SHEA #86204

WORKPLAN FOR ADDITIONAL SOIL AND WATER SAMPLING AT THE BRANDEIS-BARDIN INSTITUTE AND SANTA MONICA MOUNTAINS CONSERVANCY

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SECTION 1.0

INTRODUCTION

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.

Section 1.2 and the rest of this document describes the additional sampling to be performed at Brandeis-Bardin, the Conservancy, and three background locations.

1.1 Background

A multi-media sampling 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 (hereafter, Brandeis-Bardin and the Conservancy, respectively). In addition to the study areas, six background locations that were from 1.5 to 12.5 miles of the SSFL were sampled to provide data on background concentrations of metals 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. 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[1] 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 at 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 assure that the data were valid. 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 (completeness) demonstrated that the data were valid.

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.

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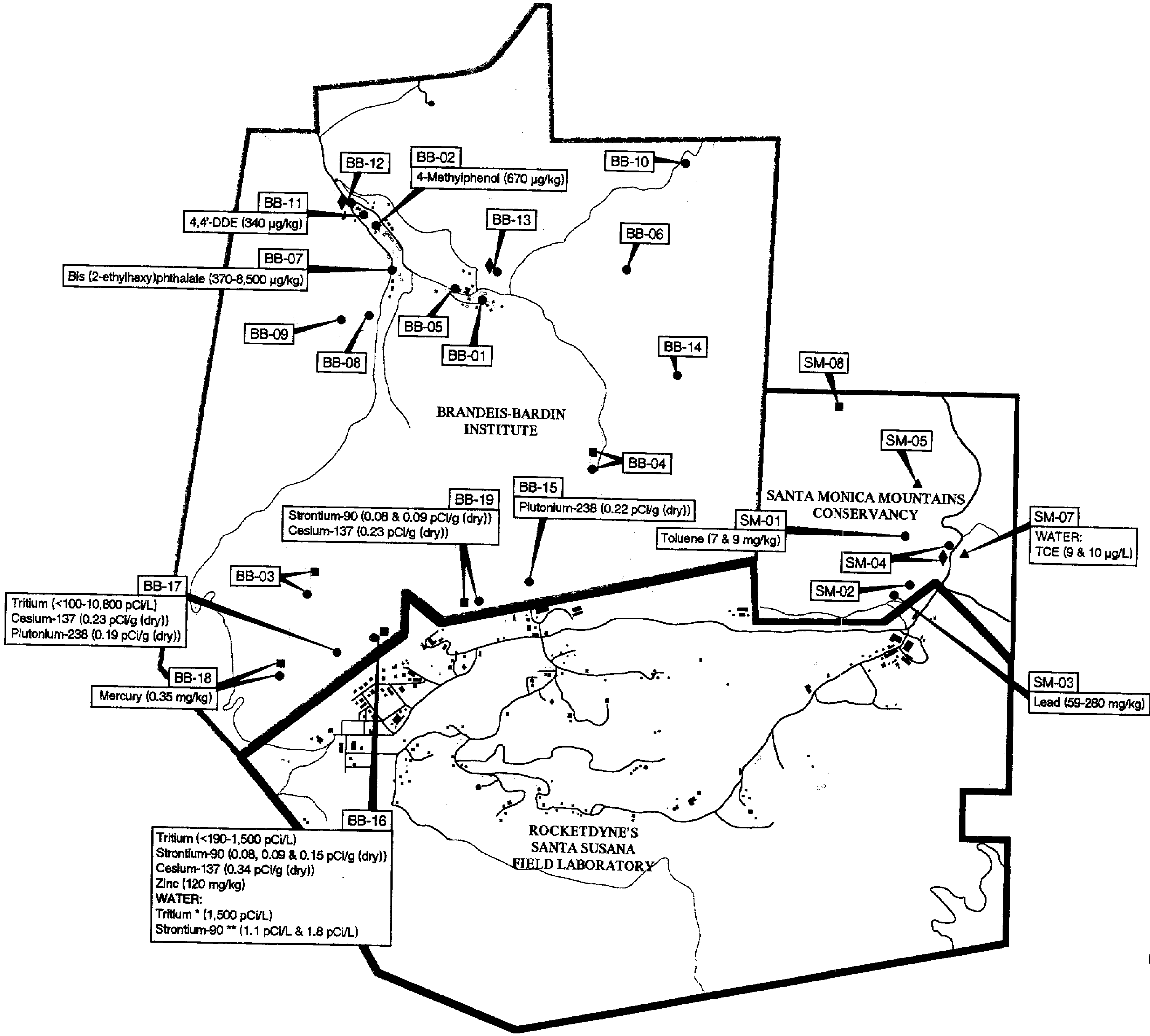
[1] Only the results of man-made radionuclides (Cesium-137 and Strontium-90) were reported in tabular form in the report.

FIGURE 1
SUMMARY OF PREVIOUS
MULTI-MEDIA SAMPLING



LEGEND

- ▲ Groundwater Sample
- ● Soil / Sediment Sample
- ♦ Fruit Sample
- ■ Surface Water Sample
- µg/kg Micrograms Per Kilogram
- µg/L Micrograms Per Liter
- mg/kg Milligrams Per Kilogram
- pCi/L Picocuries Per Liter
- pCi/g (dry) Picocuries Per Gram (Dry)
- DDE Dichlorodiphenyldichloroethene
- TCE Trichloroethene
- < Less Than
- * Below The Maximum Contaminant Limit (MCL) of 20,000 pCi/L
- ** Below The MCL of 8 pCi/L

NOTE: Only McLaren/Hart results are shown. Results are for soil samples unless otherwise indicated.

Brandeis-Bardin Institute	
BB-01	Perimeter of the Playground
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-07	Counselor-in-Training Area
BB-08	Potential Development Site 1
BB-09	Potential Development Site 2
BB-10	Potential Development Site 3
BB-11	Vegetable Garden
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

Santa Monica Mountains Conservancy	
SM-01	Visitor Center Parking Lot
SM-02	Existing Road System
SM-03	Former Rocketdyne Employee Shooting Range
SM-04	Orange Groves
SM-05	Antenna Well
SM-07	Well by the Gate
SM-08	A Spring

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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. 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 (μg/L) and 9 μg/L. It was assumed that the TCE had migrated from the SSFL because elevated levels have also been detected beneath the SSFL. The Well by the Gate has been added to Rocketdyne's ongoing groundwater monitoring program. No other chemicals 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 (μg/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 μg/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 μg/kg; and 4,4'-dichlorodiphenyldichloroethene (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 μg/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 (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 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 and cleanup.

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[2] 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 ±100 pCi/L, 990 ±150 pCi/L, 1,300 ±300 pCi/L, 1,300 ±200 pCi/L, and 1,500 ±200 pCi/L in the RMDF Watershed and 10,800 ±300 pCi/L and 9,810 ±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 ±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.

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

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 five sediment samples at the RMDF Watershed [0.08 ±0.01 pCi/g(dry), 0.09 ±0.01 pCi/g(dry), and 0.15 ±0.02 pCi/g(dry)] and the Sodium Reactor Experiment Watershed [0.08 ±0.002 pCi/g(dry) and 0.09 ±0.02 pCi/g(dry)]. Strontium-90 was also detected in two associated surface water samples at the RMDF Watershed at 1.1 ±0.03 pCi/L and 1.8 ±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 ±0.04 pCi/g(dry) in the RMDF Watershed, 0.24 ±0.06 pCi/g(dry) and 0.30 ±0.05 pCi/g(dry) in the Sodium Reactor Experiment Watershed, and 0.23 ±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 ±0.06 pCi/g(dry) and 0.22 ±0.07 pCi/g(dry) in the Building 59 and RD-51 Watersheds, respectively. Because the data from the ravines[3] were not statistically evaluated, it was not definitively concluded whether the concentrations of strontium-90, cesium-137, and plutonium-238 in the sediment above the ninety-fifth percentile of the measured background were due to off-site migration. When the t-tests were run (statistical comparisons of the area samples to background), the concentrations of these radionuclides in the ravines were not different from background.

Conclusions. The purpose of this study was to determine whether chemicals and/or radionuclides near the SSFL property line were present on Brandeis-Bardin or the Conservancy as a result of activities at the SSFL. The study identified the following occurrences of chemicals and radionuclides which were present as a result of the SSFL activities:

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[3] Ravines, watersheds, and drainage ways are used synonymously throughout this workplan.

- 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.

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 solicited from the regulatory agencies, the SSFL work group, and the public after review of the March 10 report. The follow-up activities to be conducted based on the recommendations received are described in the following section.

1.2 Scope of Work

This section describes the additional sampling that is proposed to follow up on the results of the March 10, 1993 results. Recommendations were received from the USEPA in their report and in a letter dated March 26, 1993 (Appendix A) to address the following outstanding questions that were not completely answered in the March 10 report:

1) Further study at the Building 59 Watershed for tritium characterization;
2) Additional study at the RMDF Watershed focusing on tritium, cesium-137, and strontium-90, including further characterization of tritium and strontium-90 in surface water;
3) Resample areas for tritium 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.

In addition to these recommendations, the following additional work will be performed:

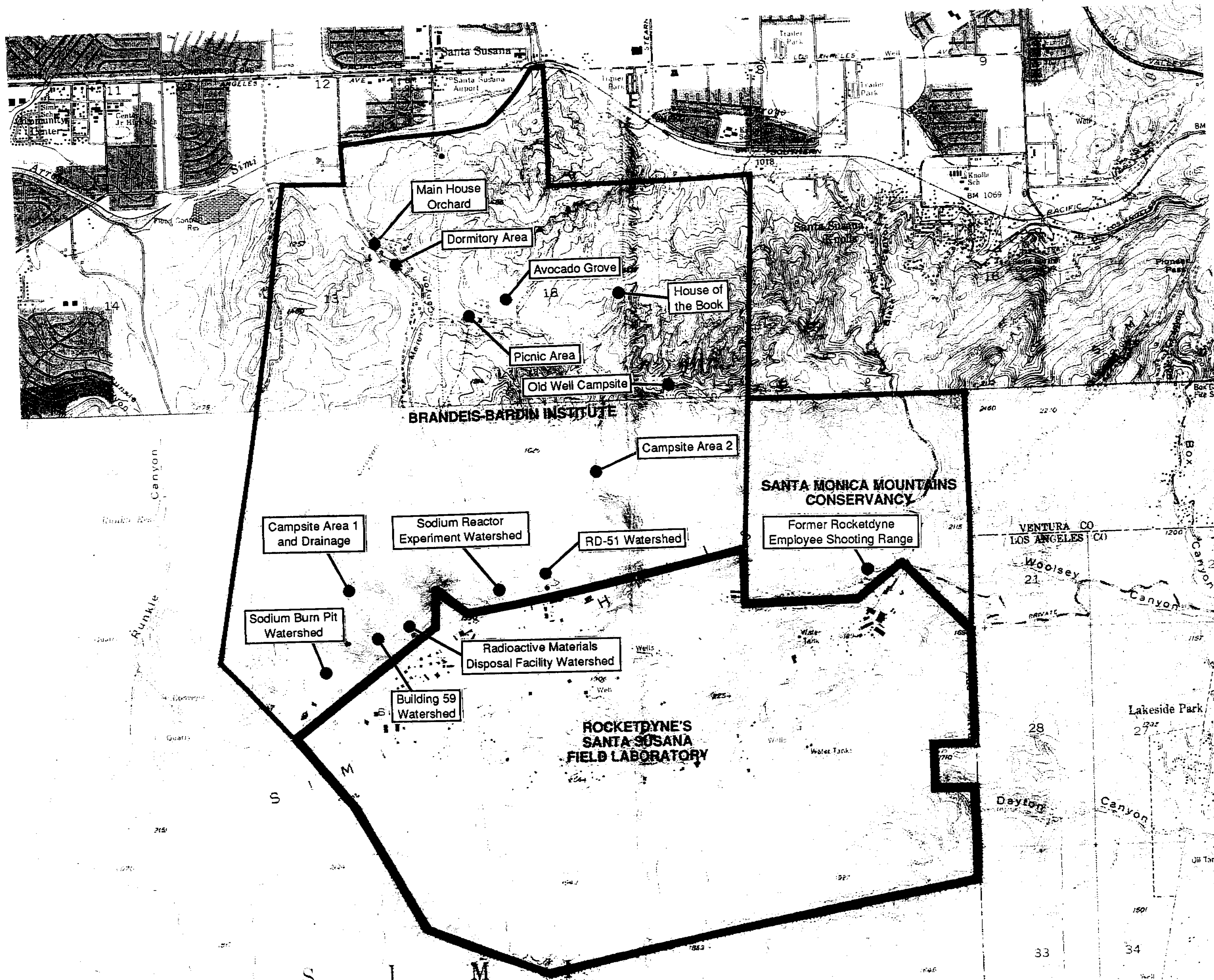
4) Characterize the distribution of tritium, strontium-90, and cesium-137 in the drainages between the RMDF/Building 59 Watersheds and Campsite Area 1 Drainage;
5) Determine whether the plutonium-238 reported in the vicinity of the RD-51 and Building 59 Watersheds is statistically different from background;
6) Determine whether the strontium-90 and cesium-137 reported in the sodium reactor experiment watershed is statistically different from background;
7) Collect additional samples in Campsite Area 2 where 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.
8) After the sediment containing mercury is removed from the Sodium Burn Pit Watershed, collect four samples from the same locations in the original report to confirm that the mercury has been removed.
9) Collect additional background data, at the request of the work group, from sites away from the SSFL.

This sampling plan describes the approach to achieve these objectives. Figure 2 shows the proposed sample locations in the study areas. Figure 3 shows the original and proposed sample locations for the background areas.

The objectives of this additional sampling will be accomplished as follows:

1) Tritium and cesium-137 in the Building 59 Watershed - As a follow-up to the finding of tritium during purposeful sampling in the Building 59 Watershed, additional characterization of tritium in the watershed will be determined by collecting 25 additional soil samples within the watershed. The samples will also be analyzed for cesium-137 to determine if the cesium-137 detected was statistically different than background.

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



LEGEND

● SOIL SAMPLE

N

0 2,350'

SCALE

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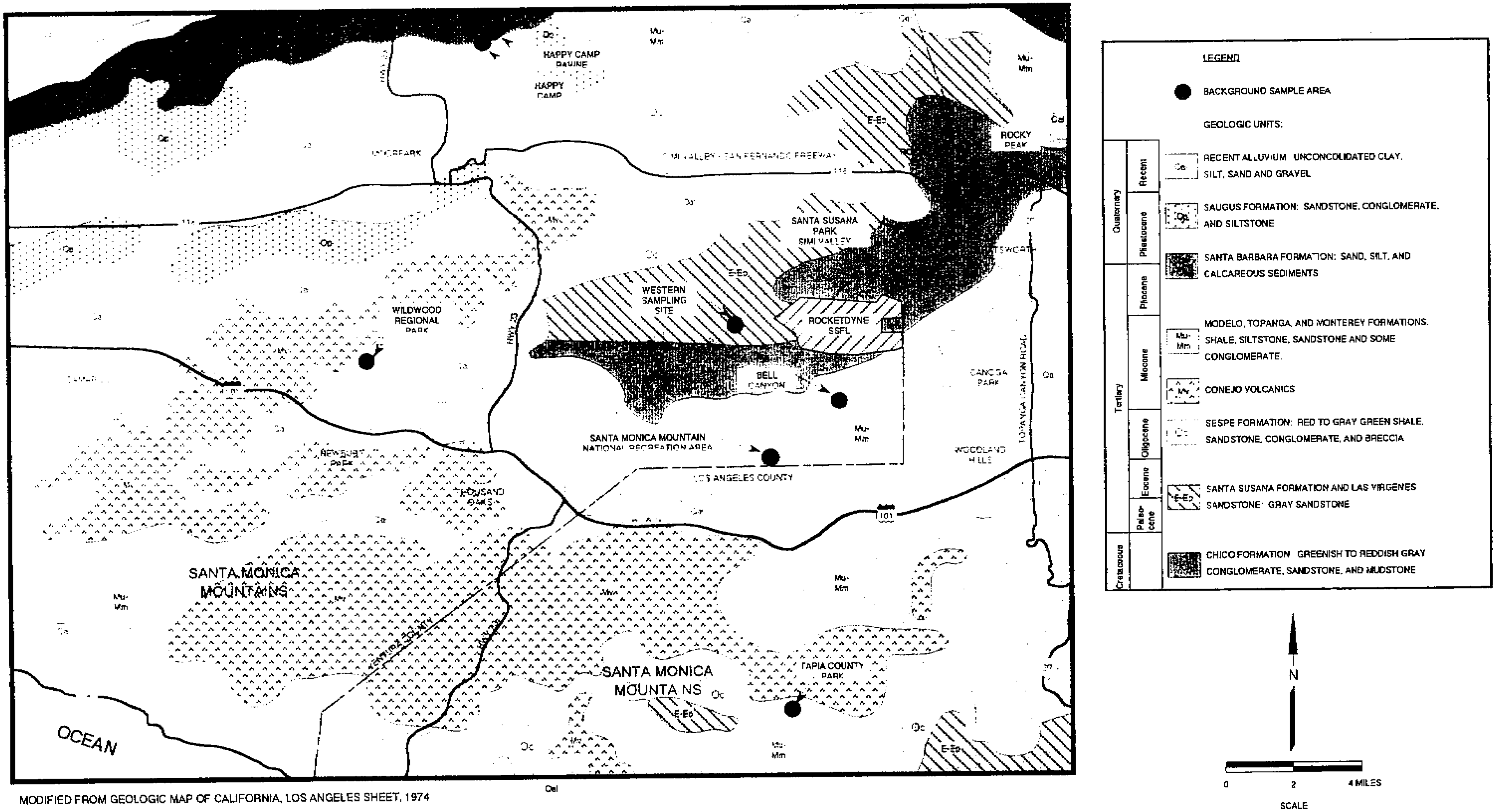
FIGURE 3
PREVIOUS AND ADDITIONAL BACKGROUND SAMPLE AREAS OVERLAID ON A GEOLOGIC MAP

GEOLOGIC MAP OF BACKGROUND AREAS



MODIFIED FROM GEOLOGIC MAP OF CALIFORNIA, LOS ANGELES SHEET, 1974

M9307058"

2) Tritium, strontium-90, and cesium-137 in the RMDF Watershed - Seventeen additional soil sample locations will be purposefully selected for sampling in the runoff channels. Subsurface samples will be collected from 5 locations along the property boundary. The results will be analyzed statistically relative to background data. Surface water samples will also be collected at one location within the runoff channels if flowing water is available at the time of sampling.

3) Additional tritium samples - A total of 53 soil samples from the areas where the laboratory withdrew the original tritium results that were analyzed by the gas counting method, will be collected and analyzed for tritium (Section 2.0, Table 1).

4) Campsite Area 1 Drainage way - Ten new samples will be taken from the drainage way between Campsite Area 1 and the ravines and analyzed for tritium, strontium-90, and cesium-137.

5) Plutonium-238 reported in the RD-51 and Building 59 Watersheds - Thirty additional soil samples will be taken from the runoff channels. The results will be analyzed statistically relative to background data.

6) Strontium-90 and cesium-137 reported in the Sodium Reactor Experiment Watershed - Five additional soil samples will be taken from the runoff channel in the watershed. The results will be analyzed statistically relative to background data.

7) Campsite Area 1 and 2 - Five new samples will be randomly taken from Campsite Area 2 and analyzed for tritium.

8) Sodium Burn Pit Watershed - Four samples will be taken from the Sodium Burn Pit Watershed for mercury characterization. These samples will be collected after the sediments containing mercury are removed.

9) Additional background data - Ten additional samples will be taken from each of two new background sites (Wildwood Regional Park and Tapia County Park) and seven samples from Happy Camp. The background samples will be collected both from level areas as in the original study and from ravines similar to those

found on Brandeis-Bardin near the SSFL and will be analyzed for the suite of radionuclides.

In addition, up to five additional samples may be collected from each of the ravines if the work group participants identify sediment deposits or other features that could contain radionuclides. The procedure for identifying additional sample locations in the field at the time of sampling will be based on a consensus of the work group participants, which was the same procedure that was used in the initial sampling.

Soil samples will be analyzed only for those radionuclides that are specified. Surface water samples will be analyzed for gross alpha and beta emitting radionuclides, strontium-90, tritium, and gamma emitting radionuclides. Strontium-90, tritium, and cesium-137 (a gamma emitter) are isotopes generally created from man-made sources (e.g., nuclear fission, neutron activation, and weapons test fallout).

SECTION 2.0

SAMPLING APPROACH

This section presents the sample locations, sample analyses, and the sampling protocols for soil/sediment (hereafter referred to as soil) and surface water. The objectives of the sampling at each location were discussed in Section 1.0.

2.1 Sampling Areas

This section describes the areas to be sampled within the study area, e.g., Brandeis-Bardin and the Conservancy. In addition, this section presents the background sampling areas.

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

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 will be sampled to establish background levels of the radionuclides (i.e., Wildwood Regional Park, Tapia County Park, and Happy Camp), and Santa Susana Park, which is being resampled for tritium only.

Sampling Area: This term refers to an area within one of the study or background areas from which samples will be collected (e.g., the Dormitory Area at Brandeis-Bardin).

Sampling Block: This term refers to the randomly selected blocks within a sampling area grid (refer to Section 4.4 for a complete description) from which discrete soil samples will be 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 will be collected.

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 U.S. EPA and discussion at the March 10, 1993 SSFL Work Group public meeting. The sampling areas in this study will use the same designations as the original study. (The italicized sample areas are areas that are only being resampled for tritium):

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)

Santa Monica Mountains Conservancy (SM):

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

Six additional sample areas will also be sampled during this study and will 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)
- Happy Camp - Ravine (BG-13)

Brandeis-Bardin Institute (BB):

- Campsite Area 1 Drainage Way (BB-20)

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

2.1.2 Background Sampling Areas

Although the statistical analysis of the original background data showed that the original background locations were not statistically different from each other, at the request of the SSFL Work Group, two additional background areas will be sampled to provide additional documentation of background radionuclide concentrations. The new background locations are at least 10 miles from the SSFL. The new locations include ravine areas as well as level areas similar to the original background sampling areas. The new background locations 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 at the request of the SSFL Public Work Group), because these areas contain similar topographic characteristics to the topography of the SSFL/Brandeis-Bardin ravine areas, and because of the consistency of the geologic material with the study areas (Figure 3).

These locations are considered tentative until there is a consensus that these are acceptable background areas and until access agreements can be obtained from the property owners. In the event that access is not granted to one or more of the tentatively identified background areas, another background area will be identified.

To eliminate confounding factors, every effort will be made to collect samples from areas that have not been disturbed by human activities. The following media will be sampled at these sampling areas:

- Soil samples will be collected from the background areas.
- If a stream or runoff area is present, surface water will be collected. The presence of surface water is seasonal; thus, background surface water samples will be collected only if water is present during sampling activities.

2.2 Sampling Approach Overview

The additional off-site sampling will focus on those areas where chemicals or radionuclides were documented (tritium in the Building 59 Watershed and mercury in the Sodium Burn Pot 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), and 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 scheduled sample result (Campsite Area 2).

This section provides a brief overview of the sampling approach proposed for soil and surface water. The sample locations, analyses to be conducted for each sample, and the rationale for the selections of the sample locations are summarized in Table 1. A detailed technical presentation of the sampling methods is provided in Section 4.0 (Sampling Methodology and

TABLE 1

SUMMARY OF PROPOSED SOIL SAMPLING

Sample Area	Analysis	Number of Samples	Rationale
Background Areas			
Santa Susana Park (BG02)	Tritium	3	Original tritium data analyzed by the gas counting method were withdrawn by the laboratory.
Happy Camp (BG05)	Tritium Strontium-90 Gamma Scan Isotopic Plutonium	2 2 2 2	Background site located 12.5 miles from the SSFL to indicate background levels of radionuclides. Two additional locations will be sampled in the original gridded area. Both the original and new data will be used as background.
Wildwood Regional Park (BG09)	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 (BG10)	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 (BG11)	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 (BG12)	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.
Happy Camp Ravine (BG13)	Tritium Strontium-90 Gamma Scan Isotopic Plutonium	5 5 5 5	Background site located 12.5 miles from the SSFL to indicate background levels of radionuclides in a ravine.
Brandeis-Bardin Institute			
Dormitory Area (BB02)	Tritium	5	Original tritium data analyzed by the gas counting method were withdrawn by the laboratory.
Campsite Area 1 (BB03)	Tritium Tritium	5 5	Original tritium data analyzed by the gas counting method were withdrawn by the laboratory. Five additional blocks will be selected to provide additional characterization.
Campsite Area 2 (BB04)	Tritium Tritium	5 5	Original tritium data analyzed by the gas counting method were withdrawn by the laboratory. Five additional blocks will be selected to evaluate the validity of the DHS sample result.
Picnic Area (BB05)	Tritium	5	Original tritium data analyzed by the gas counting method were withdrawn by the laboratory.

TABLE 1

SUMMARY OF PROPOSED SOIL SAMPLING PLAN

Sample Area	Analysis	Number of Samples	Rationale
House of the Book (BB06)	Tritium	5	Original tritium data analyzed by the gas counting method were withdrawn by the laboratory.
Main House Orchard (BB12)	Tritium	5	Original tritium data analyzed by the gas counting method were withdrawn by the laboratory.
Avocado Grove (BB13)	Tritium	5	Original tritium data analyzed by the gas counting method were withdrawn by the laboratory.
Old Well Campsite (BB14)	Tritium	5	Original tritium data analyzed by the gas counting method were withdrawn by the laboratory.
RD-51 Watershed (BB15)[4]	Tritium Isotopic Plutonium	5 5	Original tritium data analyzed by the gas counting method were withdrawn by the laboratory. Collect five samples to determine whether plutonium-238 reported in the vicinity of the RD-51 watershed is statistically different from background
Radioactive Materials Disposal Facility Watershed (BB16)[4]	Tritium Strontium-90 Gamma Scan	17 17 17	Determine whether tritium, strontium-90, and cesium-137 reported in the vicinity of the RMDF Watershed are statistically different from background. Five samples will be collected at depth at locations between the RMDF and Building 59 watersheds.
Building-59 Watershed (BB17)[4]	Tritium Gamma Scan Isotopic Plutonium	25 25 25	Characterize tritium in the soil in the Building-59 Watershed. Determine whether cesium-137 and plutonium-238 reported in the vicinity of the Building-59 Watershed are statistically different from background. Five samples will be collected at depth at locations between the RMDF and Building 59 watersheds.
Sodium Burn Pit Watershed (BB18)[4]	Mercury	4	Document that mercury within the Sodium Burn Pit Watershed has been removed.
Sodium Reactor Experiment Watershed (BB19)[4]	Gamma Scan Strontium-90	5 5	Determine whether strontium-90, and cesium-137 reported in the vicinity of the Sodium Reactor Experiment Watershed are statistically different from background.
Campsite-1 Drainage Way (BB20)[4]	Tritium Strontium-90 Gamma Scan	10 10 10	Sample five soil locations within the drainage way which is adjacent to the campsite and originates from SSFL/Brandeis-Bardin Watersheds.
Santa Monica Mountains Conservancy			
Former Rocketdyne Employee Shooting Range (SM03)	Tritium	5	Original tritium data analyzed by the gas counting method were withdrawn by the laboratory.

[4] Up to five additional samples may be collected if the workgroup participants identify potential sample locations in the field.

Quality Assurance Program). The United States Environmental Protection Agency (USEPA), the California Environmental Protection Agency (Cal-EPA), the California Department of Health Services (DHS), the Conservancy, and Brandeis-Bardin will be invited to join the sampling effort to collect split samples. Notification of the sampling dates will be given at least two weeks in advance.

2.2.1 Soil

Soil samples for the reanalysis of tritium will be collected from all sample areas where samples were analyzed for tritium using the gas counting method which could not be validated by the laboratory and were subsequently withdrawn. The original randomly selected grid blocks will be resampled one foot towards the SSFL from the original XY coordinates. These tritium sample locations are located in grid areas consisting of numerous sample blocks of equal size. Discrete, undisturbed soil samples will be collected from the designated sample locations.

Undisturbed soil samples will be purposefully collected in ravine areas and drainage ways. Each ravine and drainage way area will be sampled at a minimum of five locations. Samples will be taken from the soil surface to a depth of 6 inches and analyzed as shown on Table 1. Up to five additional samples may be collected and analyzed at the discretion of field personnel and the study participants.

The new background sampling locations will be in ravines as well as from a relatively undisturbed flat area similar to the locations from which the original background samples were collected. Wildwood Regional Park and Tapia County Park will be sampled at five locations in the ravines and in five undisturbed flat areas using a grid system. Two additional soil samples will be collected from the original sampling area at Happy Camp using the next two random blocks generated during the original sampling on the original grid (Appendix B). In addition five locations will be sampled in the ravines at Happy Camp. Undisturbed soil samples will be collected from each location as described in Section 3.4.2.

2.2.2 Surface Water

If there is sufficient flowing water at the time of sampling to collect a representative sample, surface water will be sampled in the Watershed soil sampling locations. Surface waters are considered to include emergent groundwater (springs) and streams. Surface water samples will be analyzed for tritium, strontium-90, gross alpha/beta and gamma emitting radionuclides. Background surface water samples will be collected if possible.

SECTION 3.0
SAMPLING METHODOLOGY AND QUALITY ASSURANCE PROGRAM

This section provides a detailed outline of each of the components of the sampling protocol and the associated quality assurance procedures.

3.1 Utility Clearance

Since soil sampling will be conducted to a maximum depth of 6-inches at most locations and since the areas are remote and away from industrial activities, no utility clearances will be performed.

3.2 Decontamination Procedures

All sampling equipment in direct contact with soil or surface water will be decontaminated prior to use in the field to prevent or minimize cross-contamination between field samples and external sources, and will be cleaned prior to use 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 will be collected using the drill rig or backhoe, the hollow stem drilling augers and the backhoe bucket will be steam cleaned between each boring or sampling location.

Sampling equipment will be used immediately after decontamination to avoid cross-contamination during storage. Disposable gloves will be worn when handling cleaned sampling equipment. Soil sampling equipment will not be 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 will be placed in 5-gallon buckets and transported to the SSFL where the water will be transferred to 55-gallon Department of Transportation approved drums. The gloves and filter paper will be held in a separate 55-gallon drum. A drum inventory will be maintained and will contain information on drum contents and date. Drum inventory information will be written on the drum labels with indelible ink. All drums will be located at the SSFL and held pending analytical results.

3.2.1 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, 1992, the decontamination waste water contained in the 55-gallon drums will only be analyzed for radionuclides to determine appropriate methods of disposal. Rocketdyne will be responsible for actual disposal.

3.3 Sample Identification and Labeling

3.3.1 Sample Identification

Soil and surface water samples will be identified using an appropriate sample register number and a site-specific sample identification code, both of which are defined below.

A register number is a predetermined, sequential number assigned to each individual sample linking the sample to descriptive information recorded in the sample register book. The register preprinted label will be affixed to the sample container and covered with clear plastic tape. Soil samples will receive register sample numbers from a soil sample register and surface water samples will receive register sample numbers from a water sample register. An example of a register sample label is shown in Figure 4.

The site-specific sample identification code is a 9-digit code designed to provide a clear indication of the sample location from which the sample was collected and the intended radionuclide analysis. The site-specific sample identification codes consist 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).

FIGURE 4
REGISTER LABEL EXAMPLE

Soils Label Register

#S- 80418

Project and Task #: ______________________

SB/MW#:
HA#: ______________ Field Log #: __________
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

Digit 5, 6, and 7: A three digit code which varies depending on the matrix being sampled:

<u>Soil</u> - code indicates the sampling block number.

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

<u>Blind Field Duplicates</u> - blind field duplicates will be designated by successive numbers reflecting the order in which they are collected. The relationship to the original sample must be documented in the field log book. The purpose of blind field duplicate samples is discussed in Section 3.6 (Quality Assurance/Quality Control).

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

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

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

Subsurface samples will have two additional numbers at the end of the sample code to distinguish the depth at 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. Any surface samples that are collected at these locations will have a two digit number code of "00".

3.3.2 Sample Labeling

All samples will receive two sample identification numbers: (1) the register number, which is the serial number printed on the register sample label, and (2) a descriptive site-specific sample identification code which will be written on the register sample label along with the following additional information:

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

This same information will be recorded in the field log book for all samples.

3.3.3 Sample Documentation

Bound field log books will be maintained by the sampling team leader. Daily entries will be made to document (all entries shall be made in ink):

- 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 books will remain in the possession of the sampling team leader at all times. At the end of each day's activities, the sampling team leader will review all of the day's entries for accuracy and completeness. Following this review, the sampling team leader will initial and date the last page. Each day's entries will be photocopied and retained in a separate field file box or in a file at the McLaren/Hart office. This precaution is taken to provide backup should the field log book be lost or destroyed.

Should corrections in the field log book be required, the following guidelines shall be observed:

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

3.4 Soil Sampling

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

TABLE 2

SAMPLE CONTAINER AND PRESERVATION SPECIFICATIONS

Analytical Parameter	Container Size	Container Type	Sample Handling	Preservative	Holding Time[a]
Soil Samples					
Mercury	6-inch	brass tube[b]	N/A	none	28 days
Strontium-90	6-inch	brass tube[b]	N/A	none	N/A
Isotopic Plutonium	6-inch	brass tube[b]	N/A	none	N/A
Gamma Scan	6-inch	brass tube[b]	N/A	none	N/A
Tritium	1 quart	glass jar	N/A	none	N/A
Water Samples					
Strontium-90	1 liter	plastic bottle	filtered[c]	4 ml HNO_3[d]	N/A
Gamma Scan	1 liter	plastic bottle	filtered[c]	4 ml HNO_3[d]	N/A
Tritium	1 liter	glass bottle	filtered[c]	none	N/A
Gross alpha and beta scan	1 liter	plastic bottle	filtered[c]	2 ml HNO_3[d]	N/A

N/A = Not Applicable

a Holding time from day of collection to extraction.
b A 1-gallon resealable plastic bag will be used for split samples and may be substituted for the 6-inch brass tubes.
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.

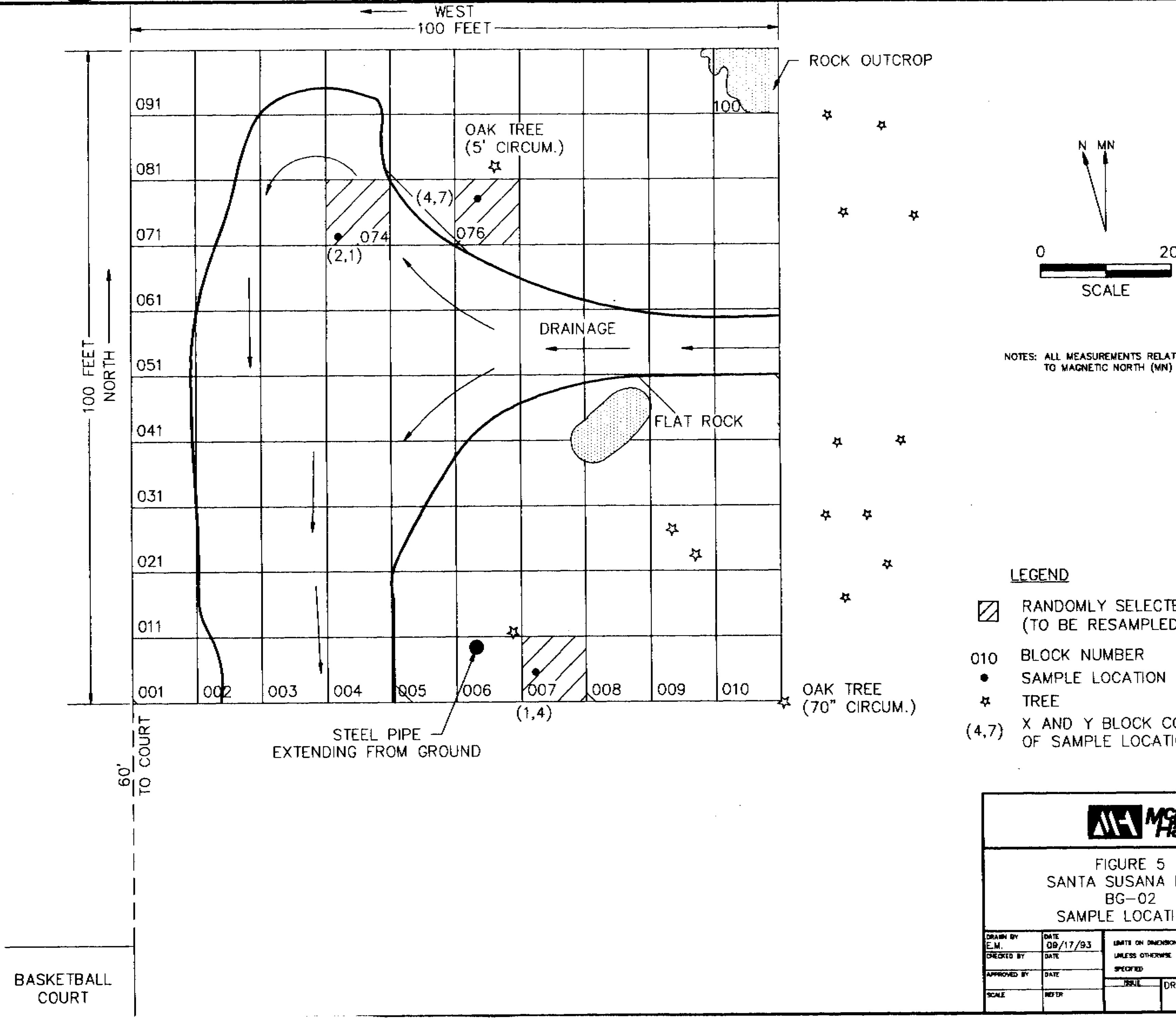
3.4.1 Soil Sampling Strategy

This section presents the methods for determining the soil sampling locations for the sampling areas. Samples collected to reanalyze the tritium that were withdrawn by the laboratory and new samples from Campsite Areas 1 and 2 will utilize the same grids designated in the March 10, 1993 report.

The following random grid sampling protocol provides 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 described in the March 10 report which contained randomly selected sampling blocks and locations (X- and Y-coordinates) and are included in this Workplan (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). Site specific sampling grids may be larger or smaller in size if the sample area size is not 100 feet by 100 feet. In general, the grid sampling blocks have assigned numbers starting with the number "001" in the southwest corner and numbered sequentially to the east, then north so that the lowest number in any given row is always in the western end of the row. Random numbers for each grid sampling area were generated 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 to be sampled during this investigation are presented in Appendix B.

Figures 5 though 15 show the sampling grid areas and sample locations from the March 10 report that will be resampled during this study. Selected sample locations within in the grid areas will be resampled as indicated on the figures. At Campsite Areas 1 and 2 (Figures



NOTES: ALL MEASUREMENTS RELATIVE TO MAGNETIC NORTH (MN)

LEGEND

▨	RANDOMLY SELECTED BLOCKS (TO BE RESAMPLED)
010	BLOCK NUMBER
●	SAMPLE LOCATION
☆	TREE
(4,7)	X AND Y BLOCK COORDINATE OF SAMPLE LOCATION

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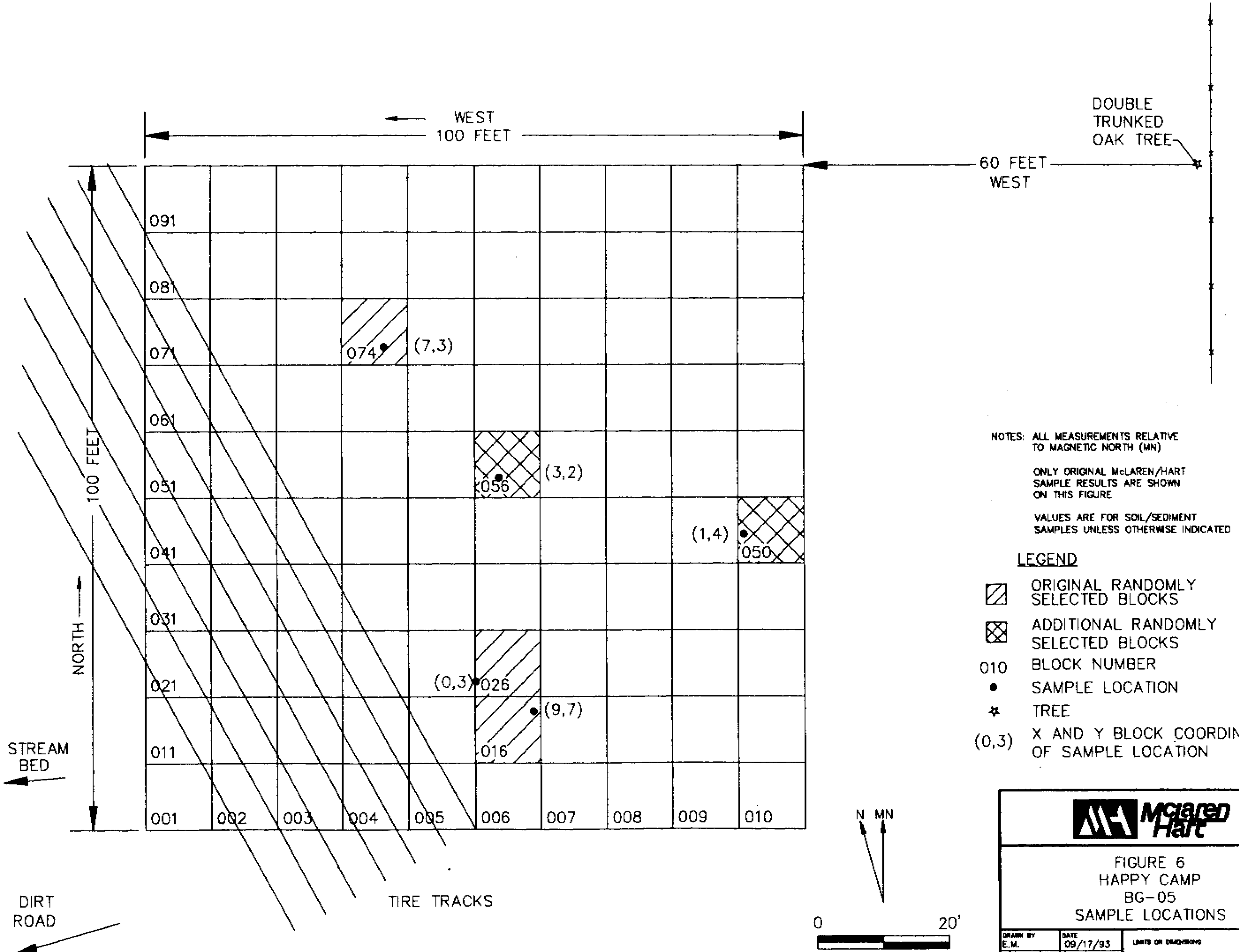
FIGURE 5
SANTA SUSANA PARK
BG-02
SAMPLE LOCATIONS

DRAWN BY E.M.	DATE 09/17/93	LIMITS ON DIMENSIONS UNLESS OTHERWISE SPECIFIED	FRAC. DEC. ANG.
CHECKED BY	DATE		
APPROVED BY	DATE	ISSUE	DRAWING NUMBER G930819.2
SCALE	REFER		



NOTES: ALL MEASUREMENTS RELATIVE TO MAGNETIC NORTH (MN)

ONLY ORIGINAL McLAREN/HART SAMPLE RESULTS ARE SHOWN ON THIS FIGURE

VALUES ARE FOR SOIL/SEDIMENT SAMPLES UNLESS OTHERWISE INDICATED

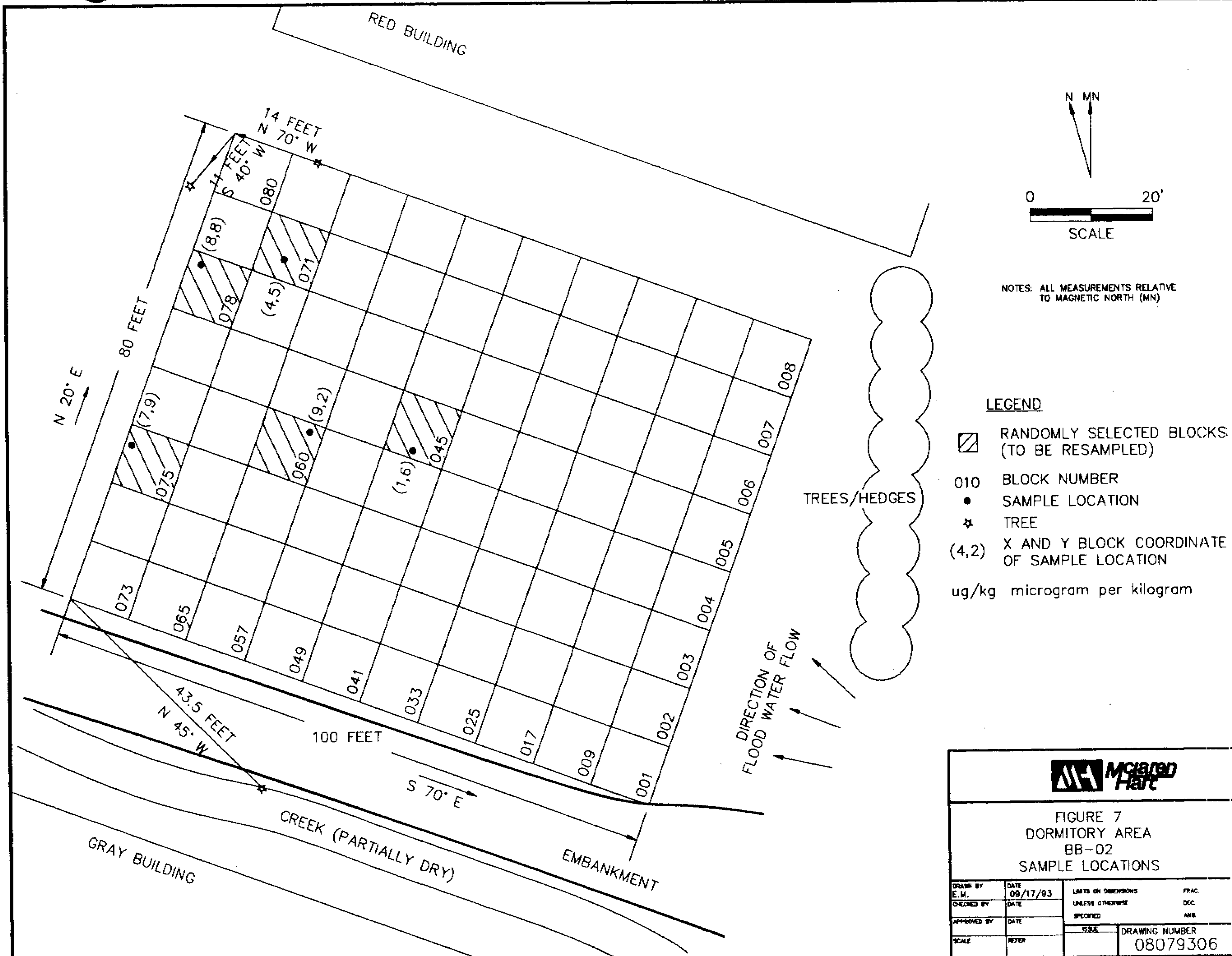
LEGEND

- ORIGINAL RANDOMLY SELECTED BLOCKS (single hatch)
- ADDITIONAL RANDOMLY SELECTED BLOCKS (cross hatch)
- 010 BLOCK NUMBER
- • SAMPLE LOCATION
- ☆ TREE
- (0,3) X AND Y BLOCK COORDINATE OF SAMPLE LOCATION

McLaren Hart

FIGURE 6
HAPPY CAMP
BG-05
SAMPLE LOCATIONS

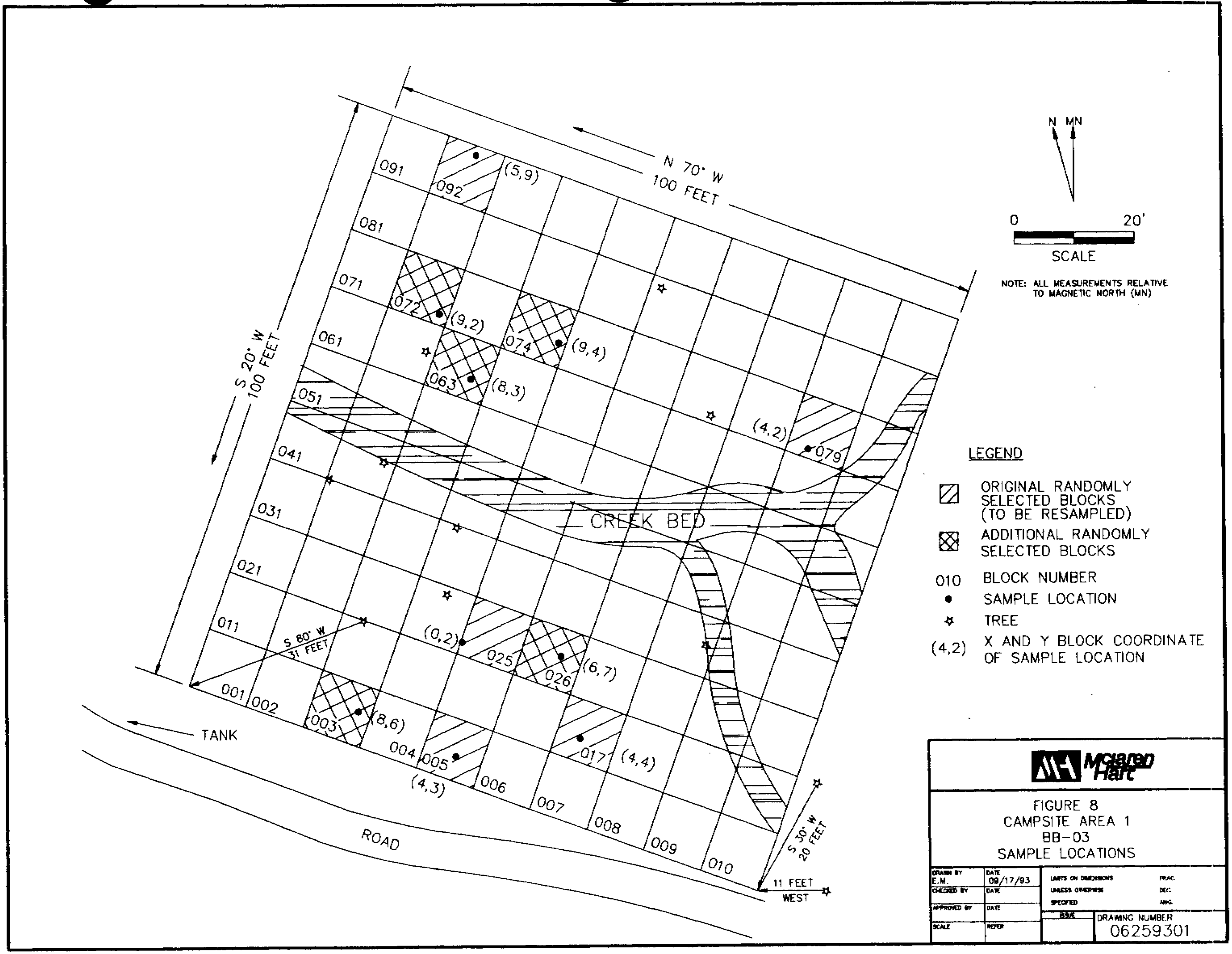
DRAWN BY	DATE	LIMITS ON DIMENSIONS UNLESS OTHERWISE SPECIFIED	
E.M.	09/17/93	FRAC. DEC. ANG.	
CHECKED BY	DATE		
APPROVED BY	DATE	ISSUE	DRAWING NUMBER 05139309
SCALE	REFER		



McLaren Hart

FIGURE 7
DORMITORY AREA
BB-02
SAMPLE LOCATIONS

DRAWN BY E.M.	DATE 09/17/93	UNITS ON DIMENSIONS UNLESS OTHERWISE SPECIFIED	FRAC. DEC. ANG.
CHECKED BY	DATE		
APPROVED BY	DATE	ISSUE	DRAWING NUMBER 08079306
SCALE	REFER		


N 70° W
100 FEET
S 20° W
100 FEET
091
092
(5,9)
081
071
072
(9,2)
074
(9,4)
061
063
(8,3)
051
041
031
021
011
001
002
003
(8,6)
004
005
(4,3)
006
007
008
009
010
(0,2)
025
026
(6,7)
017
(4,4)
(4,2)
079
CREEK BED
S 80° W
31 FEET
S 30° W
20 FEET
11 FEET
WEST
TANK
ROAD
N
MN
0
20'
SCALE
NOTE: ALL MEASUREMENTS RELATIVE TO MAGNETIC NORTH (MN)
LEGEND
ORIGINAL RANDOMLY SELECTED BLOCKS (TO BE RESAMPLED)
ADDITIONAL RANDOMLY SELECTED BLOCKS
010 BLOCK NUMBER
SAMPLE LOCATION
TREE
(4,2) X AND Y BLOCK COORDINATE OF SAMPLE LOCATION
McLaren Hart
FIGURE 8
CAMPSITE AREA 1
BB-03
SAMPLE LOCATIONS
DRAWN BY E.M.
DATE 09/17/93
CHECKED BY
DATE
APPROVED BY
DATE
SCALE
REFER
LIMITS ON DIMENSIONS UNLESS OTHERWISE SPECIFIED
FRAC.
DEC.
ANG.
ISSUE
DRAWING NUMBER
06259301

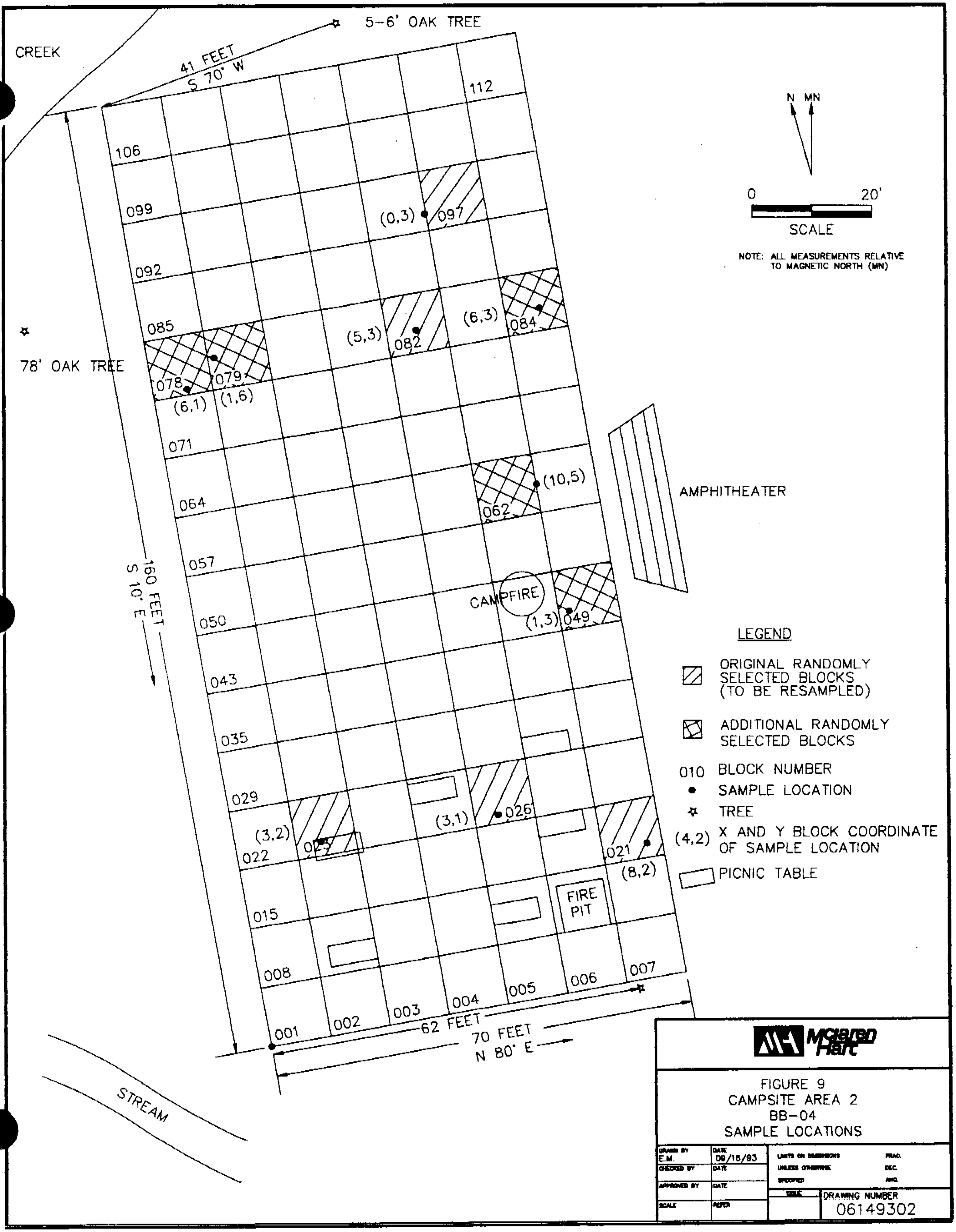


FIGURE 9
CAMPSITE AREA 2
BB-04
SAMPLE LOCATIONS

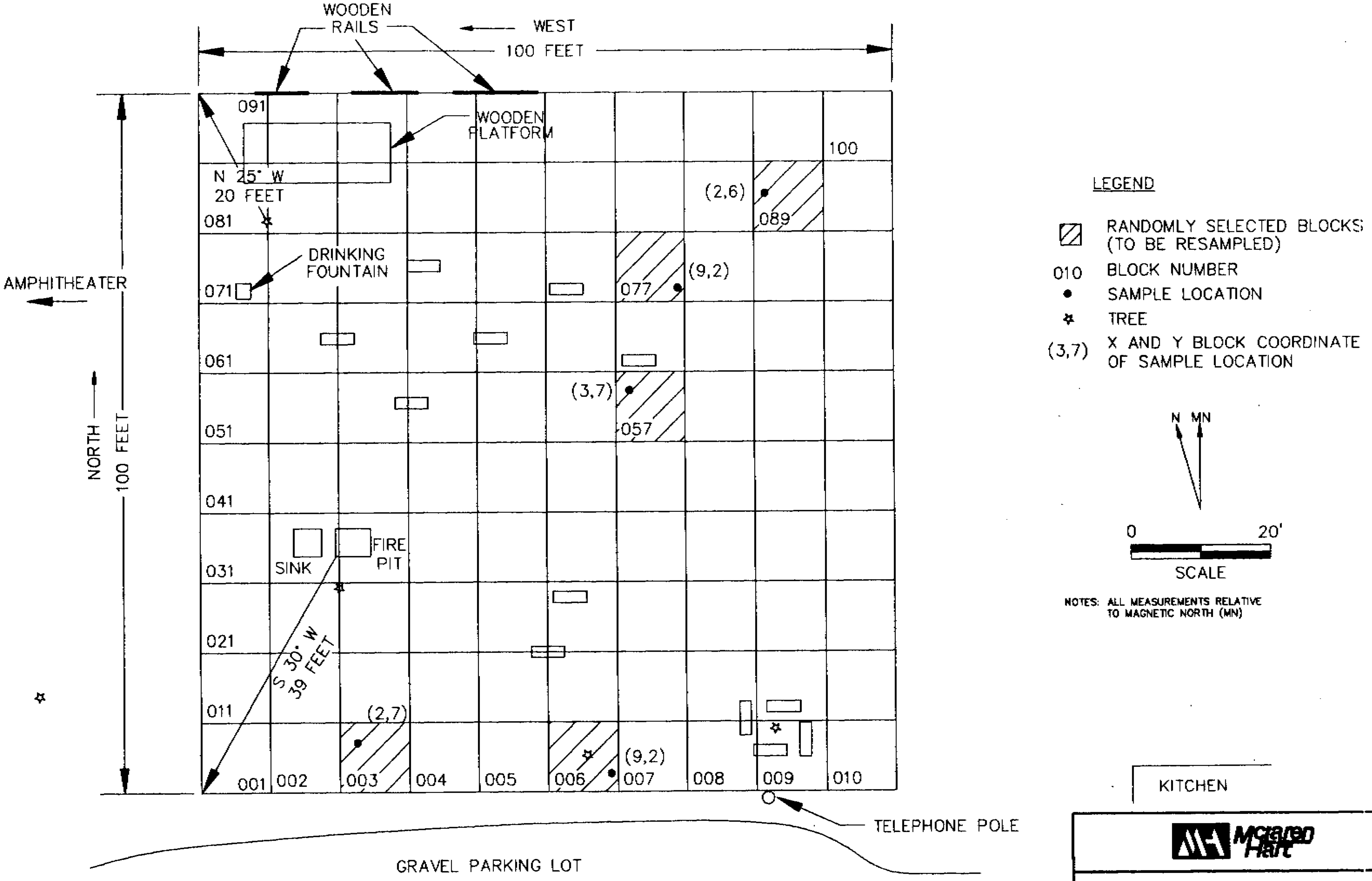


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FIGURE 10
PICNIC AREA
BB-05
SAMPLE LOCATIONS

DRAWN BY E.M.	DATE 09/17/93	LIMITS OF DIMENSIONS UNLESS OTHERWISE SPECIFIED	FRAC / DEC. / ANG.
CHECKED BY	DATE		
APPROVED BY	DATE	ISSUE	DRAWING NUMBER 05139308
SCALE	REFER		

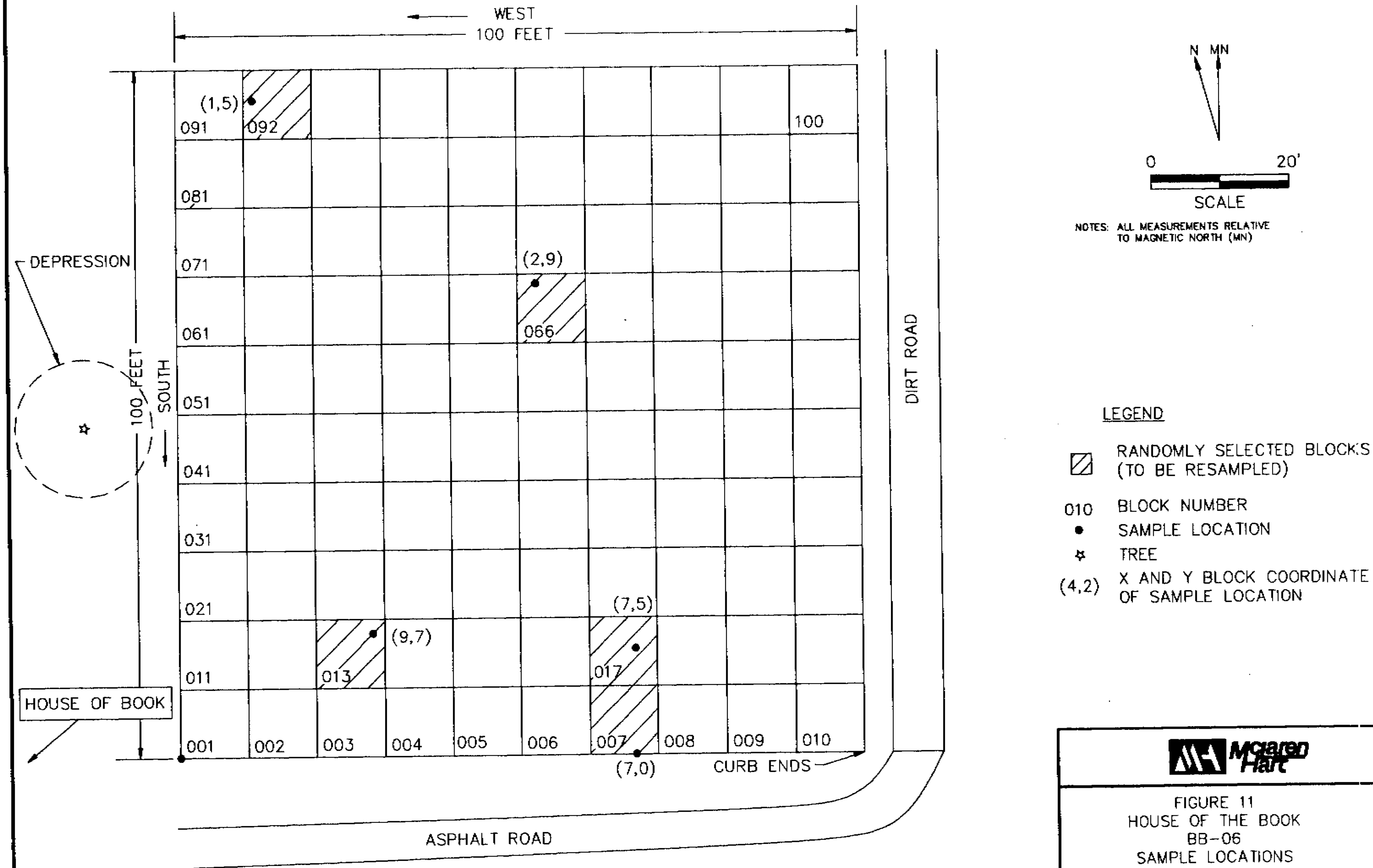

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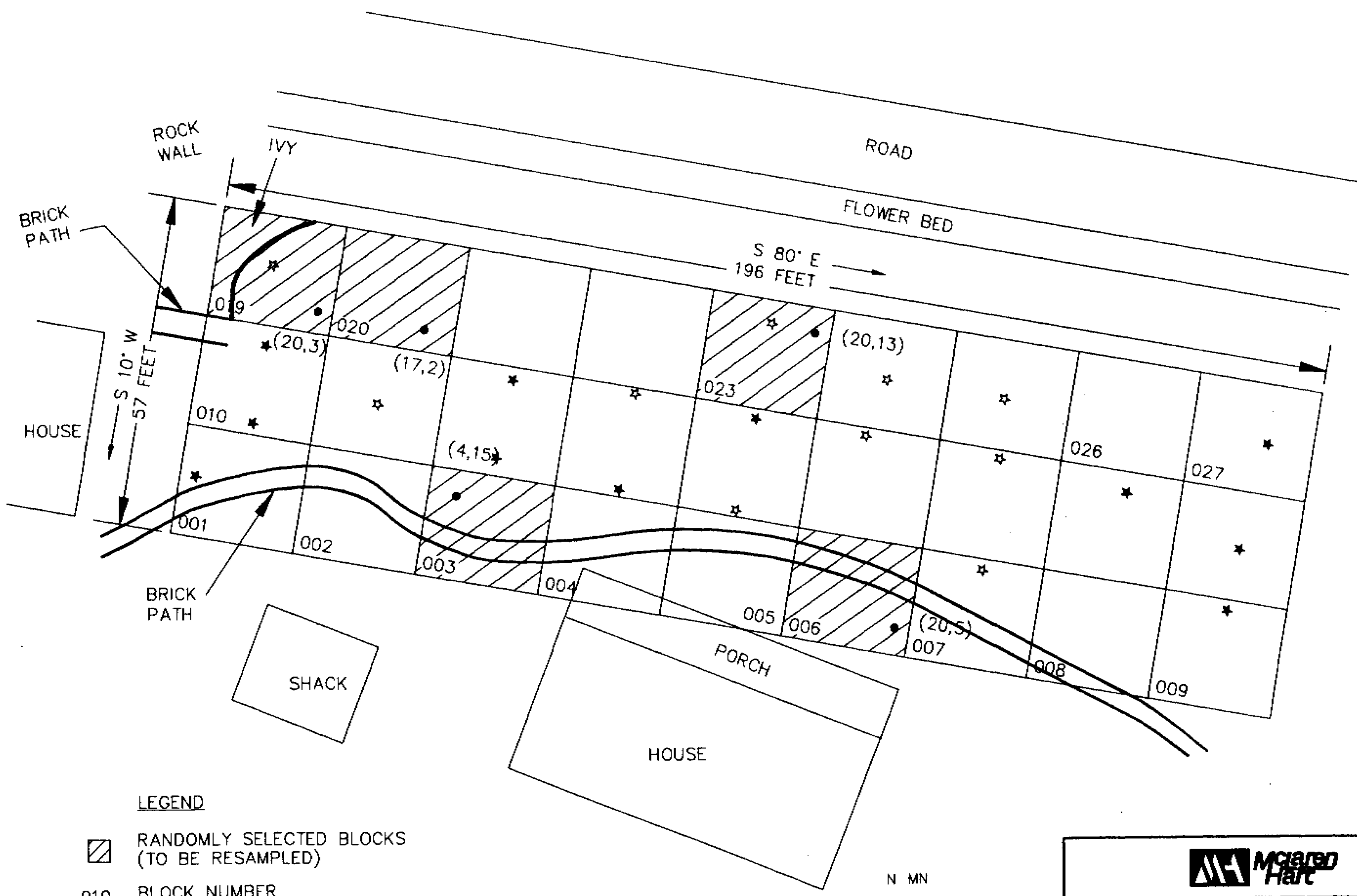
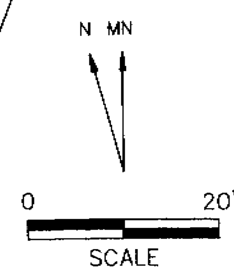
FIGURE 11
HOUSE OF THE BOOK
BB-06
SAMPLE LOCATIONS

DRAWN BY E.M.	DATE 09/17/93	LIMITS ON DIMENSIONS UNLESS OTHERWISE SPECIFIED	FRAC. DEC. ANG.
CHECKED BY	DATE		
APPROVED BY	DATE	ISSUE	DRAWING NUMBER 08069303
SCALE	REFER		





LEGEND

- RANDOMLY SELECTED BLOCKS (TO BE RESAMPLED)
- 010 BLOCK NUMBER
- ● SAMPLE LOCATION
- FRUIT BEARING TREE
- NON-FRUIT BEARING TREE
- (20,13) X AND Y BLOCK COORDINATE OF SAMPLE LOCATION

NOTES: ALL MEASUREMENTS RELATIVE TO MAGNETIC NORTH (MN)

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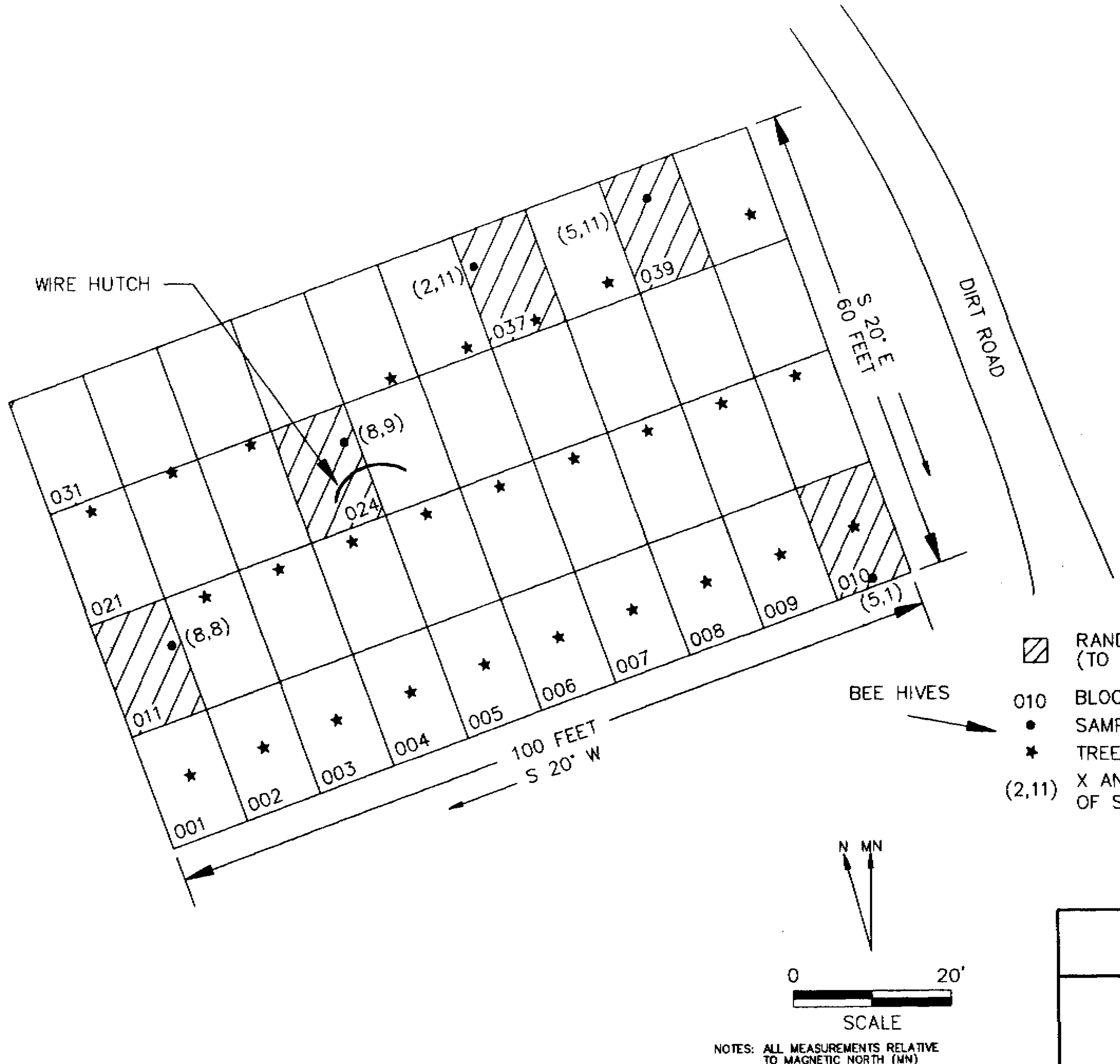
FIGURE 12
MAIN HOUSE ORCHARD
BB-12
SAMPLE LOCATIONS

DRAWN BY E.M.	DATE 09/17/93	LIMITS ON DIMENSIONS UNLESS OTHERWISE SPECIFIED	FRAC. DEC. ANG.
CHECKED BY	DATE		
APPROVED BY	DATE	ISSUE	DRAWING NUMBER 05149313
SCALE	REFER		



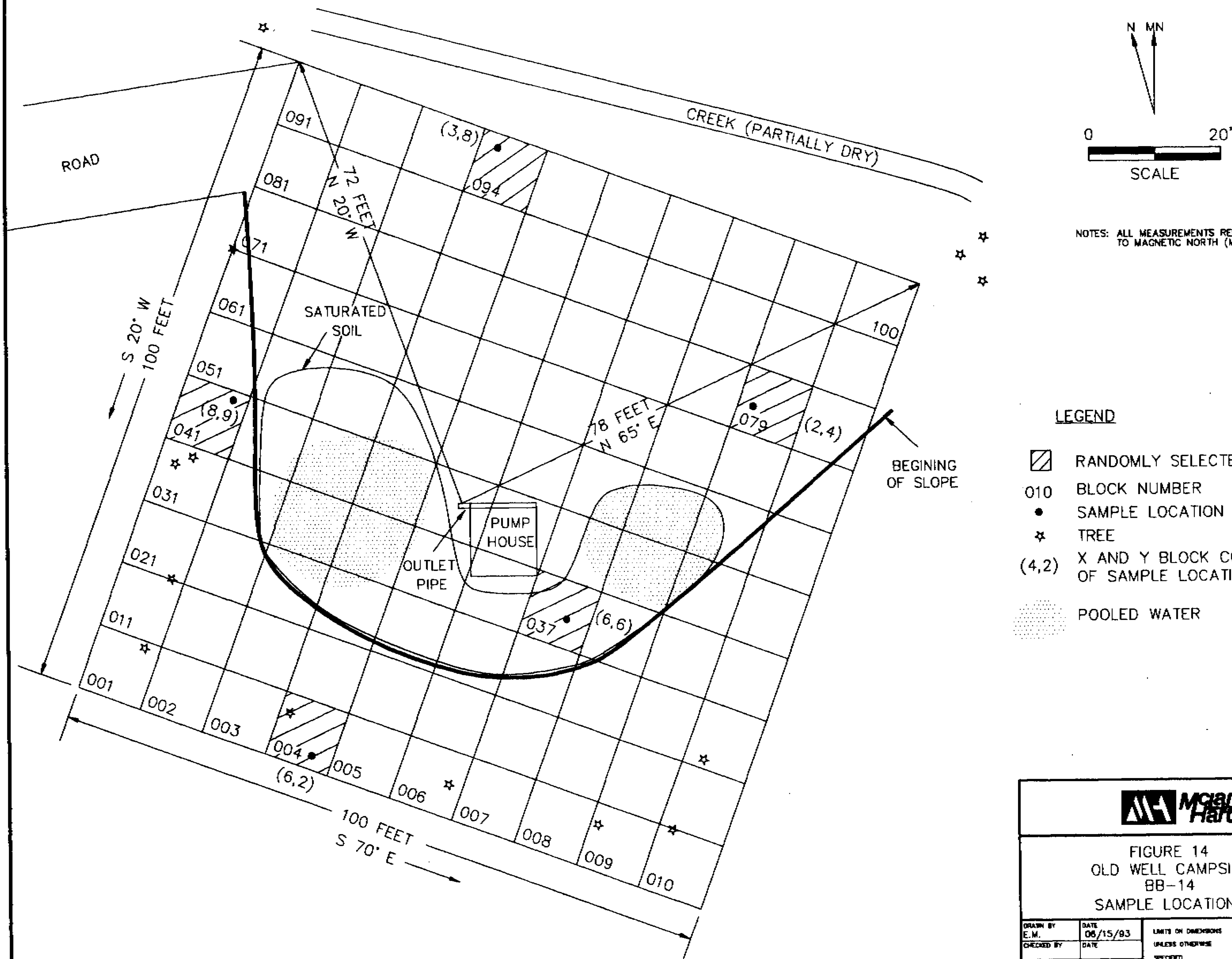
LEGEND

- RANDOMLY SELECTED BLOCKS (TO BE RESAMPLED)
- 010 BLOCK NUMBER
- ● SAMPLE LOCATION
- ★ TREE
- (2,11) X AND Y BLOCK COORDINATE OF SAMPLE LOCATION

McLaren Hart

FIGURE 13
AVOCADO GROVE
BB-13
SAMPLE LOCATIONS

DRAWN BY E.M.	DATE 09/17/93	LIMITS ON DIMENSIONS UNLESS OTHERWISE SPECIFIED	FRAC. DEC. ANG.
CHECKED BY	DATE		
APPROVED BY	DATE	ISSUE	DRAWING NUMBER 05149314
SCALE	REFER		



NOTES: ALL MEASUREMENTS RELATIVE TO MAGNETIC NORTH (MN)

LEGEND

- RANDOMLY SELECTED BLOCKS
- 010 BLOCK NUMBER
- ● SAMPLE LOCATION
- ☆ TREE
- (4,2) X AND Y BLOCK COORDINATE OF SAMPLE LOCATION
- POOLED WATER

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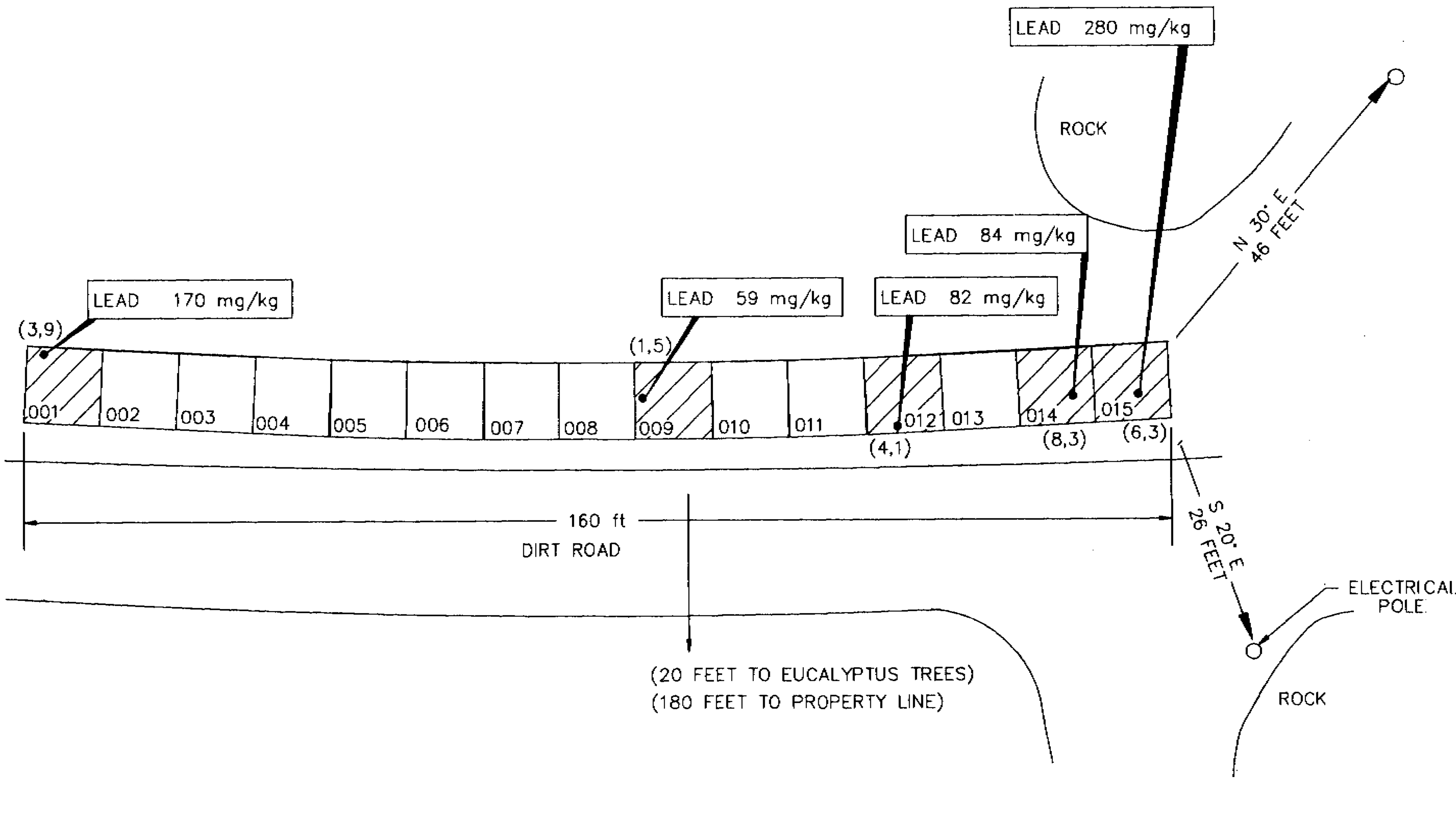
FIGURE 14
OLD WELL CAMPSITE
BB-14
SAMPLE LOCATIONS

DRAWN BY E.M.	DATE 06/15/93	LIMITS ON DIMENSIONS UNLESS OTHERWISE SPECIFIED	FRAC. DEC. ANG.
CHECKED BY	DATE		
APPROVED BY	DATE	ISSUE	DRAWING NUMBER 08069302
SCALE	REFER		



LEGEND

- RANDOMLY SELECTED BLOCKS (TO BE RESAMPLED)
- 010 BLOCK NUMBER
- • SAMPLE LOCATION
- ○ TELEPHONE POLE
- (6,3) X AND Y BLOCK COORDINATE OF SAMPLE LOCATION
- mg/kg milligram per kilogram

NOTES: ALL MEASUREMENTS RELATIVE TO MAGNETIC NORTH (MN)

ONLY RESULTS FOR ORIGINAL McLAREN/HART SAMPLES ARE SHOWN

VALUES ARE FOR SOIL/SEDIMENT SAMPLES UNLESS OTHERWISE INDICATED

McLaren Hart

FIGURE 15
FORMER ROCKETDYNE
EMPLOYEE SHOOTING RANGE
SM-03
SAMPLING LOCATIONS

DRAWN BY E.M.	DATE 09/17/93	UNITS ON DIMENSIONS UNLESS OTHERWISE SPECIFIED	FRAC. DEC. ANG.
CHECKED BY	DATE		
APPROVED BY	DATE	ISSUE	DRAWING NUMBER 05149315
SCALE	REFER		

8 and 9), samples will be collected from original locations and from five additional locations. At Happy Camp (Figure 6), two additional samples will be collected within the original sampling grid area and combined with the original data. 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 five or two random block numbers and X-Y coordinates that followed the random block numbers that were selected for the original investigation.

Ravines will be sampled using purposeful sampling. The ravines at RD-51 (BB-15) and the RMDF (BB-19) will be 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 will be taken from locations closer to the Rocketdyne property line (i.e., within the area previously sampled) in the Building 59 Watershed (BB-17) and in the SRE Watershed (BB-19). Samples in the Campsite Area 1 Drainage Way (BB-20) will be taken at 250 foot intervals between Campsite Area 1 and the ravines.

Sampling points for all ravine samples shall meet the following criteria:

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

If these criteria cannot be met, then alternate downstream locations will be examined for possible sample collection.

Figures 16 through 22 show the SSFL/Brandeis-Bardin ravine sampling areas. At the Building 59 Watershed (Figure 18) additional soil samples will also be collected on both sides of the drainage way for further characterization of tritium, cesium-137, and plutonium-238. Ten additional samples will be collected within the drainage way in the vicinity of Campsite Area 1 (Figure 22).

The sampling crew will collect soil samples from the designated locations within each of the designated blocks as described in Section 3.4.3. Prior to beginning each days field operations, the sampling team leader will ensure that all of the necessary equipment is available and functioning properly.

3.4.2 Soil Sample Location Identification

The following procedure will be followed to reestablish the previous grid locations. The sampling team upon arriving at a sampling area will examine the sample area and determine if the marked sample stakes placed during the original investigation are still present. If the stakes are present then no further sample location identification is required.

If the grid sample stakes are absent at a location where resampling is required, the sampling crew will conduct 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 will be remarked. The southwest corner is always the starting point for all sampling grids and the origin of the X and Y axes for locating the sample locations within the sample blocks.

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

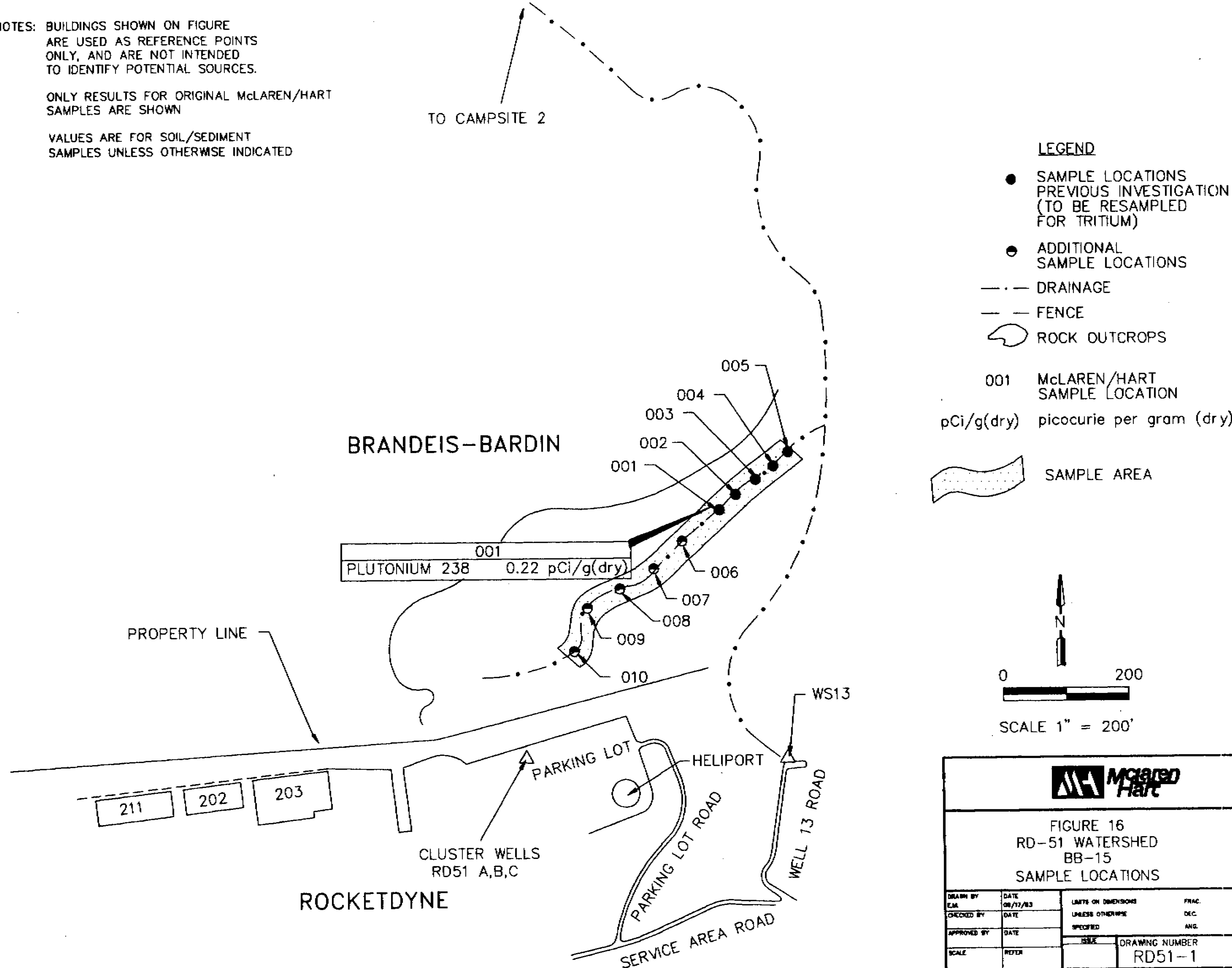


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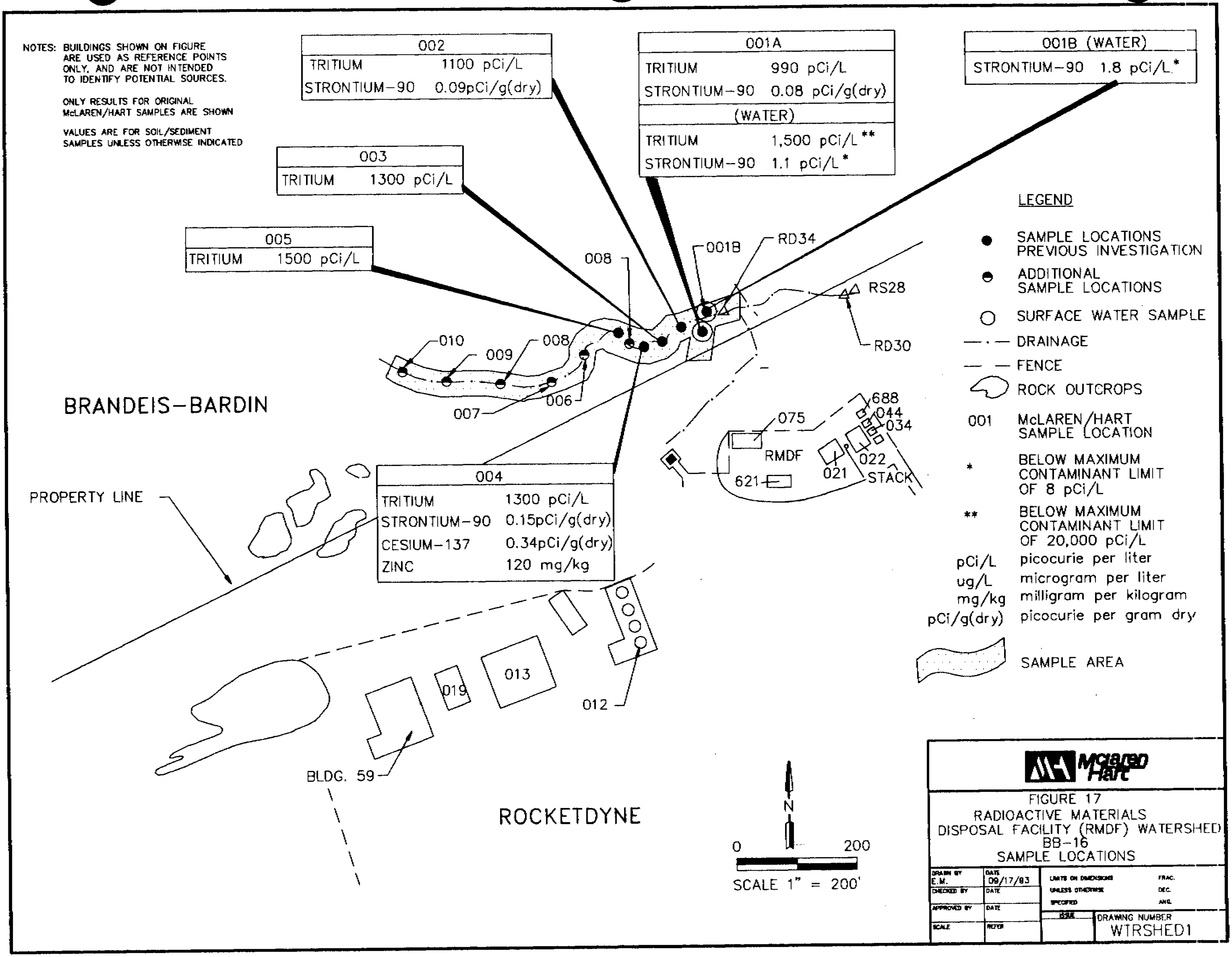
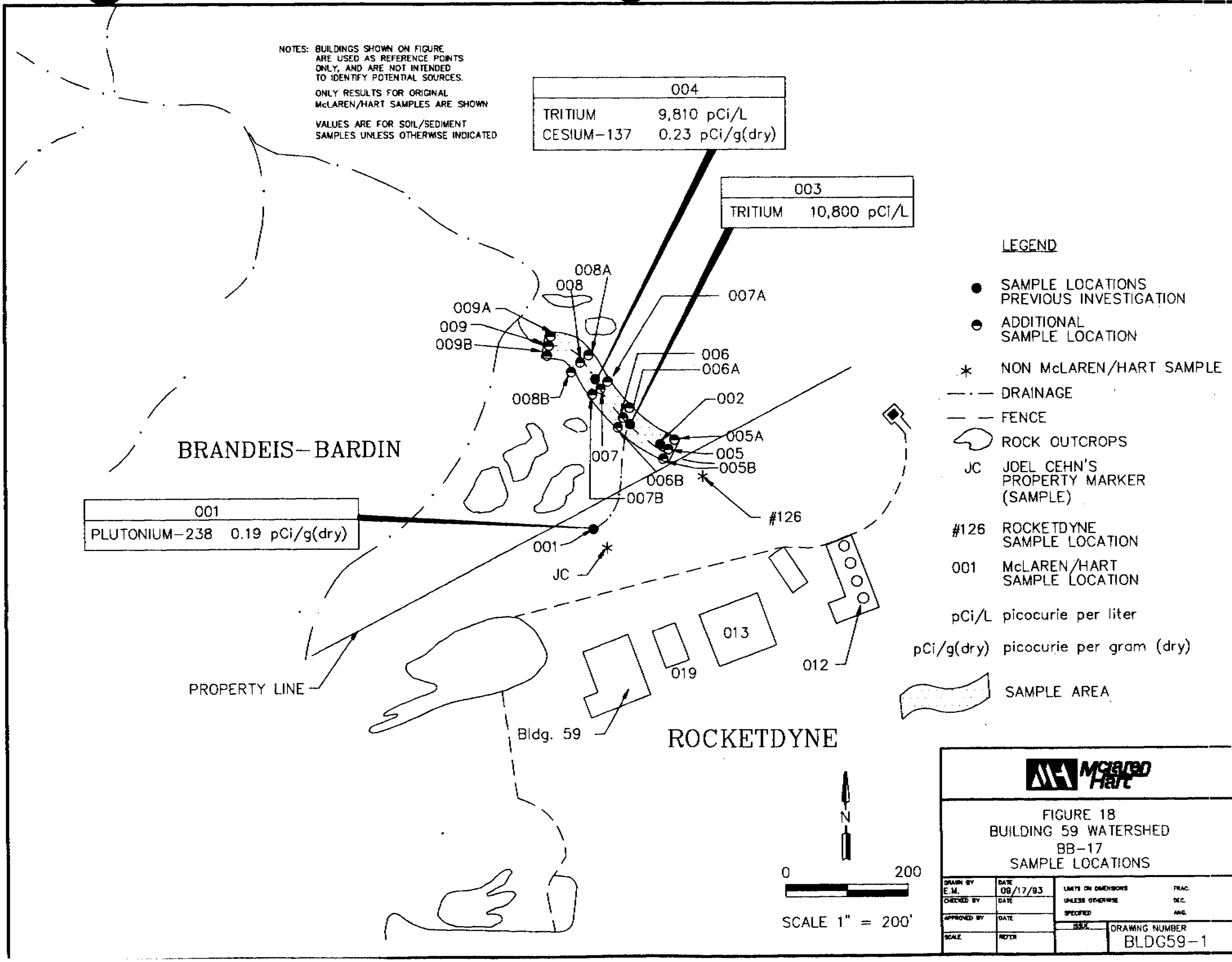
FIGURE 16
RD-51 WATERSHED
BB-15
SAMPLE LOCATIONS

DRAWN BY E.M.	DATE 08/17/93	UNITS ON DIMENSIONS UNLESS OTHERWISE SPECIFIED	FRAC. DEC. ANG.
CHECKED BY	DATE		
APPROVED BY	DATE	ISSUE	DRAWING NUMBER RD51-1
SCALE	REFER		


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
002
TRITIUM 1100 pCi/L
STRONTIUM-90 0.09pCi/g(dry)
001A
TRITIUM 990 pCi/L
STRONTIUM-90 0.08 pCi/g(dry)
(WATER)
TRITIUM 1,500 pCi/L **
STRONTIUM-90 1.1 pCi/L *
001B (WATER)
STRONTIUM-90 1.8 pCi/L *
003
TRITIUM 1300 pCi/L
005
TRITIUM 1500 pCi/L
004
TRITIUM 1300 pCi/L
STRONTIUM-90 0.15pCi/g(dry)
CESIUM-137 0.34pCi/g(dry)
ZINC 120 mg/kg
008
001B
RD34
RS28
RD30
010
009
008
007
006
075
688
044
034
RMDF
021
022
STACK
621
BRANDEIS-BARDIN
PROPERTY LINE
013
019
012
BLDG. 59
ROCKETDYNE
N
0
200
SCALE 1" = 200'
LEGEND
SAMPLE LOCATIONS PREVIOUS INVESTIGATION
ADDITIONAL SAMPLE LOCATIONS
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
McLaren Hart
FIGURE 17
RADIOACTIVE MATERIALS DISPOSAL FACILITY (RMDF) WATERSHED
BB-16
SAMPLE LOCATIONS
DRAWN BY E.M.
DATE 09/17/93
CHECKED BY
DATE
APPROVED BY
DATE
SCALE
REFER
ISSUE
DRAWING NUMBER
WTRSHED1



McLaren Hart

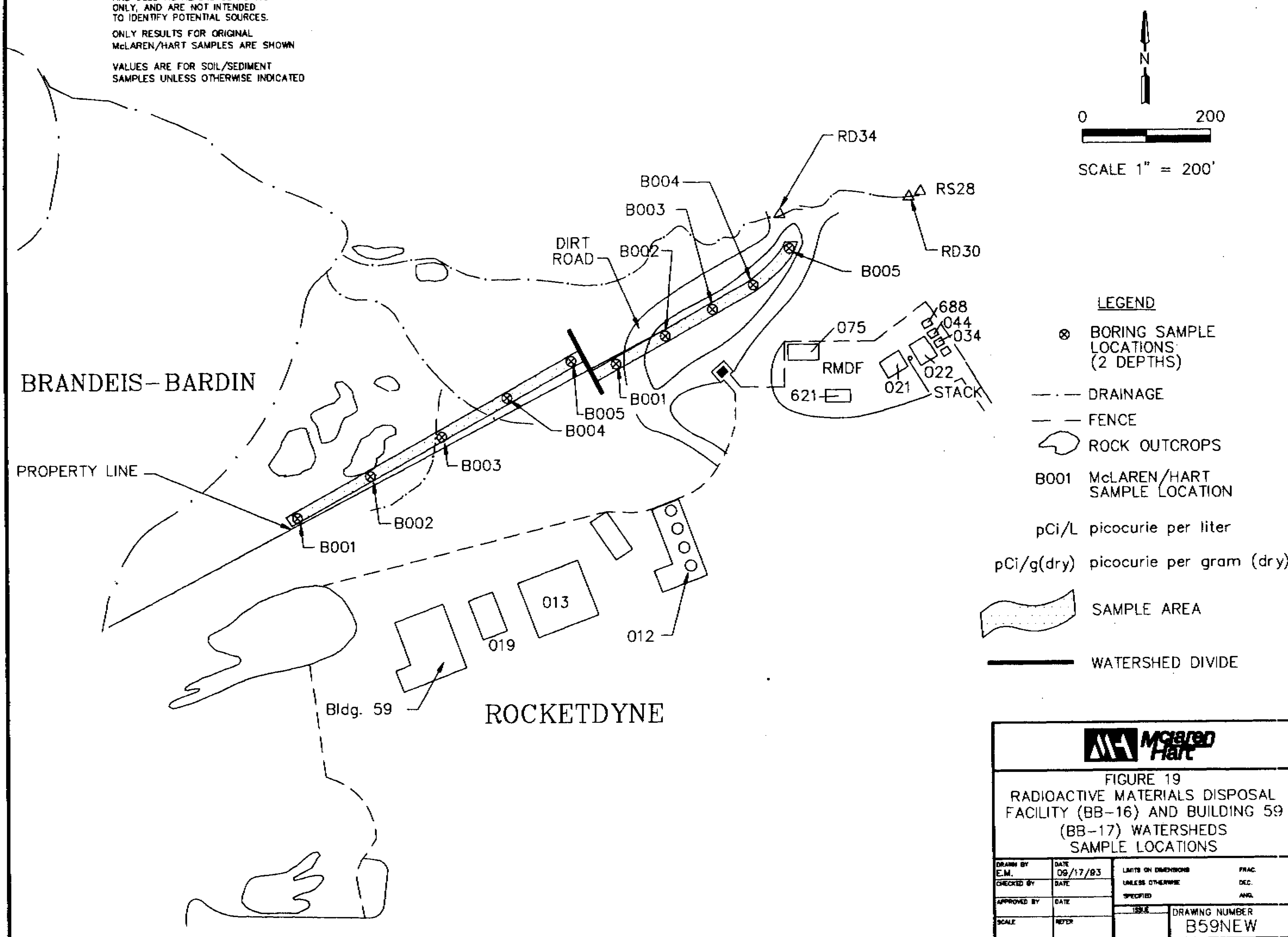
FIGURE 18
BUILDING 59 WATERSHED
BB-17
SAMPLE LOCATIONS

DRAWN BY E.M. DATE 09/17/93
CHECKED BY DATE
APPROVED BY DATE
SCALE REFER
UNITS ON DIMENSIONS UNLESS OTHERWISE SPECIFIED FRAC. DEC. ANG.
ISSUE DRAWING NUMBER BLDG59-1

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



McLaren Hart

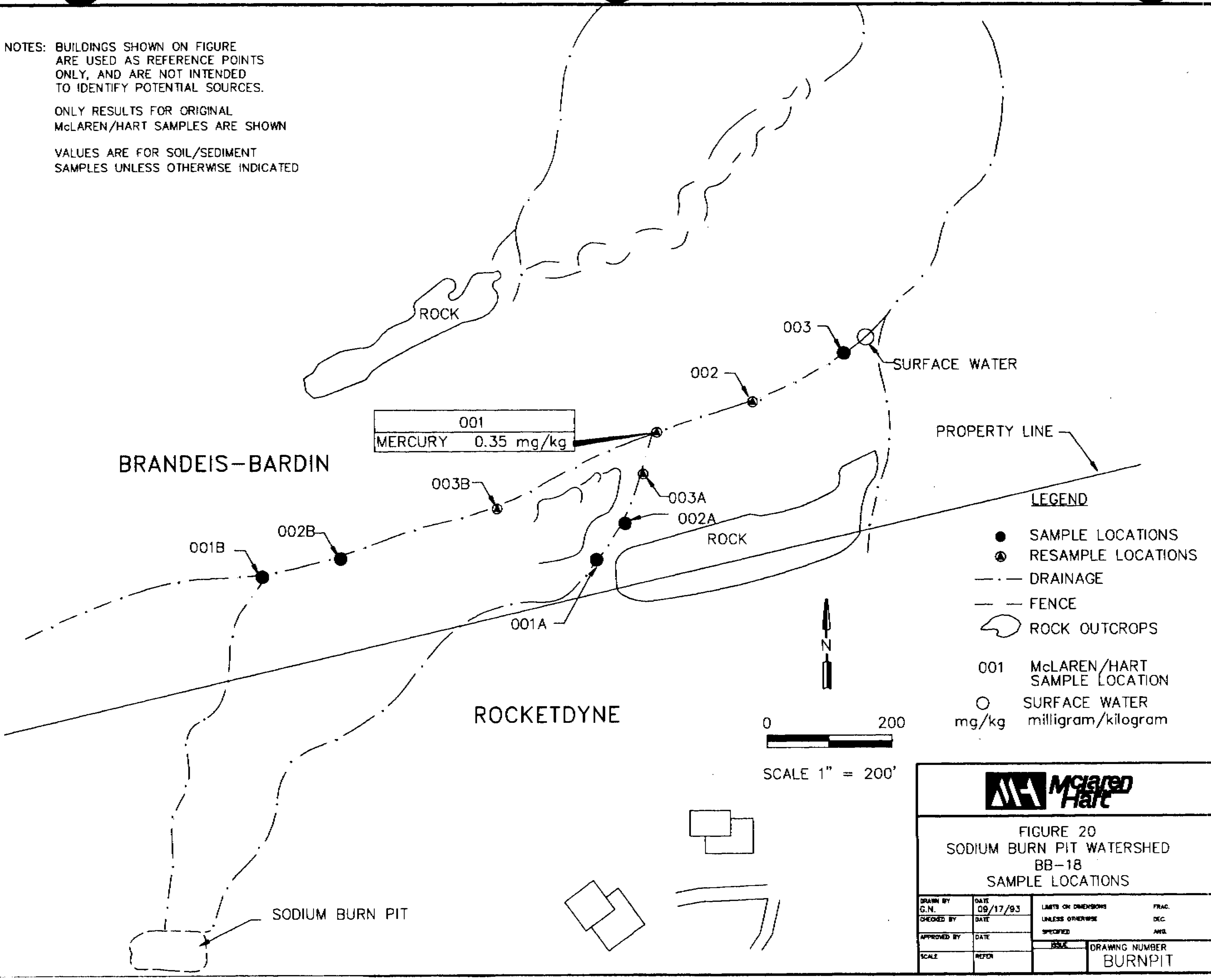
FIGURE 19
RADIOACTIVE MATERIALS DISPOSAL FACILITY (BB-16) AND BUILDING 59 (BB-17) WATERSHEDS SAMPLE LOCATIONS

DRAWN BY E.M.	DATE 09/17/93	LIMITS ON DIMENSIONS UNLESS OTHERWISE SPECIFIED	FRAC. DEC. ANG.
CHECKED BY	DATE		
APPROVED BY	DATE	ISSUE	DRAWING NUMBER B59NEW
SCALE	REFER		

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



McLaren Hart

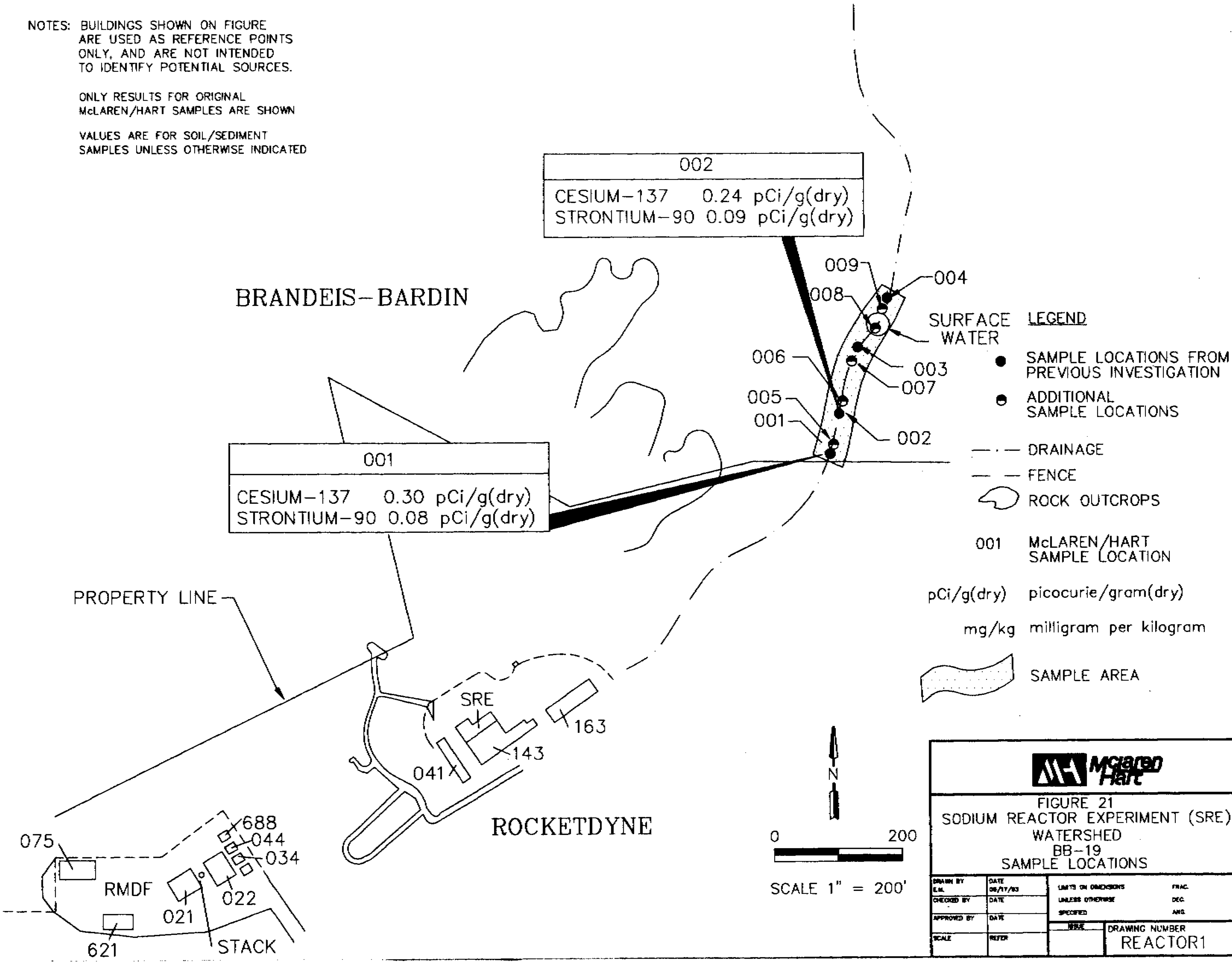
FIGURE 20
SODIUM BURN PIT WATERSHED
BB-18
SAMPLE LOCATIONS

DRAWN BY G.N.	DATE 09/17/93	LIMITS ON DIMENSIONS UNLESS OTHERWISE SPECIFIED	FRAC. DEC. ANG.
CHECKED BY	DATE		
APPROVED BY	DATE	ISSUE	DRAWING NUMBER BURNPIT
SCALE	REFER		

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

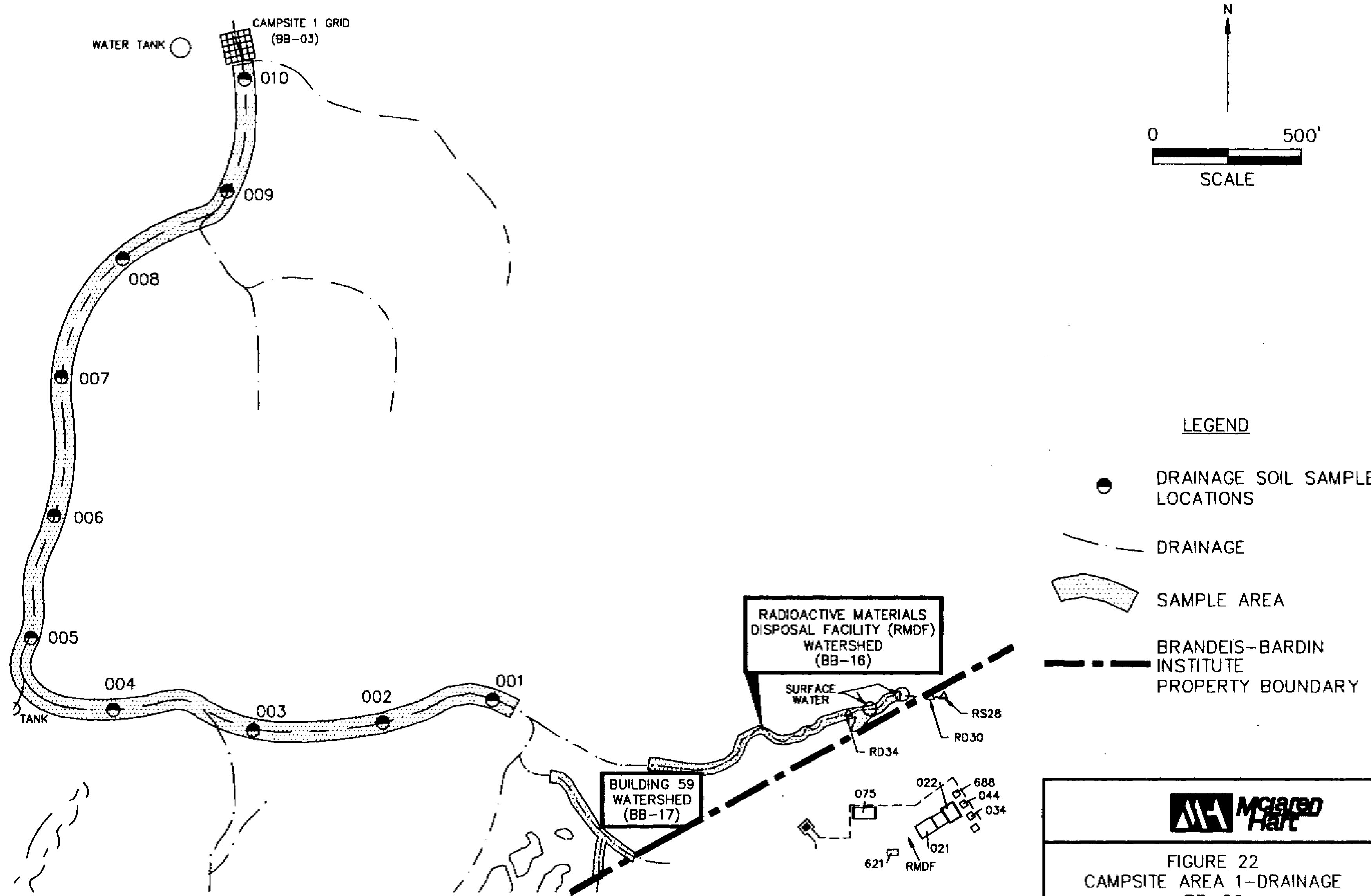
VALUES ARE FOR SOIL/SEDIMENT SAMPLES UNLESS OTHERWISE INDICATED



McLaren Hart

FIGURE 21
SODIUM REACTOR EXPERIMENT (SRE)
WATERSHED
BB-19
SAMPLE LOCATIONS

DRAWN BY E.M.	DATE 08/17/93	UNITS ON DIMENSIONS UNLESS OTHERWISE SPECIFIED	FRAC. DEC. ANG.
CHECKED BY	DATE		
APPROVED BY	DATE	ISSUE	DRAWING NUMBER REACTOR1
SCALE	REFER		



McLaren Hart

FIGURE 22
CAMPSITE AREA 1-DRAINAGE
BB-20
SAMPLE LOCATIONS

DRAWN BY SCHWARTZ	DATE 7-27-93	LIMITS ON DIMENSIONS UNLESS OTHERWISE SPECIFIED	FRAC. DEC. ANG.	
CHECKED BY	DATE			
APPROVED BY	DATE	ISSUE	DRAWING NUMBER CAMP1	
SCALE	REFER			

2) The four corners of the predetermined sampling grid will be measured and marked with colored stakes. The stakes will be marked with their orientation to the origin (e.g., north, east, and northeast). A compass will be used to ensure the grid is square. The sample team leader will note any changes to the sampling grid map and attach a copy to the field log book.

3) Each of the predetermined (randomly identified) sampling blocks that will be sampled during this investigation, will be located on the ground by measuring the appropriate footage along the X and Y axes starting at the grid origin. A compass shall be used to ensure the blocks are located in the appropriate orientation to the grid. The southwest corner of each block will be marked with a colored stake labeled with the appropriate block number.

4) Each predetermined (randomly identified) sampling location within a sampling block will be located using the values for the X and Y coordinates (increments of 1 foot). The sample location will be measured and marked with a colored stake labeled with the block number and the location coordinates (i.e., block number, X-coordinate, Y-coordinate).

5) If the sampling location falls on an obstruction, the sample will be collected at the nearest point south of the obstruction, towards the SSFL.

6) The placement of the grid and the sampling locations shall be documented photographically, and an entry in the field log book shall be made describing each photograph.

7) Before leaving a sampling area, the sample team leader must ensure the following information is 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 to be collected at Campsite Area 1 and 2 the sample crew will follow Steps 3 through 8 to mark the additional sample locations, unless their previous sample stakes are absent from these areas then all the steps will be followed.

The following procedure will be followed to implement the ravine sampling at the designated sampling areas. The sampling team upon arriving at a sampling area will walk the ravine to determine the locations of the previous ravine sampling. If the ravines are inaccessible, no sample will be collected.

After the location of the furthest downgradient sample has been identified, the sampling crew will conduct the following procedures to establish the sampling locations and mark the appropriate sampling locations:

1) The drainage ways will be marked every fifty feet with a stake to designate the sample locations. If the specific block location does not contain soil or is inaccessible that specific location will not be marked.

2) The sampling team will proceed to the first downstream sample location, and collect the appropriate soil samples. If the first sample location is inaccessible or does not contain an adequate volume of soil for the specified analysis then the team will proceed downstream to the nearest location with adequate soil.

3) Soil samples shall be collected as described in Section 3.4.3.

4) The location of the sample collected shall be documented in the field log book and photographed.

5) Before leaving a sampling location, the sample team leader must ensure the following information is 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 actual soil sampling points.
- Documentation of the bearings and landmarks used to establish the location.
- Documentation of all photographs taken.

3.4.3 Soil Sampling Procedure

3.4.3.1 Surface Soil Sampling Procedure

The sampling team leader will be responsible for ensuring that all of the necessary equipment is available and decontaminated before entering the field daily. The sampling team leader will consult the sampling workplan for the locations, maps and coordinates for the sampling areas to be sampled each day. The procedures described below will be followed for soil sampling, sample identification and documentation, and shipping and handling. Prior to collecting soil samples from an area, a member of the field team will conduct a radiation survey using the instrumentation described in the Site Safety and Health Plan (Appendix A). The field team member will walk the perimeter of the sample area (or the length of the ravine) and take a reading at each sample location, which will be recorded in the field log book.

The volume of material collected at each sample location is will be adequate to analyze the radionuclides that need be to analyzed at that specific location. The soil samples will be analyzed for one or more of the following radionuclides: strontium-90, isotopic plutonium, tritium, and gamma emitting radionuclides. One sample volume is required for each analysis.

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

1) A pre-cleaned coring head and brass tube will be assembled and connected to the coring device. Clean latex gloves will be worn at all times.

2) The sampling location will be cleared of surface rocks, sticks and other loose debris. The sample location stake will not be removed.

3) The cutting head will be placed directly on the surface soil and the impact hammer will be dropped on the coring head repeatedly until the top of the coring head is flush with the soil surface.

4) The corer will be pulled from the ground and the coring head disassembled.

5) For surface samples, the brass tube will be removed, a teflon sheet and plastic end caps will be placed at the end of each tube. The end caps will be taped to the brass tube using duct tape or plastic tape. The plastic end cap will be marked in indelible ink indicating the end of the sample from the surface. The laboratory will be directed to analyze the soil from the marked end of the sample tube. For tritium samples, the soil will be extruded from the brass tube into a glass jar, which will be closed and sealed with custody tape. If split samples are requested, the soil from the necessary number of cores will be placed into a resealable plastic bag (or jar for tritium) and mixed for one minute. The mixed soil will then be divided and placed into the appropriate number of brass tubes (or jars) with a teflon sheet and a plastic end cap placed on each end of the brass tube.

6) A label shall be filled out for each sample as described in Section 3.3.2 and placed on the plastic bag or jar. Clear plastic label tape shall be placed over

the label to prevent water damage. The surface soil samples will be put into large, clean, resealable plastic bags and placed in a cooler without ice for the appropriate laboratory.

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

At ravine grid locations the same sampling procedure will be used with the exception that a drive sampler may not be used to collect the soil samples. In the drainage ways or in the ravines that only contain a thin covering of soil, a trowel will be used to scoop the surficial soil into the sample containers. All other procedures will be followed as described above.

3.4.3.2 Subsurface Soil Sampling Procedures

Subsurface soil samples will be collected at ten locations between the Building 59 and RMDF watersheds. Because of the rugged terrain in the ravine areas, other sampling methods may be employed during the course of this investigation. A drill rig or a backhoe may be used to reach the desired sampling depth below the surface.

3.4.4 Split Samples

The United States Environmental Protection Agency (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 will be invited to collect and analyze split samples. Whenever possible, the sampling protocols allow for true split samples to be collected, i.e., the medium being sampled is mixed prior to be placed in brass tubes so that subsamples can be sent to different laboratories for analysis. Ideally, the results of the analyses can be compared to give an indication of the variability between laboratories on the same sample. However, environment 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 to be different, the blind duplicates, the laboratory spikes and the statistical variability of the data will be evaluated to determine whether the apparent difference in split or adjacent samples is real.

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

It is strongly recommended that all participants use the same analytical methodologies for duplicate samples so that the results can 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 will be considered standard for this project is included in Appendix E of this Workplan.

3.4.5 Soil Sampling Documentation

It is the responsibility of the sampling team leader to ensure that the appropriate information is recorded in the field log book. Upon completion of soil sampling, the field log book will contain:

- 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 will only be recorded at new locations in the ravines that were not described in March - April, 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).

- Results of the radiation survey (see Appendix D).

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

3.4.6 Soil Sample Handling, Shipping, and Storage

Soil samples that have been sealed, labeled and placed in appropriate containers will be placed into the cooler without ice (with the exception of samples to be analyzed for mercury), destined for the appropriate analytical laboratory. The chain of custody forms will be placed in a sealed plastic bag and taped to the inside of the cooler lid. All samples will be shipped via overnight courier.

It is the responsibility of the sampling team leader to ensure the following is prepared for each cooler:

- The chain-of-custody forms are properly filled out and account for every sample contained in the cooler.

- The samples and documentation being shipped coincide with the information contained in the field log book.
- The samples contained in the cooler are destined for the appropriate laboratory and that all of the samples are destined for the same laboratory.
- The samples are securely packed and no empty space remains within the cooler.
- The cooler is appropriately addressed and sealed with duct tape.

Appropriate QA/QC samples will be shipped with the field samples. The protocols for the collection, shipping, and handling of QA/QC samples are presented in Section 3.6.

3.5 Surface Water Sampling

Surface water grab samples will be collected from surface water sources where possible. Surface water is seasonal in the Simi Valley area and will only be collected if quantities present are sufficient to collect the volume of sample required for all analyses. Surface waters are considered to include emergent groundwater (springs), streams and ponds. One round of sampling will be conducted at each surface water source. Surface water samples will be 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.

For each sampling location, separate samples will be collected for the various radionuclides: two 1-liter plastic bottles for a gamma scan; two 1-liter plastic bottles for strontium-90; and one, 1-liter glass bottle for tritium; gross alpha and beta scan will be run on the sample collected for the other analyses.

3.5.1 Surface Water Sampling Procedure

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

1) Use a clean stainless-steel bucket to collect all surface water samples to be 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 all of 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) Survey each sample for radioactivity and record the results for each sample in the field log book.

8) Cap the sampling bottles and seal the lid with teflon and clear plastic tape. Place a chain-of-custody sticker across the seal.

9) Discard the used filter, and repeat steps 1 through 8 for the remaining samples from the same location. The filtration apparatus and the collection bucket do not need to be decontaminated between samples at the same location.

10) The filtration apparatus and the collection buckets will be decontaminated between sampling areas.

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

3.5.2 Split Samples

The study participants may choose to collect split samples at some or all of the surface water sampling locations. The filtrate will be transferred to a large, clean stainless steel bucket and mixed. The contents will then be divided between McLaren/Hart and the person or persons requesting a split sample. Notation of all split samples collected will be recorded in the field log book.

3.5.3 Surface Water Sample Documentation

The following information shall be 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 register sample identification numbers and corresponding site-specific sample identification codes (see Section 3.3.2)
- Chain-of-custody reference numbers
- Filtered and preserved samples
- Location of sample collection on sample area diagram
- Split sample documentation (e.g., identification numbers and methods)
- Results of radiation survey
- Pertinent field notes (e.g., weather conditions)
- Personnel collecting samples
- Description of sample conditions

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

3.5.4 Surface Water Sample Handling, Shipping, and Storage

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

Appropriate QA/QC samples will be shipped with the field samples. The protocols for the collection, shipping and handling of QA/QC samples are presented in Section 3.6.

3.6 Quality Assurance/Quality Control (QA/QC)

Internal quality assurance and quality control (QA/QC) samples will be 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.

3.6.1 Field Documentation

Field documentation quality control checks will be made by the sampling team leader. At the end of each day's field activities, all of the day's field log book entries will be reviewed for completeness, accuracy, reporting format, and thoroughness. The team leader will initial the last page of each day's entry as an indication that this review has been undertaken and that the entries in the log book are acceptable. It is the responsibility of the team leader to ensure that the chain-of-custody documentation agrees with the field log book entries.

3.6.2 QA/QC Sampling

The types, frequency, and numbers of QA/QC samples to be collected during the field sampling are shown in Table 3. Several different types of QA/QC samples are used to

TABLE 3

FIELD QUALITY ASSURANCE CONTROL SAMPLE REQUIREMENTS[a]

Analytical Parameter	Field Rinsate Blank		Blind Field Duplicate	Field Blanks	Prespiked Blind Field Duplicate	MS/MSD
	Required Volume	Target No. of Analyses	Target No. of Analyses	Target No. of Analyses	Target No. of Analyses	Target No. of Analyses
Soil Samples						
Strontium-90	2 liters	3	3	N/A	3	3
Isotopic Plutonium	2 liters	3	3	N/A	3	3
Gamma Scan	2 liters	4	4	N/A	4	4
Tritium	1 liter	7	7	N/A	7	7
Water Samples						
Strontium-90	2 liters	1	1	1	1	1
Gamma Scan	2 liters	1	1	1	1	1
Tritium	1 liter	1	1	1	1	1
Gross alpha and beta scan	1 liter	1	1	1	1	1

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

[a] = Based on the following number of soil analyses

Tritium	-	146
Strontium-90	-	54
Cesium-137	-	79
Isotopic Plutonium	-	57

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 below.

3.6.2.1 Field Rinsate Blanks

Field rinsate blanks will provide 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 will be collected following the decontamination procedure for field sampling equipment. A field rinsate blank should be 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 will be prepared with analyte free distilled/deionized water. The field rinsate blank samples shall be collected in the required sample bottles for each analytical method. The following protocol will be 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. The samples will be shipped consistent with the methods for other field samples.

3.6.2.2 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 will be taken as described for split samples in the previous sections. The blind samples will be placed in separate containers and will be given distinct sample numbers to allow for "blind" receipt by the analytical laboratory. The true identity must be concealed from the laboratory, but the identity of the samples must be thoroughly documented in the field log book.

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

Blind field duplicates will be collected from randomly chosen sampling locations. For example, a total of 137 soil samples will be taken and analyzed for tritium (see Table 1). This represents six groups of 20 and one group of 17 samples. As shown in Table 3, seven blind field duplicates will be 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 will be used for the corresponding blind field duplicate. A summary of the sample locations to be used for blind field duplicates is presented in Appendix C.

3.6.2.3 Trip Blanks

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

3.6.2.4 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 will be collected for radionuclide groups for which sample bottles are required (i.e.,surface water samples analyzed for the radionuclides of concern). Field blanks will be collected at a rate of one per 20 samples surface water samples. Field blanks will be assigned sample identification numbers from the water sample register book only.

3.6.2.5 Prespiked Blind Duplicate Samples

Prespiked blind duplicate samples are QA/QC samples that may be used (if available) to test the accuracy of the laboratory by submitting samples with known concentrations. The prespiked 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 sample will be 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 prespiked blind field duplicates to be prepared is summarized in Table 3. Prespiked blind field duplicates will be designated by the number "00" in the 3rd and 4th digit of the site-specific sample identification code. Prespiked blind field duplicates will be numbered successively in the 5th, 6th, and 7th digits as they are collected from new sampling areas.

Prespiked blind field duplicates will be included with other samples collected on that day at randomly chosen sampling locations. For each group of samples, a random number generator was used to select the location for each prespiked blind field duplicate. For example, if the computer generated random number table produced the number "6" for tritium, then the location at which the sixth sample taken within this group of twenty samples will be used for the corresponding prespiked blind field duplicate. A summary of the sample locations at which a prespiked blind field duplicate will be sent to the lab is presented in Appendix C.

3.6.2.6 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. The MS/MSD samples will be collected at a rate of one per 20 samples (including other QA/QC samples) on an analyte-specific basis (Table 3). MS/MSD samples will be assigned sample register identification numbers only. For the purposes of conducting these analyses, the laboratories require a complete set of sample volumes. Therefore, soil and surface water samples will be collected specifically for the purpose of running the MS/MSD analyses.

3.6.2.7 Split Samples

The USEPA, the DHS, Cal-EPA, the Conservancy, and Brandeis-Bardin will be invited to collect and analyze split samples for QA/QC purposes. Rocketdyne may also collect split samples for analyses at a certified laboratory. Whenever possible, the sampling protocols allow for true split samples to be collected, i.e., the medium being sampled is mixed so that subsamples can be 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 will be evaluated to determine whether the apparent difference in split or adjacent samples is real.

3.6.2.8 Data Validation

The analytical results of the sampling and the corresponding Quality Assurance/Quality Control (QA/QC) samples will be reviewed to assess the accuracy of the data. This review will include appropriate evaluation and review of the following QA/QC samples to determine if non-site related contamination of the samples occurred in the sample transport or handling process.

The data package received from the laboratory will be evaluated for proper documentation, data validation and data reduction. The EPA Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans (1983) will be used as guidance for this evaluation.

Data packages provided by the laboratory will include tabulated results for all parameters and, in addition, contain the necessary documentation and a detailed narrative concerning difficulties and observations noted by laboratory personnel in order to facilitate data review. Information contained in the sample data packages will be divided into the following categories for each analytical group:

- Analytical results, tabulated by sample for all parameters;
- QA/QC data;
    - percent recovery data for surrogate spikes,
    - percent recovery and relative percent difference data for prespiked control samples, matrix spike and matrix spike duplicate samples
    - laboratory method blank results
    - laboratory control samples
- Additional information;

Data accuracy and precision from the laboratory will be evaluated by examining the following QA/QC samples:

- Blind field duplicates,
- Matrix spikes, and
- Matrix spike duplicates

The effectiveness of sampling and decontamination efforts and the potential for non-site related chemical contamination will be evaluated by examining the following QA/QC samples:

- Field blanks,
- Field rinsate samples, and
- Corrective action forms and other information related to the quality of the data.

Sample precision between laboratories for split samples sent to different laboratories will also be assessed. All split samples will be compared for data precision. Those split samples whose results differ by 80% will be reevaluated. The results of these analyses will be summarized and their importance to the interpretation of the field data will be discussed in the summary report.

3.7 Laboratory Analysis

Soil and water samples to be analyzed for all radionuclides of concern (gamma-emitting radionuclides, tritium, isotopic plutonium, strontium-90) will be submitted to Teledyne Isotopes in Westwood, New Jersey. The method for tritium analysis is presented in Appendix E. Below is the address of the laboratory where radionuclide analyses will take place.

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

Soil samples from the Sodium Burn Pit Watershed will be analyzed for mercury at MBT Environmental Laboratories:

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

If adjacent/split samples are taken, they will be sent to certified laboratories identified by the study participants, independently.

SECTION 4.0
DATA ANALYSIS AND REPORT

This section presents the methods by which the radionuclide data will be analyzed to provide:

1) Data at sampling locations where previously collected samples were withdrawn by the laboratory due to results that could not be validated by the laboratory;
2) Data in watershed areas which originally contained radionuclide levels above the ninety-fifth percentile of the background concentrations to determine if the results are statistically different from background;
3) Characterization of the distribution of tritium in the Building 59 and Radioactive Materials Disposal Facility (RMDF) Watersheds; and
4) Collect additional background data a minimum of 10 miles from the site at the request of the SSFL Public Work Group to calculate radionuclide background levels.

This section is divided into three sections: data quality assurance, background statistical analysis, and study area statistical analysis.

4.1 Data Quality Assurance/Quality Control Review

The analytical results of the sampling and the corresponding Quality Assurance/Quality Control (QA/QC) samples will be reviewed to assess the validity of the data. This review will include appropriate evaluation and review of the following QA/QC samples to determine if non-site related contamination of the samples occurred in the sample transport or handling process:

- Method blanks
- Field blanks
- Rinsate blanks.

Data accuracy, precision, and completeness will be evaluated by examining the following QA/QC samples:

- Blind field duplicates
- Prespiked blind field duplicates
- Split samples
- Matrix spikes
- Matrix spike duplicates.

The results of these analyses will be summarized and their importance to the interpretation of the field data will be discussed.

4.2 Background Data Evaluation

Background soil and surface water (if available) will be collected for the purpose of providing a bench mark against which the sampling area data may be compared. Background data for soil has been collected from six different locations during the 1992 investigation. Two additional background areas located a minimum of 10 miles from the SSFL will be sampled. The background areas will be located within ravine areas for comparison with ravine samples collected from the SSFL/Brandeis-Bardin watersheds as well as from relatively flat areas as in the original sampling. The background data sets will be evaluated using an analysis of variance (ANOVA) and Tukey's Honest-Significant Difference statistical method to determine if all of the background data sets are considered to be part of the same sample population (Ott, 1984). The ANOVA will indicate whether or not any of the data sets are different and Tukey's Honest-Significant Difference statistical method will indicate which data sets are significantly different and which ones are not. Background data sets that are found to be significantly different than the other background data sets will not be incorporated into the representative background mean calculation. Those background data sets that are found not to be significantly different from one another will be used to calculate a representative background mean and standard deviation. Comparisons may also be made to background levels for selected radionuclides reported in the scientific literature.

If the data sets for the surface water are too small, then an ANOVA will not be conducted. Behrens-Fisher t-Test will be used to determine if the means of the different background data sets are statistically different (Guttman et al., 1971). This test provides a statistical comparison of the means between two data sets, and assumes the data are normally distributed. This is an appropriate and conservative assumption since the data sets may be too small to determine their distribution. (If the background data are large enough to determine their distribution, then a different statistical analysis may be utilized.) It should also be noted that this test is not sensitive to a high degree of variance, which is common in environmental data sets, thus assuring that data sets are not mistakenly identified as being different from background.

4.3 Sampling Area Statistical Analysis

Each sampling area will be treated statistically as a separate distribution. The data for each sampling area will be described as a range with a mean value and a standard deviation.

For each potential radionuclide of interest, it will be assumed that if all samples from a sampling area are below the specific reporting limit, the radionuclide is not present in the sampling area. Analytical methods have been selected based on detection limits that ensure that a significant health risk will not be overlooked. In some cases, a radionuclide may be identified at one sampling location in a sampling area but will be below detection limits at other sampling locations in that same sampling area. If this should occur, the actual value reported by the laboratory will be used, if available, (even though it may be less than the detection limit) or one-half the detection limit for the statistical analysis and will be incorporated into the mean and range. For the radionuclides of potential concern, all valid analytical data will be used to describe the range, mean, and standard deviation. Comparisons between the radionuclide-specific data for a sampling area and the background data set will be made using the Behrens-Fisher t-Test. In the event that background data for surface water cannot be collected (i.e., surface water is not present at any of the background locations), sampling area data will be compared to drinking water standards and background concentrations reported in the scientific literature, if available.

SECTION 5.0
SITE SAFETY AND HEALTH PLAN

McLaren/Hart has prepared a Site Safety and Health Plan (SSHP) for all personnel involved in the sampling program at the off-site properties (McLaren/Hart, 1993), which is presented in Appendix D. The purpose of the SSHP is to reduce the potential for injury at the site. The SSHP addresses chemical, radiological and nonchemical, nonradiological hazards (such as physical hazards).

The SSHP plan addresses health and safety issues using the following outline:

Section 1.0	General Information
Section 2.0	Project Information
Section 3.0	Health and Safety Risk Analysis
Section 4.0	Health and Safety Field Implementation
Section 5.0	Site Operating Procedures
Section 6.0	Emergency Response Plan.

Special health and safety issues included in the SSHP include training requirements, required reports and records, monitoring requirements, action levels, personnel protection, and hazard control. An on-site safety meeting will be held prior to sampling procedures. The meeting will be conducted by a qualified McLaren/Hart professional trained in health and safety.

SECTION 6.0
REFERENCES

Cehn, Joel (1991). Results of Environmental Radiation Survey at Brandeis-Bardin Institute, Brandeis, California. July, 1991.

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Guttaman, I., S. S. Willes, J. S. Hunter, (1971). Introductory Engineering Statistics, 2nd ed., John Wiley and Sons, Inc. New York, N.Y., pp. 219.

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Ott, Lyman (1984). An Introduction to Statistical Methods and Data Analysis, 2nd ed., PWS Publishers. Boston, Mass., pp. 637.

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Rocketdyne (1992). "Tritium Production and Release to Groundwater at SSFL." Safety Review Report. RI/RD92-186.

USEPA (1988). Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA. U.S. Environmental Protection Agency Office of Emergency and Remedial Response. EPA/540/G-89/004.

USEPA (1989). Risk Assessment Guidance for Superfund, Volume I. Human Health Evaluation Manual (Part A) Interim Final United States Environmental Protection Agency, Office of Emergency and Remedial Response. Washington, D.C.

APPENDIX A

U.S. EPA COMMENTS LETTER

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF RADIATION AND INDOOR AIR - LAS VEGAS
P.O. BOX 98517
LAS VEGAS, NEVADA 89193-8517
(702) 798-2476 FAX (702) 798-2465

RECEIVED MAR 1993

MAR 26 1993

Dr. Arlene Giliberto
Rocketdyne Division
Rockwell International Corporation
6633 Canoga Avenue
P.O. Box 7922
Canoga Park, CA 91309-7922

Dear Dr. Giliberto:

We have reviewed the final "Multi-Media Sampling Report for the Brandeis-Bardin Institute and the Santa Monica Mountains Conservancy." Thank you for incorporating our comments into the report. We have the following recommendations for follow-up work regarding this study:

- Further study is suggested at the Building 59 watershed area for tritium characterization, per the discussion at the Public Meeting on March 10, 1993.
- The Radioactive Materials Disposal Facility watershed should be studied specifically focused on determining more about the tritium, cesium, plutonium and strontium levels found above background.
- Long-term study of TCE at the Well by the Gate on the Santa Monica Mountains Conservancy property is suggested.
- Re-sampling is recommended at areas on Brandeis-Bardin Institute and the Santa Monica Mountains Conservancy where analysis was originally performed by gas counting. Although I believe further analysis will bear out first round reanalysis, this could go a long way to satisfy concerns raised by work group members.

For more details refer to the conclusions and recommendations of EPA's Analytical Results Report for the Off-Site, Multi-Media Sample Collection at the Santa Susana Field Laboratory. If you have any further questions, I can be reached at (702) 798-2461.

Sincerely,

03203 RC

Gregg D. Dempsey, Chief
Field Studies Branch

cc: Arnold Robbins, Region 9
Jed Harrison, LVF
Mike Bandrowski, Region 9
Howard Kaplan, BBI
Gary Butner, CADHS

Appendix B

Grid Random Number Tables

RANDOM NUMBERS USED TO SELECT SAMPLING BLOCKS AND SAMPLING LOCATIONS WITHIN EACH BLOCK

BACKGROUND SAMPLE LOCATION
BG-02
SANTA SUSANA PARK
(SEE FIGURE 5)

NUMBER	RANDOMLY SELECTED BLOCK NUMBER	X COORDINATE*	Y COORDINATE*	NUMBER	RANDOMLY SELECTED BLOCK NUMBER	X COORDINATE*	Y COORDINATE*
1	78	4	7	51	19	3	1
2	7	1	4	52	69	3	7
3	74	2	1	53	48	6	9
4	17	7	4	54	70	1	4
5	85	5	7	55	30	4	4
6	25	2	5	56	37	2	8
7	37	1	10	57	80	3	1
8	21	9	9	58	36	8	9
9	68	1	3	59	73	9	8
10	78	1	6	60	2	0	7
11	50	3	7	61	95	9	10
12	38	4	1	62	79	6	6
13	86	7	7	63	61	10	0
14	97	5	7	64	98	2	3
15	53	2	5	65	38	5	2
16	31	0	9	66	91	5	7
17	35	2	5	67	72	5	9
18	26	7	7	68	60	9	1
19	52	5	2	69	27	4	7
20	85	8	3	70	46	8	8
21	94	9	1	71	65	6	10
22	16	0	3	72	84	3	9
23	17	5	7	73	23	9	7
24	37	5	5	74	81	5	6
25	27	4	7	75	72	4	2
26	47	6	0	76	64	9	7
27	5	4	5	77	11	4	5
28	29	7	10	78	62	8	5
29	59	7	0	79	13	3	6
30	67	8	7	80	30	3	4
31	70	8	6	81	60	6	8
32	38	7	9	82	36	3	7
33	14	8	4	83	90	6	7
34	74	5	1	84	92	3	6
35	72	8	4	85	14	6	8
36	54	6	6	86	6	6	8
37	76	10	2	87	79	6	6
38	38	9	2	88	55	2	7
39	84	5	1	89	2	6	1
40	16	3	3	90	57	0	2
41	75	7	5	91	32	5	9
42	28	1	4	92	0	9	0
43	35	6	2	93	99	7	5
44	49	2	8	94	70	5	6
45	97	3	9	95	93	8	3
46	26	2	5	96	38	4	4
47	83	9	7	97	24	0	2
48	36	1	4	98	53	5	5
49	47	10	4	99	36	7	7
50	8	8	5	100	6	5	0

* - COORDINATE REPRESENTS THE DISTANCE FROM THE ORIGIN OF THE BLOCK.

[shaded box] Randomly selected sampling blocks.

[open box] Alternative randomly selected sampling blocks.

RANDOM NUMBERS USED TO SELECT SAMPLING BLOCKS AND SAMPLING LOCATIONS WITHIN EACH BLOCK

BACKGROUND SAMPLE LOCATION
BG-05
HAPPY CAMP
(SEE FIGURE 6)

NUMBER	RANDOMLY SELECTED BLOCK NUMBER	X COORDINATE*	Y COORDINATE*	NUMBER	RANDOMLY SELECTED BLOCK NUMBER	X COORDINATE*	Y COORDINATE*
1	84	8	10	51	80	6	1
2	44	10	3	52	70	4	8
3	74	7	8	53	38	1	6
4	28	6	8	54	97	1	7
5	16	9	7	55	70	6	3
6	60	1	4	56	26	8	8
7	51	3	5	57	87	2	5
8	56	3	2	58	4	4	4
9	90	8	1	59	12	4	1
10	62	2	7	60	63	8	3
11	19	5	10	61	22	0	2
12	39	7	6	62	69	5	6
13	87	9	0	63	58	0	4
14	42	2	4	64	65	2	7
15	21	2	5	65	63	5	4
16	30	9	3	66	92	5	7
17	9	4	6	67	10	2	1
18	63	4	7	68	12	3	8
19	24	5	3	69	44	8	3
20	66	5	3	70	81	5	2
21	12	7	1	71	8	5	1
22	46	3	7	72	61	3	1
23	98	6	2	73	23	2	1
24	62	4	6	74	58	4	7
25	63	2	8	75	78	10	7
26	69	1	4	76	15	9	7
27	69	5	5	77	40	0	7
28	57	2	5	78	1	8	8
29	59	1	6	79	63	9	2
30	48	8	4	80	13	10	0
31	60	4	4	81	50	3	3
32	42	7	5	82	28	8	4
33	78	5	2	83	95	8	10
34	43	4	1	84	43	2	2
35	88	10	4	85	54	3	5
36	20	5	7	86	23	7	7
37	76	1	1	87	21	7	8
38	42	0	1	88	55	2	0
39	74	9	4	89	6	8	8
40	2	7	5	90	66	9	2
41	48	2	1	91	42	4	6
42	91	2	9	92	61	1	7
43	86	4	6	93	91	9	10
44	84	2	5	94	78	8	5
45	33	1	2	95	57	4	9
46	33	7	8	96	83	7	8
47	84	4	6	97	72	9	4
48	21	10	9	98	66	1	9
49	25	1	3	99	68	5	3
50	11	7	0	100	27	6	6

* - COORDINATE REPRESENTS THE DISTANCE FROM THE ORIGIN OF THE BLOCK.

(shaded) Randomly selected sampling blocks.
(outlined) Alternative randomly selected sampling blocks.

RANDOM NUMBERS USED TO SELECT SAMPLING BLOCKS AND SAMPLING LOCATIONS WITHIN EACH BLOCK

BACKGROUND
BG-09
WILDWOOD REGIONAL PARK

NUMBER	RANDOMLY SELECTED BLOCK NUMBER	X COORDINATE*	Y COORDINATE*	NUMBER	RANDOMLY SELECTED BLOCK NUMBER	X COORDINATE*	Y COORDINATE*
1	96	1	6	51	28	4	2
2	5	9	9	52	22	2	2
3	57	7	2	53	83	5	1
4	21	1	10	54	92	2	5
5	13	6	4	55	60	4	7
6	31	10	2	56	19	0	6
7	3	2	1	57	63	5	7
8	67	7	10	58	77	10	4
9	75	3	6	59	22	10	6
10	46	1	9	60	60	3	3
11	93	8	3	61	64	9	7
12	15	6	9	62	99	5	10
13	71	10	8	63	79	4	5
14	20	5	3	64	37	0	7
15	40	10	5	65	36	8	3
16	27	2	9	66	45	8	2
17	98	1	2	67	43	6	9
18	75	3	3	68	38	10	8
19	3	8	9	69	87	9	0
20	7	8	10	70	99	4	9
21	36	4	2	71	74	9	2
22	54	10	1	72	28	3	10
23	69	7	1	73	19	2	2
24	46	1	8	74	55	1	7
25	46	4	3	75	87	4	1
26	75	10	4	76	27	6	0
27	52	8	0	77	35	7	6
28	82	3	6	78	17	5	6
29	25	4	8	79	22	9	8
30	11	9	1	80	37	3	4
31	59	9	7	81	72	2	10
32	5	5	7	82	33	9	0
33	7	6	9	83	86	10	3
34	16	7	1	84	68	9	2
35	33	6	2	85	96	2	2
36	35	2	1	86	36	2	10
37	12	6	0	87	79	7	5
38	9	4	7	88	62	6	10
39	86	6	4	89	64	9	8
40	92	6	5	90	96	2	0
41	2	8	7	91	48	3	3
42	92	5	4	92	31	10	5
43	71	9	4	93	39	2	2
44	43	10	2	94	14	9	8
45	53	6	9	95	51	3	3
46	34	2	7	96	31	9	3
47	60	2	4	97	6	2	1
48	85	6	3	98	0	5	6
49	81	4	4	99	5	4	8
50	88	5	5	100	61	2	6

* - COORDINATE REPRESENTS THE DISTANCE FROMTHE ORIGIN OF THE BLOCK

Randomly selected sampling blocks.

Alternate randomly selected sampling blocks

I:CR\BGRND09.XLS

RANDOM NUMBERS USED TO SELECT SAMPLING BLOCKS AND SAMPLING LOCATIONS WITHIN EACH BLOCK

BACKGROUND
BG-11
TAPIA COUNTY PARK

NUMBER	RANDOMLY SELECTED BLOCK NUMBER	X COORDINATE*	Y COORDINATE*	NUMBER	RANDOMLY SELECTED BLOCK NUMBER	X COORDINATE*	Y COORDINATE*
1	[illegible]	[illegible]	[illegible]	51	33	0	6
2	[illegible]	[illegible]	[illegible]	52	82	8	1
3	[illegible]	[illegible]	[illegible]	53	67	10	9
4	39	2	10	54	38	8	8
5	[illegible]	[illegible]	[illegible]	55	54	4	7
6	[illegible]	1	7	56	24	10	3
7	33	7	2	57	55	3	4
8	79	5	2	58	78	3	1
9	67	8	3	59	87	1	1
10	42	1	2	60	79	7	8
11	97	8	0	61	6	6	8
12	90	5	10	62	27	6	3
13	40	6	10	63	83	1	2
14	51	3	2	64	42	7	7
15	78	4	7	65	51	8	8
16	83	3	7	66	25	3	0
17	86	2	10	67	96	2	9
18	90	5	4	68	51	9	8
19	8	4	5	69	18	6	7
20	63	7	4	70	37	2	5
21	61	9	4	71	4	8	2
22	34	1	1	72	53	5	4
23	91	6	1	73	62	9	10
24	45	2	8	74	12	9	4
25	52	3	9	75	6	4	6
26	16	4	1	76	61	4	1
27	95	4	1	77	48	7	7
28	19	5	2	78	81	9	8
29	61	5	5	79	80	7	7
30	96	9	9	80	53	4	2
31	37	9	6	81	65	8	1
32	57	6	6	82	82	0	9
33	95	0	8	83	26	9	9
34	66	5	4	84	57	2	3
35	71	4	2	85	99	6	9
36	26	10	9	86	46	2	6
37	46	2	7	87	97	1	2
38	20	1	1	88	18	6	9
39	28	7	3	89	1	8	9
40	31	5	8	90	84	4	1
41	57	5	1	91	42	9	3
42	25	4	9	92	35	3	1
43	50	1	0	93	86	1	8
44	79	6	8	94	40	6	9
45	97	3	7	95	80	6	9
46	75	8	5	96	25	6	0
47	46	5	8	97	70	1	2
48	34	6	9	98	13	6	5
49	4	3	3	99	90	6	1
50	11	1	9	100	53	4	7

* - COORDINATE REPRESENTS THE DISTANCE FROMTHE ORIGIN OF THE BLOCK

(shaded) Randomly selected sampling blocks.

(outlined) Alternate randomly selected sampling blocks

RANDOM NUMBERS USED TO SELECT SAMPLING BLOCKS AND SAMPLING LOCATIONS WITHIN EACH BLOCK

BRANDEIS-BARDIN INSTITUTE
BB-02
DORMITORY AREA
(SEE FIGURE 7)

NUMBER	RANDOMLY SELECTED BLOCK NUMBER	X COORDINATE*	Y COORDINATE*	NUMBER	RANDOMLY SELECTED BLOCK NUMBER	X COORDINATE*	Y COORDINATE*
1	81	8	0	51	36	7	8
2	71	4	5	52	83	2	1
3	45	1	6	53	22	10	7
4	86	8	0	54	23	3	5
5	80	9	3	55	31	1	0
6	75	7	9	56	66	7	8
7	98	3	2	57	10	0	1
8	78	6	6	58	20	6	0
9	87	1	2	59	3	9	0
10	14	7	6	60	40	9	1
11	62	0	0	61	62	8	7
12	84	4	3	62	48	8	7
13	76	5	9	63	37	9	7
14	90	6	6	64	83	9	6
15	44	1	6	65	64	5	2
16	89	3	1	66	98	6	2
17	27	6	8	67	48	3	9
18	77	1	9	68	34	1	5
19	80	1	0	69	42	5	7
20	2	3	1	70	54	7	6
21	20	2	3	71	86	5	6
22	21	1	8	72	60	1	8
23	90	8	4	73	19	9	6
24	30	9	9	74	57	6	6
25	38	9	4	75	61	0	8
26	45	4	3	76	34	4	9
27	67	7	2	77	65	1	7
28	24	7	9	78	33	10	2
29	96	6	6	79	2	2	9
30	37	10	8	80	96	2	8
31	9	3	9	81	60	0	0
32	32	7	1	82	72	5	5
33	38	9	5	83	59	8	4
34	88	7	8	84	46	6	8
35	24	5	1	85	69	9	9
36	49	7	3	86	16	8	3
37	49	2	1	87	31	7	6
38	36	3	8	88	38	2	5
39	52	8	7	89	49	1	10
40	13	3	5	90	97	4	7
41	1	7	6	91	93	3	2
42	8	2	3	92	28	0	10
43	1	5	2	93	87	8	0
44	0	2	0	94	20	6	8
45	1	5	1	95	31	10	2
46	3	9	0	96	7	5	4
47	21	1	0	97	96	1	5
48	5	6	3	98	65	5	2
49	85	3	3	99	54	5	8
50	66	7	7	100	26	5	7

* - COORDINATE REPRESENTS THE DISTANCE FROM THE ORIGIN OF THE BLOCK.

[shaded box] Randomly selected sampling blocks.

RANDOM NUMBERS USED TO SELECT SAMPLING BLOCKS AND SAMPLING LOCATIONS WITHIN EACH BLOCK

BRANDEIS-BARDIN INSTITUTE
BB-03
CAMPSITE AREA 1
(SEE FIGURE 8)

NUMBER	RANDOMLY SELECTED BLOCK NUMBER	X COORDINATE*	Y COORDINATE*	NUMBER	RANDOMLY SELECTED BLOCK NUMBER	X COORDINATE*	Y COORDINATE*
1	25	9	2	51	49	6	3
2	54	3	1	52	56	10	9
3	92	6	9	53	73	3	1
4	69	2	2	54	70	9	7
5	53	9	5	55	62	7	9
6	68	9	0	56	14	3	1
7	25	0	0	57	86	4	0
8	79	4	2	58	11	1	9
9	67	4	1	59	15	2	6
10	67	8	5	60	42	4	1
11	17	4	4	61	62	8	4
12	5	4	3	62	26	9	2
13	72	9	2	63	60	8	10
14	63	8	3	64	47	5	1
15	74	9	4	65	86	3	9
16	3	8	6	66	21	5	8
17	26	6	7	67	88	2	6
18	96	7	9	68	74	7	8
19	29	2	4	69	34	4	10
20	60	2	6	70	88	3	0
21	66	5	2	71	57	8	4
22	83	4	7	72	55	8	4
23	97	3	7	73	10	3	5
24	59	10	3	74	54	5	0
25	81	10	2	75	43	9	2
26	67	7	1	76	34	6	1
27	1	7	8	77	24	7	1
28	6	3	3	78	41	9	9
29	4	9	5	79	64	1	0
30	58	9	1	80	65	0	4
31	51	1	4	81	40	4	8
32	13	8	3	82	88	5	1
33	54	1	5	83	4	9	6
34	85	4	6	84	34	2	6
35	45	2	6	85	48	5	0
36	7	6	10	86	95	7	8
37	53	6	4	87	96	8	8
38	79	4	7	88	8	1	5
39	8	8	7	89	6	1	2
40	94	3	7	90	1	0	7
41	42	10	9	91	48	2	8
42	92	4	9	92	53	8	1
43	51	6	5	93	60	9	9
44	48	7	9	94	20	6	5
45	80	5	8	95	94	8	4
46	68	1	9	96	16	3	7
47	72	6	4	97	36	3	6
48	67	8	9	98	69	8	6
49	9	9	6	99	35	1	7
50	78	9	6	100	96	3	4

* - COORDINATE REPRESENTS THE DISTANCE FROM THE ORIGIN OF THE BLOCK.
[shaded box] Randomly selected sampling blocks, previous investigation.
[outlined box] Additional randomly selected sampling blocks.

RANDOM NUMBERS USED TO SELECT SAMPLING BLOCKS AND SAMPLING LOCATIONS WITHIN EACH BLOCK

BRANDEIS-BARDIN INSTITUTE
BB-04
CAMPSITE AREA 2
(SEE FIGURE 9)

NUMBER	RANDOMLY SELECTED BLOCK NUMBER	X COORDINATE*	Y COORDINATE*	NUMBER	RANDOMLY SELECTED BLOCK NUMBER	X COORDINATE*	Y COORDINATE*
1	21	8	2	51	76	5	3
2	23	3	2	52	30	7	7
3	97	0	3	53	47	1	9
4	82	5	6	54	88	0	0
5	26	3	1	55	59	7	1
6	62	10	5	56	25	6	4
7	79	1	6	57	56	9	6
8	84	6	3	58	51	6	0
9	78	6	1	59	61	1	8
10	49	1	3	60	31	2	5
11	25	1	0	61	38	7	1
12	76	2	7	62	18	0	4
13	28	2	4	63	36	1	10
14	11	2	5	64	52	5	7
15	30	7	5	65	64	4	4
16	5	1	2	66	20	1	1
17	14	4	10	67	96	6	4
18	95	1	0	68	62	4	10
19	34	1	7	69	69	2	3
20	16	6	4	70	80	6	7
21	79	0	8	71	80	5	2
22	32	2	7	72	85	7	0
23	37	2	0	73	65	3	6
24	57	9	9	74	72	4	2
25	34	2	5	75	41	2	7
26	97	8	6	76	54	9	9
27	27	0	9	77	46	2	1
28	62	1	9	78	9	3	3
29	52	4	10	79	80	2	0
30	81	6	5	80	54	4	0
31	25	8	0	81	44	1	5
32	81	8	1	82	27	8	3
33	62	8	7	83	43	2	9
34	81	5	5	84	28	2	0
35	4	0	9	85	76	4	9
36	92	8	8	86	91	4	7
37	19	0	9	87	87	6	3
38	56	5	4	88	77	4	4
39	94	7	5	89	19	9	10
40	50	2	2	90	56	2	4
41	56	4	5	91	81	1	2
42	62	4	5	92	81	2	10
43	94	4	7	93	35	7	8
44	81	7	2	94	72	7	3
45	58	9	8	95	39	3	2
46	87	0	8	96	27	2	9
47	8	8	9	97	89	9	7
48	30	9	3	98	59	3	4
49	92	8	4	99	82	3	9
50	37	6	9	100	34	7	5

* - COORDINATE REPRESENTS THE DISTANCE FROM THE ORIGIN OF THE BLOCK.

[shaded box] Randomly selected sampling blocks, previous investigation.

[open box] Additional randomly selected sampling blocks.

RANDOM NUMBERS USED TO SELECT SAMPLING BLOCKS AND SAMPLING LOCATIONS WITHIN EACH BLOCK

BRANDEIS-BARDIN INSTITUTE
BB-05
PICNIC AREA
(SEE FIGURE 10)

NUMBER	RANDOMLY SELECTED BLOCK NUMBER	X COORDINATE*	Y COORDINATE*	NUMBER	RANDOMLY SELECTED BLOCK NUMBER	X COORDINATE*	Y COORDINATE*
1	3	2	7	51	62	2	7
2	89	2	6	52	51	9	9
3	6	8	2	53	66	1	1
4	57	5	7	54	6	4	2
5	77	9	2	55	64	7	1
6	65	3	5	56	48	6	8
7	85	3	4	57	43	3	8
8	80	6	8	58	43	5	6
9	89	5	8	59	88	8	8
10	32	5	7	60	56	8	0
11	95	0	2	61	43	5	8
12	40	8	3	62	61	4	9
13	45	9	2	63	47	0	2
14	53	7	5	64	12	8	2
15	26	10	7	65	33	4	2
16	1	0	4	66	16	8	5
17	99	6	9	67	38	6	3
18	30	0	4	68	3	6	3
19	11	7	3	69	51	5	8
20	23	10	5	70	73	3	2
21	21	1	6	71	28	2	9
22	96	7	1	72	85	3	0
23	36	2	4	73	23	7	8
24	88	3	3	74	31	4	2
25	60	5	3	75	7	8	6
26	100	2	0	76	34	9	1
27	27	3	6	77	81	8	7
28	90	2	1	78	25	7	2
29	78	2	4	79	78	3	7
30	74	3	9	80	76	7	6
31	36	5	2	81	17	9	8
32	26	9	1	82	82	3	1
33	84	10	8	83	45	1	9
34	87	3	6	84	71	8	4
35	43	5	3	85	81	6	7
36	29	4	3	86	64	3	2
37	68	3	2	87	56	6	8
38	67	0	5	88	56	0	5
39	40	5	5	89	99	4	7
40	83	8	2	90	30	6	6
41	1	3	2	91	28	7	6
42	16	4	9	92	19	2	3
43	98	1	4	93	48	3	5
44	81	4	4	94	22	8	8
45	29	7	5	95	85	10	7
46	97	5	7	96	88	0	8
47	49	8	7	97	97	9	6
48	94	0	4	98	26	2	1
49	75	6	7	99	30	2	3
50	59	7	1	100	98	8	6

* - COORDINATE REPRESENTS THE DISTANCE FROM THE ORIGIN OF THE BLOCK.
[shaded] Randomly selected sampling blocks.

RANDOM NUMBERS USED TO SELECT SAMPLING BLOCKS AND SAMPLING LOCATIONS WITHIN EACH BLOCK

BRANDEIS-BARDIN INSTITUTE
BB-06
HOUSE OF THE BOOK
(SEE FIGURE 11)

NUMBER	RANDOMLY SELECTED BLOCK NUMBER	X COORDINATE*	Y COORDINATE*	NUMBER	RANDOMLY SELECTED BLOCK NUMBER	X COORDINATE*	Y COORDINATE*
1	17	7	5	51	44	2	3
2	7	7	0	52	89	0	5
3	53	10	9	53	55	7	7
4	92	1	5	54	36	3	4
5	66	2	9	55	87	7	7
6	96	10	6	56	37	7	9
7	13	9	7	57	59	9	9
8	18	9	9	58	52	10	7
9	8	5	6	59	46	1	5
10	48	6	6	60	41	9	8
11	56	5	3	61	12	2	7
12	84	5	0	62	59	3	6
13	32	4	1	63	87	8	9
14	40	7	6	64	36	10	5
15	88	3	7	65	17	6	2
16	44	6	7	66	95	6	10
17	71	1	1	67	62	6	10
18	52	2	2	68	15	1	8
19	53	1	6	69	21	6	9
20	26	1	8	70	30	0	8
21	60	7	7	71	95	2	3
22	55	10	8	72	61	9	6
23	36	8	10	73	83	3	6
24	45	2	5	74	1	2	1
25	47	10	5	75	88	2	0
26	3	4	8	76	8	10	5
27	19	6	1	77	24	4	7
28	91	3	1	78	34	3	5
29	3	4	1	79	93	1	9
30	31	7	4	80	63	9	1
31	82	1	3	81	52	6	4
32	53	6	2	82	97	3	7
33	75	1	4	83	34	9	5
34	98	0	0	84	96	0	5
35	2	10	6	85	87	8	9
36	57	3	5	86	85	1	5
37	28	3	8	87	63	9	3
38	64	1	9	88	9	5	4
39	61	8	1	89	7	7	1
40	72	6	9	90	59	3	8
41	54	1	8	91	28	2	5
42	33	10	3	92	11	1	7
43	30	3	2	93	41	4	8
44	39	8	8	94	0	2	3
45	30	6	5	95	43	6	2
46	2	8	8	96	69	10	9
47	7	2	7	97	71	4	8
48	54	6	9	98	45	3	7
49	32	5	1	99	87	7	4
50	72	8	2	100	53	10	9

* - COORDINATE REPRESENTS THE DISTANCE FROM THE ORIGIN OF THE BLOCK.
[shaded box] Randomly selected sampling blocks.

RANDOM NUMBERS USED TO SELECT SAMPLING BLOCKS AND SAMPLING LOCATIONS WITHIN EACH BLOCK

BRANDEIS-BARDIN INSTITUTE
BB-12
MAIN HOUSE ORCHARD
(SEE FIGURE 12)

NUMBER	RANDOMLY SELECTED BLOCK NUMBER	X COORDINATE*	Y COORDINATE*	NUMBER	RANDOMLY SELECTED BLOCK NUMBER	X COORDINATE*	Y COORDINATE*
1	58	2	17	51	87	11	2
2	93	1	14	52	84	13	9
3	79	2	3	53	68	13	0
4	31	19	14	54	80	14	8
5	90	19	4	55	14	1	15
6	85	15	18	56	63	6	14
7	47	8	1	57	83	16	15
8	48	7	14	58	32	2	1
9	2	3	19	59	3	12	7
10	52	20	5	60	19	9	16
11	72	13	7	61	50	10	5
12	46	12	4	62	46	1	4
13	42	14	9	63	45	15	18
14	59	15	2	64	14	19	2
15	8	20	5	65	6	15	9
16	19	20	3	66	35	21	19
17	49	15	15	67	92	18	11
18	81	7	18	68	17	7	1
19	78	20	4	69	37	6	1
20	57	19	8	70	19	4	5
21	67	11	19	71	67	18	4
22	23	20	18	72	22	10	10
23	29	9	2	73	45	0	4
24	50	3	7	74	30	13	1
25	76	5	5	75	68	11	4
26	39	6	2	76	73	17	1
27	95	5	4	77	57	14	12
28	66	12	16	78	7	4	2
29	20	17	2	79	96	17	3
30	2	4	15	80	82	18	2
31	5	20	18	81	40	7	19
32	47	5	12	82	32	0	9
33	35	17	15	83	3	0	1
34	98	1	5	84	11	9	7
35	73	4	13	85	89	7	11
36	61	17	17	86	51	19	6
37	88	5	7	87	40	1	9
38	93	17	13	88	98	17	3
39	79	5	4	89	18	17	14
40	89	10	17	90	23	22	12
41	79	11	2	91	33	7	6
42	6	15	7	92	63	18	15
43	87	6	15	93	58	15	19
44	26	17	0	94	69	16	1
45	49	14	19	95	1	22	12
46	46	12	5	96	39	6	4
47	71	13	17	97	19	21	1
48	23	16	8	98	58	6	11
49	25	15	14	99	66	12	14
50	34	13	17	100	73	7	8

* - COORDINATE REPRESENTS THE DISTANCE FROM THE ORIGIN OF THE BLOCK.

[shaded box] Randomly selected sampling blocks.

RANDOM NUMBERS USED TO SELECT SAMPLING BLOCKS AND SAMPLING LOCATIONS WITHIN EACH BLOCK

BRANDEIS-BARDIN INSTITUTE
BB-13
AVOCADO GROVE
(SEE FIGURE 13)

NUMBER	RANDOMLY SELECTED BLOCK NUMBER	X COORDINATE*	Y COORDINATE*	NUMBER	RANDOMLY SELECTED BLOCK NUMBER	X COORDINATE*	Y COORDINATE*
1	60	2	1	51	11	8	7
2	84	8	9	52	10	7	10
3	43	1	12	53	67	2	3
4	70	5	8	54	38	9	7
5	37	2	11	55	39	9	8
6	39	5	11	56	82	1	3
7	77	7	2	57	69	5	11
8	44	8	8	58	12	10	1
9	93	8	9	59	10	3	4
10	71	5	3	60	87	1	15
11	60	0	2	61	94	1	11
12	85	10	10	62	71	4	8
13	11	8	8	63	77	6	1
14	10	5	1	64	23	10	15
15	66	9	2	65	94	0	14
16	60	3	11	66	41	3	2
17	51	0	13	67	17	4	3
18	64	6	13	68	95	7	9
19	44	3	0	69	97	1	1
20	85	10	9	70	85	4	8
21	9	1	9	71	70	4	7
22	59	2	7	72	34	7	9
23	76	4	13	73	49	1	11
24	4	5	4	74	81	1	5
25	98	9	15	75	99	8	11
26	80	9	1	76	32	9	7
27	2	2	8	77	55	0	10
28	56	9	6	78	35	7	4
29	64	4	1	79	19	8	8
30	33	3	11	80	99	8	13
31	80	6	12	81	31	8	9
32	71	6	4	82	4	5	8
33	65	2	11	83	23	7	0
34	68	4	7	84	64	10	13
35	2	0	10	85	55	8	4
36	78	7	5	86	95	8	13
37	58	8	5	87	72	9	6
38	80	5	3	88	17	9	0
39	8	5	12	89	28	0	14
40	51	9	10	90	35	3	14
41	17	1	4	91	2	3	11
42	43	9	4	92	99	2	10
43	10	4	15	93	46	7	0
44	48	9	11	94	62	6	7
45	33	4	12	95	46	7	6
46	16	3	7	96	59	4	4
47	27	5	9	97	15	2	10
48	58	9	12	98	44	5	11
49	41	0	5	99	76	5	11
50	30	5	6	100	42	3	12

* - COORDINATE REPRESENTS THE DISTANCE FROM THE ORIGIN OF THE BLOCK.
[shaded] Randomly selected sampling blocks.

RANDOM NUMBERS USED TO SELECT SAMPLING BLOCKS AND SAMPLING LOCATIONS WITHIN EACH BLOCK

BRANDEIS-BARDIN INSTITUTE
BB-14
OLD WELL CAMPSITE
(SEE FIGURE 14)

NUMBER	RANDOMLY SELECTED BLOCK NUMBER	X COORDINATE*	Y COORDINATE*	NUMBER	RANDOMLY SELECTED BLOCK NUMBER	X COORDINATE*	Y COORDINATE*
1	87	5	6	51	90	4	10
2	88	10	6	52	3	7	5
3	41	8	9	53	64	4	5
4	79	2	4	54	49	8	8
5	94	3	6	55	36	2	2
6	44	1	3	56	43	1	1
7	4	6	2	57	11	7	7
8	95	4	0	58	62	10	2
9	76	10	2	59	72	7	7
10	65	6	8	60	41	5	2
11	29	0	2	61	41	7	2
12	57	10	3	62	33	5	8
13	71	10	7	63	36	5	4
14	35	1	7	64	22	8	2
15	97	1	8	65	2	8	5
16	92	1	5	66	9	0	3
17	27	5	2	67	34	9	7
18	2	1	5	68	13	3	5
19	96	6	8	69	54	0	9
20	10	2	6	70	83	5	10
21	86	3	10	71	93	8	5
22	25	7	2	72	59	9	1
23	28	10	8	73	16	8	4
24	28	3	1	74	1	5	3
25	33	7	3	75	3	9	7
26	18	1	7	76	53	0	1
27	23	5	4	77	23	3	5
28	37	2	3	78	67	8	2
29	91	6	7	79	97	10	6
30	35	5	0	80	86	0	4
31	2	10	9	81	61	2	0
32	9	4	10	82	21	3	4
33	84	5	5	83	26	8	10
34	70	5	5	84	60	2	7
35	89	6	2	85	34	4	3
36	70	4	1	86	44	0	3
37	96	7	0	87	35	8	1
38	8	5	5	88	7	5	1
39	36	6	4	89	27	7	2
40	94	3	5	90	100	8	8
41	34	8	10	91	33	2	4
42	52	7	8	92	33	6	8
43	79	6	3	93	97	9	9
44	40	6	7	94	34	10	8
45	40	9	2	95	7	10	8
46	35	6	6	96	64	4	2
47	1	9	6	97	22	8	3
48	86	5	0	98	95	6	4
49	32	7	8	99	93	9	6
50	10	2	7	100	7	9	4

* - COORDINATE REPRESENTS THE DISTANCE FROM THE ORIGIN OF THE BLOCK.
[shaded] Randomly selected sampling blocks.

RANDOM NUMBERS USED TO SELECT SAMPLING BLOCKS AND SAMPLING LOCATIONS WITHIN EACH BLOCK

SANTA MONICA MOUNTAINS CONSERVANCY
SM-04
FORMER ROCKETDYNE EMPLOYEE SHOOTING RANGE
(SEE FIGURE 15)

NUMBER	RANDOMLY SELECTED BLOCK NUMBER	X COORDINATE*	Y COORDINATE*	NUMBER	RANDOMLY SELECTED BLOCK NUMBER	X COORDINATE*	Y COORDINATE*
1	93	7	9	51	45	5	5
2	93	6	3	52	92	3	7
3	49	10	7	53	84	5	8
4	83	4	1	54	86	3	7
5	99	9	6	55	24	5	9
6	38	4	4	56	7	1	6
7	60	4	3	57	33	4	4
8	41	8	9	58	43	7	2
9	71	9	5	59	44	2	9
10	27	2	3	60	37	0	0
11	59	1	8	61	1	3	8
12	34	4	8	62	58	8	7
13	44	8	10	63	60	3	8
14	12	4	1	64	36	3	10
15	15	6	3	65	82	8	2
16	61	2	1	66	6	8	2
17	8	10	1	67	52	9	4
18	56	0	6	68	69	4	5
19	23	0	9	69	68	6	1
20	96	7	5	70	57	1	8
21	9	1	5	71	63	9	2
22	40	6	2	72	84	6	8
23	31	4	1	73	59	0	7
24	80	5	7	74	100	4	8
25	43	7	9	75	42	3	9
26	1	3	9	76	97	2	7
27	1	4	2	77	96	4	2
28	21	3	7	78	56	1	9
29	85	6	3	79	78	8	9
30	22	0	1	80	61	1	5
31	14	6	5	81	96	7	2
32	90	1	2	82	87	7	2
33	57	0	4	83	40	10	4
34	38	4	4	84	34	7	7
35	72	5	0	85	77	2	6
36	82	9	2	86	20	5	10
37	30	4	4	87	15	8	4
38	89	6	8	88	8	5	7
39	74	8	5	89	95	6	7
40	84	3	2	90	56	3	3
41	83	10	7	91	44	6	1
42	80	1	2	92	66	10	3
43	17	10	5	93	4	10	10
44	94	1	1	94	53	4	5
45	45	3	3	95	91	6	9
46	81	7	4	96	2	6	2
47	80	4	6	97	17	10	7
48	41	2	4	98	24	9	5
49	67	9	8	99	63	8	3
50	87	9	1	100	8	1	6

* - COORDINATE REPRESENTS THE DISTANCE FROM THE ORIGIN OF THE BLOCK.

(shaded) Randomly selected sampling blocks.

Appendix C

Random Selection of Samples to be Used 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	3	14
5 (n=20)	7	19	2	5
6 (n=20)	13	6	1	17
7 (n=20)	9	3	8	19
8 (n=6)	1	4	5	2

QA/QC Group	Sequential Number in QA/QC Group to be used for Prespiked Blind Field Duplicate			
	Tritium	Gamma Scan	Strontium-90	Isotopic Plutonium
1 (n=20)	3	7	11	5
2 (n=20)	11	18	5	3
3 (n=20)	12	5	20	9
4 (n=20)	2	11	13	11
5 (n=20)	5	1	4	17
6 (n=20)	16	3	20	6
7 (n=20)	1	17	8	12
8 (n=6)	2	4	3	5

WATER 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=14)	12	5	11	6

QA/QC = Quality Assurance/ Quality Control.
n = Number of samples in each group.

APPENDIX D

SITE SAFETY AND HEALTH PLAN

SITE SAFETY AND HEALTH PLAN

ROCKETDYNE - SSFL	
CLIENT:	Rocketdyne
SITE NAME:	SSFL - Off-site sampling
PROJECT/TASK ID#:	03.0600829.002
SITE ADDRESS:	Santa Susana Field Laboratory, Black Canyon Road, Santa Susana, CA
DATE:	October 22, 1993
PLAN EXPIRATION DATE:	January 22, 1993

APPROVALS:

PROJECT MANAGER	Ann Holbrow Name	[signature] Signature	10/21/93 Date
IH REVIEW	Rick Hamaker Name (Certificate #3757)	[signature] Signature	10/21/93 Date
FIELD SUPERVISOR/ SITE SAFETY OFFICER	Eric Smith Name	[signature] Signature	10/21/93 Date
HEALTH AND SAFETY MANAGER	Chris Stavros Name	[signature] Signature	10/21/95 Date

REVIEWS:

SUBCONTRACTOR(S):	Gregg Drilling Name	Signature	Date
	Name	Signature	Date

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SECTIONS

TABLES

ATTACHMENTS

SECTION 1.0

GENERAL INFORMATION

1.1 INTRODUCTION

This Site Safety and Health Plan (SSHP) addresses those activities associated with the scope of work stated in the SSHP and will be implemented by the Site Safety Officer (SSO) during site work. Compliance with this SSHP is required of all persons and third parties who enter this site. Assistance in implementing this plan can be obtained from the Site Safety Officer and Project Manager, and/or the Health and Safety Manager (HSM). The content of this SSHP may change or undergo revision based upon additional information made available to health and safety (H&S) personnel, monitoring results or changes in the scope of work. Any changes proposed must be reviewed by H&S staff and are subject to approval by the HSM and Project Manager.

This SSHP has been written for the use of McLaren/Hart and its employees. It may also be used as a guidance document by properly trained and experienced McLaren/Hart subcontractors. However, McLaren/Hart does not guarantee the health or safety of any person entering this site.

Due to the potentially hazardous nature of this site and the activity occurring thereon, it is not possible to discover, evaluate, and provide protection for all possible hazards which may be encountered. Strict adherence to the health and safety guidelines set forth herein will reduce, but not eliminate, the potential for injury at this site. The health and safety guidelines in this Plan were prepared specifically for this site and should not be used on any other site without prior research by trained health and safety specialists.

McLaren/Hart claims no responsibility for the use of this Plan by unauthorized persons. The Plan is written for the specific site conditions, purpose, dates, and personnel specified and must be amended if these conditions change.

1.2 SITE PERSONNEL

Personnel authorized to enter the subject site while operations are being conducted must be approved by the HSM. Authorization requires confirmation of conformance with Cal/OSHA 8 CCR 5192 (Federal OSHA 29 CFR 1910.120) training and medical examination requirements and/or other applicable regulations and review/sign-off of this SSHP.

See Attachment 1 for Personnel Responsibilities and Qualifications.

	Name	Telephone Number
Field Supervisor/ Site Safety Officer:	Eric Smith	(714) 756-2667
Subcontractor(s):	Gregg Drilling	(310) 427-6899

SECTION 2.0

PROJECT INFORMATION

2.1 SITE DESCRIPTION (include unusual site features; current site status; historical uses)

The off-site sampling locations are located on the Brandeis-Barden Institute and two background sample locations at a 10 mile radius of the Rocketdyne - SSFL facility.

These areas are located in moderate to rugged canyon and mountain terrain. The Brandeis-Barden Institute is used as a children's camp facilitating outdoor recreational activities.

See Attachment 2 for Site Map(s)

2.2 PURPOSE OF SITE WORK

To collect soil and surface water samples for analysis mercury and radionuclides (strontium-90, cesium-137, tritium, and platonium-238) to determine potential off-site contamination of properties adjacent to the Rocketdyne - SSFL facility.

2.3 SCOPE OF WORK (by task in order of execution)

1. Set up sample grids and mark sample locations.
2. Collect soil samples within the sample grid locations.
3. Collect surface water samples.
4. Conduct utility clearance.
5. Drill and sample five soil borings. Decontaminate drilling and sampling equipment. Containerize rinsate in 55-gallon drums.

* Tasks to be performed by subcontractor(s) under McLaren/Hart supervision.

See Attachment 3 for Utility Clearance Check and Utility Location Map (if applicable).

SECTION 3.0

HEALTH AND SAFETY RISK ANALYSIS

3.1 HAZARD ANALYSIS

Non-chemical hazards are associated with:

1. Thorny brush
2. Snakes
3. Rugged terrain
4. Heat and cold exposure
5. Poison Oak
6. Ticks

Chemical hazards are associated with:

1. Mercury
2. Radionuclide

3.2 NON-CHEMICAL HAZARD SUMMARY

See Table 3-1 for summary assessment of non-chemical hazards.

3.3 SITE CONTAMINANT SOURCE(S) AND DATA

See Table 3-2 for list of known/probable contaminants and/or applicable analytical data reports.

3.4 CHEMICAL HAZARD SUMMARY

See Table 3-3 for summary assessment of chemical hazards.

TABLE 3-1

ASSESSMENT OF NON-CHEMICAL HAZARDS

NON-CHEMICAL HAZARD	YES	NO	TASK NO.(S)	NON-CHEMICAL HAZARD	YES	NO	TASK NO.(S)
1. Electrical (overhead lines)	X		5	17. Shoring		X	
2. Electrical (underground lines)	X		5	18. Scaffolding		X	
3. Gas/Water lines	X		5	19. Biologic	X		1-5
4. Coring Equipment				20. Holes/Ditches		X	
5. Drilling Equipment	X		5	21. Steep Grades	X		1-5
6. Excavation Equipment		X		22. Slippery Surfaces	X		1-5
7. Machinery		X		23. Uneven Terrain	X		1-5
8. Heat Exposure	X		1-5	24. Unstable Surfaces		X	
9. Cold Exposure	X		1-5	25. Elevated Surfaces		X	
10. Oxygen Deficiency		X		26. Poor Lighting		X	
11. Confined Spaces		X		27.			
12. Noise		X		28.			
13. Ionizing Radiation	X		1-5	29.			
14. Non-ionizing Radiation		X		30.			
15. Fire		X		31.			
16. Vehicle Traffic		X		32.			

Table 3-2

Known and/or Probable Contaminants*

Contaminant	Source of Contamination	Sample Location	Sample Type	Concentration Range
Radionuclides	Rocketdyne-SSFL facility	Barndeis-Bardin Institute	Soil Water	Cesium-137 (ND-651 pCi/g) Tritium (ND-10,800 pCi/l) Strontium-90 (ND-0.15 pCi/g)
Mercury	Rocketdyne-SSFL facility	Barndeis-Bardin Institute	Soil	Mercury(ND-390 ug/kg)

* Source of data: Results of Environmental Radiation Survey at Brandeis-Bardin Institute.
Date of sampling: May 1991, Results of Multi-Media Sampling Report for the Brandeis-Bardin Institute and Santa Monica Mountains Conservancy: March 1993

TABLE 3-3

ASSESSMENT OF CHEMICAL HAZARDS

TASK NO.(S)	CHEMICAL NAME* (or class)	PEL/TLV*	OTHER PERTINENT LIMITS* (Specify)	POTENTIAL EXPOSURE PATHWAYS	ACUTE HEALTH EFFECTS	CHRONIC HEALTH EFFECTS
1-5	Cesium-137	None cited	1.25 REM/qtr	Inhalation Dermal	Bone marrow destruction anemia, infection, GI disturbances, eye, skin, and respiratory damage; deathly	Cancer; sterility leukemia, diseases of bone marrow
1-5	Strontium-90	None cited	1.25 REM/qtr	Inhalation Dermal	Anemia, infection, GI disturbances	Cancer; Neoplasia of bone; osteosarcoma, fibro sarcomi; leukemia
1-5	Tritium	None cited	1.25 REM/qtr	Inhalation Dermal	Anemio, Infection	Cancer
2	Mercury	0.05mg/m^3	0.1 mg/m^3	Inhalation Skin absorption Skin and/or eye contact	Eye, skin irritation headache, GI disturbances	Tremor, irritability mental disturbances, death

* PEL = OSHA Permissible Exposure Limit; represents the maximum allowable 8-hr. time weighted average (TWA) exposure concentration.
TLV = ACGIH Threshold Limit Value; represents the maximum recommended 8-hr. TWA exposure concentration.
STEL = OSHA Short-term Exposure Limit; represents the maximum allowable 15 minute TWA exposure concentration.
TLV-STEL = ACGIH Short-term Exposure Limit; represents the maximum recommended 15 minute TWA exposure concentration.
C = OSHA Ceiling Limit; represents the maximum exposure concentration above which an employee shall not be exposed during any period without respiratory protection.
IDLH = Immediately Dangerous to Life and Health; represents the concentration at which one could be exposed for 30 minutes without experiencing escape-impairing or irreversible health effects.
( ) = ACGIH TLV Intended Change

SECTION 4.0

HEALTH AND SAFETY FIELD IMPLEMENTATION

4.1 PERSONAL PROTECTIVE EQUIPMENT (PPE) REQUIREMENTS

PPE may be upgraded or downgraded by the site industrial hygienist, HSM, or qualified Site Safety Officer based upon site conditions and air monitoring results. Reference to required PPE will be by EPA Level of Protection (A-D). A summarized description of minimum required PPE by level of protection is indicated below:

LEVEL A - Self-contained breathing apparatus (SCBA) or supplied air respirator (SAR) with escape SCBA; totally-encapsulating suit; chemical-resistant boots and gloves; two-way radio communications; hardhat.

LEVEL B - SCBA or SAR with escape SCBA; chemical-resistant suit; boots; gloves; hardhat.

LEVEL C - Air-purifying respirator (half or full face); chemical-resistant suit; boots; gloves; hardhat.

LEVEL D - Coveralls; chemical-resistant boots; safety glasses; hardhat.

See Table 4-1 for PPE requirements.

Annual qualitative fit-testing is required for all personnel wearing negative pressure respirators. Conduct a positive and negative pressure check whenever donning a respirator. Personnel are not permitted to wear a respirator if they have facial hair that interferes with the sealing surface of the respirator. Contact lenses are not allowed for use with any respirator.

4.2 MONITORING EQUIPMENT REQUIREMENTS

Monitoring is conducted by the Site Safety Officer or designee. Conduct contaminant source monitoring initially. Complete breathing zone monitoring if source concentrations are near or above contaminant action level concentrations. Log direct reading monitoring every 15-30 minutes and record results on Direct Reading Report form. Calibrate monitoring instruments daily or in accordance with manufacturers' specifications. Record calibration data on the Instrument Calibration Log.

See Table 4-2 for monitoring protocols and contaminant action levels.

See Attachment 4 for Direct Reading Report and Instrument Calibration Log.

TABLE 4-1

PERSONAL PROTECTIVE EQUIPMENT (PPE) REQUIREMENTS

TASK NO.(S)	LEVEL OF PROTECTION	LEVEL IF UPGRADE	PPE* SUIT	PPE* GLOVES	PPE* FEET	PPE* HEAD	PPE* EYE	PPE* EAR	PPE* RESPIRATOR	ADDITIONAL PPE* FOR UPGRADE
1-5	D	C	Std. or tyvek	Work or N	Steel	HH**	Glass	Plugs**		Half APR + HEPA

* Personal Protective Equipment (PPE):

SUIT:
Std = Standard work clothes
Tyvek = Uncoated Tyvek disposable coverall
PE Tyvek = Polyethylene-coated Tyvek
Chemrel = Chemrel coverall with hood
Saranex = Saranex-laminated Tyvek
Lt PVC = Light wt. PVC raingear
Med PVC = Medium wt. PVC suit
Hvy PVC = Heavy wt. PVC coverall with hood
Road = Roadwork vest
Nomex = Nomex coveralls

GLOVES:
Work = Work gloves (canvas, leather)
Neo = Neoprene gloves
PVC = PVC gloves
N = Nitrile gloves
V = Vinyl gloves
L = Latex gloves

* Personal Protective Equipment (PPE):

FEET:
Steel = Steel-toe boots
Steel+ = Steel-toe Neoprene or PVC boots
Booties = PVC or Latex booties

HEAD:
HH = Hardhat

EYE:
Glass = Safety glasses
Goggle = Goggles
Shield = Face shield

EAR:
Plugs = Earplugs
Muff = Ear muffs

* Personal Protective Equipment (PPE):

RESPIRATOR:
APR = Air-purifying respirator
Full APR = Full face APR
Half APR = Half face APR
PAPR = Powered Air-purifying Respirator
SAR = Airline supplied air respirator
SCBA = Self contained breathing apparatus
Escape = Escape SCBA
OV = Organic Vapor cartridge
AG = Acid gas cartridge
OV/AG = Organic vapor/Acid gas cartridge
AM = Ammonia cartridge
D/M = Dust/mist pre-filter and cover for cartridge
HEPA = High efficiency particulate air filter cartridge

OTHER:
* = Use if contact with wet soil or water
** = Optional use except if specific hazard present

* Return completed monitoring and safety meeting forms to the Health and Safety Manager.

TABLE 4-2

MONITORING PROTOCOLS AND CONTAMINANT ACTION LEVELS

TASK NO.(S)	CONTAMINANT	MONITORING EQUIPMENT	MONITORING PROTOCOL	BREATHING ZONE ACTION LEVEL CONCENTRATIONS*	
				MONITORED LEVEL FOR MANDATORY RESPIRATOR USE	MONITORED LEVEL FOR MANDATORY WORK STOPPAGES**
2,3,5	Radionuclide	Direct reading radiation monitor (Dosimeter Corp. Model 3500 Super MINI Radiation Monitor)	Periodic during soil and water sampling	1 mREM/hr	>2 mREM/hr
2,3,5	Cesium 137	G-M Meter	Periodic during soil and water sampling	1 mREM/hr	>2 mREM/hr
2,3,5	Strontium 90	G-M Meter with Beta Probe	Periodic during soil and water sampling	1 mREM/hr	>2 mREM/hr
2,3,5	Tritium	Alpha Meter	Periodic during soil and water sampling	1 mREM/hr	>2 mREM/hr
2	Mercury	Arizona Instruments Mercury Vapor Detector	Periodic during soil and water sampling	0.025 mg/m^3	0.05 mg/m^3

* Monitoring performed at operator's breathing zone.
** Call the Health and Safety Manager for consultation.

VOC = Volatile Organic Compound
PID = Photoionization Detector (HNU, TIP, OVM)
FID = Flame Ionization Detector (OVA)
LEL = Lower Explosive Limit; represents the minimum concentration of combustible vapor in air that will ignite, if an ignition source is present (expressed in % by volume).
LEL-O2 = LEL and Oxygen Meter
CT = Colorimetric Gas Detector Tube

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4.3 Site Zones/Delineation

Contamination Reduction Zone: At perimeter of Exclusion Zone.
Support Zone: Outside of Contamination Reduction Zone.

Exclusion Zone:

_____ Areas within barricades, cones and/or caution tape
__x__ Within 40-ft radius of drill rig operations or heavy equipment operations
_____ Within 10-ft radius of hand augering or groundwater monitoring well locations
_____ Other (describe):

4.4 Site Communication

__x__ By telephone (for telephone assignments call 800/733-2667)
_____ By pager (for pager assignments, call (800) 733-2667).)
_____ By other means (describe):

4.5 Heat Stress

Working in hot environments requires employees to take precautions and provide adequate protection to prevent heat stress. Actions may include acclimatization to hot environments, adjustment of work-rest regimens, modifications of workload, alteration of work schedules (night vs. day) etc. The following table provides guidance on working in hot environments.

Condition	Symptoms	Corrective Action(s)
Heat Stroke	▸ Hot, dry, red skin ▸ Mental confusion, nausea ▸ Elevated body temperature ($\geq$ 105°) ▸ Lack of or reduced sweating, pale coloring ▸ Strong, rapid pulse	▸ Medical emergency - call for medical assistance ▸ Move victim to a cool area ▸ Soak victim with cool water ▸ Fan victim vigorously
Heat Exhaustion	▸ Clammy, moist skin ▸ Nausea, giddiness, headache ▸ Heavy sweating ▸ Slightly elevated body temperature ▸ Fainting	▸ Rest in cool place ▸ Consume electrolyte replacement fluids
Heat Cramps	▸ Muscle spasms ▸ Profuse sweating ▸ Pain in abdomen & extremities	▸ Rest in cool place ▸ Consume electrolyte replacement fluids
Heat Rash	▸ Skin rash	▸ Rest in a cool place ▸ Dry sweat off skin continuously ▸ Wear loose-fitting clothing

- A modified work/rest regimen will be initiated when ambient temperatures and protective clothing create a potential heat stress hazard. If ambient temperatures exceed 75° F, the following work/rest regimen is recommended (guidelines assume light to moderate work):

TEMPERATURE	WORK PERIOD	REST PERIOD
75 - 80°F	90 Minutes	15 Minutes
80 - 85°F	60 Minutes	15 Minutes*
85 - 90°F	45 Minutes	15 Minutes*
90 - 95°F	30 Minutes	15 Minutes*

* Rest in a shaded area and consume at least 8 ounces of cool water and/or Gatorade (or equivalent) at each rest break.

SECTION 5.0

SITE OPERATING PROCEDURES

5.1 INITIAL SITE ENTRY PROCEDURES

- Locate nearest available telephone. Indicate location on site map.
- Determine wind direction, establish hotline, and set up decontamination facilities. Note wind direction and location of decontamination facilities on site map.
- Post Emergency Information Confirm/post emergency phone numbers and hospital route.
- Designate at least one vehicle for emergency use.
- If toilet facilities are not located within a 5-minute walk from the decontamination facilities, either provide a chemical toilet and hand washing facilities or have a vehicle available (not the emergency vehicle) for transport to nearby facilities.
- Prior to working on-site, conduct an inspection for physical and chemical hazards.
- Conduct or review utility clearance prior to start of work, if appropriate.
- Note any specialized protocols particular to work tasks associated with the project.

5.2 DAILY OPERATING PROCEDURES

- Hold daily Tailgate Safety Meetings prior to work start.

  (See Attachment 5 for Tailgate Safety Meeting Form.)

- Use monitoring instruments and follow designated protocol and contaminant action levels.
- Use personal protective equipment (PPE) as specified.
- Use hearing protection if noise levels exceed 85 dbA.
- Remain upwind of operations and airborne contaminants, if possible.
- Establish a work/rest regime when ambient temperatures and protective clothing create a potential heat stress hazard.
- Do not carry cigarettes, gum, etc. into contaminated areas.
- Refer to Site Safety Officer (SSO) for specific safety concerns for each individual site task.
- **ALWAYS EMPLOY THE BUDDY SYSTEM.**
- Be alert to your own physical condition. Watch buddy for signs of fatigue, exposure, etc.
- All accidents, no matter how minor, must be reported immediately to the SSO.

5.3 Decontamination (Decon) Procedures (Personnel and Equipment)

- Personnel decontamination procedures will be required when Level C or higher levels of protection are used by personnel.

  See Attachment 6 for equipment needed to perform decontamination and procedures to be used for decontamination of personnel.

- Wipe clean sample containers prior to packaging.
- Brush clean sampling equipment and rinse with distilled water or other cleaning solution.
- Wipe clean monitoring equipment.
- Brush clean and/or pressure-wash heavy equipment if heavily contaminated.
- Steam clean drilling augers after use.
- Wash hand augers in TSP solution and rinse in distilled water.
- Perform decontamination in a manner that minimizes waste generation.
- Set up containment systems as necessary for collection of decon solutions.
- Containerize spent decontamination solutions in drums or portable tanks and dispose of as waste, if applicable.
- Do not walk through areas of obvious or known contamination and do not handle or touch contaminated materials directly.
- Make sure all PPE have no cuts, tears, or other damage prior to donning.
- Fasten all closures on suits and secure with tape if necessary.
- Limit the extent of equipment contact with contamination if possible (e.g. on backhoes, limit contact to the arm and bucket).

5.4 Additional Health and Safety Protocols

- Maintain Material Safety Data Sheets (MSDSs) for chemicals used during project operations on-site with SSO.
- For confined space entry operations follow all requirements of McLaren/Hart Policy and Procedure HS 14.0.
- Implement applicable aspects of the McLaren/Hart Injury and Illness Prevention Program (IIPP) during field operations.

SECTION 6.0

EMERGENCY RESPONSE PLAN

6.1 EMERGENCY INCIDENT PROCEDURES

If an emergency incident occurs, take the following action:

Step 1: Notify the Site Safety Officer and Field Supervisor and size-up situation based on available information.

Step 2: As necessary, request assistance from outside sources and/or allocate personnel and equipment resources for response.

Step 3: Survey and assess existing and potential hazards.

Step 4: As appropriate, evacuate site personnel and nearby public and contain hazard.

Step 5: Prepare incident report.

6.2 EMERGENCY INJURY PROCEDURES

If an injury occurs, take the following action:

Step 1: Get medical attention for the injured person immediately.

Step 2: Notify the Site Safety Officer and Field Supervisor.

Step 3: Depending on the type and severity of the injury, notify the Regional Occupational Physician.

Step 4: Notify the injured person's Human Resources office.

Step 5: Prepare the incident report. The Site Safety Officer is responsible for its preparation and submittal to the Health and Safety Manager (HSM) and Corporate Human Resources office within 24 hours.

Step 6: The Site Safety Officer will assume charge during a medical emergency.

To Be Posted

Title	Name	Telephone Number
Police Department	Police	911
Fire Department	Fire Department	911
Local Hospital	Simi Valley Hospital and Health Care	(805) 527-2462
Local Ambulance/Rescue	Paramedics	911
Health and Safety Manager	Chris Stavros	(800) 733-2667 or (714) 756-2667
Regional Occupational Physician	Greaney Medical	(714) 533-2211
Client Contact	Arlene Giliberto	(818) 586-5831
Site Contact	Arlene Giliberto	(818) 586-5831
Project Manager	Ann Holbrow	(800) 733-2667 or (714) 756-2667
Site Safety Officer	Eric Smith	(800) 733-2667 or (714) 756-2667
Subcontractors:	Gregg Drilling	(310) 427-6899
Corporate Human Resources	M. L. Hollingsworth	(800) 366-3696 or (916) 638-3696

6.4 Hospital Name/Address/Route:

Name: *Simi Valley Hospital and Health Care* Telephone: *(805) 527-2462*

Address: *2975 North Sycamore Drive, Simi Valley, California 93062*

Route: *From Brandeis site: Topo Canyon Road (north); left onto Los Angeles Avenue; right onto Sycamore Drive; head north to the hospital. From SSFL: North on Black Canyon Road; left onto Katherine Road; left onto Kuchner Drive; left onto Los Angeles Avenue; right onto Sycamore Drive; head north to hospital.*

See hospital route map on following page (to be posted).

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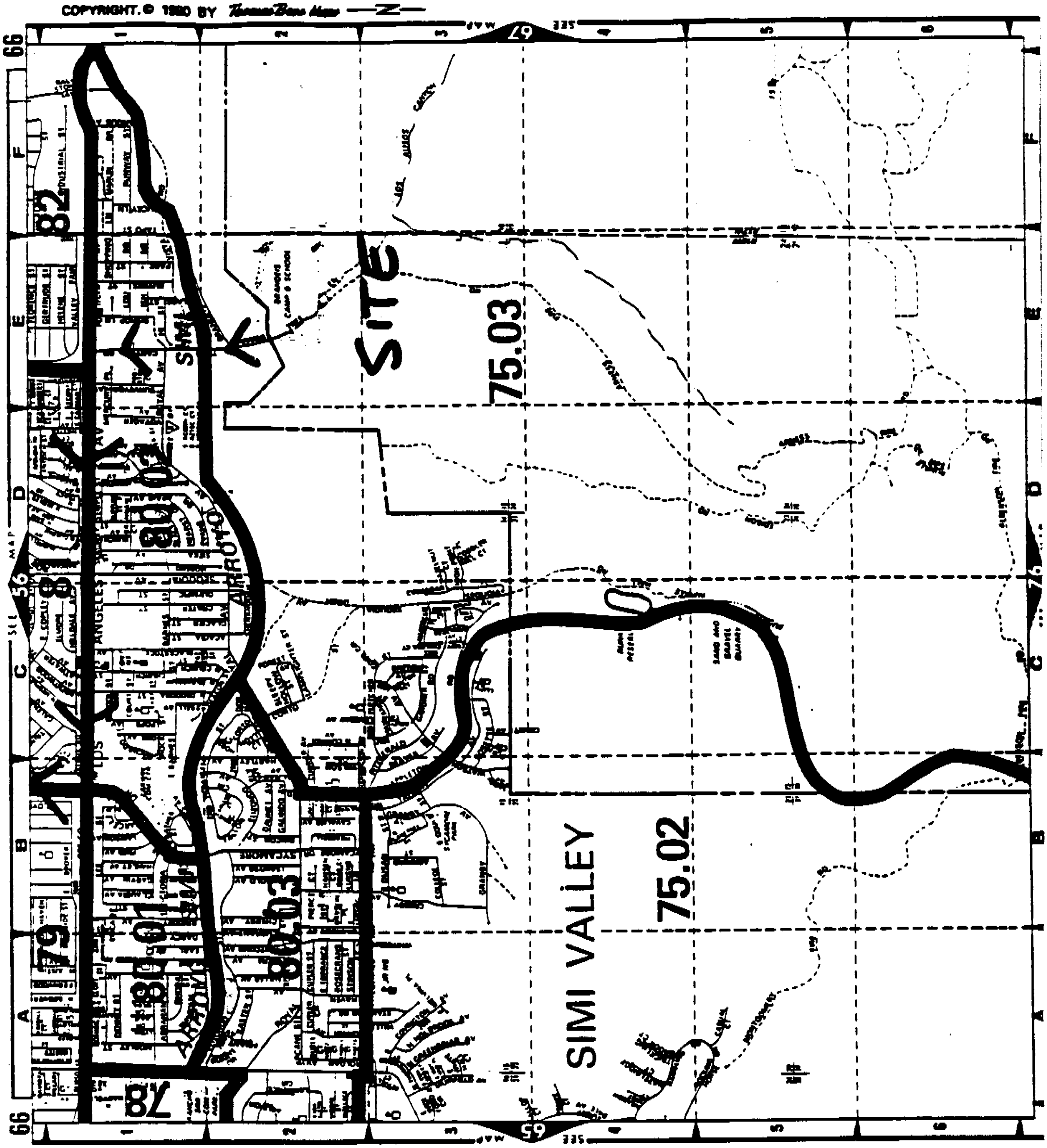

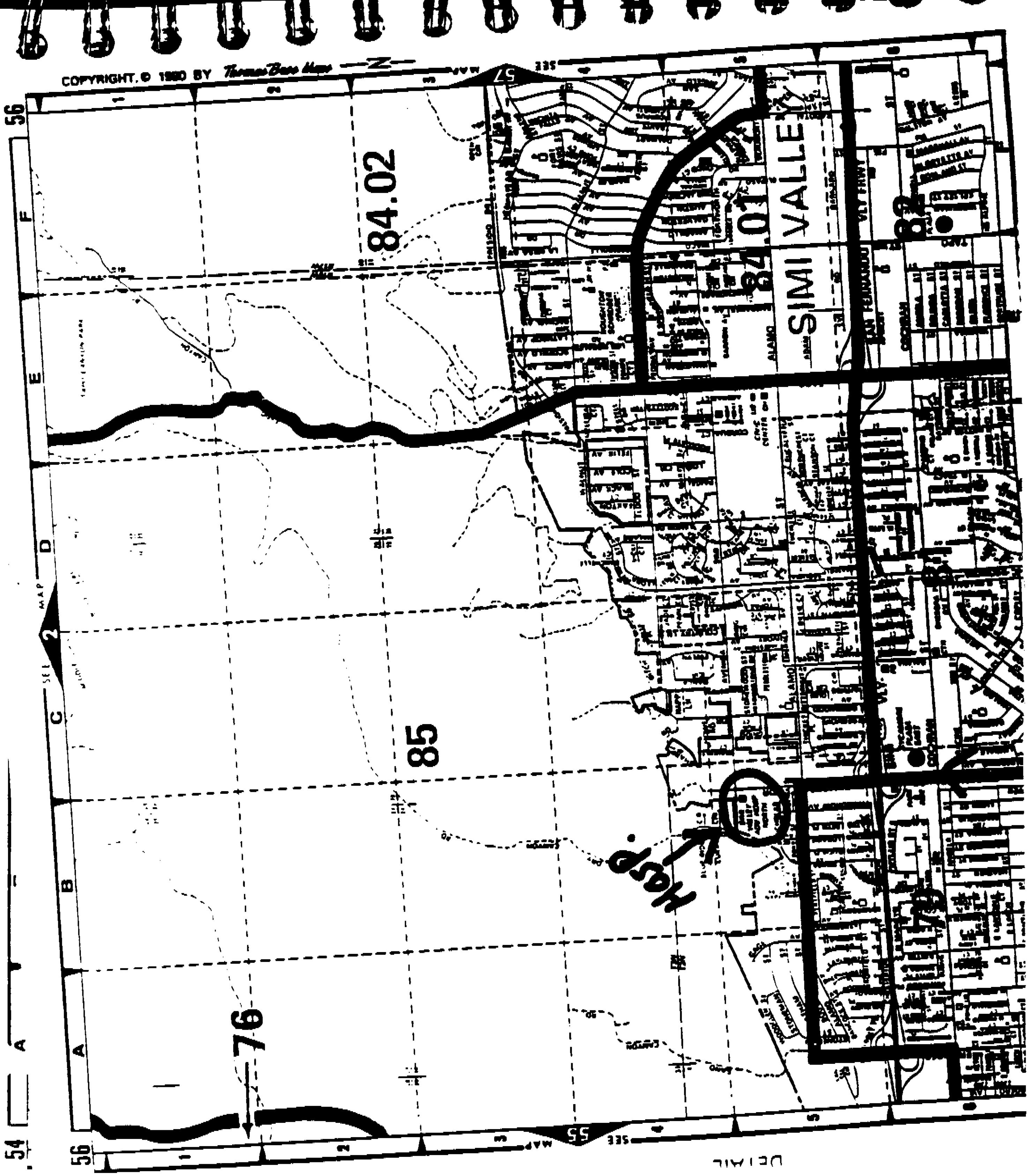

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84.02
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SIMI VALLEY
85
76
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79
Hosp.
SEE MAP 57
SEE MAP 55
SEE MAP 2
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ATTACHMENT 1

PERSONNEL RESPONSIBILITIES AND QUALIFICATIONS

PERSONNEL RESPONSIBILITIES AND QUALIFICATIONS

TITLE	GENERAL DESCRIPTION	SPECIFIC RESPONSIBILITIES	REQUIRED TRAINING AND MEDICAL SURVEILLANCE
Project Manager	▸ Reports to upper-level management. ▸ Has authority to direct response operations. ▸ Assumes total control over site activities.	▸ Prepares and organizes the background review of the job at hand, the Work Plan, the Site Safety and Health Plan, and the field team. ▸ Obtains permission for site access and coordinates activities with appropriate officials. ▸ Ensures that the work plan is completed and on schedule. ▸ Briefs the field teams on their specific assignments. ▸ Uses the Site Safety Officer to ensure that the safety and health requirements are met. ▸ Prepares the final report and support files on the response activities. ▸ Serves as the liaison with public officials.	▸ 40-hour Hazardous Waste Training including 8-hour update (8 CCR 5192/29 CFR 1910.120). ▸ 8-hour Supervisor Hazardous Waste Training (8 CCR 5192/29 CFR 1910.120). ▸ Respirator use training (if on-site work) ▸ Medical surveillance participant (if on-site work)
Site Safety Officer/Alternate Site Safety Officer	▸ Advises the Field Supervisor on all aspects of health and safety on-site. ▸ Recommends stopping work if any operations threaten worker or public health or safety.	▸ Coordinates safety and health program activities. ▸ Conducts Tailgate Safety Meetings and completes all documentation forms required by the Site Safety and Health Plan. ▸ Monitors site personnel for signs of stress, such as cold exposure, heat stress and fatigue. ▸ Monitors on-site hazards and conditions. ▸ Participates in preparation of and implements the Site Safety and Health Plan. ▸ Ensures that protective clothing and equipment are properly stored and maintained. ▸ Knows emergency procedures, evacuation routes, and the telephone numbers of the ambulance, local hospital, and fire department. ▸ Notifies, when necessary, local public emergency officials. ▸ Coordinates emergency medical care.	▸ 40-hour Hazardous Waste Training including 8-hour update (8 CCR 5192/29 CFR 1910.120). ▸ Respirator use training. ▸ Medical surveillance participant.

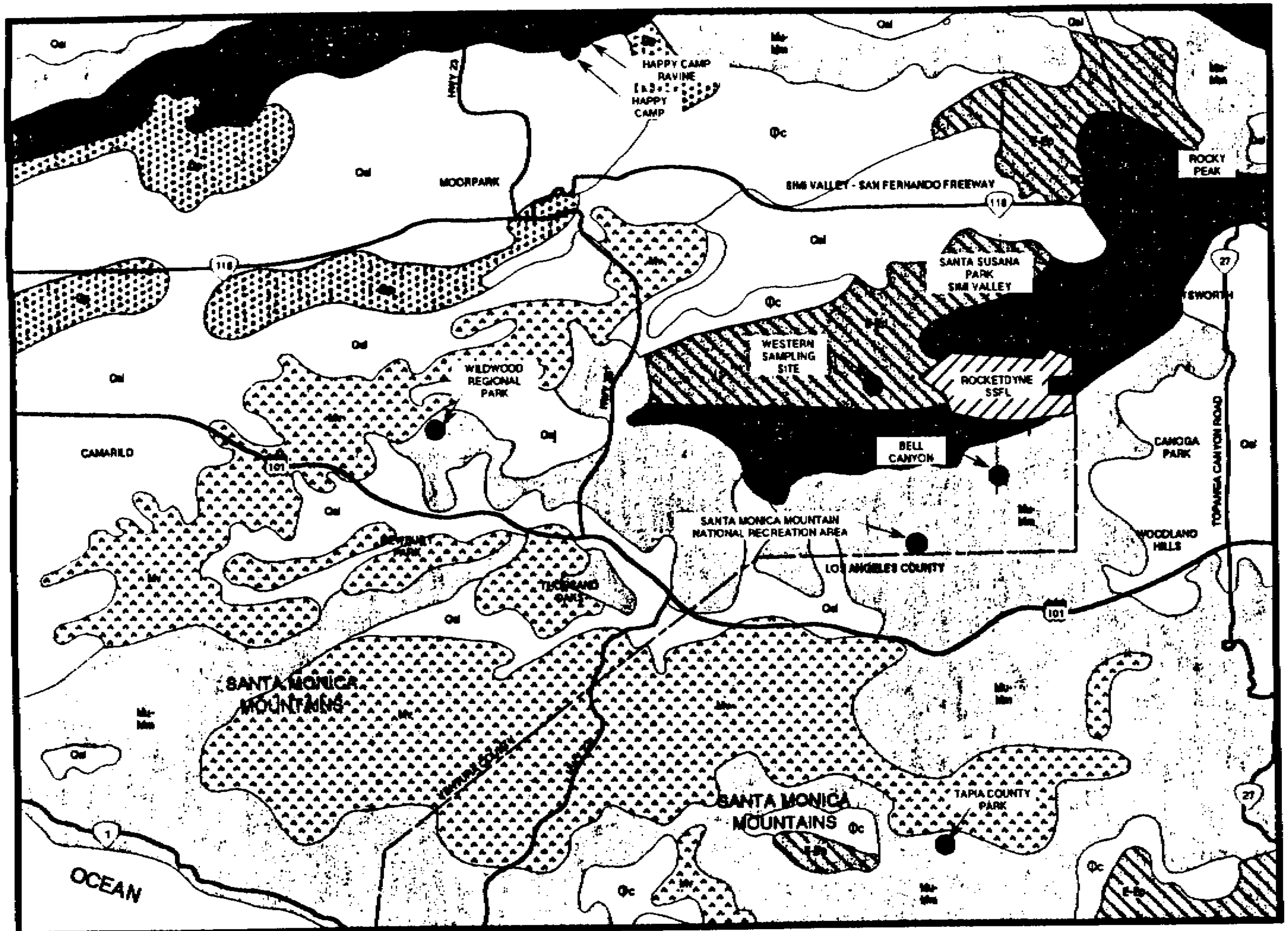
TITLE	GENERAL DESCRIPTION	SPECIFIC RESPONSIBILITIES	REQUIRED TRAINING AND MEDICAL SURVEILLANCE
Field Supervisor	▸ Responsible for field team operations and safety. ▸ Reports to Project Manager.	▸ Manages field operations. ▸ Executes the Work Plan and schedule. ▸ Enforces safety procedures. ▸ Coordinates with the Site Safety Officer in determining protection level. ▸ Enforces site control. ▸ Documents field activities and sample collection. ▸ Serves as liaison with public officials.	▸ 40-hour Hazardous Waste Training including 8-hour update (8 CCR 5192/29 CFR 1910.120). ▸ Respirator use training. ▸ Medical surveillance participant.
Team Members	▸ Reports to Field Supervisor. ▸ Contains at least two people. ▸ For drilling purposes, Team Members consist of a geologist, drilling foreman, and helpers.	▸ Safely completes the on-site tasks required to fulfill the Work Plan. ▸ Complies with the Site Safety and Health Plan. ▸ Notifies the Site Safety Officer or Field Supervisor of unsafe conditions.	▸ 40-hour Hazardous Waste Training including 8-hour update (8 CCR 5192/29 CFR 1910.120). ▸ Respirator use training. ▸ Medical surveillance participant.

ATTACHMENT 2

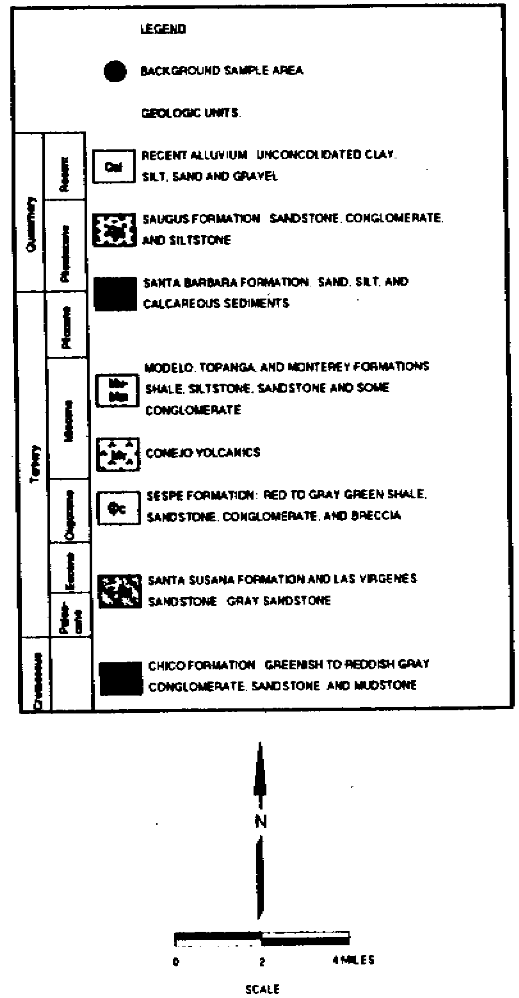
SITE MAP(S)

PREVIOUS AND ADDITIONAL BACKGROUND SAMPLE AREAS OVERLAID ON A GEOLOGIC MAP

GEOLOGIC MAP OF BACKGROUND AREAS



MODIFIED FROM GEOLOGIC MAP OF CALIFORNIA, LOS ANGELES SHEET, 1974



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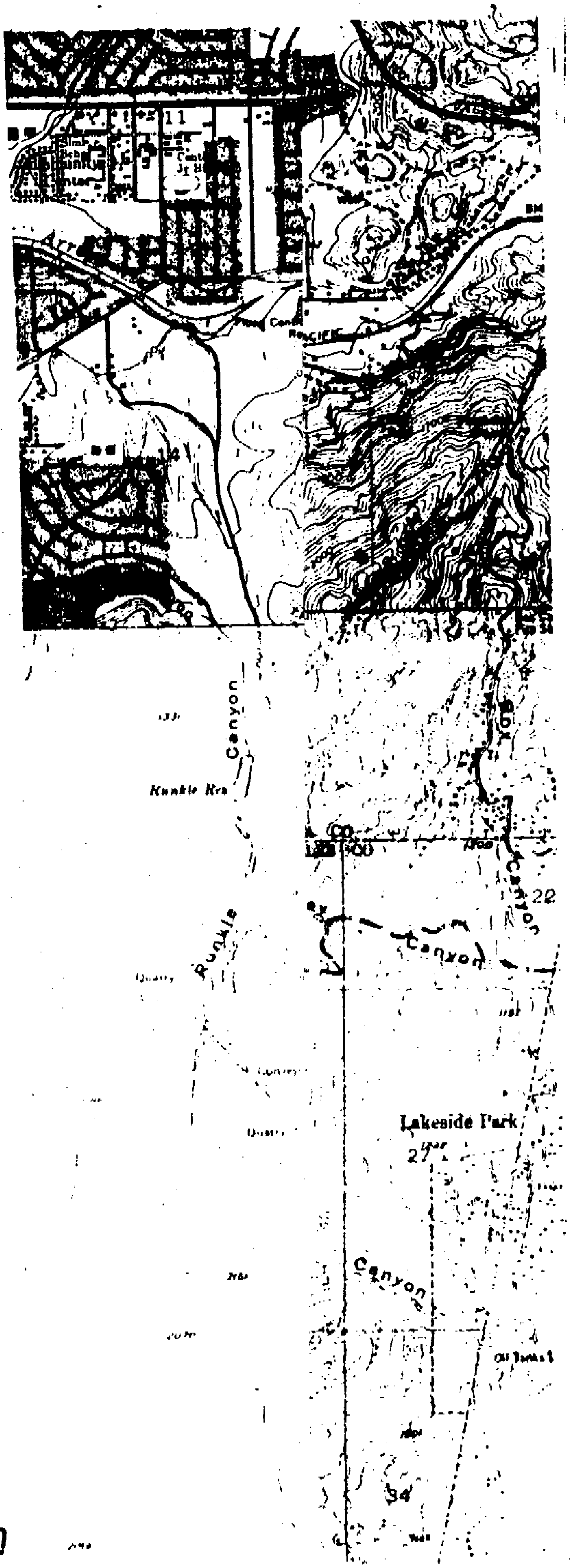
ADDITIONAL SAMPLE AREAS
BRANDEIS-BARDIN INSTITUTE AND
SANTA MONICA MOUNTAINS
CONSERVANCY



LEGEND

● SOIL SAMPLE

N

0 2,350'

SCALE

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ATTACHMENT 3

DIRECT READING REPORT AND

INSTRUMENT CALIBRATION LOG

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ENVIRONMENTAL ENGINEERING CORPORATION

RADIATION INSTRUMENT CALIBRATION LOG

Client Name and Site:	Project Manager:	Task Number:

Calibration Event:

Person Calibrating:	Date:	Time:
Instrument Type:	Model/Serial Number	
Battery Check Results:	Last Calibration Date:	
Source Type:	Source Reading:	
Comments:		
Person Calibrating:	Date:	Time:
Instrument Type:	Model/Serial Number:	
Battery Check Results:	Last Calibration Date:	
Source Type:	Source Reading:	
Comments:		
Person Calibrating:	Date:	Time:
Instrument Type:	Model/Serial Number:	
Battery Check Results:	Last Calibration Date:	
Source Reading:		
Comments:		
Person Calibrating:	Date:	Time:
Instrument Type:	Model/Serial Number:	
Battery Check:	Last Calibration Date:	
Source Type:	Source Reading:	
Comments:		

Comments:

ATTACHMENT 4

TAILGATE SAFETY MEETING FORM

McLaren Hart
ENVIRONMENTAL ENGINEERING CORPORATION

TAILGATE SAFETY MEETING

DATE________________ TIME________ PROJECT NO.________________

SITE LOCATION________________________________

____

TYPE OF TRAINING

________ **Technical Transfer/H&S Meeting** ________ **Tailgate Safety Meeting**

________ **HASP Reading/Review** ________ **Other:**________________

TRAINING PRESENTED BY:________________________________

TOPICS COVERED:________________________________

ATTENDEES

NAME PRINT	SIGNATURE

SITE SUPERVISOR:________________________ **DATE:**____________

(Copy to Health and Safety Manager and project file.)

H&S Manager Review________________ Date________

ATTACHMENT 5

DECONTAMINATION EQUIPMENT AND

PERSONNEL DECONTAMINATION PROCEDURES

DECONTAMINATION EQUIPMENT

___ Sheet Plastic (Visqueen)

___ Box Cutter

___ Caution Tape

___ Barricades

___ Cones

___ Duct Tape

___ Tubs (equipment drop station; wash station; rinse station)

___ Water

___ Decon Solution (TSP; Alconox)

___ Hudson Sprayer or equivalent

___ Water hose and nozzle

___ Scrub Brushes, long handle (wash station; rinse station)

___ Trash cans or drums

___ Plastic Liners

___ Bench, Stools, or Chairs

___ Soap

___ Drum; closed-top (for decon rinsate)

___ Hand pump, disposable

___ Rags

___ Towels

___ Buckets

LEVEL C PERSONNEL DECONTAMINATION

Station 1:	Equipment Drop	1.	Deposit equipment used on-site (tools, sampling devices and containers, monitoring instruments, radios, clipboards, etc.) on sheet plastic. Segregation at the drop reduces the probability of cross contamination. During hot weather operations, cool down station may be set up within this area.
Station 2:	Outer Garment, Boots, and Gloves Wash and Rinse	2.	Scrub outer boots, outer gloves and chemical-resistant splash suit with decon solution or detergent water. Rinse off using copious amounts of water.
Station 3:	Outer Boot and Glove Removal	3.	Remove outer boots and gloves. Deposit in container with plastic liner.
Station 4:	Respirator Cartridge or Mask Change	4.	If worker leaves Exclusion Zone to change respirator cartridge (or mask) this is the last step in the decontamination procedure. Worker's respirator cartridge is exchanged, new outer gloves and boot covers donned, joints taped, and worker returns to duty.
Station 5:	Boot, Gloves, and Outer Garment Removal	5.	Remove boots, chemical-resistant splash suit, and outer gloves and deposit in separate container with plastic liner.
Station 6:	Respirator Facepiece	6.	Remove respirator facepiece. Avoid touching face with fingers. Deposit respirator facepiece on plastic sheet.
Station 7:	Field Wash	7.	Thoroughly wash hands and face. Shower as required. Remove inner gloves and deposit in container with plastic liner.

LEVEL B PERSONNEL DECONTAMINATION

Station 1:	Equipment Drop	1.	Deposit equipment used on-site (tools, sampling devices and containers, monitoring instruments, radios, clipboards, etc.) on sheet plastic. Segregation at the drop reduces the probability of cross contamination. During hot weather operations, cool down station may be set up within this area.
Station 2:	Outer Garment, Boots, and Gloves; Wash and Rinse	2.	Scrub outer boots, outer gloves and chemical-resistant splash suit with decon solution or detergent water. Rinse off using copious amounts of water.
Station 3:	Outer Boot and Glove Removal	3.	Remove outer boots and gloves. Deposit in container with plastic liner.
Station 4:	SCBA Cylinder Change	4.	If worker leaves Exclusion Zone to change SCBA cylinder, this is the last step in the decontamination procedure. Worker's SCBA cylinder is exchanged, new outer gloves and boot covers donned, joints taped, and worker returns to duty.
Station 5:	Boot, Gloves, and Outer Garment Removal	5.	Remove boots, chemical-resistant splash suit, and outer gloves and deposit in container with plastic liner.
Station 6:	SCBA Removal	6.	Remove SCBA backpack and facepiece. Avoid touching face with fingers. Deposit SCBA on plastic sheet.
Station 7:	Field Wash	7.	Remove inner gloves and deposit in container with plastic liner. Thoroughly wash hands and face. Shower as required.

APPENDIX E

TRITIUM ANALYSIS METHOD

TELEDYNE
ISOTOPES

PRO-052-35

DETERMINATION OF TRITIUM IN WATER BY LIQUID SCINTILLATION

1.0 INTRODUCTION

This procedure describes the method for measuring tritium in water by liquid scintillation without chemical separation.

2.0 DETECTION CAPABILITY

Tritium activity in water samples is determined by liquid scintillation counting of beta activity in the nominal energy range of 0 to 18 KeV. The detection limit is 200 pCi/liter when 10 milliliters of sample are used. This is based on nominal values of 4 counts per minute for the detector background, 0.20 for the detector efficiency, and 100 minutes for the counting interval.

Other standard sample aliquots and counting intervals may be used depending on customer requirements. For each aliquot size, a quench curve must have been established and the efficiency of the instrument must have been determined.

In certain cases an aliquot of the water sample may be distilled prior to liquid scintillation counting. The decision to distill is based on customer requirements or on the observation of significant quenching in an undistilled aliquot. A quench correction is performed, automatically by the instrument, for all samples.

Issue or Revision	Pages	Prepared By	Effective Date	Approved by Vice President Technical	Approved by Manager Quality Assurance
Reissue	5		10/01/93		
		M. Burdel		J. D. Martin	J. M. Guenther

3.0 SAMPLE SELECTION PROCEDURE

(a) Using the Sample Receipt Form with the Teledyne Isotopes (TI) sample identification number, locate the sample or the sample group in the Sample Receiving and Storage Area.

(b) Label a 25 ml vial with the TI identification, customer name, and the volume of sample used. Record the date of sample preparation on the calculation worksheet.

4.0 SAMPLE PREPARATION PROCEDURES

(a) Aliquot the appropriate volume of sample into the liquid scintillation vial and add the appropriate volume of liquid scintillation "cocktail". The "cocktail" may be a pre-mixed solution or prepared by the laboratory. Cocktails shall be prepared in accordance with manufacturers instructions.

(b) Shake the vial and load it into the liquid scintillation counter approximately one hour prior to counting.

5.0 CHEMICAL SEPARATION AND PURIFICATION PROCEDURES

(a) If the counting of the sample indicates that no other radioactive isotopes are present by comparing the counts in the tritium energy region with the counts in the higher energy region or by reviewing the degree of quenching, no chemical separation or purification is necessary.

(b) If there appear to be other radionuclides or impurities present or if desired, the sample is distilled using a conventional steam distillation apparatus.

6.0 COUNTING AND CALCULATING ACTIVITY

(a) The sample is inserted into a liquid scintillation counter and counted typically for a minimum of 100 minutes.

(b) Sample activity and the 2 sigma counting error are calculated as follows:

$$\frac{pCi}{\text{unit volume}} = \frac{\frac{N}{\Delta t} - \beta}{(2.22)(v)(\varepsilon)} \pm \frac{2\sqrt{\frac{\frac{N}{\Delta t} + \beta}{\Delta t}}}{(2.22)(v)(\varepsilon)}$$

where: N = total counts from sample (counts)
t = counting time for sample (min)
β = background rate of counter (cpm)
v = sample volume
ε = detector efficiency

(c) Establishing and reporting activities that are equal to or less than the detection limit:

$$\text{net activity} = \frac{\frac{N}{\Delta t} - \beta}{(2.22)(v)(\varepsilon)}$$

If the net activity is equal to or is less than a designated multiple of the background counting error, the activity is below the limits of detection and is called "less than" (L.T.) or "minimum detectable level" (MDL).

The L.T. value can be specified by stating only the counting error at a predetermined multiple (σ_m) of the one sigma statistics. A sigma multiple (sm) of 4.66 is used for calculation of the L.T. values unless the customer requests another value such as 2.83. Therefore the less than value is given by

$$\text{L.T.} = \frac{\sigma_m\sqrt{\frac{\beta}{\Delta t}}}{(2.22)(v)(\varepsilon)}$$

7.0 EFFICIENCY AND BACKGROUND OF LIQUID SCINTILLATION SPECTROMETER

(a) The efficiency is determined at least once a year by establishing a Quench Curve. To determine the Quench Curve, prepare ten vials for each "Cocktail" and sample aliquot to be used.

(b) <u>One Milliliter Aliquots</u>

Using ten clean plastic vials add 20 ml of "Cocktail", 1.0 ml of H-3 standard and shake well. Add the number of drops of carbon tetrachloiride to the vials as shown in Section 7.0 (d).

(c) <u>Ten Milliliter Aliquots</u>

Using ten clean plastic vials add 10 ml of "Cocktail", 1.0 ml of H-3 standard, 9.0 ml of distilled water and shake well. Add the number of drops of carbon tetrachloride to the vials as shown in Section 7.0 (d)

(d) Use the following information to determine the number of drops of CCl_4.

Vial #	Number of Drops of CCl_4
1	0 (unquenched)
2	2
3	3
4	6
5	9
6	13
7	16
8	19
9	21
10	24

Before analyzing the standards wait approximately one hour. For counting instructions see Packard Handbook.

(e) Sealed H-3 and C-14 check sources should be counted every other business day and a Control Chart should be maintained to see that the efficiency remains within the 3 Sigma control limits. A

Background (no tritium present) water sample should be counted every other day.

(f) The laboratory manager or designee will interpret check source control charts. Five percent of the plotted values are expected to fall outside the $\pm 2\sigma$ precision band based on statistics alone. If a check source falls outside the $\pm 3\sigma$ precision band, another reading of the check source should be made. If the second reading also falls outside the $\pm 3\sigma$ band, the counter is judged to be out of control.

(g) A counter control chart may show trends without being out of control by the above criteria. The laboratory manager or a qualified designee shall interpret these trends and take corrective action according to their judgment. It is good practice to investigate trends which approach a 2 sigma control line. The instrument maintenance log should be used to document the occurrence and interpretation of trends, and any corrective action taken.

(h) When a counter is out of control, the laboratory manager or the person he designates will examine the check source for defects. Re-calibration of the counter may be necessary. New calibrations should be compared to previous calibrations to identify major changes in counter operations. Corrective action must be documented in the maintenance log for that instrument.

(i) When a counter is out of control for a given analysis, it may not be used for that analysis. A label must be placed on the instrument indicating its status.

TELEDYNE ISOTOPES

PRO-052-57

EXTRACTION OF WATER FROM MILK, SOIL AND VEGETATION IN ORDER TO PERFORM A TRITIUM ANALYSIS

1.0 INTRODUCTION

This procedure describes the method of extracting water from milk, soil and vegetation in order to perform an analysis for tritium content.

2.0 SAMPLE SELECTION PROCEDURE

Use the sample receipt form with the Teledyne Isotopes identification number to locate the sample in the Sample Receiving and Storage Area.

3.0 REMOVAL OF WATER FROM SOIL

(a) Transfer the sample into a suitable flask or container having a connection for a vacuum trap.

(b) For soil use approximately 200 grams of sample. Weigh the sample before removing any water. After removing the water necessary to perform the tritium analysis, dry the sample completely and weigh again so that tritium result may be calculated as pCi/gram, dry or pCi/gm, wet of sample. For milk use approximately 50 ml of sample and for vegetation use approximately 40-50 grams. Vegetation is calculated as pCi/gram wet.

(c) Connect the tube to a standard vacuum trap which in turn is connected to a mechanical pump.

Issue or Revision	Pages	Prepared By	Effective Date	Approved by Vice President Technical	Approved by Manager Quality Assurance
Reissue	2		09/07/93		

J. Buckley   D. Martin   J. Guenther

TELEDYNE ISOTOPES

(d) Turn on the mechanical pump and wait approximately one minute (until pump stops "gurgling"). Then immerse the vacuum trap in a dewar of liquid nitrogen.

(e) In approximately six hours the water will be transferred from the sample to the vacuum trap.

(f) Upon completion of transfer, turn off the pump, isolate the vacuum trap from the rest of the system and remove the liquid nitrogen dewar.

(g) After the ice thaws from the vacuum trap, transfer the water to a 25 cc plastic vial. Ten to twelve milliliters of water is sufficient for the analysis.

(h) The procedure is now complete. The usual purpose of this procedure is to extract water from a medium for tritium analysis. If this is the purpose for a specific set of samples, then proceed with PRO-052-2, Determination of Tritium in Water by Gas Counting or PRO-052-35, Determination of Tritium in Water by Liquid Scintillation, depending on the sensitivity required.

(i) Addendum: Utility company desiccants are gently heated during the extraction procedure.

APPENDIX F
COMMENTS TO
DRAFT WORKPLAN

APPENDIX F

COMMENTS TO THE DRAFT WORKPLAN

COMMENTS FROM
GREGG D. DEMPSEY
CHIEF, FIELD STUDIES BRANCH
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
LAS VEGAS, NV

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF RADIATION AND INDOOR AIR - LAS VEGAS
P.O. BOX 98517
LAS VEGAS, NEVADA 89193-8517
(702) 798-2476 FAX (702) 798-2465

AUG 27 1993

AUG 1993
RECEIVED

Arlene A. Giliberto, Ph.D.
Environmental Toxicologist/Epidemiologist
Rocketdyne Division
Rockwell International Corporation
6633 Canoga Avenue
P.O. Box 7922
Canoga Park, CA 91309-7922

Subject: Draft Workplan for Additional Soil and Water Sampling at the Brandeis-Bardin Institute and the Santa Monica Mountains Conservancy

Dear Dr. Giliberto:

We have reviewed the draft of the subject sampling plan for Brandeis-Bardin and the Conservancy. I had asked for an extension to provide comments from both this office and our contractor. Unfortunately, due to internal delays, the contract is not yet in place, so the comments on the plan reflected in this letter do not include input from the EPA contractor, Sanford Cohen & Associates. This document was reviewed in light of the first study workplan, subsequent sampling and data which followed, and in light of suggestions made formally by this office for this follow-up study.

In the Introduction, Section 1.1, under Background, page 1-2, I note that the text states that 75 naturally occurring and man-made radionuclides were analyzed by gamma spectroscopy. Unlike the other analytes, data was not provided in a tabular form for any gamma emitter other than Cs-137. This could be misleading for a reader and should be explained in another way.

On page 1-7, under the objective of the sampling, the computer program "SitePlanner" is introduced. Although a good explanation of what the model does is provided, I would like a demonstration or somehow be able to comment on its suitability and usefulness to this study. I would also like to see any reviews done by environmental journals, magazines, Rockwell, or by the government.

I am concerned that the new background locations will indeed

08761RC

be representative of the study area. Can the revised draft indicate something about the geology of the areas that would suggest that they are of the same rock type, vegetation type and precipitation?

After reading the objectives of this additional sampling that concludes on page 1-12, I could not find a reference to indicate that samples will be taken at specific locations in the ravines if the scientists want them. This so-called "purposeful" sampling was used in the first round and produced the data which lead us to a second round. I would ask that up to 5 additional samples per ravine be collected by this method.

In Section 2.0, under 2.0 Data Review and Modeling, and in 2.2 Modeling, the SitePlanner model is again cited. I cannot comment on the adequacy of this model without evaluating it in some fashion. Rocketdyne should be cautioned that it is possible that the SitePlanner's three dimensional information may indicate a study beyond the scope of this project and well beyond what Rocketdyne intends.

In Section 3.1.1, Sampling Areas, the text indicates that italics designate areas where samples will be collected only for the analysis of tritium. Somewhere in the text, it should be agreed that everyone (Rocketdyne, BBI, CADHS, and EPA) use precisely the same analytical methodology to preserve intercomparibility. I know we do not have agreement on methodology at the present time.

In Section 3.2.1, under Soil, page 3-5, I realize that one cannot get a representative sample at the same location sampled earlier because the site is disturbed. I would surmise therefore, that the designation "south" was an attempt to provide consistency for all sampling locations. It would be preferable to have the samples collected towards runoff or towards SSFL as applicable. I realize that it may not make a lot of difference overall, but it can bias the sample towards more representativeness, and the way proposed biases the sample in ways different for each sample.

"Random" sampling, mentioned as a comment in study objectives, is not mentioned here. Soil in the ravines is not deposited randomly, and therefore, radiation may not be randomly deposited. In the first round we collected "purposeful" samples that were chosen at the discretion of the scientists in the field. I think it is important that we be allowed to collect samples of this type in addition to any samples collected through this random grid. I would suggest that we have up to 5 additional samples per ravine added at the discretion of field sampling scientists. I would also ask that Rocketdyne invite the SSFL Workgroup (particularly Mr. Hirsch) to participate on the days that the ravine samples are collected.

In Table 2, page 4-8, the table shows that a glass jar will

Rocketdyne about this concern.

Joel also mentioned sampling moss in the ravines. I am not in favor of this at this time. We would have difficulty comparing any data gathered to background, since we would need a wider range of sample locations to make a statement about any analytical results obtained.

Please call me at (702) 798-2461 if you have any questions about any of these comments.

Sincerely,

Gregg D. Dempsey, Chief
Field Studies Branch

cc: Arnold Robbins, Region 9 (H-4-1)
Joel Cehn for BBI
Dan Hirsch, CBG
Steve Dean, Region 9 (A-1-1)
Penny McLay, CADHS
Yasmine Khonsary, ORIA/LV

COMMENTS FROM
JACK MCGURK
CHIEF, ENVIRONMENTAL MANAGEMENT BRANCH
STATE OF CALIFORNIA - HEALTH AND WELFARE AGENCY
DEPARTMENT OF HEALTH SERVICES
SACRAMENTO, CA

STATE OF CALIFORNIA—HEALTH AND WELFARE AGENCY

PETE WILSON, Governor

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RAMENTO, CA 94234-7320
16) 445-0498

AUG 1993
RECEIVED

August 25, 1993

Arlene A. Giliberto, Ph.D.
Environmental Toxicologist/Epidemiologist
Rocketdyne Division
Rockwell International Corporation
6633 Canoga Avenue
P.O. Box 7922, Mail Code T486
Canoga Park, CA 91309-7922

Dear Dr. Giliberto:

Thank you for providing the Department of Health Services with the opportunity to review the **Workplan for Additional Soil and Water Sampling at the Brandeis-Bardin Institute and the Santa Monica Mountains Conservancy.** We do not have any comments at this time.

We would like to participate in this sampling project by collecting a limited number of split samples and be involved in any meetings to discuss sampling strategy.

If you have any questions, feel free to contact me at (916) 323-1167, or Donna Sutherland of my staff at (916) 323-2758.

Sincerely,

Jack McGurk

Jack McGurk, Chief
Environmental Management Branch

cc: SSFL Workgroup Members
Ed Ballard
Robert LeChevalier
G.G. Gaylord

08759 RC

COMMENTS FROM
JOEL I. CEHN
CERTIFIED HEALTH PHYSICIST
OAKLAND, CA

SEP- 2-93 THU 9:05 J.I. CEHN 510-268-1571

JOEL I. CEHN
CERTIFIED HEALTH PHYSICIST
1036 HUBERT ROAD
OAKLAND, CA 94610

(510) 268-1571

August 31, 1993

Mr. Niel Mukherjee
Rockwell/Rocketdyne
Canoga Park, CA 91309
via FAX

re: McLaren/Hart report, "Workplan for Additional Soil & Water Sampling..." July 7, 1993.

Dear Mr. Mukherjee;

Per Arlene's request, I've reviewed the workplan for Rockwell's additional round of soil and water sampling at the Brandeis-Bardin Institute. I am recommending some changes, before proceeding with this work. The changes are in the areas of 1) sampling site selection, 2) inappropriate use of random sampling in the ravines, and 3) the addition of moss sampling. Each of these are discussed below.

Sampling Site Selection

It appears that the only new sampling site is the ravine just above Campsi e Area 1 (see Fig. 21, from the report, attached.) If the goal is to investigate the entire ravine system that empties into this campsite, sampling this 400' strip will not do it. The way I would do it is to sample each section of the ravine, where sediment has deposited. As steep as these ravines are, there will be a limited number of these sections. If contamination (other than tritium) is moving down the hill, that is the only way to find it. Conversely, if we find nothing, then it's not moving down that ravine.

I have the same comment on the sampling area for the top of the ravines, shown in Figure 18 (attached.) This 900' stretch of property line might be useful in a "first look." However, we've already done that. Now we want to focus in on the areas that produced hits the first time. McLaren/Hart needs to rethink their selection of sampling sites, for this round.

Use of Random Sampling

I believe it is inappropriate to use random sampling techniques in the ravines. This is where five samples are taken, and the results averaged. Gregg Dempsey agrees with me

Joel I. Cehn, C.H.P.
1036 Hubert Road, Oakland, California

Urgent!

Fax Transmittal
Date: September 2, 1993
To: Niel Mukherjee, 818-586-6188
From: Joel I. Cehn, 510-268-1571
Attached are Brandeis-Bardin's comments on the draft workplan.

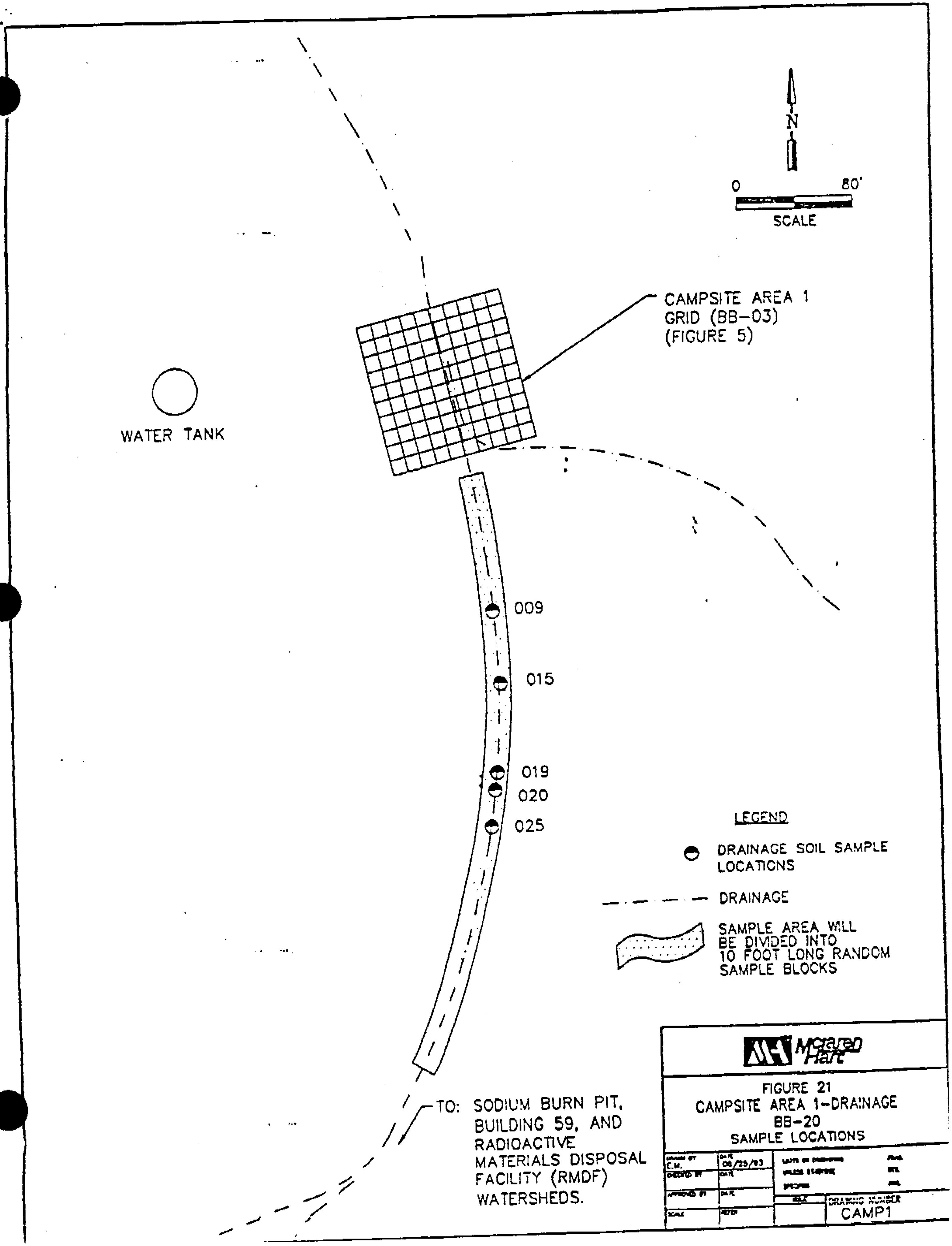


FIGURE 21
CAMPSITE AREA 1–DRAINAGE
BB–20
SAMPLE LOCATIONS

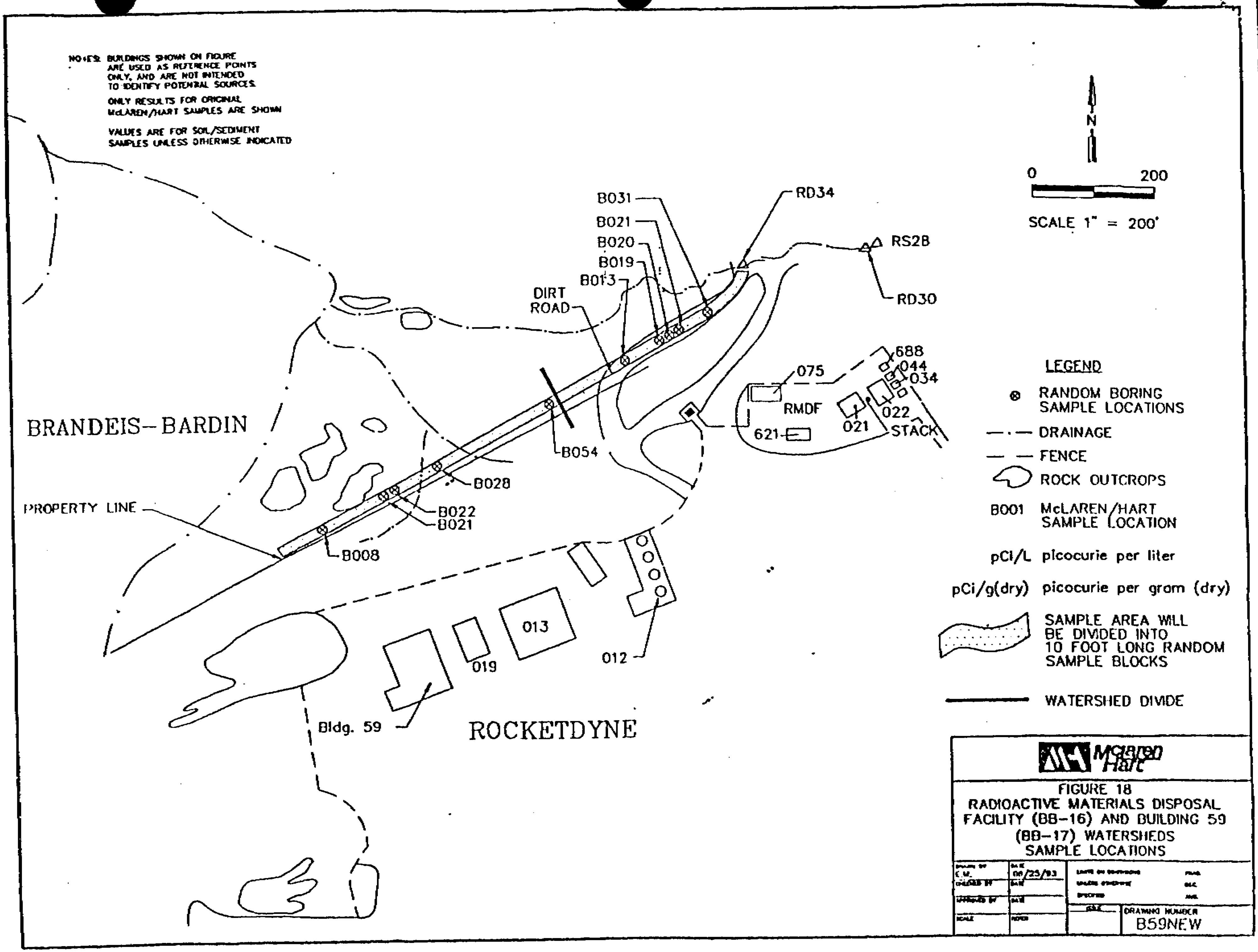


FIGURE 18
RADIOACTIVE MATERIALS DISPOSAL FACILITY (BB-16) AND BUILDING 59 (BB-17) WATERSHEDS SAMPLE LOCATIONS

Sensitivity of Moss as an Indicator of Radioactive Contamination

Sampled Medium	^{137}Cs (bq / kg)	^{134}Cs (bq / kg)
Soil (Tula)	<15	<15
Moss (Tula)	471	<15
Soil (Plavsk)	2,150	263
Moss (Plavsk)	25,250	650

McGowan, Chess and Luckett. "Moss as an Indicator of Fallout from the Chernobyl Accident" ANS Student Conference, College Station, TX. April, 1993.

Comments from
Teresa Jordan
Community Member
Simi Valley, CA

——— A. Giliberto, Ph.D.
Rocketdyne Division
6633 Canoga Park
P.O. Box 7922
Canoga Park, CA 91309-7922

Dear Mr. Giliberto:

I apologize for putting this letter together on the final day of the public review period for the Draft Workplan for Additional Soil and Water Sampling at the Brandeis Bardin Institute and Santa Monica Mountains Conservancy.

I enjoyed going through the document binder. As much as it was a well put piece of information, non-the-less I was disappointed to see that as far as the Santa Monica Mountains Conservancy area was concerned, it meant that area of the former Rockwell Employees Shooting Range. I thought it meant Sage Ranch, Box Canyon, Bell Canyon, etc. The title was misleading.

Dr. Giliberto, Section Appendix D, Site Safety and Health Plan; Attachment 2, Site Map(s); and Attachment 3, Utility Clearance Check and Map Identifying

Utilities was an interesting part of the document. I've gone over it a few times to see if I have misread or plainly missed those maps mentioned in attachments 2 and 3. The Simi Valley Public Library binder did not contain said sheets.

I think that it is unfortunate that the data from the ravines were not statistically evaluated as pointed out for Cesium-137 and plutonium-238 on page 1-5 in order to make a definite conclusion about their off-site migration concentrations.

I am glad to hear that ~~additio~~ additional sampling is going to be the case for monitoring the RMDF and Building 59 Watershed.

I am a bit concerned over the fact that for tritium, strontium-90, and cesium-137 in the RMDF Watershed soil samples will be randomly done, as well as the surface water samples done at those random times and if flowing water is available. Why has it been decided that "soil samples will be analyzed only for those radionuclides that are specified"? (Page 1-11)

Once again, thank you for putting this documentation together.

Sincerely,
Teresa Jordan

Comments from
Josesph P. Juetten
Director, Environment and Safety Support Division
United States Government
Department of Energy

United States Government Department of Energy

MEMORANDUM

Date: : AUG 0 8 1993

Reply to Attn. of : DOE San Francisco Operations Office (ESS)

Subject : Comments to Draft Workplan for Additional Soil and Water Sampling

To : Robert Le Chevalier, Site Manager, ETEC SO

ESS has reviewed this draft Workplan for Additional Soil and Water Sampling at the Brandeis-Bardin Institute and the Santa Monica Mountains Conservancy. Comments to the Workplan are attached. As requested by Rocketdyne on July 7, 1993 (letter 93RC05827), please forward comments to Arlene Giliberto for consideration by August 16, 1993.

Please call Steve Black at (510) 637-1595 should you have any questions.

Joe Juetten

Joseph P. Juetten, Director
Environment and Safety
Support Division

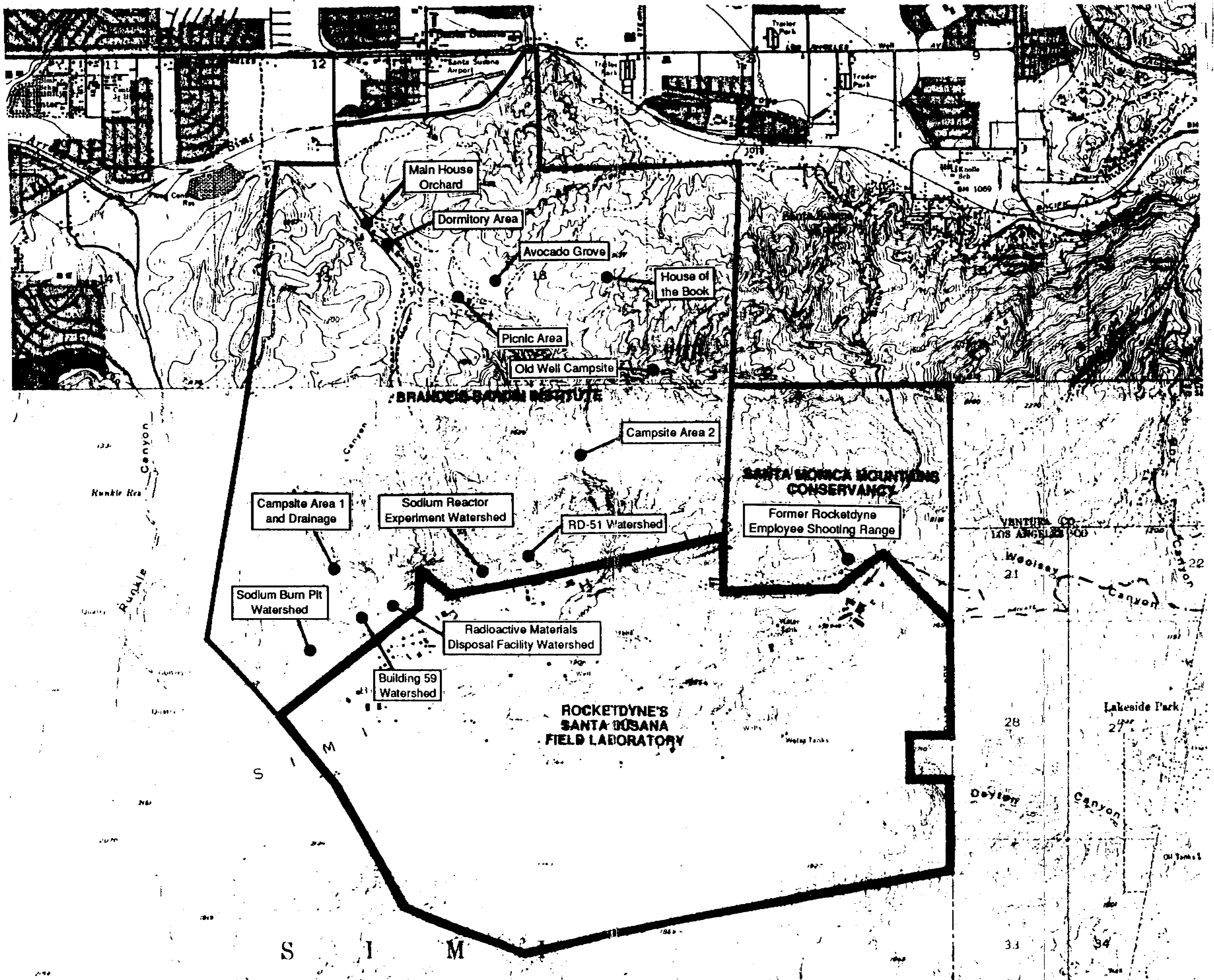
Attachment

cc: Roger Liddle, ERWM

COMMENTS TO ADDITIONAL OFF-SITE SAMPLING WORKPLAN

PAGE	COMMENTS
1-1	Section 1.0, first sentence. Better wording would be "...were presented to the Santa Susana Field Laboratory (SSFL) Work Group public meeting held at the Simi Valley Public Library."
1-2	First paragraph, ninth line. Were the two wells sampled private wells? (specify "two private wells...")
1-2	Third paragraph, second sentence. Should explain where the Watersheds are or reference a figure.
1-3	First paragraph. How far is the "Well by the Gate at the Conservancy" from Rockwell's boundary line? Also in fourth paragraph, how far was the contaminated sediment sample at the Sodium Burn Pit Watershed from the property line?
1-5	Second paragraph, first line. Which watersheds? Two results are given but there are three watersheds listed in the next sentence and four watersheds are shown in Figure 1.
1-8	Large blank space on page.
Fig. 1	Where are the "Gate at the Conservancy" and the "visitor center parking lot" discussed on page 1-3? There are no figures which show wells.
1-11	Section 2). List how many soil (17 per Table 1 in Section 3) and water samples will be collected. Other sections list how many. Also, not all areas listed in Table 1 are discussed here. Should be consistent.
4-1	Section 4.1. Typo. "depth of 6-inches feet"?
4-2	Section 4.2.1. Why is the water only being tested for rad?
App. D	Is the person signing as an Industrial Hygienist certified? There is no certification number given.

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



McLaren Hart