ZONE III
EPA REGION 9

RCRA ENFORCEMENT, PERMITTING, AND ASSISTANCE CONTRACT

FINAL
OVERSIGHT VERIFICATION AND CONFIRMATION RADIOLOGICAL SURVEY REPORT FOR BUILDING 4059

DECEMBER 20, 2002

Prepared for:

U.S. Environmental Protection Agency
Office of Compliance
Washington, DC 20460

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EPA Contract No. 68-W-02-021
Work Assignment No. R09107

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ABBREVIATIONS AND ACRONYMS

±	Plus or minus
α	alpha
Ac	Actinium
β	beta
Boeing	Boeing-Rocketdyne
cm^2	Square centimeter
COC	Contaminant of concern
DHS	Department of Health Services
DOE	U.S. Department of Energy
dpm	Disintegrations per minute
dpm/100 cm^2	Disintegrations per minute per 100 square centimeters
EPA	U.S. Environmental Protection Agency
ESSAP	Environmental Site Survey and Assessment Program
ETEC	Energy Technology and Engineering Center
γ	gamma
I	Iodine
L_C	Critical level
L_D	Detection limit
LCS	Laboratory control sample
Ludlum	Ludlum Measurements, Inc.
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
MDA	Minimum detectable activity
MFP	Mixed fission products
nat	Natural
NRC	U.S. Nuclear Regulatory Commission
ORISE	Oak Ridge Institute for Science and Education
OV	Oversight verification
Pa	Protactinium
Paragon	Paragon Analytics, Inc.
pCi/g	picoCuries per gram
Ra	Radium
Rocketdyne	Boeing-Rocketdyne
RPD	Relative percent difference

ABBREVIATIONS AND ACRONYMS (Continued)

SNAP	Systems for Nuclear and Auxiliary Power
SOP	Standard operating procedure
Sr	Strontium
SSFL	Santa Susana Field Laboratory
Tetra Tech	Tetra Tech EM Inc.
Th	Thorium
U	Uranium

EXECUTIVE SUMMARY

This document presents the results of oversight verification (OV) radiological survey tasks conducted by Tetra Tech EM Inc. (Tetra Tech) at Building 4059, at the Department of Energy (DOE), Energy Technology and Engineering Center, located in Area IV of the Santa Susana Field Laboratory, from October 22 to 25 and December 2000. General survey objectives under this task were to perform: (1) independent measurements of areas not previously surveyed, (2) measurements of areas previously surveyed to establish comparability of survey methods and results, and (3) sampling of surfaces and areas that may retain radioactivity. As such, the OV survey covers approximately 20 percent of the building surfaces.

Tetra Tech performed radiation surveys for alpha and beta-gamma radiation in Building 4059. During the surveys, Tetra Tech scanned a total of 113 survey grids for beta-gamma activity and 47 survey grids for alpha activity and performed 78 fixed-point measurements for beta-gamma activity and 41 fixed-point measurements for alpha activity. Sixty swipes were collected in the survey areas and sent off site for analysis of gross alpha and beta contamination. Tetra Tech also collected 10 concrete samples and 4 steel plate samples for off-site gamma spectroscopy analysis. All field measurements were performed in accordance with a quality assurance program developed for this survey. All laboratory analyses were performed by Paragon Analytics, Inc., a State of California-certified laboratory, and the laboratory data were independently validated.

Of the 160 scan measurements made by Tetra Tech, none exceeded the limits for maximum activity. Of the 119 fixed-point measurements made by Tetra Tech, none exceeded the limits for average activity. None of the removable contamination samples (swipes) indicated the presence of removable alpha or beta activity greater than the criteria judged by Tetra Tech to be applicable, based on the criteria established in U.S. Nuclear Regulatory Commission (NRC) Regulatory Guide 1.86. (1974).

Building 4059 consists of a below-grade test vault (basement area), with two reactor test cells and support rooms; and an above-grade portion of the facility containing a high bay, control room, locker room, storage rooms, and equipment rooms.

Boeing-Rocketdyne (Rocketdyne) has implemented a two-phase approach to the decontamination, survey, and release of Building 4059. Phase I involves cleaning, survey, and unrestricted release of the above-grade portion of the facility and the below-grade portion of the facility down to, but not including, the neutron-activated (radioactive) structures surrounding the reactor test cells. Release of the Phase I portion of the building is to be followed by demolition of that portion of the facility and disposal of the debris. In

Phase II, the radioactive materials exceeding DOE's release criteria in the lower portion of the building are to be removed and disposed as low-level radioactive waste, followed by survey and release of the excavation.

Three of the four steel plate samples taken by Tetra Tech contained identifiable (but not quantifiable) Cobalt-60, indicating low-level neutron activation of the steel structure in the basement area above the reactor test cells. These sample results confirm data previously reported by both Rocketdyne and by DOE's contractor, Oak Ridge Institute for Science and Education (ORISE) Environmental Site Survey and Assessment Program.

No nationally recognized limits exist for assessing the appropriate concentrations of activation products for disposal, recycling, or release for unrestricted use. In 1999, Rocketdyne proposed, and DOE and the California Department of Health Services Radiologic Health Branch (DHS) agreed to, establishing a boundary between the "activated" and "non-activated" areas of Building 4059. The proposed boundary is based on actual solid samples in which the activation products Cobalt-60, Europium-152, and Europium-154, were detected at levels less than DOE would allow in contaminated soil. The allowable levels for contaminated soil were developed based on a 15 millirem per year individual dose and have been approved by DOE and DHS. The activated structural materials in the basement area do not exceed levels DOE would allow in soil and will be included as part of the Phase I program. The activation products in the reactor test cells exceed the levels DOE would allow in soil and will be included in the Phase II portion for radioactive materials. Currently, a Rocketdyne request for approval of the completed Phase I survey, demolition of the Phase I portion of the building, and disposal of the debris is pending with DHS.

The decision regarding release of activated structural materials that do not exceed allowable soil levels has been superceded by a Memorandum from the Secretary of Energy dated July 13, 2000 that:
(1) reaffirms a January 12, 2000 moratorium on release of volumetrically contaminated metals, and
(2) suspends the unrestricted release for recycling of scrap metals from radiation areas within DOE facilities. It is our current understanding of DOE policy that no scrap metals, whether activated or not, may be recycled.

The independent data collected by Tetra Tech during the OV survey are of sufficient quality and quantity to: (1) assess the radiological status of Building 4059, (2) supplement and confirm other documentation of facility conditions, and (3) be used by the U.S. Environmental Protection Agency to develop recommendations and conclusions. The data show: (1) good agreement with prior surveys, (2) that surfaces monitored by Tetra Tech are within NRC-established radiological limits, and (3) that exposure rates measured by Tetra Tech do not exceed NRC-established radiological limits.

Tetra Tech's field measurements were compared to the radiological close-out survey conducted by Rocketdyne and to a confirmation survey done by ORISE. Although field measurement techniques and data reporting methods differed, Tetra Tech field measurements confirm the conclusions reached by both Rocketdyne and ORISE.

1.0 INTRODUCTION

On January 15, 1999, Tetra Tech EM Inc. (Tetra Tech), formerly known as PRC Environmental Management, Inc., received Work Assignment No. R09805 from U.S. Environmental Protection Agency (EPA) Region 9, under Contract No. 68-W-99-008, Resource Conservation and Recovery Act Enforcement, Permitting, and Assistance, Zone III. As of April 1, 2002, this work assignment expired and incomplete tasks have been continued under Work Assignment No. R09107, Contract No. 68-W-02-021. Under this work assignment, Tetra Tech provides oversight, sampling, and technical review of documents pertaining to the Department of Energy's (DOE) Energy Technology and Engineering Center (ETEC), presently operated by the Rocketdyne Division of Boeing Corporation (Rocketdyne) (formerly Rockwell Corporation), located at the Santa Susana Field Laboratory (SSFL). The work assignment currently includes review of decontamination and decommissioning reports, development of oversight verification (OV) survey and sampling work plans, and performance of OV radiation surveys.

This document presents the results of OV radiological survey tasks conducted by Tetra Tech in Building 4059 at the DOE ETEC, located in Area IV of the SSFL, from October 22 to 25 and during December 2000.

1.1 PURPOSE

The purpose of this report is to describe the results of the OV survey conducted by Tetra Tech. This report also compares OV survey data to data from the radiological close-out survey conducted by Rocketdyne and to the confirmation survey performed by DOE's contractor, Oak Ridge Institute for Science and Education (ORISE) Environmental Site Survey and Assessment Program (ESSAP).

The OV survey conducted by Tetra Tech was developed to supplement and confirm other data used to document the final radiological status of the facility. The OV survey included sampling of areas surveyed previously by other parties, as well as areas not previously surveyed in Building 4059.

The project scope and detailed technical procedures are described in the Rocketdyne Technical Support and Field OV and Confirmation Radiological Survey Final Work Plan Addendum for Building 4059 (Tetra Tech 2000) and the Rocketdyne Technical Support and Field OV and Confirmation Radiological Survey Work Plan (Tetra Tech 1999). Detailed standard operating procedures (SOP) for performing indoor and outdoor radiological surveys and instrument calibrations and the quality assurance project plan are included in the work plan.

1.2 GENERAL SURVEY OBJECTIVES

General survey objectives under this task were to perform: (1) independent measurement of areas not previously surveyed, (2) measurements of areas previously surveyed to establish comparability of survey methods, and (3) limited sampling of surfaces and areas that could retain radioactivity. Surveys were performed to a quality level equal to that of a final status survey, as defined by the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) (Revision 1) (EPA 2000). However, because an OV survey does not require the same level of detail as a final status survey, the extent of the OV survey and sampling and selection of sampling locations intentionally were reduced in scope from that of a MARSSIM final status survey.

2.0 PROJECT SCOPE

The OV survey work plan covered accessible building surfaces that could be surveyed for the purpose of establishing total and removable surface radioactivity, in accordance with standard guidance provided by the State of California, DOE, and the U.S. Nuclear Regulatory Commission (NRC). Standard release criteria are reproduced from the NRC Regulatory Guide 1.86 (1974) in Table 1. The scope of survey for Building 4059 is identified in Table 2 and the survey was performed in accordance with the OV survey work plan (Tetra Tech 1999).

3.0 SITE BACKGROUND AND HISTORY

Site background information, contaminants of concern (COC), and general and specific site history for Building 4059 are briefly discussed in the following subsections.

3.1 SITE BACKGROUND

Rocketdyne established the SSFL, located in Ventura County, California, in 1946 as a rocket engine test site. Rocketdyne divided the 2,700-acre site into four administrative areas (Areas I, II, III, and IV) and a buffer zone. During the 1950s, Rocketdyne expanded site operations to include nuclear energy research and nuclear reactor development for DOE. Nuclear operations were conducted in Area IV and included fabrication of nuclear fuels, testing of nuclear reactors, and disassembly and analysis of used fuel elements. No nuclear research has been conducted at the site since 1988.

TABLE 1

ACCEPTABLE SURFACE CONTAMINATION LEVELS
ROCKETDYNE SANTA SUSANA FIELD LABORATORY

Nuclide[a]	Average[b,c]	Maximum[b,d]	Removable[b,e]
Transuranics, Ra-226, Ra-228, Th-230, Th-228, Pa-231, Ac-227, I-125, I-129	100 dpm/ 100 cm^2	300 dpm/ 100 cm^2	20 dpm/ 100 cm^2
Th-nat, Th-232, Sr-90, Ra-223, Ra-224, U-232, I-126, I-131, I-133	1,000 dpm/100 cm^2	3,000 dpm/ 100 cm^2	200 dpm/ 100 cm^2
U-nat, U-235, U-238, and associated decay products	5,000 dpm α/ 100 cm^2	15,000 dpm α/100 cm^2	1,000 dpm α/ 100 cm^2
Beta-gamma emitters (nuclides with decay modes other than alpha emission or spontaneous fission) except, Sr-90 and others noted above	5,000 dpm βγ/ 100 cm^2	15,000 dpm βγ/100 cm^2	1,000 dpm βγ/ 100 cm^2

Source: U.S. Nuclear Regulatory Commission (NRC). 1974. Regulatory Guide 1.86.

Notes:

a Where surface contamination by both alpha- and beta-gamma-emitting nuclides exists, the limits established for alpha- and beta-gamma-emitting nuclides should apply independently.

b As used in this table, dpm (disintegrations per minute) means the rate of emission by radioactive material as determined by correcting the counts per minute observed by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.

c Measurements of average contamination should not be averaged over more than 1 square meter. For objects of less surface area, the average should be derived for each such object.

d The maximum contamination level applies to an area of not more than 100 cm^2.

e The amount of removable radioactive material per 100 cm^2 of surface area should be determined by wiping that area with dry filter or soft absorbent paper, applying moderate pressure, and assessing the amount of radioactive material on the wiping with an appropriate instrument of known efficiency. When removable contamination of objects of less surface area is determined, the pertinent levels should be reduced proportionately and the entire surface should be wiped.

Ac	Actinium
α	alpha
β	beta
cm^2	Centimeters squared
dpm	Disintegrations per minute
dpm/100 cm^2	Disintegrations per minute per 100 centimeters squared
γ	gamma
I	Iodine
Pa	Protactinium
Ra	Radium
Sr	Strontium
Th	Thorium
Th-nat	Thorium natural
U	Uranium
U-nat	Uranium natural

TABLE 2

**SCOPE OF RADIOLOGICAL SURVEY
ROCKETDYNE SANTA SUSANA FIELD LABORATORY**

Building	Description	Facility Status	Contaminants of Concern [a]	Target Areas
4059	Systems for Nuclear and Auxiliary Power Reactor Facility	Closed. All reactor systems removed. Phase I surveys completed by Rocketdyne and awaiting DHS approval	Activation products, mixed fission products, transuranium compounds, and uranium	Floors, walls, and ceilings

Note:

a Contaminants of concern are discussed in Section 3.2.

DHS Department of Health Services

The location of the SSFL and Area IV are shown in Figure 1. About 25 buildings within Area IV used radioactive material. This OV survey addresses only one building (4059), shown in Figure 2.

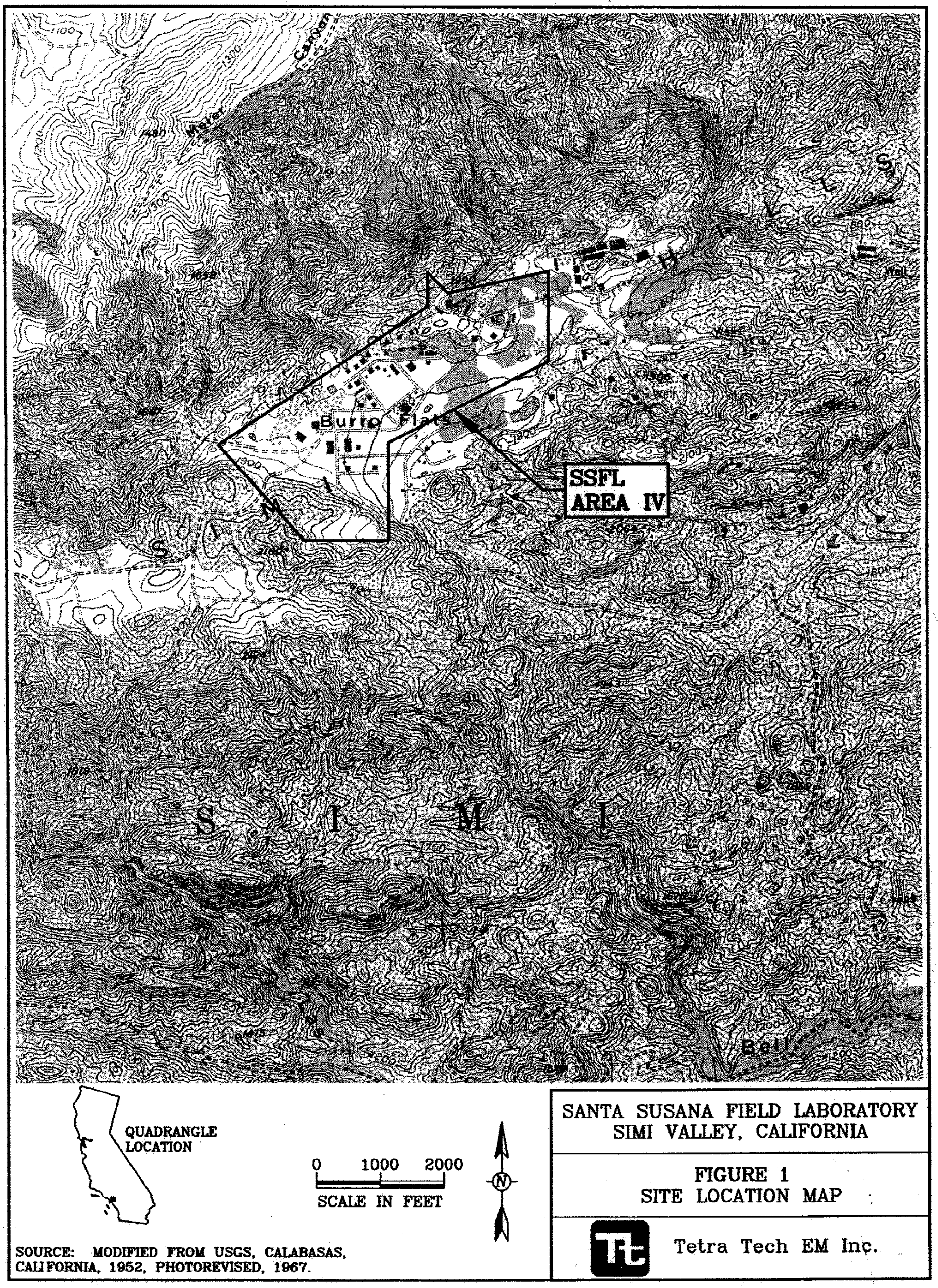
A detailed operational history of the facility is found in the document entitled, Nuclear Operations at Rockwell's SSFL – A Factual Perspective (Rocketdyne 1991). The Radiological Survey Plan for Santa Susan Field Laboratory (Rocketdyne 1985) presents a concise summary of radiological issues at the site and a discussion of the environmental setting of SSFL.

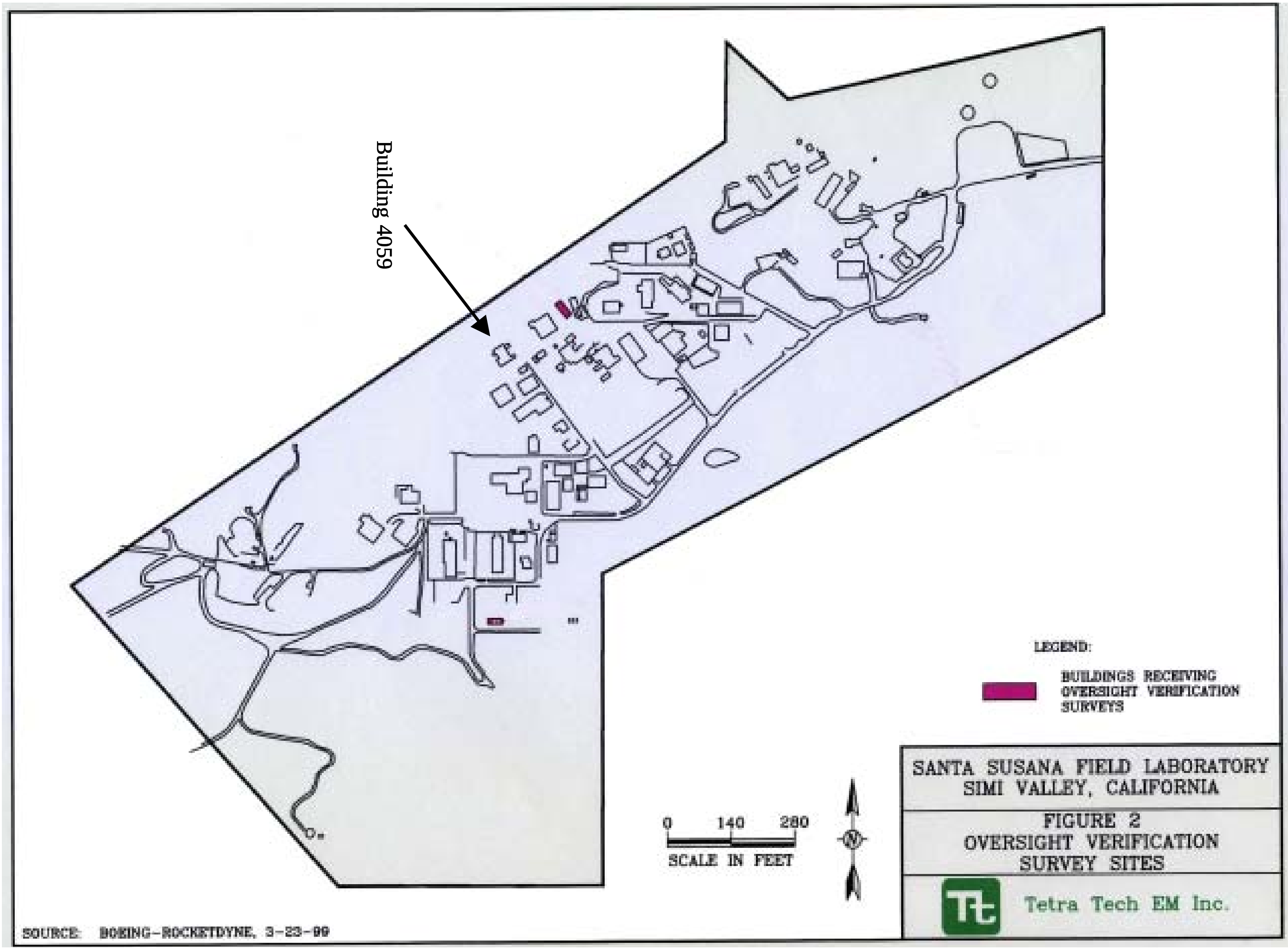
3.2 CONTAMINANTS OF CONCERN

The history of the Rocketdyne facility indicates the potential for contamination by tritium, mixed fission products (MFP), activation products, radium, uranium, and transuranic compounds. Methods used to assess the presence of contaminants are discussed briefly in the following sections. Field surveys are not designed to identify specific radionuclides, but rather gross alpha or beta-gamma radioactivity. Similarly, swipe surveys are taken to identify the presence of removable gross alpha or beta-gamma radioactivity and are not capable of identifying specific radionuclides.

3.2.1 Tritium

The OV survey was not designed for the detection of tritium, and no surface samples were collected for the purpose of assessing possible tritium contamination. Although tritium is a COC for the ETEC, based on past practices, the history of the facility, and the maximum estimated release of tritium to the environment, tritium is not considered to be a COC for Building 4059 (Rocketdyne 1991).


SSFL
AREA IV
Burro Flats
SANTA SUSANA FIELD LABORATORY
SIMI VALLEY, CALIFORNIA
FIGURE 1
SITE LOCATION MAP
Tetra Tech EM Inc.
QUADRANGLE LOCATION
0 1000 2000
SCALE IN FEET
N
SOURCE: MODIFIED FROM USGS, CALABASAS, CALIFORNIA, 1952, PHOTOREVISED, 1967.


Building 4059
LEGEND:
BUILDINGS RECEIVING OVERSIGHT VERIFICATION SURVEYS
0 140 280
SCALE IN FEET
N
SANTA SUSANA FIELD LABORATORY
SIMI VALLEY, CALIFORNIA
FIGURE 2
OVERSIGHT VERIFICATION SURVEY SITES
Tetra Tech EM Inc.
SOURCE: BOEING-ROCKETDYNE, 3-23-99

3.2.2 Mixed Fission Products

OV survey methods and survey instruments were capable of detecting beta-gamma radiation from MFPs below the release criteria set forth in Table 1 (beta-gamma emitters, except strontium-90) by detecting total beta-gamma surface activity and gamma dose rates. Swipe samples were collected to determine the presence of removable gross beta-gamma activity. Concrete and steel samples were collected to determine the presence of photon-emitting MFPs through gamma spectrum analysis.

MFP activity limits of Table 1 (beta-gamma emitters, except strontium-90) are appropriate for evaluating beta-gamma surface activity measurements for Building 4059.

3.2.3 Activation Products

The presence of activation products resulting in volumetric contamination was assessed by measuring external beta-gamma dose rates and gamma spectrum analysis of concrete and steel samples.

The MFP activity limits of Table 1 (beta-gamma emitters, except strontium-90) are appropriate for evaluating activation product surface activity measurements for Building 4059. This is one method of assessing activation products. No nationally recognized and agreed-upon limits exist for assessing the concentration of activation products. Rocketdyne has proposed, and DOE and Department of Health Services (DHS) have agreed to, establishing a boundary between the activated and nonactivated areas of Building 4059, based on actual solid sample results showing the presence of the activation products cobalt-60, europium-152, and europium-154 at levels less than those allowable for contaminated soil.

3.2.4 Radium

OV survey methods and survey instruments were capable of detecting radium below the release criteria set forth in Table 1 by detecting total alpha surface activity. Swipe samples were collected to determine the presence of removable gross alpha activity.

Activity limits of Table 1 (transuranics and radium-226) are appropriate for evaluating radium alpha surface activity measurements for Building 4059.

3.2.5 Uranium

OV survey methods and survey instruments were capable of detecting uranium below the release criteria set forth in Table 1 by detecting total alpha and total beta-gamma surface activity. Swipe samples were collected to determine the presence of removable gross alpha and beta-gamma activity.

Uranium (uranium-natural, uranium-235, uranium-238, and associated decay products) limits of Table 1 are appropriate for evaluating uranium alpha and uranium beta-gamma surface activity for Building 4059.

3.2.6 Transuranic Compounds

OV survey methods and survey instruments were capable of detecting transuranic radionuclides below the release criteria set forth in Table 1 by detecting total alpha surface activity. Swipe samples were collected to determine the presence of removable gross alpha activity. Surface activity limits for transuranic isotopes are provided in Table 1. Plutonium (a transuranic) could be present wherever irradiated fuel was handled and in the vicinity of nuclear reactors. However, based on the history of Building 4059, application of the transuranic limit was not appropriate, because none of the facility history suggests that plutonium was handled or that irradiated fuel was opened or examined in Building 4059.

3.3 BACKGROUND RADIATION IN SOILS AND CONSTRUCTION MATERIALS

Naturally occurring radiation is present in soils and common building materials. The naturally occurring isotopes include, but are not limited to, uranium and thorium, as well as their progeny, and potassium-40. Soils at the ETEC Site are discussed in the Radiological Survey Plan for SSFL (Rocketdyne 1985). Arkosic sandstone, with interbeds of marine siltstone, claystone, and shale, underlie much of the site. Arkosic sand is the predominant source of naturally occurring radioactive isotopes in these soils. Arkose is a type of sandstone that contains feldspars. The feldspar fraction is a natural source of gamma-emitting potassium-40. The arkosic sand fraction also may contain some granitic rock.

Granitic rock contains small amounts of natural uranium that decay in a natural series into other radioisotopes, including radium-226 and radon-222. Granitic rock also is commonly integrated into masonry and ceramic building materials. All numerical criteria for surface radioactivity are intended to be interpreted as “in addition to” the background concentration.

3.4 OPERATIONAL HISTORY AND BASIS FOR SURVEY

The following sections describe the operational history of Building 4059, where the OV survey was performed, and provide descriptions of Building 4059 and the technical basis for conducting the survey. All relevant figures and reference drawings for the building are included in Appendix A.

Building 4059 was used for experiments using Systems for Nuclear and Auxiliary Power (SNAP) reactor assemblies. Building 4059 contained a below-grade test vault with two reactor test cells. Test cells were used to test prototype SNAP reactors. Reactors, test systems, and components were removed prior to 1980. In 1999, Rocketdyne proposed to DOE (Rocketdyne 1999a) and DHS (Rocketdyne 1999b) to implement a two-phase program for survey and decommissioning of Building 4059. DOE approved the two-phase program in January (DOE 1999). DHS also concurred with the two-phase approach in March (DHS 1999). Under the ongoing two-phase decommissioning program, sources of radioactive material have been removed, including shielding materials, a vacuum vessel, and steel liners. Phase I involves cleaning, survey, and unrestricted release of the above-grade portion of the facility and the below-grade portion of the facility down to, but not including, the neutron-activated (radioactive) structures surrounding the reactor test cells. Release of the Phase I portion of the building is to be followed by demolition of that portion of the facility and disposal of the debris. In Phase II, the radioactive materials exceeding DOE's release criteria in the lower portion of the building are to be removed and disposed as low-level radioactive waste, followed by survey and release of the excavation.

Three of the four steel plate samples taken by Tetra Tech contained identifiable (but not quantifiable) Cobalt-60, indicating low-level neutron activation of the steel structure in the basement area above the reactor test cells. No nationally recognized limits exist for assessing the appropriate concentrations of activation products for disposal, recycling, or release for unrestricted use. In 1999, Rocketdyne proposed, and DOE and DHS agreed to, establishing a boundary between the "activated" and "non-activated" areas of Building 4059. The proposed boundary is based on actual solid samples in which the activation products Cobalt-60, Europium-152, and Europium-154, were detected at levels less than DOE would allow in contaminated soil. The allowable levels for contaminated soil were developed based on a 15 millirem per year individual dose and have been approved by DOE and DHS. The activated structural materials in the basement area do not exceed levels DOE would allow in soil and will be included as part of the Phase I program. The activation products in the reactor test cells exceed the levels DOE would allow in soil and will be included in the Phase II portion for radioactive materials.

The decision regarding release of activated structural materials that do not exceed allowable soil levels has been superceded by a Memorandum from the Secretary of Energy dated July 13, 2000 that:
(1) reaffirms a January 12, 2000 moratorium on release of volumetrically contaminated metals, and
(2) suspends the unrestricted release for recycling of scrap metals from radiation areas within DOE facilities. It is our current understanding of DOE policy that no scrap metals, whether activated or not, may be recycled.

The Phase I final Rocketdyne status survey for Building 4059 was completed in September 1999 (Rocketdyne 1999c). The final ORISE confirmation survey report was not available for review at the time the Tetra Tech work plan was prepared. The ORISE report has since been reviewed (ORISE 2000). ORISE typically performs fixed-point measurements, 100 percent scans of the floor and lower wall grid areas, and swipe measurements for removable alpha and beta-gamma activity. Portions of the building have been scheduled for removal as nonradioactive waste, based on facility surveys, oversight, and DOE and DHS approvals. These portions of the building were the subject of the additional verification surveys conducted by EPA's contractor, Tetra Tech in October and December 2000.

4.0 RADIOLOGICAL SURVEY METHODS

This section describes the overall approach used to perform the OV survey for this project, including radiation detection methods used, survey design, statistical considerations, and quality control for the survey. Subsequent sections describe the detailed measurement methods, instrument performance characteristics, and instrument operation parameters as well as detailed survey tasks.

4.1 INITIAL INSPECTION AND SURVEY GRIDS

Tetra Tech and Rocketdyne staff performed a walk-through inspection of the building to be surveyed. Tetra Tech also performed an on-site review of original survey data, locations surveyed, and coverage frequency. Based on the results of previous surveys, the survey team identified some specific locations to be included in the OV survey.

The survey team also determined some survey locations using professional judgment. Emphasis was placed on locations judged likely to trap residual radioactivity such as wall penetrations, ventilation ducts, and low points. Several pipes, ducts, cracks, and vents identified were surveyed and swiped for assessment of removable activity. Measurements also were taken at random locations.

Tetra Tech followed the established grid, when it could be identified, or established a new grid to cover required areas.

4.2 RADIATION DETECTION METHODS

Several radiation detection methods and field activities were used during radiological surveys, including: (1) fixed and removable beta-gamma activity measurements, (2) fixed and removable alpha activity measurements, and (3) collection of concrete and steel samples for off-site laboratory analysis. Field survey methodology, techniques, and terminology were in general accordance with the MARSSIM[1] (Revision 1) (EPA 2000). Surveys and data evaluation were performed in accordance with the work plan (Tetra Tech 1999).

For alpha and beta-gamma measurements of surface radioactivity, background radiation levels were measured at appropriate, unaffected locations identified within the same survey area. Background radiation levels for surface activity measurements were established by assuming that surface contribution of background is zero (which is conservative and health-protective). Contributions to the alpha and beta-gamma surface activity background are therefore assumed to be from cosmic, terrestrial, or other natural sources or detector noise (a result of detector electronics).

4.3 SYSTEMATIC SAMPLING PLAN

OV survey locations were selected based on previous survey data, accessibility, and professional judgment in order to: (1) establish comparability with previous surveys, (2) provide coverage of data gaps in the original survey, and (3) provide additional data for areas previously surveyed. Rooms that had received 100 percent area scans by ORISE were not completely resurveyed; however, small areas within each room were rescanned to establish comparability of data. Survey coverage consisted of surface area scans, together with fixed-point surveys of areas selected by Tetra Tech, as well as fixed-point, scan, and swipe surveys of areas randomly selected or selected by the community. Because each independent measurement process has an associated uncertainty, consisting of systematic and random uncertainty, on comparison, results do differ. The initial criterion established in the work plan for evaluation of data comparability is a relative percent difference (RPD) of plus or minus (±) 50 percent. If comparability cannot be established within this value, reasons for discrepancies are discussed.

4.4 FIELD MEASUREMENT IDENTIFICATION

All field measurements are clearly traceable to a detector calibration record. Field measurements are coded for use with a computer database/spreadsheet designed specifically for collecting data, performing necessary calculations, and presenting field measurement data several ways in order to aid analysis.

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[1] MARSSIM was jointly developed by EPA, NRC, the U.S. Department of Defense, and DOE.

Data typically were recorded directly on survey forms. For scanning measurements, the average and maximum alpha and beta-gamma count rates (in counts per minute) were recorded. Fixed-point measurements were identified and recorded in a survey. Detectors used and detector-specific backgrounds also were noted on the survey forms.

Raw field data were transferred to the database for conversion to activity units (disintegrations per minute per 100 square centimeters [dpm/100 cm^2]), uncertainty calculations, and reportable concentrations. Data tables from the database for all of the field measurements are presented as Table B-1 in Appendix B.

5.0 MEASUREMENT METHODS

The methods used by Tetra Tech to set up, calibrate, and operate radiation detectors, as well as record data and perform measurement QC, are described in the SOPs appended to the survey work plan (Tetra Tech 1999).

The radiological OV survey was divided into the following tasks:

- Establish grid systems, as needed (Section 5.1.1).
- Calibrate (determine the efficiency of) surface radiation detectors (Section 5.1.2).
- Survey specified areas and random areas by scanning (Section 5.2).
- Survey specified areas and random areas by scanning and fixed-point measurements (Section 5.3).
- Sample areas for removable contamination (collect swipes) and sample construction materials for gamma spectroscopy analysis (Section 5.4).

The following sections provide additional description on how each of these tasks was performed.

5.1 SCANNING SURVEYS

Tetra Tech selected areas to be scanned for surface activity to: (1) replicate previous survey data, (2) assess an area that would have a higher likelihood of containing residual contamination, or (3) assess random locations. Scanning surveys included floors, walls, and ceilings. Detectors used during the scanning surveys are described in Section 5.1.2, and scanning methods are described in Section 5.1.3.

5.1.1 Establish Site-specific Grids

Existing ESSAP or ORISE survey maps were used as a reference to establish a grid system. However, because the ESSAP report did not provide grid-by-grid data for each area surveyed, Tetra Tech established a separate numbering system for grid identification. Survey maps provided in Appendix A show the grid systems used for the surveys. Specific grid systems were not used for storage rooms, equipment rooms, and offices.

5.1.2 Calibration and Efficiency Determination

Survey instruments were rented for the OV survey. The instrument supplier calibrated the detectors before shipment. Prior to using the detectors, the survey team determined the efficiency of each detector (probe and rate meter pair) using National Institute of Standards and Technology-traceable sources, in accordance with the procedures provided in the survey work plan (Tetra Tech 1999). Efficiencies were calculated in order to convert detector counts in counts per minute to alpha or beta-gamma activity in disintegrations per minute. Efficiencies also were used to determine scan rates and counting times that would provide sufficient detection limits to ensure that residual contamination of less than one-half of the release criteria is detectable within a 95 percent confidence limit. Equations used to calculate detector efficiency are provided in Appendix C. A response check was performed each day to verify that the instruments properly responded to a known source of radioactivity. A background measurement was performed each day.

5.1.3 Detectors Sensitive to Multiple Radiation Types

Large-area phoswich[2] dual alpha and beta-gamma detectors (Ludlum Measurements, Inc. [Ludlum] Model 43-89), coupled to a rate/scalar meter (Ludlum Model 2260 or Model 2224), were used for surface scans. The large-area detectors (100 square centimeters [cm^2]) provide a proportionate increase in sensitivity over pancake-style Geiger-Mueller detectors. Actual detector efficiencies were determined by the survey team during calibration, using methods described in the survey work plan (Tetra Tech 1999). Field efficiency determinations reflect an appropriate source energy and detector distance actually used. These factors can account for significant effects on measurement results. Detectors selected were suitable for site conditions.

[2] A phoswich detector contains one alpha-sensitive layer and one beta-sensitive layer; therefore, alpha and beta emissions may be counted simultaneously.

5.2 SCANNING METHODS

Tetra Tech performed scan survey measurements for alpha surface activity in 47 grid locations in Building 4059. Scan survey measurements for beta-gamma surface activity were taken in 113 grids. Floor, wall, and ceiling surfaces were scanned with 100-cm^2 phoswich detectors, sensitive to both alpha and beta-gamma activity. The detector probe was held no more than 1 centimeter from the surface being scanned, and the scan rate was no more than one probe width per 4 seconds. The phoswich detector is unique in that it produces two different tones (clicks) for alpha and beta-gamma detections and thereby allows an experienced surveyor to scan simultaneously for both alpha and beta-gamma radiation. The vast majority of the surfaces were clean, flat, and relatively smooth. Surface conditions, in general, are not considered to have affected the sensitivity of the detectors. Some areas, however, where holes or cracks existed in walls or floor surfaces, were not considered to be appropriate for alpha activity measurements because of the alpha particles' limited range in air.

For optimum detection sensitivity, changes in the instrument response were monitored by visual and audible outputs. Average and maximum alpha and beta-gamma count rates, as read from the digital output display on the rate meters, were recorded for each grid scanned. Locations of activity that appeared to be above the ambient background level were remeasured using a fixed measurement.

The scan minimum detectable concentration was calculated prior to the survey, using the method described in MARSSIM (Revision 1) (EPA 2000). The detection sensitivity for this type of detection system, calibrated to a moderate energy beta source (technicium-99), ranged from 1,449 to 2,072 dpm/100 cm^2 for scanning measurements for this project. The detection sensitivity for this type of detector system, calibrated to a moderate energy alpha source (thorium-230), ranged from 93 to 120 dpm/100 cm^2 for scanning measurements. In each case, the minimum detectable concentration is less than half of the appropriate activity limit identified in Table 1 (an average activity limit of 5,000 dpm/100 cm^2 for beta-gamma emitters and an average activity limit of 1,000 dpm/100 cm^2 for alpha emitters).

5.3 FIXED-POINT ACTIVITY MEASUREMENTS

Tetra Tech selected locations for fixed-point measurements to: (1) replicate previous survey data, (2) assess an area that would have a higher likelihood of containing residual contamination, or (3) assess random locations. Fixed-point activity measurements were taken on floors, walls, ceilings, and doors. Measurement methods for beta-gamma and alpha activity are described in Sections 5.3.1 and 5.3.2, respectively.

5.3.1 Fixed Measurements of Beta-gamma Activity

Tetra Tech performed fixed-point beta-gamma surface activity measurements in 78 grid locations in Building 4059. Tetra Tech measured beta-gamma activity by using 100-cm^2 phoswich probes (Ludlum Model 43-89), coupled to a rate/scalar meter (Ludlum Model 2260). The detection sensitivity calibrated for this type of detection system to a moderate energy beta source (technicium-99) ranged from 33 to 744 dpm/100 cm^2 for static, 2-minute counts for this project. Counting times of 2 minutes were chosen to meet detection limit requirements of one-half of the maximum allowable average beta-gamma surface activity provided in Table 1.

For the purpose of these measurements, the beta-gamma activity expressed in dpm/100 cm^2 was calculated using the equations given in Appendix C.

5.3.2 Fixed Measurements of Alpha Activity

Tetra Tech performed fixed-point alpha surface activity measurements in 41 grid locations in Building 4059. Tetra Tech measured alpha activity on the interior surfaces of the rooms, while simultaneously measuring beta-gamma activity. A 100-cm^2 phoswich probe (Ludlum Model 43-89), coupled to a rate/scalar meter (Ludlum Model 2260), was used for these measurements. The detection sensitivity for this type of detector system calibrated to a moderate energy source (thorium-230) ranged from 2.1 to 47 dpm/100 cm^2 for static, 2-minute counts for this project. Counting times of 2 minutes were chosen to meet detection limit requirements of one-half of the maximum allowable average alpha surface activity provided in Table 1.

5.4 REMOVABLE CONTAMINATION ASSESSMENT

Removable contamination measurements were made by taking 60 surface swipe samples at locations of interest, in areas that are likely to have trapped or pooled contaminated liquids, such as cracks and floor-wall joints. In addition, areas were selected randomly for collection of surface swipes. Swipes for assessment of removable surface activity were obtained by using a dry filter paper to wipe an area of about 100 cm^2, while applying moderate pressure.

On January 22, 2001, the 60 swipes were sent to Paragon Analytics, Inc. (Paragon), in Fort Collins, Colorado, for gross alpha and gross beta analysis. Ten concrete samples and 4 steel fragment samples collected from the floors and walls also were sent to Paragon for gamma spectroscopy analysis. All samples were sent under chain-of-custody control.

5.5 DETECTION LIMITS

Detection limits (L_D) specify the capability of a measurement system to detect a signal in the presence of a background/noise signal. Because all low-level radioactivity measurements are associated with a physical error characteristic of the measurement process, statistical analysis is required for all measurements. Detection limits must be calculated at the field location where the survey is performed to account for background and to attain sufficient data quality of the intended purpose. Detection limits are based on counting statistics using the 95^{th} percentile confidence interval for both Type I and II errors. Type I and II errors are discussed in more detail in MARSSIM (EPA 2000). Adjustments of counting times allow required or specific detection limits to be met.

5.5.1 Critical Level

Detection limits are reported in terms of the critical level (L_C), the a posteriori statement of detection that protects from the false positive or Type I error. The L_C activity is the concentration at which the analyst has a 50 percent chance of determining that a measurement is part of background when in fact it is not. That is, at the L_C, a measurement is equally likely to be from the background or not. All activity measurements less than L_C are reported as less-than values. The L_C is a statistical function of the sample and background counting times and the background count rate. Equations for calculating L_C and the reported less-than value are provided in Appendix C.

5.5.2 Detection Limit

The detection limit is the a priori limit that protects from the false negative or Type II error and represents the measurement system sensitivity. That is, a measurement with a true activity equal to L_D will be identified correctly as different from background for a predetermined percentage of the time. For the OV survey, the L_D was calculated to represent a 95 percent confidence level. Activities determined to be greater than L_D are reported with a ± error. The L_D is a statistical function of the sample and background counting times and the background count rate. Equations for calculating L_D and the reportable activity error are provided in Appendix C.

The minimum detectable activity (MDA) is an a priori measure of the smallest quantity of activity that could be present and still be detected with a specified level of confidence. The MDA is equal to the L_D converted from raw data units (counts per minute) to activity units (disintegrations per minute).

5.6 LABORATORY QUALITY CONTROL/QUALITY ASSURANCE AND DATA VALIDATION

Solid and swipe samples were shipped to Paragon Analytics, Inc. under chain-of-custody control. Trained laboratory personnel received and verified the inventory of the samples and entered them into the laboratory control system. The samples were analyzed using instruments calibrated against National Institute of Standards traceable standards in accordance with verified procedures. Laboratory control sample analysis, method blank analysis, and duplicate sample analysis, as applicable were used to verify the accuracy of sample analyses. No discrepancies requiring action were reported. All laboratory data were reviewed for completeness and correctness.

All laboratory data were validated by an independent validator. Approximately 10 percent of the samples received full validation, while the remainder received cursory validation. All swipe sample results were reported as estimated. The gamma spectrometry results for three of the concrete core samples and the steel plate samples were qualified as estimated because of a lack of calibrated geometries that matched those samples. No swipe sample results or solid sample results were rejected.

6.0 SURVEY RESULTS

The following sections discuss data reporting requirements, as outlined in the survey work plan (Tetra Tech 2000), discuss the results of the OV survey, present summaries of the survey data, and present comparisons of the survey data to data from previous surveys. All of the survey data is presented in Appendix B. The data is in three sets of data tables, as follows:

- Table B-1 contains results of scan and fixed-point surveys for alpha and beta-gamma activity.
- Table B-2 contains results of swipe samples analyzed for removable alpha and removable beta-gamma activity.
- Table B-3 contains results of gamma spectrum analyses of concrete core and steel fragment samples.

6.1 REPORTING REQUIREMENTS

When reporting field survey results, levels of radioactivity will be reported to be "less than L_D" if the value (in disintegrations per minute per 100 cm^2) is less than the L_D. If the value (in disintegrations per minute per 100 cm^2) is greater than the calculated activity L_D, it is assigned an uncertainty estimate.[3] The

[3] A 95th percentile confidence interval, based on counting statistics

L_D is the smallest quantity of radioactivity that can be reliably distinguished from background 95 percent of the time, based on counting statistics (for a laboratory detection system, the L_D is equal to the laboratory MDA when the units are converted from counts to activity). The L_C is the level at which there is a 5 percent chance of calling a background sample value "greater than background" (that is, the probability of a false positive). Alternatively, the L_C is the smallest quantity of radioactivity that can be distinguished reliably from background 50 percent of the time. For the purpose of reporting individual measurement results, any response above the instrument L_C will be considered to be above background (or a net positive result). For a detailed explanation of how L_C, L_D, and MDA limits are determined, see Appendix A of the survey work plan (Tetra Tech 1999) and MARSSIM (EPA 2000).

6.2 SUMMARY OF SURVEY RESULTS

This section provides the summary statistics for the OV survey. The number of measurements that can be compared to measurements made during previous surveys also is discussed. Table 3 presents the number of grids scanned, the number of fixed-point measurements, and the number of swipe samples collected.

TABLE 3

SUMMARY OF MEASUREMENT LOCATIONS
ROCKETDYNE SANTA SUSANA FIELD LABORATORY

Building	Number of Scanned Grids	Number of Fixed-point Measurements	Number of Swipes
4059	113 beta-gamma	78 beta-gamma	60
	47 alpha	41 alpha	60

Table 4 provides information on the highest measurement results obtained. None of the 160 scan measurements and 119 fixed-point measurements performed by Tetra Tech exceed the 15,000dpm/100 cm^2 limit for maximum beta-gamma activity or the 300 dpm/100 cm^2 limit for maximum alpha activity. Therefore, no further action is required.

TABLE 4

MAXIMUM ACTIVITY MEASUREMENTS
ROCKETDYNE SANTA SUSANA FIELD LABORATORY

Building	Room	Tetra Tech Grid Number	Activity (dpm/100 cm^2)
alpha measurements			
4059	Basement, East Wall	3-1m	39.9
	Vacuum Equipment Room North Wall	E-1m	21.7
	West Stairwell	WSW-14	8.8
	High Bay Storage Room	none	46.3
beta-gamma measurements			
4059	High Bay South Wall	15-1m	2,035
	East Stairwell	ESW-13	906
	West Stairwell	WSW-11	2,772
	Noble Gas Room	none	2,594
	Basement, East wall	3-1m	1,861
	Vacuum Equipment Room (2 grids)	A-2m, 1-3m	6,267
	Heating, ventilation, and air conditioning	none	1,864
	Offices	none	1,510
	Building 459	none	1,749

Note:

dpm/100 cm^2 Disintegrations per minute per 100 square centimeters

Tetra Tech Tetra Tech EM Inc.

6.3 MEASUREMENT COMPARABILITY

Tetra Tech performed beta-gamma surface activity scan measurements in many of the same grid locations surveyed by Rocketdyne. These measurements were made for the purpose of being able to perform a direct comparison of the Rocketdyne measured value to the Tetra Tech measured value. Specifically, 37 grids in the basement area of Building 4059 were scan surveyed for beta-gamma activity by both Rocketdyne and Tetra Tech. Of the 37 grid measurements, the result of the Rocketdyne survey was a negative value for 28 grids. In seven of the nine remaining grids, Tetra Tech scan average results were also negative values. Two grids can be compared. For these two grids, one on the basement floor and one in the alcove, the agreement between the measured values was very good. (Rocketdyne Grid F-16 result --- 184.9 dpm/100 cm^2 beta-gamma activity versus Tetra Tech Grid A-6 result --- 229 dpm/100cm^2 beta-gamma activity; and Rocketdyne Grid ALC-3 result --- 26 dpm/100 cm^2 beta-gamma activity versus Tetra Tech Grid 5A result --- 86 dpm/100 cm^2 beta-gamma activity.) The results show excellent comparability in that no measurable activity was detected by either Rocketdyne or Tetra Tech in the majority of the 37 grids. Because both the Rocketdyne beta-gamma surface activity results and the Tetra Tech results for the same grids are less than 10 percent of the surface activity limits, it is clearly not feasible to perform a specific comparison to determine a statistical RPD. Removable alpha and beta-gamma activity data are similarly comparable. Table 5 shows the comparison between the Tetra Tech, Rocketdyne, and ORISE range of survey results.

TABLE 5

SURVEY MEASUREMENT COMPARISONS FOR BUILDING 4059
ROCKETDYNE SANTA SUSANA FIELD LABORATORY

Measurement Type	Tetra Tech	Rocketdyne	ORISE
Fixed beta-gamma Activity Range dpm/100cm^2	< MDA to 6,267	< MDA to 783	< MDA to 8,300
Removable alpha Activity Range dpm/100 cm^2	< MDA to 1.8	< MDA to 5.4	< MDA to 9
Removable beta-gamma Activity Range dpm/100 cm^2	< MDA to 75.2	< MDA to 54	< MDA to 17

Notes: All values are in disintegrations per minute per 100 square centimeters.
< less than
MDA Minimum detectable activity
ORISE Oak Ridge Institute for Science and Education
Rocketdyne Boeing-Rocketdyne
Tetra Tech Tetra Tech EM Inc.

6.4 REMOVABLE CONTAMINATION AND OTHER SAMPLING RESULTS

Sixty removable contamination samples (swipes) and 14 solid samples were collected throughout Building 4059 during the period of October 22 to 25 and December 2000. All samples were shipped to Paragon on January 22, 2001. Swipe samples were analyzed for gross alpha and beta-gamma activity. Solid samples were analyzed for a standard suite of gamma-emitting radionuclides, using gamma spectrometry.

Analytical data for the 60 swipe samples are presented in Table B-2, Appendix B. The location for each of the swipe samples is listed in Table B-2. The most restrictive criteria for alpha activity is 20 dpm/100cm^2, for transuranic alpha activity. Based on documented past activities associated with Building 4059, there is no indication that transuranics were handled in Building 4059. It is more appropriate to compare removable contamination sample results to release limits for uranium and its natural decay products. As shown in Table 1, the appropriate limit for evaluation of swipe activity data is the enriched uranium limit of 1,000 dpm/100cm^2. This limit was not exceeded. None of the 60 swipe samples analyzed for removable alpha activity showed any activity above sample-specific minimum detectable activities. Of the 60 swipe samples analyzed for removable beta-gamma activity, 19 showed activity greater than the MDA. The highest removable beta-gamma activity detected was 75.2 dpm/100 cm^2, which is less than 10 percent of the removable beta-gamma activity limit of 1,000 dpm/100 cm^2.

Full validation was performed on 6 of the 60 swipe samples. Cursory validation was performed on the remaining 54 samples. The validation was based on satisfactory review of daily instrument performance check results and background check results, analysis of empty planchets as blanks, and analysis of laboratory control samples (LCS) in place of samples at approximately the activity of the swipe samples. The wipe sample gross alpha and gross beta results were qualified as estimated. No wipe sample results were rejected by the validation process.

Gamma spectrometry data for 14 solid samples, including 10 concrete samples and 4 steel plate samples, are presented in Table B-3, Appendix B. Concrete samples were cores from floor and wall surfaces in Building 4059. Three steel plate samples came from the floor or wall in the basement of Building 4059, near the reactor pits. A fourth steel sample was collected from a door on the northern wall of the vacuum equipment room. Results are summarized in Table B-3 of Appendix B. Three of the steel samples (from inside of the basement) showed the presence of cobalt-60, an activation product. Steel samples were not in a configuration suitable to allow quantification of the cobalt-60. Estimated concentrations for each of the three samples are less than 1 picoCurie per gram (pCi/g), which are lower than the DOE- and DHS-approved soil release criteria of 1.9 pCi/g. None of the concrete samples showed the presence of any isotope, other than naturally occurring potassium-40.

Full validation was performed on one steel sample and one concrete core sample. Cursory validation was performed on the remaining three steel samples and nine concrete core samples. The validation was based on satisfactory review of daily instrument performance check results and background check results, satisfactory analysis of method blanks, satisfactory results of three samples that were analyzed twice in lieu of duplicate analyses, and satisfactory analyses of LCSs. Additionally, one concrete core sample was analyzed as a solid core and then was blended to fit a standard geometry and recounted. Comparison of the results of the two analyses shows very close agreement. No solid samples results were rejected by the validation process.

7.0 SUMMARY AND CONCLUSIONS

Tetra Tech performed radiation surveys for alpha and beta-gamma radiation in the Phase I portion of Building 4059. During the surveys, Tetra Tech scanned a total of 113 survey grids for beta-gamma activity and 47 survey grids for alpha activity and performed 78 fixed-point measurements for beta-gamma activity and 41 fixed points for alpha activity. Sixty swipes were collected in the survey areas and sent off site for analysis of gross alpha and beta contamination. Tetra Tech also collected 10 concrete core samples and 4 steel plate samples for off-site gamma spectroscopy analysis. Laboratory analyses were performed by Paragon Analytics, Inc., a State of California-certified laboratory, in accordance with a quality assurance program designed for analyses of swipe samples and solid samples.

Three steel plate samples collected in the basement, near the reactor cells, showed the presence of activated Cobalt-60 caused by neutron activation of the steel. These samples confirm the existence of activation products documented in previous reports. In 1999, Rocketdyne proposed, and DOE and DHS agreed to, establishing a boundary between “activated” and “nonactivated” areas of Building 4059, based on actual Rocketdyne solid sample results showing the presence of the activation products Cobalt-60, Europium-152, and Europium-154 at levels less than the acceptance criteria for those isotopes in soil.

The independent data developed by Tetra Tech show: (1) good agreement with prior surveys, (2) that surfaces monitored by Tetra Tech are within NRC-established radiological limits, and (3) that exposure rates measured by Tetra Tech do not exceed the NRC-established radiological limits.

Field measurements conducted by Tetra Tech did not indicate the presence of surface contamination at levels greater than maximum free-release criteria established in the NRC Regulatory Guide 1.86 (1974) or Proposed Sitewide Release Criteria (Rocketdyne 1996). Of the119 fixed-point measurements made by Tetra Tech, none exceeded the limits for average activity. Tetra Tech's field measurements were compared to the previous radiological close-out survey conducted in 1999 by Rocketdyne and to the confirmation survey performed by ORISE. Although field measurement and data reporting methods used by the parties differed, Tetra Tech field measurements confirm the conclusions reached by both Rocketdyne and ORISE.

8.0 REFERENCES

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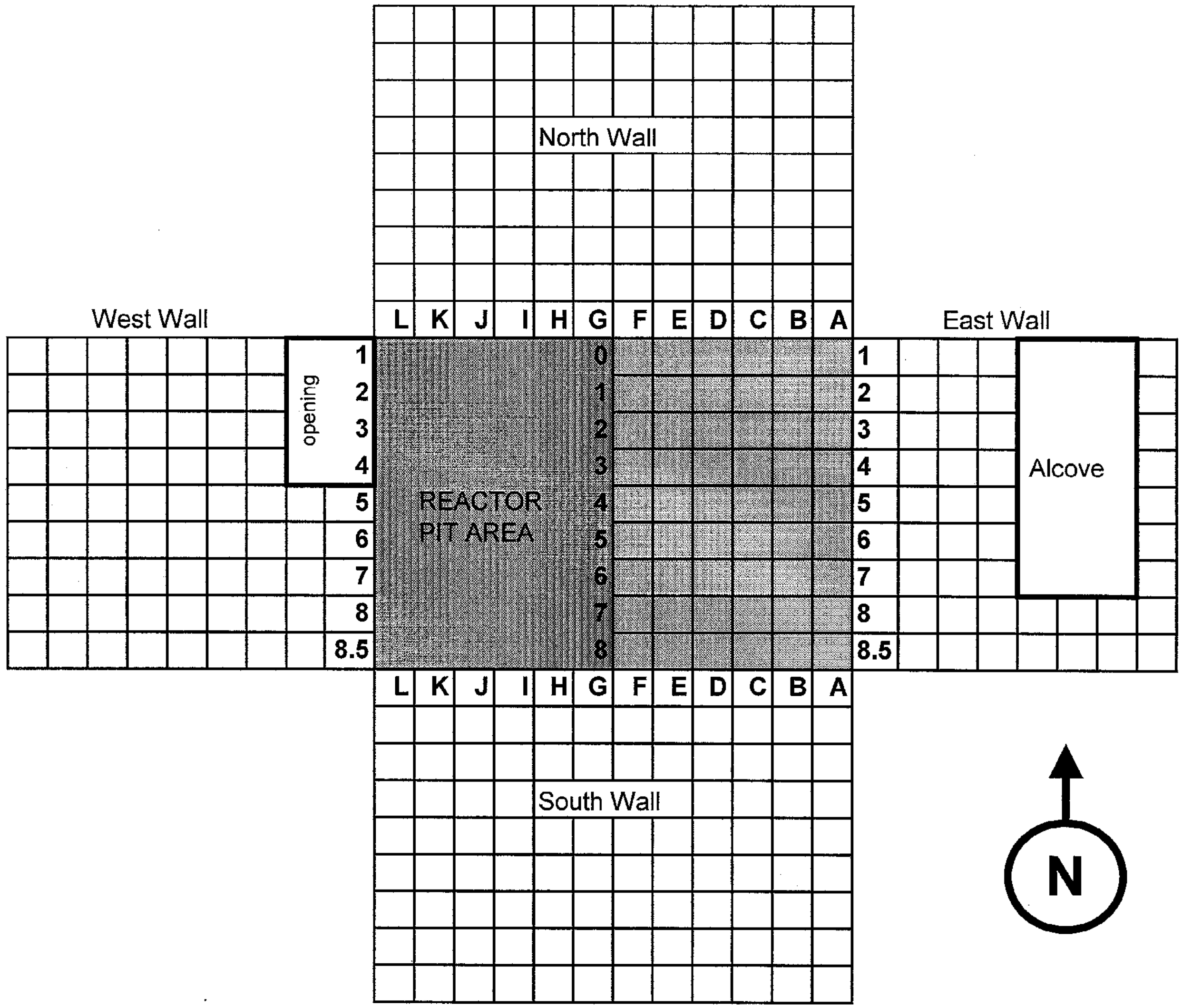
APPENDIX A
SITE SURVEY GRID MAPS
(29 Pages)

EPA Region 9
Oversight Verification (OV) Survey Grids

EPA Survey Date:
October 2001



LEGEND

Floor Grid

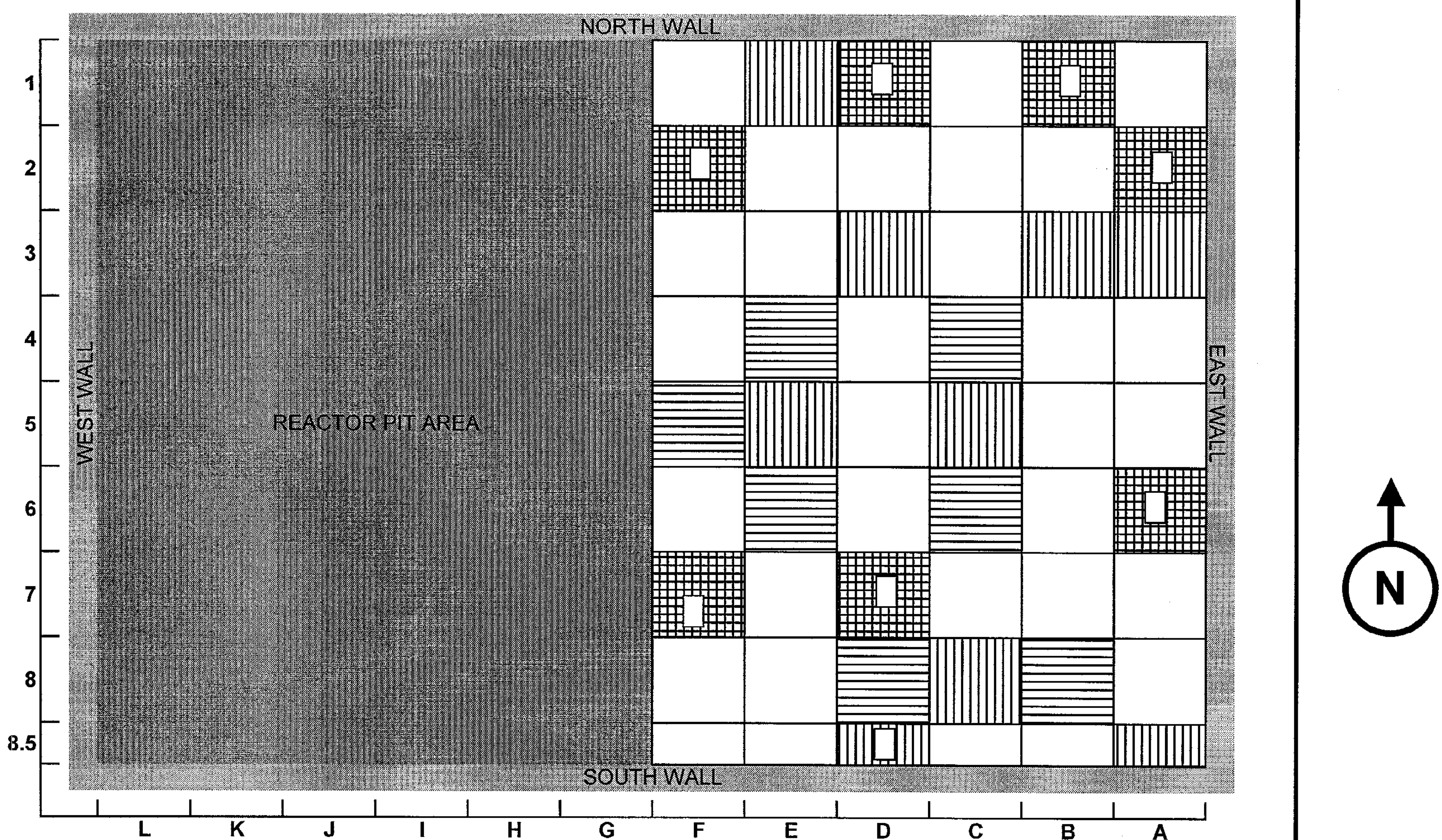
ESSAP Survey Grid

Oversight Survey Grid

Oversight Fixed Point

OVERSIGHT VERIFICATION SURVEY GRID
SANTA SUSANA FIELD LABORATORY
BUILDING 4059
Basement Overview
Tetra Tech EM Inc.

EPA Region 9
Oversight Verification (OV) Survey Grids

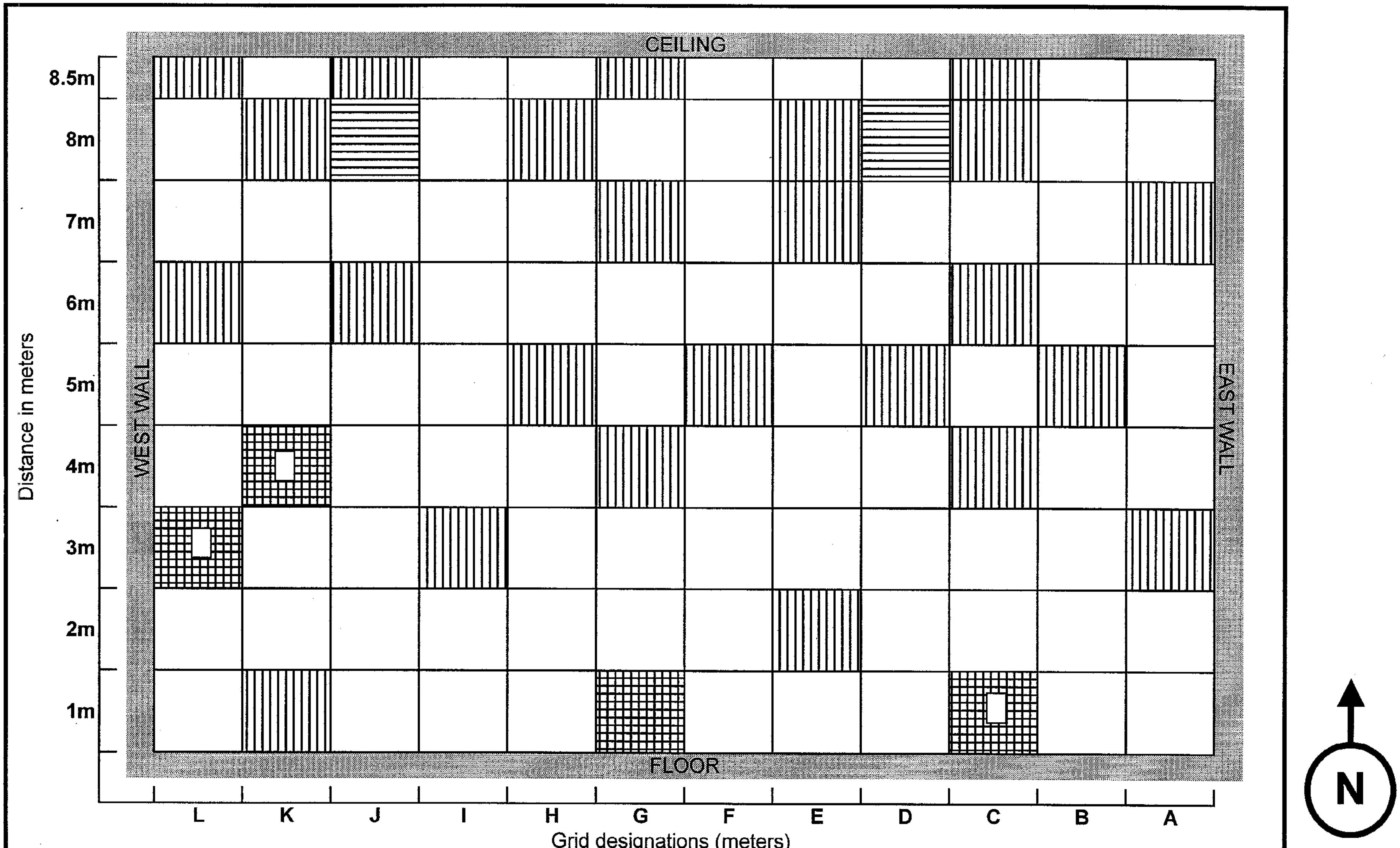


LEGEND

Floor Grid
ESSAP Survey Grid
Oversight Survey Grid
Oversight Fixed Point

OVERSIGHT VERIFICATION SURVEY GRID
SANTA SUSANA FIELD LABORATORY
BUILDING 4059
BASEMENT FLOOR
Tetra Tech EM Inc.

EPA Region 9
Oversight Verification (OV) Survey Grids



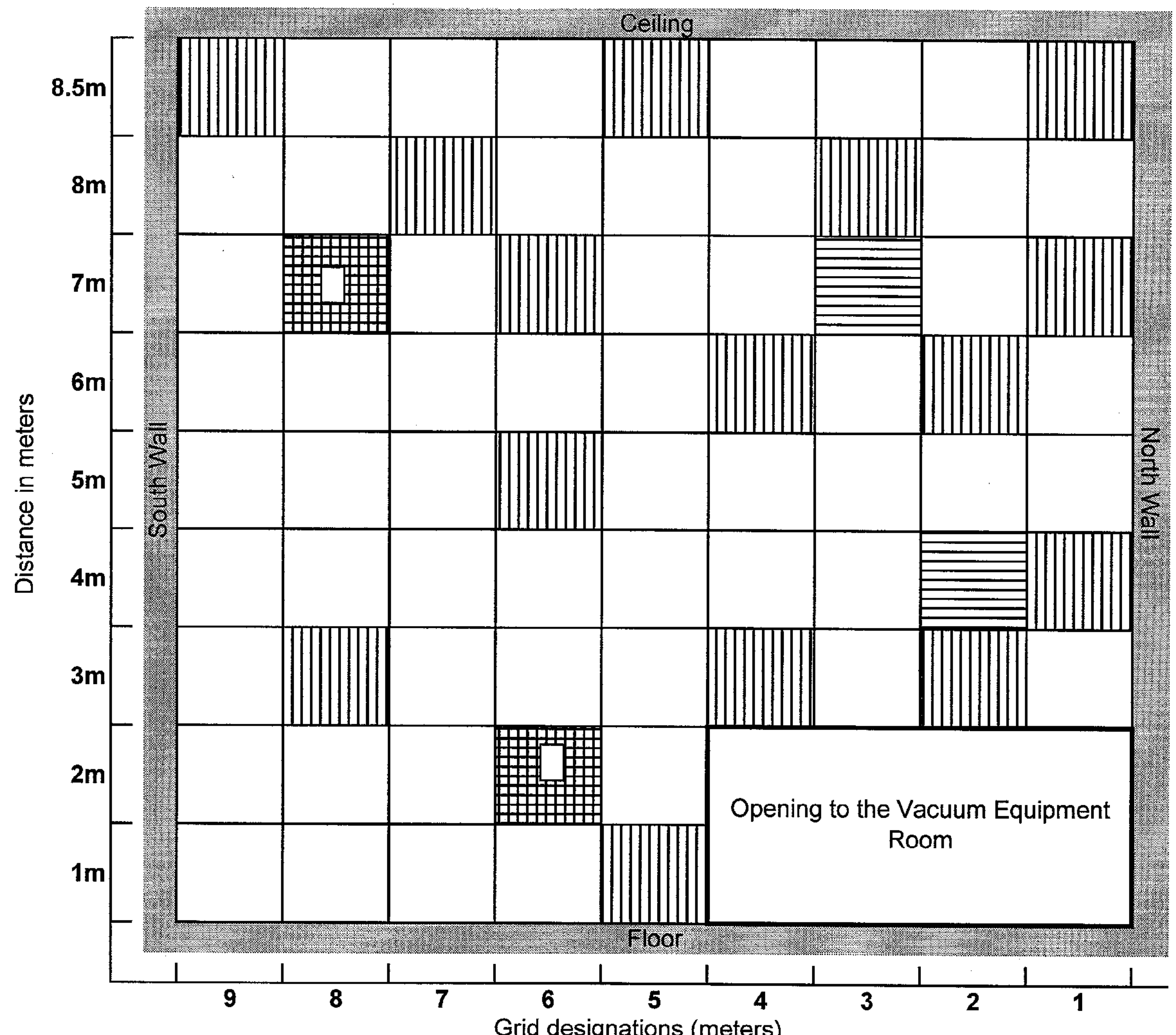
LEGEND

- Wall Grid
- ESSAP Survey Grid
- Oversight Survey Grid
- Oversight Fixed Point

OVERSIGHT VERIFICATION SURVEY GRID
SANTA SUSANA FIELD LABORATORY
BUILDING 4059
BASEMENT NORTH WALL

Tetra Tech EM Inc.

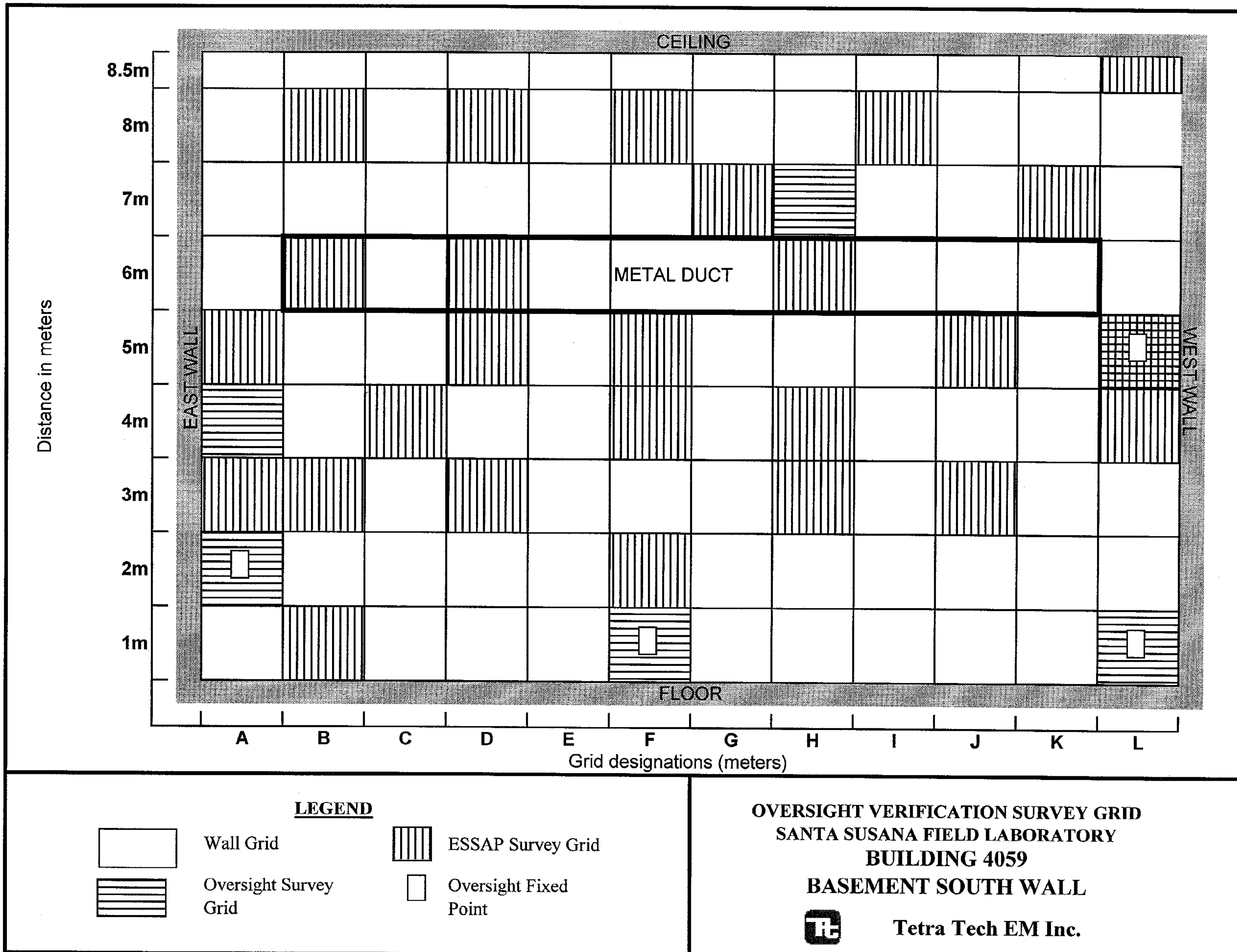
EPA Region 9
Oversight Verification (OV) Survey Grids



LEGEND

- Wall Grid
- ESSAP Survey Grid
- Oversight Survey Grid
- Oversight Fixed Point

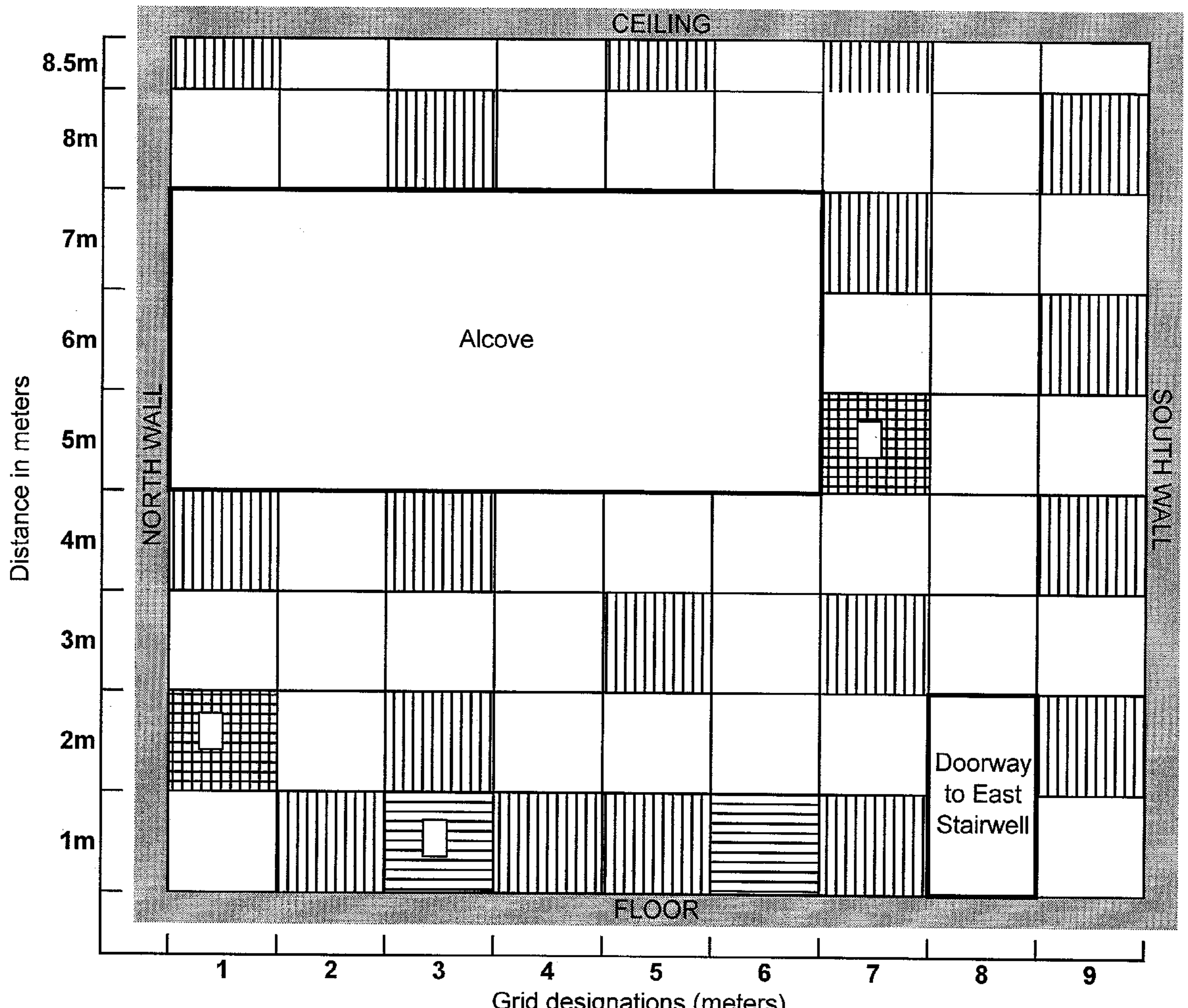
OVERSIGHT VERIFICATION SURVEY GRID
SANTA SUSANA FIELD LABORATORY
BUILDING 4059
BASEMENT WEST WALL
Tetra Tech EM Inc.



OVERSIGHT VERIFICATION SURVEY GRID
SANTA SUSANA FIELD LABORATORY
BUILDING 4059
BASEMENT SOUTH WALL

Tetra Tech EM Inc.

EPA Region 9
Oversight Verification (OV) Survey Grids

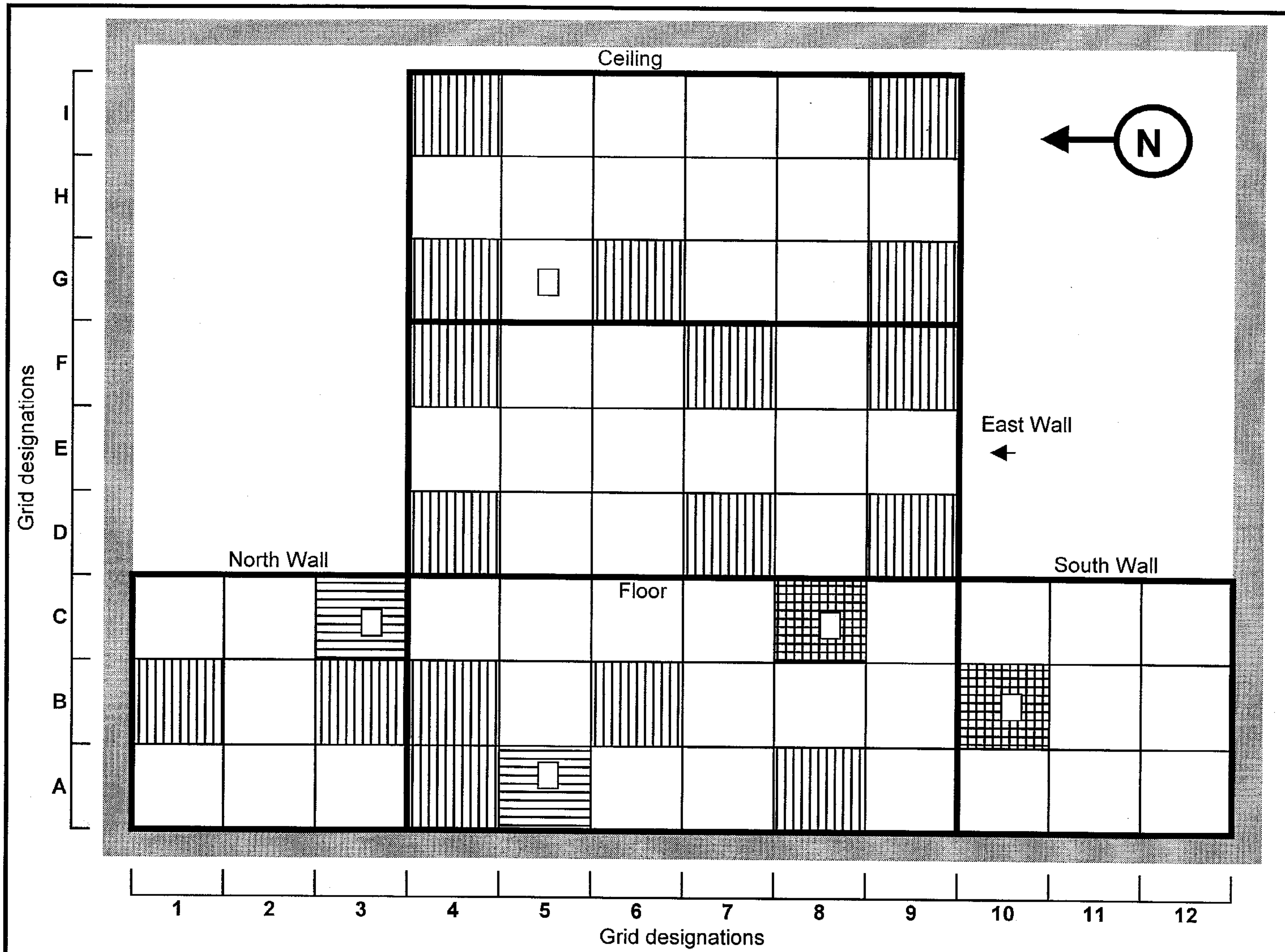


LEGEND

Wall Grid
ESSAP Survey Grid
Oversight Survey Grid
Oversight Fixed Point

OVERSIGHT VERIFICATION SURVEY GRID
SANTA SUSANA FIELD LABORATORY
BUILDING 4059
BASEMENT EAST WALL

Tetra Tech EM Inc.



LEGEND

Floor or Wall Grid

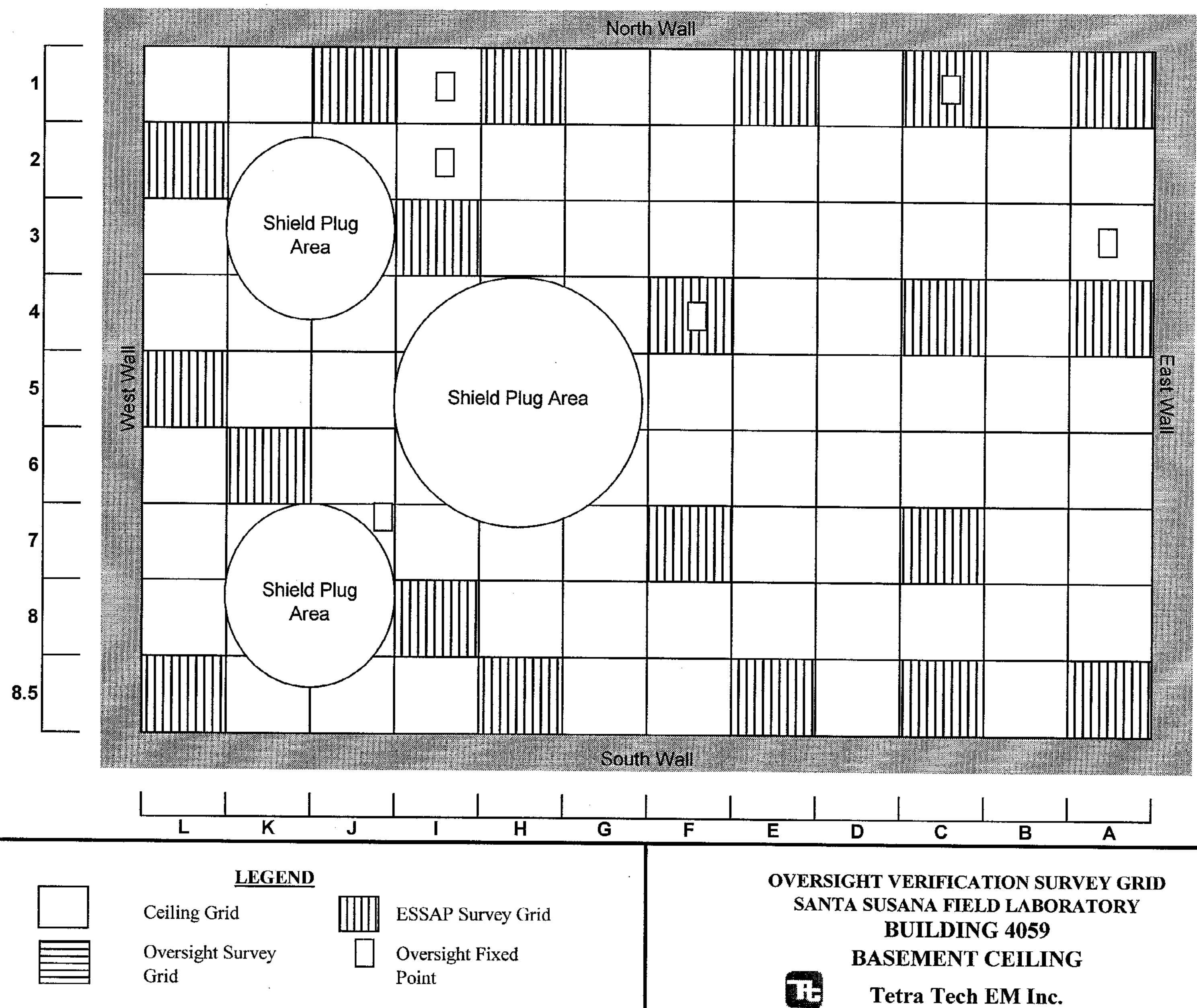
ESSAP Survey Grid

Oversight Survey Grid

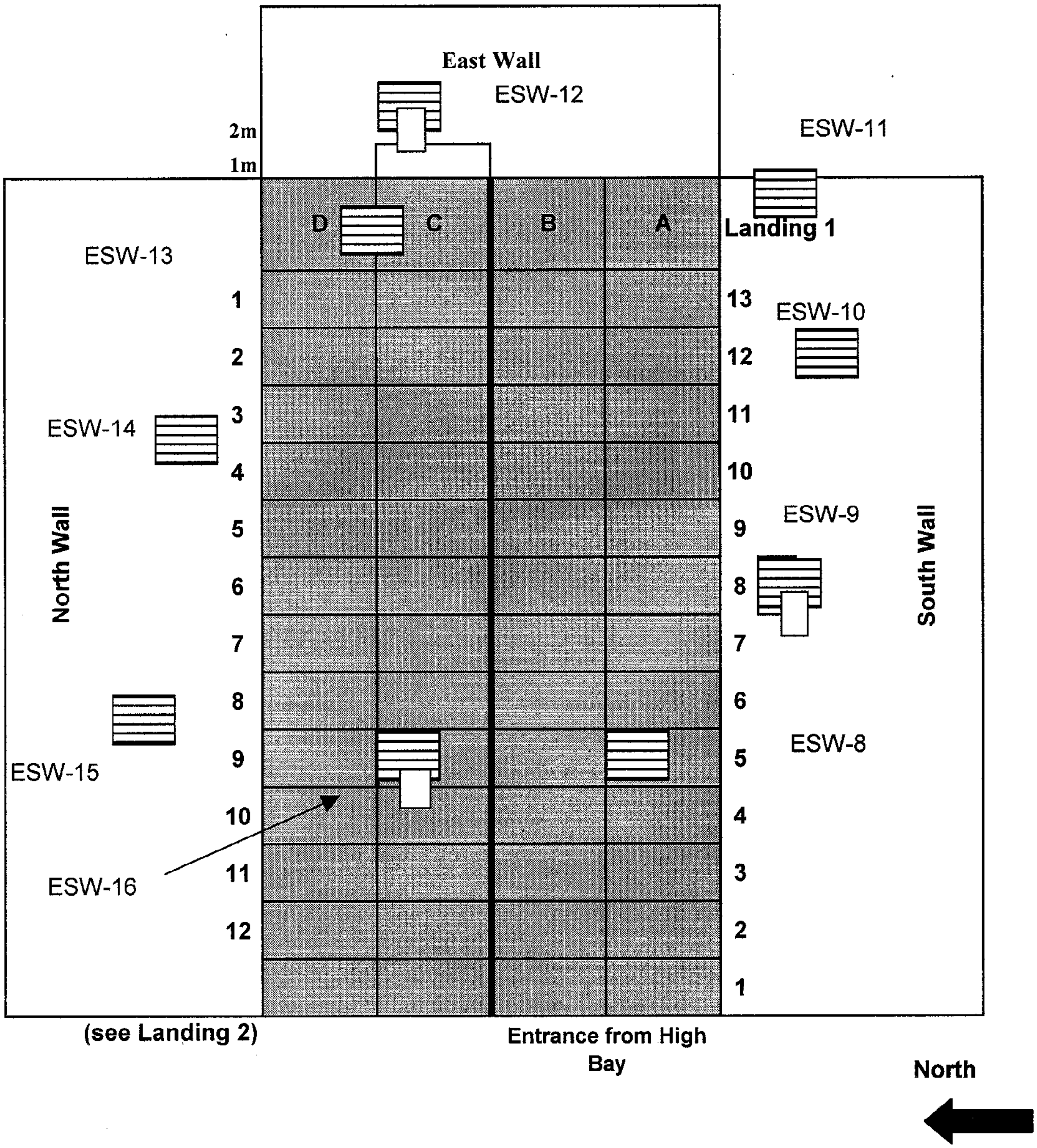
Oversight Fixed Point

OVERSIGHT VERIFICATION SURVEY GRID
SANTA SUSANA FIELD LABORATORY
BUILDING 4059
BASEMENT ALCOVE IN EAST WALL

Tetra Tech EM Inc.



OVERSIGHT VERIFICATION SURVEY GRID
SANTA SUSANA FIELD LABORATORY
BUILDING 4059
BASEMENT CEILING
Tetra Tech EM Inc.



LEGEND

Floor Grid

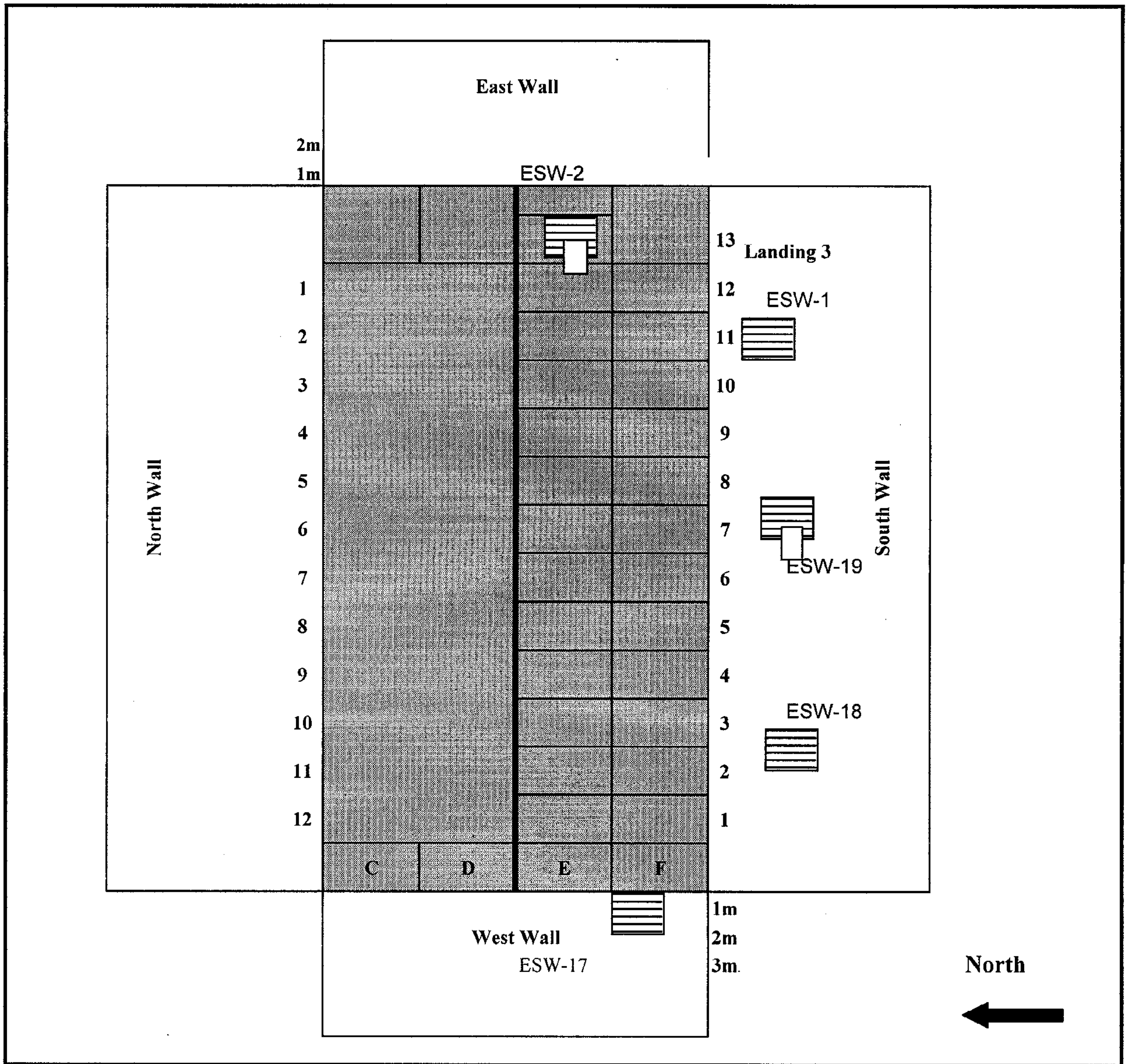
OV Grid

ESSAP Survey Grid

OV Fixed Point

OVERSIGHT VERIFICATION SURVEY GRID
SANTA SUSANA FIELD LABORATORY
BUILDING 4059
East Stairwell - Staircase 1 and 2

Tetra Tech EM Inc.

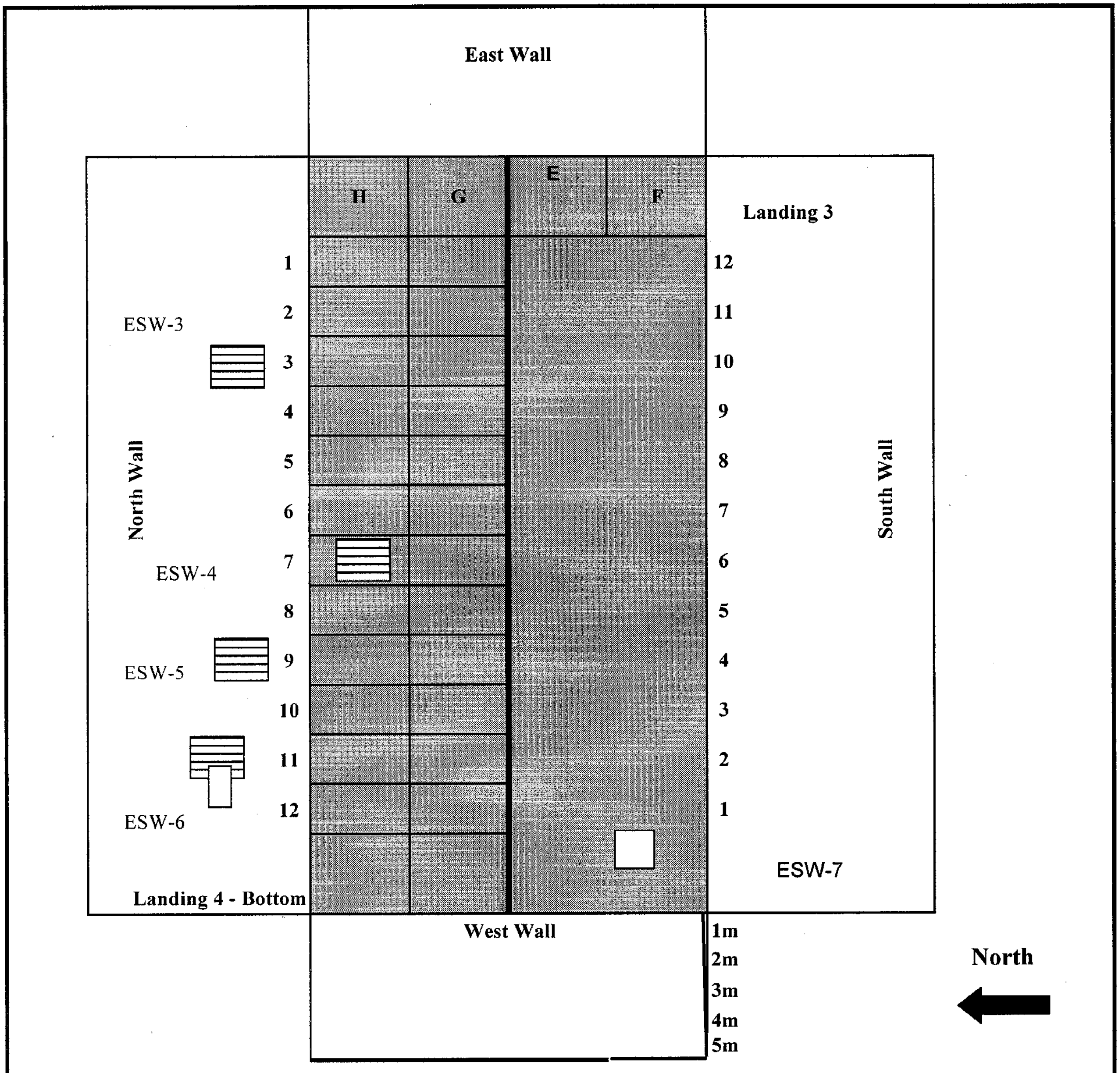


LEGEND

Floor Grid
OV Grid
ESSAP Survey Grid
OV Fixed Point

OVERSIGHT VERIFICATION SURVEY GRID
SANTA SUSANA FIELD LABORATORY
BUILDING 4059
East Stairwell - Staircase 3

Tetra Tech EM Inc.



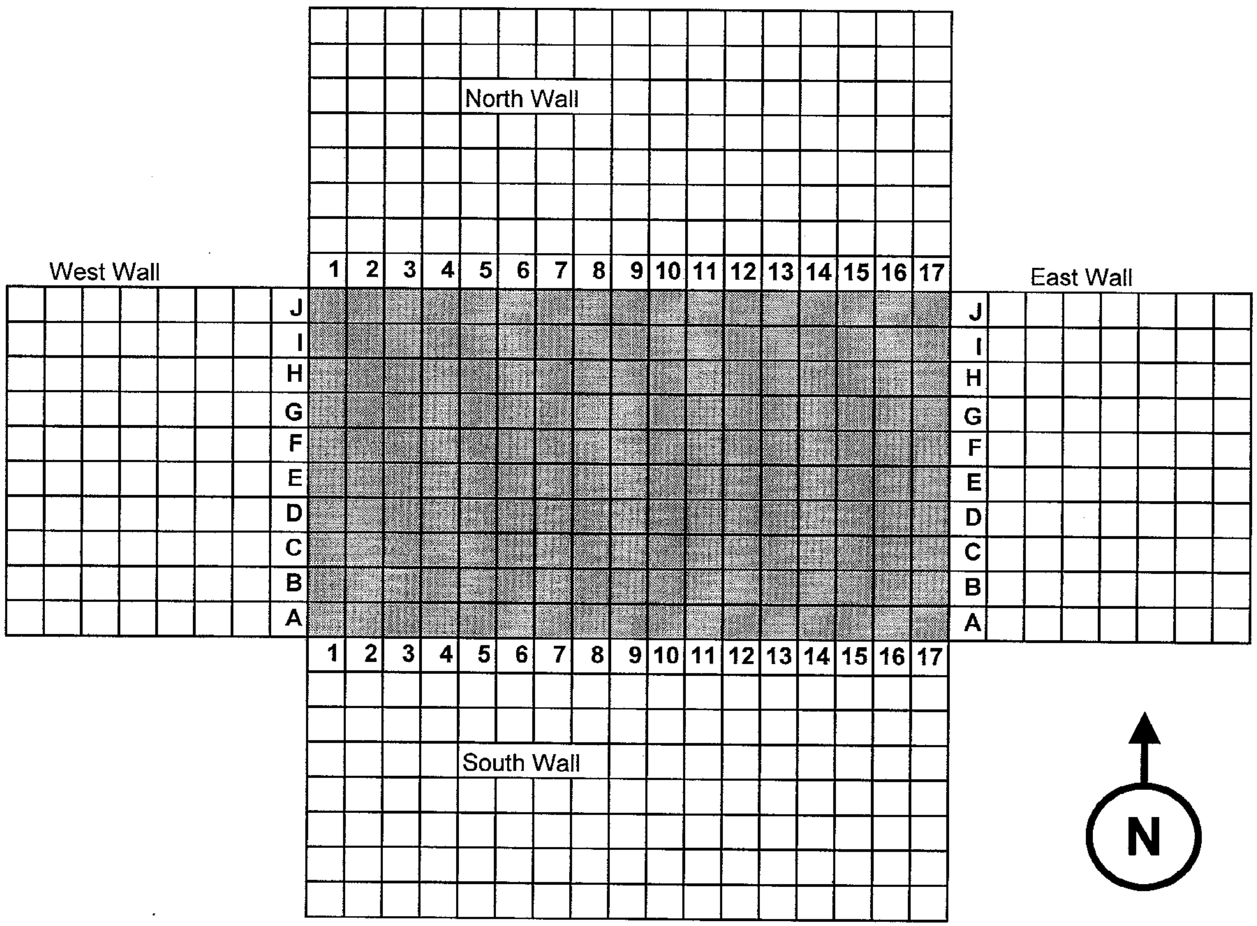
LEGEND

- Floor Grid
- OV Grid
- ESSAP Survey Grid
- OV Fixed Point

OVERSIGHT VERIFICATION SURVEY GRID
SANTA SUSANA FIELD LABORATORY
BUILDING 4059
East Stairwell - Staircase 4

Tetra Tech EM Inc.

EPA Region 9
Oversight Verification (OV) Survey Grids



LEGEND

Floor Grid

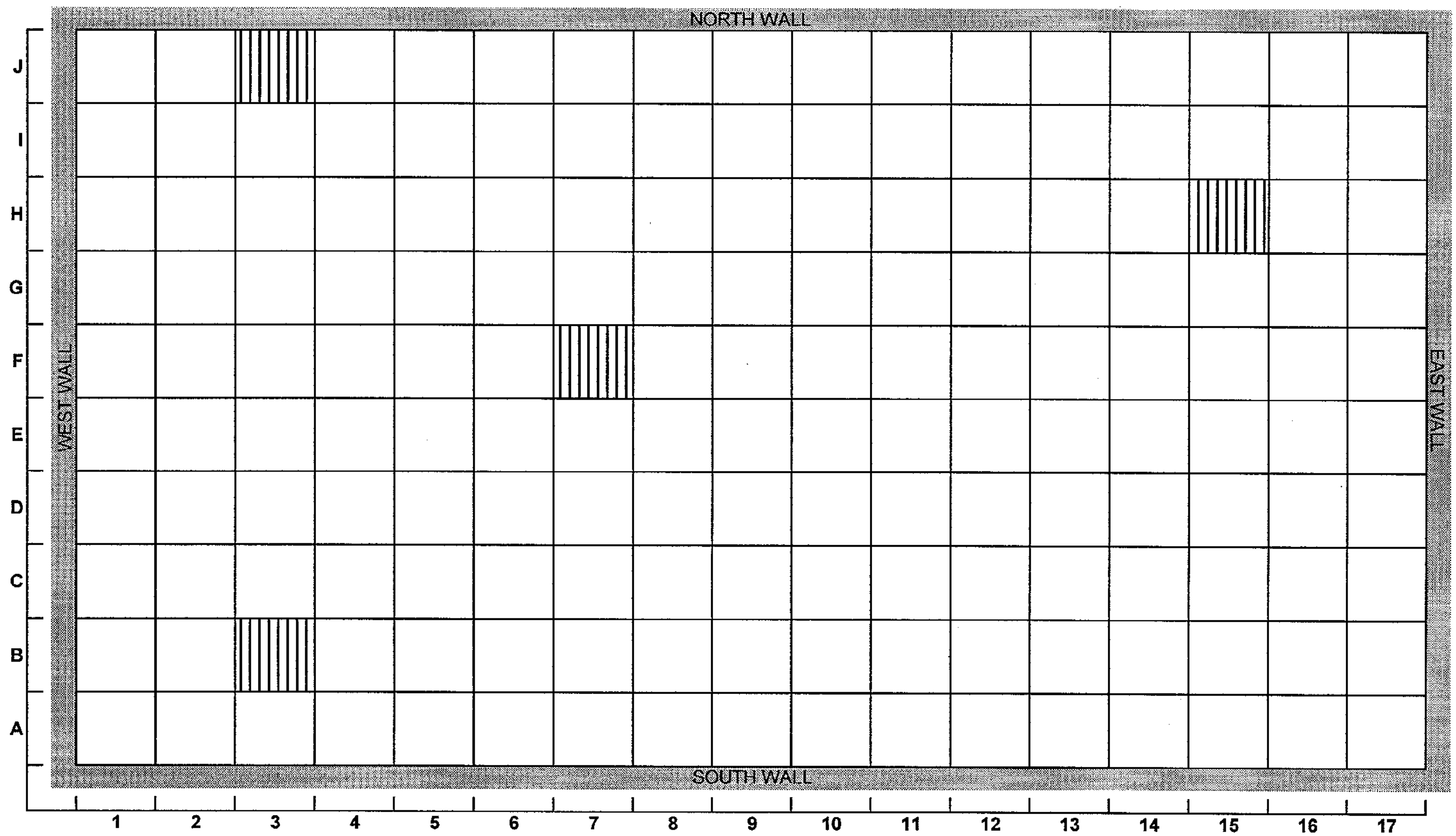
ESSAP Survey Grid

OV Survey Grid

OV Fixed Coint

OVERSIGHT VERIFICATION SURVEY GRID
SANTA SUSANA FIELD LABORATORY
BUILDING 4059
High Bay Overview

Tetra Tech EM Inc.



LEGEND

Floor Grid

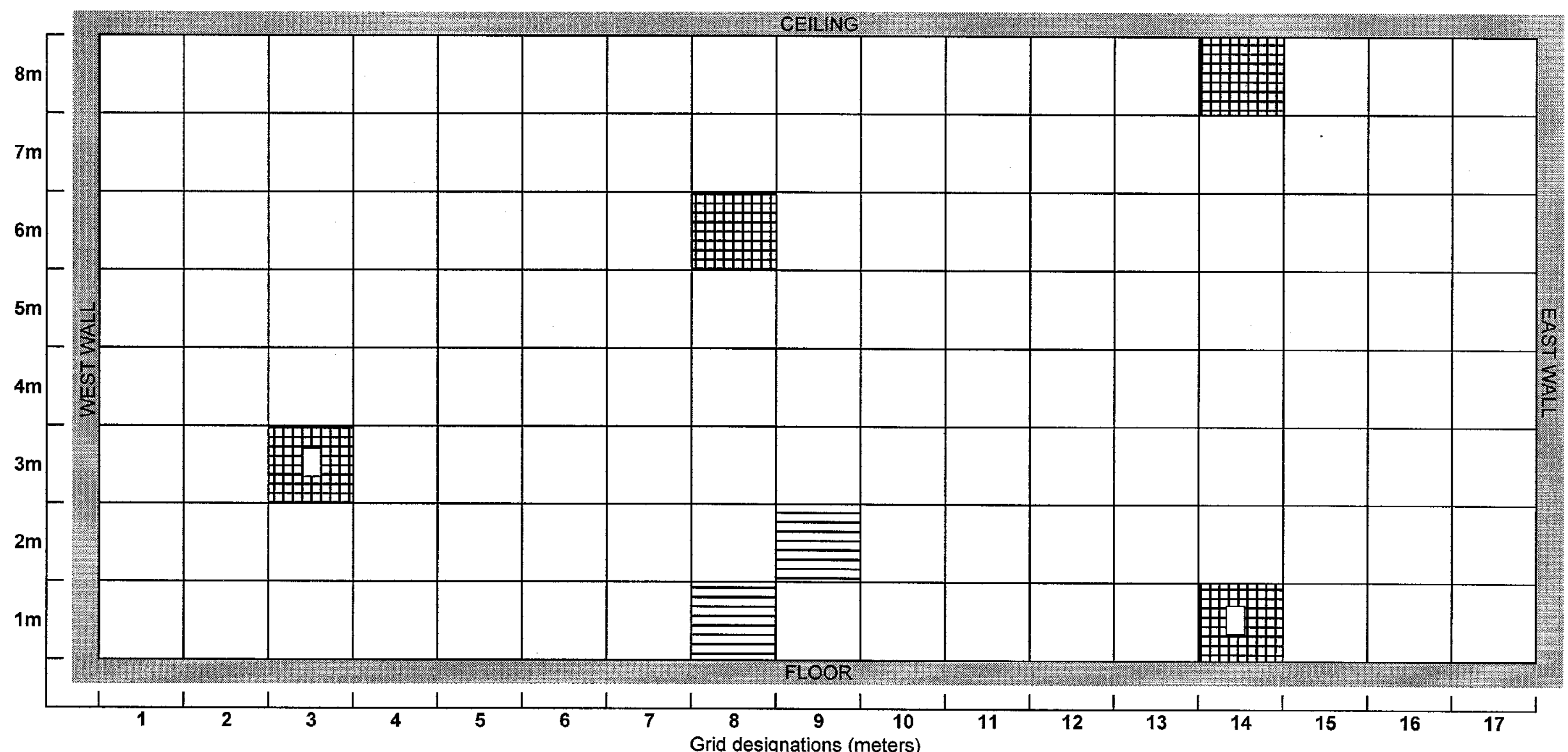
ESSAP Survey Grid

Ovesight Survey Grid

Oversight Fixed Point

OVERSIGHT VERIFICATION SURVEY GRID
SANTA SUSANA FIELD LABORATORY
BUILDING 4059
HIGH BAY FLOOR

Tetra Tech EM Inc.



LEGEND

Wall Grid

ESSAP Survey Grid

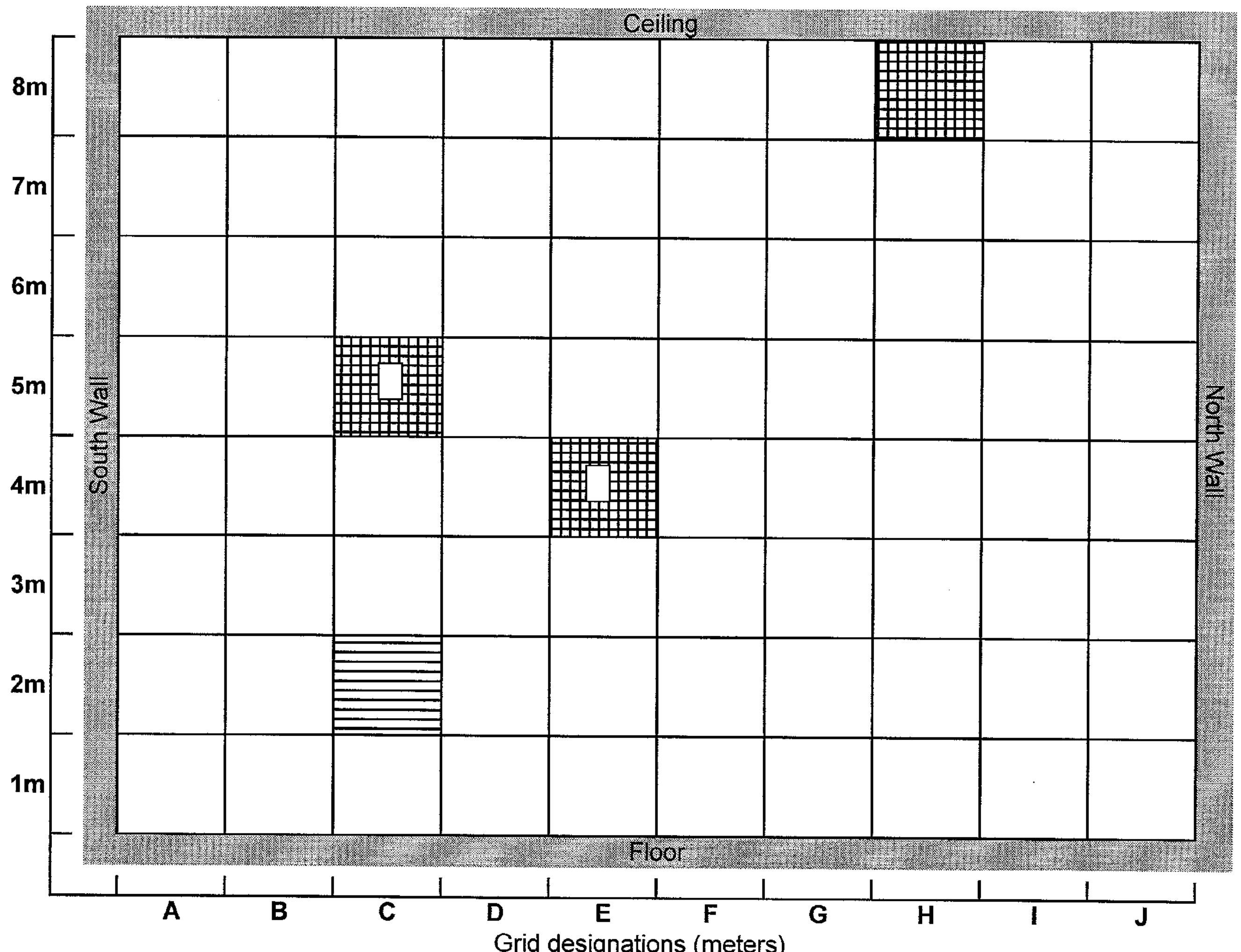
Oversight Survey Gri

Oversight Fixed Point

OVERSIGHT VERIFICATION SURVEY GRID
SANTA SUSANA FIELD LABORATORY
BUILDING 4059
HIGH BAY NORTH WALL

Tetra Tech EM Inc.

EPA Region 9
Oversight Verification (OV) Survey Grids



LEGEND

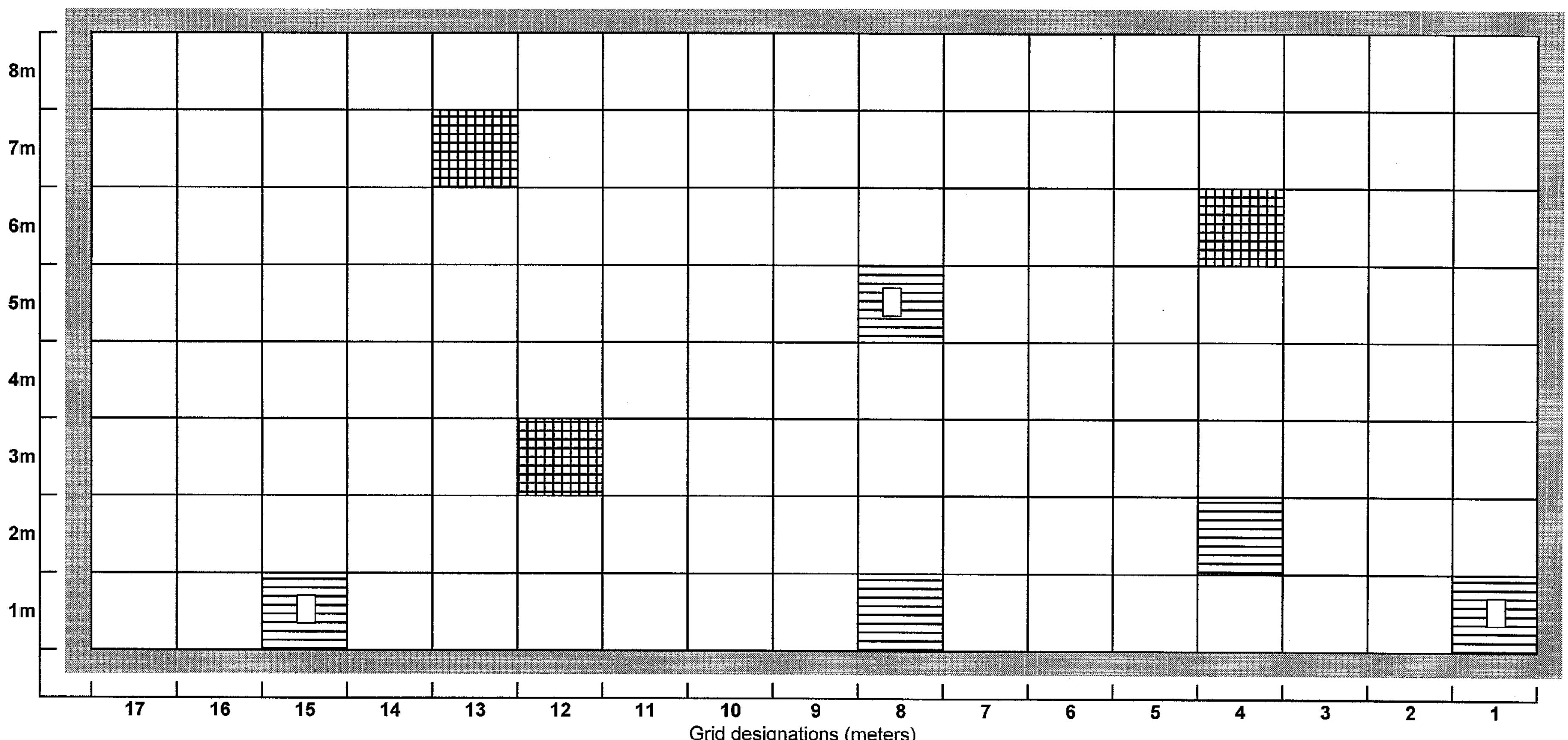
Wall Grid

Oversight Survey Grid

ESSAP Survey Grid

Oversight Fixed Point

OVERSIGHT VERIFICATION SURVEY GRID
SANTA SUSANA FIELD LABORATORY
BUILDING 4059
HIGH BAY WEST WALL
Tetra Tech EM Inc.



LEGEND

Wall Grid

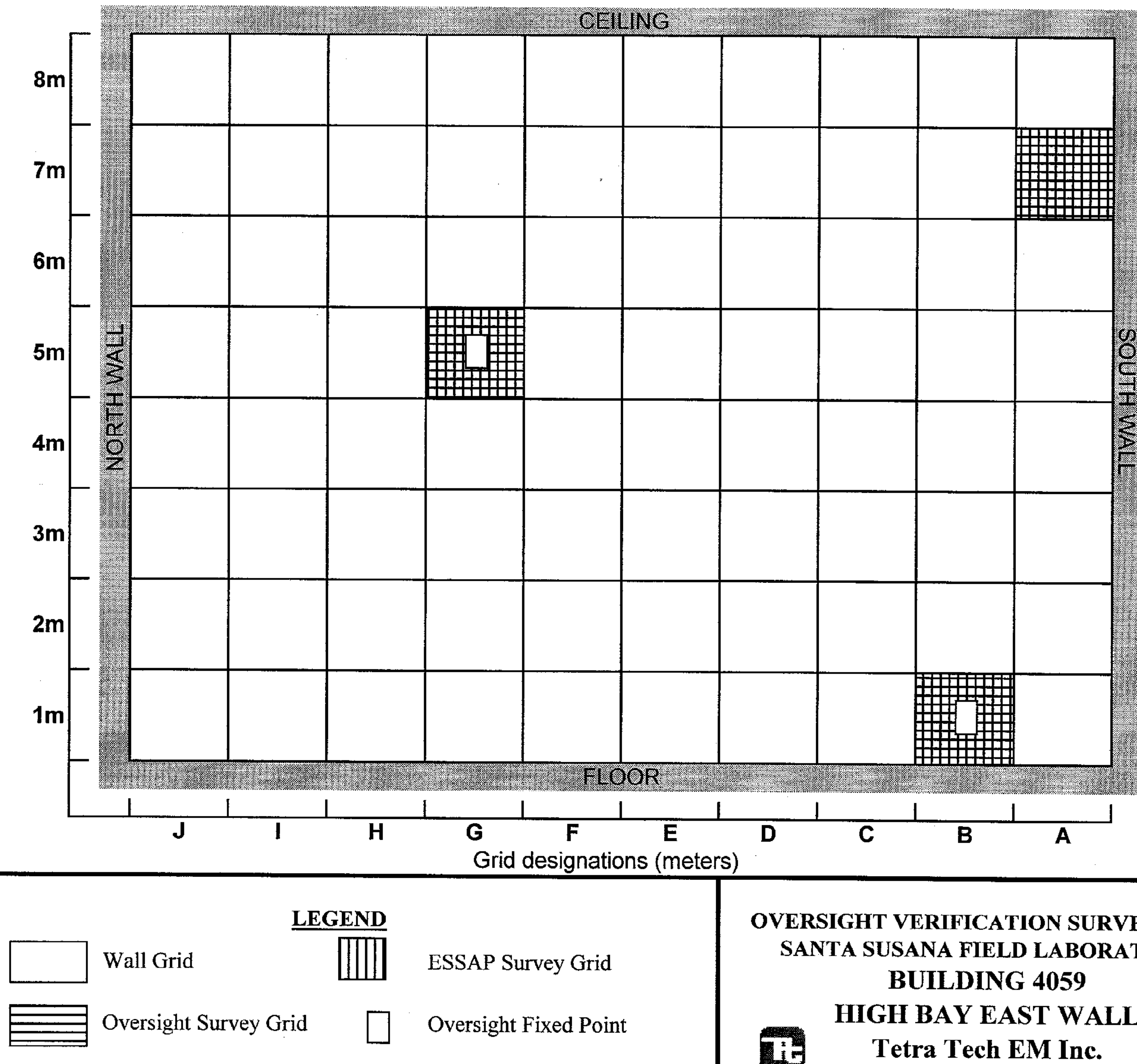
ESSAP Survey Grid

Oversight Survey Grid

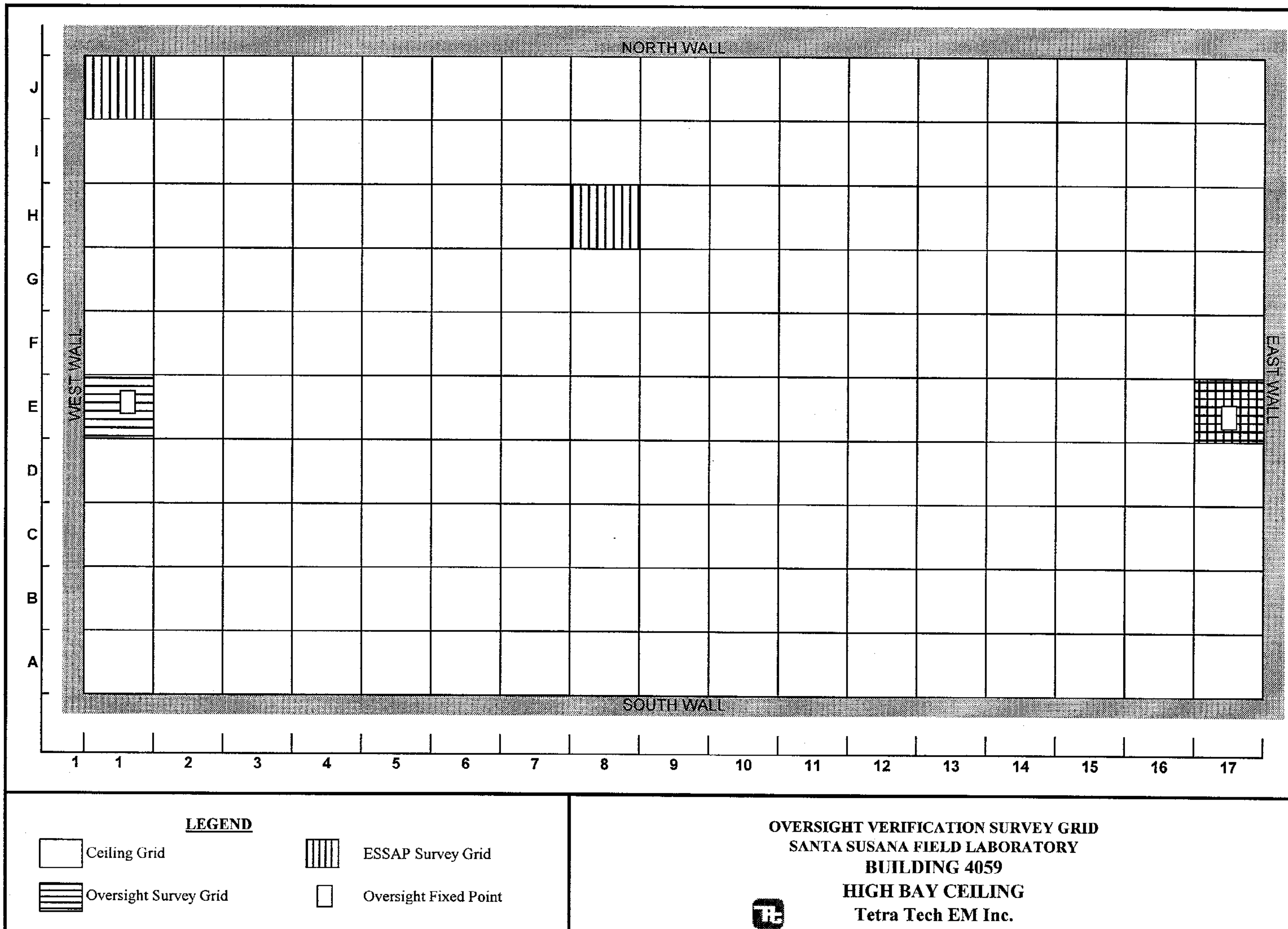
Oversight Fixed Point

OVERSIGHT VERIFICATION SURVEY GRID
SANTA SUSANA FIELD LABORATORY
BUILDING 4059
HIGH BAY SOUTH WALL
Tetra Tech EM Inc.

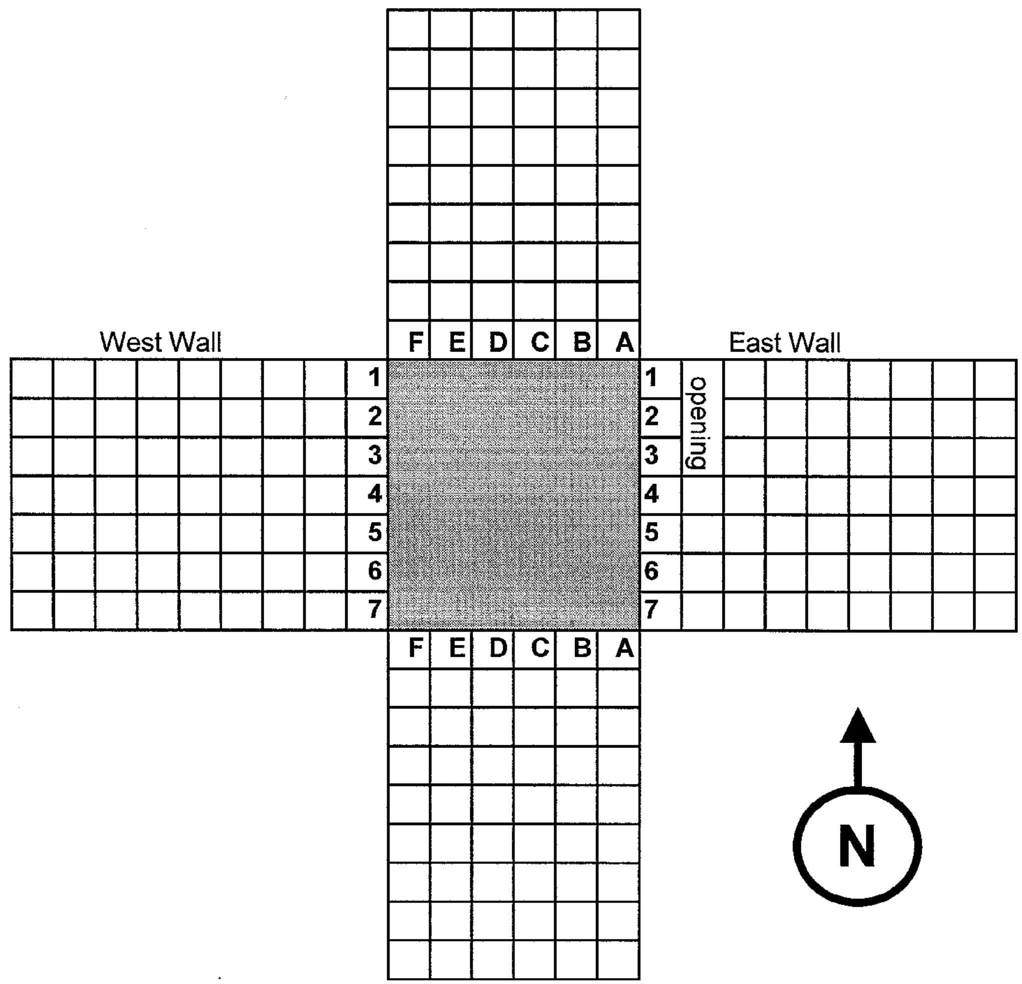
EPA Region 9
Oversight Verification (OV) Survey Grids



OVERSIGHT VERIFICATION SURVEY GRID
SANTA SUSANA FIELD LABORATORY
BUILDING 4059
HIGH BAY EAST WALL
Tetra Tech EM Inc.



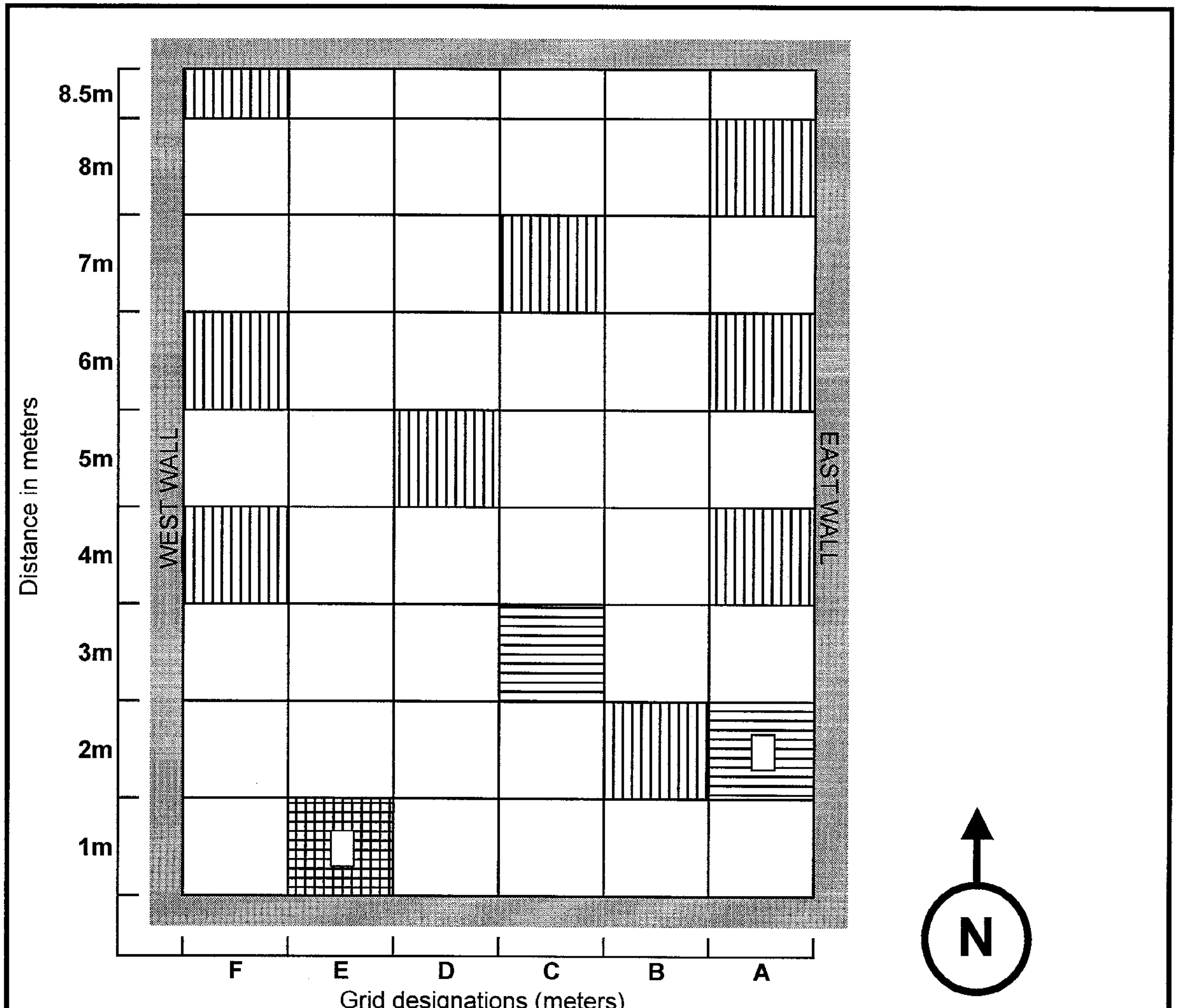
OVERSIGHT VERIFICATION SURVEY GRID
SANTA SUSANA FIELD LABORATORY
BUILDING 4059
HIGH BAY CEILING
Tetra Tech EM Inc.



OVERSIGHT VERIFICATION SURVEY GRID
SANTA SUSANA FIELD LABORATORY
BUILDING 4059
Vacuum Equipment Room Overview

Tetra Tech EM Inc.

EPA Region 9
Oversight Verification (OV) Survey Grids



LEGEND

Wall Grid

ESSAP Survey Grid

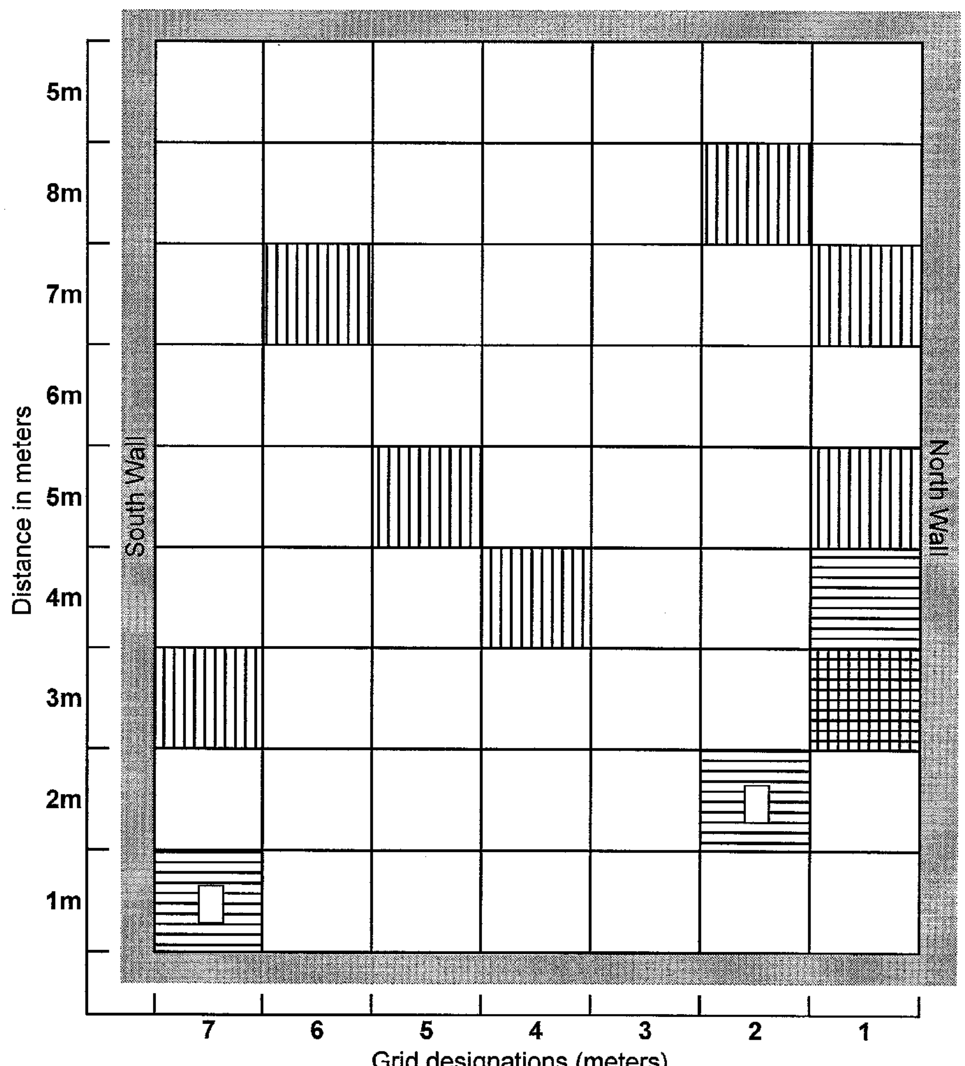
Oversight Survey Grid

Oversight Fixed Point

OVERSIGHT VERIFICATION SURVEY GRID
SANTA SUSANA FIELD LABORATORY
BUILDING 4059
Vacuum Equipment Room North Wall

Tetra Tech EM Inc.

EPA Region 9
Oversight Verification (OV) Survey Grids

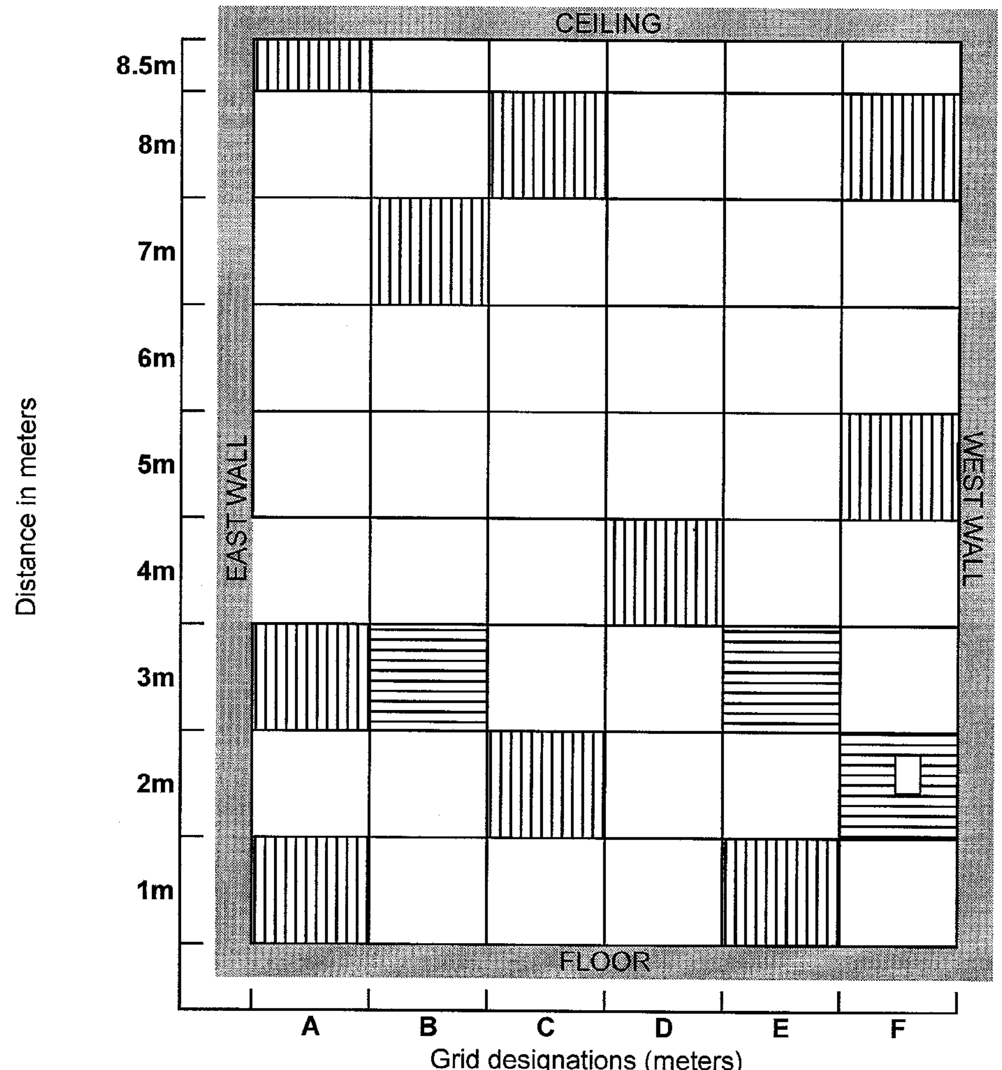


LEGEND

Wall Grid
ESSAP Survey Grid
Oversight Survey Grid
Oversight Fixed Point

OVERSIGHT VERIFICATION SURVEY GRID
SANTA SUSANA FIELD LABORATORY
BUILDING 4059
Vacuum Equipment Room West Wall
Tetra Tech EM Inc.

EPA Region 9
Oversight Verification (OV) Survey Grids

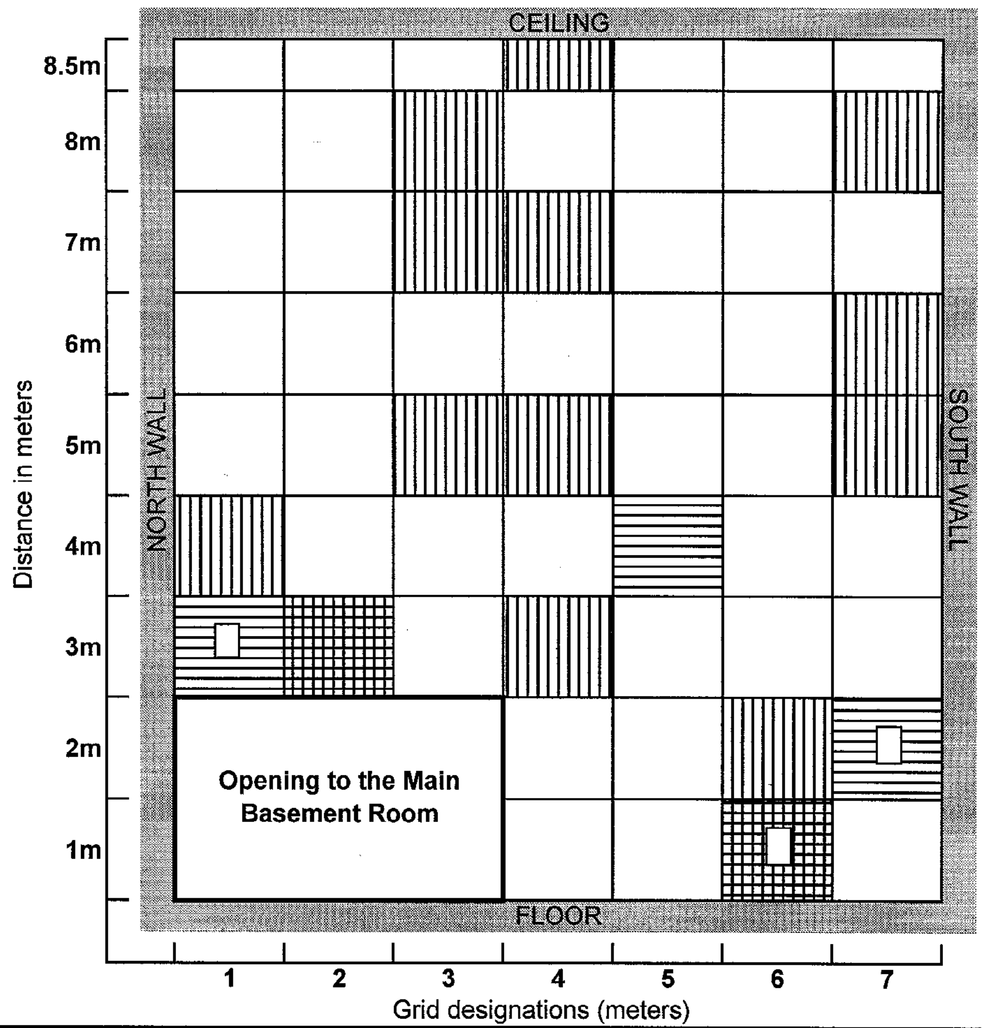


LEGEND

- Wall Grid
- ESSAP Survey Grid
- Oversight Survey Grid
- Oversight Fixed Point

OVERSIGHT VERIFICATION SURVEY GRID
SANTA SUSANA FIELD LABORATORY
BUILDING 4059
Vacuum Equipment Room South Wall

Tetra Tech EM Inc.



LEGEND

Wall Grid

ESSAP Survey Grid

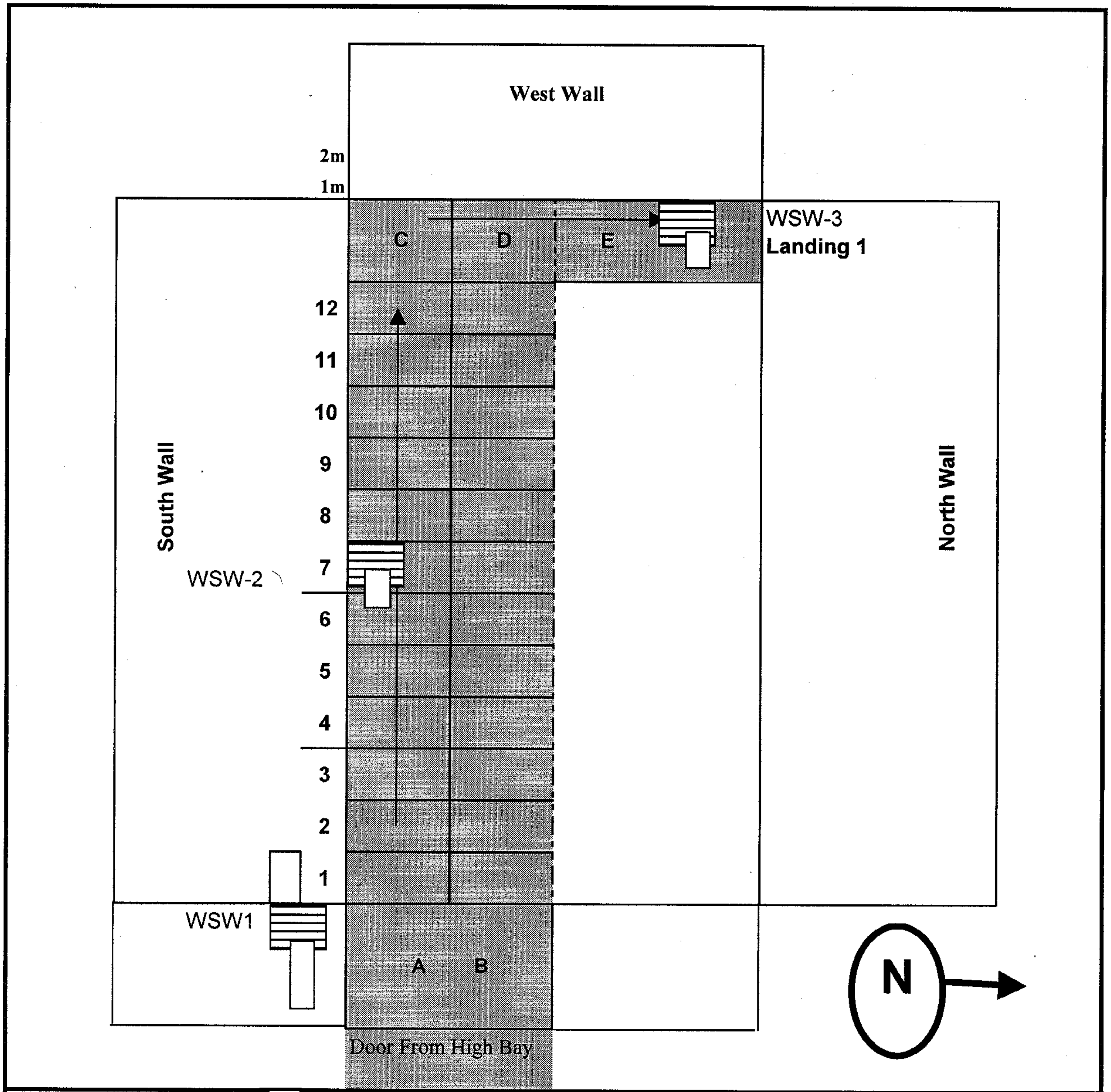
Oversight Survey Grid

Oversight Fixed Point

OVERSIGHT VERIFICATION SURVEY GRID
SANTA SUSANA FIELD LABORATORY
BUILDING 4059

Vacuum Equipment Room East Wall

Tetra Tech EM Inc.



Floor Grid

OV Grid

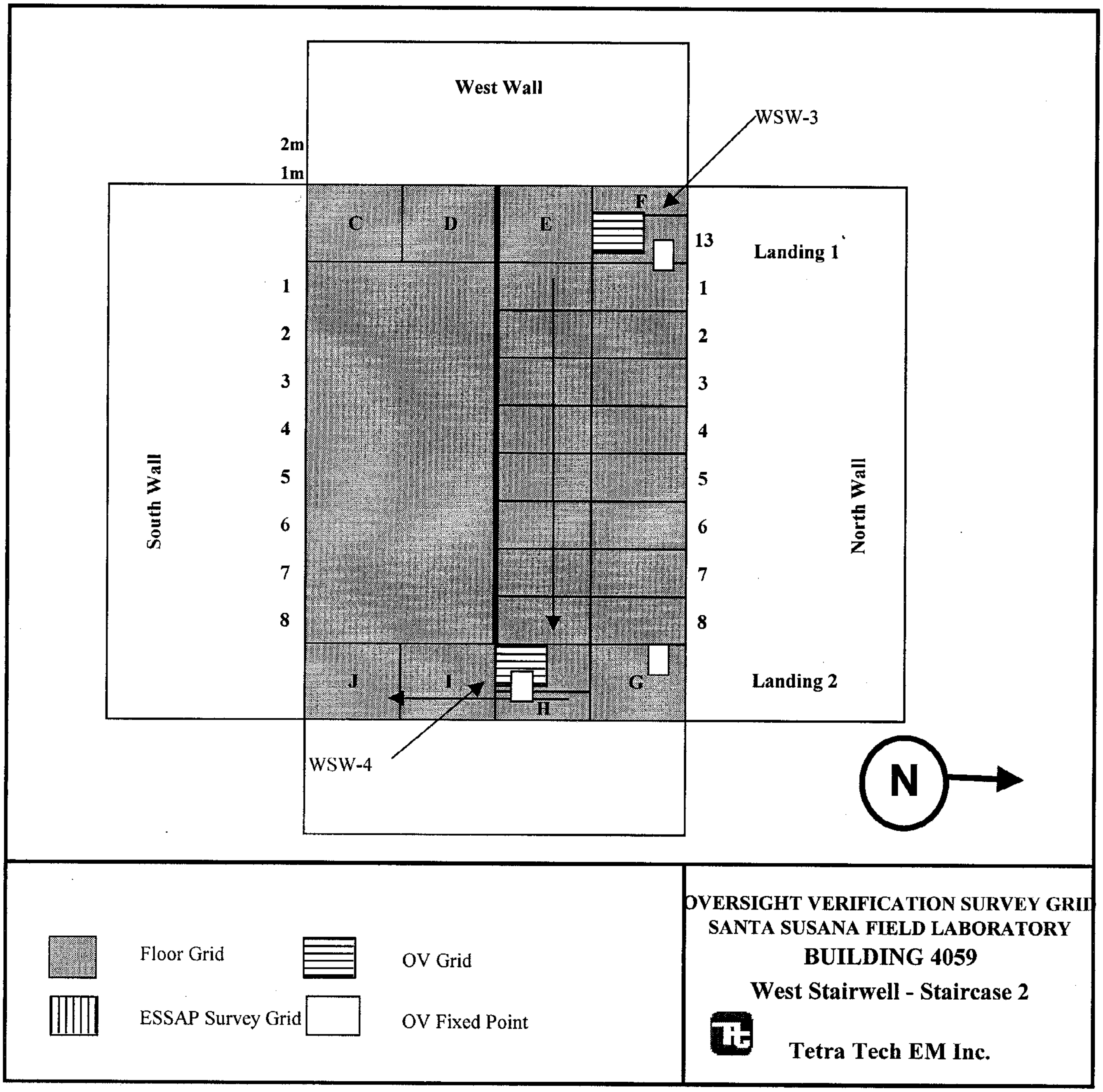
ESSAP Survey Grid

OV Fixed Point

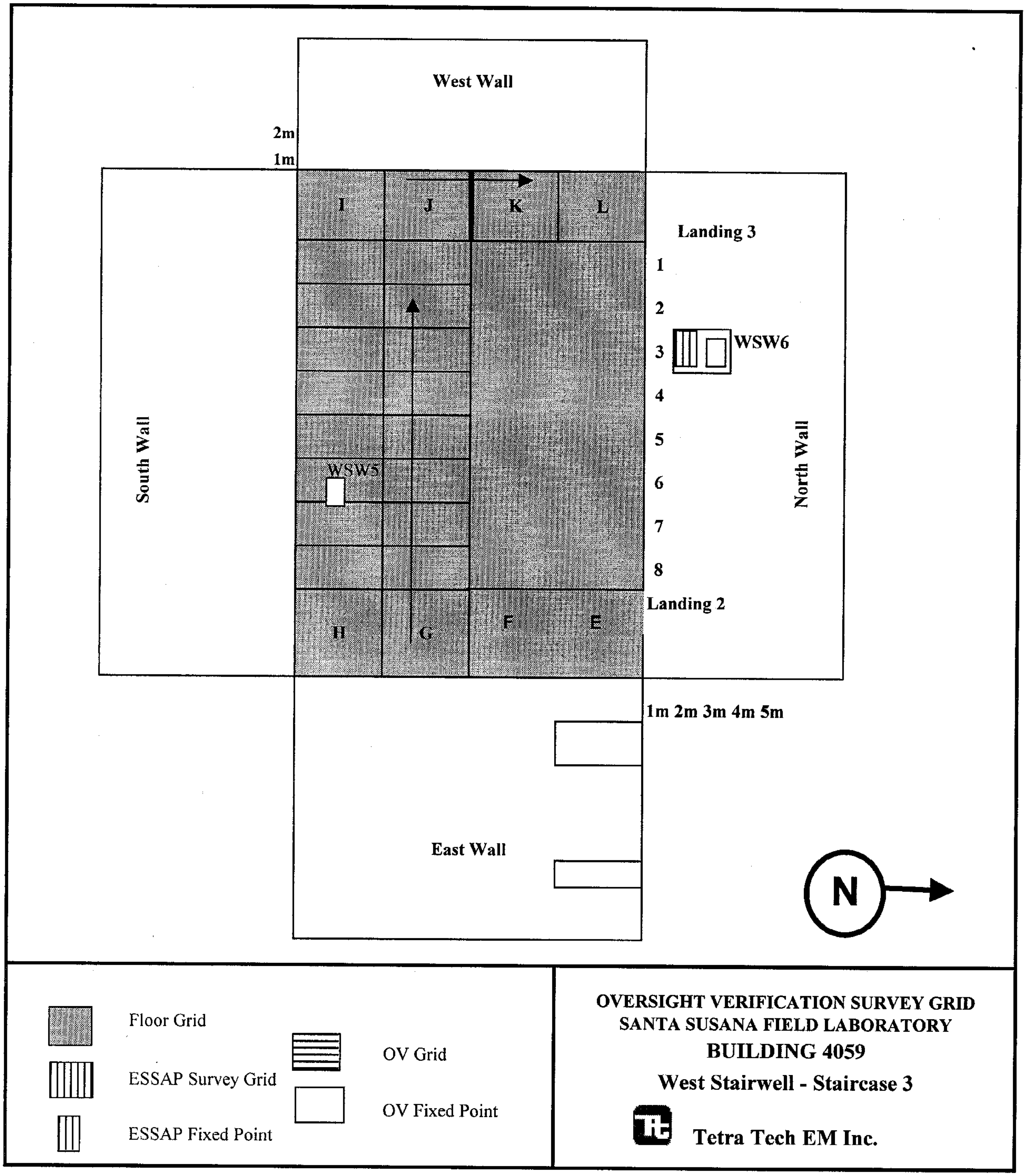
OVERSIGHT VERIFICATION SURVEY GRID
SANTA SUSANA FIELD LABORATORY
BUILDING 4059
West Stair Well - Staircase 1

Tetra Tech EM Inc.

EPA Region 9
Oversight Verification (OV) Survey Grids

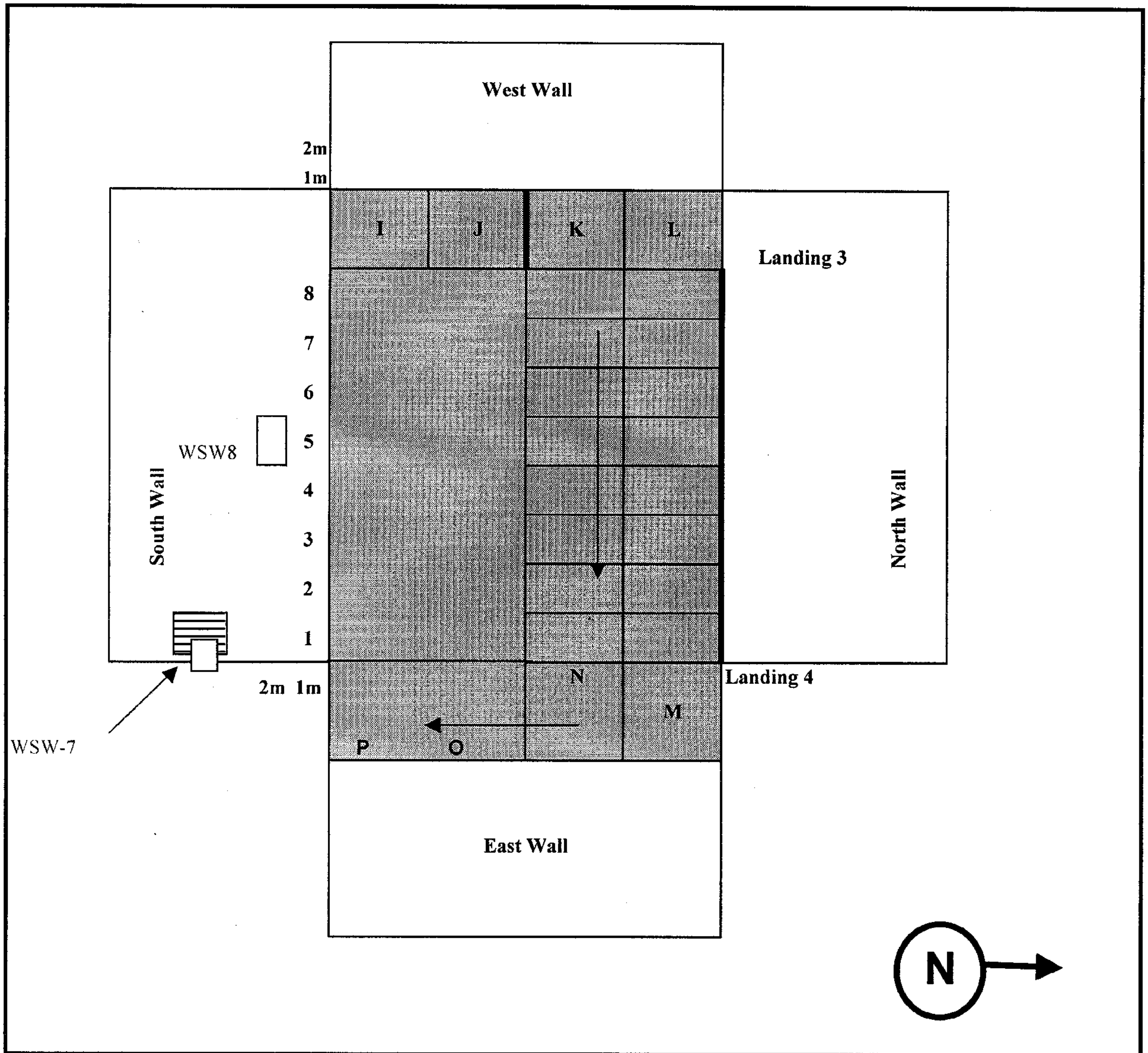


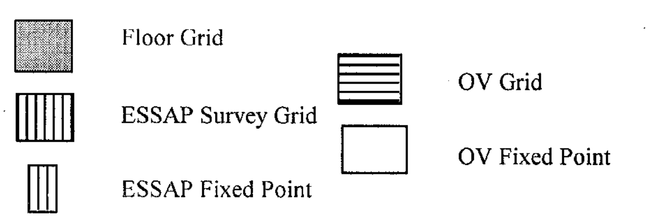
OVERSIGHT VERIFICATION SURVEY GRID
SANTA SUSANA FIELD LABORATORY
BUILDING 4059
West Stairwell - Staircase 2
Tetra Tech EM Inc.



OVERSIGHT VERIFICATION SURVEY GRID
SANTA SUSANA FIELD LABORATORY
BUILDING 4059
West Stairwell - Staircase 3

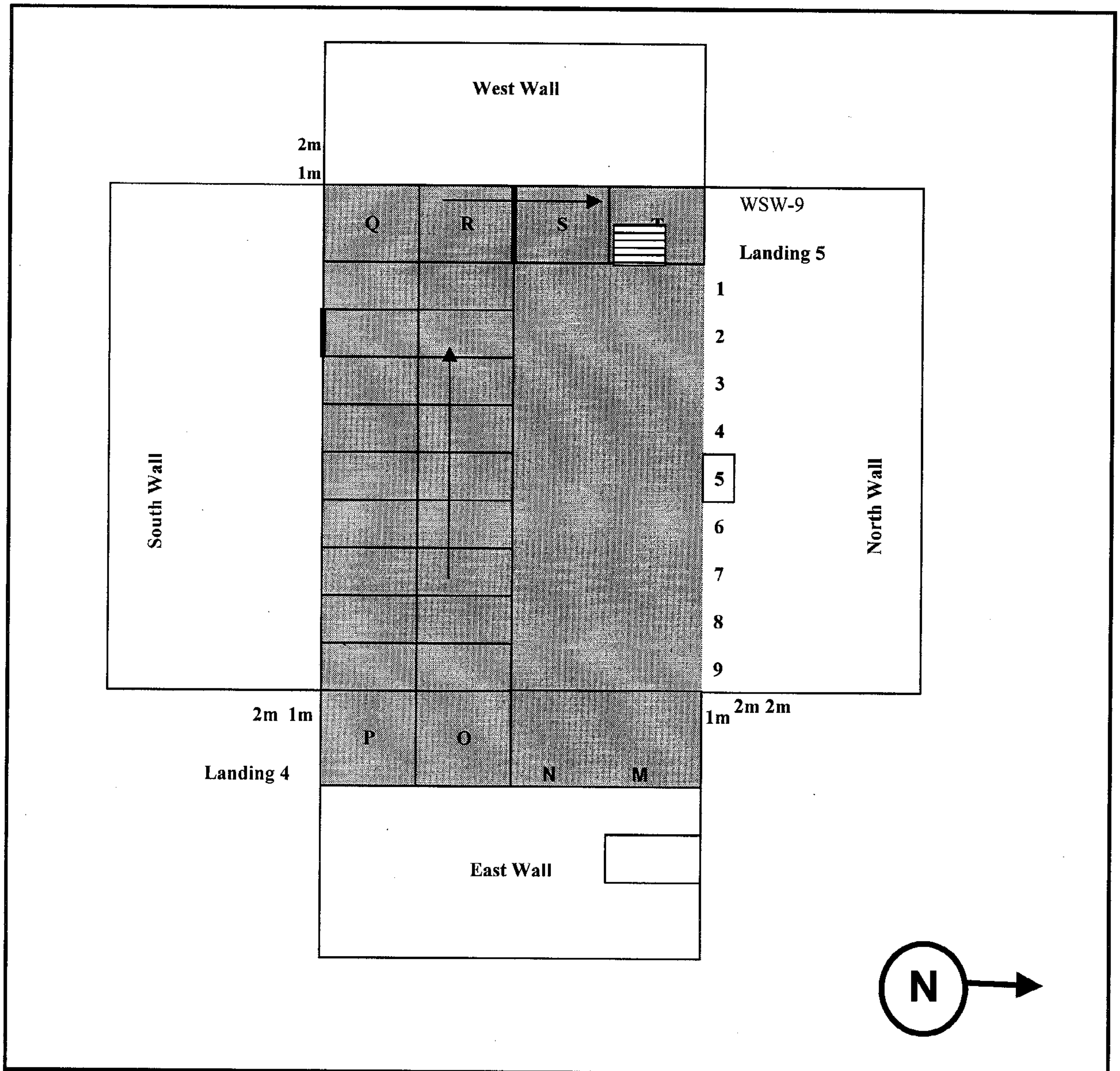
Tetra Tech EM Inc.

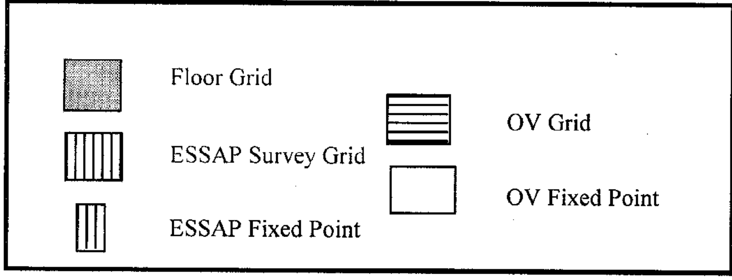




OVERSIGHT VERIFICATION SURVEY GRID
SANTA SUSANA FIELD LABORATORY
BUILDING 4059
West Stairwell - Staircase 4

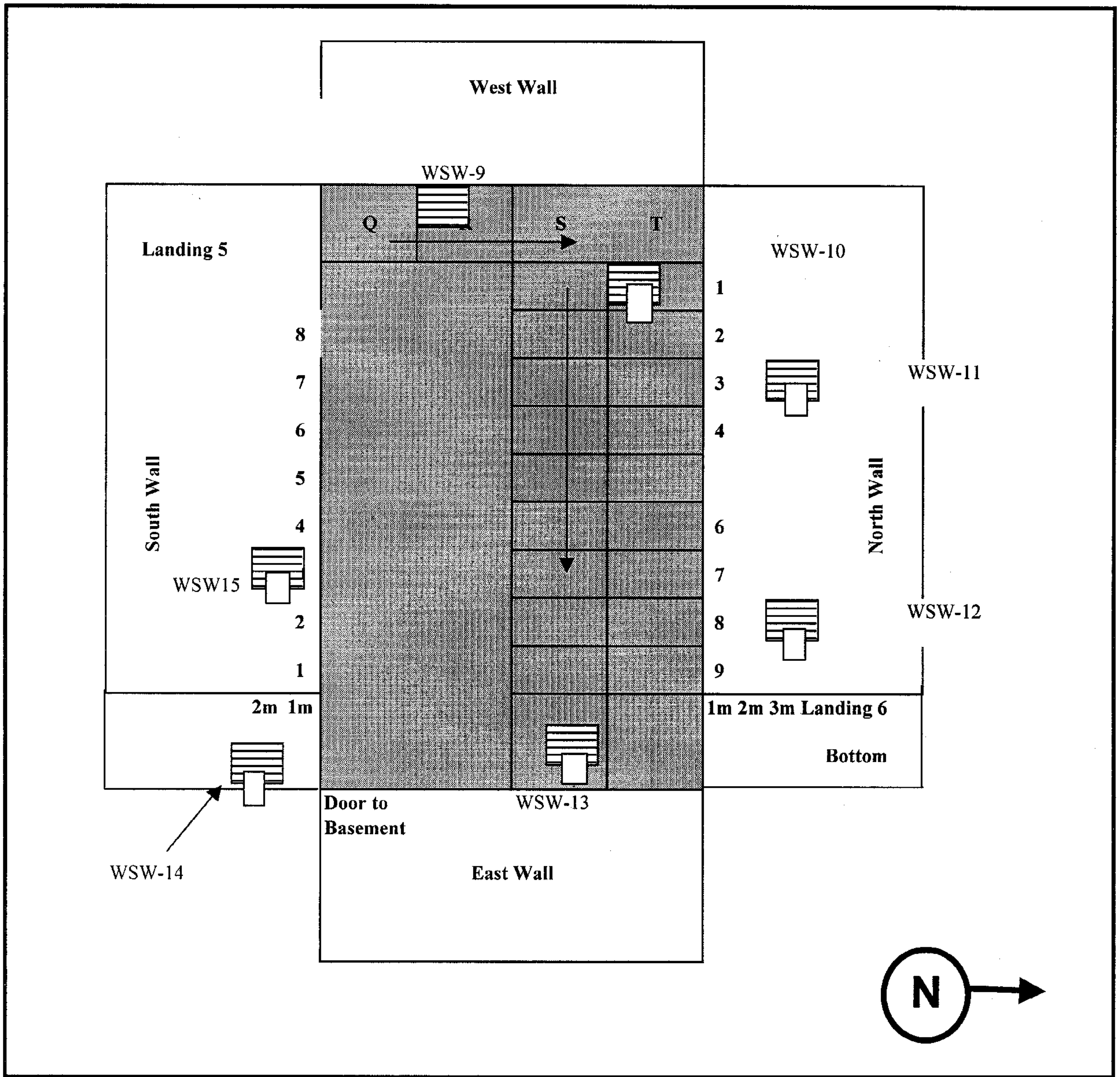
Tetra Tech EM Inc.





OVERSIGHT VERIFICATION SURVEY GRID
SANTA SUSANA FIELD LABORATORY
BUILDING 4059
West Stairwell - Staircase 5

Tetra Tech EM Inc.



Floor Grid
ESSAP Survey Grid
ESSAP Fixed Point
OV Grid
OV Fixed Point

OVERSIGHT VERIFICATION SURVEY GRID
SANTA SUSANA FIELD LABORATORY
BUILDING 4059
West Stairwell - Staircase 6

Tetra Tech EM Inc.

APPENDIX B
SURVEY DATA
(19 Pages)

TABLE B-1
SURVEY DATA
ROCKETDYNE

Det. Case	date	Building	Room	Fix or Scan	Type	Field Notes Grid Coor.	Survey Report Grid Coordinates	Sequence No.	Count	Notes	Count Rate	Sample time	Bkg Rate	Net count rate	Activity	%error	units	criteria	flag
ea	10/23/2000	4059	high bay	sa		15ax	15-1m	1	325	south wall	325	1	219.40	106	1189.79	33.5%	dpm/100 cm2	5000	pass
ea	10/23/2000	4059	high bay	sm		15ax	15-1m	2	400	south wall	400	1	219.40	181	2034.81	21.7%	dpm/100 cm2	15000	pass
ea	10/23/2000	4059	high bay	sa		8ax	8-1m	3	300	south wall	300	1	219.40	81	908.12	42.1%	dpm/100 cm2	5000	pass
ea	10/23/2000	4059	high bay	sm		8ax	8-1m	4	400	south wall	400	1	219.40	181	2034.81	21.7%	dpm/100 cm2	15000	pass
ea	10/23/2000	4059	high bay	sa		4ay	4-2m	5	275	south wall	275	1	219.40	56	626.44		dpm/100 cm2	5000	pass
ea	10/23/2000	4059	high bay	sm		4ay	4-2m	6	350	south wall	350	1	219.40	131	1471.46	28.1%	dpm/100 cm2	15000	pass
ea	10/23/2000	4059	high bay	sa		0ax	1-1m	7	225	south wall	225	1	219.40	6	63.09		dpm/100 cm2	5000	pass
ea	10/24/2000	4059	high bay	sm		0ax	1-1m	8	300	south wall	300	1	219.40	81	908.12	42.1%	dpm/100 cm2	15000	pass
eb	10/24/2000	4059	west stairwell	sa		0ay	WSW-1	9	200	dry wall, WSW1	200	1	173.00	27	304.21		dpm/100 cm2	5000	pass
eb	10/24/2000	4059	west stairwell	sm		0ay	WSW-1	10	300	dry wall, WSW1	300	1	173.00	127	1430.90	26.7%	dpm/100 cm2	15000	pass
eb	10/24/2000	4059	west stairwell	sa		ax6-8	WSW-2	11	300	concrete step 7	300	1	173.00	127	1430.90	26.7%	dpm/100 cm2	5000	pass
eb	10/24/2000	4059	west stairwell	sm		ax6-8	WSW-2	12	400	concrete step 7	400	1	173.00	227	2557.60	17.3%	dpm/100 cm2	15000	pass
eb	10/24/2000	4059	west stairwell	sa		d13w	WSW-3	13	250	steel, WSW3	250	1	173.00	77	867.56	40.2%	dpm/100 cm2	5000	pass
eb	10/24/2000	4059	west stairwell	sm		d13w	WSW-3	14	400	steel, WSW3	400	1	173.00	227	2557.60	17.3%	dpm/100 cm2	15000	pass
en	10/24/2000	4059	west stairwell	sa		d13y	WSW-4	15	325	concrete	325	1	267.20	58	651.23		dpm/100 cm2	5000	pass
en	10/24/2000	4059	west stairwell	sm		d13y	WSW-4	16	425	concrete	425	1	267.20	158	1777.93	25.6%	dpm/100 cm2	15000	pass
en	10/24/2000	4059	west stairwell	sa		f2-4x	WSW-6	17	350	concrete, WSW6	350	1	267.20	83	932.90	44.3%	dpm/100 cm2	5000	pass
en	10/24/2000	4059	west stairwell	sm		f2-4x	WSW-6	18	400	concrete, WSW6	400	1	267.20	133	1496.25	29.5%	dpm/100 cm2	15000	pass
en	10/24/2000	4059	west stairwell	sa		f9y	WSW-7	19	325	concrete wall	325	1	267.20	58	651.23		dpm/100 cm2	5000	pass
en	10/24/2000	4059	west stairwell	sm		f9y	WSW-7	20	400	concrete wall	400	1	267.20	133	1496.25	29.5%	dpm/100 cm2	15000	pass
en	10/24/2000	4059	west stairwell	sa		h4-6x	WSW-8	21	300	concrete wall, step 5	300	1	267.20	33	369.56		dpm/100 cm2	5000	pass
en	10/24/2000	4059	west stairwell	sm		h4-6x	WSW-8	22	400	concrete wall, step 5	400	1	267.20	133	1496.25	29.5%	dpm/100 cm2	15000	pass
en	10/24/2000	4059	west stairwell	sa		j0w	WSW-9	23	250	steel landing 5	250	1	267.20	-17	-193.79		dpm/100 cm2	5000	pass
en	10/24/2000	4059	west stairwell	sm		j0w	WSW-9	24	300	steel landing 5	300	1	267.20	33	369.56		dpm/100 cm2	15000	pass
ed	10/24/2000	4059	west stairwell	sa		j1-2w	WSW-10	25	225	steel step	225	1	154.00	71	799.95	41.4%	dpm/100 cm2	5000	pass
ed	10/24/2000	4059	west stairwell	sm		j1-2w	WSW-10	26	300	steel step	300	1	154.00	146	1644.98	23.3%	dpm/100 cm2	15000	pass
ed	10/24/2000	4059	west stairwell	sa		j1-3x	WSW-11	27	325	concrete wall	325	1	154.00	171	1926.65	20.7%	dpm/100 cm2	5000	pass
ed	10/24/2000	4059	west stairwell	sm		j1-3x	WSW-11	28	400	concrete wall	400	1	154.00	246	2771.67	15.9%	dpm/100 cm2	15000	pass
ed	10/24/2000	4059	west stairwell	sa		j9x	WSW-12	29	300	concrete wall	300	1	154.00	146	1644.98	23.3%	dpm/100 cm2	5000	pass
ed	10/24/2000	4059	west stairwell	sm		j9x	WSW-12	30	350	concrete wall	350	1	154.00	196	2208.32	18.7%	dpm/100 cm2	15000	pass
ee	10/24/2000	4059	basement	sa		z8y	A-2m	31	175	south wall	175	1	201.80	-27	-301.95		dpm/100 cm2	5000	pass
ee	10/24/2000	4059	basement	sm		z8y	A-2m	32	300	south wall	300	1	201.80	98	1106.42	34.6%	dpm/100 cm2	15000	pass
ee	10/24/2000	4059	basement	sa		e8x	F-1m	33	200	south wall	200	1	201.80	-2	-20.28		dpm/100 cm2	5000	pass
ee	10/24/2000	4059	basement	sm		e8x	F-1m	34	250	south wall	250	1	201.80	48	543.07		dpm/100 cm2	15000	pass
ej	10/24/2000	4059	basement	sa		k8x	L-1m	35	200	south wall	200	1	192.20	8	87.88		dpm/100 cm2	5000	pass
ej	10/24/2000	4059	basement	sm		k8x	L-1m	36	250	south wall	250	1	192.20	58	651.23	53.6%	dpm/100 cm2	15000	pass
ej	10/24/2000	4059	basement	sa		5ly	6-2m	37	225	west wall, W-1	225	1	192.20	33	369.56		dpm/100 cm2	5000	pass
ej	10/24/2000	4059	basement	sm		5ly	6-2m	38	350	west wall, W-1	350	1	192.20	158	1777.93	23.2%	dpm/100 cm2	15000	pass
ef	10/24/2000	4059	basement	sa		0zy	1-2m	39	200	east wall, E-3	200	1	184.80	15	171.26		dpm/100 cm2	5000	pass
ef	10/24/2000	4059	basement	sm		0zy	1-2m	40	250	east wall, E-3	250	1	184.80	65	734.61	47.5%	dpm/100 cm2	15000	pass
ef	10/24/2000	4059	basement	sa		2zx	3-1m	41	200	east wall	200	1	184.80	15	171.26		dpm/100 cm2	5000	pass
ef	10/24/2000	4059	basement	sm		2zx	3-1m	42	350	east wall	350	1	184.80	165	1861.30	22.2%	dpm/100 cm2	15000	pass
ef	10/24/2000	4059	basement	sa		5zx	6-1m	43	200	east wall	200	1	184.80	15	171.26		dpm/100 cm2	5000	pass
ef	10/24/2000	4059	basement	sm		5zx	6-1m	44	225	east wall	225	1	184.80	40	452.93		dpm/100 cm2	15000	pass
ek	10/24/2000	4059	basement	sa		k0y	L-3m	45	300	north wall, N-3	300	1	371.80	-72	-808.97		dpm/100 cm2	5000	pass
ek	10/24/2000	4059	basement	sm		k0y	L-3m	46	450	north wall, N-3	450	1	371.80	78	881.08	53.2%	dpm/100 cm2	15000	pass
ek	10/24/2000	4059	basement	sa		e0x	G-1m	47	200	north wall	200	1	371.80	-172	-1935.66		dpm/100 cm2	5000	pass
ek	10/24/2000	4059	basement	sm		e0x	G-1m	48	225	north wall	225	1	371.80	-147	-1653.99		dpm/100 cm2	15000	pass
ek	10/24/2000	4059	basement	sa		c0x	C-1m	49	200	north wall, N-26	200	1	371.80	-172	-1935.66		dpm/100 cm2	5000	pass
ek	10/24/2000	4059	basement	sm		c0x	C-1m	50	275	north wall, N-26	275	1	371.80	-97	-1090.64		dpm/100 cm2	15000	pass
eg	10/24/2000	4059	vaccuum equipment room	sa		x0y	A-2m	51	500	north wall	500	1	243.80	256	2886.59	17.1%	dpm/100 cm2	5000	pass

TABLE B-1
SURVEY DATA
ROCKETDYNE

Det. Case	date	Building	Room	Fix or Scan	Type	Field Notes Grid Coor.	Survey Report Grid Coordinates	Sequence No	Count	Notes	Count Rate	Sample time	Bkg Rate	Net count rate	Activity	%error	units	criteria	flag
eg	10/24/2000	4059	vaccuum equipment room	sm		x0y	A-2m	52	800	north wall	800	1	243.80	556	6266.68	10.0%	dpm/100 cm2	15000	pass
eg	10/24/2000	4059	vaccuum equipment room	sa		l0y	1-3m	53	500	east wall	500	1	243.80	256	2886.59	17.1%	dpm/100 cm2	5000	pass
eg	10/24/2000	4059	vaccuum equipment room	sm		l0y	1-3m	54	800	east wall	800	1	243.80	556	6266.68	10.0%	dpm/100 cm2	15000	pass
eg	10/24/2000	4059	vaccuum equipment room	sa		d0x	E-1m	55	325	north wall, NS-2	325	1	243.80	81	914.88	43.5%	dpm/100 cm2	5000	pass
eg	10/24/2000	4059	vaccuum equipment room	sm		d0x	E-1m	56	400	north wall, NS-2	400	1	243.80	156	1759.90	25.1%	dpm/100 cm2	15000	pass
eh	10/24/2000	4059	vaccuum equipment room	sa		1fy	2-2m	57	325	west wall	325	1	270.20	55	617.43		dpm/100 cm2	5000	pass
eh	10/24/2000	4059	vaccuum equipment room	sm		1fy	2-2m	58	400	west wall	400	1	270.20	130	1462.45	30.2%	dpm/100 cm2	15000	pass
eh	10/24/2000	4059	vaccuum equipment room	sa		a5x	6-1m	59	300	east wall, EWF-7	300	1	270.20	30	335.76		dpm/100 cm2	5000	pass
eh	10/24/2000	4059	vaccuum equipment room	sm		a5x	6-1m	60	350	east wall, EWF-7	350	1	270.20	80	899.10	46.0%	dpm/100 cm2	15000	pass
eh	10/24/2000	4059	vaccuum equipment room	sa		6ay	7-2m	61	325	east wall	325	1	270.20	55	617.43		dpm/100 cm2	5000	pass
eh	10/24/2000	4059	vaccuum equipment room	sm		6ay	7-2m	62	475	east wall	475	1	270.20	205	2307.47	20.9%	dpm/100 cm2	15000	pass
eh	10/24/2000	4059	vaccuum equipment room	sa		6ex	7-1m	63	315	west wall	315	1	270.20	45	504.76		dpm/100 cm2	5000	pass
eh	10/24/2000	4059	vaccuum equipment room	sm		6ex	7-1m	64	410	west wall	410	1	270.20	140	1575.12	28.4%	dpm/100 cm2	15000	pass
eh	10/24/2000	4059	vaccuum equipment room	sa		f5y	F-2m	65	315	south wall	315	1	270.20	45	504.76		dpm/100 cm2	5000	pass
eh	10/24/2000	4059	vaccuum equipment room	sm		f5y	F-2m	66	425	south wall	425	1	270.20	155	1744.12	26.1%	dpm/100 cm2	15000	pass
ei	10/24/2000	4059	high bay	sa		g18zz	G-5m	67	125	east wall, HB-15	125	1	81.60	43	488.99	50.5%	dpm/100 cm2	5000	pass
ei	10/24/2000	4059	high bay	sm		g18zz	G-5m	68	200	east wall, HB-15	200	1	81.60	118	1334.01	23.4%	dpm/100 cm2	15000	pass
ei	10/24/2000	4059	high bay	sa		8azz	8-5m	69	125	south wall, corr.steel	125	1	81.60	43	488.99	50.5%	dpm/100 cm2	5000	pass
ei	10/24/2000	4059	high bay	sm		8azz	8-5m	70	200	south wall, corr.steel	200	1	81.60	118	1334.01	23.4%	dpm/100 cm2	15000	pass
ei	10/24/2000	4059	high bay	sa		c0zz	C-5m	71	120	west wall, HB-8	120	1	81.60	38	432.65	55.9%	dpm/100 cm2	5000	pass
ei	10/24/2000	4059	high bay	sm		c0zz	C-5m	72	150	west wall, HB-8	150	1	81.60	68	770.66	35.1%	dpm/100 cm2	15000	pass
fa	10/23/2000	4059	high bay	f		15ax	15-1m	73	563	south wall	282	2	219.40	62	596.71	53.0%	dpm/100 cm2	15000	pass
fa	10/23/2000	4059	high bay	f		8ax	8-1m	74	599	south wall	300	2	219.40	80	769.67	42.3%	dpm/100 cm2	15000	pass
fa	10/23/2000	4059	high bay	f		0ax	1-1m	75	557	south wall	279	2	219.40	59	567.88	55.3%	dpm/100 cm2	15000	pass
fb	10/23/2000	4059	west stairwell	f		0ay	WSW-1	76	374	dry wall, WSW1	187	2	173.00	14	134.52		dpm/100 cm2	15000	pass
fb	10/23/2000	4059	west stairwell	f		0ay	WSW-1	77	419	dry wall, lower right corner	210	2	173.00	37	350.72		dpm/100 cm2	15000	pass
fb	10/24/2000	4059	west stairwell	f		ax6-8	WSW-2	78	745	concrete step 7	373	2	173.00	200	1916.97	19.0%	dpm/100 cm2	15000	pass
fb	10/24/2000	4059	west stairwell	f		d13w	WSW-3	79	561	steel, WSW3	281	2	173.00	108	1032.95	30.5%	dpm/100 cm2	15000	pass
ga	10/24/2000	4059	west stairwell	f		d13y	WSW-4	80	1639	concrete	328	5	267.20	61	582.30	58.6%	dpm/100 cm2	15000	pass
fn	10/24/2000	4059	west stairwell	f		f2-4x	WSW-6	81	621	concrete, WSW6	311	2	267.20	43	416.06		dpm/100 cm2	15000	pass
fn	10/24/2000	4059	west stairwell	f		e6w	WSW-5	82	439	steel stair, WSW5	220	2	267.20	-48	-458.34		dpm/100 cm2	15000	pass
fn	10/24/2000	4059	west stairwell	f		f9y	WSW-7	83	632	concrete	316	2	267.20	49	468.91	71.4%	dpm/100 cm2	15000	pass
fn	10/24/2000	4059	west stairwell	f		h4-6x	WSW-8	84	590	concrete wall, step 5	295	2	267.20	28	267.13		dpm/100 cm2	15000	pass
fd	10/24/2000	4059	west stairwell	f		j1-2w	WSW-10	85	451	steel step, step 6	226	2	154.00	72	687.03	41.2%	dpm/100 cm2	15000	pass
fd	10/24/2000	4059	west stairwell	f		j1-3x	WSW-11	86	609	concrete wall	305	2	154.00	151	1446.14	22.7%	dpm/100 cm2	15000	pass
fd	10/24/2000	4059	west stairwell	f		j9x	WSW-12	87	662	concrete wall	331	2	154.00	177	1700.77	20.1%	dpm/100 cm2	15000	pass
fe	10/24/2000	4059	basement	f		z8y	A-2m	88	419	south wall	210	2	201.80	8	73.99		dpm/100 cm2	15000	pass
ab	10/24/2000	4059	basement	sm		e8x	F-1m	89	2	south wall	2	1	0.40	2	9.38		dpm/100 cm2	100	pass
fe	10/24/2000	4059	basement	f		e8x	F-1m	90	415	south wall	208	2	201.80	6	54.77		dpm/100 cm2	15000	pass
bb	10/24/2000	4059	basement	f		e8x	F-1m	91	3	south wall	2	2	0.40	1	6.45		dpm/100 cm2	300	pass
ae	10/24/2000	4059	basement	sm		k8x	L-1m	92	3	south wall	3	1	1.00	2	11.73		dpm/100 cm2	300	pass
fj	10/24/2000	4059	basement	f		k8x	L-1m	93	372	south wall	186	2	192.20	-6	-59.58		dpm/100 cm2	15000	pass
be	10/24/2000	4059	basement	f		k8x	L-1m	94	3	south wall	2	2	1.00	1	2.93		dpm/100 cm2	300	pass
aa	10/24/2000	4059	basement	sm		0zy	1-2m	95	2	east wall, E-3	2	1	0.20	2	10.56		dpm/100 cm2	300	pass
ff	10/24/2000	4059	basement	f		0zy	1-2m	96	372	east wall, E-3	186	2	184.80	1	11.53		dpm/100 cm2	15000	pass
ba	10/24/2000	4059	basement	f		0zy	1-2m	97	1	east wall, E-3	1	2	0.20	0	1.76		dpm/100 cm2	300	pass
aa	10/24/2000	4059	basement	sm		2zx	3-1m	98	7	east wall	7	1	0.20	7	39.90	76.0%	dpm/100 cm2	300	pass
ff	10/24/2000	4059	basement	f		2zx	3-1m	99	414	east wall	207	2	184.80	22	213.32		dpm/100 cm2	15000	pass
ba	10/24/2000	4059	basement	f		2zx	3-1m	100	5	east wall	3	2	0.20	2	13.49		dpm/100 cm2	300	pass
aa	10/24/2000	4059	basement	sm		5zx	6-1m	101	3	east wall	3	1	0.20	3	16.43		dpm/100 cm2	300	pass
fk	10/24/2000	4059	basement	f		k0y	L-3m	102	829	north wall, near N-3	415	2	371.80	43	410.30		dpm/100 cm2	15000	pass

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SURVEY DATA
ROCKETDYNE

Det. Case	date	Building	Room	Fix or Scan	Type	Field Notes Grid Coor.	Survey Report Grid Coordinates	Sequence No.	Count	Notes	Count Rate	Sample time	Bkg Rate	Net count rate	Activity	%error	units	criteria	flag
bc	10/24/2000	4059	basement	f		k0y	L-3m	103	0	north wall, near N-3	0	2	0.60	-1	-3.52		dpm/100 cm2	300	pass
ac	10/24/2000	4059	basement	sm		e0x	G-1m	104	5	north wall	5	1	0.60	4	25.81		dpm/100 cm2	300	pass
ac	10/24/2000	4059	basement	sm		c0x	C-1m	105	2	north wall	2	1	0.60	1	8.21		dpm/100 cm2	300	pass
fk	10/24/2000	4059	basement	f		c0x	C-1m	106	364	north wall	182	2	371.80	-190	-1823.76		dpm/100 cm2	15000	pass
bc	10/24/2000	4059	basement	f		c0x	C-1m	107	0	north wall	0	2	0.60	-1	-3.52		dpm/100 cm2	300	pass
fg	10/24/2000	4059	vaccuum equipment room	f		x0y	A-2m	108	1131	north wall	566	2	243.80	322	3091.18	14.5%	dpm/100 cm2	15000	pass
bd	10/24/2000	4059	vaccuum equipment room	f		x0y	A-2m	109	2	north wall	1	2	0.80	0	1.17		dpm/100 cm2	300	pass
ad	10/24/2000	4059	vaccuum equipment room	sm		l0y	1-3m	110	0	east wall	0	1	0.80	-1	-4.69		dpm/100 cm2	300	pass
fg	10/24/2000	4059	vaccuum equipment room	f		l0y	1-3m	111	1011	east wall	506	2	243.80	262	2514.64	16.8%	dpm/100 cm2	15000	pass
bd	10/24/2000	4059	vaccuum equipment room	f		l0y	1-3m	112	1	east wall	1	2	0.80	0	-1.76		dpm/100 cm2	300	pass
ad	10/24/2000	4059	vaccuum equipment room	sm		d0x	E-1m	113	1	north wall, NS-2	1	1	0.80	0	1.17		dpm/100 cm2	300	pass
fg	10/24/2000	4059	vaccuum equipment room	f		d0x	E-1m	114	638	north wall, NS-2	319	2	243.80	75	722.59	46.6%	dpm/100 cm2	15000	pass
bd	10/24/2000	4059	vaccuum equipment room	f		d0x	E-1m	115	9	north wall	5	2	0.80	4	21.70		dpm/100 cm2	300	pass
ac	10/24/2000	4059	basement	sm		k0y	L-3m	116	0	north wall, N-3	0	1	0.60	-1	-3.52		dpm/100 cm2	300	pass
ac	10/24/2000	4059	vaccuum equipment room	sm		1fy	2-2m	117	3	west wall	3	1	0.60	2	14.08		dpm/100 cm2	300	pass
fh	10/24/2000	4059	vaccuum equipment room	f		1fy	2-2m	118	619	west wall	310	2	270.20	39	377.63		dpm/100 cm2	15000	pass
bc	10/24/2000	4059	vaccuum equipment room	f		1fy	2-2m	119	3	west wall	2	2	0.60	1	5.28		dpm/100 cm2	300	pass
fh	10/24/2000	4059	vaccuum equipment room	f		a5x	6-1m	120	662	east wall, EWF-7	331	2	270.20	61	584.22	58.6%	dpm/100 cm2	15000	pass
bc	10/24/2000	4059	vaccuum equipment room	f		a5x	6-1m	121	3	east wall, EWF-7	2	2	0.60	1	5.28		dpm/100 cm2	300	pass
ac	10/24/2000	4059	vaccuum equipment room	sm		6ay	7-2m	122	1	east wall	1	1	0.60	0	2.35		dpm/100 cm2	300	pass
fh	10/24/2000	4059	vaccuum equipment room	f		6ay	7-2m	123	632	east wall	316	2	270.20	46	440.09		dpm/100 cm2	15000	pass
bc	10/24/2000	4059	vaccuum equipment room	f		6ay	7-2m	124	5	east wall	3	2	0.60	2	11.14		dpm/100 cm2	300	pass
ac	10/24/2000	4059	vaccuum equipment room	sm		6ex	7-1m	125	3	west wall	3	1	0.60	2	14.08		dpm/100 cm2	300	pass
fh	10/24/2000	4059	vaccuum equipment room	f		6ex	7-1m	126	667	west wall	334	2	270.20	63	608.24	56.5%	dpm/100 cm2	15000	pass
bc	10/24/2000	4059	vaccuum equipment room	f		6ex	7-1m	127	4	west wall	2	2	0.60	1	8.21		dpm/100 cm2	300	pass
ac	10/24/2000	4059	vaccuum equipment room	sm		f5y	F-2m	128	3	south wall	3	1	0.60	2	14.08		dpm/100 cm2	300	pass
fh	10/24/2000	4059	vaccuum equipment room	f		f5y	F-2m	129	653	south wall	327	2	270.20	56	540.98	62.9%	dpm/100 cm2	15000	pass
bc	10/24/2000	4059	vaccuum equipment room	f		f5y	F-2m	130	4	south wall	2	2	0.60	1	8.21		dpm/100 cm2	300	pass
fi	10/24/2000	4059	high bay	f		g18zz	G-5M	131	348	east wall, HB-15	174	2	81.60	92	887.86	28.0%	dpm/100 cm2	15000	pass
fi	10/24/2000	4059	high bay	f		8azz	8-5m	132	263	south wall, corr.steel	132	2	81.60	50	479.48	45.0%	dpm/100 cm2	15000	pass
fi	10/24/2000	4059	high bay	f		c0zz	C-5m	133	237	west wall, HB-8	119	2	81.60	37	354.57	57.8%	dpm/100 cm2	15000	pass
fi	10/24/2000	4059	high bay	f		e0zy	1-E	134	292	ceiling	146	2	81.60	64	618.81	36.8%	dpm/100 cm2	15000	pass
fi	10/24/2000	4059	high bay	f		c314	No grid	135	544	storage shed	272	2	81.60	190	1829.53	17.0%	dpm/100 cm2	15000	pass
bc	10/24/2000	4059	high bay	f		c314	No grid	136	17	storage shed	9	2	0.60	8	46.34	72.0%	dpm/100 cm2	300	pass
fi	10/24/2000	4059	high bay	f		c314	No grid	137	543	storage shed	272	2	81.60	190	1824.73	17.0%	dpm/100 cm2	15000	pass
bc	10/24/2000	4059	high bay	f		c314	No grid	138	10	storage shed	5	2	0.60	4	25.81		dpm/100 cm2	300	pass
fa	10/23/2000	4059	high bay	f		18cx	B-1m	139	437	east wall, HB-6	219	2	219.40	-1	-8.65		dpm/100 cm2	15000	pass
ea	10/23/2000	4059	high bay	sm		18cx	B-1m	140	300	east wall, HB-6	300	1	219.40	81	908.12	42.1%	dpm/100 cm2	15000	pass
ea	10/23/2000	4059	high bay	sa		18cx	B-1m	141	200	east wall, HB-6	200	1	219.40	-19	-218.58		dpm/100 cm2	5000	pass
el	10/24/2000	459	building 459	sa		d4w	No grid	142	225	floor	225	1	169.80	55	621.94	53.3%	dpm/100 cm2	5000	pass
el	10/24/2000	459	building 459	sm		d4w	No grid	143	325	floor	325	1	169.80	155	1748.63	22.8%	dpm/100 cm2	15000	pass
fl	10/24/2000	459	building 459	f		d4w	No grid	144	588	floor	294	2	169.80	124	1193.42	27.1%	dpm/100 cm2	15000	pass
el	10/24/2000	459	building 459	sa		f8w	No grid	145	300	floor	300	1	169.80	130	1466.96	26.1%	dpm/100 cm2	5000	pass
el	10/24/2000	459	building 459	sm		f8w	No grid	146	325	floor	325	1	169.80	155	1748.63	22.8%	dpm/100 cm2	15000	pass
fl	10/24/2000	459	building 459	f		f8w	No grid	147	534	floor	267	2	169.80	97	933.98	32.9%	dpm/100 cm2	15000	pass
el	10/24/2000	459	building 459	sa		b10w	No grid	148	250	floor	250	1	169.80	80	903.61	38.6%	dpm/100 cm2	5000	pass
el	10/24/2000	459	building 459	sm		b10w	No grid	149	300	floor	300	1	169.80	130	1466.96	26.1%	dpm/100 cm2	15000	pass
el	10/24/2000	4059	noble gas room	sa		ph1w	No grid	150	325		325	1	169.80	155	1748.63	22.8%	dpm/100 cm2	5000	pass
el	10/24/2000	4059	noble gas room	sm		ph1w	No grid	151	400		400	1	169.80	230	2593.65	17.0%	dpm/100 cm2	15000	pass
fl	10/24/2000	4059	noble gas room	f		ph1w	No grid	152	632		316	2	169.80	146	1404.82	23.8%	dpm/100 cm2	15000	pass
el	10/24/2000	4059	noble gas room	sa		pit1x	No grid	153	300		300	1	169.80	130	1466.96	26.1%	dpm/100 cm2	5000	pass

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Det. Case	date	Building	Room	Fix or Scan	Type	Field Notes Grid Coor.	Survey Report Grid Coordinates	Sequence No.	Count	Notes	Count Rate	Sample time	Bkg Rate	Net count rate	Activity	%error	units	criteria	flag
el	10/24/2000	4059	noble gas room	sm		pit1x	No grid	154	350		350	1	169.80	180	2030.31	20.3%	dpm/100 cm2	15000	pass
el	10/24/2000	4059	noble gas room	sa		pit2w	No grid	155	300		300	1	169.80	130	1466.96	26.1%	dpm/100 cm2	5000	pass
el	10/24/2000	4059	noble gas room	sm		pit2w	No grid	156	360		360	1	169.80	190	2142.97	19.6%	dpm/100 cm2	15000	pass
el	10/24/2000	4059	noble gas room	sa		pit2x	No grid	157	250		250	1	169.80	80	903.61	38.6%	dpm/100 cm2	5000	pass
el	10/24/2000	4059	noble gas room	sm		pit2x	No grid	158	300		300	1	169.80	130	1466.96	26.1%	dpm/100 cm2	15000	pass
em	10/24/2000	4059	noble gas room	sa		c1w	No grid	159	250		250	1	150.80	99	1117.68	31.2%	dpm/100 cm2	5000	pass
em	10/24/2000	4059	noble gas room	sm		c1w	No grid	160	300		300	1	150.80	149	1681.03	22.8%	dpm/100 cm2	15000	pass
em	10/24/2000	4059	noble gas room	sa		ngr1	No grid	161	160		160	1	150.80	9	103.66		dpm/100 cm2	5000	pass
em	10/24/2000	4059	noble gas room	sm		ngr1	No grid	162	200		200	1	150.80	49	554.33	56.3%	dpm/100 cm2	15000	pass
ha	10/24/2000	4059	hvac	sa		hvac1w	No grid	163	280		280	1	156.00	124	1191.50	26.4%	dpm/100 cm2	5000	pass
ha	10/24/2000	4059	hvac	sm		hvac1w	No grid	164	350		350	1	156.00	194	1864.12	18.9%	dpm/100 cm2	15000	pass
ia	10/24/2000	4059	hvac	f		hvac1w	No grid	165	292		146	2	156.00	-10	-96.09		dpm/100 cm2	15000	pass
ha	10/24/2000	4059	hvac	sa		hvac2w	No grid	166	250		250	1	156.00	94	903.23	33.0%	dpm/100 cm2	5000	pass
ha	10/24/2000	4059	hvac	sm		hvac2w	No grid	167	300		300	1	156.00	144	1383.68	23.6%	dpm/100 cm2	15000	pass
fi	10/24/2000	4059	high bay	f		f18zy	17-E	168	191	ceiling, HB-14	96	2	81.60	14	133.56		dpm/100 cm2	15000	pass
bb	10/24/2000	4059	basement	f		z8y	A-2m	169	4	south wall	2	2	0.40	2	9.38		dpm/100 cm2	300	pass
ae	10/24/2000	4059	basement	sa		5ly	6-2m	170	3	west wall, W-1	3	1	1.00	2	11.73		dpm/100 cm2	100	pass
ae	10/24/2000	4059	basement	sm		5ly	6-2m	171	6	west wall, W-1	6	1	1.00	5	29.33		dpm/100 cm2	300	pass
fj	10/24/2000	4059	basement	f		5ly	6-2m	172	512	west wall, W-1	256	2	192.20	64	613.05	49.2%	dpm/100 cm2	15000	pass
be	10/24/2000	4059	basement	f		5ly	6-2m	173	2	west wall, W-1	1	2	1.00	0	0.00		dpm/100 cm2	300	pass
kc	10/24/2000	4059	basement alcove	f		5(3.5m)	8-C	174	1	floor of alcove, ALC-5	1	2	0.60	0	-0.55		dpm/100 cm2	300	pass
kc	10/24/2000	4059	basement alcove	f		(3.5m)	3-C	175	3	north wall of alcove, E-ALC-10	2	2	0.60	1	4.94		dpm/100 cm2	300	pass
na	10/24/2000	4059	east stairwell	sa		f10,11,12x	ESW-1	176	450	1 meter up wall	450	1	532.20	-82	-407.22		dpm/100 cm2	5000	pass
na	10/24/2000	4059	east stairwell	sm		f10,11,12x	ESW-1	177	600	1 meter up wall	600	1	532.20	68	335.89		dpm/100 cm2	15000	pass
na	10/24/2000	4059	east stairwell	sa		f,e13w	ESW-2	178	575	landing 3 - floor	575	1	532.20	43	212.03		dpm/100 cm2	5000	pass
na	10/24/2000	4059	east stairwell	sm		f,e13w	ESW-2	179	620	landing 3 - floor	620	1	532.20	88	434.97	55.6%	dpm/100 cm2	15000	pass
oa	10/24/2000	4059	east stairwell	f	dup	e13w	ESW-2	180	1262	landing 3 - floor	631	2	532.20	99	489.46	49.8%	dpm/100 cm2	15000	pass
na	10/24/2000	4059	east stairwell	sa		h3,4,5x	ESW-3	181	400	1 meter up wall	400	1	532.20	-132	-654.93		dpm/100 cm2	5000	pass
na	10/24/2000	4059	east stairwell	sm		h3,4,5x	ESW-3	182	500	1 meter up wall	500	1	532.20	-32	-159.52		dpm/100 cm2	15000	pass
na	10/24/2000	4059	east stairwell	sa		h,g6,7,8w	ESW-4	183	300	stairs	300	1	532.20	-232	-1150.33		dpm/100 cm2	5000	pass
na	10/24/2000	4059	east stairwell	sm		h,g6,7,8w	ESW-4	184	400	stairs	400	1	532.20	-132	-654.93		dpm/100 cm2	15000	pass
na	10/24/2000	4059	east stairwell	sa		h8,9,10x	ESW-5	185	425	1 meter up wall	425	1	532.20	-107	-531.08		dpm/100 cm2	5000	pass
na	10/24/2000	4059	east stairwell	sm		h8,9,10x	ESW-5	186	600	1 meter up wall	600	1	532.20	68	335.89		dpm/100 cm2	15000	pass
na	10/24/2000	4059	east stairwell	sa		h10,11,12y	ESW-6	187	500	2 meters up wall	500	1	532.20	-32	-159.52		dpm/100 cm2	5000	pass
na	10/24/2000	4059	east stairwell	sm		h10,11,12y	ESW-6	188	650	2 meters up wall	650	1	532.20	118	583.59	42.4%	dpm/100 cm2	15000	pass
oa	10/24/2000	4059	east stairwell	f	dup	H11y	ESW-6	189	1137	2 meters up wall	569	2	532.20	36	179.83		dpm/100 cm2	15000	pass
oa	10/24/2000	4059	east stairwell	f	dup	landing4	ESW-7	190	1191	landing 4	596	2	532.20	63	313.59		dpm/100 cm2	15000	pass
nb	10/24/2000	4059	basement floor	sa		z1w	A-2	191	220	floor	220	1	359.00	-139	-688.62		dpm/100 cm2	5000	pass
nb	10/24/2000	4059	basement floor	sm		z1w	A-2	192	400	floor	400	1	359.00	41	203.12		dpm/100 cm2	15000	pass
ob	10/24/2000	4059	basement floor	f	dup	z1w	A-2	193	900	floor, f-19	450	2	359.00	91	450.82	45.7%	dpm/100 cm2	15000	pass
nc	10/24/2000	4059	basement floor	sa		b3w	C-4	194	350	floor	350	1	353.80	-4	-18.83		dpm/100 cm2	5000	pass
nc	10/24/2000	4059	basement floor	sm		b3w	C-4	195	400	floor	400	1	353.80	46	228.88		dpm/100 cm2	15000	pass
nc	10/24/2000	4059	basement floor	sa		c0w	D-1	196	325	floor, 40% covered with metal	325	1	353.80	-29	-142.68		dpm/100 cm2	5000	pass
nc	10/24/2000	4059	basement floor	sm		c0w	D-1	197	400	floor, 40% covered with metal	400	1	353.80	46	228.88		dpm/100 cm2	15000	pass
oc	10/24/2000	4059	basement floor	f	dup	c0w	D-1	198	744	floor, f-9	372	2	353.80	18	90.16		dpm/100 cm2	15000	pass
nc	10/24/2000	4059	basement floor	sa		e1w	F-2	199	325	floor	325	1	353.80	-29	-142.68		dpm/100 cm2	5000	pass
nc	10/24/2000	4059	basement floor	sm		e1w	F-2	200	400	floor	400	1	353.80	46	228.88		dpm/100 cm2	15000	pass
oc	10/24/2000	4059	basement floor	f	dup	e1w	F-2	201	778	floor, f-7	389	2	353.80	35	174.38		dpm/100 cm2	15000	pass
nc	10/24/2000	4059	basement floor	sa		d3w	E-4	202	300	floor	300	1	353.80	-54	-266.53		dpm/100 cm2	5000	pass
nc	10/24/2000	4059	basement floor	sm		d3w	E-4	203	375	floor	375	1	353.80	21	105.03		dpm/100 cm2	15000	pass
nc	10/24/2000	4059	basement floor	sa		5zw	A-6	204	400	floor	400	1	353.80	46	228.88		dpm/100 cm2	5000	pass

TABLE B-1
SURVEY DATA
ROCKETDYNE

Det. Case	date	Building	Room	Fix or Scan	Type	Field Notes Grid Coor.	Survey Report Grid Coordinates	Sequence No.	Count	Notes	Count Rate	Sample time	Bkg Rate	Net count rate	Activity	%error	units	criteria	flag
nc	10/24/2000	4059	basement floor	sm		5zw	A-6	205	500	floor	500	1	353.80	146	724.28	30.0%	dpm/100 cm2	15000	pass
oc	10/24/2000	4059	basement floor	f	dup	5zw	A-6	206	999	floor, f-16	500	2	353.80	146	721.81	30.1%	dpm/100 cm2	15000	pass
nc	10/24/2000	4059	basement floor	sa		7aw	B-8	207	225	floor	225	1	353.80	-129	-638.08		dpm/100 cm2	5000	pass
nc	10/24/2000	4059	basement floor	sm		7aw	B-8	208	300	floor	300	1	353.80	-54	-266.53		dpm/100 cm2	15000	pass
nf	10/24/2000	4059	basement floor	sa		c7w	D-8	209	300	floor	300	1	365.20	-65	-323.01		dpm/100 cm2	5000	pass
nf	10/24/2000	4059	basement floor	sm		c7w	D-8	210	400	floor	400	1	365.20	35	172.40		dpm/100 cm2	15000	pass
of	10/24/2000	4059	basement floor	f	dup	c8w	D-8.5	211	1055	floor, f-13	528	2	365.20	162	804.05	27.7%	dpm/100 cm2	15000	pass
nf	10/24/2000	4059	basement floor	sa		d5w	E-6	212	300	floor	300	1	365.20	-65	-323.01		dpm/100 cm2	5000	pass
nf	10/24/2000	4059	basement floor	sm		d5w	E-6	213	375	floor	375	1	365.20	10	48.55		dpm/100 cm2	15000	pass
nf	10/24/2000	4059	basement floor	sa		e6w	F-7	214	250	floor	250	1	365.20	-115	-570.71		dpm/100 cm2	5000	pass
nf	10/24/2000	4059	basement floor	sm		e6w	F-7	215	390	floor	390	1	365.20	25	122.86		dpm/100 cm2	15000	pass
nf	10/24/2000	4059	basement floor	sa		c6w	D-7	216	390	floor	390	1	365.20	25	122.86		dpm/100 cm2	5000	pass
nf	10/24/2000	4059	basement floor	sm		c6w	D-7	217	480	floor	480	1	365.20	115	568.73	37.4%	dpm/100 cm2	15000	pass
of	10/24/2000	4059	basement floor	f	dup	c6w	D-7	218	701	floor, f-12	351	2	365.20	-15	-72.82		dpm/100 cm2	15000	pass
of	10/24/2000	4059	basement floor	f	dup	b/w e6&e7w	F-7	219	838	floor, f-1	419	2	365.20	54	266.53		dpm/100 cm2	15000	pass
nf	10/24/2000	4059	basement floor	sa		e4w	F-5	220	390	floor	390	1	365.20	25	122.86		dpm/100 cm2	5000	pass
nf	10/24/2000	4059	basement floor	sm		e4w	F-5	221	460	floor	460	1	365.20	95	469.65	44.3%	dpm/100 cm2	15000	pass
nb	10/24/2000	4059	basement floor	sa		a0w	B-1	222	380	floor, 30% steel beam	380	1	359.00	21	104.04		dpm/100 cm2	5000	pass
nb	10/24/2000	4059	basement floor	sm		a0w	B-1	223	460	floor, 30% steel beam	460	1	359.00	101	500.36	41.6%	dpm/100 cm2	15000	pass
ob	10/24/2000	4059	basement floor	f	dup	a0w	B-1	224	842	floor, f-20	421	2	359.00	62	307.15	64.9%	dpm/100 cm2	15000	pass
nd	10/24/2000	4059	basement walls/ceiling	sa		7 (6m)	8-7m	225	400	west wall, column 7, 6m up	400	1	422.80	-23	-112.95		dpm/100 cm2	5000	pass
nd	10/24/2000	4059	basement walls/ceiling	sm		7 (6m)	8-7m	226	500	west wall, column 7, 6m up	500	1	422.80	77	382.45	56.8%	dpm/100 cm2	15000	pass
od	10/24/2000	4059	basement walls/ceiling	f	dup	7 (6m)	8-7m	227	775	west wall, w-5	388	2	422.80	-35	-174.88		dpm/100 cm2	15000	pass
nd	10/24/2000	4059	basement walls/ceiling	sa		k (6m)	L-5m	228	420	south wall, s-23	420	1	422.80	-3	-13.87		dpm/100 cm2	5000	pass
nd	10/24/2000	4059	basement walls/ceiling	sm		k (6m)	L-5m	229	520	south wall, s-23	520	1	422.80	97	481.54	46.0%	dpm/100 cm2	15000	pass
od	10/24/2000	4059	basement walls/ceiling	f	dup	k (6m)	L-5m	230	854	south wall, s-23	427	2	422.80	4	20.81		dpm/100 cm2	15000	pass
nd	10/24/2000	4059	basement walls/ceiling	sa		f (5m)	H-7m	231	250	south wall, west of s-17 (on metal duct)	250	1	422.80	-173	-856.06		dpm/100 cm2	5000	pass
nd	10/24/2000	4059	basement walls/ceiling	sm		f (5m)	H-7m	232	400	south wall, west of s-17 (on metal duct)	400	1	422.80	-23	-112.95		dpm/100 cm2	15000	pass
od	10/24/2000	4059	basement walls/ceiling	f	dup	c-12	F-4	233	1021	ceiling, c-12	511	2	422.80	88	434.47	50.5%	dpm/100 cm2	15000	pass
od	10/24/2000	4059	basement walls/ceiling	f		Nc-1	J-7	234	951	ceiling, north&left of c-1	476	2	422.80	53	261.08		dpm/100 cm2	15000	pass
nd	10/24/2000	4059	basement walls/ceiling	sa		2(7m)	3-7m	235	375	west wall, south of w-19	375	1	422.80	-48	-236.80		dpm/100 cm2	5000	pass
nd	10/24/2000	4059	basement walls/ceiling	sm		2(7m)	3-7m	236	450	west wall, metal 10% area	450	1	422.80	27	134.75		dpm/100 cm2	15000	pass
od	10/24/2000	4059	basement walls/ceiling	f		E of c-6	I-1	237	1024	ceiling, east of c-6 (8.5m)	512	2	422.80	89	441.90	49.7%	dpm/100 cm2	15000	pass
nd	10/24/2000	4059	basement walls/ceiling	sa		1(3m)	2-4m	238	400	west wall, above w-14	400	1	422.80	-23	-112.95		dpm/100 cm2	5000	pass
nd	10/24/2000	4059	basement walls/ceiling	sm		1(3m)	2-4m	239	475	west wall, south of w-16	475	1	422.80	52	258.60		dpm/100 cm2	15000	pass
nd	10/24/2000	4059	basement walls/ceiling	sa		J(3.5m)	K-4m	240	350	north wall, N-4 (column J)	350	1	422.80	-73	-360.66		dpm/100 cm2	5000	pass
nd	10/24/2000	4059	basement walls/ceiling	sm		J(3.5m)	K-4m	241	450	north wall, N-4 (column J)	450	1	422.80	27	134.75		dpm/100 cm2	15000	pass
od	10/24/2000	4059	basement walls/ceiling	f		J(3.5m)	K-4m	242	1063	north wall, around N-4 (column J)	532	2	422.80	109	538.51	41.6%	dpm/100 cm2	15000	pass
nd	10/24/2000	4059	basement walls/ceiling	sa		I(7m)	J-8m	243	250	north wall, S-N-8	250	1	422.80	-173	-856.06		dpm/100 cm2	5000	pass
nd	10/24/2000	4059	basement walls/ceiling	sm		I(7m)	J-8m	244	375	north wall, S-N-8	375	1	422.80	-48	-236.80		dpm/100 cm2	15000	pass
ng	10/24/2000	4059	basement walls/ceiling	sa		C(6m)	D-8m	245	325	north wall, NE-N-19	325	1	402.60	-78	-384.44		dpm/100 cm2	5000	pass
ng	10/24/2000	4059	basement walls/ceiling	sm		C(6m)	D-8m	246	400	north wall, NE-N-19	400	1	402.60	-3	-12.88		dpm/100 cm2	15000	pass
og	10/24/2000	4059	basement walls/ceiling	f		C-14	C-1	247	929	ceiling, C-14	465	2	402.60	62	306.66	68.2%	dpm/100 cm2	15000	pass
eo	10/24/2000	4059	office 1	sa		01w	no grid	248	400	not used	400	1	466.00	-66	-743.62		dpm/100 cm2	5000	pass
ng	10/24/2000	4059	basement walls/ceiling	sa		6(4m)	7-5m	249	250	east wall, E-13	250	1	402.60	-153	-755.99		dpm/100 cm2	5000	pass
ng	10/24/2000	4059	basement walls/ceiling	sm		6(4m)	7-5m	250	390	east wall, E-13	390	1	402.60	-13	-62.42		dpm/100 cm2	15000	pass
og	10/24/2000	4059	basement walls/ceiling	f		6(4m)	7-5m	251	797	east wall, E-13	399	2	402.60	-4	-20.31		dpm/100 cm2	15000	pass
ng	10/24/2000	4059	basement walls/ceiling	sa		7z(4m)	A-4m	252	225	south wall, below S-8	225	1	402.60	-178	-879.84		dpm/100 cm2	5000	pass
ng	10/24/2000	4059	basement walls/ceiling	sm		7z(4m)	A-4m	253	390	south wall, below S-8	390	1	402.60	-13	-62.42		dpm/100 cm2	15000	pass
og	10/24/2000	4059	basement walls/ceiling	f		N-C-19	A-3	254	1005	ceiling, b/w C-15 & C-19	503	2	402.60	100	494.91	44.0%	dpm/100 cm2	15000	pass
ng	10/24/2000	4059	basement alcove	sa		ALC-5	8-C	255	375	floor of alcove, ALC-5	375	1	402.60	-28	-136.73		dpm/100 cm2	5000	pass

TABLE B-1
SURVEY DATA
ROCKETDYNE

Det. Case	date	Building	Room	Fix or Scan	Type	Field Notes Grid Coor.	Survey Report Grid Coordinates	Sequence No	Count	Notes	Count Rate	Sample time	Bkg Rate	Net count rate	Activity	%error	units	criteria	flag
ng	10/24/2000	4059	basement alcove	sm		ALC-5	8-C	256	425	floor of alcove, ALC-5	425	1	402.60	22	110.97		dpm/100 cm2	15000	pass
og	10/24/2000	4059	basement alcove	f		ALC-5	8-C	257	770	floor of alcove, ALC-5	385	2	402.60	-18	-87.19		dpm/100 cm2	15000	pass
ng	10/24/2000	4059	basement alcove	sa		SE-ALC-3	5-A	258	420	floor of alcove, s of ALC3	420	1	402.60	17	86.20		dpm/100 cm2	5000	pass
ng	10/24/2000	4059	basement alcove	sm		SE-ALC-3	5-A	259	575	floor of alcove	575	1	402.60	172	854.08	27.3%	dpm/100 cm2	15000	pass
og	10/24/2000	4059	basement alcove	f		SE-ALC-3	5-A	260	1145	floor of alcove	573	2	402.60	170	841.70	27.6%	dpm/100 cm2	15000	pass
ng	10/24/2000	4059	basement alcove	sa		ALC-6	10-B	261	250	south wall of alcove, ALC6	250	1	402.60	-153	-755.99		dpm/100 cm2	5000	pass
ng	10/24/2000	4059	basement alcove	sm		ALC-6	10-B	262	325	south wall of alcove, ALC6	325	1	402.60	-78	-384.44		dpm/100 cm2	15000	pass
og	10/24/2000	4059	basement alcove	f		ALC-6	10-B	263	758	south wall of alcove	379	2	402.60	-24	-116.92		dpm/100 cm2	15000	pass
ng	10/24/2000	4059	basement alcove	sa		E-ALC-10	3-C	264	225	north wall of alcove, e of ALC10	225	1	402.60	-178	-879.84		dpm/100 cm2	5000	pass
ng	10/24/2000	4059	basement alcove	sm		E-ALC-10	3-C	265	350	north wall of alcove, e of ALC10	350	1	402.60	-53	-260.58		dpm/100 cm2	15000	pass
og	10/24/2000	4059	basement alcove	f		E-ALC-10	3-C	266	826	north wall of alcove, e of ALC10	413	2	402.60	10	51.52		dpm/100 cm2	15000	pass
og	10/24/2000	4059	basement alcove	f		N-ALC-19	5-G	267	866	ceiling of alcove, b/w ALC-19 & -16	433	2	402.60	30	150.60		dpm/100 cm2	15000	pass
oh	10/24/2000	4059	basement walls/ceiling	f		C-BM	I-2	268	798	ceiling, steel beam e side of northernmost opening in ceiling	399	2	441.20	-42	-209.06		dpm/100 cm2	15000	pass
nb	10/24/2000	4059	basement floor	sa		b5w	C-6	269	420	floor, south of F-11	420	1	359.00	61	302.20		dpm/100 cm2	5000	pass
nb	10/24/2000	4059	basement floor	sm		b5w	C-6	270	500	floor, south of F-11	500	1	359.00	141	698.52	31.1%	dpm/100 cm2	15000	pass
eh	10/24/2000	4059	vaccuum equipment room	sm		0fxx	1-3m	271	350	west wall, CWWC-5	350	1	270.20	80	899.10	46.0%	dpm/100 cm2	15000	pass
eh	10/24/2000	4059	vaccuum equipment room	sa		0fxy	1-4m	272	300	west wall	300	1	270.20	30	335.76		dpm/100 cm2	5000	pass
eh	10/24/2000	4059	vaccuum equipment room	sm		0fxy	1-4m	273	400	west wall	400	1	270.20	130	1462.45	30.2%	dpm/100 cm2	15000	pass
eh	10/24/2000	4059	vaccuum equipment room	sa		a6xx	B-3m	274	250	south wall	250	1	270.20	-20	-227.59		dpm/100 cm2	5000	pass
eh	10/24/2000	4059	vaccuum equipment room	sm		a6xx	B-3m	275	300	south wall	300	1	270.20	30	335.76		dpm/100 cm2	15000	pass
eh	10/24/2000	4059	vaccuum equipment room	sa		4xxy	5-4m	276	300	east wall	300	1	270.20	30	335.76		dpm/100 cm2	5000	pass
eh	10/24/2000	4059	vaccuum equipment room	sm		4xxy	5-4m	277	400	east wall	400	1	270.20	130	1462.45	30.2%	dpm/100 cm2	15000	pass
eh	10/24/2000	4059	vaccuum equipment room	sa		e6xx	E-3m	278	250	south wall	250	1	270.20	-20	-227.59		dpm/100 cm2	5000	pass
eh	10/24/2000	4059	vaccuum equipment room	sm		e6xx	E-3m	279	300	south wall	300	1	270.20	30	335.76		dpm/100 cm2	15000	pass
eh	10/24/2000	4059	vaccuum equipment room	sa		1axx	2-3m	280	350	east wall, EWF-10	350	1	270.20	80	899.10	46.0%	dpm/100 cm2	5000	pass
eh	10/24/2000	4059	vaccuum equipment room	sm		1axx	2-3m	281	400	east wall, EWF-10	400	1	270.20	130	1462.45	30.2%	dpm/100 cm2	15000	pass
eh	10/24/2000	4059	vaccuum equipment room	sa		b0xx	C-3m	282	300	north wall	300	1	270.20	30	335.76		dpm/100 cm2	5000	pass
eh	10/24/2000	4059	vaccuum equipment room	sm		b0xx	C-3m	283	400	north wall	400	1	270.20	130	1462.45	30.2%	dpm/100 cm2	15000	pass
eh	10/24/2000	4059	vaccuum equipment room	sa		0fxx	1-3m	284	300	west wall, CWWC-5	300	1	270.20	30	335.76		dpm/100 cm2	5000	pass
jb	10/24/2000	4059	basement	alpha		z1w	A-2	285	7	floor	7	1	0.40	7	36.20	78.4%	dpm/100 cm2	100	pass
kb	10/24/2000	4059	basement	f		z1w	A-2	286	6	floor	3	2	0.40	3	14.26		dpm/100 cm2	300	pass
jd	10/24/2000	4059	basement	alpha		b3w	C-4	287	3	floor	3	1	1.00	2	2.74		dpm/100 cm2	100	pass
jd	10/24/2000	4059	basement	alpha		c0w	D-1	288	3	floor	3	1	1.00	2	2.74		dpm/100 cm2	100	pass
kd	10/24/2000	4059	basement	f		c0w	D-1	289	1	floor	1	2	1.00	-1	-0.91		dpm/100 cm2	300	pass
jd	10/24/2000	4059	basement	alpha		e1w	F-2	290	1	floor	1	1	1.00	0	0.00		dpm/100 cm2	100	pass
kd	10/24/2000	4059	basement	f		e1w	F-2	291	2	floor	1	2	1.00	0	0.00		dpm/100 cm2	300	pass
kd	10/24/2000	4059	basement	alpha		d3w	E-4	292	6	floor	3	2	1.00	2	3.66		dpm/100 cm2	300	pass
kd	10/24/2000	4059	basement	alpha		5zw	A-6	293	4	floor	2	2	1.00	1	1.83		dpm/100 cm2	300	pass
kd	10/24/2000	4059	basement	f		5zw	A-6	294	3	floor	2	2	1.00	1	0.91		dpm/100 cm2	300	pass
kd	10/24/2000	4059	basement	alpha		7aw	B-8	295	2	floor	1	2	1.00	0	0.00		dpm/100 cm2	300	pass
ke	10/24/2000	4059	basement	alpha		c7w	D-8	296	4	floor	2	2	1.20	1	1.46		dpm/100 cm2	300	pass
ke	10/24/2000	4059	basement	f		c8w	D-8.5	297	5	floor	3	2	1.20	1	2.38		dpm/100 cm2	300	pass
ke	10/24/2000	4059	basement	alpha		d5w	E-6	298	4	floor	2	2	1.20	1	1.46		dpm/100 cm2	300	pass
ke	10/24/2000	4059	basement	alpha		e6w	F-7	299	2	floor	1	2	1.20	0	-0.37		dpm/100 cm2	300	pass
ke	10/24/2000	4059	basement	alpha		c6w	D-7	300	0	floor	0	2	1.20	-1	-2.19		dpm/100 cm2	300	pass
ke	10/24/2000	4059	basement	f		c6w	D-7	301	1	floor	1	2	1.20	-1	-1.28		dpm/100 cm2	300	pass
ke	10/24/2000	4059	basement	f		e6 & e7w	F-7	302	3	floor	2	2	1.20	0	0.55		dpm/100 cm2	300	pass
ke	10/24/2000	4059	basement	alpha		e4w	F-5	303	3	floor	2	2	1.20	0	0.55		dpm/100 cm2	300	pass
kb	10/24/2000	4059	basement	alpha		a0w	B-1	304	2	floor	1	2	0.40	1	3.29		dpm/100 cm2	300	pass
kb	10/24/2000	4059	basement	f		a0w	B-1	305	3	floor	2	2	0.40	1	6.03		dpm/100 cm2	300	pass

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SURVEY DATA
ROCKETDYNE

Det. Case	date	Building	Room	Fix or Scan	Type	Field Notes Grid Coor.	Survey Report Grid Coordinates	Sequence No.	Count	Notes	Count Rate	Sample time	Bkg Rate	Net count rate	Activity	%error	units	criteria	flag
ka	10/24/2000	4059	basement	alpha		7(6m)	8-7m	306	6	west wall, W-5	3	2	2.20	1	4.39		dpm/100 cm2	300	pass
ka	10/24/2000	4059	basement	f		7(6m)	8-7m	307	5	west wall, W-5	3	2	2.20	0	1.65		dpm/100 cm2	300	pass
ka	10/24/2000	4059	basement	alpha		k(6m)	L-5m	308	3	south wall, S-23	2	2	2.20	-1	-3.84		dpm/100 cm2	300	pass
ka	10/24/2000	4059	basement	f		k(6m)	L-5m	309	0	south wall, S-23	0	2	2.20	-2	-12.07		dpm/100 cm2	300	pass
ka	10/24/2000	4059	basement	alpha		f(5m)	H-7m	310	4	south wall, west of S-17, on metal duct	2	2	2.20	0	-1.10		dpm/100 cm2	300	pass
ka	10/24/2000	4059	basement	f		C-12	F-4	311	3	ceiling, C-12	2	2	2.20	-1	-3.84		dpm/100 cm2	300	pass
ka	10/24/2000	4059	basement	f		N-C-1	J-7	312	3	ceiling, north and left of C-1	2	2	2.20	-1	-3.84		dpm/100 cm2	300	pass
ka	10/24/2000	4059	basement	alpha		3(3m)	3-7m	313	4	west wall, south W-19	2	2	2.20	0	-1.10		dpm/100 cm2	300	pass
ka	10/24/2000	4059	basement	f		E-C-1	I-1	314	5	ceiling, east of C-1	3	2	2.20	0	1.65		dpm/100 cm2	300	pass
ka	10/24/2000	4059	basement	alpha		1(3m)	2-4m	315	3	west wall, above W-14, south W-16	2	2	2.20	-1	-3.84		dpm/100 cm2	300	pass
ka	10/24/2000	4059	basement	alpha		J(3.5m)	K-4m	316	4	north wall, N-4	2	2	2.20	0	-1.10		dpm/100 cm2	300	pass
ka	10/24/2000	4059	basement	f		J(3.5m)	K-4m	317	3	north wall, N-4	2	2	2.20	-1	-3.84		dpm/100 cm2	300	pass
ka	10/24/2000	4059	basement	alpha		I(7m)	J-8m	318	2	north wall, S-N-8	1	2	2.20	-1	-6.58		dpm/100 cm2	300	pass
kc	10/24/2000	4059	basement	alpha		C(6m)	D-8m	319	3	north wall, NE-N-19	2	2	0.60	1	4.94		dpm/100 cm2	300	pass
kc	10/24/2000	4059	basement	f		C-14	C-1	320	0	ceiling, C-14	0	2	0.60	-1	-3.29		dpm/100 cm2	300	pass
kc	10/24/2000	4059	basement	alpha		6(4m)	7-5m	321	3	east wall, E-13	2	2	0.60	1	4.94		dpm/100 cm2	300	pass
kc	10/24/2000	4059	basement	f		6(4m)	7-5m	322	1	east wall, E-13	1	2	0.60	0	-0.55		dpm/100 cm2	300	pass
kc	10/24/2000	4059	basement	alpha		7z(4m)	A-4m	323	1	south wall, below S-8	1	2	0.60	0	-0.55		dpm/100 cm2	300	pass
kc	10/24/2000	4059	basement	f		N-C-19	A-3	324	7	ceiling, b/w C-15 & C-19	4	2	0.60	3	15.90		dpm/100 cm2	300	pass
kc	10/24/2000	4059	basement alcove	alpha		5(3.5m)	8-C	325	1	floor of alcove, ALC-5	1	2	0.60	0	-0.55		dpm/100 cm2	300	pass
kc	10/24/2000	4059	basement alcove	alpha		0(3.5m)	5-A	326	6	floor of alcove	3	2	0.60	2	13.16		dpm/100 cm2	300	pass
kc	10/24/2000	4059	basement alcove	f		0(3.5m)	5-A	327	9	floor of alcove, SE of ALC-3	5	2	0.60	4	21.39		dpm/100 cm2	300	pass
kc	10/24/2000	4059	basement alcove	alpha		ALC-6	10-B	328	3	south wall of alcove	2	2	0.60	1	4.94		dpm/100 cm2	300	pass
kc	10/24/2000	4059	basement alcove	f		ALC-6	10-B	329	4	south wall of alcove	2	2	0.60	1	7.68		dpm/100 cm2	300	pass
kc	10/24/2000	4059	basement alcove	alpha		E-ALC-10	3-C	330	3	north wall of alcove	2	2	0.60	1	4.94		dpm/100 cm2	300	pass
kc	10/24/2000	4059	basement alcove	f		N-ALC-19	5-G	331	5	ceiling of alcove	3	2	0.60	2	10.42		dpm/100 cm2	300	pass
kd	10/24/2000	4059	basement	f		C-BM	I-2	332	4	ceiling, steel beam, east side of northernmost opening in ceiling	2	2	1.00	1	1.83		dpm/100 cm2	300	pass
kb	10/24/2000	4059	basement floor	alpha		b5w	C-6	333	7	floor, south of F-11	4	2	0.40	3	17.00		dpm/100 cm2	300	pass
ne	10/24/2000	4059	east stairwell	sa		d3,4,5x	ESW-14	334	400	1 meter up wall	400	1	597.20	-197	-976.94		dpm/100 cm2	5000	pass
ne	10/24/2000	4059	east stairwell	sm		d3,4,5x	ESW-14	335	600	1 meter up wall	600	1	597.20	3	13.87		dpm/100 cm2	15000	pass
ne	10/24/2000	4059	east stairwell	sa		d8,9,10y	ESW-15	336	475	2 meters up wall	475	1	597.20	-122	-605.39		dpm/100 cm2	5000	pass
ne	10/24/2000	4059	east stairwell	sm		d8,9,10y	ESW-15	337	600	2 meters up wall	600	1	597.20	3	13.87		dpm/100 cm2	15000	pass
ne	10/24/2000	4059	east stairwell	sa		d+c9,10,11w	ESW-16	338	400	stairs	400	1	597.20	-197	-976.94		dpm/100 cm2	5000	pass
ne	10/24/2000	4059	east stairwell	sm		d+c9,10,11w	ESW-16	339	525	stairs	525	1	597.20	-72	-357.68		dpm/100 cm2	15000	pass
oe	10/24/2000	4059	east stairwell	f		c9w	ESW-16	340	978	stair	489	2	597.20	-108	-536.03		dpm/100 cm2	15000	pass
ne	10/24/2000	4059	east stairwell	sa		f0x	ESW-17	341	450	1 meter up wall	450	1	597.20	-147	-729.24		dpm/100 cm2	5000	pass
ne	10/24/2000	4059	east stairwell	sm		f0x	ESW-17	342	600	1 meter up wall	600	1	597.20	3	13.87		dpm/100 cm2	15000	pass
ne	10/24/2000	4059	east stairwell	sa		f1,2,3y	ESW-18	343	450	2 meters up wall	450	1	597.20	-147	-729.24		dpm/100 cm2	5000	pass
ne	10/24/2000	4059	east stairwell	sm		f1,2,3y	ESW-18	344	575	2 meters up wall	575	1	597.20	-22	-109.98		dpm/100 cm2	15000	pass
ne	10/24/2000	4059	east stairwell	sa		f6,7,8y	ESW-19	345	475	2 meters up wall	475	1	597.20	-122	-605.39		dpm/100 cm2	5000	pass
ne	10/24/2000	4059	east stairwell	sm		f6,7,8y	ESW-19	346	550	2 meters up wall	550	1	597.20	-47	-233.83		dpm/100 cm2	15000	pass
oe	10/24/2000	4059	east stairwell	f		f7y	ESW-19	347	1201	2 meters up wall	601	2	597.20	3	16.35		dpm/100 cm2	15000	pass
ne	10/24/2000	4059	east stairwell	sa		a5w+a6w	ESW-8	348	350	stair	350	1	597.20	-247	-1224.65		dpm/100 cm2	5000	pass
ne	10/24/2000	4059	east stairwell	sm		a5w+a6w	ESW-8	349	500	stair	500	1	597.20	-97	-481.54		dpm/100 cm2	15000	pass
ne	10/24/2000	4059	east stairwell	sa		a7,8,9x	ESW-9	350	475	1 meter up wall	475	1	597.20	-122	-605.39		dpm/100 cm2	5000	pass
ne	10/24/2000	4059	east stairwell	sm		a7,8,9x	ESW-9	351	600	1 meter up wall	600	1	597.20	3	13.87		dpm/100 cm2	15000	pass
oe	10/24/2000	4059	east stairwell	f		a8x	ESW-9	352	1146	1 meter up wall	573	2	597.20	-24	-119.89		dpm/100 cm2	15000	pass
ne	10/24/2000	4059	east stairwell	sa		a11,12,13y	ESW-10	353	400	2 meters up wall	400	1	597.20	-197	-976.94		dpm/100 cm2	5000	pass
ne	10/24/2000	4059	east stairwell	sm		a11,12,13y	ESW-10	354	500	2 meters up wall	500	1	597.20	-97	-481.54		dpm/100 cm2	15000	pass
ne	10/24/2000	4059	east stairwell	sa		a14x	ESW-11	355	400	1 meter up wall	400	1	597.20	-197	-976.94		dpm/100 cm2	5000	pass

TABLE B-1
SURVEY DATA
ROCKETDYNE

Det. Case	date	Building	Room	Fix or Scan	Type	Field Notes Grid Coor.	Survey Report Grid Coordinates	Sequence No.	Count	Notes	Count Rate	Sample time	Bkg Rate	Net count rate	Activity	%error	units	criteria	flag
ne	10/24/2000	4059	east stairwell	sm		a14x	ESW-11	356	600	1 meter up wall	600	1	597.20	3	13.87		dpm/100 cm2	15000	pass
ne	10/24/2000	4059	east stairwell	sa		c0y+d0y	ESW-12	357	500	2 meters up wall	500	1	597.20	-97	-481.54		dpm/100 cm2	5000	pass
ne	10/24/2000	4059	east stairwell	sm		c0y+d0y	ESW-12	358	600	2 meters up wall	600	1	597.20	3	13.87		dpm/100 cm2	15000	pass
oe	10/24/2000	4059	east stairwell	f		c0y	ESW-12	359	1167	2 meters up wall	584	2	597.20	-14	-67.87		dpm/100 cm2	15000	pass
ne	10/24/2000	4059	east stairwell	sa		d0+c0	ESW-13	360	590	on landing 1 -floor	590	1	597.20	-7	-35.67		dpm/100 cm2	5000	pass
ne	10/24/2000	4059	east stairwell	sm		d0+c0	ESW-13	361	780	on landing 1 -floor	780	1	597.20	183	905.60	29.9%	dpm/100 cm2	15000	pass
ni	10/24/2000	4059	high bay	sa		14jx	14-1m	362	450	north wall, HB-20	450	1	432.40	18	87.19		dpm/100 cm2	5000	pass
ni	10/24/2000	4059	high bay	sm		14jx	14-1m	363	500	north wall, HB-20	500	1	432.40	68	334.89		dpm/100 cm2	15000	pass
oi	10/24/2000	4059	high bay	f		14jx	14-1m	364	997	north wall, HB-20	499	2	432.40	66	327.46	66.2%	dpm/100 cm2	15000	pass
ni	10/24/2000	4059	high bay	sa		3jy	3-3m	365	350	north wall, HB-5	350	1	432.40	-82	-408.22		dpm/100 cm2	5000	pass
ni	10/24/2000	4059	high bay	sm		3jy	3-3m	366	400	north wall, HB-5	400	1	432.40	-32	-160.51		dpm/100 cm2	15000	pass
oi	10/24/2000	4059	high bay	f		3jy	3-3m	367	941	north wall, HB-5	471	2	432.40	38	188.75		dpm/100 cm2	15000	pass
ni	10/24/2000	4059	high bay	sa		9jy	9-2m	368	375	north wall	375	1	432.40	-57	-284.36		dpm/100 cm2	5000	pass
ni	10/24/2000	4059	high bay	sm		9jy	9-2m	369	420	north wall	420	1	432.40	-12	-61.43		dpm/100 cm2	15000	pass
ni	10/24/2000	4059	high bay	sa		8jx	8-1m	370	325	north wall	325	1	432.40	-107	-532.07		dpm/100 cm2	5000	pass
ni	10/24/2000	4059	high bay	sm		8jx	8-1m	371	410	north wall	410	1	432.40	-22	-110.97		dpm/100 cm2	15000	pass
pa	10/24/2000	4059	high bay	sa		e0y	E-4m	372	300	west wall, HB-4	300	1	404.00	-104	-515.22		dpm/100 cm2	5000	pass
pa	10/24/2000	4059	high bay	sm		e0y	E-4m	373	420	west wall, HB-4	420	1	404.00	16	79.27		dpm/100 cm2	15000	pass
qa	10/24/2000	4059	high bay	f		e0y	E-4m	374	558	west wall, HB-4	279	2	404.00	-125	-619.26		dpm/100 cm2	15000	pass
pa	10/24/2000	4059	high bay	sa		beam c0y	C-2m	375	300	west wall on beam	300	1	404.00	-104	-515.22		dpm/100 cm2	5000	pass
pa	10/24/2000	4059	high bay	sm		beam c0y	C-2m	376	420	west wall on beam	420	1	404.00	16	79.27		dpm/100 cm2	15000	pass
nj	10/24/2000	4059	west stairwell	sa		9ky	WSW-13	377	450	Bottom landing	450	1	470.00	-20	-99.08		dpm/100 cm2	5000	pass
nj	10/24/2000	4059	west stairwell	sm		9ky	WSW-13	378	600	Bottom landing	600	1	470.00	130	644.03	36.9%	dpm/100 cm2	15000	pass
kb	10/24/2000	4059	west stairwell	alpha		9ky	WSW-13	379	3	Bottom landing	2	2	0.40	1	6.03		dpm/100 cm2	300	pass
nj	10/24/2000	4059	west stairwell	sa		9lx	WSW-14	380	410	Bottom landing	410	1	470.00	-60	-297.24		dpm/100 cm2	5000	pass
nj	10/24/2000	4059	west stairwell	sm		9lx	WSW-14	381	590	Bottom landing	590	1	470.00	120	594.49	39.7%	dpm/100 cm2	15000	pass
kb	10/24/2000	4059	west stairwell	alpha		9lx	WSW-14	382	4	Bottom landing	2	2	0.40	2	8.78		dpm/100 cm2	300	pass
nj	10/24/2000	4059	west stairwell	sa		9mx	WSW-15	383	375	Bottom landing	375	1	470.00	-95	-470.64		dpm/100 cm2	5000	pass
nj	10/24/2000	4059	west stairwell	sm		9mx	WSW-15	384	450	Bottom landing	450	1	470.00	-20	-99.08		dpm/100 cm2	15000	pass
kb	10/24/2000	4059	west stairwell	alpha		9mx	WSW-15	385	2	Bottom landing	1	2	0.40	1	3.29		dpm/100 cm2	300	pass
eo	10/24/2000	4059	office 1	sm		01w	no grid	386	500		500	1	466.00	34	383.08		dpm/100 cm2	15000	pass
fo	10/24/2000	4059	office 1	f		01w	no grid	387	1167		584	2	466.00	118	1129.04	40.3%	dpm/100 cm2	15000	pass
eo	10/24/2000	4059	office 2	sa		02w	no grid	388	400		400	1	466.00	-66	-743.62		dpm/100 cm2	5000	pass
eo	10/24/2000	4059	office 2	sm		02w	no grid	389	500		500	1	466.00	34	383.08		dpm/100 cm2	15000	pass
eo	10/24/2000	4059	office 4	sa		04w	no grid	390	500		500	1	466.00	34	383.08		dpm/100 cm2	5000	pass
eo	10/24/2000	4059	office 4	sm		04w	no grid	391	600		600	1	466.00	134	1509.77	35.8%	dpm/100 cm2	15000	pass
fo	10/24/2000	4059	office 4	f		04w	no grid	392	1206		603	2	466.00	137	1316.42	35.1%	dpm/100 cm2	15000	pass

TABLE B-2

SWIPE SAMPLE DATA
ROCKETDYNE SANTA SUSANA FIELD LABORATORY
(PAGE 1 OF 3)

Sample ID	Sampling Location	Gross Alpha (dpm/100 cm^2)	MDA Alpha (dpm/100 cm^2)	Validated Qualifier	Gross Beta (dpm/100 cm^2)	MDA Beta (dpm/100 cm^2)	Validated Qualifier
NE-C-1	B4059-Basement Ceiling (Northeast of C-1)	1.39 ± 1.25	1.89	UJ	5.5 ± 2.42	3.08	J
S-W-19	B4059-Basement West Wall (South of W-19), Column 2, 7 m High	0.40 ± 1.03	1.91	UJ	3.17 ± 2.20	3.52	UJ
N-4	B4059-Basement North Wall, Column J, 3.5 m High	0.62 ± 1.01	1.74	UJ	0.97 ± 1.89	3.30	UJ
S-N-8	B4059-Basement North Wall (1 m south of N-8), Column I, 7 m High	0.15 ± 0.73	1.47	UJ	1.06 ± 1.83	3.08	UJ
NE-N-19	B4059-Basement North Wall (Northeast of N-19), Column C, 6 m High	0.40 ± 0.97	1.78	UJ	0.92 ± 2.09	3.52	UJ
SE-ALC-3	B4059-Basement Alcove Floor (Southeast of ALC 3), Column 0, 3.5 m	0.37 ± 1.01	1.87	UJ	7.26 ± 2.64	3.52	J
ALC-6	B4059-Basement Alcove South Wall, 3.5 m	0.90 ± 1.01	1.63	UJ	2.86 ± 2.42	3.74	UJ
E-ALC-10	B4059-Basement Alcove North Wall, 3.5 m	-0.20 ± 0.84	1.83	UJ	-0.07 ± 1.80	3.3	UJ
ALC-16	B4059-Basement Alcove Ceiling, 8.5 m	0.92 ± 1.21	2.00	UJ	5.06 ± 2.42	3.52	J
C-BM	B4059-Basement Ceiling Beam by Opening above Reactor	0.75 ± 0.99	1.65	UJ	-0.29 ± 1.85	3.30	UJ
N-20	B4059-Basement North Wall, Column B	-.029 ± 0.75	1.74	UJ	0.15 ± 1.76	3.08	UJ
N-PO-18	B4059-Basement North Wall Pipe Opening 18	0.66 ± 1.17	2.02	UJ	-0.57 ± 1.72	3.30	UJ
W-C-1	B4059-Basement Ceiling Edge inside of Opening	-0.07 ± 0.75	1.63	UJ	1.94 ± 2.02	3.30	UJ
S-16	B4059-Basement South Wall, S-16 in Duct, Column G, 5 m	0.53 ± 0.88	1.52	UJ	1.06 ± 1.91	3.30	UJ
N-S-9	B4059-Basement South Wall Bottom of inside of same Duct as S-9, Column Z	1.12 ± 1.19	1.89	UJ	75.24 ± 11.44	3.08	J

TABLE B-2 (Continued)

SWIPE SAMPLE DATA
ROCKETDYNE SANTA SUSANA FIELD LABORATORY
PAGE 2 OF 3

Sample ID	Sampling Location	Gross Alpha (dpm/100 cm^2)			MDA Alpha (dpm/100 cm^2)	Validated Qualifier	Gross Beta (dpm/100 cm^2)			MDA Beta (dpm/100 cm^2)	Validated Qualifier
N-PO-9	B4059-Basement North Wall Pipe Opening 9	0.53	±	1.06	1.91	UJ	0.81	±	1.98	3.52	UJ
N-PO-5	B4059-Basement North Wall Pipe Opening 5	0.24	±	0.90	1.74	UJ	5.94	±	2.42	3.30	J
N-PO-12	B4059-Basement North Wall Pipe Opening 12	0.02	±	0.68	1.47	UJ	1.78	±	1.89	3.08	UJ
S-2	B4059-Basement South Wall	0.51	±	0.99	1.78	UJ	29.7	±	5.50	3.52	J
S-4	B4059-Basement South Wall	0.51	±	1.03	1.87	UJ	5.94	±	2.64	3.52	J
E-3	B4059-Basement East Wall	0.48	±	0.92	1.65	UJ	3.37	±	2.18	3.30	J
E-6	B4059-Basement East Wall	-0.42	±	0.68	1.74	UJ	3.30	±	2.07	3.08	J
E-11	B4059-Basement East Wall	0.66	±	1.17	2.02	UJ	2.95	±	2.05	3.30	UJ
N-1	B4059-Basement North Wall	-0.20	±	0.68	1.63	UJ	11.0	±	3.08	3.30	J
N-26	B4059-Basement North Wall	0.15	±	0.75	1.52	UJ	3.34	±	2.13	3.30	J
W-1	B4059-Basement West Wall	-2.46	±	1.41	3.30	UJ	1.74	±	1.91	3.08	UJ
W-14B	B4059-Basement Wall, Southernmost Pipe opening	-1.83	±	1.52	3.30	UJ	0.22	±	1.91	3.52	UJ
F-19	B4059-Basement Floor (Grid 21W)	-2.46	±	1.41	3.30	UJ	3.56	±	2.13	3.30	J
F-7	B4059-Basement Floor (Grid E1W)	-1.89	±	1.39	3.08	UJ	1.78	±	1.89	3.08	UJ
F-12	B4059-Basement Floor (Grid C6W)	-1.58	±	1.25	2.86	UJ	1.41	±	2.13	3.52	UJ
F-1	B4059-Basement Floor (Bl WE6 and E7W)	-2.27	±	1.56	3.52	UJ	0.77	±	2.07	3.52	UJ
F-4	B4059-Basement Floor	-0.66	±	1.39	2.86	UJ	0.29	±	2.13	3.74	UJ
F-5	B4059-Basement Floor	-2.31	±	1.21	3.08	UJ	0.09	±	1.83	3.30	UJ
F-10	B4059-Basement Floor	-0.86	±	1.50	3.08	UJ	1.06	±	2.07	3.52	UJ
F-17	B4059-Basement Floor	-1.01	±	1.36	2.86	UJ	2.71	±	2.11	3.30	UJ
NS-1	B4059-Basement Back Room North Wall	-2.20	±	1.45	3.30	UJ	0.55	±	1.78	3.08	UJ
NS-11	B4059-Basement Back Room South Wall	-2.11	±	1.63	3.52	UJ	8.58	±	2.64	3.30	J
EWF-7	B4059-Basement Back Room East Wall	-2.20	±	1.30	3.08	UJ	2.27	±	2.05	3.30	UJ
S-23	B4059-Basement South Wall, Column K, 6 m High	-1.85	±	1.32	3.08	UJ	2.53	±	2.07	3.30	UJ

TABLE B-2 (Continued)

SWIPE SAMPLE DATA
ROCKETDYNE SANTA SUSANA FIELD LABORATORY
PAGE 3 OF 3

Sample ID	Sampling Location	Gross Alpha (dpm/100 cm^2)			MDA Alpha (dpm/100 cm^2)	Validated Qualifier	Gross Beta (dpm/100 cm^2)			MDA Beta (dpm/100 cm^2)	Validated Qualifier
W-S-17	B4059-Basement South Wall, Column F, 5 m High on Metal Duct	0.35	±	1.01	1.89	UJ	7.92	±	2.64	3.08	J
C-12	B4059-Basement Ceiling (C-12)	-0.09	±	0.84	1.78	UJ	-0.33	±	2.00	3.52	UJ
NGR1	B459, Grated Vent	1.80	±	1.34	1.87	UJ	9.02	±	2.86	3.52	J
F8W	B459, Noble Gas Room Floor	1.28	±	1.10	1.63	UJ	2.42	±	2.42	3.74	UJ
D4W	B459, Noble Gas Room Floor	-0.07	±	0.88	1.83	UJ	3.94	±	2.20	3.30	J
PIT2	B459, Top of Pit Wall	1.32	±	1.30	2.00	UJ	0.97	±	2.07	3.52	UJ
EO2Y	High Bay Ceiling, West End	0.48	±	0.92	1.65	UJ	1.21	±	1.98	3.30	UJ
ESW-6	B4059, East Stairwell	-0.42	±	0.68	1.74	UJ	0.64	±	1.80	3.08	UJ
ESW-17	B4059, East Stairwell	-0.48	±	0.88	2.02	UJ	1.23	±	1.89	3.30	UJ
ESW-8	B4059, East Stairwell	-0.07	±	0.75	1.63	UJ	0.73	±	1.91	3.30	UJ
HB-2	B4059, High Bay, Grid H15	0.29	±	0.79	1.52	UJ	0.81	±	1.89	3.30	UJ
ESW-19	B4059, East Stairwell	0.35	±	1.01	1.89	UJ	-0.02	±	1.74	3.08	UJ
HB-3	B4059, High Bay, Grid B3	-0.55	±	0.77	1.91	UJ	0.55	±	1.96	3.52	UJ
HB-6	B4059, High Bay, 18CX	0.11	±	0.88	1.74	UJ	5.5	±	2.42	3.30	J
HB-5	B4059, High Bay, Grid 3JY	0.26	±	0.77	1.47	UJ	-0.13	±	1.72	3.08	UJ
HB4	High Bay, West Wall (EQY)	0.02	±	0.88	1.78	UJ	-0.33	±	2.00	3.52	UJ
WSW-5	West Stairwell	0.64	±	1.08	1.87	UJ	1.10	±	2.09	3.52	UJ
WSW-9	West Stairwell	0.90	±	1.01	1.63	UJ	0.88	±	2.18	3.74	UJ
WSW-12	West Stairwell	0.57	±	1.03	1.83	UJ	7.26	±	2.64	3.30	J
WSW-1	West Stairwell	0.26	±	1.03	2.00	UJ	11.44	±	3.08	3.52	J
HVAC1W	Heating, Ventilation, and Air Conditioning	0.62	±	0.95	1.65	UJ	1.87	±	2.05	3.30	UJ

Notes:

±	Plus or minus	m	meter
Dpm/100cm^2	Disintegrations per minute per 100 square centimeters	MDA	Minimum detectable activity
ID	Identification	UJ	Reported quantity is an estimated value less than the MDA
J	Reported quantity is an estimated value.		

TABLE B-3

CONCRETE CORE AND STEEL FRAGMENT SAMPLES
ROCKETDYNE SANTA SUSANA FIELD LABORATORY PAGE 1 OF 8

Sample: CORE-EPA-1A											
	Silver -110 m	Beryllium -7	Cadmium -109	Cerium -144	Cobalt -58	Cobalt - 60	Cesium-134	Cesium -137	Europium -152	Europium -154	Europium -155
Result (pCi/g)	0.040 +/- 0.07	-0.1 +/- 5.8	2.0 +/- 1.0	0.03 +/- 0.50	0.05 +/- 0.29	0.00 +/- 0.050	0.024 +/- 0.056	-0.002 +/- 0.054	0.12 +/- 0.34	-0.02 +/- 0.30	0.10 +/- 0.17
MDC (pCi/g)	0.89	2.7	1.3	0.68	0.19	0.093	0.088	0.097	0.60	0.54	0.27
Qualifier	U	U	TI	U	U	U	U	U	U	U	U
	Iron-59	Potassium -40	Manganese -54	Sodium -22	Niobium -94	Niobium -95	Ruthenium -106	Antimony -124	Antimony -125	Scandium -46	Zinc-65
Result (pCi/g)	-0.1 +/- 2.2	18.6 +/- 2.9	0.006 +/- 0.071	-0.007 +/- 0.061	0.013 +/- 0.054	-0.10 +/- 0.51	-0.08 +/- 0.67	-0.02 +/- 0.54	-0.06 +/- 0.17	-0.02 +/- 0.27	0.02 +/- 0.16
MDC (pCi/g)	0.83	0.84	0.10	0.11	0.096	0.29	0.99	0.29	0.27	0.21	0.22
Qualifier	U		U	U	U	U	U	U	U	U	U

Sample: CORE-EPA-1B											
	Silver -110 m	Beryllium -7	Cadmium -109	Cerium -144	Cobalt -58	Cobalt -60	Cesium -134	Cesium -137	Europium -152	Europium -154	Europium -155
Result (pCi/g)	-0.014 +/- 0.084	0.9 +/- 6.7	-0.1 +/- 1.7	-0.14 +/- 0.62	-0.05 +/- 0.40	-0.033 +/- 0.092	-0.011 +/- 0.067	0.033 +/- 0.056	0.05 +/- 0.28	0.03 +/- 0.31	0.12 +/- 0.21
MDC (pCi/g)	0.12	3.1	2.6	0.83	0.27	0.16	0.11	0.096	0.57	0.58	0.34
Qualifier	U	U	U	U	U	U	U	U	U	U	U
	Iron-59	Potassium -40	Manganese -54	Sodium -22	Niobium -94	Niobium -95	Ruthenium -106	Antimony -124	Antimony -125	Scandium -46	Zinc-65
Result (pCi/g)	-0.2 +/- 3.3	18.6 +/- 3.2	-0.024 +/- 0.098	0.001 +/- 0.080	-0.002 +/- 0.050	-0.06 +/- 0.51	0.05 +/- 0.60	0.00 +/- 0.57	0.05 +/- 0.14	-0.04 +/- 0.32	0 +/- 0
MDC (pCi/g)	1.2	1.2	0.14	0.14	0.093	0.30	0.93	0.32	0.23	0.25	0.40
Qualifier	U		U	U	U	U	U	U	U	U	SQ

TABLE B-3 (Continued)

CONCRETE CORE AND STEEL FRAGMENT SAMPLES
ROCKETDYNE SANTA SUSANA FIELD LABORATORY PAGE 2 OF 8

Sample: CORE-EPA-1C											
	Silver -110 m	Beryllium -7	Cadmium -109	Cerium -144	Cobalt -58	Cobalt -60	Cesium -134	Cesium -137	Europium -152	Europium -154	Europium -155
Result (pCi/g)	-0.027 +/- 0.068	0.0 +/- 4.2	2.0 +/- 1.2	0.07 +/- 0.42	-0.07 +/- 0.31	-0.011 +/- 0.043	-0.035 +/- 0.051	0.005 +/- 0.038	0.09 +/- 0.25	0.03 +/- 0.22	-0.07 +/- 0.17
MDC (pCi/g)	0.087	2.0	1.5	0.56	0.20	0.074	0.077	0.066	0.45	0.39	0.27
Qualifier	U	U	Tl	U	U	U	U	U	U	U	U
	Iron-59	Potassium -40	Manganese -54	Sodium -22	Niobium -94	Niobium -95	Ruthenium -106	Antimony -124	Antimony -125	Scandium -46	Zinc-65
Result (pCi/g)	-0.3 +/- 2.3	18.6 +/- 2.7	-0.012 +/- 0.060	-0.007 +/- 0.057	0.012 +/- 0.041	-0.01 +/- 0.39	0.15 +/- 0.53	0.07 +/- 0.36	0.02 +/- 0.11	0.01 +/- 0.19	-0.05 +/- 0.17
MDC (pCi/g)	0.81	0.88	0.084	0.094	0.071	0.23	0.75	0.19	0.19	0.15	0.22
Qualifier	U		U	U	U	U	U	U	U	U	U

Sample: CORE-EPA-1D											
	Silver -110 m	Beryllium -7	Cadmium -109	Cerium -144	Cobalt -58	Cobalt -60	Cesium -134	Cesium -137	Europium -152	Europium -154	Europium -155
Result (pCi/g)	-0.018 +/- 0.067	0.3 +/- 4.2	1.77 +/- 0.93	0.02 +/- 0.43	0.02 +/- 0.26	0.005 +/- 0.040	0.026 +/- 0.023	0.006 +/- 0.040	0.01 +/- 0.24	0.01 +/- 0.20	0.10 +/- 0.15
MDC (pCi/g)	0.089	2.0	1.2	0.58	0.17	0.073	0.083	0.072	0.46	0.38	0.24
Qualifier	U	U	Tl	U	U	U	U	U	U	U	U
	Iron-59	Potassium -40	Manganese -54	Sodium -22	Niobium -94	Niobium -95	Ruthenium -106	Antimony -124	Antimony -125	Scandium -46	Zinc-65
Result (pCi/g)	0.0 +/- 1.8	16.9 +/- 2.6	-0.030 +/- 0.076	0.003 +/- 0.047	-0.006 +/- 0.044	-0.02 +/- 0.34	-0.11 +/- 0.62	0.01 +/- 0.44	0.01 +/- 0.11	0.01 +/- 0.17	-0.02 +/- 0.16
MDC (pCi/g)	0.67	0.84	0.10	0.083	0.078	0.20	0.90	0.24	0.18	0.13	0.22
Qualifier	U		U	U	U	U	U	U	U	U	U

TABLE B-3 (Continued)

CONCRETE CORE AND STEEL FRAGMENT SAMPLES
ROCKETDYNE SANTA SUSANA FIELD LABORATORY PAGE 3 OF 8

Sample: CORE-EPA-2

	Silver -110 m	Beryllium -7	Cadmium -109	Cerium -144	Cobalt -58	Cobalt -60	Cesium -134	Cesium -137	Europium -152	Europium -154	Europium -155
Result (pCi/g)	-0.003 +/- 0.061	0.1 +/- 4.2	0.1 +/- 1.3	-0.09 +/- 0.44	0.12 +/- 0.27	0.031 +/- 0.049	-0.010 +/- 0.048	-0.018 +/- 0.044	0.16 +/- 0.30	-0.07 +/- 0.24	0.08 +/- 0.16
MDC (pCi/g)	0.082	2.0	1.9	0.60	0.16	0.080	0.076	0.075	0.51	0.42	0.26
Qualifier	U	U	U	U	U	U	U	U	U	U	U

	Iron-59	Potassium -40	Manganese -54	Sodium -22	Niobium -94	Niobium -95	Ruthenium -106	Antimony -124	Antimony -125	Scandium -46	Zinc-65
Result (pCi/g)	-0.1 +/- 1.9	18.6 +/- 2.7	0.043 +/- 0.067	-0.008 +/- 0.055	-0.011 +/- 0.042	0.03 +/- 0.34	0.09 +/- 0.52	-0.02 +/- 0.42	0.04 +/- 0.13	0.01 +/- 0.23	0.02 +/- 0.15
MDC (pCi/g)	0.69	0.90	0.090	0.091	0.074	0.20	0.76	0.23	0.20	0.17	0.20
Qualifier	U		U	U	U	U	U	U	U	U	U

Sample: CORE-EPA-3

	Silver -110 m	Beryllium -7	Cadmium -109	Cerium -144	Cobalt -58	Cobalt -60	Cesium -134	Cesium -137	Europium -152	Europium -154	Europium -155
Result (pCi/g)	0.003 +/- 0.053	-0.2 +/- 4.0	0.1 +/- 1.7	0.02 +/- 0.47	0.04 +/- 0.22	0.031 +/- 0.036	-0.002 +/- 0.036	-0.001 +/- 0.035	0.16 +/- 0.25	0.05 +/- 0.21	0.11 +/- 0.20
MDC (pCi/g)	0.071	1.9	2.6	0.64	0.14	0.057	0.058	0.062	0.42	0.37	0.33
Qualifier	U	U	U	U	U	U	U	U	U	U	U

	Iron-59	Potassium -40	Manganese -54	Sodium -22	Niobium -94	Niobium -95	Ruthenium -106	Antimony -124	Antimony -125	Scandium -46	Zinc-65
Result (pCi/g)	-0.1 +/- 1.7	18.8 +/- 2.7	-0.026 +/- 0.064	-0.014 +/- 0.050	-0.012 +/- 0.038	0.00 +/- 0.34	-0.01 +/- 0.45	-0.04 +/- 0.37	0.01 +/- 0.11	0.00 +/- 0.17	-0.05 +/- 0.17
MDC (pCi/g)	0.62	0.71	0.088	0.082	0.066	0.20	0.66	0.19	0.18	0.13	0.22
Qualifier	U		U	U	U	U	U	U	U	U	U

TABLE B-3 (Continued)

CONCRETE CORE AND STEEL FRAGMENT SAMPLES
ROCKETDYNE SANTA SUSANA FIELD LABORATORY PAGE 4 OF 8

Sample: CORE-EPA-4

	Silver -110 m	Beryllium -7	Cadmium -109	Cerium -144	Cobalt-58	Cobalt-60	Cesium -134	Cesium -137	Europium -152	Europium -154	Europium -155
Result (pCi/g)	0.002 +/- 0.077	-0.1 +/- 5.3	0.0 +/- 2.2	0.05 +/- 0.68	-0.04 +/- 0.33	-0.008 +/- 0.045	-0.001 +/- 0.046	-0.001 +/- 0.053	0.10 +/- 0.24	-0.10 +/- 0.28	0.03 +/- 0.25
MDC (pCi/g)	0.10	2.5	3.2	0.91	0.21	0.080	0.076	0.093	0.43	0.49	0.41
Qualifier	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ
	Iron-59	Potassium -40	Manganese -54	Sodium-22	Niobium -94	Niobium -95	Ruthenium -106	Antimony -124	Antimony -125	Scandium -46	Zinc-65
Result (pCi/g)	0.0 +/- 1.9	23.8 +/- 3.6	-0.002 +/- 0.073	-0.015 +/- 0.063	-0.001 +/- 0.051	0.08 +/- 0.46	0.14 +/- 0.55	0.09 +/- 0.43	-0.06 +/- 0.15	0.01 +/- 0.20	-0.04 +/- 0.20
MDC (pCi/g)	0.71	1.2	0.11	0.10	0.092	0.26	0.80	0.22	0.24	0.16	0.26
Qualifier	UJ	J	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ

Sample: CORE-EPA-5

	Silver -110 m	Beryllium -7	Cadmium -109	Cerium -144	Cobalt-58	Cobalt-60	Cesium -134	Cesium -137	Europium -152	Europium -154	Europium -155
Result (pCi/g)	0.016 +/- 0.076	0.4 +/- 5.0	4.3 +/- 2.6	-0.19 +/- 0.54	-0.02 +/- 0.35	-0.011 +/- 0.056	-0.014 +/- 0.053	0.001 +/- 0.051	0.17 +/- 0.31	0.09 +/- 0.26	0.03 +/- 0.17
MDC (pCi/g)	0.099	2.3	2.2	0.71	0.22	0.094	0.082	0.089	0.53	0.45	0.28
Qualifier	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ
	Iron-59	Potassium -40	Manganese -54	Sodium-22	Niobium -94	Niobium -95	Ruthenium -106	Antimony -124	Antimony -125	Scandium -46	Zinc-65
Result (pCi/g)	-0.2 +/- 2.3	32.0 +/- 4.5	0.024 +/- 0.078	-0.030 +/- 0.076	-0.001 +/- 0.049	-0.02 +/- 0.46	0.15 +/- 0.68	0.00 +/- 0.44	0.02 +/- 0.13	0.02 +/- 0.23	-0.02 +/- 0.19
MDC (pCi/g)	0.82	1.3	0.11	0.12	0.085	0.26	0.97	0.24	0.22	0.17	0.24
Qualifier	UJ	J	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ

TABLE B-3 (Continued)

CONCRETE CORE AND STEEL FRAGMENT SAMPLES
ROCKETDYNE SANTA SUSANA FIELD LABORATORY PAGE 5 OF 8

Sample: CORE-EPA-6

	Silver -110 m	Beryllium -7	Cadmium -109	Cerium -144	Cobalt-58	Cobalt-60	Cesium -134	Cesium -137	Europium -152	Europium -154	Europium -155
Result (pCi/g)	-0.005 +/- 0.050	0.1 +/- 1.5	-0.18 +/- 0.92	0.14 +/- 0.34	0.020 +/- 0.099	0.013 +/- 0.036	0.007 +/- 0.027	0.037 +/- 0.046	0.03 +/- 0.23	-0.07 +/- 0.25	0.06 +/- 0.14
MDC (pCi/g)	0.077	1.2	1.4	0.50	0.099	0.064	0.046	0.076	0.44	0.44	0.24
Qualifier	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ
	Iron-59	Potassium -40	Manganese -54	Sodium -22	Niobium -94	Niobium -95	Ruthenium -106	Antimony -124	Antimony -125	Scandium -46	Zinc-65
Result (pCi/g)	-0.03 +/- 0.44	15.8 +/- 2.4	-0.017 +/- 0.055	-0.012 +/- 0.047	0.016 +/- 0.035	0.03 +/- 0.12	-0.14 +/- 0.48	-0.01 +/- 0.12	0.012 +/- 0.095	0.02 +/- 0.11	-0.04 +/- 0.15
MDC (pCi/g)	0.33	0.73	0.085	0.081	0.061	0.11	0.75	0.11	0.16	0.12	0.22
Qualifier	UJ	J	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ

Sample: CORE-EPA-6-RECOUNT

	Silver -110 m	Beryllium -7	Cadmium -109	Cerium -144	Cobalt-58	Cobalt-60	Cesium -134	Cesium -137	Europium -152	Europium -154	Europium -155
Result (pCi/g)	-0.21 +/-0.073	0.2 +/- 4.7	1.27 +/- 0.81	0.27 +/- 0.43	0.01 +/- 0.23	0.002 +/- 0.052	0.009 +/- 0.042	-0.002 +/- 0.047	0 +/- 0	-0.02 +/- 0.23	0.09 +/- 0.12
MDC (pCi/g)	0.097	2.2	1.1	0.55	0.15	0.094	0.069	0.084	0.43	0.42	0.20
Qualifier	U	U	Tl	U	U	U	U	U	SQ	U	U
	Iron-59	Potassium -40	Manganese -54	Sodium-22	Niobium -94	Niobium -95	Ruthenium -106	Antimony -124	Antimony -125	Scandium -46	Zinc-65
Result (pCi/g)	0.1 +/- 1.7	17.5 +/- 2.9	0.005 +/- 0.056	-0.023 +/- 0.066	-0.014 +/- 0.049	0.04 +/- 0.41	-0.30 +/- 0.66	0.00 +/- 0.46	0.04 +/- 0.12	0.04 +/- 0.21	-0.02 +/- 0.21
MDC (pCi/g)	0.62	1.0	0.082	0.11	0.086	0.24	0.94	0.26	0.20	0.16	0.28
Qualifier	U		U	U	U	U	U	U	U	U	U

TABLE B-3 (Continued)

CONCRETE CORE AND STEEL FRAGMENT SAMPLES
ROCKETDYNE SANTA SUSANA FIELD LABORATORY PAGE 6 OF 8

Sample: CORE-EPA-7											
	Silver -110 m	Beryllium -7	Cadmium -109	Cerium -144	Cobalt -58	Cobalt -60	Cesium -134	Cesium - 137	Europium -152	Europium -154	Europium -155
Result (pCi/g)	-0.006 +/- 0.075	0.1 +/- 3.0	1.83 +/- 0.95	-0.08 +/- 0.43	0.00 +/- 0.28	0.022 +/- 0.033	-0.028 +/- 0.058	-0.013 +/- 0.047	0.02 +/- 0.25	-0.06 +/- 0.27	0.04 +/- 0.15
MDC (pCi/g)	0.10	1.4	1.2	0.57	0.19	0.055	0.091	0.082	0.47	0.47	0.25
Qualifier	U	U	T1	U	U	U	U	U	U	U	U
	Iron-59	Potassium -40	Manganese -54	Sodium - 22	Niobium -94	Niobium -95	Ruthenium -106	Antimony -124	Antimony -125	Scandium -46	Zinc-65
Result (pCi/g)	0.0 +/- 1.4	17.8 +/- 2.7	-0.015 +/- 0.071	-0.002 +/- 0.045	-0.002 +/- 0.043	-0.02 +/- 0.41	0.19 +/- 0.47	0.07 +/- 0.41	0.00 +/- 0.10	-0.01 +/- 0.18	-0.01 +/- 0.14
MDC (pCi/g)	0.56	0.83	0.10	0.079	0.078	0.24	0.68	0.22	0.17	0.15	0.19
Qualifier	U		U	U	U	U	U	U	U	U	U

Sample: STEEL-EPA-8											
	Silver -110 m	Beryllium -7	Cadmium -109	Cerium -144	Cobalt-58	Cobalt -60	Cesium - 134	Cesium - 137	Europium -152	Europium -154	Europium -155
Result (pCi/g)	-0.015 +/- 0.062	-0.2 +/- 2.5	-0.5 +/- 1.6	-0.01 +/- 0.44	-0.01 +/- 0.19	0.010 +/- 0.040	-0.003 +/- 0.053	0.005 +/- 0.034	0 +/- 0	-0.03 +/- 0.25	-0.05 +/- 0.18
MDC (pCi/g)	0.088	1.5	2.4	0.64	0.15	0.073	0.088	0.062	0.074	0.45	0.30
Qualifier	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ
	Iron-59	Potassium -40	Manganese -54	Sodium - 22	Niobium - 94	Niobium -95	Ruthenium -106	Antimony -124	Antimony -125	Scandium -46	Zinc-65
Result (pCi/g)	0 +/- 0	-1.12 +/- 0.14	0.017 +/- 0.040	-0.005 +/- 0.039	-0.009 +/- 0.044	0.04 +/- 0.19	-0.12 +/- 0.49	0.05 +/- 0.28	0.092 +/- 0.087	-0.02 +/- 0.15	0.02 +/- 0.14
MDC (pCi/g)	0.058	1.1	0.058	0.071	0.080	0.13	0.75	0.18	0.13	0.13	0.20
Qualifier	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ

TABLE B-3 (Continued)

CONCRETE CORE AND STEEL FRAGMENT SAMPLES
ROCKETDYNE SANTA SUSANA FIELD LABORATORY PAGE 7 OF 8

Sample: STEEL-EPA-9											
	Silver - 110 m	Beryllium -7	Cadmium - 109	Cerium - 144	Cobalt-58	Cobalt-60	Cesium - 134	Cesium - 137	Europium -152	Europium -154	Europium -155
Result (pCi/g)	0.000 +/- 0.026	0.07 +/- 0.99	0.08 +/- 0.38	0.03 +/- 0.15	-0.001 +/- 0.091	0.185 +/- 0.039	-0.008 +/- 0.024	-0.005 +/- 0.019	-0.002 +/- 0.096	-0.02 +/- 0.11	0.005 +/- 0.057
MDC (pCi/g)	0.038	0.61	0.59	0.22	0.075	0.030	0.038	0.034	0.19	0.19	0.098
Qualifier	UJ	UJ	UJ	UJ	UJ	J	UJ	UJ	UJ	UJ	UJ
	Iron-59	Potassium -40	Manganese -54	Sodium - 22	Niobium - 94	Niobium - 95	Ruthenium -106	Antimony -124	Antimony -125	Scandium -46	Zinc-65
Result (pCi/g)	0.00 +/- 0.41	-0.25 +/- 0.18	-0.009 +/- 0.029	0 +/- 0	0.003 +/- 0.017	-0.009 +/- 0.099	0.13 +/- 0.20	0.00 +/- 0.12	0.014 +/- 0.055	0.00 +/- 0.050	-0.014 +/- 0.068
MDC (pCi/g)	0.22	0.63	0.043	0.0053	0.031	0.074	0.29	0.083	0.092	0.049	0.097
Qualifier	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ

Sample: STEEL-EPA-10											
	Silver - 110 m	Beryllium -7	Cadmium - 109	Cerium - 144	Cobalt-58	Cobalt-60	Cesium - 134	Cesium - 137	Europium -152	Europium -154	Europium -155
Result (pCi/g)	0.007 +/- 0.0019	0.02 +/- 0.81	0.10 +/- 0.27	0.17 +/- 0.18	0.006 +/- 0.063	0.89 +/- 0.12	0.004 +/- 0.013	-0.008 +/- 0.015	-0.012 +/- 0.077	-0.10 +/- 0.10	0.008 +/- 0.037
MDC (pCi/g)	0.026	0.48	0.40	0.15	0.048	0.022	0.020	0.025	0.14	0.17	0.062
Qualifier	UJ	UJ	UJ	UJ	UJ	J	UJ	UJ	UJ	UJ	UJ
	Iron-59	Potassium -40	Manganese -54	Sodium - 22	Niobium - 94	Niobium - 95	Ruthenium -106	Antimony - 124	Antimony -125	Scandium -46	Zinc-65
Result (pCi/g)	0.06 +/- 0.37	0.29 +/- 0.37	0.001 +/- 0.020	-0.003 +/- 0.014	0.002 +/- 0.014	0.019 +/- 0.076	-0.01 +/- 0.16	-0.002 +/- 0.074	0.006 +/- 0.034	-0.017 +/- 0.063	0.030 +/- 0.049
MDC (pCi/g)	0.17	0.35	0.029	0.023	0.024	0.052	0.24	0.050	0.056	0.053	0.065
Qualifier	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ

TABLE B-3 (Continued)

CONCRETE CORE AND STEEL FRAGMENT SAMPLES
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Sample: STEEL-EPA-11											
	Silver -110 m	Beryllium -7	Cadmium -109	Cerium -144	Cobalt-58	Cobalt-60	Cesium -134	Cesium -137	Europium -152	Europium -154	Europium -155
Result (pCi/g)	0.000 +/- 0.035	-0.1 +/- 1.6	0.33 +/- 0.85	-0.05 +/- 0.25	-0.02 +/- 0.12	0.95 +/- 0.14	-0.011 +/- 0.031	0.012 +/- 0.026	0.04 +/- 0.12	0.00 +/- 0.16	-0.01 +/- 0.10
MDC (pCi/g)	0.050	0.97	1.3	0.35	0.094	0.050	0.049	0.045	0.23	0.29	0.17
Qualifier	UJ	UJ	UJ	UJ	UJ	J	UJ	UJ	UJ	UJ	UJ
	Iron-59	Potassium -40	Manganese -54	Sodium -22	Niobium -94	Niobium -95	Ruthenium -106	Antimony -124	Antimony -125	Scandium -46	Zinc-65
Result (pCi/g)	-0.01 +/- 0.67	-0.47 +/- 0.28	0.002 +/- 0.037	-0.003 +/- 0.021	-0.001 +/- 0.023	-0.01 +/- 0.15	0.08 +/- 0.34	0.02 +/- 0.17	0.010 +/- 0.056	0.02 +/- 0.11	0.042 +/- 0.083
MDC (pCi/g)	0.33	0.70	0.056	0.037	0.041	0.11	0.50	0.11	0.094	0.092	0.11
Qualifier	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ	UJ

Notes:

+/-	Plus or minus
pCi/g	picocuries per gram
J	Quantity reported is estimated
m	Metastable isotope
MDC	Minimum detectable concentration
U	Quantity reported is less than the sample-specific minimum detectable concentration
UJ	Quantity reported is estimated less than the sample specific minimum detectable concentration
SQ	Spectral interference prevents accurate quantitation.
Tl	Nuclide identification is tentative.

APPENDIX C
FORMULAS AND EQUATIONS
(Two Pages)

Critical Level (L_C)

$$L_C = \frac{K_a}{t_s} \times \sqrt{t_s r_b \left(1 + \frac{t_s}{t_b}\right)}$$

Detection Limit (L_D)

$$L_D = \frac{K_a^2}{t_s}\left[2 \times \frac{K_a}{t_s} \times \sqrt{t_s r_b \left(1 + \frac{t_s}{t_b}\right)}\right]$$

Activity in dpm/100cm^2 (A)

$$A(dpm/100cm^2) = \left(\frac{n_s}{t_s} - \frac{n_b}{t_b}\right) \times A_{CF} \pm \left(A_{CF} \times K_b\right) \times \sqrt{\frac{r_s}{t_s} - \frac{r_b}{t_b}}$$

Less Than Value for Reportable Activity (LTV)

$$\text{LTV (for } r_s - r_b \leq L_C) = \left(\frac{n_s}{t_s} - \frac{n_b}{t_b}\right) \times A_{CF} + \left(A_{CF} \times K_a\right) \times \sqrt{\frac{r_s}{t_s} - \frac{r_b}{t_b}}$$

Activity Conversion Factor (A_{CF})

$$A_{CF} = \frac{1}{\varepsilon} \times \frac{100cm^2}{area_d}$$

Efficiency (ε)

$$\varepsilon = \frac{A_{source}}{\left(\frac{n_{cal}}{t_{cal}} - \frac{n_{b-cal}}{t_{b-cal}}\right)} \times f_1 \times f_2 \times f_3 \bullet\bullet\bullet$$

TERMS AND DEFINITIONS

A	=	Activity (disintegrations per minute per 100 square centimeters [dpm/100cm^2])
A_{CF}	=	Activity conversion factor
A_{source}	=	Activity of the standard calibration source disintegrations per minute (dpm)
$area_d$	=	Detector surface area square centimeters (cm^2)
cpm	=	Counts per minute
dpm	=	Disintegrations per minute
ε	=	Efficiency
f_i	=	Other conversion factors
K_a	=	1.645 (one-sided 95 percent standard deviation)
K_b	=	1.96 (two-sided 95 percent standard deviation)
L_C	=	Critical level disintegrations per minute (dpm/100 cm^2)
L_D	=	Detection limit disintegrations per minute (dpm/100 cm^2)
n_b	=	Total background counts
n_{cal}	=	Total calibration source counts
$n_{b\text{-}cal}$	=	Total background counts at calibration location
n_s	=	Total sample counts
t_s	=	Sample count time (minutes)
t_{cal}	=	Calibration count time (minutes)
$t_{b\text{-}cal}$	=	Background count time at calibration location (minutes)
t_b	=	Background count time (minutes)
r_b	=	Background count rate counts per minute (cpm) = n_b/t_b
r_s	=	Sample count rate counts per minute (cpm) = n_s/t_s