiation Measurement (approximately 30 inches from the ground) $\mu\text{R}/\text{Hr}$
3/8/94	Composite 1 Drainage	20	01	17
		20	02	18
		20	03	20
		20	04	20
		20	05	20
		20	06	19
		20	07	18
3/9/94	Building 59 Watershed	17	04	18
		17	07	18
		17	08	18
		17	09	18
3/9/94	Radioactive Materials Disposal Facility Watershed	16	06	18
		16	07	18
		16	08	17
		16	09	18
		16	10	17
3/10/94	RD-51 Watershed	15	01	17
		15	02	16
		15	03	17
		15	04	17
		15	05	17
		15	08	16
		15	09	16
		15	10	16
3/10/94	Sodium Reactor Experiment Watershed	19	06	16
		19	07	16
		19	08	16
		19	09	17

Table 6.1 Radiation Measurement Results (continued)

Survey Date	Sample Area	Sample Area Code	Block Number	Radiation Measurement (approximately 30 inches from the ground) $\mu\text{R}/\text{Hr}$
3/10/94	Sodimm Burn Fit Watershed	18	05	15
3/10/94	Santa Susana Park	02	76	12
3/11/94	Happy Camp	05	16	14
3/11/94	Wildwood Regional Park	09	05	12
3/14/94	Wildwood Regional Park Ravine	10	01	12
3/14/94	Tapia County Park	11	10	7
		11	11	7
		11	31	7
		11	36	7
		11	75	7
3/14/94	Tapia County Park Ravine	12	04	7

APPENDIX H  
WRITTEN COMMENTS TO  
DRAFT REPORT  
NOV 18, 1994

**Appendix H**

***Written Comments to  
Draft Report  
November 18, 1994***

Joel I. Cehn, C.H.P.

1036 Hubert Road, Oakland, CA 94610

Radiation Physicist

(510) 268-1571

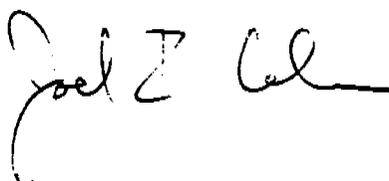
December 8, 1994

Mr. Eric Smith  
McLaren/Hart  
16755 Von Karman Ave.  
Irvine, CA 92714  
via FAX

Dear Eric;

In response to your letter of November 18, 1994, attached are my comments on McLaren/Hart's November draft of the Soil and Water Sampling Report. These are in addition to my comments on an earlier draft, transmitted October 17.

Yours truly,



cc: Arthur Pinchev, Brandeis Bardin Institute  
Helen Zukin, Simke Chodos Silberfield & Anteau  
Dr. Neil Mukherjee, Rockwell/Rocketdyne

***Comments on Additional Soil & Water Sampling  
at the Brandeis-Bardin Institute and  
Santa Monica Mountains Conservancy***

Page 5-1 This section of the report describes the statistical analyses used on the data. You state that these analyses are not used on the tritium data. However, no method of analysis is described for these data. By leaving this out, it appears that no analysis was performed on this data set (see next comment.)

Page 8-3 You discuss the tritium data in this results section. A background cutoff of 600 pCi/L is used to separate elevated tritium results from background results. This is twice the detection limit of 300 pCi/L. Can you discuss the basis for using this?

Page 8-1 The footnote on this page refers to quality control results for mercury analyses. Where do these results appear? They are not in the QC requirements table (Table 3), nor in Figures 5 & 6 (QC results.) Were any QC samples actually submitted for mercury analysis?

Page 9-2 Pockets of mercury contamination still exist on BBI property, below the sodium burn pit. This is acknowledged in the Executive Summary but not in the body of the report. I believe this should be discussed here, under Issue 3.

Page 9-4 Regarding the Campsite Area 1 drainage investigation, please acknowledge the limitations of that work. There is a 1,200 ft. gap between the lowest soil sample at the top of the hill (BB-17) and the highest soil sample at the bottom (BB-20). This area was not explored. Thus, we cannot confirm that only one ravine is involved, nor how far down the hill the contamination extends. Recall that both tritium and cesium-137 were detected at the bottom of BB-17. Samples further down the hill could not be collected due to steep terrain, resulting in this 1,200 ft. gap.

Joel I. Cehn, CHP  
December 8, 1994



December 6, 1994

McLaren-Hart Environmental Engineering Corp.  
16755 Von Karman Avenue  
Irvine, CA 92714

RE: Draft Additional Soil and Water Sampling at the Brandeis-Bardin Institute and  
Santa Monica Mountains Conservancy Report, Rockwell International Corporation -  
Rocketdyne Division

Dear Mr. Smith:

In general the document seemed well organized and understandable. However, I found the Chapter 4 discussion about "outside of acceptance limits" difficult to follow. In fairness this is a subject area wherein I have very limited knowledge. Nonetheless, it may be possible to provide more simplistic language and conceptualization for your less technical audience.

Thank you for the opportunity to review the document.

Sincerely,

A handwritten signature in cursive script, appearing to read "R. L. Holtzer".

Robert L. Holtzer, M.D.  
Public Health Medical Officer III  
Hazardous Waste Toxicology Section

cc: Arnold Robbins, USEPA

