FACT SHEET/STATEMENT OF BASIS

Sandia National Laboratories

August 2005 Request for Corrective Action Complete (No Further Action) Status

for

28 Solid Waste Management Units / Areas of Concern

(RCRA Permit No. NM5890110518-1)

September 2007

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ACRONYMS AND ABBREVIATIONS

AOC	Area of Concern
AT&T	American Telephone and Telegraph
bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene and xylene
CAC	Corrective Action Complete
CDP	Chemical Disposal Pit
COA	City of Albuquerque
COC	constituent of concern
COPEC	constituent of potential ecological concern
CTF	Coyote Test Field
cu	cubic
CWL	Chemical Waste Landfill
DOE	U.S. Department of Energy
DSS	Drain and Septic Systems
EB	equipment blank
EPA	U.S. Environmental Protection Agency
ER	Environmental Restoration
FLUTe™	Flexible Liner Underground Technologies
ft	foot
GCDP	Gas Cylinder Disposal Pit
GS	Gore-Sorber™
HE	high explosive
HI	hazard index
HQ	hazard quotient
HSWA	Hazardous and Solid Waste Amendments
HWB	Hazardous Waste Bureau
KAFB	Kirtland Air Force Base
kg	kilogram(s)
L	liter(s)
lb	pound(s)
MDA	minimum detectable activity
MDL	method detection limit
µg	microgram(s)
mg	milligram(s)
MO	Mobile Office
mrem	millirem
NFA	no further action
NMED	New Mexico Environment Department
NNSA	National Nuclear Security Administration
PCB	polychlorinated biphenyl
PCE	tetrachloroethene
pCi	picocurie(s)
ppbv	parts per billion by volume

ACRONYMS AND ABBREVIATIONS (Concluded)

ppmv	parts per million by volume
RCRA	Resource Conservation and Recovery Act
RPSD	Radiation Protection Sample Diagnostics
RWL	Radioactive Waste Landfill
SNL/NM	Sandia National Laboratories/New Mexico
SSO	Sandia Site Office
SVOC	semivolatile organic compound
SWMU	Solid Waste Management Unit
TA	Technical Area
TB	trip blank
TCE	trichloroethene
TCLP	toxicity characteristic leaching procedure
TEDE	total effective dose equivalent
TNT	trinitrotoluene
UCL	upper confidence limit
USFS	U.S. Forest Service
VCM	voluntary corrective measure
VOC	volatile organic compound
yd	yard
yr	year

FACT SHEET/STATEMENT OF BASIS

Request for Corrective Action Complete (No Further Action) Status for
28 Solid Waste Management Units / Areas of Concern

Sandia National Laboratories, EPA ID No. NM5890110518

Under authority of the New Mexico Hazardous Waste Act (Section 74-4-1 et seq., NMSA 1978, as amended, 1992) and the New Mexico Hazardous Waste Management Regulations (20.4.1 NMAC), the New Mexico Environment Department (Department) can approve or deny hazardous waste permits, closure plans, permit modifications and amendments. Under this authority, the Department intends, pending public input, to approve an August 30, 2005, permit modification request from the U.S. Department of Energy (DOE)/Sandia Corporation (Permittees) to grant Corrective Action Complete (CAC) status for 28 Solid Waste Management Units (SWMUs)/Areas of Concern (AOCs) at the Sandia National Laboratories / New Mexico (SNL/NM) Facility. The term "Corrective Action Complete" was previously refered to as "No Further Action (NFA)". The Class 3 Permit modification request is subject to 20.4.1.900 NMAC incorporating 40 CFR 270.42 (c) and 20.4.1.901 NMAC. The SWMUs/AOCs are listed in the Hazardous and Solid Waste Amendments (HSWA) Module IV, which is part of the DOE/SNL/NM Resource Conservation and Recovery Act (RCRA) Hazardous Waste Management Facility Permit (NM5890110518-1).

All of the AOCs subject to this permit modification request are also properly classified as SWMUs. The AOC designation in some of the names of the SWMUs is retained in this document as a matter of maintaining consistency with the names listed in the Facility's RCRA Permit.

A. Facility Description

SNL/NM is located within the boundaries of Kirtland Air Force Base (KAFB) near Albuquerque in Bernalillo County, New Mexico (Figure 1). KAFB covers 52,223 acres on a high arid mesa approximately 5 miles east of the Rio Grande. SNL/NM occupies 2,829 acres of land owned by the DOE and an additional 14,920 acres of land provided through land-use permits with KAFB, the U.S. Forest Service (USFS), the State of New Mexico and the Isleta Indian Reservation. Sandia Corporation, formerly a subsidiary of American Telephone and Telegraph (AT&T) Corporation, operated the properties for the DOE from the time of its opening in 1945 until September 1993, when Martin Marietta Corporation, now Lockheed-Martin Inc, took over operations from AT&T. Sandia Corporation is now owned by Lockheed-Martin, Inc. The Facility is owned by the DOE and co-operated by the DOE and Sandia Corporation.

SNL/NM is engaged in research and development of conventional and nuclear weapons, alternative energy sources, and a wide variety of national security related research and development. SNL/NM includes five technical areas (TAs) and several remote test areas. The primary mission of SNL/NM is to provide engineering and testing support for nuclear weapons components and related systems. During the late 1940s, the final assembly of weapons was conducted at SNL/NM. Since 1949, SNL/NM has been dedicated to research, development and

testing. Currently, SNL/NM employs approximately 9,300 people. As a result of its testing and research activities, SNL/NM has generated hazardous, radioactive, mixed (those wastes containing both hazardous and radioactive components) and solid wastes. From 1945 to 1988, most of these wastes were disposed of at SNL/NM at numerous locations, which have been classified by the Department as SWMUs or AOCs. The SWMUs/AOCs include unpermitted landfills, septic system drainfields and seepage pits, outfalls, waste piles and test areas. Past waste management activities at SNL/NM have caused the release of hazardous and radioactive contaminants into the environment.

SNL/NM is located at 1515 Eubank SE, Albuquerque, New Mexico 87123. The National Nuclear Security Administration (NNSA)/DOE/Sandia Site Office (SSO) is located at KAFB-East, Pennsylvania & H Street, Albuquerque, New Mexico 87116. The Permittee's primary contact for this action is Mr. John Gould, NNSA/SSO, DOE, P. O. Box 5400, Albuquerque, New Mexico 87185.

B. Background

The U.S. Environmental Protection Agency (EPA) issued Module IV of the RCRA Permit, effective August 26, 1993. Module IV requires investigation and corrective action of SWMUs/AOCs. On January 2, 1996, the Department received authorization from the EPA for corrective action under the HSWA and became the administrative authority for this action.

DOE/SNL/NM has submitted a total of 27 batches of CAC (NFA) documents to the EPA and/or the Department for approval. This Statement of Basis describes 28 SWMUs / AOCs. Table 1 lists the regulatory correspondence related to the submittal, review and responses for each SWMU/AOC. Prior to the 10th submission, all SWMU/AOCs were referred to as *ER Sites*.

If approved, the proposed modification would grant CAC status for the 28 SWMUs/AOCs. Table A.1, Module IV of the Permittees RCRA Permit lists the SWMU/AOCs at SNL/NM where corrective action is necessary to characterize and/or remediate past releases of hazardous wastes or hazardous waste constituents. Based on public comments, it is possible that CAC status will be approved for only some of the SWMU/AOCs included in this permit modification request. If any SWMU/AOCs are not approved for CAC status, their names will remain listed on Table A.1. If this permit modification is approved by the Department for all or some SWMUs/AOCs, the listings of the approved SWMUs/AOCs would be transferred from Table A.1 to Table A.2. Table A.2 lists SWMUs/AOCs for which corrective action is not required.

Additionally, NMED intends to make the following other changes to Table A.2: the comment "controls needed" is also being added to SWMU/AOCs 1, 3, 45, 137, 148, 152, 276 and 1081. The same comment will be added to the listing for SWMU 226 as a correction to the table based on the June 2, 2006, final decision on the February 2005 petition for No Further Action. The duplicate listing for SWMU (ER Site) 226 under Operable Unit 1309 will be deleted. The date of approval will be corrected to 6/06 from 5/06 for SWMUs 2, 48, 87, 96, 135, 136, 159, 165, 166, 167, 187, 190, 226, 227, 229, 1006, 1007, 1010, 1015, 1020, 1024, 1028, 1029, 1083, 1086, 1108, and 1110.

C. Investigation and Remediation

The Department has developed CAC criteria that are used during the investigation and remediation (if necessary) of SWMU/AOCs and that are used to determine the appropriateness of proposing CAC for any particular SWMU/AOC. In the case of this Class 3 Permit Modification request, it was determined that each of the SWMU/AOCs were characterized and remediated (if necessary) in accordance with current applicable state and/or federal regulations and that confirmatory data indicate that any remaining contaminant concentrations pose acceptable levels of risk to human health and the environment under current and projected future land uses (Criterion 5, see Section E below).

Section I, below, briefly describes the location, history, evaluation of relevant information and the basis for determination for each of the 28 SWMU/AOCs proposed for CAC. More detailed descriptions of the particulars for each SWMU/AOC can be found in the original RCRA Facility Investigation Report or other reports for each SWMU/AOC. The report for each SWMU/AOC is correlated to a CAC batch (refer to Table 1; a batch is a collection of corrective-action-related reports submitted on a given date).

D. Administrative Record

The Administrative Record for this proposed action consists of the SNL Permit modification request, the Statement of Basis/Fact Sheet, this Public Notice, the draft Permit that consists of the proposed Tables A.1 and A.2, and the referenced supporting documentation. The complete Administrative Record may be reviewed at the following location during the public comment period with prior appointment:

NMED – Hazardous Waste Bureau
2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505-6303
(505) 476-6000
Monday - Friday from 8:00 a.m. to 5:00 p.m.
Contact: Pam Allen

A copy of the Statement of Basis/Fact Sheet, the Public Notice, and the draft Permit that consists of the proposed Tables A.1 and A.2, are available electronically on the NMED website at: www.nmenv.state.nm.us/HWB/snlperm.html under No Further Action or may be reviewed at the following location during the public comment period with prior appointment:

NMED-District 1 Albuquerque Office
5500 San Antonio NE
Albuquerque, New Mexico 87109
(505) 222-9551
Monday - Friday from 8:00 a.m. to 5:00 p.m.
Contact: William Moats

Any person seeking additional information regarding this notice or the draft permit may also contact:

Mr. John E. Kieling, Program Manager
Hazardous Waste Bureau - New Mexico Environment Department
2905 Rodeo Park Drive East, Bldg 1
Santa Fe, New Mexico 87505-6303
E-mail: john.kieling@state.nm.us
Telephone: (505) 476-6000
Fax: (505) 476-6030

To obtain a copy of the Administrative Record or a portion thereof, in addition to further information, please contact Ms. Pamela Allen at (505) 476-6000, or at the Santa Fe address given above. NMED will provide copies, or portions thereof, of the Administrative Record at a charge to the requestor.

Table 1
Regulatory Correspondence by SWMU/AOC Number

SWMU/ AOC Number	OU	Date Submitted / CAC Batch	Date Submittal of NOD or RSI	Department Criterion for CAC Proposal	Discussed in Section
1	1303	September 1997 / 9	September 1999 March 2003 November 2004 May 2005	5	I.1
3	1303	September 1997 / 9	September 1999 March 2003 November 2004 May 2005	5	I.1
45	1309	September 1997 / 9	September 1999 November 2004	5	I.2
78	1306	June 1996 / TA 3/5 RFI Report	October 1997 July 1998 November 2000 November 2004 May 2005	5	I.3
137	1295	January 1997 / 6	September 1999 November 2003 March 2005	5	I.4
146	1295	August 1995 / 3	June 1997 March 2005	5	I.5
148	1295	August 1995 / 3	June 1997 March 2005	5	I.6
152	1295	January 1997 / 6	September 1999 March 2005	5	I.7
153	1295	January 1997 / 6	September 1999 March 2005	5	I.8
276	1295	December 2004 / 25 (7)	March 2005 April 2005	5	I.9

Refer to footnotes at end of table.

Table 1 (Continued)

1004	1295	December 2004 / 25 (7)	March 2005 April 2005	5	I.10
1031	1295	December 2004 / 25 (7)	March 2005 April 2005	5	I.11
1034	1295	September 2004 / 24 (6)	April 2005	5	I.12
1035	1295	September 2004 / 24 (6)	April 2005	5	I.13
1036	1295	September 2004 / 24 (6)	April 2005	5	I.14
1052	1295	December 2004 / 25 (7)	March 2005 April 2005	5	I.15
1078	1295	September 2004 / 24 (6)	April 2005	5	I.16
1079	1295	September 2004 / 24 (6)	April 2005	5	I.17
1080	1295	December 2004 / 25 (7)	March 2005 April 2005	5	I.18
1081	1295	March 2005 / 26 (8)	April 2005	5	I.19
1084	1295	September 2004 / 24 (6)	April 2005	5	I.20
1087	1295	December 2004 / 25 (7)	March 2005 April 2005	5	I.21
SWMU/ AOC Number	OU	Date Submitted / CAC Batch	Date Submittal of NOD or RSI	Department Criterion for CAC Proposal	Discussed in Section
1092	1295	March 2005 / 26 (8)	April 2005	5	I.22
1098	1295	September 2004 / 24 (6)	April 2005	5	I.23
1102	1295	December 2004 / 25 (7)	March 2005 April 2005	5	I.24
1104	1295	September 2004 / 24 (6)	April 2005	5	I.25
1113	1295	December 2004 / 25 (7)	March 2005 April 2005	5	I.26
1120	1295	September 2004 / 24 (6)	April 2005	5	I.27

Footnotes:
AOC = Area of Concern.
CAC = Corrective Action Complete (No Further Action).
Department = New Mexico Environment Department.
NOD = Notice of Deficiency.
OU = Operable Unit.
RFI = RCRA Facility Investigation.
RSI = Request for Supplemental Information.
SWMU = Solid Waste Management Unit.

E. Corrective Action Complete Criteria

CAC status may be proposed based upon one or more of the following: field surveys, historical records, aerial photographs, employee interviews and/or confirmatory sampling results that indicate that there has not been a release of hazardous wastes or hazardous constituents to the environment or that the release does not pose a significant risk to human health or the environment. The criteria to propose a SWMU/AOC for CAC are:

1. The SWMU/AOC cannot be located, does not exist, is a duplicate SWMU/AOC, or is located within—and, therefore, investigated as part of—another SWMU/AOC.

2. The SWMU/AOC has never been used for the management (that is, generation, treatment, storage or disposal) of RCRA solid or hazardous wastes and/or constituents or other Comprehensive Environmental Response, Compensation, and Liability Act hazardous substances.

3. No release to the environment has occurred nor is likely to occur in the future. The term "release" includes any spilling, leaking, pouring, emitting, emptying, discharging, injecting, pumping, escaping, leaching, dumping or disposing of hazardous wastes (including hazardous constituents) into the environment.

4. There was a release but the site was characterized and/or remediated under another authority that adequately addressed corrective action, and documentation such as a closure letter is available.

5. The SWMU/AOC has been characterized or remediated in accordance with current applicable state and/or federal regulations and the available data indicate that contaminants pose an acceptable level of risk under current and projected future land use.

The 28 SWMUs/AOCs are proposed for NFA by the Permittees on the basis that they were characterized and/or remediated in accordance with current applicable state or federal regulations (Criterion 5). Based on risk assessment results, future land use at SWMUs/AOCs 1, 3, 45, 137, 148, 152, 276 and 1081 will be restricted to industrial land use only.

F. Public Participation

Fifteen people (including representatives from DOE, SNL/NM and the Department) attended a public meeting arranged by SNL/NM on September 13, 2005 at the Manzano Mesa Multigenerational Center. Written comments were submitted by the public to DOE/SNL on October 28, 2005 and copies provided to the Department by DOE/SNL on December 12, 2005. The December 2005 submittal included DOE/SNL's response to the comments, concerns and recommendations expressed at the public meeting. Comments from the public included concerns that SWMU 153 be restricted to industrial use for future land use; that lead should be included in the risk analysis for SWMU 78; that to perform a more realistic cost-benefit analysis, the cost of cleanup activities at SWMUs 1 and 3 be included in the NFA Proposal, as well as that of all other SWMUs in all NFA proposals; and, that SWMUs 146, 148 and 152 should have ground water monitoring wells, as well as soil vapor wells installed.

NMED issues this public notice on **September 20, 2007** to announce the beginning of a 60-day comment period that will end at **5:00 p.m., November 19, 2007**. Any person who wishes to comment on this action or request a public hearing should submit written or electronic mail (e-mail) comment(s) with the commenter's name and address to the respective address below. Only comments and/or requests received on or before **5:00 p.m., November 19, 2007** will be considered.

John E. Kieling, Program Manager
Hazardous Waste Bureau - New Mexico Environment Department
2905 Rodeo Park Drive East, Bldg 1
Santa Fe, NM 87505-6303
Ref: Sandia National Laboratories – 28 SWMUs/AOCs
E-mail: john.kieling@state.nm.us

Written comments must be based on the Administrative Record. Documents in the Administrative Record need not be re-submitted if referenced by the commenter. Requests for a public hearing shall provide: (1) a clear and concise factual statement of the nature and scope of the interest of the person requesting the hearing; (2) the name and address of all persons whom the requestor represents; (3) a statement of any objections to the proposed action, including specific references; and (4) a statement of the issues which such persons propose to raise for consideration at the hearing. Written comment and requests for Public Hearing must be filed with Mr. John Kieling on or before **5:00 p.m., November 19, 2007**. The NMED will provide a thirty (30) day notice of a public hearing, if scheduled.

Any person with a disability requiring assistance or auxiliary aid to participate in this process should contact Judy Bentley by 10 days prior to the end of the public comment period at the following address: New Mexico Environment Department, Room N-4030, P.O. Box 26110, 1190 St. Francis Drive, Santa Fe, New Mexico 87502-6110, (505) 827-9872. TDD or TDY users please access Ms. Bentley's number via the New Mexico Relay Network at 1-800-659-8331.

G. Next Steps

The NMED must ensure that the approved final Permit will be consistent with the New Mexico Hazardous Waste Management Regulations. All written comments submitted on the draft Permit will become part of the administrative record, will be considered in formulating a final decision, and may cause the draft Permit to be modified. NMED will respond in writing to all significant public comment. The response will specify which provisions, if any, of the draft Permit have been changed in the final Permit decision, and the reasons for the change. This response will also be posted on the NMED website in addition to NMED notifying all persons providing written comments.

After consideration of all written public comments received, NMED will issue, or modify and issue, or disapprove the Permit modification. If NMED modifies the Permit, the Permittees shall be provided by mail a copy of the modified Permit and a detailed written statement of reasons for the modifications. The NMED Secretary will make the final Permit decision publicly available and shall notify the Permittees by certified mail. The Secretary's decision shall constitute a final agency decision and may be appealed as provided by the Hazardous Waste Act. All persons on the mailing list, or that provided written comments, or who requested notification in writing, will be notified of the final decision by mail.

The final decision will become effective thirty days after service of the decision to the Permittees, unless a later date is specified or review is requested under the New Mexico Hazardous Waste Management Regulations, 20.4.1 NMAC, Section 901.E, *Hearings*.

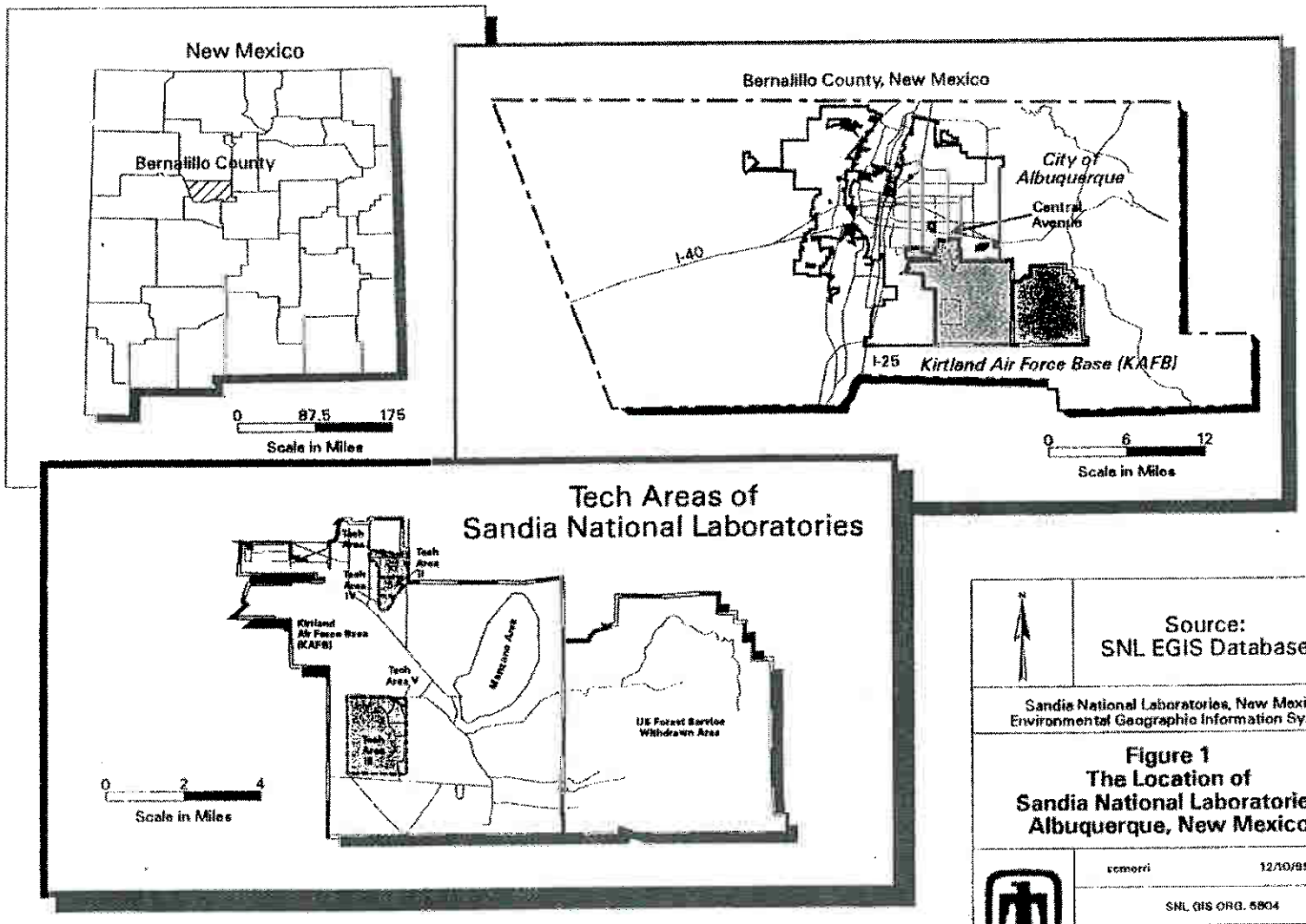
H. Contact Person for Additional Information

For additional information, contact the following individuals:

John E. Kieling, Program Manager
Hazardous Waste Bureau - New Mexico Environment Department
2905 Rodeo Park Drive East, Bldg 1
Santa Fe, NM 87505-6303
Ref: Sandia National Laboratories – 28 SWMUs/AOCs
E-mail: john.kieling@state.nm.us
Telephone: (505) 476-6000
Fax: (505) 476-6030

or

William Moats
Hazardous Waste Bureau - New Mexico Environment Department
5500 San Antonio NE
Albuquerque, NM 87109
Ref: Sandia National Laboratories – 28 SWMUs/AOCs
E-mail: william.moats@state.nm.us
Telephone: (505) 222-9551
Fax: (505) 222-9510


New Mexico
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Scale in Miles
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City of Albuquerque
Central Avenue
I-40
I-25
Kirtland Air Force Base (KAFB)
0 6 12
Scale in Miles
Tech Areas of
Sandia National Laboratories
Tech Area I
Tech Area II
Tech Area IV
Kirtland Air Force Base (KAFB)
Tech Area V
Manzano Area
US Forest Service Withdrawn Area
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Scale in Miles
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SNL EGIS Database
Sandia National Laboratories, New Mexico
Environmental Geographic Information System
Figure 1
The Location of
Sandia National Laboratories
Albuquerque, New Mexico
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sm990863.aml
MAPID = 990863

I. Description of SWMUs/AOCs Proposed for CAC

SWMU 1, Radioactive Waste Landfill and SWMU 3, Chemical Disposal Pits

Site Location

SWMU 1, the Radioactive Waste Landfill (RWL) and SWMU 3, the Chemical Disposal Pits (CDPs), are located in the eastern portion of Technical Area (TA) -II. The sites together cover approximately 0.3 acres (Figure 2). SWMUs 1 and 3 have been combined for discussion herein because the site boundary for SWMU 1 encompasses SWMU 3.

Operational History

From 1949 to 1959, disposal activities were conducted at the RWL and the CDPs. The RWL consisted of three trenches and three pits. The pits ranged from 10 to 15 feet (ft) wide, varied in length from 12 to 15 ft and had a maximum depth of 19 ft. The trenches ranged in length from 25 to 50 ft and in width from 5 to 15 ft. The maximum depth was 23 ft. Weapons-related debris was buried in the unlined earthen trenches and pits. The debris consisted of a heterogeneous mixture of weapon components, radiation sources and laboratory refuse (gloves, glassware, etc.). After being filled with the debris, all six disposal cells of the RWL were covered with native soil and capped with concrete.

The CDPs consisted of several poorly defined earthen pits (disposal cells), which together had a diameter of approximately 25 ft. The CDPs had a depth of about 15 ft and were located at the northeast corner of the RWL. Debris in the CDPs included glass bottles containing acids (nitric, hydrochloric and phosphoric) and plutonium-239. After being filled with the glass bottles, the CDPs were covered with soil.

The potential constituents of concern (COCs) include metals and radionuclides.

Evaluation of Relevant Information

Numerous assessment activities have been conducted at the site. These investigations are discussed below.

During 1991 to 1994, several nonintrusive investigations were conducted including geophysical surveys, surface radiological surveys, personnel interviews and a review of historical aerial photographs. The investigations confirmed the location of the disposal cells and identified the types of buried debris.

In December 1993, a passive soil-vapor survey was conducted across the eastern half of TA-II. Soil-vapor collectors were buried for 30 days at a depth of approximately 1 ft below the ground surface (bgs). After retrieval, the collectors were analyzed at an off-site laboratory. No volatile organic compounds (VOCs) or semivolatile organic compounds (SVOCs) were detected.

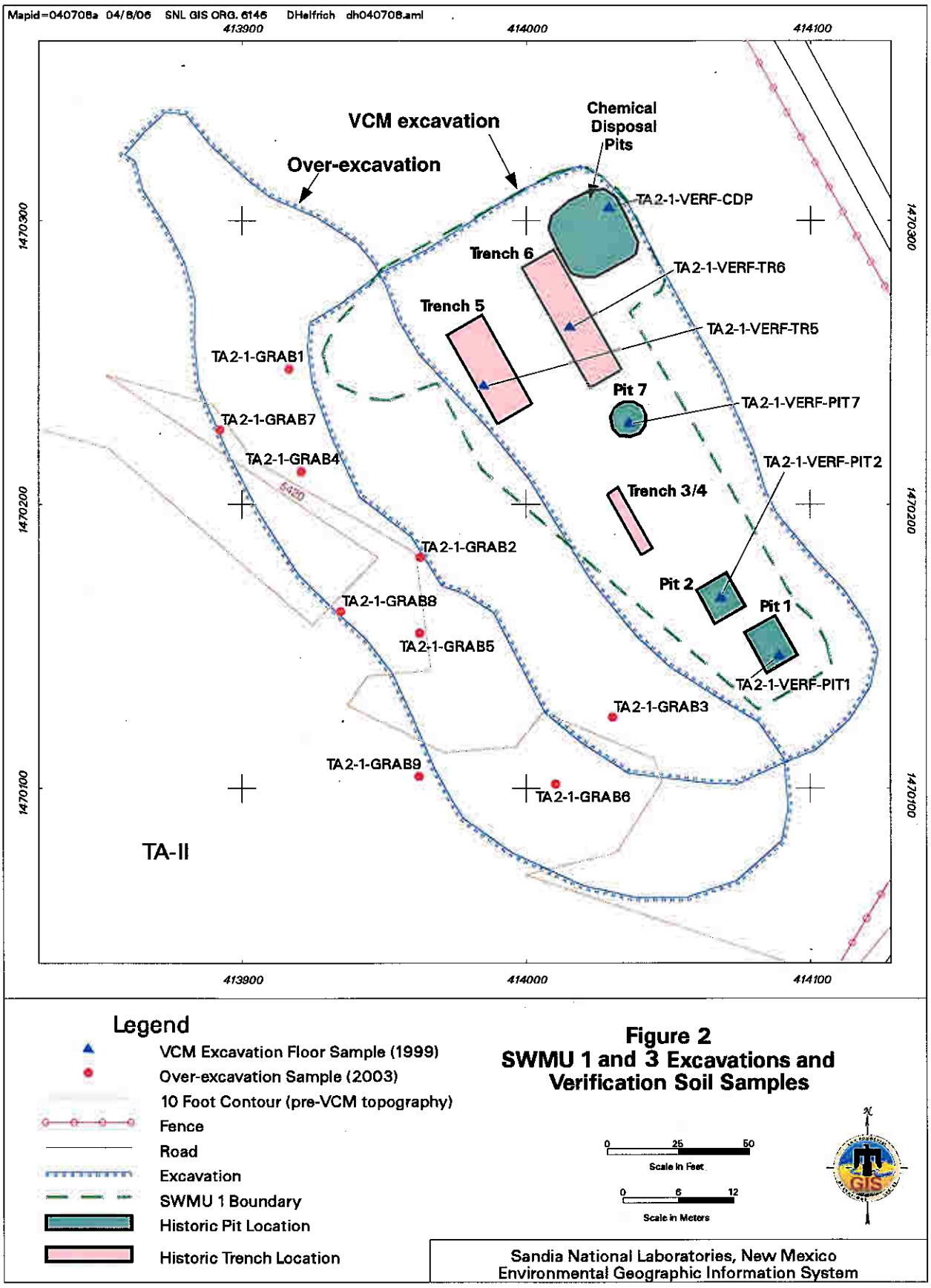
From May to August 1996, a voluntary corrective measure (VCM) was conducted to remediate the site by excavating the entire SWMU 1 area which includes all of SWMU 3. The resulting

VCM excavation was 120 ft wide and 220 ft long, with a maximum excavation depth of approximately 23 ft. The original floor of each disposal cell was left exposed for sampling. The excavated soil was segregated into two categories according to field screening for radionuclides, VOCs, HE and visual appearance. The two categories consisted of potentially uncontaminated soil and potentially contaminated soil. Further laboratory analysis of samples from the piles determined the final designation. Approximately 400 cubic (cu) yards (yds) of radioactively contaminated soil were shipped to an off-site waste disposal facility. Approximately 96 cu yds of weapon debris and solid material were also shipped off site. Approximately 5,000 cu yds of excavated soil were sampled and stockpiled for later use. At the conclusion of the VCM excavation, verification surveys (radiation and geophysical) were conducted across the floor and sidewalls of the excavation. No radioactive or metallic anomalies were detected at that time.

In July and August 1996, prior to backfilling, six composite soil samples were collected as verification samples from the floors of the disposal cells and analyzed for radionuclides and metals. The sampling depths ranged from 15 to 23 ft bgs. Metals and radionuclides were detected above background values. Because these were composite samples, the results were not used in the risk assessments.

In November 1999, six discrete soil samples were collected from the floors of the disposal cells at depths ranging from 15 to 23 ft bgs. Samples were analyzed for cadmium, mercury and silver by an off-site laboratory and for radionuclides by on- and off-site laboratories. There was a detection of mercury that exceeded the background value. The radionuclides plutonium-238 and plutonium-239/240 were detected but there are no background levels calculated for plutonium isotopes. Tritium was detected at activities exceeding the background level. The minimum detectable activities (MDAs) for uranium-235 exceeded background levels. Despite the above-background activity results, no additional soil removal was deemed necessary, as the analytical results met ER Project risk criteria.

In 2000, consolidation (combining) of the soil piles into fewer piles was conducted in preparation for the backfilling operation. Extensive soil sampling was conducted in 1997, prior to consolidation, and after consolidation in 2000 through 2003. Soil samples were analyzed for radionuclides (by alpha and gamma spectroscopy), isotopic plutonium, tritium, and RCRA metals plus beryllium, nickel and total uranium. Elevated levels of metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver and uranium) and radionuclides (cesium-137, tritium, plutonium-238, plutonium-239/240, thorium-232, uranium-235 and uranium-238) were detected. Analytical results and risk assessments showed that the "slightly contaminated" soil piles would be suitable as backfill material if a layer at least 5 ft thick of "clean" soil was used to cover the piles.



Legend

- VCM Excavation Floor Sample (1999)
- Over-excavation Sample (2003)
- 10 Foot Contour (pre-VCM topography)
- Fence
- Road
- Excavation
- SWMU 1 Boundary
- Historic Pit Location
- Historic Trench Location

Figure 2
SWMU 1 and 3 Excavations and Verification Soil Samples

0 25 50
Scale in Feet

0 6 12
Scale in Meters

Sandia National Laboratories, New Mexico
Environmental Geographic Information System

During May to June 2003, an "over-excavation" trench approximately 25 ft wide, 200 ft long and approximately 20 ft deep was dug immediately west of the VCM excavation. The soil was analyzed for isotopic plutonium, tritium and RCRA metals plus beryllium, nickel and total uranium. There were detections of plutonium-238 and plutonium-239/240. Tritium had activities above the background level. Four metals (arsenic, barium, mercury and silver) were detected at concentrations above background values. This soil was also referred to as "clean" soil and was later used to cover the "slightly contaminated" soil.

In June and July 2003, the VCM excavation and the adjacent over-excavation trench were backfilled to the original (pre-VCM) ground elevation. Backfill plans designated 17 lifts of soil utilizing the "slightly contaminated" and the "clean" soil piles. Sampling results determined which soil pile was used for each of the 17 lifts. The deepest lifts (10 to 20 ft bgs) contained slightly elevated concentrations of metals and radionuclides. The uppermost lifts (0 to 10 ft bgs) were composed of "clean" soils from the over-excavated trench and from outside of known soil contamination areas (the RWL slope and TA-II bunkers).

In November 2003, final verification soil samples were collected from the restored ground surface and analyzed for radionuclides and metals. There were several detections of plutonium-238 and plutonium-239/240. A detection of cesium-137 exceeded the background value and four detections of tritium exceeded the background value. A detection of barium and two detections of mercury exceeded the background values.

During January to March 2004, comprehensive walkover radiation surveys were conducted across the restored ground surface. A few small radioactive anomalies (uranium and plutonium) were identified and removed.

A risk screening assessment was performed to evaluate the potential for adverse health effects for industrial and residential land-use scenarios.

The maximum concentration value for lead was 81.7 J milligrams (mg)/kilogram (kg). The EPA intentionally does not provide any human health toxicological data on lead; therefore, no risk parameter values could be calculated. Department requirements for lead screening concentrations for construction and industrial land-use scenarios are 750 and 1,500 mg/kg, respectively. The Department's accepted value for residential land-use scenario is 400 mg/kg. The maximum concentration for lead at this site is less than all the screening values.

The risk screening assessment for the remaining nonradiological COCs indicated that, for the industrial land-use scenario, the total human health hazard index (HI) and the estimated excess cancer risks meet Department requirements (Table 2). However, both the total HI and excess cancer risks are unacceptable for the residential land-use scenario (Table 2). The substitution of the UCL value for arsenic yielded a total HI that is barely acceptable for a residential land-use scenario.

The human health incremental total effective dose equivalent (TEDE) for radiological constituents using an industrial land-use scenario with a 5-ft layer of "clean" soil over the contaminated soil (using the maximum reported activity) was 2.9E-2 millirem (mrem)/year (yr),

which is below the EPA numerical guideline of 15 mrem/yr. The human health incremental TEDE for an industrial land-use scenario for direct contact with "clean" soil 0 to 5 ft bgs is 8.3E-1 mrem/yr, which is below the EPA numerical guideline of 15 mrem/yr. The incremental TEDE for a residential land-use scenario that results from a complete loss of institutional control is 15.2 mrem/yr, with an associated risk of 5.1E-5. However, the associated cancer risk of 5.1E-5 exceeds the acceptable risk value of 1.0E-5 for residential land use and complete loss of institutional control.

Ecological risks associated with SWMUs 1 and 3 were estimated through a screening assessment that incorporated site-specific information when available. Predicted risks to ecological receptors are based upon exposures to constituents of potential ecological concern (COPECs) calculated from the maximum measured COPEC concentrations and other conservative assumptions. Predicted risks from exposure to arsenic, barium, cadmium, total chromium and lead were estimated using these maximum detected values. Potential risks associated with mercury were limited to the burrowing owl under the assumptions that all mercury is in organic form and that the area use factor for the owl is 1. The use of a more realistic area use factor for this receptor is sufficient to reduce the hazard quotient (HQ) to less than unity regardless of the form of mercury present. Based upon this final analysis, ecological risks associated with SWMUs 1 and 3 are expected to be low.

In conclusion, human health scenario and ecological risks are acceptable under an industrial land-use scenario.

Basis for Determination

SWMUs 1 and 3 have been characterized or remediated in accordance with current applicable state and/or federal regulations, and the available data indicate that contaminants pose an acceptable level of risk under current and projected future land use.

Table 2
Risk Assessment Values for SWMUs 1 and 3 Nonradiological COCs

COC	Maximum Concentration/UCL (All Samples) (mg/kg)	Industrial Land-Use Scenario[a]		Residential Land-Use Scenario[a]	
		Hazard Index	Cancer Risk	Hazard Index	Cancer Risk
Arsenic	6.99/**3.40**	0.03	4E-6	0.32/**Below Background**	2E-5/**Below Background**
Barium	479	0.01		0.09	
Cadmium	6.7	0.01	2E-9	0.17	5E-9
Chromium III	19.2	0.01	4E-8	0.09	9E-8
Mercury	7.8	0.03		0.34	
Selenium	2.0	0.00		0.01	
Silver	1.95	0.00		0.01	
Uranium	58.6	0.02		0.25	
Total		0.10	4E-6	1.28/**0.96**	2E-5/**9E-8**

[a]EPA 1989.
Bold values represent UCLs and calculations with UCLs.

COC = Constituent of concern.
EPA = U.S. Environmental Protection Agency.
mg/kg = Milligram(s) per kilogram.
SWMU = Solid Waste Management Unit.
UCL = Upper Confidence Limit.

SWMU 45, Liquid Discharge

Site Location

SWMU 45, Liquid Discharge, is located at the northeast corner of TA-IV and covers approximately 0.8 acres on the northern rim of Tijeras Arroyo. The site is located on U.S. Air Force land withdrawn from the USFS and permitted to the DOE.

Operational History

In February 1985, an SNL/NM employee observed a discharge of brownish water from an unmarked water truck to the ground surface. The type of water was not known. No hazardous chemicals or materials are known to have been disposed of at SWMU 45.

Potential COCs include metals, high explosive (HE) compounds, VOCs, SVOCs and radionuclides.

Evaluation of Relevant Information

Numerous assessment activities have been conducted at the site. These investigations are discussed below.

In 1993, soil sampling was conducted at a sewer-line trench located in the northern part of SWMU 45. The corresponding analytical results were presented in the SWMU 45 CAC Proposal, but were later determined to be applicable to another site, SWMU 48.

In 1994, the ground surface at SWMU 45 was surveyed for unexploded ordnance, HE and radioactive materials; no anomalies were detected. Historical aerial photographs were also reviewed. During the time when the discharge occurred, the SWMU 45 area was used as a temporary storage (borrow) area for construction-related soil. For reporting purposes, the borrow area was named the Liquid Discharge Area. A separate, shallow trench shown in the aerial photographs was named the Area A Pit.

In May 1995, a passive soil-vapor survey was conducted across SWMU 45 for scoping purposes. Twenty-one collectors were buried for 14 days at a depth of approximately 1 ft bgs. After retrieval, the collectors were analyzed at an off-site laboratory. Low levels of trichloroethene (TCE), tetrachloroethene (PCE), and benzene, toluene, ethylbenzene, and xylene (BTEX) were detected. No SVOCs were detected.

In May 1995, a geophysical survey was conducted across SWMU 45. Three buried magnetic anomalies were identified.

In June 1995, scoping soil samples were collected from hand-augured boreholes to 1.5 ft bgs at the Liquid Discharge Area. The samples were analyzed for VOCs, RCRA metals and radionuclides. Three VOCs were detected at low concentrations (J qualified). One metal, barium, was above the Department-approved background level. Except for lead, the other metals had method detection limits (MDLs) that were above background levels.

In October 1995, the three magnetic anomalies were excavated from two trenches dug to depths of 4 and 6 ft bgs. The buried material was found in a debris layer at approximately 3 ft bgs that consisted of nonhazardous scrap metal and concrete rubble. Soil samples were collected below the debris layer at 3 ft bgs using a backhoe bucket. The soil samples were analyzed for VOCs, RCRA metals and radionuclides (one sample only) by on- and off-site laboratories. Off-site laboratory results revealed two metals, barium and lead, above background levels. Some of the other metals had MDLs that were above background levels.

In October 1995, soil samples were collected from 10 locations at the surface and at 1.5 ft bgs at the Liquid Discharge Area. Samples were analyzed at on- and off-site laboratories for VOCs, RCRA metals and radionuclides (two samples only). Off-site laboratory results revealed five metals (arsenic, barium, cadmium, lead and mercury) exceeded background values and the MDL for uranium-235 exceeded the background activity level for one sample. In October 1995, two boreholes were advanced to investigate the Area A Pit (Figure 3). Soil samples were collected to 14 ft bgs. Samples were analyzed for VOCs, RCRA metals and radionuclides by on- and off-site laboratories. Off-site laboratory results revealed arsenic concentrations that exceeded the background levels. Some of the other metals had MDLs that were above background levels.

In November 2003, a comprehensive review of historical aerial photographs was conducted. The Area A Pit was determined to be where an Army tank had been parked for security purposes in the late 1950s and early 1960s. The Area A Pit was filled with soil prior to 1964. In November 2003, historical records were reviewed and they revealed that the 1985 water discharge most likely occurred at the western end of the nearby SWMU 229 outfall ditch. Two sampling events (September 1994 and March 2001) were conducted at the SWMU 229 outfall ditch. The September 1994 soil samples were collected at the western end of the ditch to a maximum depth of 3 ft bgs. The samples were analyzed for VOCs, SVOCs, metals and radionuclides by on- and off-site laboratories. Off-site laboratory results revealed five metals (antimony, arsenic, barium, cadmium and lead) that had concentrations exceeding background values. Two VOCs and eight SVOCs were reported at low concentrations (J qualified). The MDA for cesium-137 exceeded the background activity. The March 2001, soil samples were also collected at the western end of the SWMU 229 outfall ditch to a maximum sampling depth of 19 ft bgs. One metal, barium, had a concentration that exceeded the Department-approved background level.

In February 2004, two locations at the SWMU 45 Area A pit were sampled (Figure 3). A Geoprobe™ rig was used to collect soil samples to a depth of 10 ft bgs. The soil samples were analyzed for metals, VOCs, SVOCs and radionuclides by an off-site laboratory. One metal, barium, exceeded the background value. Two VOCs and two SVOCs were reported at low concentrations.

A risk screening assessment was performed to evaluate the potential for adverse health effects for industrial and residential land-use scenarios. For the industrial land-use scenario, the total human health HIs and the estimated excess cancer risks meet Department requirements (Table 3). However, both the HI and estimated excess cancer risk are unacceptable for the residential land-use scenario (Table 3).

In this case, average concentrations are considered more representative of actual site conditions. Using the UCL of the mean concentrations for the main contributors to excess cancer risk and hazards (antimony [5.35 mg/kg] and arsenic [5.43 mg/kg]) reduced the total HI and estimated excess cancer risk for a residential land-use scenario to 0.56 and 1.59E-5, respectively. The estimated excess cancer risk is still unacceptable for the residential land-use scenario.
For the radiological COCs (tritium) a total effective dose equivalent (TEDE) was calculated that results in a TEDE of 2.0E-4 millirem (mrem)/year (yr). A TEDE of 15 mrem/yr is appropriate for an industrial land-use scenario. The estimated excess cancer risk is 6.0E-9.

Table 3
Risk Assessment Values for SWMU 45 Nonradiological COCs

COC	Maximum Concentration/UCL (All Samples) (mg/kg)	Industrial Land-Use Scenario[a]		Residential Land-Use Scenario[a]	
		Hazard Index	Cancer Risk	Hazard Index	Cancer Risk
Inorganic					
Antimony	17/**5.35**	0.04		0.56/**0.18**	
Arsenic	11/**5.43**	0.04	7E-6	0.51/**0.25**	3E-5/**1E-5**
Barium	280	0.00		0.05	
Cadmium	2.4	0.00	8E-10	0.06	2E-9
Chromium VI	0.1[b]	0.00	1E-10	0.00	2E-10
Mercury	2.19	0.00		0.00	
Selenium	5[b]	0.00		0.02	
Organic					
2-Butanone	0.006 J	0.00		0.00	
Acetone	0.009 J	0.00		0.00	
Benzo(a)anthracene	0.071 J	0.00	3E-8	0.00	1E-7
Benzo(a)pyrene	0.092 J	0.00	4E-7	0.00	1E-6
Benzo(b)fluoranthene	0.16 J	0.00	8E-8	0.00	3E-7
Bis(2-ethylhexyl) phthalate	0.17 J	0.00	9E-10	0.00	4E-9
Chrysene	0.12 J	0.00	6E-10	0.00	2E-9
Di-n-butyl phthalate	0.18 J	0.00		0.00	
Fluoranthene	0.23 J	0.00		0.00	
Methylene chloride	0.0011 J	0.00	6E-11	0.00	1E-10
Phenanthrene	0.18 J	0.00		0.00	
Pyrene	0.28 J	0.00		0.00	
Total		0.08	7E-6	1.20/**0.56**	3E-5/**1.59E-5**

[a]EPA 1989.

[b]Nondetected concentration (concentration listed is one-half of the maximum detection limit, used for a conservative risk assessment).

Bold values represent UCLs and calculations with UCLs.

COC = Constituent of concern.

EPA = U.S. Environmental Protection Agency.

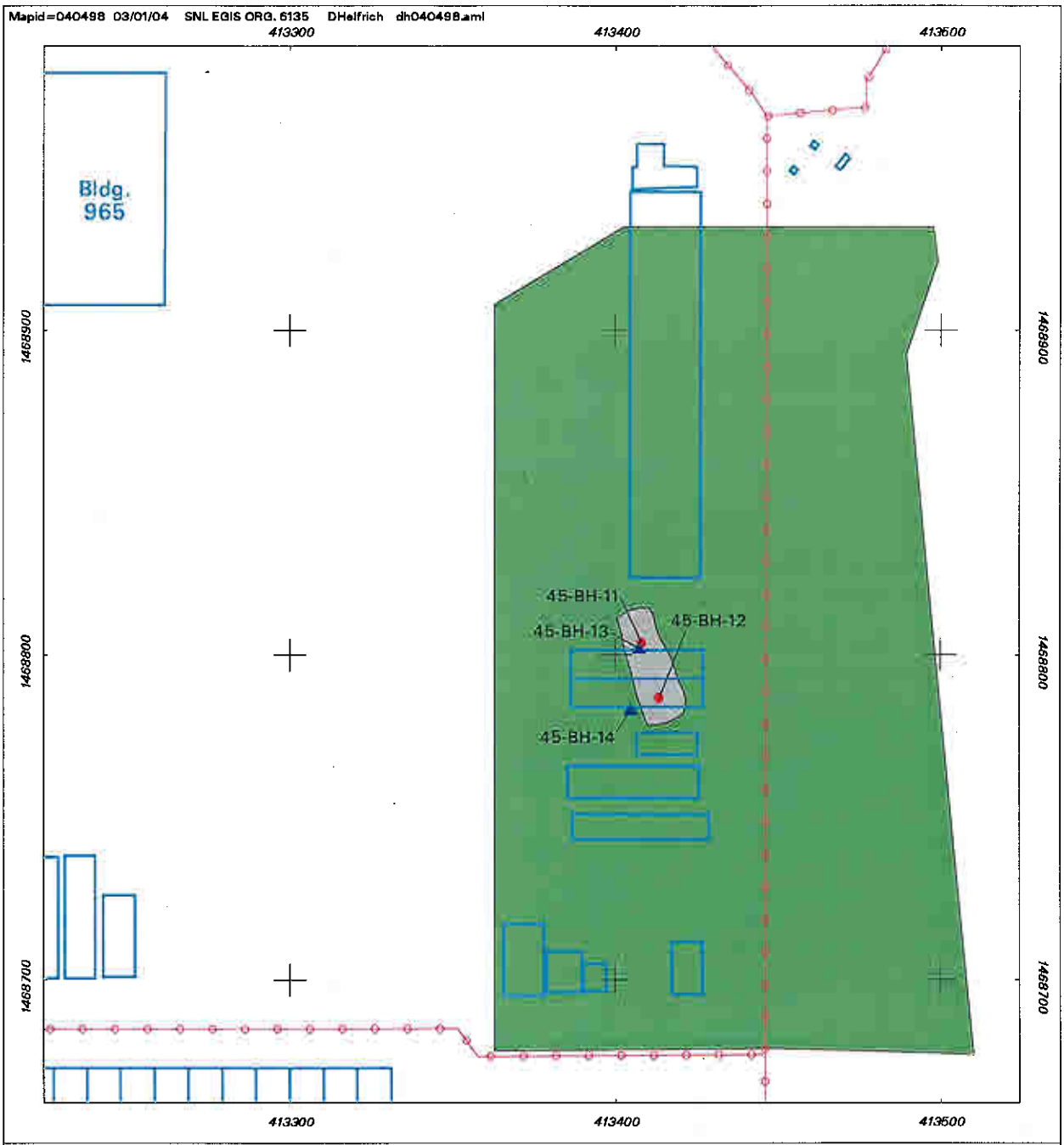
J = Estimated concentration.
mg/kg = Milligram(s) per kilogram.
SWMU = Solid Waste Management Unit.
UCL = Upper Confidence Limit.

Ecological risks associated with SWMU 45 were estimated through a risk assessment that incorporated site-specific information when available. Initial predictions of potential risk to plants from exposure to several metals were based on maximum measured soil concentrations, highly conservative plant toxicity benchmarks, and assumptions of high bioavailability. Actual risk to this receptor is expected to be low based on more realistic exposure assumptions. Predictions of potential risk to the deer mice from exposures to antimony, arsenic, barium, mercury and selenium are also attributable to conservative exposure assumptions. For the burrowing owl, the initial prediction of risk from exposure to mercury and bis(2-ethylhexyl) phthalate is attributed to the assumption of 100 percent area use by this receptor. A more realistic assumption of area use for this receptor resulted in HQs of only 0.69 and 0.025, respectively. The very small size of this site (0.78 acre) also limits the potential for significant risk to ecological receptors at this site, particularly at the population or community levels. Based upon this final analysis, the potential for ecological risks associated with SWMU 45 is expected to be low.

In conclusion, human health and ecological risks are acceptable under an industrial land-use scenario.

Basis for Determination

SWMU 45 has been characterized or remediated in accordance with current applicable state and/or federal regulations, and the available data indicate that contaminants pose an acceptable level of risk under current and projected future land use (industrial).



Legend

- 1995 Borehole Location
- 2004 Borehole Location
- Fence
- Building / Structure
- Area A Pit
- SWMU 45

Figure 3
SWMU 45
Geoprobe Borehole Locations

0 25 50
Scale in Feet

0 6 12
Scale in Meters

Sandia National Laboratories, New Mexico
Environmental Geographic Information System

SWMU 78, Gas Cylinder Disposal Pit

Site Location

SWMU 78, the Gas Cylinder Disposal Pit (GCDP), occupied an 80- by 180-ft area (approximately 0.3 acres) in the southeast portion of TA-III.

Operational History

The pit was used from 1963 to 1984 to dispose of reactive chemicals and metals, as well as flammable, oxidizing, toxic and reactive gases in their original containers. The original depth of the pit is not known, but prior to the VCM, the pit floor was approximately 10 ft bgs. The pit floor was uneven with several mounds that were formed during past disposal activities.

The COCs for the site have been identified as VOCs, SVOCs, metals, HE compounds and radionuclides.

Evaluation of Relevant Information

A VCM was performed at SWMU 78 in order to assess the contents of the GCDP and to excavate, remove, identify, segregate and dispose of those contents. The VCM was executed in three phases. In Phase I of the VCM, nonintrusive site assessment activities were conducted, including analysis of aerial photographs and identification of buried objects (geophysical survey) and radiological hazards (radiological survey). Based on the results of the nonintrusive surveys, the GCDP was divided into five separate areas. In Phase II of the VCM, the GCDP contents were removed, examined and segregated and the COCs were identified. In Phase III, the gas cylinders were characterized, the excavation was backfilled and confirmatory soil samples were collected.

The waste stream produced by the VCM in Phase II included the following.

- 450 gas cylinders (97 of which were intact)
- 1,120 pounds (lbs) of thermal batteries
- 5 lbs lithium metal
- 6.5 lbs rubidium metal
- 8,618 lbs scrap metal
- 560 lbs scrap wood
- 270 cu yds chromium-contaminated soil
- 89 cu yds thorium-contaminated soil (originally estimated to be 140 cu yds).

As part of the VCM, approximately 1,200 cu yds of soil were removed from the excavation, sampled and returned as clean backfill material. Final dimensions of the excavation were approximately 80 ft by 180 ft, with an average depth of 15 ft. Additional backfill material was brought in from two other SNL/NM locations. The imported backfill material was sampled for

VOCs, SVOCs, HE compounds and RCRA metals plus beryllium. Beryllium exceeded the background level in one sample. There were detections of two VOCs and eight SVOCs above MDLs (all were J qualified). There were no detections of any HE compounds.

In March 1995, following backfill activities, a total of seven boreholes (Figure 4) were advanced within the GCDP boundary for the collection of confirmatory soil samples. Samples were collected from 15-16 ft bgs and 19-20 ft bgs. Samples were analyzed for VOCs, SVOCs, HE compounds and RCRA metals at an off-site laboratory and for radionuclides at an on-site laboratory. Off-site laboratory results revealed four metals (arsenic, chromium, lead and silver) at concentrations exceeding background values. Two VOCs and one SVOC were detected at very low levels (all were J qualified). No HE compounds were detected. No detectable activities for uranium-235 and uranium-238 were reported; however, the MDAs exceeded the background activity. Thorium-232 was detected above the background activity.

The surface of SWMU 78 was used as a staging area for activities at the Chemical Waste Landfill (CWL) from 1999 to 2003. In order to achieve closure of the CWL Site Operational Boundary, the area was scraped and confirmatory soil samples were collected in 2001 and 2003. Soil samples were analyzed for VOCs, SVOCs, polychlorinated biphenyl (PCBs), RCRA metals plus chromium VI, copper and nickel. All results for VOCs, SVOCs, PCBs, metals and radionuclides passed CWL risk criteria. Analytical laboratory results from these samples were included in the risk assessment for SWMU 78.

At the request of the Department, additional work was conducted to confirm that the GCDP VCM was successful in the cleanup of the site. A follow-up geophysical survey was conducted in May 2003 that included both the area within the GCDP and that beyond the GCDP boundary but within the site boundary. A few, small near-surface metallic objects were detected in and around the GCDP. A single, somewhat larger object, buried at a depth of approximately 3 ft bgs, was detected within the backfill material. This item was excavated and scanned for gamma radiation. The metallic item was not readily identifiable, but appeared to be a cover or lid. No radionuclide activities above background activities were detected. In May and June 2003, confirmatory soil samples were collected with a Geoprobe™ (Figure 4). Thirty-five soil samples were collected from a range of depths selected to ensure that soil data were obtained from three areas: backfill materials, areas outside and along the edges of the pit and undisturbed soil beneath the excavated area. Maximum sample depths were 21 ft below the graded site surface. Samples were analyzed for VOCs, SVOCs, RCRA metals plus beryllium and thorium and radionuclides by gamma spectroscopy. There were three VOCs and 18 SVOCs detected above MDLs (many J qualified). Four metals (arsenic, chromium, lead and mercury) exceeded background levels.

No radionuclides were detected above background activities, but all the MDA values for uranium-235 exceeded the background activity.

A risk screening assessment was performed to evaluate the potential for adverse health effects for industrial and residential land-use scenarios.

PCBs (stemming from sampling activities at the CWL) were eliminated from consideration in the human health risk assessment because the maximum concentration for total PCBs was

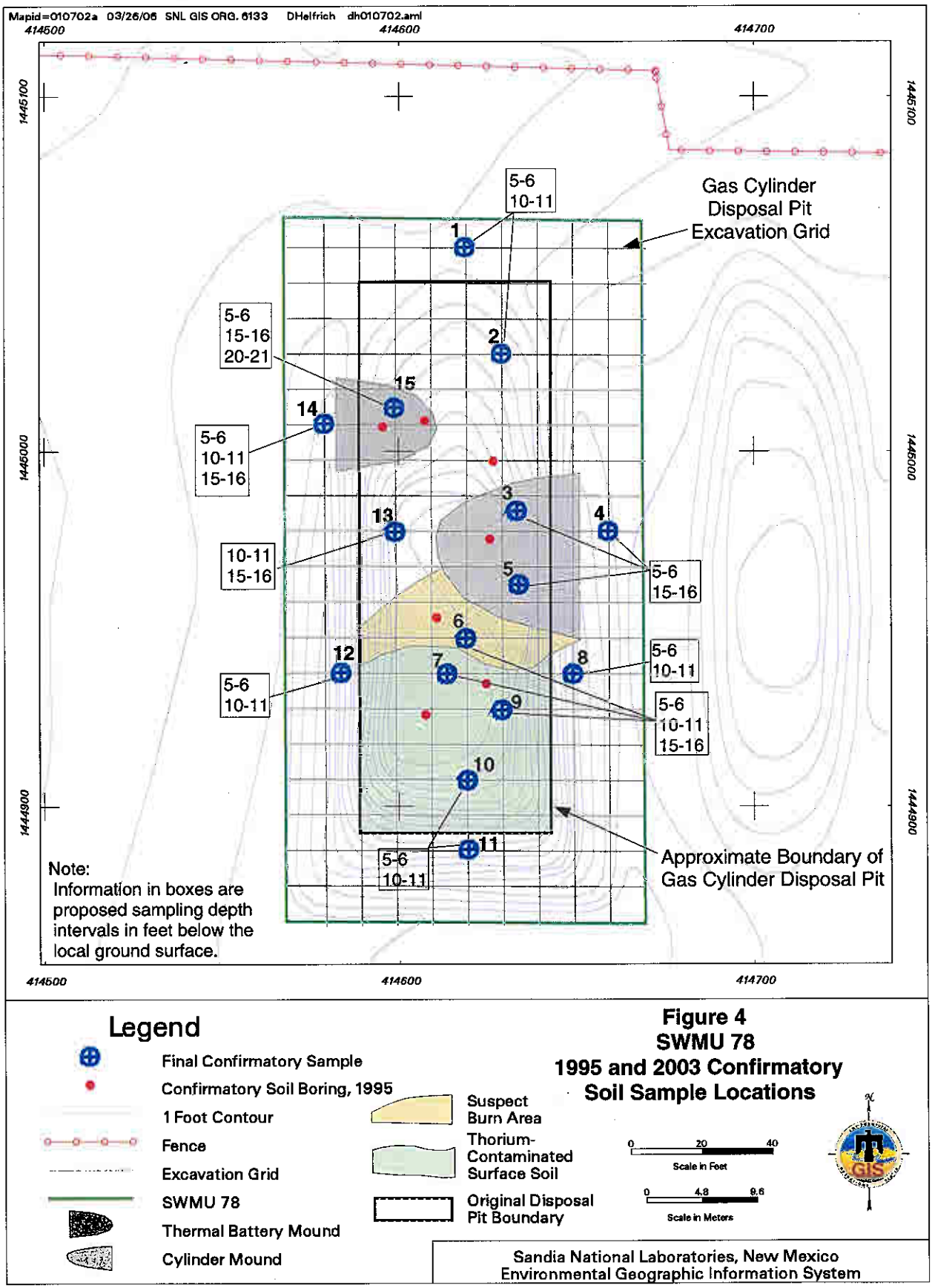
0.7198 mg/kg, which is less than the Department and EPA screening level of 1 mg/kg (Title 40, Code of Federal Regulations, Part 761).

Lead was also eliminated from consideration in the human health risk assessment because the maximum concentration of 388 mg/kg was less than the Department accepted value for a residential land-use scenario of 400 mg/kg and less than the accepted values for construction and industrial land-use scenarios of 750 and 1,500 mg/kg, respectively.

For the industrial land-use scenario, the total HI and the estimated excess cancer risk meet Department requirements (Table 4). However, both the total human health HI and excess cancer risk are unacceptable for the residential land-use scenario (Table 4).

Though both the HI and estimated excess cancer risk are unacceptable for the residential land-use scenario, maximum concentrations were used in the risk calculation. Using the UCL of the average concentrations for the main contributors [arsenic, mercury and benzo(a)pyrene] to excess cancer risk, the total HI and estimated excess cancer risk are reduced to 0.23 and 6E-6, respectively. Thus, using concentrations in the risk calculations that more accurately depict site conditions, the total HI and estimated excess cancer risk meet Department requirements.

For the radiological COCs (thorium-232, uranium-235 and uranium-238) a total effective dose equivalent (TEDE) was calculated that results in a TEDE of 4.5E+0 millirem (mrem)/year (yr). The estimated excess cancer risk is 4.7E-6.
Ecological risks associated with SWMU 78 were estimated through a risk assessment that incorporates site-specific information when available. The potential for risk to ecological receptors was initially quantified by the calculation of HQs; however, analysis of the uncertainties associated with these predicted values indicate that they are more likely to overestimate actual risk rather than underestimate it. Initial predictions of potential risk to plants (i.e., HQs exceeding unity) from exposure to total chromium, chromium VI, lead, mercury and selenium were based on maximum measured soil concentrations, highly conservative plant toxicity benchmarks, and assumptions of high bioavailability. Actual risk to this receptor is expected to be low based on more realistic exposure assumptions and toxicity benchmarks. With the exceptions of mercury and total PCBs, initial predictions of potential risk to the omnivorous and insectivorous deer mice are accounted for by the use of the maximum measured soil concentrations as the exposure point concentrations. In the case of mercury, predicted risk is limited to the highly conservative assumption that all mercury at this site is in organic form. For PCBs, predictions of risk are attributable to the conservative use of aroclor-1254 as the surrogate for evaluating risk from total PCBs (i.e., the sum of all aroclors), and conservative exposure assumptions, such as the assumed dietary composition of the deer mouse. For the burrowing owl, the initial predictions of risk from exposure to mercury and bis(2-ethylhexyl) phthalate are attributable to the assumption of 100 percent area use by this receptor. A more realistic assumption of area use for this receptor (approximately 0.9 percent) resulted in HQs less than unity for bis(2-ethylhexyl) phthalate and for mercury when assumed to be in inorganic form, and very near unity (HQ = 1.1) for mercury when assumed to be entirely in organic form. The very small size of this site (0.33 acre) also limits the potential for significant risk to ecological receptors at this site, particularly at the population or community levels. Based upon this final analysis, the potential for ecological risks associated with SWMU 78 is expected to be low.



Legend

- Final Confirmatory Sample
- Confirmatory Soil Boring, 1995
- 1 Foot Contour
- Fence
- Excavation Grid
- SWMU 78
- Thermal Battery Mound
- Cylinder Mound
- Suspect Burn Area
- Thorium-Contaminated Surface Soil
- Original Disposal Pit Boundary

Figure 4
SWMU 78
1995 and 2003 Confirmatory Soil Sample Locations

0 20 40
Scale in Feet

0 4.8 9.6
Scale in Meters

Sandia National Laboratories, New Mexico
Environmental Geographic Information System

In conclusion, human health and ecological risks are acceptable under a residential land-use scenario.

Basis for Determination

SWMU 78 has been characterized or remediated in accordance with current applicable state and/or federal regulations, and the available data indicate that contaminants pose an acceptable level of risk under current and projected future land use.

Table 4
Risk Assessment Values for SWMU 78 Nonradiological COCs

COC	Maximum Concentration/UCL (All Samples) (mg/kg)	Industrial Land-Use Scenario[a]		Residential Land-Use Scenario[a]	
		Hazard Index	Cancer Risk	Hazard Index	Cancer Risk
Inorganic					
Arsenic	15.9 J/**4.1**[b]	0.06	1E-5	0.73/	4E-5/
Barium	202	0.00		0.04	
Beryllium	0.69	0.00	3E-10	0.00	6E-10
Cadmium	1.97	0.00	6E-10	0.05	1E-9
Chromium	181	0.00		0.00	
Chromium VI	4.59 J	0.00	1E-8	0.02	2E-8
Copper	57.5 J	0.00		0.02	
Mercury	8.48/**1.39**	0.03		0.37/**0.06**	
Nickel	15	0.00		0.01	
Selenium	1.58	0.00		0.00	
Silver	2.7	0.00		0.01	
Organic					
Acenaphthene	0.33	0.00		0.00	
Acetone	0.0084[c]	0.00		0.00	
Anthracene	0.754	0.00		0.00	
Benzo(a)anthracene	0.425	0.00	2E-7	0.00	7E-7
Benzo(a)pyrene	0.176/**0.083**	0.00	8E-7	0.00/**0.00**	3E-6/**1E-6**
Benzo(b)fluoranthene	0.279	0.00	1E-7	0.00	5E-7
Benzo(ghi)perylene	0.165[c]	0.00	8E-7	0.00	3E-6
Benzo(k)fluoranthene	0.218	0.00	1E-8	0.00	4E-8
Bromoform	0.00312	0.00	1E-11	0.00	5E-11
Butanone, 2-	0.00735	0.00		0.00	
Carbazole	0.244 J	0.00	2E-9	0.00	8E-9
Chloroform	0.0025[c]	0.00	5E-9	0.01	1E-8
Chrysene	0.616	0.00	3E-9	0.00	9E-9
Dibenzofuran	0.165[c]	0.00		0.00	
Dibromochloromethane	0.0025[c]	0.00	8E-11	0.00	3E-10
1,2-Dichlorobenzene	0.25 J	0.00		0.00	
Di-n-octyl phthalate	0.223 J	0.00		0.00	
bis(2-Ethylhexyl) phthalate	4.36	0.00	2E-8	0.00	1E-7
Fluoranthene	2.65	0.00		0.00	
Fluorene	0.231	0.00		0.00	
Hexachlorobenzene	0.165[c]	0.00	2E-7	0.00	5E-7
Indeno(1,2,3-c,d)pyrene	0.165[c]	0.00	8E-8	0.00	3E-7
Methylene chloride	0.0025 J	0.00	2E-8	0.00	3E-8
Phenanthrene	2.51	0.00		0.00	
Pyrene	1.9 J	0.00		0.00	
Tetrachloroethene	0.0025[c]	0.00	7E-10	0.00	2E-9
Toluene	0.00446	0.00		0.00	
Trichloroethene	0.0025[c]	0.00	3E-8	0.00	6E-8
2,4,5-Trichlorophenol[d]	0.8[c]	0.00	4E-8	0.00	2E-7

Table 4 (Concluded)
Risk Assessment Values for SWMU 78 Nonradiological COCs

COC	Maximum Concentration/UCL (All Samples) (mg/kg)	Industrial Land-Use Scenario[a]		Residential Land-Use Scenario[a]	
		Hazard Index	Cancer Risk	Hazard Index	Cancer Risk
Xylene	0.0025[c]	0.00		0.00	
Total		0.1	1E-5	1.26/**0.23**	5E-5/**6E-6**

[a]EPA 1989.
[b]UCL value is less than the background value eliminating COC from further evaluation.
[c] Nondetected concentration (concentration listed is one-half of the maximum detection limit which is used for a conservative risk assessment).
[d]Pentachlorophenol used as a surrogate.
Bold values represent UCLs and calculations with UCLs.
COC = Constituent of concern.
EPA = U.S. Environmental Protection Agency.
J = Concentration was qualified as an estimated value.
mg/kg = Milligram(s) per kilogram.
SWMU = Solid Waste Management Unit.
UCL = Upper Confidence Limit.

SWMU 137, Building 6540/6542 Septic System

Site Location

SWMU 137, the Buildings 6540/6542 Septic System at SNL/NM, is located in TA-III on federally owned land controlled by KAFB and permitted to the DOE. SWMU 137 consists of two abandoned septic systems. A northern system consisted of a steel septic tank that discharged to a drainfield with six, 50-ft-long drain lines and a southern system consisted of a cast concrete septic tank that discharged to a drainfield with 12, 70-ft-long drain lines (Figure 5).

Operational History

Available information indicates that Building 6540 was constructed in 1954 and Building 6542 was constructed in 1956; it is assumed that the northern septic system was constructed about 1954. Sometime after 1975, the northern system was abandoned and the larger southern system was installed. In 1991, septic system discharges were routed to the City of Albuquerque (COA) sanitary sewer system. The southern septic system line was disconnected and capped, and the system was abandoned in place concurrent with this change. The northern steel septic tank was excavated and found to be in a much degraded condition, and the remains of this tank were removed on October 18, 1995. Waste in the southern (newer) septic tank was removed in early January 1996. The empty and decontaminated septic tank was backfilled with clean, native soil in accordance with 20.7.3.410 NMAC on January 26, 1996.

The COCs include RCRA metals, hexavalent chromium, cyanide, VOCs, SVOCs and radionuclides.

Evaluation of Relevant Information

Five different assessment investigations have been conducted at this site. In 1992, 1994 and 1995, waste characterization samples were collected from the north system septic tank and in 1992 and 1994, waste characterization samples were collected from the south system septic tank (Investigation 1). Soil sampling at SWMU 137 was conducted in 1990, 1994 and 1995 (Investigation 2). Two geophysical surveys using Geonics™ Model EM-31 and EM-38 ground conductivity meters were performed at the site in June 1994 (Investigation 3). In May and June 1994, a passive soil-vapor survey was conducted to identify potential releases of VOCs and SVOCs in the soil in the two drainfield areas (Investigation 4). In 2003, a soil-vapor monitoring well was installed and sampled (Investigation 5). These investigations are discussed in the following sections.

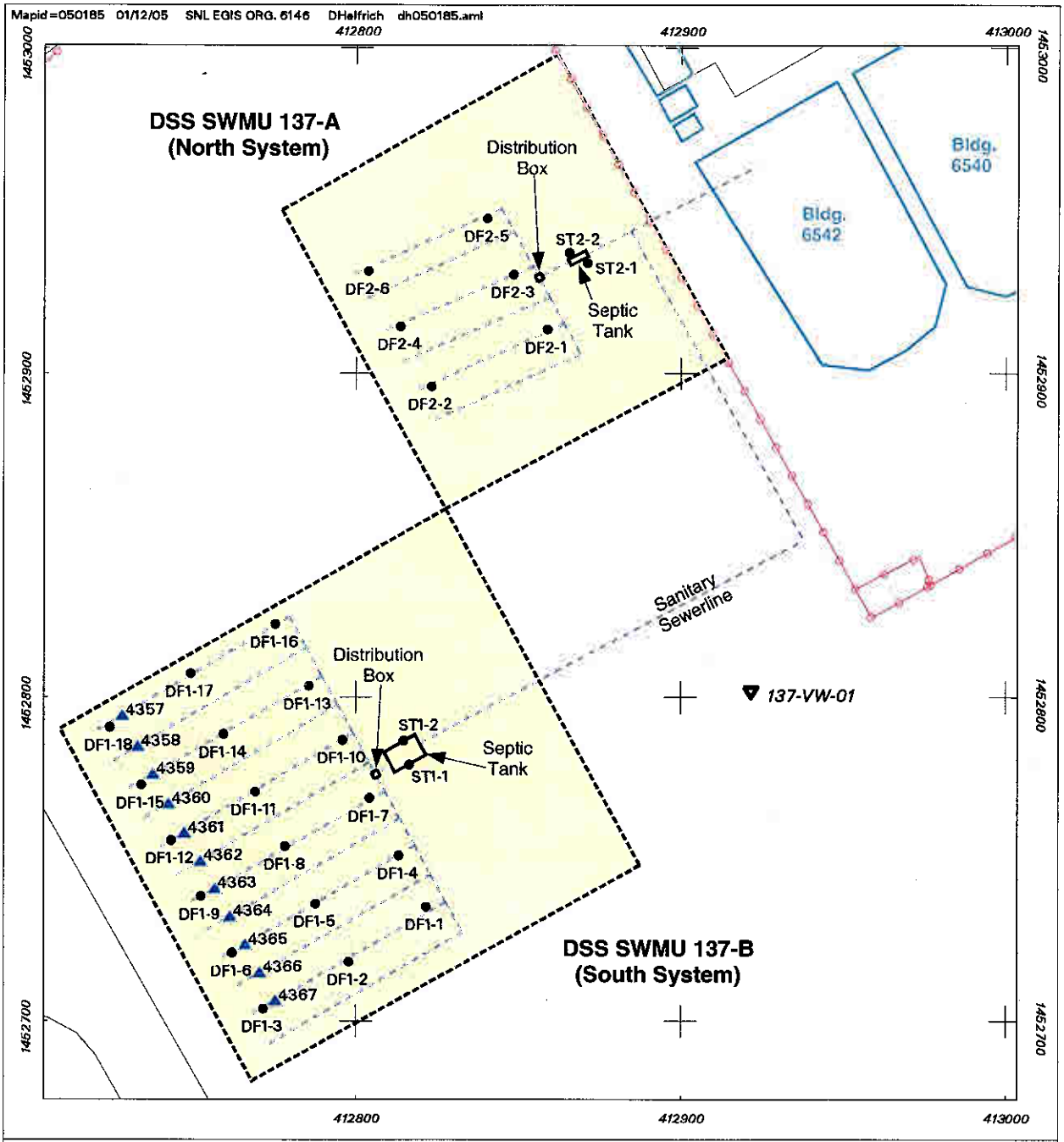
Investigation 1—Septic Tank Sampling

A sludge sample was collected from the north system septic tank in August 1992 and was analyzed for selected radionuclide constituents. Low activity levels of several radionuclide constituents were detected in the material. Although not specifically stated in the report, it is apparent that no liquid was present in the tank at the time of sampling because the analytical summary table for the north tank sludge sample shows that a tritium analysis was not performed because the sample was dry.

A second round of dry sludge/soil samples were collected for waste characterization purposes in June 1994; no liquid was present in the tank at the time of sampling. The sludge/soil samples were analyzed for VOCs, SVOCs, RCRA metals, hexavalent chromium and cyanide. Low concentrations of one (1) VOC and 12 SVOC compounds were identified in the material. All eight RCRA metals (including 371 mg/kg of silver) were detected in the total metals analysis of the sludge/soil, but only two of the eight metals (barium and cadmium) were detected in the TCLP-derived leachate from the material. Hexavalent chromium and cyanide were not detected in the material.

A third set of waste characterization samples was collected from the bottom of the north system tank in October 1995 when the tank was removed from the ground. The dry sludge consisted of a 2-inch thick layer of decomposed humus-like material mixed with dirt from around the tank. These dry sludge samples were analyzed for isotopic uranium and tritium by a commercial laboratory, and were also screened for other radionuclides by SNL/NM in-house gamma spectroscopy. Tritium was not detected, and anomalous activity levels of isotopic uranium or other radionuclides were not identified in the material relative to the radionuclide background activity levels for SNL/NM soils.

A sludge sample was collected from the south system septic tank in August 1992 and was analyzed for selected radionuclide constituents. No liquid sample was collected at this time. Low activity levels of several radionuclide constituents were detected in the sludge.



Legend

- 1990 Soil Sample Location
- 1994 Soil Boring Location
- Soil-Vapor Monitoring Well
- Fence
- Road
- Septic Tank, Distribution Box
- Sanitary Sewerline, Drainfield
- Building
- DSS SWMU 137

Figure 5
Site Map of Drain and Septic Systems (DSS) SWMU 137, Bldgs. 6540/6542 Septic System, TA-III

0 25 50
Scale in Feet

0 6 12
Scale in Meters

N

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A second round of both liquid and sludge samples were collected from the south system for waste characterization purposes in June 1994. They were analyzed for VOCs, SVOCs (sludge sample only), RCRA total and TCLP (sludge sample only) metals, hexavalent chromium, cyanide, isotopic uranium, tritium (liquid sample only) and gamma spectroscopy radionuclides. Low concentrations of several VOC and SVOC compounds were identified in the liquid and/or sludge. A number of RCRA total metals were identified in the liquid and sludge (including 372 mg/kg of silver in the sludge), but only two out of eight of these metals (barium and silver) were detected in the TCLP-derived leachate from the sludge. Hexavalent chromium and cyanide were not detected in the liquid or sludge. Very low levels of isotopic uranium and several other radionuclides detected by gamma spectroscopy were found in the material. In addition, 440 picocuries (pCi)/liter (L) of tritium was detected in the liquid septage fraction, and was considered to be representative of the liquid sludge fraction.

Investigation 2—Soil Sampling

In November 1990, construction activities for the COA sanitary sewer extension into TA-III were taking place west of Building 6540/6542. These activities included digging a trench for the new sewer line that intercepted the western end of the SWMU 137 south system drainfield, cutting through and exposing the western ends of the 12 drainlines in this drainfield.

While the trench was open, soil samples were collected from immediately around and beneath 11 of the 12 exposed drainlines. Six soil samples were collected from along the six northern drainlines, and five samples were collected from along the six southern lines. An aliquot of soil from each of the six discrete samples from the northern part of the drainfield were then composited into one sample (composite #1), and aliquots of soil from each of the five discrete samples from the southern portion of the drainfield were composited into a second composite sample (composite #2). These two composite samples were analyzed for SVOC compounds and RCRA total metals.

No SVOC compounds or anomalous concentrations of any of the eight metals were identified in composite sample #1 from the northern part of the drainfield. Composite soil sample #2 from the southern part of the drainfield contained only one SVOC compound (diethyl phthalate at 0.5 mg/kg) and also contained 191 mg/kg of silver. As a result of the relatively high silver concentration in composite sample #2, the five individual samples from which the composite was taken were each analyzed for silver.

A backhoe was used in September 1994 to determine the precise location, dimensions and drainline depths of the two ER Site 137 drainfields. Once the drainfields were located, soil samples were collected in November and December 1994 from boreholes in each of the two drainfields, and from either side of the two septic tanks at this site.

Soil samples were collected from one boring on either side of and within 1 ft of the outside of each of the two septic tanks. Samples were also collected from six borings located next to and near the ends of alternating north system drainfield lateral lines, and from 18 locations near each end and at the midpoint of alternating south drainfield system drainlines (Figure 5). The septic tank boring samples were collected from one interval in each borehole starting at the outside

bottom of the tank, which was 9 ft bgs for the north system tank, and 11 ft bgs for the south system tank. For drainfield borings, samples were collected from two intervals in each borehole. The top of the north system shallow interval started at the bottom of the drain line trenches (average of 5 ft bgs), and the lower (deep) interval started at 10 ft below the top of the upper interval, or 15 ft bgs. For the south system drainfield, the shallow interval started at the bottom of the drainline trenches at 7 ft bgs, and the deep sampling interval started at 10 ft below the upper interval, or 17 ft bgs.

Soil samples collected next to the septic tanks and in the drainfields were analyzed for VOCs, SVOCs, cyanide, RCRA metals, hexavalent chromium and cyanide by an off-site commercial laboratory. Also composite samples were collected from shallow and deep sampling intervals in both the north and south system drainfields and analyzed by an off-site commercial laboratory for isotopic uranium and tritium. They were also screened for other radionuclides using SNL/NM in-house gamma spectroscopy.

A final set of soil samples was collected from directly beneath the north system septic tank when it was removed from the ground on October 18, 1995. These samples were collected to determine if significant concentrations of COCs had leaked into surrounding soils from the degraded tank. They were analyzed for VOCs, SVOCs, RCRA metals, hexavalent chromium, isotopic uranium and tritium, and were screened for other radionuclides using SNL/NM in-house gamma spectroscopy.

Arsenic, barium, total chromium and silver were detected in some SWMU 137 soil samples at concentrations greater than Department-approved background concentrations for these metals.

Silver was detected at a concentration of 2.4 mg/kg in the October 1995 soil sample from beneath the north septic tank, and was not detected in two samples collected in 1994 from either side of the same tank. Silver was detected in 11 of the 13 soil samples from the north system drainfield at concentrations ranging from 0.41 to 39.5 mg/kg. Eight of the 11 samples contained silver above the background concentration. Silver was not detected in the two samples collected in 1994 from either side of the south tank. Forty soil samples were collected from shallow and deep intervals in the south drainfield in 1994, and silver was detected in 18 of the 40 samples up to a concentration of 40.9 mg/kg. Also, as described above, the composite sample collected in 1990 from the southern part of the south drainfield, and three of the five discrete samples from the southern part of the drainfield contained silver between 1 and 400 mg/kg; the other two discrete samples contained 1,170 and 920 mg/kg of silver.

No barium concentrations were detected above the background concentration in any of the 16 north system soil samples. Barium above the background concentration was detected in 3 of the 44 south system soil samples. No chromium concentrations were detected above the background concentration in any of the 16 north system soil samples. Chromium above the background concentration was detected in 2 of the 44 south system soil samples. Only one (1) sample had a concentration of arsenic above the background concentration.

Five SVOCs [2-4-dichlorophenol, bis (2-ethylhexyl) phthalate, diethyphthalate, methyl isobutyl ketone and di-n-butylphthalate] and three VOCs (acetone, methylene chloride and toluene) were detected in the soil samples. Cyanide was also detected in one of the soil samples.

Investigation 3—Geophysical Surveys

Two geophysical surveys using Geonics™ Model EM-31 and EM-38 ground conductivity meters were performed at the site in June 1994, and two areas of low conductivity (indicating possible areas of disturbed soils) were identified in the suspected areas of the two ER Site 137 drainfields. Geophysical techniques were not used to precisely determine the drainfield locations; actual locations of the two drainfields (Figure 5) were later determined using a backhoe.

Investigation 4—Passive Soil-Gas Survey

A passive soil-gas survey conducted in the two drainfield areas in May and June 1994 used PETREX™ sampling tubes to identify potential releases of VOCs and SVOCs from the drainfield. Fourteen PETREX™ tube samplers were placed in a grid pattern that covered the north drainfield area, and 22 samplers were placed in a grid pattern that covered the south drainfield area at this site. Significant concentrations of PCE or TCE were not detected in soil gas at any of the 36 PETREX™ sampling locations at this site. BTEX and/or aliphatic compounds at potentially detectable concentrations were identified at 1 of the 14 north drainfield locations. However, except for trace levels of contaminants, VOCs and SVOCs were not detected in the north drainfield shallow and deep-interval soil samples collected from the two nearest boreholes, which were within 18 and 25 ft of the PETREX™ location with the BTEX and aliphatic compounds with potentially detectable concentrations.

Potentially detectable BTEX and/or aliphatic compounds were also identified at 1 of the 22 south drainfield sampling locations. Again, VOCs and SVOCs were not detected in shallow or deep interval soil samples collected from a borehole within about 7 ft of this PETREX™ location, or in any of the other south drainfield soil samples.

Investigation 5—Active Soil-Vapor Sampling

In May 2003, as part of the Drain and Septic Systems (DSS) investigation, a Flexible Liner Underground Technologies (FLUTe™) soil-vapor monitoring well was installed at a location selected by the NMED at SWMU 137. Soil-vapor well 137-VW-01 was 150 ft deep with vapor sampling ports at depths of 5, 20, 70, 100 and 150 ft bgs. After installation, subsurface conditions were allowed to equilibrate for over three months before the well was sampled on September 9, 2003. Soil-vapor samples from each of the five sampling depths were collected in special canisters and sent to an off-site laboratory for analysis. Total VOC soil-vapor concentrations ranged from a low of 0.0015 parts per million by volume (ppmv) in the 20-ft-bgs sample to a maximum of 0.0524 ppmv in the 100-ft-bgs sample. Because the total VOC concentration in the 150-ft-bgs sample from this well was less than 10 ppmv, no additional soil-vapor sampling from this well and no additional soil-vapor or groundwater monitoring wells were required.

A risk screening assessment was performed for this site to evaluate the potential for adverse health effects for industrial and residential land-use scenarios. For the industrial land-use scenario, the total human health HI and the estimated excess cancer risk meet Department

requirements. However, the total human health HI and excess cancer risk are unacceptable for the residential land-use scenario (Table 5).

Although using the UCL of the mean concentrations for arsenic, cyanide and silver, the main contributors to excess cancer risk and hazards reduces the total HI and estimated excess cancer risk to acceptable values, the small number of samples collected at this site does not justify that analysis. Thus, SWMU 137 is only suitable for CAC under an industrial land-use scenario.

For the radiological COCs (uranium-235 and uranium-238) a total effective dose equivalent (TEDE) was calculated that results in a TEDE of 3.4E-2 millirem (mrem)/year (yr). A TEDE of 15 mrem/yr is appropriate for an industrial land-use scenario. The estimated excess cancer risk is 3.0E-7.

Table 5
Risk Assessment Values for SWMU 137 Nonradiological COCs

COC	Maximum Concentration/UCL (mg/kg)	Industrial Land-Use Scenario[a]		Residential Land-Use Scenario[a]	
		Hazard Index	Cancer Risk	Hazard Index	Cancer Risk
Inorganic					
Arsenic	6.2/**3.0**	0.02	4E-6	0.29/**Below Background**	2E-5/**Below Background**
Barium	241	0.00		0.05	
Chromium, total	46.7	0.00		0.00	
Cyanide	920/**17.7**	0.07		0.75/**0.14**	
Silver	1,170/**267**	0.24		3.08/**0.70**	
Organic					
Acetone	0.023	0.00		0.00	
2,4-Dichlorophenol	0.33	0.00		0.00	
Diethylphthalate	0.5	0.00		0.00	
Di-n-butylphthalate	0.77	0.00		0.00	
bis(2-Ethylhexyl) phthalate	0.165[b]	0.00	9E-10	0.00	4E-9
Methyl isobutyl ketone	0.005[b]	0.00		0.00	
Methylene chloride	0.0073	0.00	5E-8	0.00	1E-7
Toluene	0.0027[b]	0.00		0.00	
Total		0.35	4E-6	4.17/**0.89**	2E-5/**1E-7**

[a]EPA 1989.

[b]Nondetected concentration (concentration listed is one-half of the maximum detection limit, used for a conservative risk assessment).

Bold values represent UCLs and calculations with UCLs.

COC = Constituent of concern.
EPA = U.S. Environmental Protection Agency.
mg/kg = Milligram(s) per kilogram.
SWMU = Solid Waste Management Unit.
UCL = Upper Confidence Limit.

The exposure pathway analysis established that no complete pathway exists for exposure of ecological species to contaminants at SWMU 137. All COCs are located at depths at or greater than 5 ft bgs. Therefore, no COCs are considered to be COPECs.

In conclusion, human health and ecological risks are acceptable under an industrial land-use scenario.

Basis for Determination

SWMU 137 has been characterized or remediated in accordance with current applicable state and/or federal regulations, and the available data indicate that contaminants pose an acceptable level of risk under current and projected future land use.

SWMU 146, Building 9920 Drain System

Site Location

SWMU 146, the Building 9920 Drain System at SNL/NM, is located in the Coyote Test Field (CTF) area east of SNL/NM TA-III on federally owned land controlled by KAFB and permitted to the DOE. The abandoned drain system consists of a drywell that is a 6-ft-square pit excavated into the native material, and filled with 2-inch-diameter gravel from approximately 1 ft bgs to an estimated depth of 4 ft bgs (Figure 6).

Operational History

The drywell received discharges from a photography laboratory sink in the building. Available information indicates that Building 9920 was constructed in 1958, and it is assumed that the drywell was also constructed about that time. In 1965, photo-processing activities in Building 9920 ceased and, in 1980, a darkroom sink that discharged to the drywell was removed. The drain system piping would have been disconnected and capped, and the system abandoned in place concurrent with this change.

The COCs include RCRA metals, hexavalent chromium, total cyanide, HE compounds, VOCs, SVOCs and radionuclides.

Evaluation of Relevant Information

Five different assessment investigations have been conducted at this site. In 1994, a surface radiological survey was conducted (Investigation 1). A brief geophysical survey using a magnetometer was performed at the site in March 1994 to help locate metal parts of the drywell (Investigation 2). In January 1995, a backhoe was used to locate and partially excavate the drywell (Investigation 3). In July 1994, a passive soil-vapor survey was conducted to identify potential releases of VOCs and SVOCs (Investigation 4). In January 1995, confirmatory soil sampling was conducted immediately adjacent to the drywell (Investigation 5). These investigations are discussed in the following sections.

Investigation 1—Surface Radiological Survey

A surface radiological survey conducted by RUST Geotech Inc. in March 1994 included the area around Building 9920. There were no point or aerial anomalies detected above background levels within the confines of SWMU 146.

Investigation 2—Geophysical Survey

A brief geophysical survey using a magnetometer was performed at the site in March 1994 to help locate metal parts of the drywell, if any. No attempt was made to use geophysical techniques to identify areas with high moisture content, since discharges of significant volumes of effluent did not occur at this site. The results of the magnetometer survey were inconclusive. Therefore, the geophysical survey results were not useful in identifying the location of the drywell.

Investigation 3—Passive Soil-Gas Survey

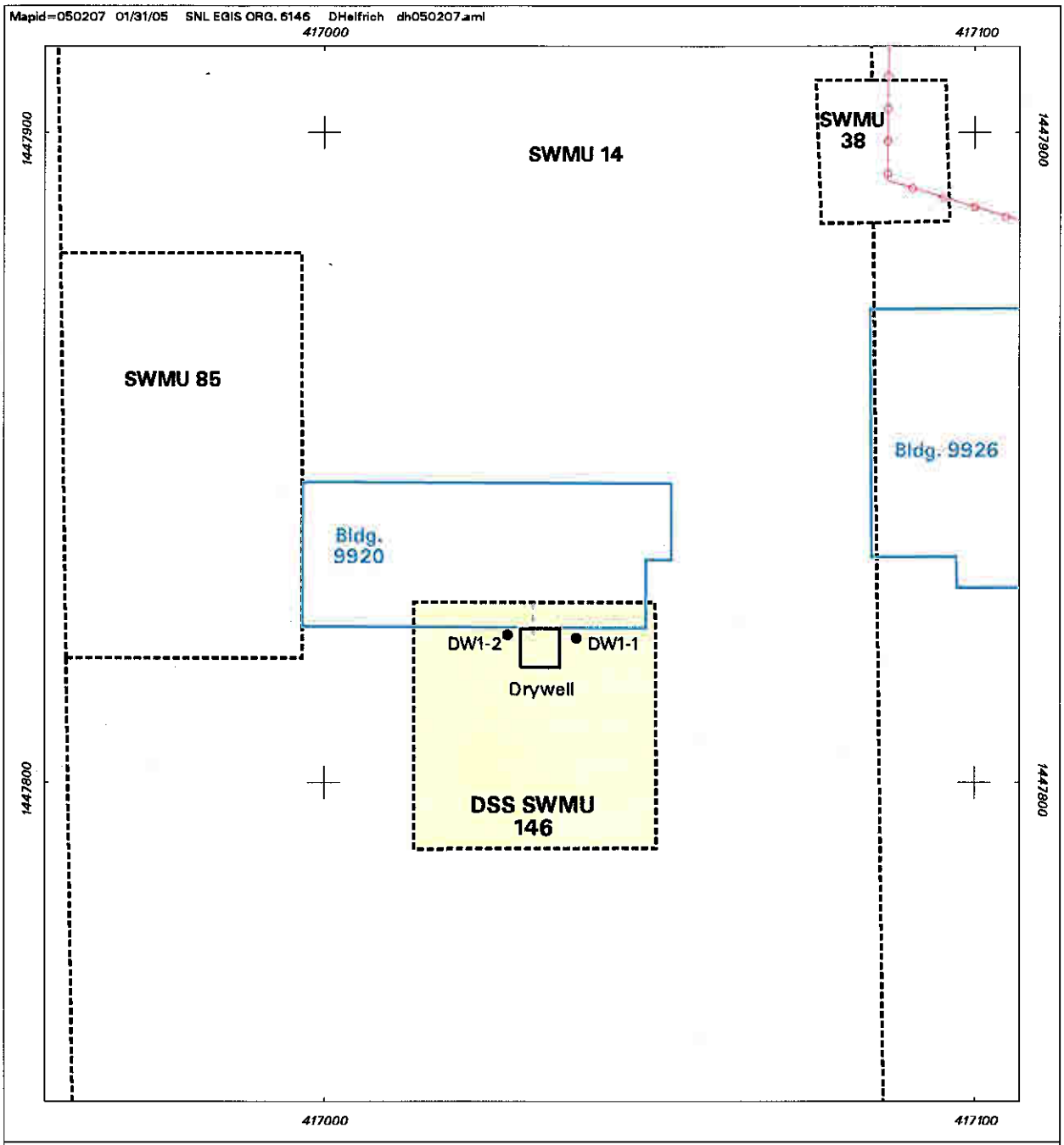
A passive soil-gas survey was conducted at the site in July 1994 utilizing PETREX™ sampling tubes to identify any releases of VOCs and SVOCs to the soil around the drywell. No VOCs or SVOCs were found in detectable quantities in PETREX™ tubes placed at this site.

Investigation 4—Backhoe Excavation

In January 1995, a backhoe was used to locate and partially excavate the drywell to determine the exact location of the end of the drain pipe from Building 9920. The drywell was found to consist of a rectangular pit, 6 ft long by 6 ft wide, excavated in native material, and filled with 2-inch aggregate from about 1 ft bgs down to the estimated bottom of the drywell at 4 ft bgs. No concrete or metal liner enclosing the gravel was found. The actual bottom of the drywell was not determined by excavating because of the abundance of buried utilities at this location. The end of the Building 9920 drainline was positioned 1.3 ft into the north side of the drywell gravel. The drainline itself consists of a 4-inch-diameter cast iron pipe buried about 18 inches bgs. No visual or olfactory evidence of contamination was noted in soils excavated from immediately around the gravel-filled pit.

Investigation 5—Soil Sampling

Confirmatory soil sampling was conducted in January 1995 immediately adjacent to the drywell. Soil samples were collected from borings on either side of the drywell. The boreholes were located approximately 2 ft away from the edge of opposite sides of the gravel-filled drywell pit, and are shown on Figure 6. Two depth intervals were sampled in each borehole, the first starting at the estimated bottom of the drywell (4 ft bgs), and the second starting at 10 ft below the top of the first sampling interval (14 ft bgs). One set of duplicate samples was collected from the shallow sampling interval in borehole S146-DW1-2 (Figure 6). The soil was analyzed for SVOCs, RCRA metals, hexavalent chromium, and cyanide by laboratory analysis and HE compounds using a field screening immunoassay technique. The soil was also analyzed for radionuclides. Four VOC compounds (acetone, methyl ethyl ketone, methylene chloride and



Legend

- Soil Boring Location
- Fence
- Drywell
- Drain line
- Other SWMU Boundary
- Building
- DSS SWMU 146

Figure 6
Site Map of Drain and Septic Systems (DSS) SWMU 146, Bldg. 9920 Drain System, Coyote Test Field

0 12.5 25
Scale in Feet

0 3 6
Scale in Meters

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methyl isobutyl ketone) were detected. No SVOCs, cyanide or HE compounds were detected. No metals were detected above the background concentrations. The samples had MDAs for uranium-235 and uranium-238 that exceeded the background activity.

To determine if radionuclides were present in soils adjacent to the drywell at this site, shallow and deep interval composite soil samples from the two borings were also analyzed by a commercial laboratory for isotopic uranium and tritium, and screened for radionuclides using SNL/NM in-house gamma spectroscopy. Although not detected, uranium-235 and uranium-238 had MDAs in the gamma spectroscopy analyses that exceeded the background activity. No other radionuclides exceeded background activities.

A risk screening assessment was performed to evaluate the potential for adverse health effects for industrial and residential land-use scenarios. For both the industrial and residential land-use scenarios, the total human health HI and estimated excess cancer risk meet Department requirements (Table 6).

For the radiological COCs (uranium-235 and uranium-238) a total effective dose equivalent (TEDE) was calculated that results in a TEDE of 4.5E-2 millirem (mrem)/year (yr). The estimated excess cancer risk is 4.0E-7.

Table 6
Risk Assessment Values for SWMU 146 Nonradiological COCs

COC	Maximum Concentration (All Samples) (mg/kg)	Industrial Land-Use Scenario[a]		Residential Land-Use Scenario[a]	
		Hazard Index	Cancer Risk	Hazard Index	Cancer Risk
Inorganic					
Cyanide	0.25[b]	0.00		0.00	
Organic					
Acetone	0.013	0.00		0.00	
Methylene Chloride	0.0022 J	0.00	1E-8	0.00	3E-8
Methyl Ethyl Ketone	0.005[b]	0.00		0.00	
Methyl Isobutyl Ketone	0.005[b]	0.00		0.00	
Total		**0.00**	**1E-8**	**0.00**	**3E-8**

[a]EPA 1989.
[b]Nondetected concentration (concentration listed is one-half of the maximum detection limit, used for a conservative risk assessment).
COC = Constituent of concern.
EPA = U.S. Environmental Protection Agency.
J = Estimated concentration.
mg/kg = Milligram(s) per kilogram.
SWMU = Solid Waste Management Unit.

Ecological risks associated with SWMU 146 were estimated through a risk assessment that incorporates site-specific information when available. All HQ values predicted for the COPECs at this site are less than unity. Based upon this final analysis, the potential for ecological risks associated with DSS SWMU 146 is expected to be low.

In conclusion, human health and ecological risks are acceptable under a residential land-use scenario.

Basis for Determination

SWMU 146 has been characterized or remediated in accordance with current applicable state and/or federal regulations, and the available data indicate that contaminants pose an acceptable level of risk under current and projected future land use.

SWMU 148, Building 9927 Septic System

Site Location

DSS SWMU 148, the Building 9927 Septic System at SNL/NM, is located in the CTF area east of SNL/NM TA-III on federally owned land controlled by KAFB and permitted to the DOE. The abandoned septic system consisted of a 750-gallon septic tank connected to a single seepage pit (Figure 7).

Operational History

Available information indicates that Building 9927 was constructed in 1962, and it is assumed that the septic system was also constructed at that time. By 1991, the septic system discharges were routed to the COA sanitary sewer system. The old septic system line was disconnected and capped, and the system was abandoned in place concurrent with this change. The empty and decontaminated septic tank was inspected by the Department on December 15, 1995, and a closure form was signed. The septic tank was reportedly backfilled with clean, native soil from the area in late 1995 or early 1996. Building 9927 was demolished in Fiscal Year 2002. A site visit on July 22, 2004, confirmed that the seepage pit was still intact. The seepage pit was demolished and backfilled in place in August 2005 in accordance with 20.7.3.410 NMAC.

The COCs include RCRA metals plus beryllium, hexavalent chromium, cyanide, VOCs, SVOCs, HE compounds and radionuclides.

Evaluation of Relevant Information

Four different assessment investigations have been conducted at this site. In 1992, 1994 and 1995, waste characterization samples were collected from the septic tank (Investigation 1). In 1994, a surface radiological survey was conducted (Investigation 2). In June 1994, a geophysical survey was performed at the site (Investigation 3). In June 1994, a passive soil-vapor survey was conducted to identify potential releases of VOCs and SVOCs in the soil around the septic tank and seepage pit (Investigation 3). In October 1994, confirmatory soil sampling was conducted immediately adjacent to both the septic tank and seepage pit (Investigation 4).

Investigation 1—Septic Tank Sampling

The contents of the Building 9927 septic tank have been sampled on three separate occasions for waste characterization purposes. Liquid and sludge samples were collected from the septic tank on June 21, 1992. These samples were analyzed for VOCs, SVOCs, pesticides, PCBs, metals, various radionuclide isotopes and other miscellaneous compounds. The samples contained low concentrations of three VOC constituents, metals and other miscellaneous constituents. The radiological analyses conducted in 1992 had significant quality assurance/quality control problems and could not be used for waste characterization purposes.

A second set of sludge (dry at the time of sampling) samples were collected from the Building 9927 septic tank on May 9, 1994, and were analyzed for VOCs, SVOCs, TCLP metals and isotopic uranium. A screen was completed for other radionuclides using SNL/NM in-house gamma spectroscopy to characterize the tank residue for waste disposal. No VOCs or SVOCs were detected in the dry sludge. Barium, cadmium, chromium, selenium and silver were detected in the TCLP-derived leachate, but at concentrations well below RCRA Toxicity characteristic action levels. Low activities of radionuclides were detected in the sludge. Additional dried sludge samples were collected from the septic tank on January 26, 1995, in order to complete additional analyses required for waste characterization. These samples were analyzed for isotopic uranium and tritium, and radionuclides using gamma spectroscopy and contained low levels of isotopic uranium, tritium and other radionuclides detectable through gamma spectroscopy.

Investigation 2—Surface Radiological Survey

A surface radiological survey was conducted by RUST Geotech Inc. around Building 9927 in March 1994. The survey did not detect any point or aerial anomalies above background levels within SWMU 148.

A geophysical survey performed at the site in March 1994 was intended to identify any subsurface areas with high moisture content, indicating a possible contaminant plume from past releases. The results of the geophysical survey were inconclusive, with no definitive indications of high moisture concentrations. Therefore, the geophysical survey results were not used as a guide in the soil sampling effort.

Investigation 3—Passive Soil-Gas Survey

The passive soil-gas survey conducted at the site in June 1994 utilized PETREX™ sampling tubes to identify any releases of VOCs and SVOCs to the soil around the septic tank and seepage pit. The soil-gas survey identified PCE at a concentration just above the PETREX™ technique detection limit at one sampling location. Subsequent laboratory analysis of soil samples from this location did not detect PCE, nor was PCE detected in the septic tank contents sampled in 1994. No other VOCs or SVOCs were found in detectable quantities in PETREX™ tubes placed at this site.

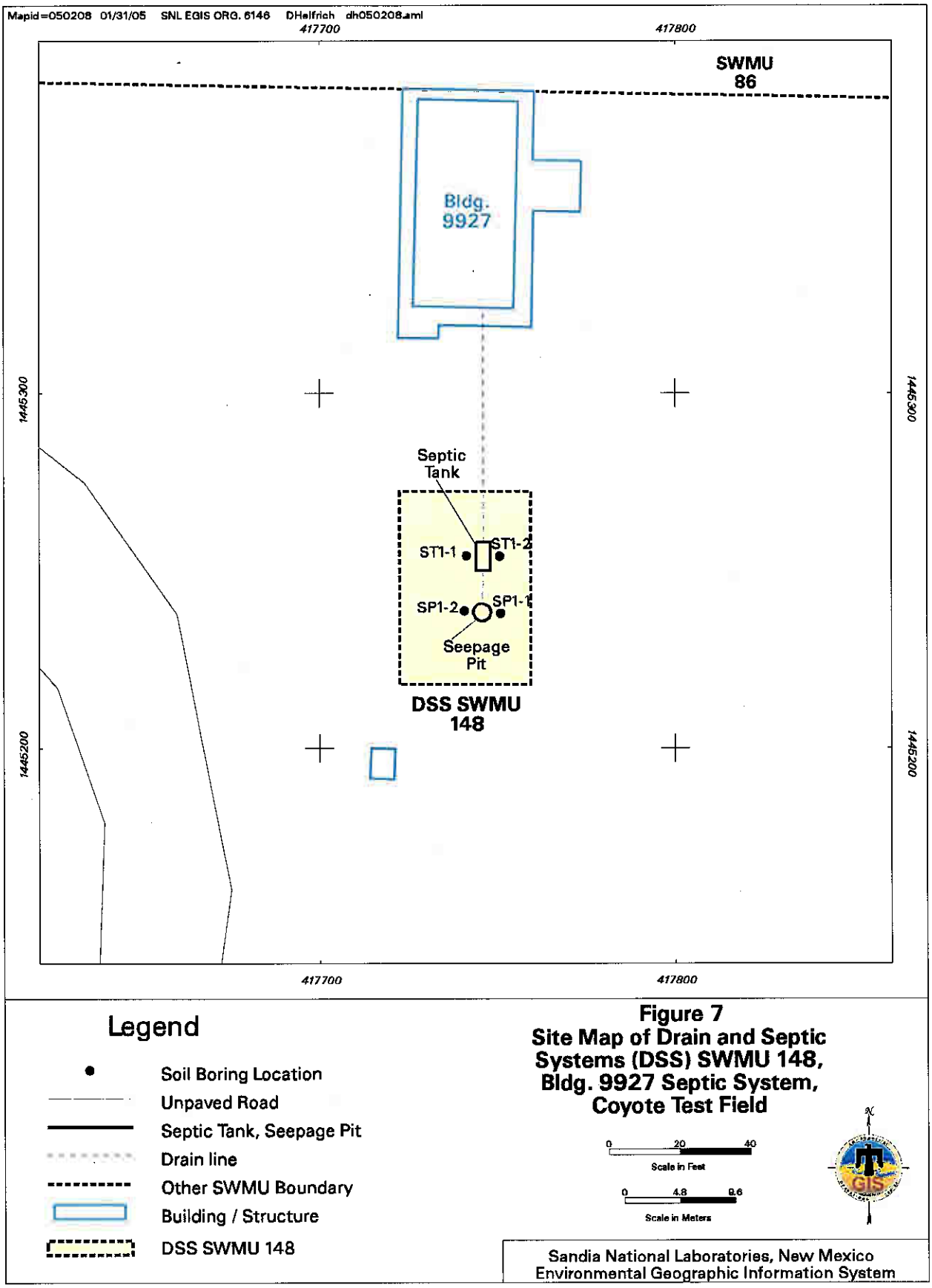

Figure 7
Site Map of Drain and Septic Systems (DSS) SWMU 148, Bldg. 9927 Septic System, Coyote Test Field

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Investigation 4—Soil Sampling

Confirmatory soil sampling was conducted in October 1994 immediately adjacent to both the septic tank and seepage pit. Soil samples were collected from borings on either side of the seepage pit, and from borings on either side of the septic tank. The soil sampling locations are shown in Figure 7. Two depth intervals were sampled at each location around the seepage pit, the first starting at the outside bottom of the pit (14 ft bgs), and the second, 10 ft below the top of the first sampling interval (24 ft bgs). The sampling locations on either side of the septic tank, from one interval in each borehole, started at the outside bottom of the tank, 12 ft bgs. Depths below grade to the outside bottoms of the septic tank and seepage pit were determined based on field measurements and SNL/NM facilities engineering drawings. The soil was analyzed for SVOCs, RCRA metals, hexavalent chromium, beryllium and cyanide by laboratory analysis and HE compounds using a field screening immunoassay technique.

Two VOC compounds (methylene chloride and toluene) were identified at below-reporting-limit concentrations. No SVOC constituents, cyanide or HE compounds were identified in the soil samples. Arsenic was detected in concentrations above the Department-approved background concentration. Tritium had sample with a MDA above the background activity.

A risk screening assessment was performed to evaluate the potential for adverse health effects for the industrial and residential land-use scenarios. For the industrial land-use scenario, both the total human health HI and estimated excess cancer risk meet Department requirements. For the residential land-use scenario the total human health HI meets Department requirements (Table 7). However, the estimated cancer risk is not acceptable.

For the radiological COC (tritium) a total effective dose equivalent (TEDE) was calculated that results in a TEDE of 1.9E-5 millirem (mrem)/year (yr). The estimated excess cancer risk is 2.2E-11.

The exposure pathway analysis established that no pathway exists for exposure of ecological species to contaminants at SWMU 148. All COCs are located at depths greater than 5 ft bgs. Therefore, no COCs are considered to be COPECs.

In conclusion, human health and ecological risks are acceptable under an industrial land-use scenario.

Basis for Determination

SWMU 148 has been characterized or remediated in accordance with current applicable state and/or federal regulations, and the available data indicate that contaminants pose an acceptable level of risk under current and projected future land use.

Table 7
Risk Assessment Values for SWMU 148 Nonradiological COCs

COC	Maximum Concentration (All Samples) (mg/kg)	Industrial Land-Use Scenario[a]		Residential Land-Use Scenario[a]	
		Hazard Index	Cancer Risk	Hazard Index	Cancer Risk
Inorganic					
Arsenic	8.5	0.03	5E-6	0.39	2E-5
Cyanide	0.25[b]	0.00		0.00	
Organic					
Methylene chloride	0.0025[b]	0.00	2E-8	0.00	3E-8
Toluene	0.0025 J	0.00		0.00	
Total		**0.03**	**5E-6**	**0.39**	**2E-5**

[a]EPA 1989.
[b]Nondetected concentration (concentration listed is one-half of the maximum detection limit, used for a conservative risk assessment).
(i.e., one-half the maximum detection limit is greater than the maximum detected concentration).
COC = Constituent of concern.
EPA = U.S. Environmental Protection Agency.
J = Estimated concentration.
mg/kg = Milligram(s) per kilogram.
SWMU = Solid Waste Management Unit.

SWMU 152, Building 9950 Septic System

Site Location

SWMU 152, the Building 9950 Septic System at SNL/NM, is located in the CTF, east of SNL/NM TA-III, on federally owned land controlled by KAFB and permitted to the DOE. SWMU 152 consists of a 750-gallon septic tank that discharged to four, approximately 25-ft-long drain lines (Figure 8).

Operational History

Available information indicates that Building 9950 was constructed in 1964, and it is assumed that the septic system was constructed about that time. In 1991, septic system discharges were routed to the COA sanitary sewer system. The septic system line was disconnected and capped, and the system was abandoned in place concurrent with this change. The empty decontaminated septic tank was backfilled with clean, native soil in accordance with 20.7.3.410 NMAC on January 26, 1996.

The COCs include RCRA metals, HE compounds, VOCs, SVOCs and radionuclides.

Evaluation of Relevant Information

Five different types of assessment investigations have been conducted at this site. In 1992 and 1994, waste characterization samples were collected from the septic tank (Investigation 1). In

June 1994, a geophysical survey was performed at the site to attempt to locate the drainfield (Investigation 2). In June and November 1994, a passive soil-vapor survey was conducted to identify potential releases of VOCs and SVOCs in the soil in the drainfield (Investigation 3). In August 1994, the drainfield was located and partially excavated with a backhoe (Investigation 4). In November 1994, January 1995 and October 1995, confirmatory soil sampling was conducted within the drainfield, and around the septic tank (Investigation 5).

Investigation 1—Septic Tank Sampling

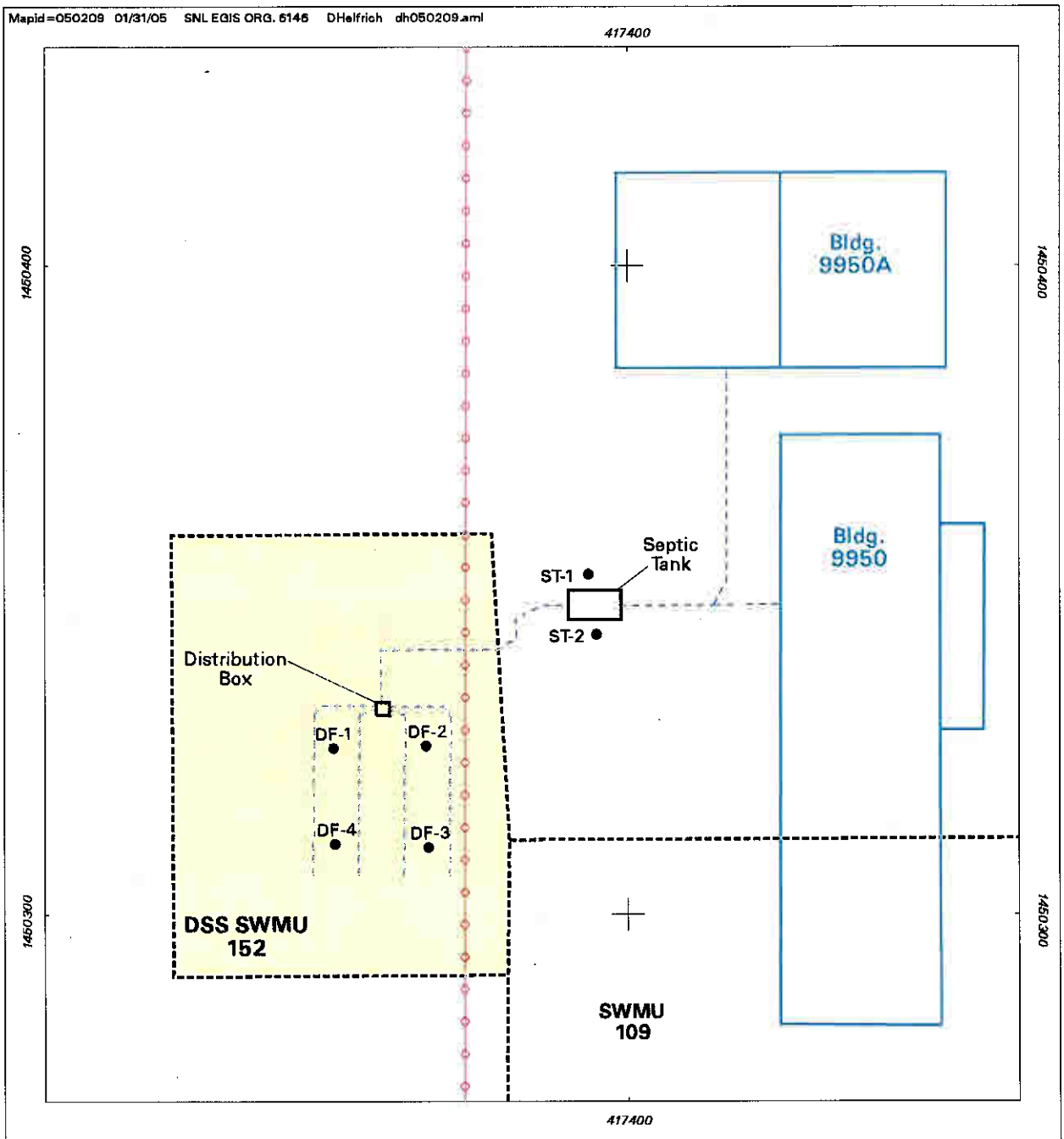
Sludge and aqueous samples were collected from the SWMU 152 septic tank in July 1992. The aqueous sample was analyzed for VOCs, SVOCs, pesticides, PCBs, metals, selected radionuclide constituents, and several miscellaneous analytes. Three VOCs were identified (methylene chloride, 1, 2-dichloroethene [total] and TCE) and one SVOC was identified (phenol). No pesticides or PCBs were detected. Several metals, phenolic compounds, oil and grease, and radionuclides were detected. The sludge sample was analyzed for metals, gross alpha/beta and selected radionuclide constituents. Several metals and radionuclides were detected.

A second round of septic tank sludge samples were collected in May 1994 for waste characterization purposes and were analyzed for VOCs, SVOCs, total and TCLP RCRA metals, beryllium, hexavalent chromium, phenolics, HE, isotopic uranium and gamma spectroscopy radionuclides. One VOC (TCE), and three SVOCs (phenol, 4-methylphenol and bis[2-ethylhexyl] phthalate) were identified. Concentrations of a number of metals were detected in the total metals analysis. However, the TCLP RCRA metals analysis identified only barium. Hexavalent chromium was detected at a level below the reporting limit. Low levels of phenolics were identified. No HE compounds were detected. Uranium isotopes were detected in the isotopic uranium analysis. The only radionuclide identified in the gamma spectroscopy analysis was potassium-40, a common naturally occurring radionuclide.

Septic tank liquid samples were also collected in May 1994 for waste characterization purposes. They were analyzed for VOCs, phenolics, explosive compounds, cyanide, RCRA metals, tritium, isotopic uranium and gamma spectroscopy radionuclides. Three VOCs (acetone, TCE and 1,2-dichloroethene) were identified. No phenolics, HE or cyanide were detected. Several RCRA metals were detected. Uranium isotopes were detected in the isotopic uranium analysis. Tritium was detected at an activity level of 870 pCi/L. No radionuclides were identified in the gamma spectroscopy analysis.

Investigation 2—Geophysical Survey

A geophysical survey using Geonics™ Model EM-31 and EM-38 ground conductivity meters was performed at the site in June 1994 to attempt to locate the drainfield. The technique was not successful in delineating the drainfield. A possible shallow plume of higher moisture content was identified west of the distribution box in an area that is mostly north and west of the drainlines in the drainfield.



Legend

- Soil Boring Location
- Fence
- Septic Tank, Distribution Box
- Sanitary Sewerline, Drainfield
- Other SWMU Boundary
- Building / Structure
- DSS SWMU 152

Figure 8
Site Map of Drain and Septic Systems (DSS) SWMU 152, Bldg. 9950 Septic System, Coyote Test Field

0 12.5 25
Scale in Feet

0 3 6
Scale in Meters

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Investigation 3—Passive Soil-Gas Survey

A passive soil-gas survey was conducted in the area of the drainfield in June and November 1994 using PETREX™ sampling tubes to identify any releases of VOCs and SVOCs that may have occurred to the drainfield. Eighteen PETREX™ tube samplers were placed, in two phases, in a grid pattern that covered the drainfield and septic tank area at this site. No significant levels of PCE, BTEX or aliphatic compounds were identified in the survey. However, the soil-gas survey identified potentially detectable levels of TCE at three locations. Two of the locations were near the north end of the drainfield, and the other location was in the southern part of the drainfield. Subsequent confirmatory soil samples that were collected near these PETREX™ sample locations and analyzed for VOCs and SVOCs did not detect any of these constituents.

Investigation 4—Backhoe Excavation

A backhoe was used in August 1994 to determine the location, dimensions, and depth of the drainfield.

Investigation 5—Soil Sampling

Once the drainfield was located, soil samples were collected in 1994 and 1995 from boreholes within the drainfield, and from either side of the septic tank. There were significant difficulties in obtaining the deep interval soil samples at two locations in the drainfield in 1994. The Geoprobe™ met refusal at 5 to 11.5 ft bgs in three tries at and near DF-3. No deep interval soil samples were collected at sample location DF-3. It also was not possible to obtain the deep interval soil sample from DF-4; the Geoprobe™ met refusal at 10 to 10.5 ft bgs in two tries at and near the DF-4 location. In later sampling events in January 1995 and October 1995, using a larger Geoprobe™ unit, enough soil was collected from the deep interval at DF-4 for a PCB analysis and a radiological composite sample. Because of the difficulty in collecting samples at the 15-ft interval and because the samples collected in November 1994 did not identify COCs above detection limits or background concentrations in the drainfield, no other samples were collected at the deep interval at DF-4 for analysis. Additional efforts during these subsequent sampling events to collect samples from the deep interval at DF-3 were unsuccessful.

Drainfield and septic tank soil samples were analyzed for VOCs, SVOCs, cyanide, PCBs, HE, RCRA metals, beryllium and hexavalent chromium by an offsite laboratory. Samples were also screened for HE at the SNL/NM field laboratory. Also, composite samples were collected from the drainfield shallow and deep sampling intervals and analyzed by an offsite laboratory for tritium and isotopic uranium, and were screened for other radionuclides using SNL/NM in-house gamma spectroscopy.

The metal, arsenic, was detected above the Department-approved background concentration in one sample. No PCBs, SVOCs, HE compounds or cyanide were detected. Two VOCs (acetone and methylene chloride) were detected. Uranium-238 and tritium were detected at activities below their corresponding background activity. However, the MDAs for uranium-235 and uranium-238 for some of the samples exceeded their corresponding background activity.

A risk screening assessment was performed to evaluate the potential for adverse health effects for the industrial and residential land-use scenarios. For the industrial land-use scenario, the total human health HI and the estimated excess cancer risk meet Department requirements (Table 8). For the residential land-use scenario, the total human health HI meets Department requirements, however, the excess cancer risk does not.

For the radiological COCs (tritium, uranuim-235 and uranium-238) a total effective dose equivalent (TEDE) was calculated that results in a TEDE of 2.1E-2 millirem (mrem)/year (yr). The estimated excess cancer risk is 1.9E-7.

The exposure pathway analysis established that no pathway exists for exposure of ecological species to contaminants at SWMU 152. All COCs are located at depths at or greater than 5 ft bgs. Therefore, no COCs are considered to be COPECs.

In conclusion, human health and ecological risks were acceptable under an industrial land-use scenario.

Basis for Determination

SWMU 152 has been characterized or remediated in accordance with current applicable state and/or federal regulations, and the available data indicate that contaminants pose an acceptable level of risk under current and projected future land use.

Table 8
Risk Assessment Values for SWMU 152 Nonradiological COCs

COC	Maximum Concentration (mg/kg)	Industrial Land-Use Scenario[a]		Residential Land-Use Scenario[a]	
		Hazard Index	Cancer Risk	Hazard Index	Cancer Risk
Inorganic					
Arsenic	7.9	0.03	5E-6	0.37	2E-5
Cyanide	0.25[b]	0.00		0.00	
Organic					
Acetone	0.0096 J	0.00		0.00	
Methylene Chloride	0.004 J	0.00	3E-8	0.00	5E-8
Total		**0.03**	**5E-6**	**0.37**	**2E-5**

[a]EPA 1989.
[b]Nondetected concentration (concentration listed is one-half of the maximum detection limit, used for a conservative risk assessment).
COC = Constituent of concern.
EPA = U.S. Environmental Protection Agency.
J = Estimated concentration.
mg/kg = Milligram(s) per kilogram.
SWMU = Solid Waste Management Unit.

SWMU 153, Building 9956 Septic System

Site Location

SWMU 153, the Building 9956 Septic Systems at SNL/NM, is located in the CTF, approximately 0.4 miles east of TA-III on federally owned land controlled by KAFB and permitted to the DOE.

Operational History

Available information indicates that Building 9956 was constructed in 1969, and it is assumed that the east (original) septic system was also constructed at that time. The original septic system consisted of a 750- to 1,000-gallon septic tank connected to a single seepage pit. This system is located on the east side of Building 9956. A second septic system was installed on the southwest side of the building in 1988 and consisted of a septic tank and drainfield composed of four 50-ft-long parallel drain lines (Figure 9). By 1993, the Building 9956 Septic System discharges were routed to the COA sanitary sewer system. The old septic system lines were disconnected and capped, and the system was abandoned in place concurrent with this change. The empty and decontaminated east septic tank was inspected by the Department on November 7, 1995, and a closure form was signed. The empty and decontaminated septic tanks were backfilled with clean, native material on January 26, 1996 in accordance with 20.7.3.410 NMAC.

The COCs include RCRA metals plus beryllium, cyanide, hexavalent chromium, HE compounds, VOCs, SVOCs and radionuclides.

Evaluation of Relevant Information

Five different assessment investigations have been conducted at this site. In 1992, 1994 and 1995, waste characterization samples were collected from the septic tank (Investigation 1). In June 1994, a geophysical survey was performed to locate the drainfield (Investigation 2). In June 1994, a passive soil-vapor survey was conducted to identify potential releases of VOCs and SVOCs in soil in the drainfield (Investigation 3). In September 1994, the west system drainfield and the east system septic tank were located with a backhoe (Investigation 4). In October and November 1994, confirmatory soil sampling was conducted within the drainfield, and around the septic tanks and seepage pit (Investigation 5).

Investigation 1—Septic Tank Sampling

Sludge and aqueous samples were collected from the ER Site 153 east system septic tank in July 1992. The aqueous sample was analyzed for VOCs, SVOCs, pesticides, PCBs, metals, selected radionuclide constituents and several miscellaneous analytes. Four VOCs were identified (toluene, TCE, methylene chloride and tetrachloroethene). The pesticide, 4,4'-DDT was detected. Several metals and radionuclides were detected as well as phenolic compounds, nitrates/nitrites and fluoride. No PCBs were detected. No samples were collected from the west system tank at that time.

A second round of septic tank sludge samples were collected from both septic tanks for waste characterization purposes in May 1994 and were analyzed for VOCs, SVOCs, total and TCLP RCRA metals, cyanide, phenolics, HE, isotopic uranium and gamma spectroscopy radionuclides. A sludge sample from the east system was also collected and analyzed for hexavalent chromium.

Concentrations of a number of metals were detected in the total RCRA metals analysis. However, in the TCLP RCRA metal analysis, only barium and silver were detected in the samples from the west system and only barium and lead were detected in the samples from the east system. The SVOC analysis identified only two SVOCs, a phthalate in the east septic tank and naphthalene in the west septic tank. The concentrations of both SVOCs were below the respective reporting limits for the two compounds. The VOC, methylene chloride, was identified in levels below the detection limit in both septic tanks; it was also observed in the related laboratory blanks. Phenolics were identified in both the east and west septic systems. No cyanide, hexavalent chromium or HE were detected. No radionuclide anomalies were identified.

The septic tank for the east system was dry but the west septic tank contained liquid and sludge in May 1994. Therefore, second round liquid samples were only collected from the west septic tank. The samples were analyzed for VOCs, phenolics, cyanide, RCRA metals, tritium and isotopic uranium. Barium and arsenic were detected. A VOC, methylene chloride, was identified at a concentration slightly above the detection limit; it was also detected in the related laboratory blank. Cyanide and phenolics were not detected, and no isotopic uranium anomalies were identified. Tritium was detected at slightly above the MDA level in the liquid, and was also identified in an associated blank sample.

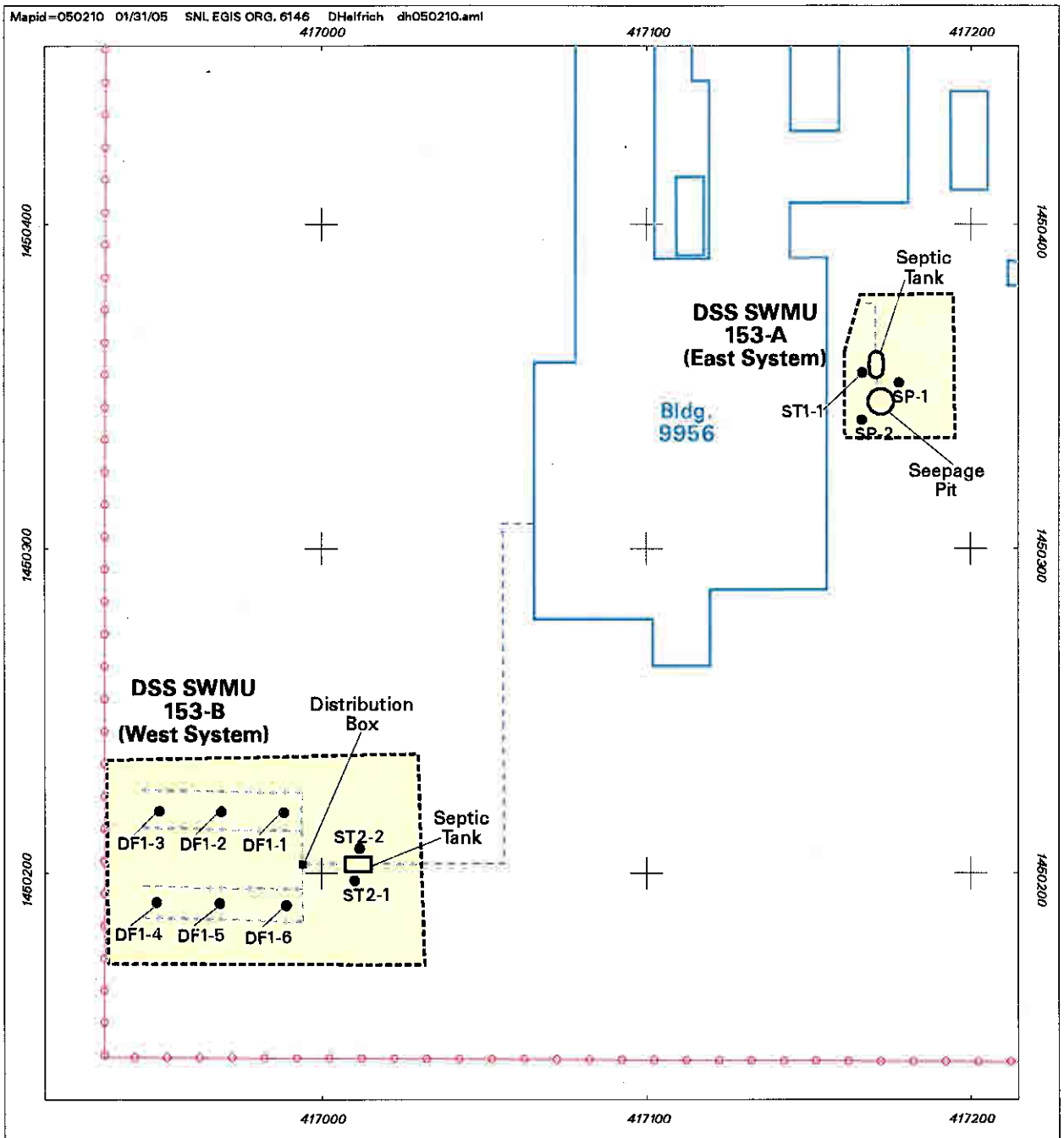
A third round of waste characterization sludge samples were collected from the east and west septic tanks in February 1995. The east tank samples were analyzed for tritium and isotopic uranium, and the west tank sample was screened for radionuclides using SNL/NM in-house gamma spectroscopy. No radionuclide anomalies were identified in any of the samples.

Investigation 2—Geophysical Survey

A geophysical survey using the Geonics™ models EM-38 and EM-31 ground conductivity meters was performed at the site in June 1994 to attempt to locate a drainfield east of Building 9956. The data from the geophysical survey were influenced by surface and subsurface metallic interference in the area and did not indicate any evidence of a drainfield.

Investigation 3—Passive Soil-Vapor Sampling

A passive soil-gas survey conducted in June 1994 in the area of the west system drainfield and in the area of the east system seepage pit used PETREX™ sampling tubes to identify any releases of VOCs and SVOCs that may have occurred from the two septage systems. Ten PETREX™ tube samplers were placed in a grid pattern that covered the east system septic tank and seepage pit as well as an additional area originally thought to be a drainfield. Eighteen PETREX™ tube samplers were placed in a grid pattern that covered the west drainfield. NERI characterized the west site as having "no significant soil gas detections." However, PETREX™ sampling location



Legend

- Soil Boring Location
- Fence
- Septic Tank, Distribution Box, Seepage Pit
- Sanitary Sewerline, Drainfield
- Building
- DSS SWMU 153

Figure 9
Site Map of Drain and Septic Systems (DSS) SWMU 153, Bldg. 9956 Septic System, Coyote Test Field

0 25 50
Scale in Feet

0 6 12
Scale in Meters

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218 had an ion count slightly above 20,000 for aliphatic compounds. An attempt was made to collect soil samples within 5 ft of location 218 at drainfield sampling location DF1-4, but refusal at 4 ft bgs prevented sample collection at this location. Subsequent confirmatory soil samples collected within about 20 ft of location 218 did not detect any aliphatic compounds. Also, near the east system seepage pit, the soil gas survey detected aliphatic compounds at PETREX™ sample location 196 at a level that might indicate potential concentrations of these contaminants in the subsurface. Subsequent confirmatory soil samples collected near locations 196 and 218 were analyzed for VOCs and SVOCs, and none were detected.

Investigation 4—Backhoe Excavation

A backhoe was used in September 1994 to determine the location, dimensions, and depth of what was originally thought to be two drainfields at ER Site 153. Neither potential drainfield had any surface expression. The west system drainfield was successfully delineated using backhoe excavation. However, backhoe excavation at the east system revealed that what had been thought to be a distribution box was a seepage pit, and no drainfield was found.

Investigation 5—Soil Sampling

In October and November 1994, once the septic structures were located and identified, soil samples were collected from five boreholes within the drainfield and from two boreholes on either side of the septic tank in the west system. No samples were collected at the drainfield sample location DF1-4 (Figure 9) due to auger refusal at 4 ft bgs at that location. Sampling difficulties were also encountered in the deep interval at sample location DF1-5. East system soil samples were collected from one borehole near the septic tank and from two boreholes on either side of the seepage pit (Figure 9). Because of the close proximity of the septic tank and seepage pit which are less than 5 ft apart, and because the northeast seepage pit sample location was about 5 ft from the septic tank, three instead of four sampling locations were used to characterize soils around these units.

For septic tank borings, samples were collected from one interval in each borehole starting at the outside bottom of the tanks, both of which were measured to be 8 ft bgs at this site. For the east system seepage pit, samples were collected from two intervals in each borehole. The top of the shallow interval started at the bottom of the seepage pit that was measured to be 8 ft bgs during backhoe excavation at the site and the lower (deep) interval started at 10 ft below the top of the upper interval, or 18 ft bgs. For the west system drainfield borings, samples were collected from two intervals in each borehole; the interval depths were based on information obtained during the backhoe exploration of the drainfield. The top of the shallow interval started at the bottom of the drain line trenches which were 6 ft bgs on average at this site, and the lower (deep) interval started at 10 ft below the top of the upper interval, or 16 ft bgs.

Drainfield, seepage pit and septic tank soil samples were analyzed for VOCs, SVOCs, cyanide, RCRA metals, beryllium and hexavalent chromium by a commercial laboratory. With the exception of the deep interval of borehole DF1-5 where there were problems with early refusal, soil samples from this site were collected and screened in-house for TNT. A commercial laboratory analyzed the seepage pit soil samples for HE. Composite samples were collected

from the seepage pit and drainfield shallow and deep sampling intervals, and were analyzed by a commercial laboratory for tritium and isotopic uranium and screened for other radionuclides using SNL/NM in-house gamma spectroscopy.

The metals, chromium and lead were detected above the Department-approved background concentration, each individually in two different samples. No PCBs, SVOCs or HE compounds were detected. Cyanide was detected in one sample at 3.7 mg/kg. Four VOCs (acetone, methylene chloride, 1,1,2,2-tetrachloroethane and toluene) were detected. No radionuclides were detected at activities above their corresponding background activity. However, the MDAs for uranium-235 and uranium-238 for some of the samples exceeded their corresponding background activity.

A risk screening assessment was performed to evaluate the potential for adverse health effects in industrial and residential land-use scenarios. For both the industrial and residential land-use scenarios, the total HI and estimated excess cancer risk meet Department requirements (Table 9).

For the radiological COCs (uranuim-235 and uranium-238) a total effective dose equivalent (TEDE) was calculated that results in a TEDE of 5.7E-2 millirem (mrem)/year (yr). The estimated excess cancer risk is 5.0E-7.

Table 9
Risk Assessment Values for SWMU 153 Nonradiological COCs

COC	Maximum Concentration (mg/kg)	Industrial Land-Use Scenario[a]		Residential Land-Use Scenario[a]	
		Hazard Index	Cancer Risk	Hazard Index	Cancer Risk
Inorganic					
Chromium, total	93.8	0.00		0.00	
Cyanide	3.7	0.00		0.00	
Organic					
Acetone	0.013	0.00		0.00	
Methylene Chloride	0.0038 J	0.00	2E-8	0.00	5E-8
1,1,2,2-Tetrachloroethane	0.0025[b]	0.00	3E-9	0.00	7E-9
Toluene	0.0025[b]	0.00		0.00	
Total		**0.00**	**3E-8**	**0.00**	**6E-8**

[a]EPA 1989.
[b]Nondetected concentration (concentration listed is one-half of the maximum detection limit, used for a conservative risk assessment).
COC = Constituent of concern.
EPA = U.S. Environmental Protection Agency.
J = Estimated concentration.
mg/kg = Milligram(s) per kilogram.
SWMU = Solid Waste Management Unit.

The exposure pathway analysis established that no pathway exists for exposure of ecological species to contaminants at SWMU 153. All COCs are located at depths greater than 5 ft bgs. Therefore, no COCs are considered to be COPECs.

In conclusion, human health and ecological risks are acceptable under a residential land-use scenario.

Basis for Determination

SWMU 153 has been characterized or remediated in accordance with current applicable state and/or federal regulations, and the available data indicate that contaminants pose an acceptable level of risk under current and projected future land use.

SWMU 276, Building 829X Silver Recovery Sump

Site Location

SWMU 276 is located in SNL/NM TA-I on federally owned land controlled by KAFB and permitted to the DOE. The site is near the northwest corner of TA-I, approximately 4,200 ft southeast of the Wyoming Gate entrance to KAFB. The abandoned sump was circular, approximately 6 ft in diameter and 5.5 ft deep. Construction details are based upon engineering drawings, soil sampling following building demolition and site inspections. The system received discharges from former Building 829X, approximately 6 ft to the east (Figure 10).

Operational History

Available information indicates that Building 829X was constructed in 1948 and the silver recovery sump was added in 1978. The building was used either for office space or by the Graphics Arts Services Organization. The sump contained two 55-gallon, steel drums that collected effluent from a film-processing unit. The drums were periodically pumped out and the silver recovered from the solution. The sump bottom was unlined and the drums rested on a layer of loose gravel approximately 6 inches in thickness. The building was demolished in 1994, and soil surrounding the building, under the septic line piping and under the sump was sampled in December 1994. The metal culvert enclosing the abandoned sump and approximately 1.5 ft of underlying soil and gravel aggregate were removed and the excavation was backfilled in September 1999. The sump location was surveyed for later relocation and sampling. The site investigation was planned to be consistent with other drain and septic system investigations and to sample for possible COCs that may have been released during facility operations.

The COCs include RCRA metals, hexavalent chromium, cyanide, PCBs, HE compounds, VOCs, SVOCs and radionuclides.

Evaluation of Relevant Information

Three assessment investigations have been conducted at SWMU 276. In December 1994, soil samples were collected from the area surrounding the former building, along the septic system drain line and from the soil beneath the gravel on the bottom of the sump (Investigation 1). In April and May 2002, a passive soil-vapor survey was conducted to determine whether areas of significant VOC contamination were present in soil around the sump (Investigation 2). In

September 2004, subsurface soil samples were collected from a boring drilled through the center of, and beneath, the sump location (Investigation 3). These investigations are discussed in the following sections.

Investigation 1—Silver Recovery Sump Soil Sampling

On December 20, 1994, following the demolition of Building 829X, soil samples were collected from the area surrounding the former building, along the Building 892X septic system drain line, and from soil beneath the gravel layer on the sump bottom. The primary goal of the sump sampling was to identify types and concentrations of potential contaminants, mainly silver, in soil beneath the sump so that any necessary remedial activities could be planned. Four samples were collected from the sump at depths of 0 to 12 inches bgs. Three of the four samples were analyzed for silver only; the fourth sample was also analyzed for VOCs, SVOCs, total metals, radionuclides by gamma spectroscopy and tritium. Silver concentrations ranged from less than detection levels up to 125 mg/kg. When the culvert was subsequently removed in September 1999, approximately 1.5 ft of soil and gravel aggregate underlying the sump were removed and disposed of.

Investigation 2—Passive Soil-Vapor Sampling

In April and May 2002, a passive soil-vapor survey was conducted in the area of the former Building 829X silver recovery sump. This survey was conducted to determine whether significant VOC contamination was present in soil at the site. A total of four Gore-Sorber™ (GS) passive soil-vapor samplers were placed in the silver recovery sump area. Samplers were installed on April 26, 2002, and retrieved on May 10, 2002. The GS samplers were analyzed for a total of 30 individual or groups of VOCs, including TCE, tetrachloroethene, cis- and trans-dichloroethene and BTEX. Low to trace-level (but quantifiable) amounts of 14 individual or groups of VOCs were detected in the GS samplers.

Investigation 3—Soil Sampling

On September 24, 2002, soil sampling was conducted. Soil samples were collected from a borehole drilled through, and beneath, the former sump location. An auger drill rig was used to sample the borehole at two depth intervals. A shallow sample interval started in native soil below the depth of the sump removal excavation, and a lower (deep) interval started at 5 ft below the top of the upper sample interval. Soil borehole locations are shown on Figure 10.

Results for two soil samples and one duplicate collected from the sump location borehole are summarized herein. Low concentrations of 2-butanone were detected in the 8-ft-bgs duplicate and the 13-ft-bgs soil samples. This compound was not detected in the equipment blank (EB) or trip blank (TB) associated with these samples. Neither SVOCs nor HE compounds were detected in any of the samples collected from this site. Diethylphthalate was detected in the EB associated with these samples. Both PCBs, aroclor-1242 and aroclor-1254, were detected in the 8-ft-bgs duplicate sample. Aroclor-1254 was also detected in the 13-ft-bgs sample collected at this site. No PCBs were detected in the EB associated with these samples. Cyanide was detected in the 8-ft-bgs duplicate and 13-ft-bgs sample from the borehole. Two RCRA metals,

arsenic and chromium, were detected at concentrations above the Department-approved background levels in the 8-ft-bgs duplicate sample. All other metal concentrations were below background. For radionuclides, no activities above Department-approved background levels were detected in any sample analyzed. However, although not detected, the MDA for one of the uranium-235 analyses exceeded the background activity because the standard gamma spectroscopy count time for soil samples (6,000 seconds) was not adequate to achieve a lower and more appropriate MDA. Regardless, the MDA was sufficiently low that the Department accepts the sampling results. No gross alpha or beta activity above background levels was detected in any of the samples.

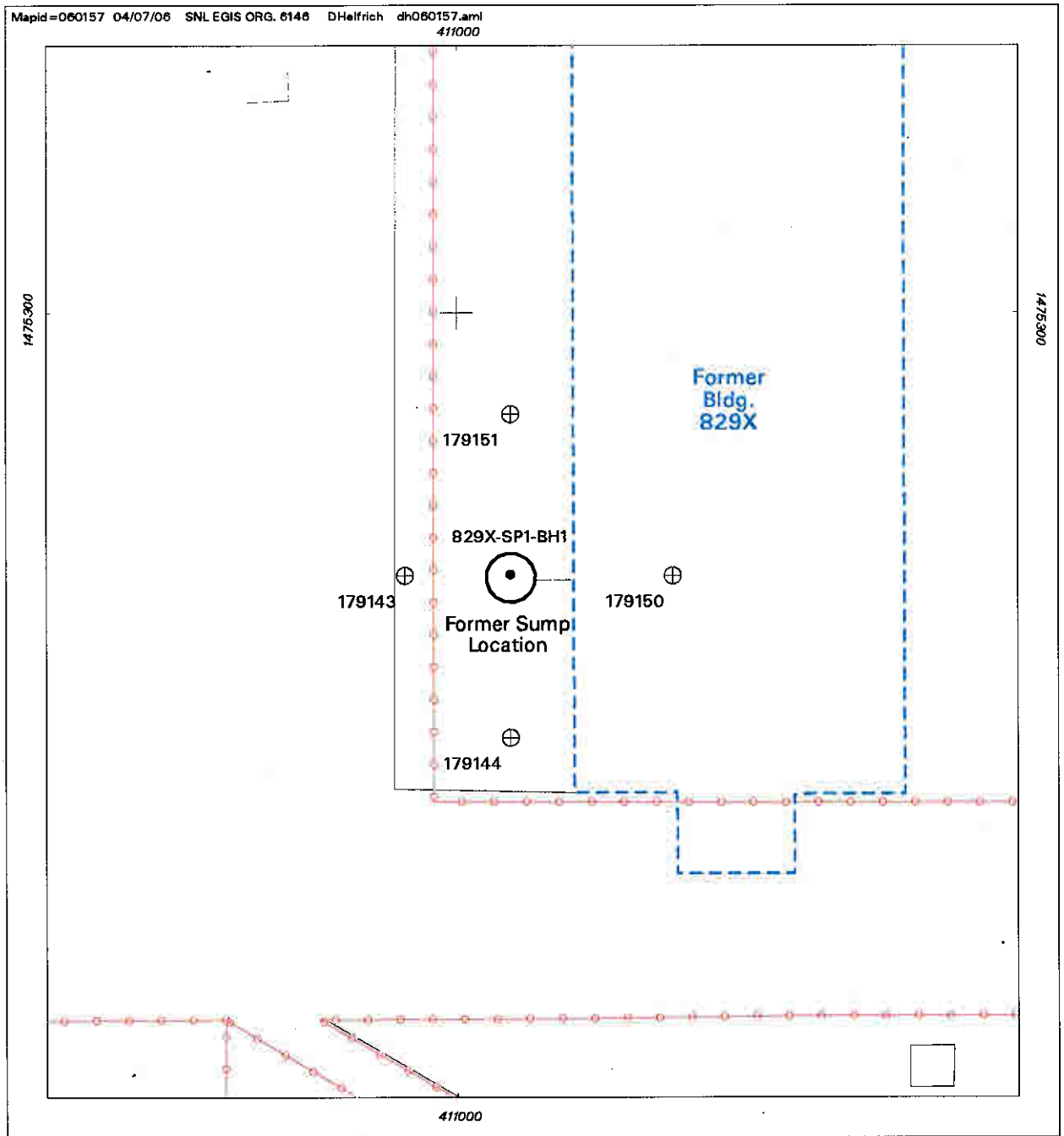
A risk screening assessment was performed to evaluate the potential for adverse health effects for industrial and residential land-use scenarios. For the industrial land-use scenario, the total human health HI and estimated excess cancer risk meet Department requirements. For the residential land-use scenario, the total human health HI meets Department requirements; however, the cancer risk is not acceptable under a residential land-use scenario (Table 10).

For the radiological COC (uranuim-235) a total effective dose equivalent (TEDE) was calculated that results in a TEDE of 7.3E-3 millirem (mrem)/year (yr). A TEDE of 15 mrem/yr is appropriate for an industrial land-use scenario. The estimated excess cancer risk is 6.2E-8.

Table 10
Risk Assessment Values for SWMU 276 Nonradiological COCs

COC	Maximum Concentration (mg/kg)	Industrial Land-Use Scenario[a]		Residential Land-Use Scenario[a]	
		Hazard Index	Cancer Risk	Hazard Index	Cancer Risk
Inorganic					
Arsenic	5.93	0.02	4E-6	0.27	2E-5
Chromium	13.6 J	0.00		0.00	
Chromium VI	0.0265[b]		6E-11		1E-10
Cyanide	0.0495 J	0.00		0.00	
Organic					
2-Butanone	0.00761	0.00		0.00	
Total		**0.02**	**4E-6**	**0.27**	**2E-5**

[a]EPA 1989.
[b] Nondetected concentration (concentration listed is one-half of the maximum detection limit, used for a conservative risk assessment).
COC = Constituent of concern.
EPA = U.S. Environmental Protection Agency.
J = Estimated concentration.
mg/kg = Milligram(s) per kilogram.
SWMU = Solid Waste Management Unit.



Legend

- Soil Boring Location
- Gore-Sorber Sample Location
- Former Silver Recovery Sump
- Parking / Sidewalk
- Current Fence
- Former Building 829X
- Sump Drain Line

Figure 10
Site Map of Drain and Septic Systems (DSS) AOC 276, Former Bldg. 829X Silver Recovery Sump, TA-I

0 10 20
Scale in Feet

0 2.4 4.8
Scale in Meters

N

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The exposure pathway analysis established that no pathway exists for exposure of ecological species to contaminants at SWMU 276. All COCs are located at depths 5 ft bgs or greater. Therefore, no COCs are considered to be COPECs.

In conclusion, human health and ecological risks are acceptable under an industrial land-use scenario.

Basis for Determination

SWMU 276 has been characterized or remediated in accordance with current applicable state and/or federal regulations, and the available data indicate that contaminants pose an acceptable level of risk under current and projected future land use.

AOC 1004, Building 6969 Septic System

Site Location

AOC 1004, the Building 6969 Septic System, is part of the Robotic Vehicle Range Facility located in a remote area approximately 3,200 ft east of SNL/NM TA-II. AOC 1004 is located on federally owned land controlled by KAFB and permitted to the DOE (Figure 11). The site is located approximately 70 ft southwest of Building 6969. The septic system consists of a 2,000-gallon septic tank and distribution box that empties to a drainfield consisting of three 65-ft-long drain lines. Construction details are based upon engineering drawings, site inspections and backhoe excavations of the system.

Operational History

Available information indicates that Building 6969 was constructed in 1988 as a workshop and garage for the Robotic Vehicle Range facility. It is assumed the septic system was constructed at the same time. Because operational records are not available, the site investigation was planned to be consistent with other drain and septic system investigations and to sample for all possible COCs that may have been released during facility operations. A field inspection conducted in September 1999 confirmed that the septic system continues to receive discharges from Building 6969.

The COCs include RCRA metals, hexavalent chromium, cyanide, PCBs, HE compounds, VOCs, SVOCs and radionuclides.

Evaluation of Relevant Information

Four assessment investigations have been conducted at this site. In March 2002, a backhoe was used to physically locate the buried drainfield lines (Investigation 1). In May 2002, a passive soil-vapor survey was conducted to determine whether areas of significant VOC contamination were present in soil around the drainfield (Investigation 2). In September 2002, subsurface soil samples were collected from three borings drilled in the drainfield area (Investigation 3). In May and June 2003, a 150-ft-deep, active soil-vapor monitoring well was installed. This was

one of seven AOCs selected by the Department for additional, deep soil-vapor monitoring (Investigation 4). These investigations are discussed below.

Investigation 1—Backhoe Excavation

On March 27, 2002, a backhoe was used to determine the location, dimensions and average depth of the AOC 1004 drainfield system. Backhoe excavations were carefully dug to minimize any possible damage to this still-active drainfield. The drainfield was found to have three laterals with an average drain line depth of 7 ft. No visible evidence of stained or discolored soil or odors was observed during the excavation. No samples were collected during the backhoe excavation at the site.

Investigation 2—Passive Soil-Vapor Sampling

In May 2002, a passive soil-vapor survey was conducted in the Building 6969 septic system area. This survey was conducted to determine whether significant VOC contamination was present in soil at the site.

A total of five GS passive soil-vapor samplers were placed in the drainfield area (Figure 11). Samplers were installed at the site on May 1, 2002, and retrieved on May 16, 2002.
The GS samplers were analyzed for a total of 30 individual or groups of VOCs, including TCE, tetrachloroethene, cis- and trans-dichloroethene and BTEX. Low to trace-level (but quantifiable) amounts of 16 individual or groups of VOCs were detected in the GS samplers.

Investigation 3—Soil Sampling

Once the system drain lines were located, soil sampling was conducted. On September 20, 2002, soil samples were collected from three boreholes. An auger drill rig was used to sample all boreholes at two depth intervals. The top of the shallow interval started at the bottom of the drain lines, as determined by the backhoe excavation, and the lower (deep) interval started at 5 ft below the top of the upper interval. Soil boring locations are shown on Figure 11.

Results for six soil samples collected from the three drainfield boreholes (BH) are summarized herein. The VOC 2-butanone was detected in both the 8-ft-bgs samples from BH2 and BH3 and the 13-ft-bgs samples from BH1, BH2 and BH3. Acetone was detected in the 13-ft-bgs sample collected from BH3. Toluene was detected in the 13-ft-bgs sample in BH1. Acetone and 1,2-dichloropropane were detected in the associated TB. Eight SVOCs were detected in the 8-ft-bgs sample from BH1. No SVOCs were detected in any of the other borehole samples. These are compounds commonly found in asphalt and may indicate the presence of asphalt in the sample. The absence of SVOCs in the other samples at this site suggests an isolated, surface SVOC source (e.g., asphalt). No PCBs and HE compounds were detected in any of the samples collected from this site. Cyanide was detected only in the 8-ft-bgs sample from BH1. For RCRA metals, barium was detected above the background level in the 13-ft-bgs sample from BH3 and no other metals were detected above their respective background concentrations. For radionuclides, uranium-235 was detected above the background level only in the 13-ft-bgs sample from BH2. In addition, the MDA for uranium-235 exceeded the corresponding

background activity in the four other samples because the standard gamma spectroscopy count time for soil samples (6,000 seconds) was not adequate to achieve a lower and more appropriate MDA. Regardless, the MDA was sufficiently low that the Department accepts the sampling results. No gross alpha or beta activity above background levels was detected in any of the samples.

A risk screening assessment was performed to evaluate the potential for adverse health effects for industrial and residential land-use scenarios. For both the industrial and residential land-use scenarios, the total human health HI and estimated excess cancer risk meet Department requirements (Table 11).

For the radiological COC (uranuim-235) a total effective dose equivalent (TEDE) was calculated that results in a TEDE of 7.9E-3 millirem (mrem)/year (yr). The estimated excess cancer risk is 6.7 E-8.

Table 11
Risk Assessment Values for AOC 1004 Nonradiological COCs

COC	Maximum Concentration (mg/kg)	Industrial Land-Use Scenario[a]		Residential Land-Use Scenario[a]	
		Hazard Index	Cancer Risk	Hazard Index	Cancer Risk
Inorganic					
Barium	240	0.00		0.05	
Chromium VI	0.0549 J	0.00	1E-10	0.00	3E-10
Cyanide	4.07	0.00		0.00	
Organic					
Acetone	0.0034 J	0.00		0.00	
Benzo(a)pyrene	0.0497	0.00	2E-7	0.00	8E-7
Benzo(b)fluoranthene	0.0775	0.00	4E-8	0.00	1E-7
Benzo(g,h,i)perylene	0.0443	0.00	2E-7	0.00	7E-7
2-Butanone	0.0159	0.00		0.00	
Chrysene	0.064	0.00	3E-10	0.00	1E-9
Fluoranthene	0.0673	0.00		0.00	
Indeno(1,2,3-cd)pyrene	0.0338	0.00	2E-8	0.00	5E-8
Phenanthrene	0.0268 J	0.01		0.03	
Pyrene	0.0722	0.00		0.00	
Toluene	0.0005 J	0.00		0.00	
Total		**0.01**	**5E-7**	**0.08**	**2E-6**

[a]EPA 1989.
AOC = Area of Concern.
COC = Constituent of concern.
EPA = U.S. Environmental Protection Agency.
J = Estimated concentration.
mg/kg = Milligram(s) per kilogram.

The exposure pathway analysis established that no complete pathway exists for exposure of ecological species to contaminants at AOC 1004. All COCs are located at depths greater than 5 ft bgs. Therefore, no COCs are considered to be COPECs.

In conclusion, human health and ecological risks are acceptable under a residential land-use scenario.

Basis for Determination

AOC 1004 has been characterized or remediated in accordance with current applicable state and/or federal regulations, and the available data indicate that contaminants pose an acceptable level of risk under current and projected future land use.

AOC 1031, Former Buildings 6589 and 6600 Septic System

Site Location

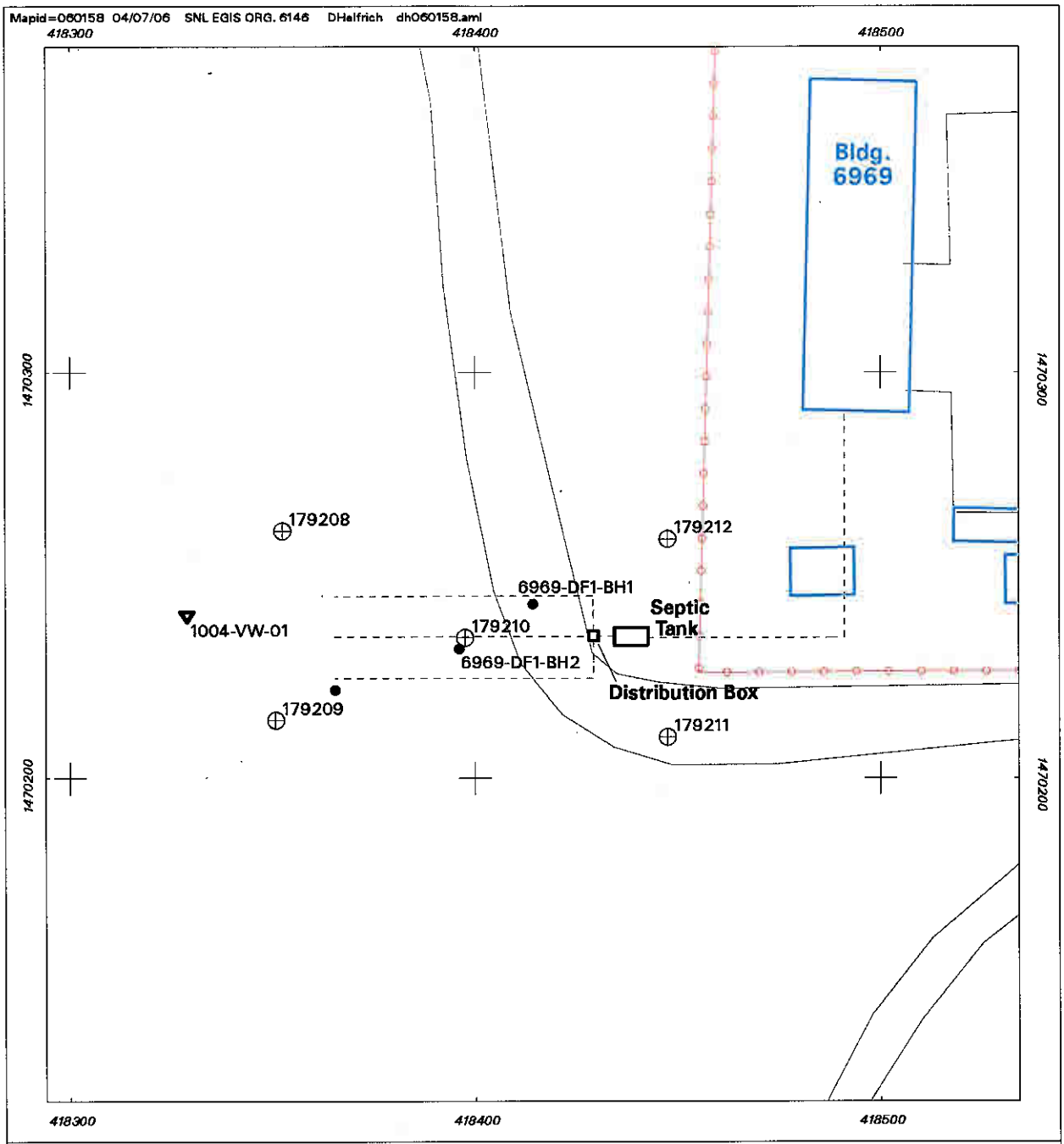
AOC 1031 is located in SNL/NM TA-III on federally owned land controlled by KAFB and permitted to the DOE. The site is located approximately 265 ft northwest of the entrance to TA-III. The abandoned septic system consisted of a septic tank that emptied into two 10-ft-diameter and approximately 15-ft-deep seepage pits (Figure 12). Construction details are based upon engineering drawings, site inspections and backhoe excavations of the system. The system received discharges from former Building 6589, approximately 250 ft to the southeast, and former Building 6600, approximately 155 ft to the east.

Operational History

Available information indicates that Building 6589 was constructed in 1961 and Building 6600 was constructed in 1967, and it is assumed that the septic system was constructed about 1967. Building 6589 was a guard post at the entrance to TA-III and Building 6600 was initially a dining facility that was later converted to a laboratory. Both buildings were demolished in fiscal year 2000 during the remodeling of the TA-III entrance and nearby Building 6584. Because operational records are not available, the site investigation was planned to be consistent with other drain and septic system investigations and to sample for all possible COCs that may have been released during facility operations.

In 1991, Buildings 6589 and 6600 were connected to an extension of the COA sanitary sewer system. The old septic system line was disconnected and capped, and the system was abandoned in place concurrent with this change. The AOC 1031 septic tank and two seepage pits were backfilled in February 2002 during the remodeling of nearby Building 6584.

The COCs include RCRA metals, hexavalent chromium, cyanide, PCBs, HE compounds, VOCs, SVOCs and radionuclides.



Legend

- Soil Boring Location
- Gore-Sorber Sample Location
- Soil-Vapor Monitoring Well
- Septic Tank / Distribution box
- Drain Line
- Building / Structure
- Fence
- Unpaved Road / Paved Parking

Figure 11
Site Map of Drain and Septic Systems (DSS) AOC 1004, Building 6969 Septic System, Robotic Vehicle Range

0 20 40
Scale in Feet

0 4.8 9.6
Scale in Meters

Sandia National Laboratories, New Mexico
Environmental Geographic Information System

Evaluation of Relevant Information

Four assessment investigations have been conducted at this site. In late 1990 or early 1991, 1992 and 1995, waste characterization samples were collected from the septic tank (Investigation 1). In February 2002, a backhoe was used to physically locate the covered-over seepage pits (Investigation 2). In April and May 2002, a passive soil-vapor survey was conducted to determine whether areas of significant VOC contamination were present in soil around the seepage pits (Investigation 3). In September 2002, subsurface soil samples were collected from borings drilled through the center of, and beneath, each of the two seepage pits (Investigation 4). These investigations are discussed in the following sections.

Investigation 1—Septic Tank Sampling

Investigation 1 consisted of sampling efforts to characterize the waste contents of septic tanks for chemical and radiological contamination. The primary goal of the sampling was to identify types and concentrations of potential contaminants in the waste within the tanks so that the appropriate waste disposal and remedial activities could be planned. As part of the SNL/NM Septic System Monitoring Program, aqueous and sludge samples were collected from the former Buildings 6589 and 6600 septic tank. An aqueous sample collected in late 1990 or early 1991 was analyzed at an off-site laboratory for VOCs, SVOCs, oil and grease, PCBs, nitrate/nitrite, phenolics, metals, total cyanide, gross alpha/beta activity, radionuclides by gamma spectroscopy, isotopic uranium, isotopic plutonium and tritium. The June 1992 sludge sample was analyzed at an off-site laboratory for gross alpha/beta activity, tritium and radionuclides by gamma spectroscopy. The July 1995 aqueous sample was analyzed at an off-site laboratory for VOCs, SVOCs, pesticides, PCBs, metals, nitrate/nitrite, oil and grease, total phenol, fluoride, formaldehyde, gross alpha/beta activity, radionuclides by gamma spectroscopy, and tritium. A sludge sample collected at the same time was analyzed for VOCs, SVOCs, pesticides, PCBs, metals, radionuclides by gamma spectroscopy, isotopic plutonium, strontium, thorium and uranium. On February 22 and 27, 1996, the residual contents, approximately 790 gallons of waste and added water, were pumped out.

Investigation 2—Backhoe Excavation

On February 23, 2002, a backhoe was used to determine the location, dimensions and approximate depth of the two AOC 1031 seepage pits. No visible evidence of stained or discolored soil or odors was observed during the excavation. No samples were collected during the backhoe excavation at the site.

Investigation 3—Passive Soil-Vapor Sampling

In April and May 2002, a passive soil-vapor survey was conducted in the area of the former Buildings 6589 and 6600 seepage pits. This survey was conducted to determine whether significant VOC contamination was present in soil at the site.

A total of four GS passive soil-vapor samplers were placed in the seepage pits area. Samplers were installed at the site on April 26, 2002 and retrieved on May 10, 2002. The GS samplers

were analyzed for a total of 30 individual or groups of VOCs, including TCE, tetrachloroethene, cis- and trans-dichloroethene and BTEX. Low to trace-level (but quantifiable) amounts of 12 individual or groups of VOCs were detected.

Investigation 4—Soil Sampling

Once the septic system seepage pits were located, soil sampling was conducted. On September 5, 2002, soil samples were collected from two seepage pit boreholes. An auger drill rig was used to sample all boreholes at two depth intervals. The top of the shallow interval started at the base of the gravel aggregate in the seepage pit bottom, and the lower (deep) interval started at 5 ft below the top of the upper sample interval. Soil borehole locations are shown on Figure 12.

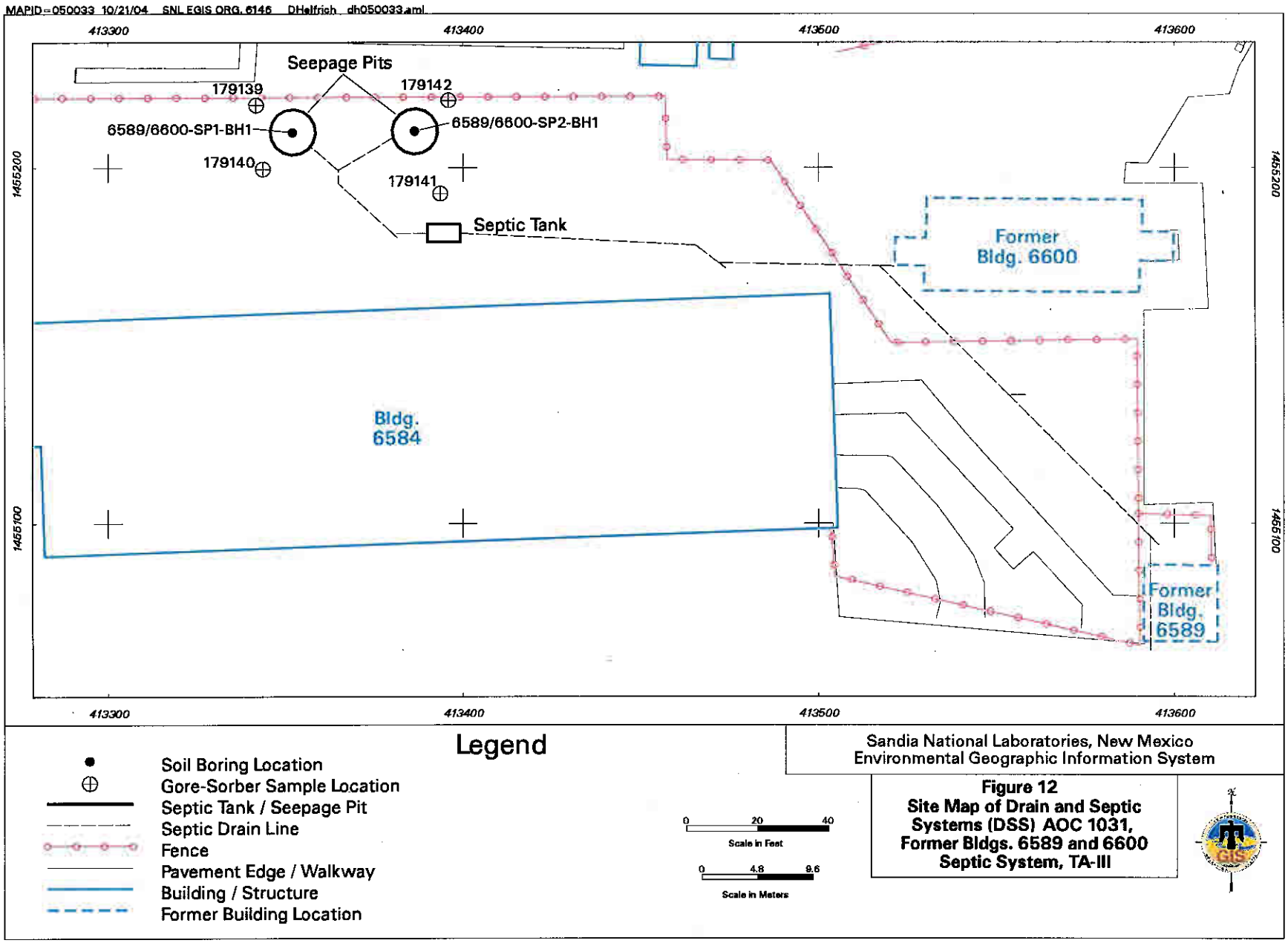
Results for the four soil samples collected from the two seepage pit boreholes are summarized in this paragraph. The VOC 2-butanone was detected in three of the four samples. It was not detected in the associated TB. Two SVOCs were detected in the 15-ft-bgs sample from SP1-BH1-15-S. Four SVOCs were detected in the 15-ft-bgs sample from SP2-BH1-15-S. No SVOCs were detected in the 20-ft-bgs samples from either borehole. No PCBs or HE compounds were detected in any of the samples collected from this site. Cyanide was detected in three of the four soil samples collected. For RCRA metals, arsenic was detected above the background concentration in the 20-ft-bgs sample from SP2-BH1-20-S. All other metal concentrations were below the corresponding background levels. For radionuclides, no activities above background levels were detected in any sample analyzed. However, although not detected, the MDAs for the uranium-235 analyses exceeded the respective background level because the standard gamma spectroscopy count time for soil samples (6,000 seconds) was not adequate to achieve a lower and more appropriate MDA. Regardless, the MDA was sufficiently low that the Department accepts the sampling results. No gross alpha or beta activity above background levels was detected in any of the samples.

A risk screening assessment was performed to evaluate the potential for adverse health effects for industrial and residential land-use scenarios. For both the residential and industrial land-use scenarios, the total human health HI and estimated excess cancer risk meet Department requirements (Table 12).

For the radiological COC (uranuim-235) a total effective dose equivalent (TEDE) was calculated that results in a TEDE of 2.1E-2 millirem (mrem)/year (yr). The estimated excess cancer risk is 2.0E-7.

The exposure pathway analysis established that no complete pathway exists for exposure of ecological species to contaminants at AOC 1031. All COCs are located at depths greater than 5 ft bgs. Therefore, no COCs are considered to be COPECs.

In conclusion, human health and ecological risks are acceptable under a residential land-use scenario.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413600
1455200
1455100
Seepage Pits
179139
179142
6589/6600-SP1-BH1
6589/6600-SP2-BH1
179140
179141
Septic Tank
Former Bldg. 6600
Bldg. 6584
Former Bldg. 6589
Legend
Soil Boring Location
Gore-Sorber Sample Location
Septic Tank / Seepage Pit
Septic Drain Line
Fence
Pavement Edge / Walkway
Building / Structure
Former Building Location
0 20 40
Scale in Feet
0 4.8 9.6
Scale in Meters
Sandia National Laboratories, New Mexico
Environmental Geographic Information System
Figure 12
Site Map of Drain and Septic Systems (DSS) AOC 1031, Former Bldgs. 6589 and 6600 Septic System, TA-III
GIS

Table 12
Risk Assessment Values for AOC 1031 Nonradiological COCs

COC	Maximum Concentration (mg/kg)	Industrial Land-Use Scenario[a]		Residential Land-Use Scenario[a]	
		Hazard Index	Cancer Risk	Hazard Index	Cancer Risk
Inorganic					
Arsenic	5.38	0.02	3E-6	0.25	1E-5
Cyanide	3.79	0.00		0.00	
Organic					
Benzo(b)fluoranthene	0.0192 J	0.00	9E-9	0.00	3E-8
2-Butanone	0.00604 J	0.00		0.00	
Chrysene	0.0181 J	0.00	9E-11	0.00	3E-10
Fluoranthene	0.0223 J	0.00		0.00	
Pyrene	0.0237 J	0.00		0.00	
Total		0.02	3E-6	0.25	1E-5

[a]EPA 1989.
AOC = Area of Concern.
COC = Constituent of concern.
EPA = U.S. Environmental Protection Agency.
J = Estimated concentration.
mg/kg = Milligram(s) per kilogram.

Basis for Determination

AOC 1031 has been characterized or remediated in accordance with current applicable state and/or federal regulations, and the available data indicate that contaminants pose an acceptable level of risk under current and projected future land use.

AOC 1034, Building 6710 Septic System

Site Location

AOC 1034 is located in SNL/NM TA-III on federally owned land controlled by KAFB and permitted to the DOE. The site is located approximately 2,800 ft southwest of the entrance to TA-III and approximately 100 ft west of the southwest corner of Building 6710. The abandoned septic system consisted of a septic tank that emptied to a seepage pit. Construction details are based upon engineering drawings and site inspections. The system received discharges from Building 6710, approximately 100 ft to the east (Figure 13).

Operational History

Available information indicates that Building 6710 was constructed in 1958, and it is assumed the septic system was constructed at the same time. Building 6710 is currently known as the Air Gun Test Facility. Because operational records are not available, the site investigation was planned to be consistent with other drain and septic system investigations and to sample for possible COCs that may have been released during facility operations. In the early 1990s,

Building 6710 was connected to an extension of the COA sanitary sewer system. The old septic system line was disconnected and capped, and the system was abandoned in place concurrent with this change. The septic tank was backfilled in place in July 2005 in accordance with 20.7.3.410 NMAC.

The COCs include RCRA metals, hexavalent chromium, cyanide, PCBs, HE compounds, VOCs, SVOCs and radionuclides.

Evaluation of Relevant Information

Three assessment investigations have been conducted at this site. In late 1990 or early 1991, 1992 and 1995, waste characterization samples were collected from the septic tank (Investigation 1). In April and May 2002, a passive soil-vapor survey was conducted to determine whether areas of significant VOC contamination were present in soil around the seepage pit (Investigation 2). In 2002, near-surface soil samples were collected from a boring drilled through the center of, and beneath, the seepage pit (Investigation 3).

Investigation 1—Septic Tank Sampling

Investigation 1 consisted of sampling efforts to characterize the waste contents of septic tanks for chemical and radiological contamination. The primary goal of the sampling was to identify types and concentrations of potential contaminants in the waste within the tanks so that the appropriate waste disposal and remedial activities could be planned.

Aqueous and/or sludge samples for waste characterization were collected from the Building 6710 septic tank in late 1990 or early 1991, 1992 and 1995. The 1990 or 1991 aqueous sample was analyzed at an off-site laboratory for VOCs, SVOCs, oil and grease, nitrate, phenolics, metals and gross alpha/beta activity. The 1992 sludge sample was analyzed at an off-site laboratory for gross alpha/beta activity, tritium, and radionuclides by gamma spectroscopy. The 1995 sludge sample was analyzed for VOCs, SVOCs, pesticides and PCBs, metals, radionuclides by gamma spectroscopy, tritium, isotopic plutonium, strontium, thorium and uranium. A fraction of each sample was also submitted to the SNL/NM Radiation Protection Sample Diagnostics (RPSD) Laboratory for gamma spectroscopy analysis prior to off-site release. On March 20, 1996, the residual contents, approximately 230 gallons of waste and added water, were pumped out.

Investigation 2—Passive Soil-Vapor Sampling

In April and May 2002, a passive soil-vapor survey was conducted in the Building 6710 septic system area. This survey was conducted to determine whether significant VOC contamination was present in soil at the site.

A total of four GS passive soil-vapor samplers were placed in the seepage pit area. Samplers were installed at the site on April 29, 2002, and retrieved on May 14, 2002. The GS samplers were analyzed for a total of 30 individual or groups of VOCs, including TCE, tetrachloroethene, cis- and trans-dichloroethene and BTEX. Low to trace-level (but quantifiable) amounts of 17 individual or groups of VOCs were detected in the GS samplers.

Investigation 3—Soil Sampling

Soil sampling beneath the seepage pit was conducted. On September 19, 2002, soil samples were collected from a borehole drilled through, and beneath, the seepage pit. An auger rig was used to collect one sample at the estimated base of the gravel aggregate in the bottom of the seepage pit, and another sample 5 ft below the top of the upper interval. The soil boring location is shown on Figure 13.

Results for the two soil samples collected from the one seepage pit borehole are summarized herein. The VOC 2-butanone was detected in the 19-ft bgs sample. No other VOCs were detected in these samples. Two SVOCs were detected in these samples. Pyrene was detected in the 14-ft bgs sample and bis(2-ethylhexyl) phthalate was detected in the 19-ft bgs sample.

Neither PCBs nor HE compounds were detected in any of the samples collected from this site. Cyanide was detected in the 19-ft bgs sample from the borehole. For metals, none of the metal concentrations detected in the samples exceeded the background concentrations. For radionuclides, no activities above background levels were detected in any sample analyzed. However, although not detected, the MDAs for the uranium-235 analyses exceeded the respective background activity because the standard gamma spectroscopy count time for soil samples (6,000 seconds) was not adequate to achieve a lower and more appropriate MDA. Regardless, the MDA was sufficiently low that the Department accepts the sampling results. No gross alpha or beta activity above background levels was detected in any of the samples.

A risk screening assessment was performed to evaluate the potential for adverse health effects for industrial and residential land-use scenarios. For both the industrial and residential land-use scenarios, the total human health HI and estimated excess cancer risk meet Department requirements (Table 13).

For the radiological COC (uranuim-235) a total effective dose equivalent (TEDE) was calculated that results in a TEDE of 5.2E-3 millirem (mrem)/year (yr). The estimated excess cancer risk is 6.8E-8.

The exposure pathway analysis established that no pathway exists for exposure of ecological species to contaminants at AOC 1034. All COCs are located at depths greater than 5 ft bgs. Therefore, no COCs are considered to be COPECs.

In conclusion, human health and ecological risks are acceptable under a residential land-use scenario.

Basis for Determination

AOC 1034 has been characterized or remediated in accordance with current applicable state and/or federal regulations, and the available data indicate that contaminants pose an acceptable level of risk under current and projected future land use.

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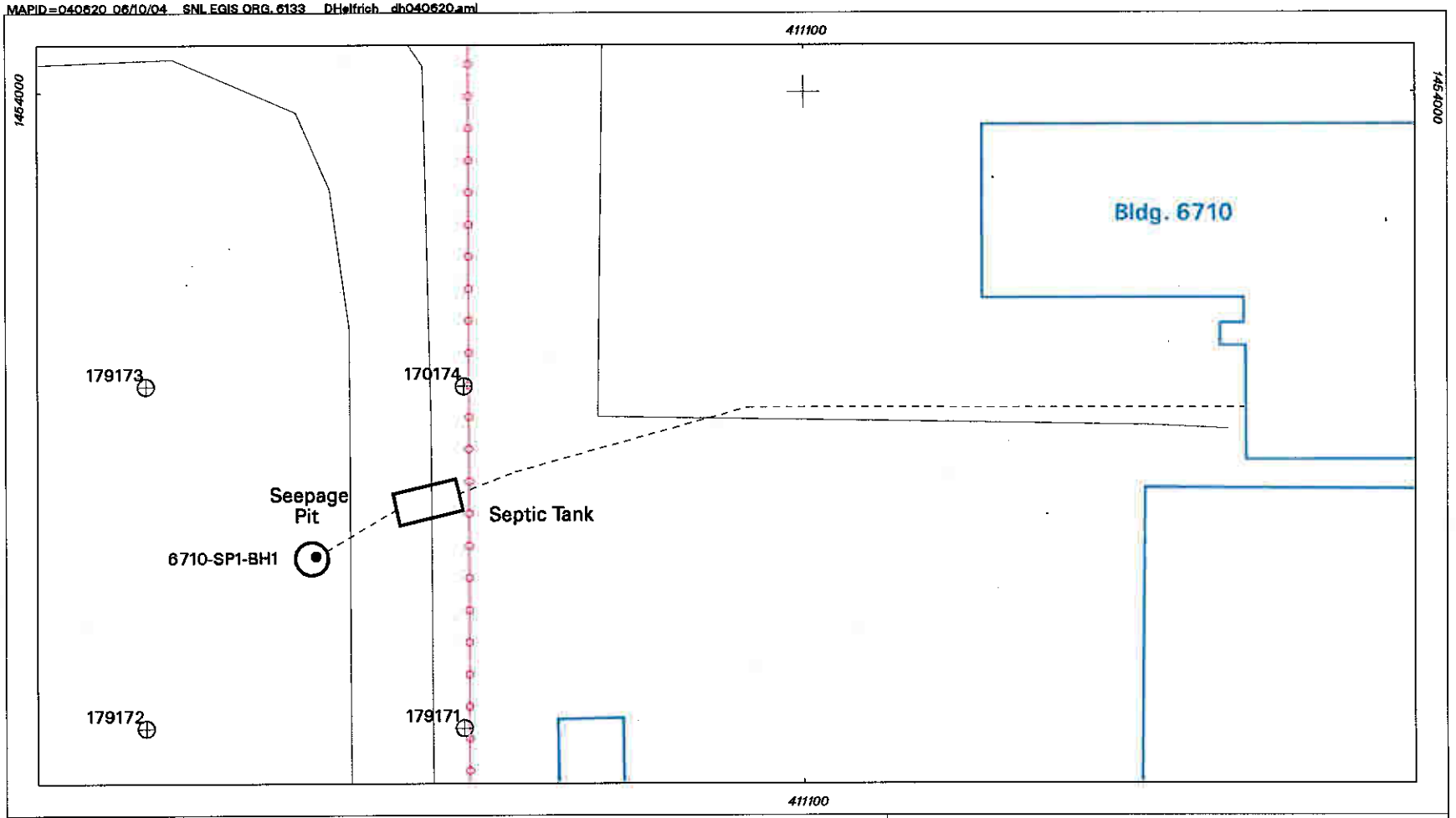


Legend

- Soil Boring Location
- Gore-Sorber Sample Location
- Septic Tank / Seepage Pit
- Drain Line
- Building / Structure
- Edge of Pavement / Unpaved Road
- Fence

0 10 20
Scale in Feet

0 2.4 4.8
Scale in Meters

Sandia National Laboratories, New Mexico
Environmental Geographic Information System

Figure 13
Site Map of Drain and Septic Systems (DSS) AOC 1034, Bldg. 6710 Septic System, TA-III

Table 13
Risk Assessment Values for AOC 1034 Nonradiological COCs

COC	Maximum Concentration (mg/kg)	Industrial Land-Use Scenario[a]		Residential Land-Use Scenario[a]	
		Hazard Index	Cancer Risk	Hazard Index	Cancer Risk
Inorganic					
Cyanide	0.0602 J	0.00		0.00	
Organic					
2-Butanone	0.00552	0.00		0.00	
bis(2-Ethylhexyl) phthalate	0.0949 J	0.00	5E-10	0.00	2E-9
Pyrene	0.132 J	0.00		0.00	
Total		**0.00**	**5E-10**	**0.00**	**2E-9**

[a]EPA 1989.
AOC = Area of Concern.
COC = Constituent of concern.
EPA = U.S. Environmental Protection Agency.
J = Estimated concentration.
mg/kg = Milligram(s) per kilogram.

AOC 1035, Building 6715 Septic System

Site Location

AOC 1035 is located in SNL/NM TA-III on federally owned land controlled by KAFB and permitted to the DOE. The site is located approximately 1,500 ft southwest of the entrance to TA-III. The abandoned septic system consisted of a 750-gallon septic tank that emptied to a single seepage pit. Construction details are based upon engineering drawings and site inspections. The system received discharges from Building 6715, approximately 90 ft to the east (Figure 14).

Operational History

Available information indicates that Building 6715, currently known as the Explosive Test Facility, was constructed in 1962, and it is assumed the septic system was constructed at the same time. Because operational records are not available, the site investigation was planned to be consistent with other drain and septic system investigations and to sample for the possible COCs that may have been released during facility operations.

In the early 1990s, Building 6715 was connected to an extension of the COA sanitary sewer system. The old septic system line was disconnected and capped, and the system was abandoned in place concurrent with this change. On March 27, 1996, the residual contents, approximately 615 gallons of waste and added water, were pumped out. The septic tank and seepage pit were backfilled in accordance with 20.7.3.410 NMAC in July 2005.

The COCs include RCRA metals, hexavalent chromium, cyanide, PCBs, HE compounds, VOCs, SVOCs and radionuclides.

Evaluation of Relevant Information

Three assessment investigations have been conducted at this site. In late 1990 or early 1991, 1992 and 1995, waste characterization samples were collected from the septic tank (Investigation 1). In late April and early May 2002, a passive soil-vapor survey was conducted to determine whether areas of significant VOC contamination were present in soil around the seepage pit (Investigation 2). In September 2002, subsurface soil samples were collected from a boring drilled through the center of, and beneath, the seepage pit (Investigation 3). These investigations are discussed below.

Investigation 1—Septic Tank Sampling

Investigation 1 consisted of sampling efforts to characterize the waste contents of septic tanks for chemical and radiological contamination. The primary goal of the sampling was to identify types and concentrations of potential contaminants in the waste within the tanks so that the appropriate waste disposal and remedial activities could be planned.

In late 1990 or early 1991, August 1992 and July 1995, aqueous and sludge samples were collected from the Building 6715 septic tank. In late 1990 or early 1991, an aqueous sample was analyzed at an off-site laboratory for VOCs, oil and grease, total cyanide, nitrate, phenolics, total metals and gross alpha/beta activity. On August 18, 1992, a sludge sample was collected and analyzed at an off-site laboratory for gross alpha/beta activity, tritium, and radionuclides by gamma spectroscopy. On July 12, 1995, an aqueous sample and a sludge sample were collected and analyzed at an off-site laboratory. The aqueous sample was analyzed for VOCs, SVOCs, pesticides and PCBs, total metals, pH, formaldehyde, fluoride, nitrate plus nitrite, oil and grease, total phenols, gross alpha/beta activity, tritium and radionuclides by gamma spectroscopy. The sludge sample was analyzed for VOCs, SVOCs, pesticides and PCBs, total metals, and radionuclides by isotopic analysis and gamma spectroscopy. A fraction of each sample was also submitted to the SNL/NM RPSD Laboratory for gamma spectroscopy analysis prior to off-site release.

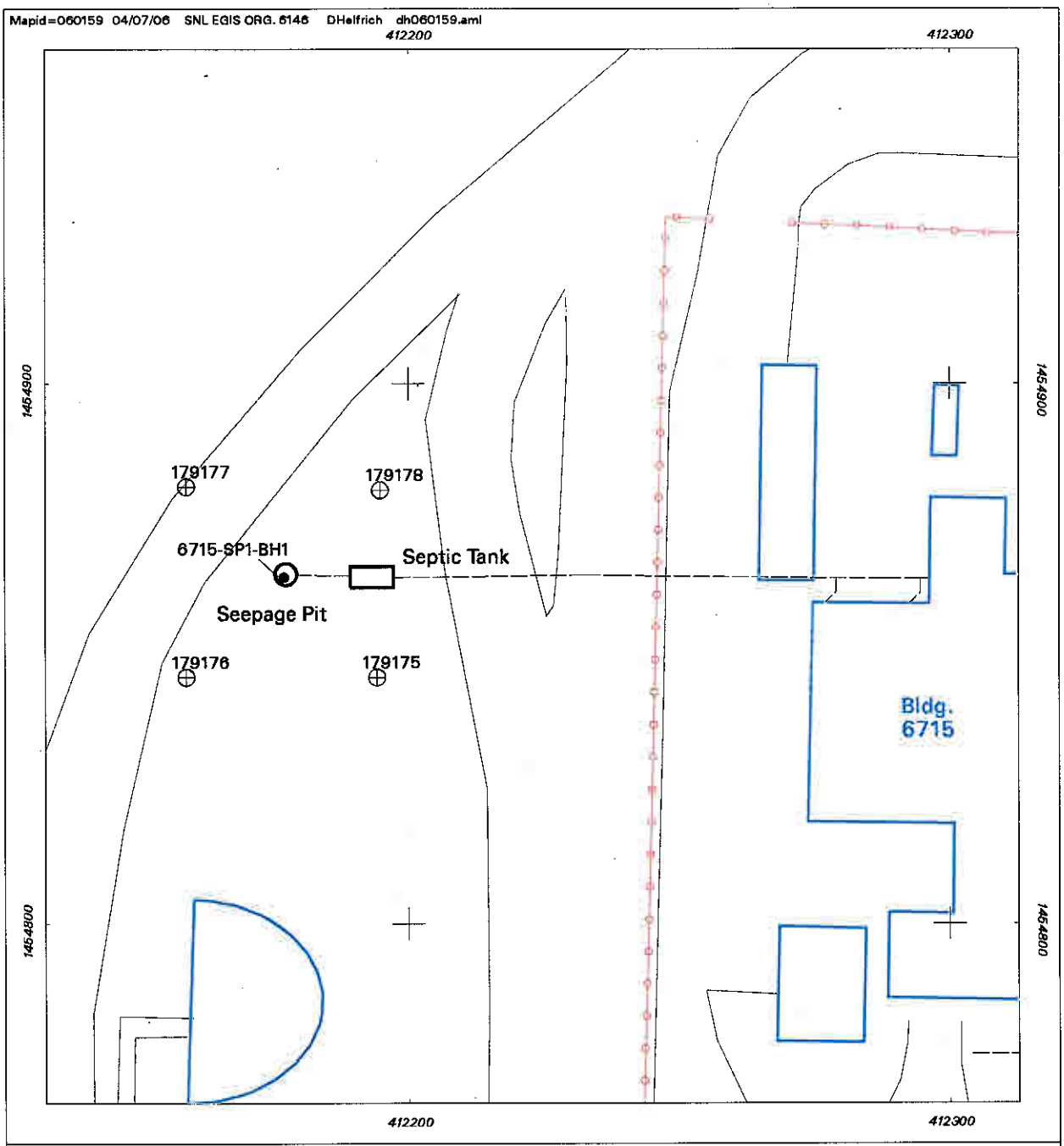
Investigation 2—Passive Soil-Vapor Sampling

In late April and early May 2002, a passive soil-vapor survey was conducted in the Building 6715 Septic System area. This survey was conducted to determine whether significant VOC contamination was present in soil at the site.

A total of four GS passive soil-vapor samplers were placed in the seepage pit area. Samplers were installed at the site on April 29, 2002 and retrieved on May 14, 2002. The GS samplers were analyzed for a total of 30 individual or groups of VOCs, including TCE, tetrachloroethene, cis- and trans-dichloroethene and BTEX. Low to trace-level (but quantifiable) amounts of 18 individual or groups of VOCs were detected in the GS samplers.

Investigation 3—Soil Sampling

Soil sampling beneath the seepage pit was conducted on September 12, 2002. Soil samples were



Legend

- Soil Boring Location
- Gore-Sorber Sample Location
- Septic Tank / Seepage Pit
- Fence
- Road
- Building / Structure
- Septic Drain Line

Figure 14
Site Map of Drain and Septic Systems (DSS) AOC 1035, Bldg. 6715 Septic System, TA-III

0 15 30
Scale in Feet

0 3.6 7.2
Scale in Meters

Sandia National Laboratories, New Mexico
Environmental Geographic Information System

collected from a seepage pit borehole. An auger drill rig was used to sample the borehole at two depth intervals. A shallow sample interval was sampled starting at the estimated base of the gravel aggregate in the seepage pit bottom, and a lower (deep) interval was sampled starting at 5 ft below the top of the upper interval. The soil boring location is shown on Figure 14.

Results for the two soil samples collected from the seepage pit borehole at AOC 1035 are presented and discussed herein. Acetone was detected in the 11-ft bgs sample, and 2-butanone was detected in the 16-ft bgs sample. One SVOC, bis(2-ethylhexyl) phthalate, was detected in both the 11- and 16-ft bgs samples collected from the borehole. Neither HE compounds nor were PCBs detected in either of the samples collected. Cyanide was detected in both the 11- and 16-ft bgs samples from the borehole. The RCRA metal, barium was detected above Department -approved background levels in the 16-ft bgs sample from the borehole. All other metal concentrations were below Department-approved background concentrations. For radionuclides, no activities above background levels were detected in any sample analyzed. However, although not detected, the MDAs for one of the uranium-235 analyses exceeded the background activity levels because the standard gamma spectroscopy count time for soil samples (6,000 seconds) was not adequate to achieve a lower and more appropriate MDA. Regardless, the MDA was sufficiently low that the Department accepts the sampling results. No gross alpha or beta activity above background levels was detected in any of the samples.

A risk screening assessment was performed to evaluate the potential for adverse health effects for industrial and residential land-use scenarios. For both the industrial and residential land-use scenarios, the total human health HI and estimated excess cancer risk meet Department requirements (Table 14).

Table 14
Risk Assessment Values for AOC 1035 Nonradiological COCs

COC	Maximum Concentration (mg/kg)	Industrial Land-Use Scenario[a]		Residential Land-Use Scenario[a]	
		Hazard Index	Cancer Risk	Hazard Index	Cancer Risk
Inorganic					
Barium	232	0.00		0.04	
Cyanide	0.0462 J	0.00		0.00	
Organic					
Acetone	0.00417 J	0.00		0.00	
2-Butanone	0.00674	0.00		0.00	
bis(2-Ethylhexyl) phthalate	0.142 J	0.00	7E-10	0.00	3E-9
Total		**0.00**	**7E-10**	**0.04**	**3E-9**

[a]EPA 1989.
AOC = Area of Concern.
COC = Constituent of concern.
EPA = U.S. Environmental Protection Agency.
J = Estimated concentration.
mg/kg = Milligram(s) per kilogram.

For the radiological COC (uranuim-235) a total effective dose equivalent (TEDE) was calculated that results in a TEDE of 1.1E-2 millirem (mrem)/year (yr). The estimated excess cancer risk is 1.5E-7.

The exposure pathway analysis established that no pathway exists for exposure of ecological species to contaminants at AOC 1035. All COCs are located at depths greater than 5 ft bgs. Therefore, no complete ecological exposure pathways exist at this site and no COCs are considered to be COPECs.

In conclusion, human health and ecological risks are acceptable under a residential land-use scenario.

Basis for Determination

SWMU 1035 has been characterized or remediated in accordance with current applicable state and/or federal regulations, and the available data indicate that contaminants pose an acceptable level of risk under current and projected future land use.

AOC 1036, Building 6922 Septic System

Site Location

AOC 1036 is located in SNL/NM TA-III on federally owned land controlled by KAFB and permitted to the DOE. The site is located approximately 1.8 miles south of the entrance to TA-III and northwest of Building 6922. The abandoned septic system consisted of a 750-gallon septic tank and distribution box that emptied to a drainfield with four parallel laterals, each approximately 40 ft long. Construction details are based upon engineering drawings, site inspections, and backhoe excavations of the system. The system received discharges from Building 6922, approximately 85 ft to the southeast (Figure 15).

Operational History

Available information indicates that Building 6922, currently known as the Molten Core Laboratory facility, was constructed in 1955, and it is assumed the septic system was constructed at the same time. Because operational records are not available, the site investigation was planned to be consistent with other drain and septic system investigations and to sample for the all possible COCs that may have been released during facility operations. In 1991, Building 6922 was connected to an extension of the COA sanitary sewer system. The old septic system line was disconnected and capped, and the system was abandoned in place concurrent with this change. The septic tank was backfilled August 2005 in accordance with 20.7.3.410 NMAC.

The COCs include RCRA metals, hexavalent chromium, cyanide, PCBs, HE compounds, VOCs, SVOCs and radionuclides.

Evaluation of Relevant Information

Three assessment investigations have been conducted at this site. In late 1990 or early 1991, 1992 and 1995, waste characterization samples were collected from the septic tank (Investigation 1). In May 1997, a backhoe was used to physically locate the buried drainfield lines at the site (Investigation 2). In June 1998 and August 1999, soil samples were collected from two borings in the drainfield (Investigation 3). These investigations are discussed below.

Investigation 1—Septic Tank Sampling

Investigation 1 consisted of sampling efforts to characterize the waste contents of septic tanks for chemical and radiological contamination. The primary goal of the sampling was to identify types and concentrations of potential contaminants in the waste within the tanks so that the appropriate waste disposal and remedial activities could be planned.

In late 1990 or early 1991, 1992 and 1995, aqueous and sludge samples were collected from the Building 6922 septic tank. The 1990 or 1991 aqueous sample was analyzed at an off-site laboratory for SVOCs, metals, oil and grease, nitrate/nitrite, phenolics, gross alpha/beta activity and isotopic plutonium. The 1992 sludge sample was analyzed at an off-site laboratory for gross alpha/beta activity, tritium, and radionuclides by gamma spectroscopy. The 1995 aqueous sample was analyzed at an off-site laboratory for VOCs, SVOCs, pesticides, PCBs, metals, phenolic compounds, nitrate/nitrite, formaldehyde, fluoride, pH, oil and grease, gross alpha/beta activity, tritium and radionuclides by gamma spectroscopy. The 1995 sludge sample was analyzed for VOCs, SVOCs, metals, pesticides, PCBs, isotopic plutonium, thorium, uranium, strontium and radionuclides by gamma spectroscopy. A fraction of each sample was also submitted to the SNL/NM RPSD Laboratory for gamma spectroscopy analysis prior to off-site release. On January 31, 1996, the tank was flushed with clean water, and the rinsate was discharged to the COA sanitary sewer system.

Investigation 2—Backhoe Excavation

On May 6, 1997, a backhoe was used to determine the location, dimensions, and average depth of the AOC 1036 drainfield system. The drainfield was found to have four laterals with an average drain line depth of 5 ft bgs. No visible evidence of stained or discolored soil or odors was observed during the excavation. No samples were collected during the backhoe excavation.

Investigation 3—Soil Sampling

Once the drain lines were located, soil sampling was conducted. On June 16 and 17, 1998, and again on August 16, 1999, soil samples were collected from two drainfield boreholes. An auger drill rig was used to sample the boreholes at two depth intervals. The top of the shallow interval started at the bottom of the drain line trenches, as determined by the backhoe excavation, and the lower (deep) interval started at 5 ft beneath the top sample interval. Soil boring locations are shown on Figure 15.

Results for the eight soil samples collected from four drainfield boreholes at AOC 1036 are discussed herein. Two VOCs, acetone and methylene chloride, were detected in the 10-ft bgs duplicate sample collected from BH2. Methylene chloride was also detected in the TB associated. No SVOCs, HE compounds or cyanide were detected in the samples. The PCB, aroclor-1254, was detected in the 10-ft bgs sample from BH2. No other PCBs were detected in the samples. The metal, arsenic, was detected above Department-approved background concentration in the primary 10-ft bgs sample from BH2, but not in the duplicate. Barium was detected above Department-approved background concentration only in the 5-ft bgs sample from borehole BH1. All other metals were below Department-approved background concentrations.

For radionuclides, no activities above Department-approved background levels were detected in any sample analyzed. However, although not detected, the MDAs for some of the uranium-235 and all of the uranium-238 analyses exceed the background activity levels because the standard gamma spectroscopy count time for soil samples (6,000 seconds) was not adequate to achieve a lower and more appropriate MDA. Regardless, the MDAs were sufficiently low that the Department accepts the sampling results. No gross alpha or beta activity above background levels was detected in any of the samples.

A risk screening assessment was performed to evaluate the potential for adverse health effects for industrial and residential land-use scenarios. For both the residential and industrial land-use scenarios, the total human health HI and estimated excess cancer risk meet Department requirements (Table 15).

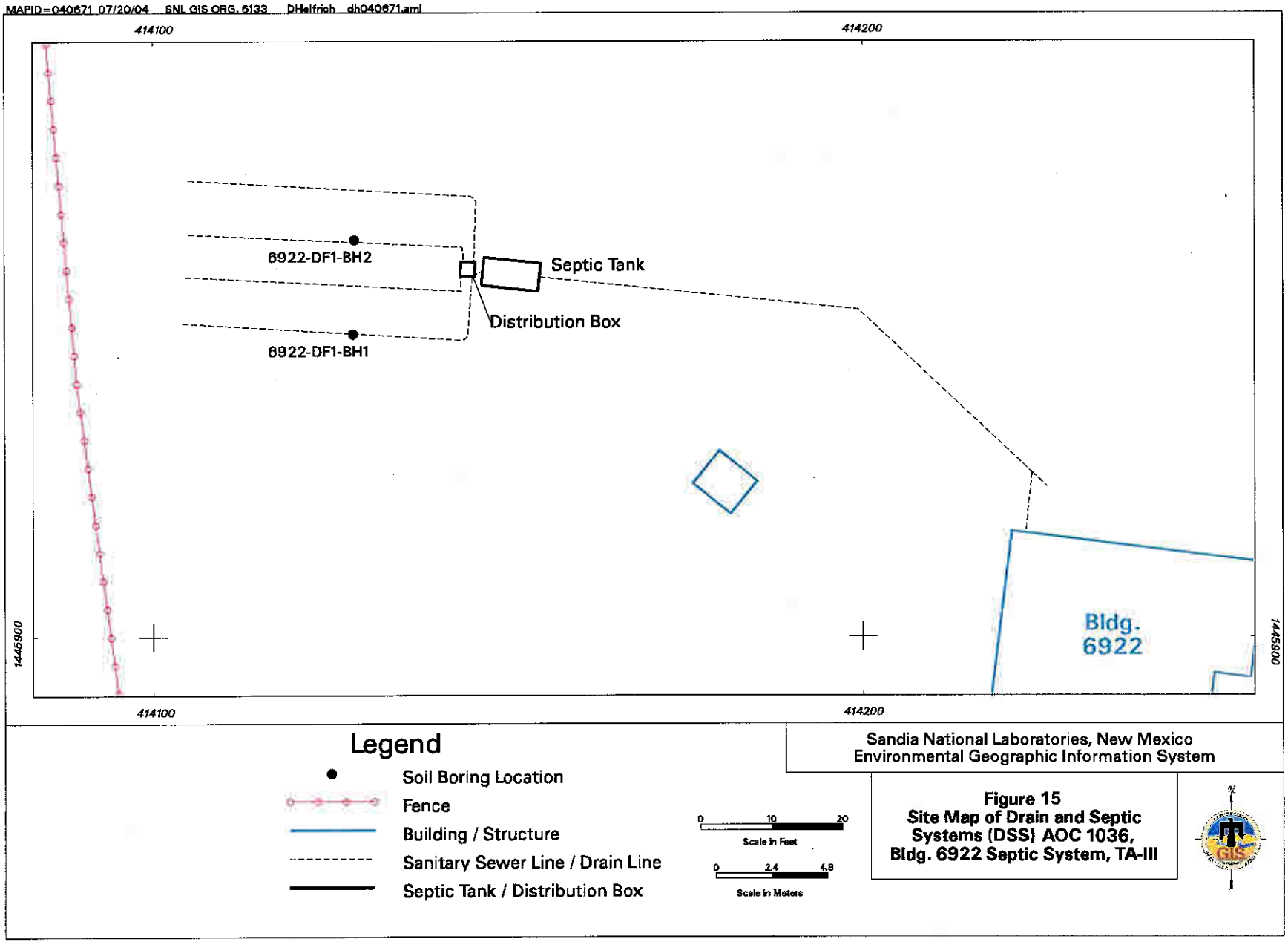
For the radiological COC (uranuim-235 and uranium-238) a total effective dose equivalent (TEDE) was calculated that results in a TEDE of 1.2E-1 millirem (mrem)/year (yr). The estimated excess cancer risk is 1.3E-6.

The exposure pathway analysis established that no pathway exists for exposure of ecological species to contaminants at AOC 1036. All COCs are located at depths greater than 5 ft bgs. Therefore, no COCs are considered to be COPECs.

In conclusion, human health and ecological risks are acceptable under a residential land-use scenario.

Basis for Determination

AOC 1036 has been characterized or remediated in accordance with current applicable state and/or federal regulations, and the available data indicate that contaminants pose an acceptable level of risk under current and projected future land use.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414100
414200
6922-DF1-BH2
Septic Tank
Distribution Box
6922-DF1-BH1
Bldg.
6922
1445900
1445900
414100
414200
Legend
Soil Boring Location
Fence
Building / Structure
Sanitary Sewer Line / Drain Line
Septic Tank / Distribution Box
0 10 20
Scale in Feet
0 2.4 4.8
Scale in Meters
Sandia National Laboratories, New Mexico
Environmental Geographic Information System
Figure 15
Site Map of Drain and Septic
Systems (DSS) AOC 1036,
Bldg. 6922 Septic System, TA-III

Table 15
Risk Assessment Values for AOC 1036 Nonradiological COCs

COC	Maximum Concentration (mg/kg)	Industrial Land-Use Scenario[a]		Residential Land-Use Scenario[a]	
		Hazard Index	Cancer Risk	Hazard Index	Cancer Risk
Inorganic					
Arsenic	4.7	0.02	3E-6	0.22	1E-5
Barium	220 J	0.00		0.04	
Cyanide	0.0205[b]	0.00		0.00	
Organic					
Acetone	0.0048 J	0.00		0.00	
Methylene Chloride	0.0046 J	0.00	3E-8	0.00	6E-8
Total		**0.02**	**3E-6**	**0.26**	**1E-5**

[a]EPA 1989.
[b] Nondetected concentration (concentration listed is one-half of the maximum detection limit, used for a conservative risk assessment).
AOC = Area of Concern.
COC = Constituent of concern.
EPA = U.S. Environmental Protection Agency.
J = Estimated concentration.
mg/kg = Milligram(s) per kilogram.

AOC 1052, Building 803 Seepage Pit

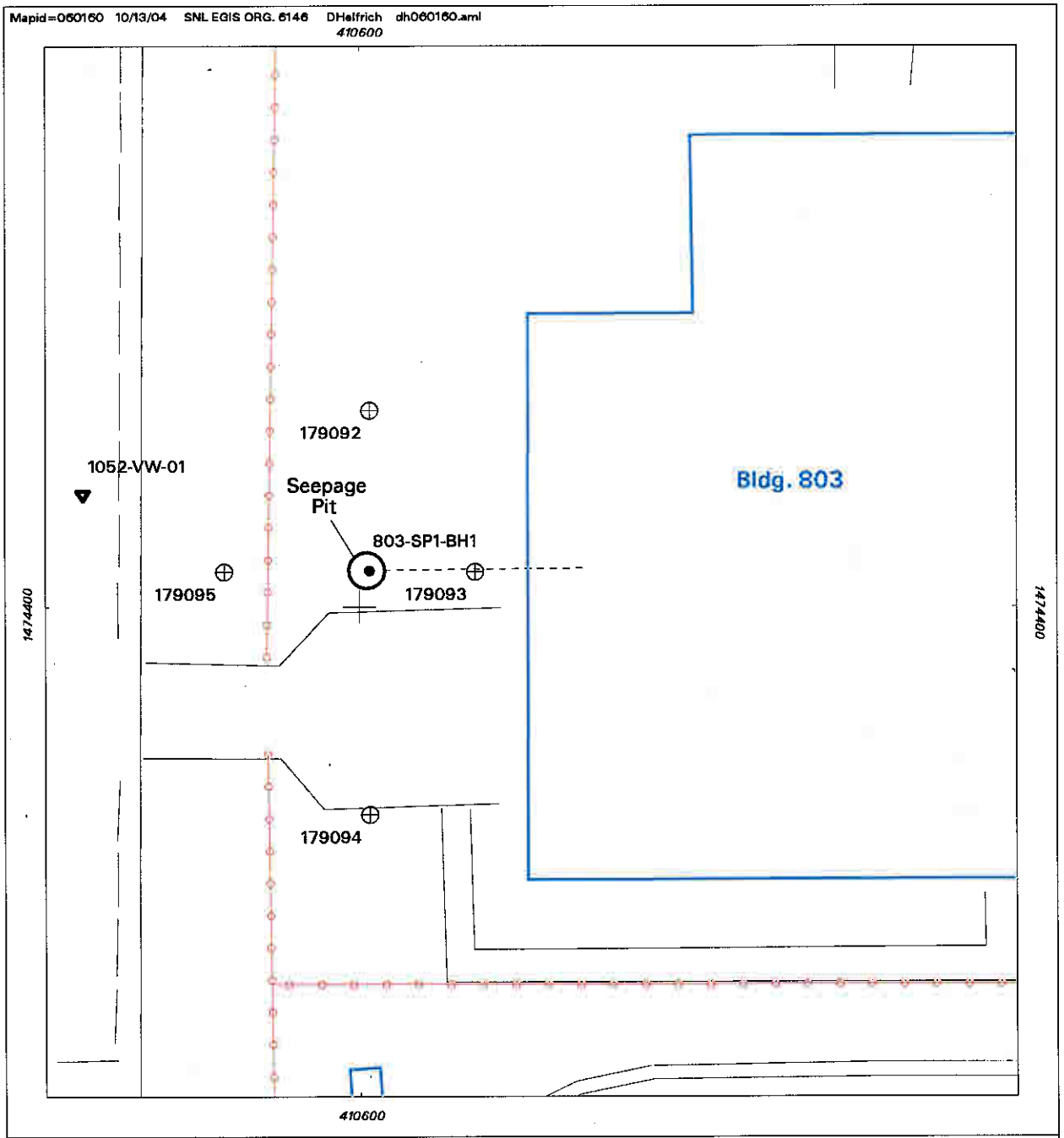
Site Location

AOC 1052 is located in SNL/NM TA-I on federally owned land controlled by KAFB and permitted to the DOE. The site is located approximately 5,000 ft south of the Wyoming Gate entrance to KAFB and is on the west side of Building 803. The abandoned system consisted of a 4-ft diameter, 22-ft deep, metal seepage pit. Construction details are based upon engineering drawings, site inspections, and backhoe excavations of the system. The system received discharges from Building 803, approximately 20 ft to the east (Figure 16).

Operational History

Available information indicates that Building 803, which is currently an administration building, was constructed in 1957, and it is assumed the seepage pit system was constructed at the same time. Because operational records are not available, the site investigation was planned to be consistent with other drain and septic system investigations and to sample for potential COCs that may have been released during facility operations. At an undetermined date, the discharges were routed to the COA sanitary sewer system. The old drain line would have been disconnected, capped, and the system abandoned in place concurrent with this change. The seepage pit was backfilled in October 2004.

The COCs include RCRA metals, hexavalent chromium, cyanide, PCBs, HE compounds, VOCs, SVOCs and radionuclides.



Legend

- Soil-Vapor Monitoring Well
- Soil Boring Location
- Gore-Sorber Sample Location
- Seepage Pit
- Drain Line
- Building / Structure
- Edge of Pavement
- Fence

Figure 16
Site Map of Drain and Septic System (DSS) AOC 1052, Bldg. 803 Seepage Pit, TA-I

0 10 20
Scale in Feet

0 2.4 4.8
Scale in Meters

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Environmental Geographic Information System

Evaluation of Relevant Information

Three assessment investigations have been conducted at this site. In April and May 2002, a passive soil-vapor survey was conducted to determine whether areas of significant VOC contamination were present in soil around the seepage pit (Investigation 1). In September 2002, subsurface soil samples were collected from a boring drilled through the center of, and beneath, the seepage pit (Investigation 2). In May and June 2003, a 150-ft deep, active soil-vapor monitoring well was installed at AOC 1052. This was one of seven AOCs selected by the Department for additional, deep soil-vapor monitoring (Investigation 3).

Investigation 1—Passive Soil-Vapor Sampling

In April and May 2002, a passive soil-vapor survey was conducted in the Building 803 seepage pit area. This survey was conducted to determine whether significant VOC contamination was present in soil at the site.

A total of four GS passive soil-vapor samplers were placed in the seepage pit area. Samplers were installed at the site on April 23, 2002, and retrieved on May 8, 2002. The GS samplers were analyzed for a total of 30 individual or groups of VOCs, including TCE, tetrachloroethene, cis- and trans-dichloroethene and BTEX. Low to trace-level (but quantifiable) amounts of six individual or groups of VOCs were detected in the GS samplers.

Investigation 2—Soil Sampling

Once the seepage pit was located, soil sampling was conducted. On September 19, 2002, soil samples were collected from a borehole drilled through, and beneath, the seepage pit. An auger drill rig was used to sample the borehole at two depth intervals. A shallow sample was collected at the estimated base of the gravel aggregate in the seepage pit bottom. A lower (deep) interval sample was collected starting at 5 ft below the top of the upper sample interval. The soil boring location is shown on Figure 16.

Results for the two soil samples collected from the seepage pit borehole at AOC 1052 are presented in this section. Low concentrations of 2-butanone were detected in both soil samples. This compound was not detected in the associated TBs. One SVOC was detected in the 22-ft bgs sample and eight SVOCs were detected in the 27-ft bgs sample. Neither HE compounds nor cyanide were detected in either of the samples collected from this site. A low concentration of the PCB, aroclor-1254, was detected in the 27-ft bgs sample. None of the metal concentrations detected in the samples exceeded Department-approved background concentrations. For radionuclides, uranium-235 was detected at an activity above background level in the 22-ft bgs sample. All other activities were below background levels. No gross alpha or beta activity above background levels was detected in any of the samples.

Investigation 3—Active Soil-Vapor Sampling

In May 2003, as part of the DSS investigation, a FLUTe™ soil-vapor monitoring well was installed at AOC 1052. This vapor well was 150 ft deep and had vapor sampling ports at depths

of 5, 20, 70, 100 and 150 ft bgs. After installation, subsurface conditions were allowed to equilibrate for more than three months before the well was sampled on September 10, 2003. Soil-vapor samples from each of the five sampling depths were collected in special canisters and sent to an off-site laboratory for analysis. Total VOC soil-vapor concentrations ranged from a low of 66.4 parts per billion by volume (ppbv) in the 20-ft bgs interval to a maximum of 169 ppbv in the 100-ft bgs sample. Because the total VOC concentration in the 150-ft bgs sample from this well was less than 10 ppmv, no additional soil-vapor sampling was required from this well and no additional soil-vapor or groundwater monitoring wells were required.

A risk screening assessment was performed to evaluate the potential for adverse health effects for industrial and residential land-use scenarios. For the both industrial and residential land-use scenarios, the total human health HI and estimated excess cancer risk meet Department requirements (Table 16).

For the radiological COC (uranuim-235) a total effective dose equivalent (TEDE) was calculated that results in a TEDE of 2.1E-2 millirem (mrem)/year (yr). The estimated excess cancer risk is 2.0E-7.

Table 16
Risk Assessment Values for AOC 1052 Nonradiological COCs

COC	Maximum Concentration (mg/kg)	Industrial Land-Use Scenario[a]		Residential Land-Use Scenario[a]	
		Hazard Index	Cancer Risk	Hazard Index	Cancer Risk
Inorganic					
Chromium VI	0.0267[b]	0.00	6E-11	0.00	1E-10
Cyanide	0.021[b]	0.00		0.00	
Organic					
Benzo(a)pyrene	0.105	0.00	5E-7	0.00	2E-6
Benzo(b)fluoranthene	0.0323 J	0.00	2E-8	0.00	5E-8
Benzo(g,h,i)perylene	0.0286 J	0.00	1E-7	0.00	5E-7
Benzo(k)fluoranthene	0.0429	0.00	2E-9	0.00	7E-9
2-Butanone	0.0052	0.00		0.00	
Chrysene	0.0381	0.00	2E-10	0.00	6E-10
Fluoranthene	0.0372	0.00		0.00	
Indeno(1,2,3-cd)pyrene	0.175	0.00	8E-8	0.00	2E-7
Pyrene	0.166 J	0.00		0.00	
Total		**0.00**	**7E-7**	**0.00**	**2E-6**

[a]EPA 1989.

[b] Nondetected concentration (concentration listed is one-half of the maximum detection limit, used for a conservative risk assessment).

AOC = Area of Concern.
COC = Constituent of concern.
EPA = U.S. Environmental Protection Agency.
J = Estimated concentration.
mg/kg = Milligram(s) per kilogram.

The exposure pathway analysis established that no pathway exists for exposure of ecological species to contaminants at AOC 1052. All COCs are located at depths greater than 5 ft bgs. Therefore no COCs are considered to be COPECs.

In conclusion, human health and ecological risks are acceptable under a residential land-use scenario.

Basis for Determination

AOC 1052 has been characterized or remediated in accordance with current applicable state and/or federal regulations, and the available data indicate that contaminants pose an acceptable level of risk under current and projected future land use.

AOC 1078, Building 6640 Septic System

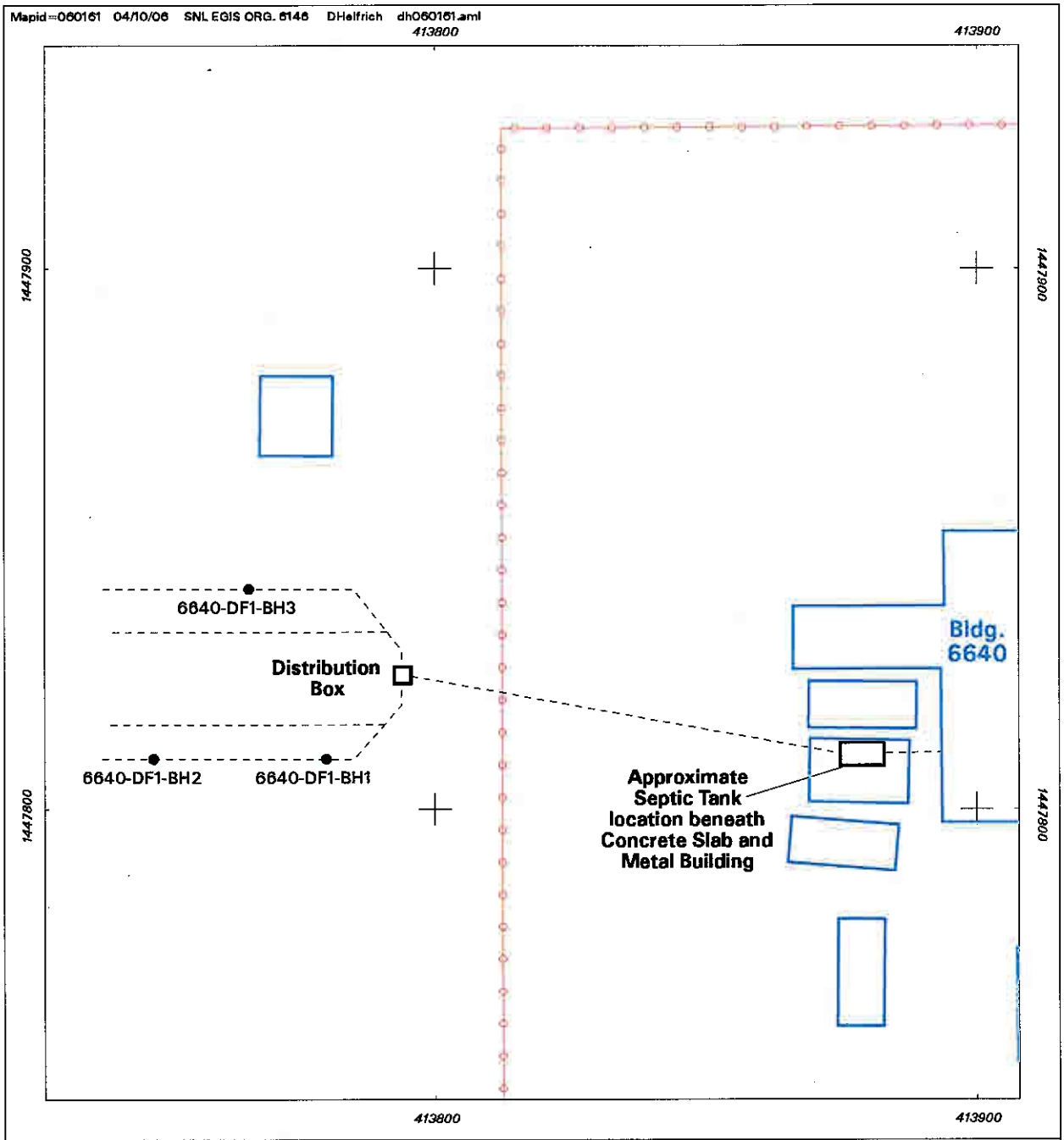
Site Location

AOC 1078 is located in SNL/NM TA-III on federally owned land controlled by KAFB and permitted to the DOE. The site is located approximately 1.4 miles south of the entrance to TA-III. The abandoned septic system is on the west side of Building 6640, and consisted of a septic tank and distribution box that emptied to four 45- to 50-ft parallel drain lines (Figure 17). Construction details are based upon site inspections, backhoe excavations of the drainfield and interviews with Building 6640 facility personnel. The system received discharges from Building 6640, approximately 100 ft to the east.

Operational History

Available information indicates that Building 6640, currently known as the Acoustical Test Facility, was constructed in 1959, and it is assumed the septic system was constructed at the same time. Because operational records are not available, the site investigation was planned to be consistent with other drain and septic system investigations and to sample for all possible COCs that may have been released during facility operations. By June 1991, Building 6640 was connected to an extension of the COA sanitary sewer system. The old septic system line was disconnected and capped, and the system was abandoned in place concurrent with this change. Interviews held on November 19, 2003, with Building 6640 personnel who had worked at the facility since September 1990, determined that the septic tank was pumped out and backfilled with soil when Building 6640 was connected to the new sanitary sewer extension in early 1991.

The COCs include RCRA metals, hexavalent chromium, cyanide, PCBs, HE compounds, VOCs, SVOCs and radionuclides.



Legend

- Soil Boring Location
- Septic Tank / Distribution Box
- Sanitary Sewer Line / Drain Line
- Building / Concrete Pad
- Fence

Figure 17
Site Map of Drain and Septic Systems (DSS) AOC 1078, Bldg. 6640 Septic System, TA-III

0 15 30
Scale in Feet

0 3.6 7.2
Scale in Meters

Sandia National Laboratories, New Mexico
Environmental Geographic Information System

Evaluation of Relevant Information

Three assessment investigations have been conducted at this site. In late 1990 or early 1991, waste characterization samples were collected from the septic tank (Investigation 1). In March 2002, a backhoe was used to physically locate the buried drainfield lines (Investigation 2). In August 2002, subsurface soil samples were collected from three borings in the drainfield (Investigation 3).

Investigation 1—Septic Tank Sampling

Investigation 1 consisted of sampling efforts to characterize the waste contents of the septic tank for chemical and radiological contamination. The primary goal of the sampling was to identify types and concentrations of potential contaminants in the waste within the tank so that the appropriate waste disposal and remedial activities could be planned.

One round of waste characterization samples were collected from the Building 6640 septic tank. Aqueous samples collected in December 1990 or January 1991 were analyzed for SVOCs, oil and grease, phenolics, metals and gross beta activity. A sample was also submitted to the SNL/NM RPSD Laboratory for gamma spectroscopy analysis prior to off-site release.

Investigation 2—Backhoe Excavation

On March 18, 2002, a backhoe was used to determine the location, dimensions, and average depth of the AOC 1078 drainfield system. The drainfield was found to have four 45- to 50-ft-long parallel drain lines arranged as shown in Figure 17, with an average drain line depth of 5 ft bgs. No visible evidence of stained or discolored soil or odors was observed during the excavation. No samples were collected during the backhoe excavation.

Investigation 3—Soil Sampling

Once the system drain lines were located, soil sampling was conducted. An auger drill rig was used to sample all boreholes at two depth intervals. The top of the shallow interval started at the bottom of the drain lines, as determined by the backhoe excavation, and the lower (deep) interval started at 5 ft beneath the top sample interval. On August 23 and 26, 2002, soil samples were collected from the three drainfield boring locations shown on Figure 17.

Results for the six soil samples and one duplicate collected from the drainfield boreholes at AOC 1078 are summarized herein. Three VOCs (2-butanone, methylene chloride and toluene) were detected in soil samples from this site but were not detected in the associated TB. Trace levels of one SVOC (1,2-dichlorobenzene) were detected in two soil samples from this site. No HE compounds, PCB compounds or cyanide were detected in the SVOC samples. Arsenic was detected in one sample and barium was detected in three samples above Department-approved background levels. The other seven metals were all below background concentrations. For radionuclides, no measurements above background levels were detected in the gamma spectroscopy samples. However, although it was not detected, the MDA for uranium-235 exceeded the approved background level because the gamma spectroscopy count time (6,000

seconds) was not adequate to achieve a lower and more appropriate MDA. Regardless, the MDA was sufficiently low that the Department accepts the sampling results. No gross alpha or beta activity above background levels was detected in any of the samples.

A risk screening assessment was performed to evaluate the potential for adverse health effects for industrial and residential land-use scenarios. For both the industrial and residential land-use scenarios, the total human health HI and estimated excess cancer risks meet Department requirements (Table 17).

For the radiological COC (uranuim-235) a total effective dose equivalent (TEDE) was calculated that results in a TEDE of 2.0E-2 millirem (mrem)/year (yr). The estimated excess cancer risk is 2.6E-7.

Table 17
Risk Assessment Values for AOC 1078 Nonradiological COCs

COC	Maximum Concentration (All Samples) (mg/kg)	Industrial Land-Use Scenario[a]		Residential Land-Use Scenario[a]	
		Hazard Index	Cancer Risk	Hazard Index	Cancer Risk
Inorganic					
Arsenic	4.53	0.02	3E-6	0.21	1E-5
Barium	292	0.00		0.06	
Cyanide	0.0210[b]	0.00		0.00	
Organic					
2-Butanone	0.0184	0.00		0.00	
1,2-Dichlorobenzene	0.0402 J	0.00		0.00	
Methylene chloride	0.0027 J	0.00	2E-8	0.00	4E-8
Toluene	0.0006 J	0.00		0.00	
Total		**0.02**	**3E-6**	**0.27**	**1E-5**

[a]EPA 1989.
[b] Nondetected concentration (concentration listed is one-half of the maximum detection limit, used for a conservative risk assessment).
AOC = Area of Concern.
COC = Constituent of concern.
EPA = U.S. Environmental Protection Agency.
J = Estimated concentration.
mg/kg = Milligram(s) per kilogram.

The exposure pathway analysis established that no pathway exists for exposure of ecological species to contaminants at AOC 1078. All COCs are located at depths at or greater than 5 ft bgs. Therefore, no COCs are considered to be COPECs.

In conclusion, human health and ecological risks are acceptable under a residential land-use scenario.

Basis for Determination

AOC 1078 has been characterized or remediated in accordance with current applicable state and/or federal regulations, and the available data indicate that contaminants pose an acceptable level of risk under current and projected future land use.

AOC 1079, Building 6643 Septic System

Site Location

AOC 1079 is located in SNL/NM TA-III on federally owned land controlled by KAFB and permitted to the DOE. The site is located approximately 1.4 miles southwest of the entrance to TA-III and is on the northeast side of Building 6643 (Figure 18). The abandoned septic system consisted of a septic tank that emptied to a distribution box 40 ft away, which in turn emptied to three drainfield laterals, each approximately 30 ft long (Figure 18). Construction details are based upon engineering drawings, site inspections and backhoe excavations of the system. The system received discharges from Building 6643, approximately 110 ft to the southwest.

Operational History

Available information indicates that Building 6643, currently known as the Laser Optics Test Facility, was constructed in 1989, and its septic system was constructed at the same time. Because operational records are not available, the site investigation was planned to be consistent with other drain and septic system investigations and to sample for all possible COCs that may have been released during facility operations. In 1991, Building 6643 was connected to an extension of the COA sanitary sewer system. The old septic system line was disconnected and capped, and the system was abandoned in place concurrent with this change. On January 31, 1996, the residual contents, approximately 220 gallons of waste and added water, were pumped out. The septic tank was backfilled with clean soil on August 30, 2005 in accordance with 20.7.3.410 NMAC.

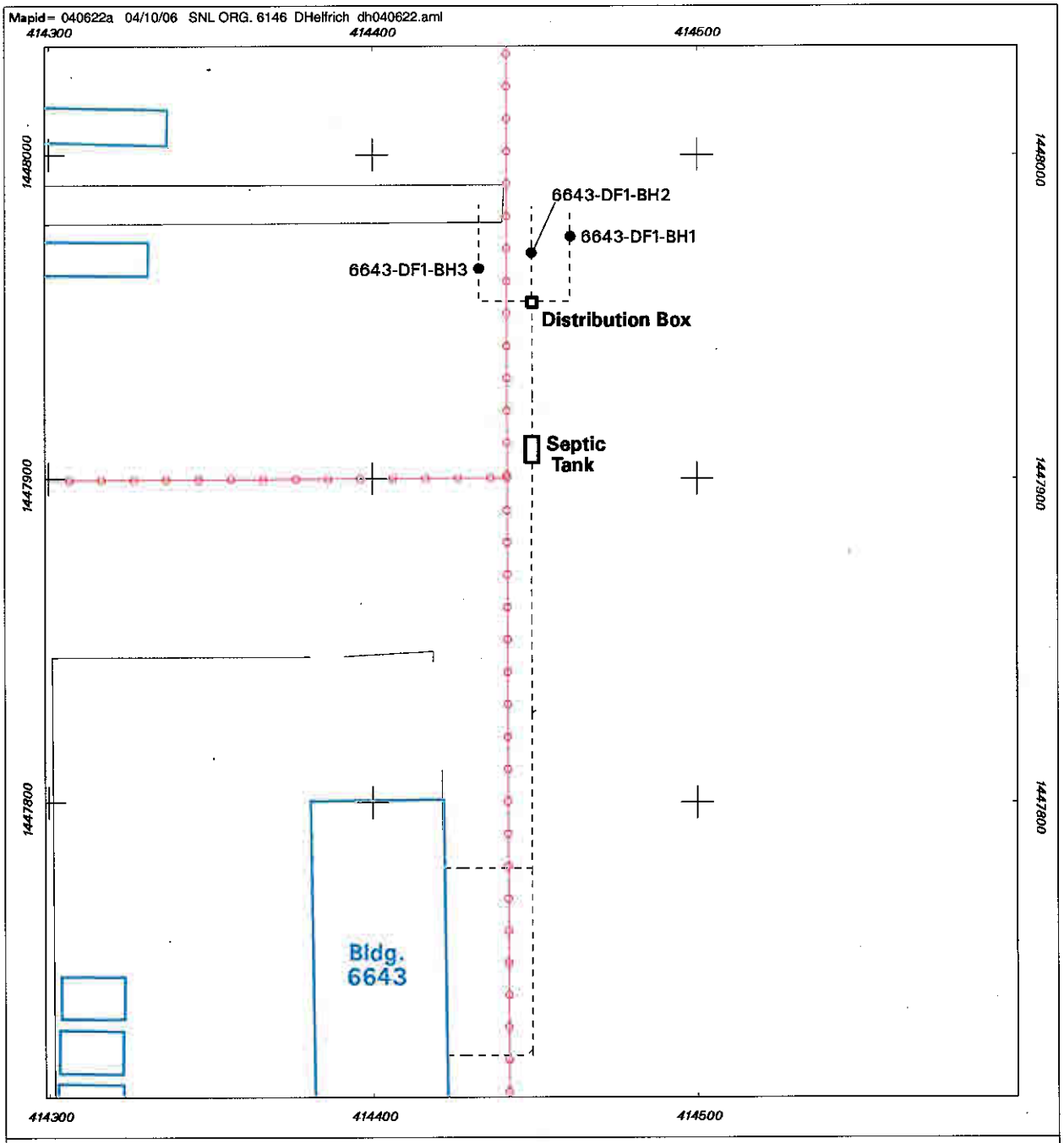
Evaluation of Relevant Information

The COCs include RCRA metals, hexavalent chromium, cyanide, PCBs, HE compounds, VOCs, SVOCs and radionuclides.

Three assessment investigations have been conducted at this site. In late 1990 or early 1991, 1992 and 1995 waste characterization samples were collected from the septic tank (Investigation 1). In March 2002, a backhoe was used to physically locate the buried drainfield lines (Investigation 2). In August 2002, soil samples were collected from three borings in the drainfield (Investigation 3).

Investigation 1—Septic Tank Sampling

Investigation 1 consisted of sampling efforts to characterize the waste contents of the septic tank for chemical and radiological contamination. The primary goal of the sampling was to identify



Legend

- Soil Boring Location
- Septic Tank / Distribution Box
- Drain Line
- Building / Structure
- Fence
- Edge of Pavement / Parking

Figure 18
Site Map of Drain and Septic Systems (DSS) AOC 1079, Bldg. 6643 Septic System, TA-III

0 25 50
Scale in Feet

0 6 12
Scale in Meters

N

Sandia National Laboratories, New Mexico
Environmental Geographic Information System

types and concentrations of potential contaminants in the waste within the tank so that the appropriate waste disposal and remedial activities could be planned.

Aqueous and/or sludge samples for waste characterization were collected from the Building 6643 septic tank in late 1990 or early 1991, 1992 and 1995. The 1990 or 1991 aqueous sample was analyzed at an off-site laboratory for VOCs, oil and grease, metals, uranium-235, uranium-238 and gross alpha/beta activity. The 1992 sludge sample was analyzed at an off-site laboratory for gross alpha/beta activity, tritium and radionuclides by gamma spectroscopy. The 1995 aqueous sample was analyzed for VOCs, SVOCs, pesticides, PCBs, metals, formaldehyde, fluoride, nitrate/nitrite, oil and grease, total phenol, radionuclides by gamma spectroscopy, isotopic uranium, tritium and gross alpha/beta activity. A fraction of each sample was also submitted to the SNL/NM RPSD Laboratory for gamma spectroscopy analysis prior to off-site release.

Investigation 2—Backhoe Excavation

On March 13 and 14, 2002, a backhoe was used to determine the location, dimensions and average depth of the AOC 1079 drainfield system. The drainfield was found to have three 30-ft-long laterals, with an average drain line depth of 11 ft bgs. No visible evidence of stained or discolored soil or odors was observed during the excavation. No samples were collected during the backhoe excavation.

Investigation 3—Soil Sampling

Once the system drain lines were located, soil sampling was conducted. On August 22 and 23, 2002, soil samples were collected from three drainfield boreholes. An auger drill rig was used to sample all boreholes at two depth intervals. The top of the shallow interval started at the bottom of the drain lines, as determined by the backhoe investigation, and the lower (deep) interval started at 5 ft below the top of the upper interval. Soil boring locations are shown on Figure 18. Results for the six soil samples collected from the three drainfield boreholes at AOC 1079 are summarized below.

For VOCs, methylene chloride was detected in all six soil samples collected; 2-butanone was detected in two of the soil samples collected. One SVOC, fluorene, was detected in the 16-ft-bgs sample from BH3. No other SVOCs were detected in these samples. No PCBs, or HE compounds were detected in the six soil samples. Cyanide was detected in the 16-ft-bgs sample from BH2. None of the RCRA metal concentrations detected in the samples exceeded the corresponding Department-approved background concentrations.

For radionuclides, no activities above background activity levels were detected in any sample analyzed. However, although not detected, the MDAs for uranium-235 exceed the background activity because the standard gamma spectroscopy count time for soil samples (6,000 seconds) was not adequate to achieve a lower and more appropriate MDA. Regardless, the MDA was sufficiently low that the Department accepts the sampling results.

No gross beta activity above background levels was detected in any of the samples. Gross alpha activity slightly above the background level was measured in the 11- and 16-ft-bgs samples from BH2 and in the 16-ft-bgs sample from BH3.

A risk screening assessment was performed to evaluate the potential for adverse health effects for industrial and residential land-use scenarios. For both the industrial and residential land-use scenarios, the total human health HI and estimated excess cancer risk meet Department requirements (Table 18).

For the radiological COC (uranuim-235) a total effective dose equivalent (TEDE) was calculated that results in a TEDE of 2.1E-2 millirem (mrem)/year (yr). The estimated excess cancer risk is 2.8E-7.

The exposure pathway analysis established that no pathway exists for exposure of ecological species to contaminants at AOC 1079. All COCs are located at depths greater than 5 ft bgs. Therefore, no complete ecological exposure pathways exist at this site and no COCs are considered to be COPECs.

In conclusion, human health and ecological risks are acceptable under a residential land-use scenario.

Table 18
Risk Assessment Values for AOC 1079 Nonradiological COCs

COC	Maximum Concentration (mg/kg)	Industrial Land-Use Scenario[a]		Residential Land-Use Scenario[a]	
		Hazard Index	Cancer Risk	Hazard Index	Cancer Risk
Inorganic					
Cyanide	0.0511 J	0.00		0.00	
Organic					
2-Butanone	0.00685	0.00		0.00	
Fluorene	0.201	0.00		0.00	
Methylene chloride	0.0024 J	0.00	2E-8	0.00	3E-8
Total		**0.00**	**2E-8**	**0.00**	**3E-8**

[a]EPA 1989.
AOC = Area of Concern.
COC = Constituent of concern.
EPA = U.S. Environmental Protection Agency.
J = Estimated concentration.
mg/kg = Milligram(s) per kilogram.

Basis for Determination

AOC 1079 has been characterized or remediated in accordance with current applicable state and/or federal regulations, and the available data indicate that contaminants pose an acceptable level of risk under current and projected future land use.

AOC 1080, Building 6644 Septic System

Site Location

AOC 1080 is located in SNL/NM TA-III on federally owned land controlled by KAFB and permitted to the DOE. The site is located approximately 1.4 miles south of the entrance to TA-III. The abandoned septic system consisted of a 1,000-gallon septic tank and distribution box that emptied to three, approximately 20-ft-long, drainfield laterals (Figure 19). Construction details are based upon engineering drawings site inspections, and backhoe excavations of the system. The system received discharges from Building 6644, approximately 30 ft to the northeast.

Operational History

Available information indicates that Building 6644, currently a material assembly building was constructed in 1989, and it is assumed the septic system was constructed at the same time. Because operational records are not available, the site investigation was planned to be consistent with other drain and septic system investigations and to sample for all possible COCs that may have been released during facility operations. In 1991, Building 6644 was connected to an extension of the COA sanitary sewer system. The old septic system line was disconnected and capped, and the system was abandoned in place concurrent with this change. On February 20, 1996, the residual contents, approximately 395 gallons of waste and added water, were pumped out. The septic tank was backfilled in October 2004.

The COCs include RCRA metals, hexavalent chromium, cyanide, PCBs, HE compounds, VOCs, SVOCs and radionuclides.

Evaluation of Relevant Information

Three assessment investigations have been conducted at this site. In late 1990 or early 1991, 1992 and 1995, waste characterization samples were collected from the septic tank (Investigation 1). In March 2002, a backhoe was used to physically locate the drain lines at the site (Investigation 2). In August 2002, subsurface soil samples were collected from three borings in the drainfield (Investigation 3). These investigations are discussed in the following sections.

Investigation 1—Septic Tank Sampling

Investigation 1 consisted of sampling efforts to characterize the waste contents of the septic tank for chemical and radiological contamination. The primary goal of the sampling was to identify types and concentrations of potential contaminants in the waste within the tank so that the appropriate waste disposal and remedial activities could be planned.

Aqueous and sludge samples were collected from the Building 6644 septic tank. An aqueous sample collected in late 1990 or early 1991 was analyzed at an off-site laboratory for VOCs, SVOCs, oil and grease, nitrates/nitrites, phenolics, PCBs, metals, total cyanide, gross alpha/beta

activity, radionuclides by gamma spectroscopy, isotopic uranium, isotopic plutonium and tritium. The August 1992 sludge sample was analyzed at an off-site laboratory for gross alpha/beta activity, tritium, and radionuclides by gamma spectroscopy. The June 1995 aqueous sample was analyzed at an off-site laboratory for VOCs, SVOCs, pesticides, PCBs, metals, nitrate/nitrite, oil and grease, total phenol, fluoride, formaldehyde, gross alpha/beta activity, radionuclides by gamma spectroscopy, isotopic uranium and tritium.

Investigation 2—Backhoe Excavation

On March 14, 2002, a backhoe was used to determine the location, dimensions and average depth of the AOC 1080 drainfield system. The drainfield was found to have three laterals, with an average drain line depth of 5 ft bgs for the two southern laterals, and 6 ft bgs for the northernmost lateral. No visible evidence of stained or discolored soil or odors was observed during the excavation. No samples were collected during the backhoe excavation.

Investigation 3—Soil Sampling

Once the system drain lines were located, soil sampling was conducted. On August 26, 2002, soil samples were collected from three drainfield boreholes. An auger drill rig was used to sample all the boreholes at two depth intervals. The top of the shallow interval started at the bottom of the drain lines, as determined by the backhoe excavation, and the lower (deep) interval started at 5 ft below the top of the upper sample interval. Soil boring locations are shown on Figure 19.

Results for the six soil samples collected from the three drainfield boreholes are discussed in this paragraph. The VOC, methylene chloride was detected in every soil sample collected; 2-butanone was detected in all but one soil sample collected. A total of five SVOCs were detected in the shallow sample intervals at each of the three borehole locations. Four SVOCs were detected in the 5-ft-bgs sample in BH1, three SVOCs were detected in the 5-ft-bgs sample in BH2, and one SVOC was detected in the 6-ft-bgs sample in BH3. No SVOCs were detected in any of the three deep samples. One SVOC was detected in the EB associated with these samples. No HE compounds were detected in any of the samples. The PCB, aroclor-1254, was detected in the 10-ft-bgs sample from BH2. No other PCBs were detected in soil samples or the EB. For RCRA metals, none of the metal concentrations detected exceed Department-approved background concentrations. Cyanide was detected in both samples from BH1 and in the 10-ft-bgs sample in BH2. Cyanide was not detected in the EB. For radionuclides, uranium-235 was detected above background levels in the 11-ft-bgs sample from BH3. Also, although not detected, the MDAs for three of the uranium-235 analyses exceeded the background activity level because the standard gamma spectroscopy count time for soil samples (6,000 seconds) was not adequate to achieve a lower and more appropriate MDA. Regardless, the MDAs were

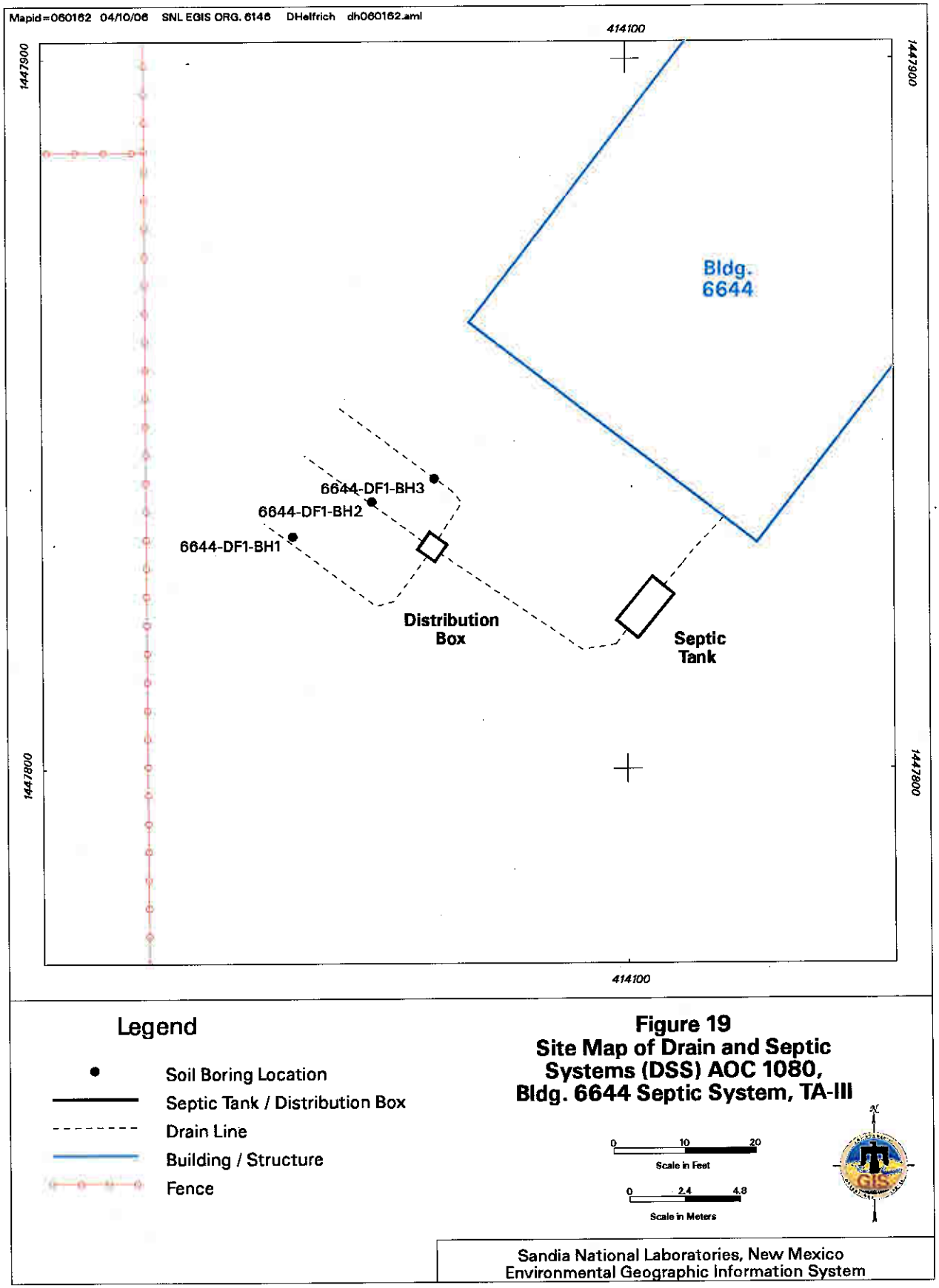


Figure 19
Site Map of Drain and Septic Systems (DSS) AOC 1080, Bldg. 6644 Septic System, TA-III

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sufficiently low that the Department accepts the sampling results. Gross alpha activity above the background level was detected in the three soil samples.

A risk screening assessment was performed to evaluate the potential for adverse health effects for industrial and residential land-use scenarios. For the both industrial and residential land-use scenarios, the total human health HI and estimated excess cancer risk meet Department requirements (Table 19).

For the radiological COC (uranuim-235) a total effective dose equivalent (TEDE) was calculated that results in a TEDE of 3.6E-2 millirem (mrem)/year (yr). The estimated excess cancer risk is 3.4E-7.

The exposure pathway analysis established that no pathway exists for exposure of ecological species to contaminants at AOC 1080. All COCs are located at depths 5 ft bgs or greater. Therefore, no COCs are considered to be COPECs.

In conclusion, human health and ecological risks are acceptable under a residential land-use scenario.

Table 19
Risk Assessment Values for AOC 1080 Nonradiological COCs

COC	Maximum Concentration (mg/kg)	Industrial Land-Use Scenario[a]		Residential Land-Use Scenario[a]	
		Hazard Index	Cancer Risk	Hazard Index	Cancer Risk
Inorganic					
Cyanide	0.0994 J	0.00		0.00	
Organic					
Anthracene	0.0168 J	0.00		0.00	
2-Butanone	0.0148	0.00		0.00	
bis(2-Ethylhexyl) phthalate	0.0629 J	0.00	3E-10	0.00	1E-9
Fluoranthene	0.0205 J	0.00		0.00	
Fluorene	0.201	0.00		0.00	
Methylene Chloride	0.00247 J	0.00	2E-8	0.00	3E-8
Pyrene	0.144	0.00		0.00	
Total		**0.00**	**2E-8**	**0.00**	**4E-8**

[a]EPA 1989.
AOC = Area of Concern.
COC = Constituent of concern.
EPA = U.S. Environmental Protection Agency.
J = Estimated concentration.
mg/kg = Milligram(s) per kilogram.

Basis for Determination

AOC 1080 has been characterized or remediated in accordance with current applicable state and/or federal regulations, and the available data indicate that contaminants pose an acceptable level of risk under current and projected future land use.

AOC 1081, Building 6650 Septic System

Site Location

AOC 1081 is located in SNL/NM TA-III on federally owned land controlled by KAFB and permitted to the DOE. The site is located approximately 5,400 ft southwest of the entrance to TA-III. The abandoned septic system is on the west side of Building 6650 and consisted of two individual septic systems (Figure 20). Each system consisted of a septic tank and distribution box connected to two seepage pits. Construction details are based upon engineering drawings and site inspections of the systems.

Operational History

Available information indicates that Building 6650, currently known as the Vibration Data and Control Center, was constructed in 1967, and it is assumed the original (southern) system was constructed at the same time. In the early 1980s the southern system was augmented or replaced by a second (northern) system. Because operational records are not available, the site investigation was planned to be consistent with other drain and septic system investigations and to sample for all potential COCs that may have been released during facility operations. By 1991, the septic system discharges were routed to the COA sanitary sewer system. The old septic system lines would have been disconnected, capped, and the system abandoned in place concurrent with this change. On February 21, 1996, the residual contents of the southern tank, approximately 710 gallons of waste and added water, were pumped out. The two septic tanks and four seepage pits were backfilled in August 2005 in accordance with 20.7.3.410 NMAC.

The COCs include RCRA metals, hexavalent chromium, cyanide, PCBs, HE compounds, VOCs, SVOCs and radionuclides.

Evaluation of Relevant Information

Six assessment investigations have been conducted at this site. In 1992 and 1995, waste characterization samples were collected from the assumed, southern septic tank, although it is not clear from the 1993 and 1995 septic tank sampling reports which of the two tanks were sampled (Investigation 1). In May 2002, a passive soil-vapor survey was conducted to determine whether areas of significant VOC contamination were present in soil around the seepage pits (Investigation 2). In August 2002, subsurface soil samples were collected from four borings drilled through the center of, and beneath, the seepage pits (Investigation 3). In May and June 2003, a 150-ft-deep, active soil-vapor monitoring well was installed at AOC 1081. This was one of seven AOCs selected for additional, deep soil-vapor monitoring (Investigation 4). In December 2004, a backhoe was used to physically locate and inspect the northern septic tank, as the tank access was covered by dirt (Investigation 5). Additional waste characterization samples were collected from the northern septic tank in July 2004 (Investigation 6). These investigations are discussed in the following sections.

Investigations 1 and 6—Septic Tank Sampling

Investigation 1 consisted of sampling efforts to characterize the waste contents of the septic tank for chemical and radiological contamination. The primary goal of the sampling was to identify types and concentrations of potential contaminants in the waste within the tank so that the appropriate waste disposal and remedial activities could be planned.

A sludge sample collected on August 17, 1992, was analyzed at an off-site laboratory for gross alpha/beta activity, tritium, and radionuclides by gamma spectroscopy. A fraction of the sample was also submitted to the SNL/NM RPSD Laboratory for gamma spectroscopy analysis prior to off-site release.

Aqueous samples collected on June 26, 1995, were analyzed at an off-site laboratory for VOCs, SVOCs, pesticides, PCBs, total metals, total phenol, nitrates/nitrites, formaldehyde, fluoride, oil and grease, gross alpha/beta activity, isotopic analysis for tritium and uranium, and radionuclides by gamma spectroscopy. A fraction of each sample was also submitted to the SNL/NM RPSD Laboratory for gamma spectroscopy analysis prior to off-site release.

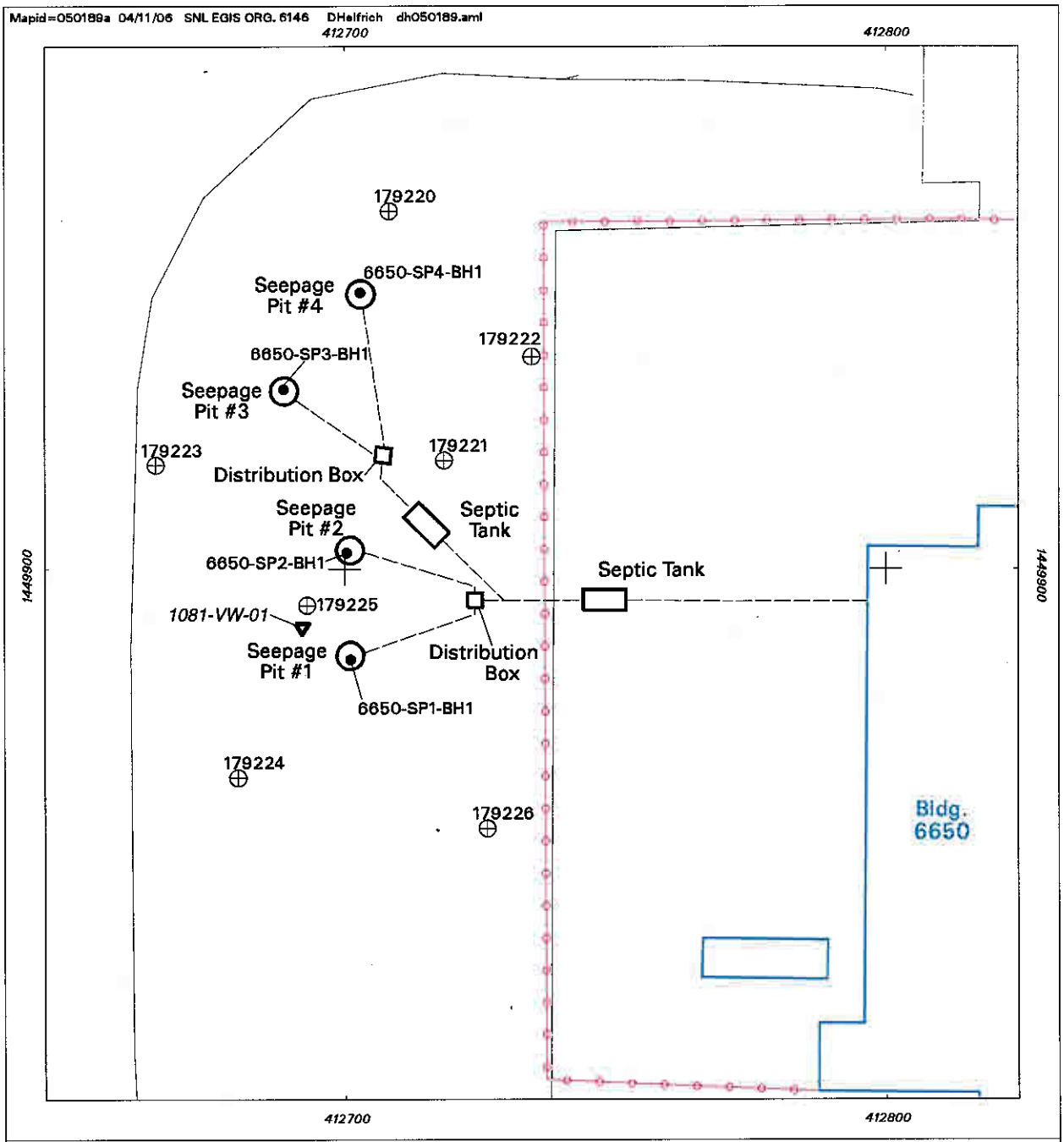
No information was available to determine whether samples or residual effluent had been removed from the northern septic tank in February 1996. It was therefore assumed that the northern tank contents had not been characterized or that the effluent had been removed from the tank.

The access cover to the northern tank was located and opened in December 2003 and the tank was found to still contain approximately 1.5 ft of liquid but no sludge. Waste characterization samples of the liquid were collected on July 12, 2004.

Investigation 2—Passive Soil-Vapor Sampling

In May 2002, a passive soil-vapor survey was conducted in the Building 6650 Septic System area. This survey was conducted to determine whether significant VOC contamination was present in soil at the site.

A total of seven GS passive soil-vapor samplers were placed in the seepage pit areas. Samplers were installed on May 6, 2002, and retrieved on May 21, 2002. The GS samplers were analyzed for a total of 30 individual or groups of VOCs, including TCE, tetrachloroethene, cis- and trans-dichloroethene and BTEX. Low to trace-level (but quantifiable) amounts of 14 individual or groups of VOCs were detected in the GS samplers.



Legend

- Borehole Location
- Gore-Sorber Sample Location
- Soil-Vapor Monitoring Well
- Fence
- Septic Tank / Seepage Pit / Distribution Box
- Paved & Unpaved Road
- Building / Structure
- Septic Drain Line

Figure 20
Site Map of Drain and Septic Systems (DSS) AOC 1081, Bldg. 6650 Septic System, TA-III

0 15 30
Scale in Feet

0 3.6 7.2
Scale in Meters

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in the seepage pit bottom, and the lower (deep) interval started at 5 ft below the top of the upper sample interval. Soil boring locations are shown on Figure 20.

Results for the eight soil samples collected from the four seepage pit boreholes collected at AOC 1081 are summarized in this paragraph. The VOC 2-butanone was detected in six of the eight samples collected. Both 2-butanone and methylene chloride were detected in the 12-ft-bgs sample from SP2-BH1. These compounds were not detected in the associated TB. The SVOC, Di-n-octyl phthalate, was detected in the 17-ft-bgs sample from SP2-BH1. The SVOC, bis(2-ethylhexyl) phthalate, was detected in the 10-ft-bgs sample from SP1-BH1 and in the 12- and 17-ft-bgs samples collected from SP2-BH1. No HE compounds were detected in the soil samples. Three PCB compounds (aroclor-1248, -1254 and -1260) were detected in the 10-ft-bgs sample and PCB aroclor-1254 was detected in the 15-ft-bgs sample from SP1-BH1. Aroclor-1254 and -1260 were detected in both the 12- and 17-ft-bgs samples collected from SP2-BH1, and aroclor-1260 was detected in the 17-ft-bgs sample collected from SP3-BH1. Five RCRA metals (arsenic, lead, chromium, mercury and silver) were detected above Department-approved background levels in the 10-ft-bgs sample collected from SP1-BH1. Lead and silver were detected above NMED-approved background levels in the 15-ft-bgs sample collected from SP1-BH1. Silver was detected above Department-approved background level in the 12- and 17-ft-bgs samples collected from SP2-BH1. Cyanide was detected in the 10- and 15-ft-bgs samples from SP1-BH1 and in the 12-ft-bgs sample collected from SP2-BH1. For radionuclides, no activities above background levels were detected in any sample analyzed. However, although not detected, the MDA for the uranium-235 analyses exceeded the corresponding background activity because the standard gamma spectroscopy count time for soil samples (6,000 seconds) was not adequate to achieve a lower and more appropriate MDA. Regardless, the MDA was sufficiently low that the Department accepts the sampling results. No gross alpha or beta activity above background levels was detected in any of the samples.

A risk screening assessment was performed to evaluate the potential for adverse health effects for industrial and residential land-use scenarios. For the industrial land-use scenario, the total HI and estimated excess cancer risk meet Department requirements (Table 20). However, the total HI and estimated excess cancer risk are unacceptable for the residential land-use scenario.

For the radiological COCs (uranuim-235 and uranium-238) a total effective dose equivalent (TEDE) was calculated that results in a TEDE of 7.0E-3 millirem (mrem)/year (yr). A TEDE of 15 mrem/yr is appropriate for an industrial land-use scenario. The estimated excess cancer risk is 5.9E-8.

The exposure pathway analysis established that no pathway exists for exposure of ecological species to contaminants at AOC 1081. All COCs are located at depths greater than 5 ft bgs. Therefore, no COCs are considered to be COPECs.

In conclusion, human health and ecological risks are acceptable under an industrial land-use scenario.

Table 20
Risk Assessment Values for AOC 1081 Nonradiological COCs

COC	Maximum Concentration (mg/kg)	Industrial Land-Use Scenario[a]		Residential Land-Use Scenario[a]	
		Hazard Index	Cancer Risk	Hazard Index	Cancer Risk
Inorganic					
Arsenic	8.54 J	0.03	5E-6	0.39	2E-5
Chromium, total	16.7 J	0.00		0.00	
Cyanide	0.115 J	0.00		0.00	
Mercury	0.126	0.00		0.01	
Silver	1690	0.35		4.44	
Organic					
2-Butanone	0.011	0.00		0.00	
Di-n-octyl phthalate	0.21 J	0.00		0.00	
bis(2-Ethylhexyl) phthalate	2.29	0.00	1E-8	0.00	5E-8
Methylene chloride	0.00143 J	0.00	9E-9	0.00	2E-8
Total		**0.39**	**5E-6**	**4.84**	**2E-5**

[a]EPA 1989.
AOC = Area of Concern.
COC = Constituent of concern.
EPA = U.S. Environmental Protection Agency.
J = Estimated concentration.
mg/kg = Milligram(s) per kilogram.

Basis for Determination

AOC 1081 has been characterized or remediated in accordance with current applicable state and/or federal regulations, and the available data indicate that contaminants pose an acceptable level of risk under current and projected future land use.

AOC 1084, Building 6505 Septic System

Site Location

AOC 1084 is located in SNL/NM TA-III on federally owned land controlled by KAFB and permitted to the DOE. The site is located approximately 3,400 ft southeast of the entrance to TA-III and is about 80 ft west of the corner of Building 6505 (Figure 21). The abandoned septic system consisted of a 325-gallon septic tank and distribution box that emptied to a 30-ft-long drain line with four branching laterals, each 60 ft long. Construction details are based upon engineering drawings, site inspections, backhoe excavations, and Geoprobe™ exploration of the system. The system received discharges from Building 6505, approximately 80 ft to the east.

Operational History

Available information indicates that Building 6505, currently known as the Thermal Spray Research Lab, was constructed in 1954, and it is assumed the septic system was constructed at

the same time. Because operational records are not available, the site investigation was planned to be consistent with other drain and septic system investigations and to sample for possible COCs that may have been released during facility operations. In June 1991, Building 6505 was connected to an extension of the COA sanitary sewer system. The old septic system line was disconnected and capped and the system was abandoned in place concurrent with this change.

The COCs include RCRA metals, hexavalent chromium, cyanide, PCBs, HE compounds, VOCs, SVOCs and radionuclides.

Evaluation of Relevant Information

Five assessment investigations have been conducted at this site. In late 1990 or early 1991, waste characterization samples were collected from the septic tank (Investigation 1). In March 2002, a backhoe was used to locate the buried drainfield lines (Investigation 2). In April 2002, a passive soil-vapor survey was conducted to determine whether areas of significant VOC contamination were present in soil around the drainfield (Investigation 3). In August 2002, six subsurface soil samples were collected from three borings in the drainfield area (Investigation 4). In December 2003, a Geoprobe™ was used to locate the septic tank and determine the contents of the tank (Investigation 5).

Investigation 1—Septic Tank Sampling

Investigation 1 consisted of sampling efforts to characterize the waste contents of the septic tank for chemical and radiological contamination. The primary goal of the sampling was to identify types and concentrations of potential contaminants in the waste within the tank so that the appropriate waste disposal and remedial activities could be planned.

In late 1990 or early 1991, as part of the SNL/NM Septic System Monitoring Program, an aqueous sample was collected from the Building 6505 septic tank. The aqueous samples were analyzed at an off-site laboratory for SVOCs, oil and grease, phenolic compounds, metals, gross beta activity and uranium-238. A fraction of each sample was also submitted to the SNL/NM RPSD Laboratory for gamma spectroscopy analysis prior to off-site release.

Investigation 2—Backhoe Excavation

On March 11, 2002, a backhoe was used to determine the location, dimensions, and average depth of the AOC 1084 drainfield system. Excavation began in the vicinity of the drainfield lines. The drainfield was found to have four laterals with an average drain line depth of 3 ft bgs. The north drain line was followed east to the point where it continued under the paved asphalt area (Figure 21). The backhoe work was stopped at this point in order to prevent damage to the asphalt pavement. No visible evidence of stained or discolored soil or odors was observed during the excavation. No samples were collected during the backhoe excavation.

Investigation 3—Passive Soil-Vapor Sampling

In late April 2002 and early May 2002, a passive soil-vapor survey was conducted in the Building 6505 Septic System area. This survey was conducted to determine whether significant VOC contamination was present in soil at the site.

A total of five GS passive soil-vapor samplers were placed in the drainfield area. Samplers were installed on April 29, 2002, and retrieved on May 14, 2002. The GS samplers were analyzed for a total of 30 individual or groups of VOCs, including TCE, tetrachloroethene, cis- and trans-dichloroethene and BTEX. Low to trace-level (but quantifiable) amounts of 17 individual or groups of VOCs were detected in the GS samplers.

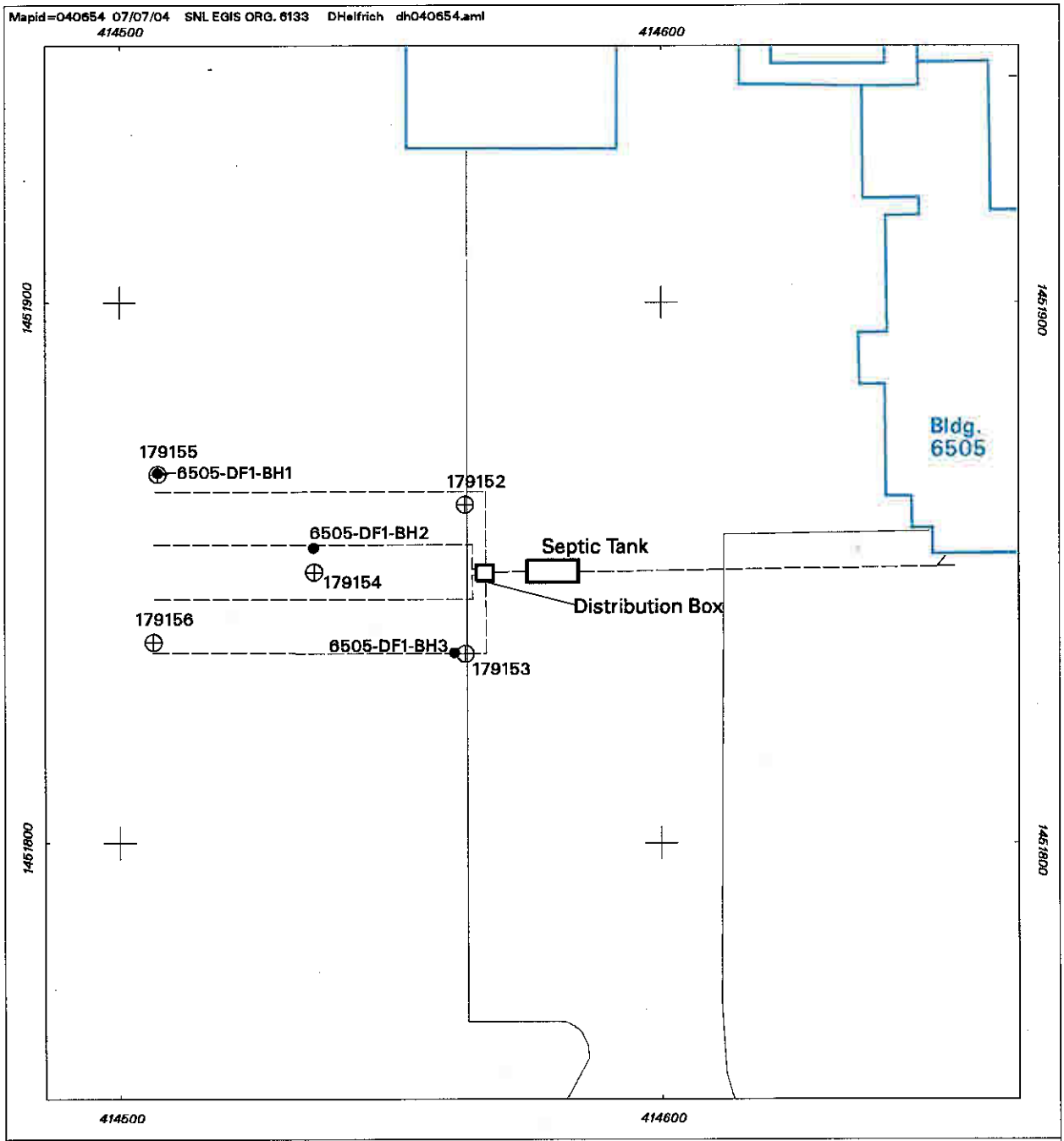
Investigation 4—Soil Sampling

Once the system drain lines were located, soil sampling was conducted. On August 20, 2002, soil samples were collected from three drainfield boreholes. Soil boring locations are shown on Figure 21.

Results for the six soil samples and one duplicate soil sample collected from the three drainfield boreholes are summarized in this paragraph. One VOC, 2-butanone, was detected in the 3-ft-bgs sample and the duplicate sample from BH2 and in the 8-ft-bgs samples from BH2 and BH3. This compound was not detected in the associated TBs. No SVOCs, or HE compounds were detected in any of the samples collected from the boreholes. One PCB, aroclor-1260, was detected in the 8-ft-bgs sample from borehole BH2. Cyanide was detected in the 3-ft-bgs samples from boreholes BH2 and BH3 and in the 8-ft-bgs samples from boreholes BH1, BH2 and BH3. For RCRA metals, barium and chromium were detected above Department-approved background levels in the 3-ft-bgs and the 8-ft-bgs samples, respectively, from borehole BH3. All other metal concentrations were below their corresponding Department-approved background concentrations. For radionuclides, no activities above background levels were detected in any of the samples analyzed. However, although not detected, the MDA for most of the uranium-235 analyses exceeded the respective background activity level because the standard gamma spectroscopy count time for soil samples (6,000 seconds) was not adequate to achieve a lower and more appropriate MDA. Regardless, the MDAs were sufficiently low that the Department accepts the sampling results. No gross alpha or beta activity above background levels was detected in any of the samples.

A risk screening assessment was performed to evaluate the potential for adverse health effects for industrial and residential land-use scenarios. For both the industrial and residential land-use scenarios, the total human health HI and estimated excess cancer risk meet Department requirements (Table 21).

For the radiological COC (uranuim-235) a total effective dose equivalent (TEDE) was calculated that results in a TEDE of 3.1E-2 millirem (mrem)/year (yr). The estimated excess cancer risk is 4.0E-7.



Legend

- Soil Boring Location
- Gore-Sorber Sample Location
- Septic Tank / Distribution Box
- Edge of Pavement
- Building / Structure
- Septic Drain Line

Figure 21
Site Map of Drain and Septic Systems (DSS) AOC 1084, Bldg. 6505 Septic System, TA-III

0 15 30
Scale in Feet

0 3.6 7.2
Scale in Meters

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Ecological risks associated with AOC 1084 are estimated through a risk assessment that incorporated site-specific information when available. All HQ values predicted for the COPECs at this site are found to be less than unity with the exception of barium. For barium, the contribution from background accounts for the majority (52 percent) of the HQ values. Based upon this final analysis, the potential for ecological risks associated with AOC 1084 is expected to be low.

In conclusion, human health and ecological risks are acceptable under a residential land-use scenario.

Table 21
Risk Assessment Values for AOC 1084 Nonradiological COCs

COC	Maximum Concentration (All Samples) (mg/kg)	Industrial Land-Use Scenario[a]		Residential Land-Use Scenario[a]	
		Hazard Index	Cancer Risk	Hazard Index	Cancer Risk
Inorganic					
Barium	411 J	0.01		0.08	
Chromium	20.2 J	0.00		0.00	
Cyanide	0.125 J	0.00		0.00	
Organic					
2-Butanone	0.0255	0.00		0.00	
Total		**0.01**		**0.08**	

[a]EPA 1989.
AOC = Area of Concern.
COC = Constituent of concern.
EPA = U.S. Environmental Protection Agency.
J = Concentration was qualified as an estimated value.
mg/kg = Milligram(s) per kilogram.

Basis for Determination

AOC 1084 has been characterized or remediated in accordance with current applicable state and/or federal regulations, and the available data indicate that contaminants pose an acceptable level of risk under current and projected future land use.

AOC 1087, Building 6743 Seepage Pit

Site Location

AOC 1087 is located in SNL/NM TA-III on federally owned land controlled by KAFB and permitted to the DOE. The site is located approximately 4,600 ft west of the entrance to, and along the northern boundary of TA-III. The seepage pit is approximately 4 ft in diameter and 8 ft deep. Construction details are based upon engineering drawings and site inspection of the system. The system received discharges from four floor drains inside Building 6743, approximately 25 ft to the north (Figure 22).

Operational History

Available information indicates that Building 6743, currently known as the Rocket Motor Conditioning Building, was constructed in 1967, and it is assumed the seepage pit system was constructed at the same time. The building operator stated that rainwater occasionally entered the building under a bay door and drained to the seepage pit via the one floor drain. The system was inspected in September 2004, at which time the floor drain system was still in use. The seepage pit was backfilled in July 2005 after all the inflow plumbing had been disconnected. Because operational records are not available, the site investigation was planned to be consistent with other drain and septic system investigations and to sample for all possible COCs that may have been released during facility operations.

The COCs include RCRA metals, hexavalent chromium, cyanide, PCBs, HE compounds, VOCs, SVOCs and radionuclides.

Evaluation of Relevant Information

Two assessment investigations have been conducted at AOC 1087. In April and May 2002, a passive soil-vapor survey was conducted to determine whether areas of significant VOC contamination were present in soil around the seepage pit (Investigation 1). In September 2002, subsurface soil samples were collected from a boring drilled through the center of, and beneath, the seepage pit (Investigation 2). These investigations are discussed in the following sections.

Investigation 1—Passive Soil-Vapor Sampling

In April and May 2002, a passive soil-vapor survey was conducted in the Building 6743 seepage pit area. This survey was conducted to determine whether significant VOC contamination was present in soil at the site. A total of four GS passive soil-vapor samplers were placed in the seepage pit area. Samplers were installed on April 30, 2002, and retrieved on May 15, 2002. The GS samplers were analyzed for a total of 30 individual or groups of VOCs, including TCE, tetrachloroethene, cis- and trans-dichloroethene and BTEX. Low to trace-level (but quantifiable) amounts of 13 individual or groups of VOCs were detected in the GS samplers.

Investigation 2—Soil Sampling

On September 17, 2002, soil sampling was conducted. Two soil samples were collected from a borehole drilled through, and beneath, the seepage pit. An auger drill rig was used to sample the boreholes at two depth intervals. A shallow sample interval was sampled starting at the estimated base of the gravel aggregate in the seepage pit bottom, and a lower (deep) interval was sampled starting at 5 ft below the top of the upper sample interval. The soil boring location is shown on Figure 22.

Results for the two soil samples collected from the seepage pit borehole at AOC 1087 are summarized in this paragraph. For VOCs, 2-butanone was detected at approximately the same concentration in both samples collected, but was not detected in the TB associated with these samples. Two SVOCs were detected in the 8-ft-bgs sample from the borehole. Neither cyanide

nor HE compounds were detected in either sample collected at this site. One PCB compound (aroclor-1254) was detected in both samples collected. The concentrations decreased with depth from 448 micrograms (µg)/kg in the 8-ft-bgs sample to 10.6 µg/kg in the 13-ft-bgs sample. For RCRA metals, lead and silver were detected above their Department-approved background concentrations in the 8-ft-bgs sample from the borehole. All other RCRA metal concentrations were below Department-approved background concentrations. For radionuclides, no measurements above background levels were detected in either sample.

However, although it was not detected, the MDA for uranium-235 in one sample exceeded the background activity level because the standard gamma spectroscopy count time for soil samples (6,000 seconds) was not adequate to achieve a lower and more appropriate MDA. Regardless, the MDA was sufficiently low that the Department accepts the sampling results. No gross alpha or beta activity was detected above background levels in any of the samples.

A risk screening assessment was performed for to evaluate the potential for adverse health effects for industrial and residential land-use scenarios. For both the industrial and residential land-use scenarios, the total human health HI and estimated excess cancer risk meet Department requirements (Table 22).

Table 22
Risk Assessment Values for AOC 1087 Nonradiological COCs

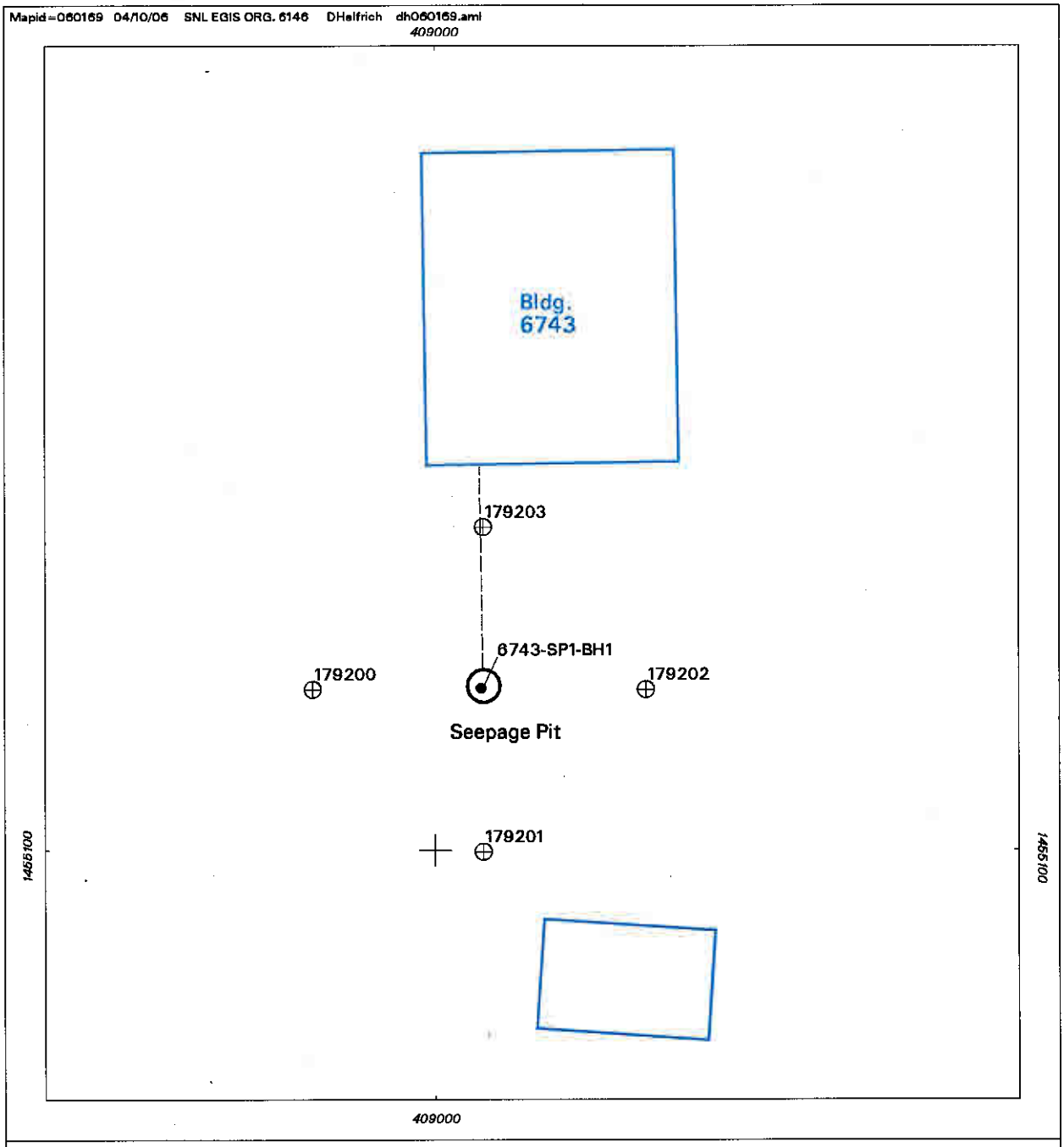
COC	Maximum Concentration (mg/kg)	Industrial Land-Use Scenario[a]		Residential Land-Use Scenario[a]	
		Hazard Index	Cancer Risk	Hazard Index	Cancer Risk
Inorganic					
Cyanide	0.0233[b]	0.00		0.00	
Silver	1.1	0.00		0.00	
Organic					
2-Butanone	0.0137	0.00		0.00	
Di-n-butyl phthalate	0.205 J	0.00		0.00	
bis(2-Ethylhexyl) phthalate	0.177 J	0.00	9E-10	0.00	4E-9
Total		**0.00**	**9E-10**	**0.00**	**4E-9**

[a]EPA 1989.

[b] Nondetected concentration (concentration listed is one-half of the maximum detection limit, used for a conservative risk assessment).

AOC = Area of Concern.
COC = Constituent of concern.
EPA = U.S. Environmental Protection Agency.
J = Estimated concentration.
mg/kg = Milligram(s) per kilogram.

For the radiological COC (uranuim-235) a total effective dose equivalent (TEDE) was calculated that results in a TEDE of 1.7E-2 millirem (mrem)/year (yr). The estimated excess cancer risk is 1.7E-7.



Legend

- Soil Boring Location
- Gore-Sorber Sample Location
- Seepage Pit
- Building / Structure
- Drain Line

Figure 22
Site Map of Drain and Septic Systems (DSS) AOC 1087, Bldg. 6743 Seepage Pit, TA-III

0 10 20
Scale in Feet

0 2.4 4.8
Scale in Meters

Sandia National Laboratories, New Mexico
Environmental Geographic Information System

The exposure pathway analysis established that no pathway exists for exposure of ecological species to contaminants at AOC 1087. All COCs are located at depths greater than 5 ft bgs. Therefore, no COCs are considered to be COPECs.

In conclusion, human health and ecological risks are acceptable under a residential land-use scenario.

Basis for Determination

AOC 1087 has been characterized or remediated in accordance with current applicable state and/or federal regulations, and the available data indicate that contaminants pose an acceptable level of risk under current and projected future land use.

AOC 1092, MO 228-230 Septic System

Site Location

AOC 1092 is located in SNL/NM TA-III on federally owned land controlled by KAFB and permitted to the DOE. The site is located approximately 800 ft southwest of the entrance to TA-III. The abandoned septic system is approximately 90 ft southwest of the former Mobile Office (MO) 228-230 complex, and consisted of a 3,000-gallon septic tank and distribution box that emptied to four branching drain line laterals, each approximately 70 ft long (Figure 23). Construction details are based upon engineering drawings, site inspections and backhoe excavations of the system.

Operational History

Available information indicates that the MO 228-230 complex was constructed in 1988, and it is assumed the septic system was constructed at the same time. The SNL/NM Protective Force was using the complex as office space when environmental characterization work was completed. Because operational records are not available, the site investigation was planned to be consistent with other drain and septic system investigations and to sample for all possible COCs that may have been released during facility operations. In 1991, septic system discharges were routed to the COA sanitary sewer system. The old septic system line would have been disconnected, capped, and the system abandoned in place concurrent with this change. The septic tank was probably backfilled in the early 1990s.

The COCs include RCRA metals, hexavalent chromium, cyanide, PCBs, HE compounds, VOCs, SVOCs and radionuclides.

Evaluation of Relevant Information

Four assessment investigations have been conducted at this site. In late 1990 or early 1991, waste characterization samples were collected from the septic tank (Investigation 1). In March 2002 and December 2003, a backhoe was used to physically locate the buried drainfield lines and buried, backfilled septic tank (Investigation 2). In September 2002, subsurface soil samples were

collected from three borings in the drainfield (Investigation 3). In June 2003, a 150-ft-deep, active soil-vapor monitoring well was installed. This was one of seven AOCs selected for additional, deep soil-vapor monitoring (Investigation 4).

Investigation 1—Septic Tank Sampling

Investigation 1 consisted of sampling efforts to characterize the waste contents of the septic tank for chemical and radiological contamination. The primary goal of the sampling was to identify types and concentrations of potential contaminants in the waste within the tank so that the appropriate waste disposal and remedial activities could be planned.

An aqueous sample collected in December 1990 or January 1991 was analyzed at an off-site laboratory for VOCs, SVOCs, oil and grease, phenolics, nitrates/nitrites, total cyanide, metals, PCBs, gross alpha/beta activity, radionuclides by gamma spectroscopy, isotopic uranium, isotopic plutonium and tritium.

Investigation 2—Backhoe Excavation

On March 28, 2002, a backhoe was used to determine the location, dimensions, and average depth of the drainfield system. The drainfield was found to have four laterals, with an average drain line depth of 6 ft bgs. No visible evidence of stained or discolored soil or odors was observed during the excavation. No samples were collected during the backhoe excavation.

No records were found to indicate that the septic tank had been sampled after late 1990 or early 1991 or that it had been pumped out. It was also unknown whether the tank was still intact, so additional backhoe and hand excavations were conducted on December 2, 2003, to uncover and inspect the septic tank. The remains of the cast concrete tank were found, and it was determined that the top of the unit had been removed and the tank had been cleaned out and backfilled with soil at some point in the past.

Investigation 3—Soil Sampling

Once the system drain lines were located, soil sampling was conducted. On September 9, 2002, soil samples were collected from three drainfield boreholes. An auger drill rig was used to sample all boreholes at two depth intervals. The top of the shallow interval started at the bottom of the drain lines, as determined by the backhoe excavation, and the lower (deep) interval started at 5 ft below the top of the upper sample interval. The soil boring locations are shown on Figure 23.

Results for the six soil samples collected from the three drainfield boreholes are discussed in this paragraph. Low concentrations of 2-butanone were detected in every soil sample collected, and low concentrations of acetone were also detected in three soil samples. These compounds were not detected in the associated TB. The SVOC, pyrene, was detected in the 11-ft-bgs sample from BH1. No other SVOCs were detected in these samples. Low concentrations of aroclor-1260 were detected in every sample except the 11-ft-bgs sample from BH1. No HE compounds were detected in any of the samples. Low concentrations of cyanide were detected in every

sample except the 11-ft-bgs sample from BH1. The RCRA metal, chromium, was detected at a concentration above Department-approved background levels in the 6-ft-bgs sample from BH1. Silver was detected at concentrations above Department-approved background concentrations in the 6-ft-bgs samples from each of the three boreholes. All other RCRA metal concentrations were below Department approved background levels. For radionuclides, uranium-235 was detected at activity levels above background levels in the 11-ft-bgs samples from BH1 and BH2. However, although not detected, the MDA values for the remaining uranium-235 analyses exceeded the respective background activity because the standard gamma spectroscopy count time for soil samples (6,000 seconds) was not adequate to achieve a lower and more appropriate MDA. Regardless, the MDAs were sufficiently low that the Department accepts the sampling results. No gross alpha or beta activity was detected above background levels in any of the samples.

Investigation 4—Active Soil-Vapor Sampling

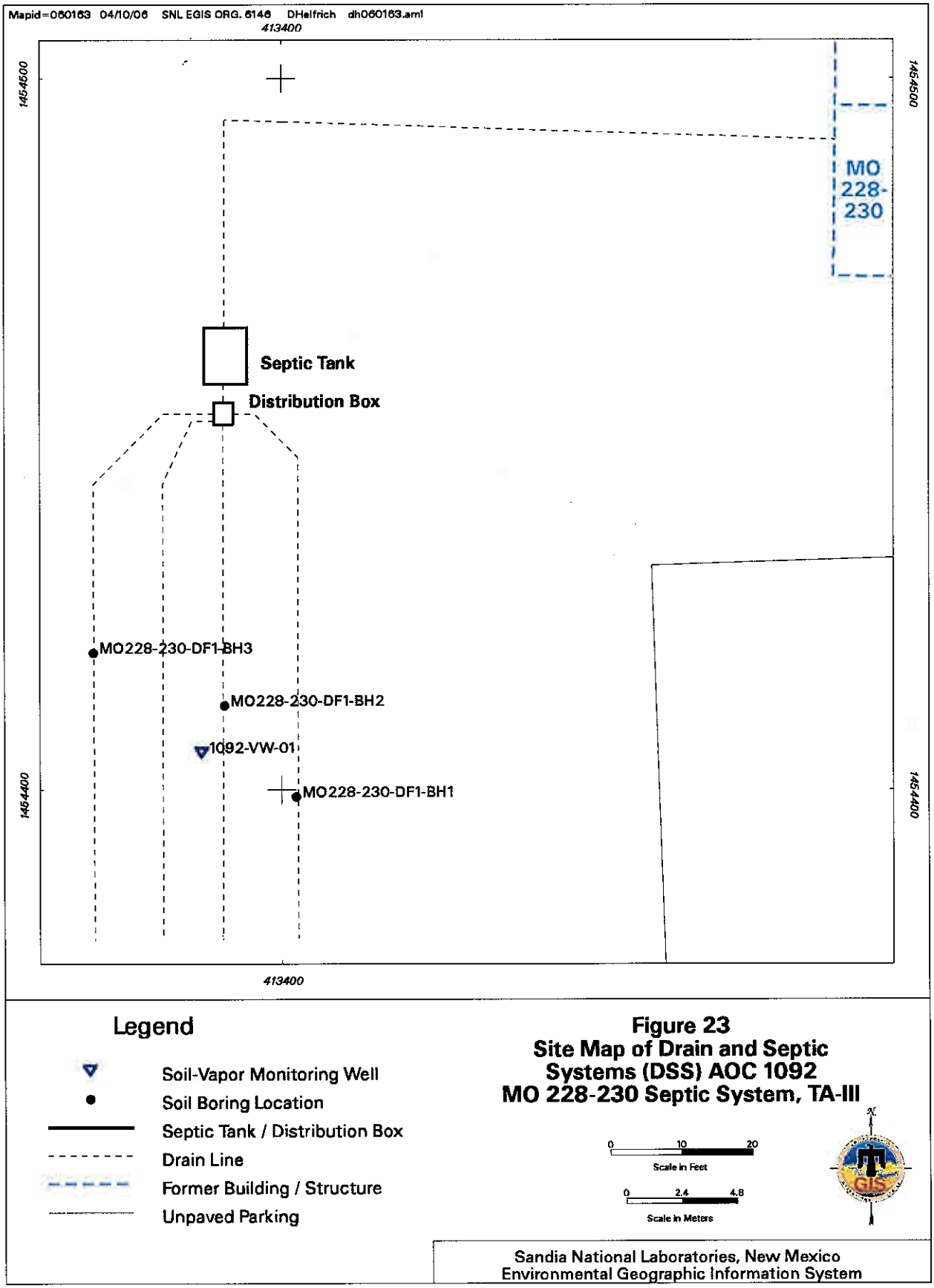
In June 2003, as part of the DSS investigation, a FLUTe™ soil-vapor monitoring well was installed at a location specified by the Department at AOC 1092. This vapor well was constructed in accordance with deep soil-vapor well design specifications in the Sampling and Analysis Plan. Soil-vapor well 1092-VW-01 (Figure 23) was 150 ft deep and had vapor sampling ports at depths of 5, 20, 70, 100 and 150 ft bgs. After installation, subsurface conditions were allowed to equilibrate for more than three months before the well was sampled on September 9, 2003. Soil-vapor samples from each of the five sampling depths were collected into special canisters and sent to an off-site laboratory for analysis. Total VOC soil-vapor concentrations ranged from a low of 0.394 ppmv in the 150-ft-bgs interval to a maximum of 2.418 ppmv in the 5-ft-bgs interval. Because the total VOC concentration in the 150-ft-bgs sample from this well was less than 10 ppmv, no additional soil-vapor sampling was required from this well and no additional soil-vapor or groundwater monitoring wells were required.

A risk screening assessment was performed to evaluate the potential for adverse health effects for industrial and residential land-use scenarios. For both the industrial and residential land-use scenarios, the total human health HI and estimated excess cancer risk meet Department requirements (Table 23).

For the radiological COCs (uranuim-235) a total effective dose equivalent (TEDE) was calculated that results in a TEDE of 9.8E-3 millirem (mrem)/year (yr). The estimated excess cancer risk is 8.2E-8.

The exposure pathway analysis established that no pathway exists for exposure of ecological species to contaminants at AOC 1092. All COCs are located at depths greater than 5 ft bgs. Therefore, no COCs are considered to be COPECs.

In conclusion, human health and ecological risks are acceptable under a residential land-use scenario.



Legend

- Soil-Vapor Monitoring Well
- Soil Boring Location
- Septic Tank / Distribution Box
- Drain Line
- Former Building / Structure
- Unpaved Parking

Figure 23
Site Map of Drain and Septic Systems (DSS) AOC 1092
MO 228-230 Septic System, TA-III

0 10 20
Scale in Feet

0 2.4 4.8
Scale in Meters

Sandia National Laboratories, New Mexico
Environmental Geographic Information System

Basis for Determination

AOC 1092 has been characterized or remediated in accordance with current applicable state and/or federal regulations, and the available data indicate that contaminants pose an acceptable level of risk under current and projected future land use.

Table 23
Risk Assessment Values for AOC 1092 Nonradiological COCs

COC	Maximum Concentration (mg/kg)	Industrial Land-Use Scenario[a]		Residential Land-Use Scenario[a]	
		Hazard Index	Cancer Risk	Hazard Index	Cancer Risk
Inorganic					
Chromium, total	30.4	0.00		0.00	
Cyanide	0.143 J	0.00		0.00	
Silver	21.5	0.00		0.06	
Organic					
Acetone	0.00438 J	0.00		0.00	
2-Butanone	0.0502	0.00		0.00	
Pyrene	0.134 J	0.00		0.00	
Total		**0.00**		**0.06**	

[a]EPA 1989.
AOC = Area of Concern.
COC = Constituent of concern.
EPA = U.S. Environmental Protection Agency.
J = Estimated concentration.
mg/kg = Milligram(s) per kilogram.

AOC 1098, TA-V Plenum Rooms Drywell

Site Location

AOC 1098 is located in SNL/NM TA-V on federally owned land controlled by KAFB and permitted to the DOE. The site is located approximately 240 ft east of the entrance to TA-V and approximately 10 ft south and west of the TA-V plenum rooms (Figure 24). The abandoned unit consisted of a gravel drywell. Construction details are based upon engineering drawings of the system. The unit received condensate discharge from the TA-V plenum rooms, which are connected by ductwork to a large exhaust stack in the northeast part of TA-V.

Operational History

Although no precise construction information is available, records indicate that the TA-V Plenum Rooms were in operation and discharging to the drywell since about 1958. Because operational records are not available, the site investigation was planned to be consistent with other drain and septic system investigations and to sample for all potential COCs that may have been released during facility operations. It is assumed that this drywell was deactivated in the early 1990s when the TA-V facilities were connected to an extension of the COA sanitary sewer

system. The two plenum room drain lines were re-routed to the sanitary sewer, the old drywell lines were disconnected, and the unit was bypassed and abandoned in place concurrent with this change.

The COCs include RCRA metals, hexavalent chromium, cyanide, PCBs, HE compounds, VOCs, SVOCs and radionuclides.

Evaluation of Relevant Information

One assessment investigation has been conducted at this site. In October 2002, subsurface soil samples were collected from a boring drilled near the northeast edge of the drywell based upon its location shown on engineering drawings (Investigation 1).

Investigation 1—Soil Sampling

On October 2, 2002, soil samples were collected from a drywell borehole. The boring was located on the northeast side of the drywell. The borehole was positioned to avoid hitting the existing and active drain lines from the plenum rooms, which could have been damaged had the boring been drilled in the center of the unit. An auger drill rig was used to sample the borehole at two depth intervals. The top of the shallow interval started at the estimated base of the drywell aggregate at 10 ft bgs, and the lower (deep) interval started at 5 ft below the top of the upper interval. The soil boring location is shown on Figure 24.

Only one VOC, 2-butanone, was detected in the samples collected from the borehole. Only bis(2-ethylhexyl) phthalate was detected in the 10-ft-bgs sample. This compound was not detected in the associated TB or EB. Six SVOCs (benzo(a)anthracene, benzo(a)pyrene, chrysene, fluoranthene, phenanthrene and pyrene) were detected in the 15-ft-bgs sample. No PCBs, HE compounds or cyanide were detected in any soil samples collected. The RCRA metal, chromium, was detected above Department-approved background levels in the15-ft-bgs sample. None of the remaining RCRA metal concentrations detected in these samples exceeded Department-approved background concentrations. For radionuclides, no activities above background levels were detected in any sample analyzed. However, although not detected, the MDA for uranium-235 exceeded the background activity in one of the samples because the standard gamma spectroscopy count time for soil samples (6,000 seconds) was not adequate to achieve a lower and more appropriate MDA. Regardless, the MDA was sufficiently low that the Department accepts the sampling results. No gross alpha or beta activity above background levels was detected in any of the samples.

A risk screening assessment was performed to evaluate the potential for adverse health effects for industrial and residential land-use scenarios. For both the industrial and residential land-use scenarios, the total human health HI and estimated excess cancer risks meet Department requirements (Table 24).

For the radiological COC (uranuim-235) a total effective dose equivalent (TEDE) was calculated that results in a TEDE of 1.2E-2 millirem (mrem)/year (yr). The estimated excess cancer risk is 1.7E-7.

The exposure pathway analysis established that no pathway exists for exposure of ecological species to contaminants at AOC 1098. All COCs are located at depths greater than 5 ft bgs. Therefore, no COCs are considered to be COPECs.

Table 24
Risk Assessment Values for AOC 1098 Nonradiological COCs

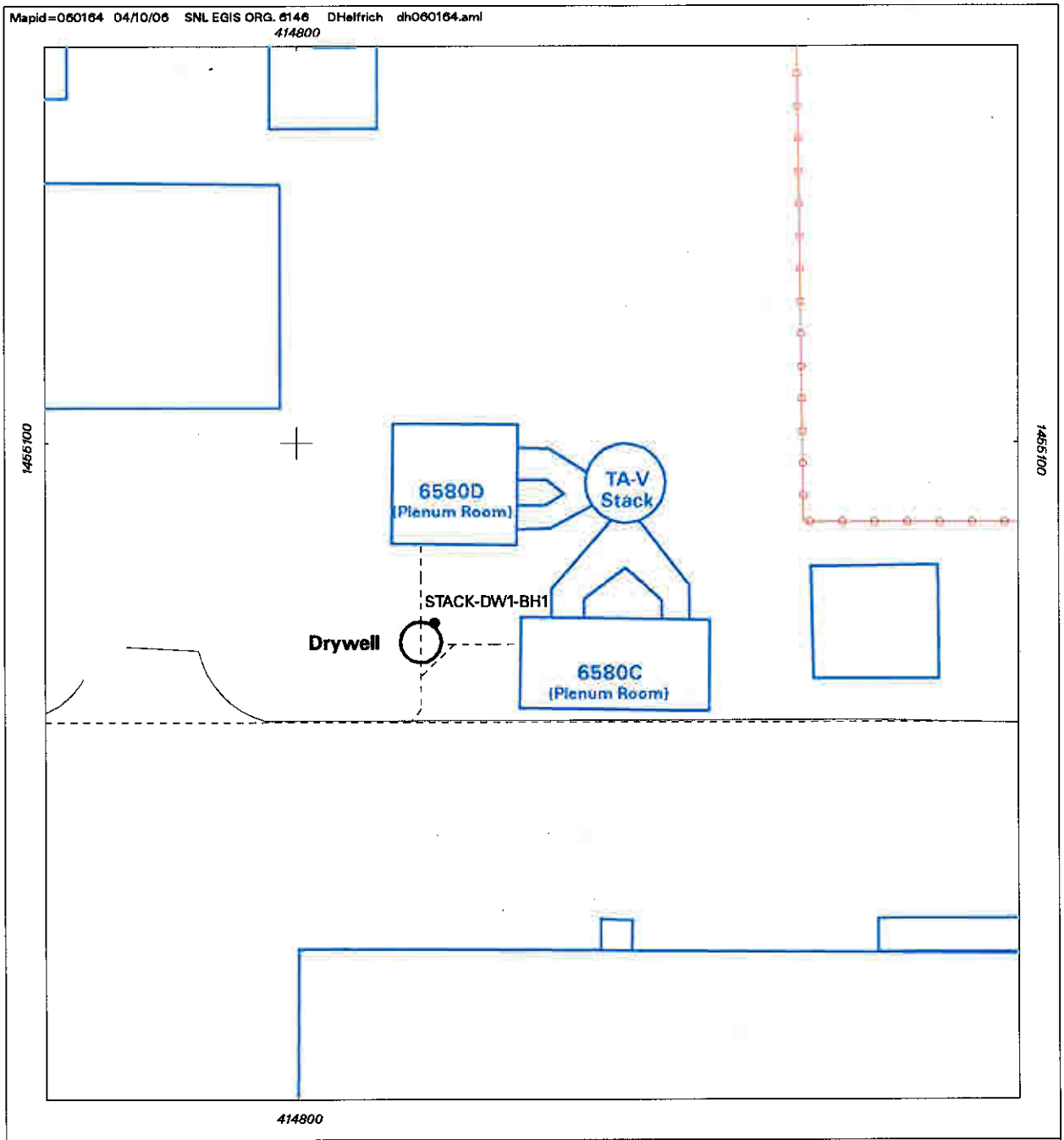
COC	Maximum Concentration (mg/kg)	Industrial Land-Use Scenario[a]		Residential Land-Use Scenario[a]	
		Hazard Index	Cancer Risk	Hazard Index	Cancer Risk
Inorganic					
Chromium, total	44	0.00		0.00	
Cyanide	0.021[b]	0.00		0.00	
Organic					
2-Butanone	0.0098	0.00		0.00	
Benzo(a)anthracene	0.0204 J	0.00	1E-8	0.00	3E-8
Benzo(a)pyrene	0.0171 J	0.00	8E-8	0.00	3E-7
Chrysene	0.018 J	0.00	9E-11	0.00	3E-10
bis(2-Ethylhexyl) phthalate	0.0303 J	0.00	2E-9	0.00	7E-9
Fluoranthene	0.0349	0.00		0.00	
Phenanthrene	0.0214 J	0.01		0.03	
Pyrene	0.0285 J	0.00		0.00	
Total		**0.01**	**9E-8**	**0.03**	**3E-7**

[a]EPA 1989.
[b] Nondetected concentration (concentration listed is one-half of the maximum detection limit, used for a conservative risk assessment).
AOC = Area of Concern.
COC = Constituent of concern.
EPA = U.S. Environmental Protection Agency.
J = Estimated concentration.
mg/kg = Milligram(s) per kilogram.

In conclusion, human health and ecological risks are acceptable under a residential land-use scenario.

Basis for Determination

AOC 1098 has been characterized or remediated in accordance with current applicable state and/or federal regulations, and the available data indicate that contaminants pose an acceptable level of risk under current and projected future land use.



Legend

- Soil Boring Location
- Drywell
- Drain Line
- Building / Structure / Ductwork
- Edge of Pavement
- Fence

Figure 24
Site Map of Drain and Septic Systems (DSS) AOC 1098, TA-V Plenum Rooms Drywell, TA-V

0 10 20
Scale in Feet

0 2.4 4.8
Scale in Meters

Sandia National Laboratories, New Mexico
Environmental Geographic Information System

AOC 1102, Former Building 899 Septic System

Site Location

AOC 1102 is located in SNL/NM TA-I on federally owned land controlled by KAFB and permitted to the DOE. The site is located approximately 700 ft north of the intersection of Hardin and 14th Streets. The septic tank and seepage pit are located approximately 20 and 40 ft south of the southwest corner of former Building 889 (Figure 25). The abandoned septic system consisted of a 500-gallon septic tank connected to a single 8-ft diameter and 25-ft deep seepage pit. Construction details are based upon engineering drawings, site inspections, and the backhoe excavation of the system.

Operational History

Available information indicates that former Building 889 was constructed in the early 1950s, and it is assumed the septic system was constructed at the same time. The building was demolished in the early 1990s, and it is assumed that the septic system was abandoned at that time. Because operational records are not available, the site investigation was planned to be consistent with other drain and septic system investigations and to sample for all potential COCs that may have been released during facility operations.

The COCs include RCRA metals, hexavalent chromium, cyanide, PCBs, HE compounds, VOCs, SVOCs and radionuclides.

Evaluation of Relevant Information

Three assessment investigations have been conducted at this site. In November 1992 and August 1995, waste characterization samples were collected from the septic tank (Investigation 1). In March 2002, a backhoe was used to physically locate the buried seepage pit (Investigation 2). In September 2002, subsurface soil samples were collected from a boring drilled through the center of, and beneath, the seepage pit (Investigation 3). These investigations are discussed below.

Investigation 1—Septic Tank Sampling

Investigation 1 consisted of sampling efforts to characterize the waste contents of the septic tank for chemical and radiological contamination. The primary goal of the sampling was to identify types and concentrations of potential contaminants in the waste within the tank so that the appropriate waste disposal and remedial activities could be planned. On November 10, 1992, and August 3, 1995, sludge samples were collected from the former Building 889 septic tank. The 1992 sludge samples were analyzed at an off-site laboratory for VOCs, SVOCs, pesticides, PCBs, explosives, total metals, phenolic compounds, nitrates/nitrites, formaldehyde, fluoride, cyanide, oil and grease, radium, gross alpha/beta activity, and tritium. The 1995 samples were also analyzed at an off-site laboratory for VOCs, SVOCs, pesticides, PCBs, metals, tritium, isotopic plutonium, strontium, thorium, and uranium, and radionuclides by gamma spectroscopy. A fraction of each sample was also submitted to the SNL/NM RPSD Laboratory for gamma spectroscopy analysis prior to off-site release.

Investigation 2—Backhoe Excavation

A field inspection was conducted on October 29, 1999, and four protective posts marked the presumed location of the septic tank, but no evidence of the tank itself was found. If the tank was still intact at the time, it was subsequently removed as part of the Microsystems and Engineering Science Applications facility construction activities. The seepage pit was located and determined to be intact. However, the interior of the seepage pit had been backfilled with soil and the depth of the unit could not be determined. On March 26, 2002, a backhoe was used to excavate along the outside of the unit to determine the average depth of the seepage pit. A hole was excavated to 13.5 ft bgs, the maximum excavation depth of the backhoe, but the base of the seepage pit was not reached. The total depth of the seepage pit was confirmed to be approximately 25 ft bgs during the subsequent soil sampling. No visible evidence of stained or discolored soil or odors was observed during the excavation. No samples were collected during the backhoe excavation at the site.

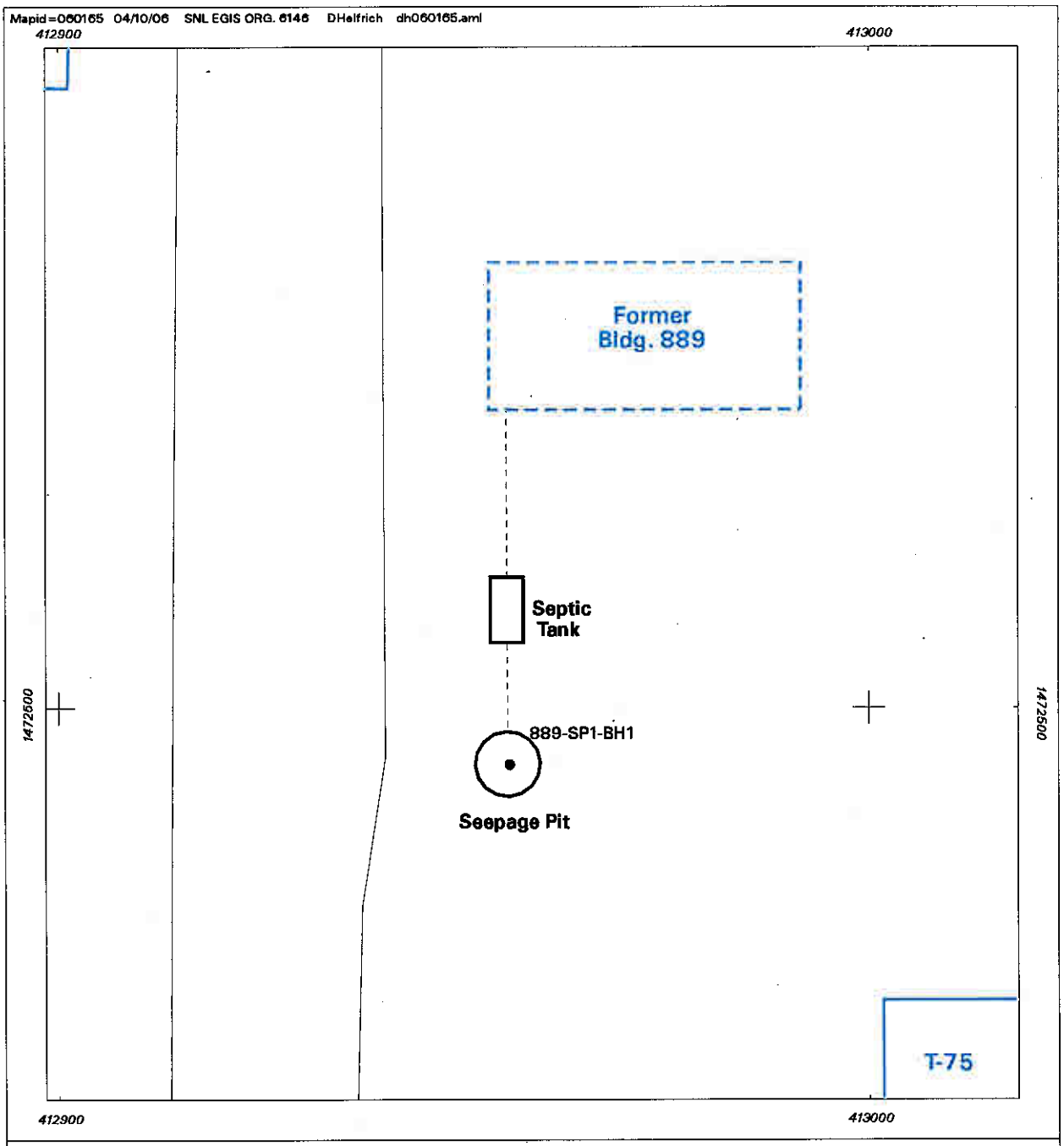
Investigation 3—Soil Sampling

Soil sampling was conducted on September 6, 2002. Soil samples were collected from a borehole drilled through the center of and beneath the seepage pit. An auger drill rig was used to sample the borehole at two depth intervals. The shallow sample interval started at the estimated base of the gravel aggregate in the seepage pit bottom, and the lower (deep) interval started at 5 ft below the top of the upper sample interval. The soil boring location is shown on Figure 25.

The VOC 2-butanone was detected in both samples collected from the borehole. This compound was not detected in the associated TB. Neither SVOCs nor HE compounds were detected in any of the soil samples collected. The PCB, aroclor-1260, was detected in both samples collected, although the method holding time was exceeded for both samples. None of the RCRA metal concentrations detected in the samples exceeded Department-approved background concentrations. Cyanide was detected in both soil samples. For radionuclides, uranium-235 was detected at an activity above background level in the 25-ft-bgs sample. Also, although not detected, the MDA for the uranium-235 analysis in the 30-ft-bgs sample exceeded the background activity level because the standard gamma spectroscopy count time for soil samples (6,000 seconds) was not adequate to achieve a lower and more appropriate MDA. Regardless, the MDA was sufficiently low that the Department accepts the sampling results. No gross alpha or beta activity above background levels was detected in any of the samples.

A risk screening assessment was performed to evaluate the potential for adverse health effects for industrial and residential land-use scenarios. For both the industrial and residential land-use scenarios, the total human health HI and estimated excess cancer risk meet Department requirements (Table 25).

For the radiological COC (uranuim-235) a total effective dose equivalent (TEDE) was calculated that results in a TEDE of 6.3E-2 millirem (mrem)/year (yr). The estimated excess cancer risk is 6.1E-7.



Legend

- Soil Boring Location
- Septic Tank / Seepage Pit
- Drain Line
- Former Building 889
- Paved Road
- Building / Structure

Figure 25
Site Map of Drain and Septic Systems (DSS) AOC 1102, Former Building 889 Septic System, TA-I

0 10 20
Scale in Feet

0 2.4 4.8
Scale in Meters

Sandia National Laboratories, New Mexico
Environmental Geographic Information System

The exposure pathway analysis established that no pathway exists for exposure of ecological species to contaminants at AOC 1102. All COCs are located at depths of 5 ft bgs or greater. Therefore, no COCs are considered to be COPECs.

In conclusion, human health and ecological risks are acceptable under a residential land-use scenario.

Basis for Determination

AOC 1102 has been characterized or remediated in accordance with current applicable state and/or federal regulations, and the available data indicate that contaminants pose an acceptable level of risk under current and projected future land use.

Table 25
Risk Assessment Values for AOC 1102 Nonradiological COCs

COC	Maximum Concentration (mg/kg)	Industrial Land-Use Scenario[a]		Residential Land-Use Scenario[a]	
		Hazard Index	Cancer Risk	Hazard Index	Cancer Risk
Inorganic					
Chromium VI	0.0262[b]	0.00	6E-11	0.00	1E-10
Cyanide	0.0833 J	0.00	–	0.00	–
Organic					
2-Butanone	0.0207	0.00	–	0.00	–
Total		**0.00**	**6E-11**	**0.00**	**1E-10**

[a]EPA 1989.
[b] Nondetected concentration (concentration listed is one-half of the maximum detection limit, used for a conservative risk assessment).
AOC = Area of Concern.
COC = Constituent of concern.
EPA = U.S. Environmental Protection Agency.
J = Estimated concentration.
mg/kg = Milligram(s) per kilogram.

AOC 1104, Building 6595 Seepage Pits

Site Location

AOC 1104 is located in SNL/NM TA-V on federally owned land controlled by KAFB and permitted to the DOE. The site is located approximately 465 ft east of the entrance to TA-V, and between the two TA-V perimeter security fences. The abandoned system consisted of a seepage pit approximately 8 ft deep. Construction details are based upon engineering drawings (SNL/NM Unknown Year) and site inspections of the system. The system received discharges from Building 6595, approximately 30 ft to the south (Figure 26).

Operational History

Available information indicates that Building 6595, currently known as the Irradiated Material Storage Facility, was constructed in 1966, and it is assumed that the seepage pit was constructed at the same time. Because operational records are not available, the site investigation was planned to be consistent with other drain and septic system investigations and to sample for the possible COCs that may have been released during facility operations. It is assumed that the seepage pit was deactivated in 1991 when the TA-V facilities were connected to an extension of the COA sanitary sewer system. The seepage pit lines would have been disconnected, capped and the system abandoned in place concurrent with this change.

The COCs include RCRA metals, hexavalent chromium, cyanide, PCBs, HE compounds, VOCs, SVOCs and radionuclides.

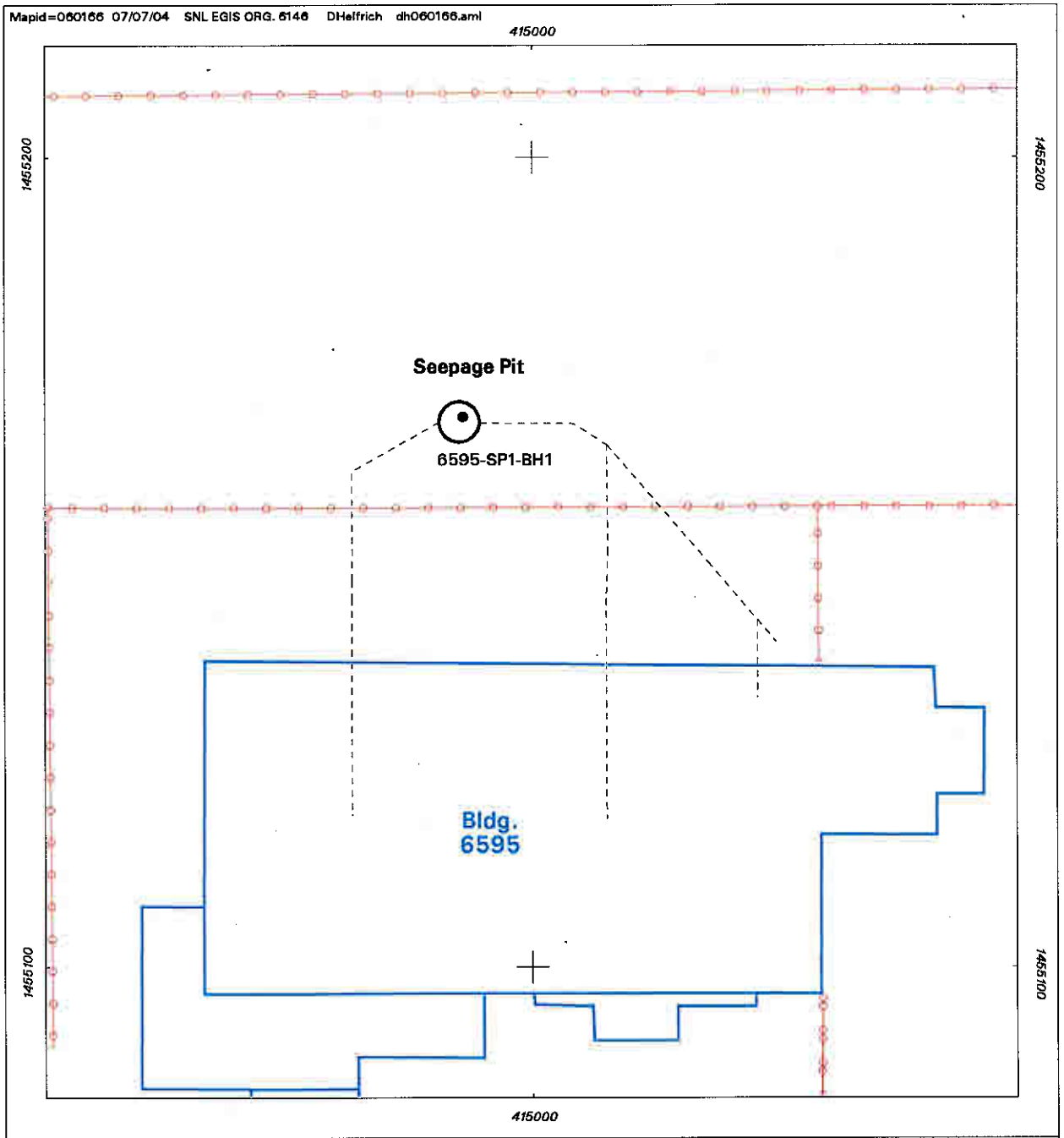
Evaluation of Relevant Information

One assessment investigation has been conducted at this site. In October 2002, soil samples were collected from a boring drilled through the center of, and beneath, the seepage pit.

On October 1, 2002, two soil samples were collected from a seepage pit borehole. The soil boring location is shown on Figure 26. Six VOCs (acetone, 2-butanone, ethylbenzene, 2-hexanone, tetrachloroethene and toluene) were detected in the 11-ft-bgs sample and eight VOCs (acetone, 2-butanone, ethylbenzene, styrene, tetrachloroethene, toluene, TCE and xylene) were detected in the 16-ft-bgs sample from BH1. These compounds were not detected in the associated TB. Five SVOCs (benzo[a]pyrene, bis[2-ethylhexyl] phthalate, fluorene, indeno[1,2,3-cd]pyrene and 2-methylnaphthalene) were detected in the 11-ft-bgs sample and three SVOCs (bis[2-ethylhexhyl] phthalate, fluorene and 2,4,5-trichlorophenol) were detected in the 16-ft-bgs sample. No PCBs or HE compounds were detected in any of the soil samples collected from the site. Cyanide was detected in both the 11- and 16-ft-bgs samples from the borehole. For RCRA metals, none of the metals were detected at concentrations above their corresponding Department-approved background concentrations. For radionuclides, no activities above background levels were detected in any sample analyzed. However, although not detected, the MDA for uranium-235 exceeded the background activity level because the standard gamma spectroscopy count time for soil samples (6,000 seconds) was not adequate to achieve a lower and more appropriate MDA. Regardless, the MDA was sufficiently low that the Department accepts the sampling results. No gross alpha or beta activity above background levels was detected in any of the samples.

A risk screening assessment was performed to evaluate the potential for adverse health effects in industrial and residential land-use scenarios. For both the industrial and residential land-use scenarios, the total human health HI and estimated excess cancer risk meet Department requirements (Table 26).

For the radiological COC (uranuim-235) a total effective dose equivalent (TEDE) was calculated that results in a TEDE of 2.6E-3 millirem (mrem)/year (yr). The estimated excess cancer risk is 3.4E-8.



Legend

- Soil Boring Location
- Seepage Pit
- Drain Line
- Building / Structure
- Fence

Figure 26
Site Map of Drain and Septic Systems (DSS) AOC 1104, Bldg. 6595 Seepage Pit, TA-V

0 10 20
Scale in Feet

0 2.4 4.8
Scale in Meters

N

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The exposure pathway analysis established that no pathway exists for exposure of ecological species to contaminants at AOC 1104. All COCs are located at depths greater than 5 ft bgs. Therefore, no complete ecological exposure pathways exist at this site and no COCs are considered to be COPECs.

In conclusion, human health and ecological risks are acceptable under a residential land-use scenario.

Basis for Determination

AOC 1104 has been characterized or remediated in accordance with current applicable state and/or federal regulations, and the available data indicate that contaminants pose an acceptable level of risk under current and projected future land use.

Table 26
Risk Assessment Values for AOC 1104 Nonradiological COCs

COC	Maximum Concentration (mg/kg)	Industrial Land-Use Scenario[a]		Residential Land-Use Scenario[a]	
		Hazard Index	Cancer Risk	Hazard Index	Cancer Risk
Inorganic					
Cyanide	0.158 J	0.00		0.00	
Organic					
Acetone	0.0588	0.00		0.00	
Benzo(a)pyrene	0.0193 J	0.00	4E-7	0.00	1E-6
2-Butanone	0.0142 J	0.00		0.00	
Ethylbenzene	0.00192 J	0.00	1E-10	0.00	3E-10
bis(2-Ethylhexyl) phthalate	3.6 J	0.00	2E-8	0.00	8E-8
Fluorene	0.575 J	0.00		0.00	
2-Hexanone	0.0043 J	0.00		0.00	
Indeno(1,2,3-cd)pyrene	0.0177 J	0.00	4E-8	0.00	1E-7
2-Methylnaphthalene	0.0377 J	0.00		0.00	
Styrene	0.0006 J	0.00		0.00	
Tetrachloroethene	0.0092 J	0.00	3E-9	0.00	6E-9
Toluene	0.0013 J	0.00		0.00	
Trichloroethene	0.0009 J	0.00	1E-8	0.00	2E-8
2,4,5-Trichlorophenol	0.193 J	0.00		0.00	
Xylene	0.0026 J	0.00		0.00	
Total		**0.00**	**5E-7**	**0.00**	**2E-6**

[a]EPA 1989.
AOC = Area of Concern.
COC = Constituent of concern.
EPA = U.S. Environmental Protection Agency.
J = Estimated concentration.
mg/kg = Milligram(s) per kilogram.

AOC 1113, Building 6597 Drywell

Site Location

AOC 1113 is located in SNL/NM TA-V on federally owned land controlled by KAFB and permitted to the DOE. The site is located approximately 650 ft southeast of the entrance to TA-V and approximately 28 ft east of Building 6597 (Figure 27). An inspection conducted at the site on July 15, 1999, indicated that the unit was apparently connected to a floor drain inside a small attached mechanical equipment room on the east side of Building 6597.

Operational History

Available information indicates that Building 6597, currently known as the Radiation Simulation Development Facility, was constructed in 1971, and it is assumed the drywell was constructed at the same time. Because operational records are not available, the site investigation was planned to be consistent with other drain and septic system investigations and to sample for potential COCs that may have been released during facility operations. An April 2002 backhoe excavation determined that the drain pipe to the drywell had been disconnected between the edge of the asphalt pavement and the drywell prior to the excavation of the unit.

The COCs include RCRA metals, hexavalent chromium, cyanide, PCBs, HE compounds, VOCs, SVOCs and radionuclides.

Evaluation of Relevant Information

Two assessment investigations have been conducted at AOC 1113. In April 2002, a backhoe was used to physically locate the buried Building 6597 drywell (Investigation 1). In September 2002, subsurface soil samples were collected from a boring drilled through the center of, and beneath, the drywell (Investigation 2). These investigations are discussed in the following sections.

Investigation 1—Backhoe Excavation

On April 4, 2002, a backhoe was used to determine the location, dimensions and depth of the drywell. It was found to consist of a 4-ft-square and 4-ft-deep unlined hole with a gravel aggregate layer from 2 to 4 ft bgs. The center of the unit was determined to be located approximately 28 ft east of the Building 6597 mechanical room. No visible evidence of stained or discolored soil or odors was observed during the excavation. No samples were collected during the backhoe excavation.

Investigation 2—Soil Sampling

Once the drywell was located, soil sampling was conducted. On September 26, 2002, soil samples were collected from a borehole drilled through the center of, and beneath, the drywell. An auger drill rig was used to sample the borehole at two depth intervals. The shallow sample interval started approximately 1 ft below the bottom of the aggregate to ensure that only soil, and

not aggregate, was collected in the samples, and the lower (deep) interval started at 5 ft below the top of the upper sample interval. The soil boring location is shown on Figure 27.

A total of eight individual VOCs were detected in the two VOC soil samples and none was detected in the associated TB. The SVOC bis(2-ethylhexyl) phthalate was detected in both soil samples. No PCBs compounds were detected in soil samples collected. Three HE compounds were detected in the samples. One HE compound (2-nitrotoluene) was detected in the 5-ft bgs sample, and two HE compounds (HMX and nitrobenzene) were detected in the 10-ft bgs sample. Low concentrations of cyanide were detected in both samples from the borehole. The RCRA metal, barium was detected above Department-approved background level in the 10-ft-bgs sample, and no other metal concentrations exceeded the background concentrations. For radionuclides, no activities above Department-approved background levels were detected in any sample analyzed. However, although not detected, the MDA for one of the uranium-235 analyses exceeded the background activity level because the standard gamma spectroscopy count time for soil samples (6,000 seconds) was not adequate to achieve a lower and more appropriate MDA. Regardless, the MDA was sufficiently low that the Department accepts the sampling results. No gross alpha or beta activity above background levels was detected in any of the samples.

A risk screening assessment was performed using maximum nonradiological COC concentrations to evaluate the potential for adverse health effects for industrial and residential land-use scenarios. For both the industrial and residential land-use scenarios, the total human health HIs and estimated excess cancer risk meet Department requirements (Table 27).

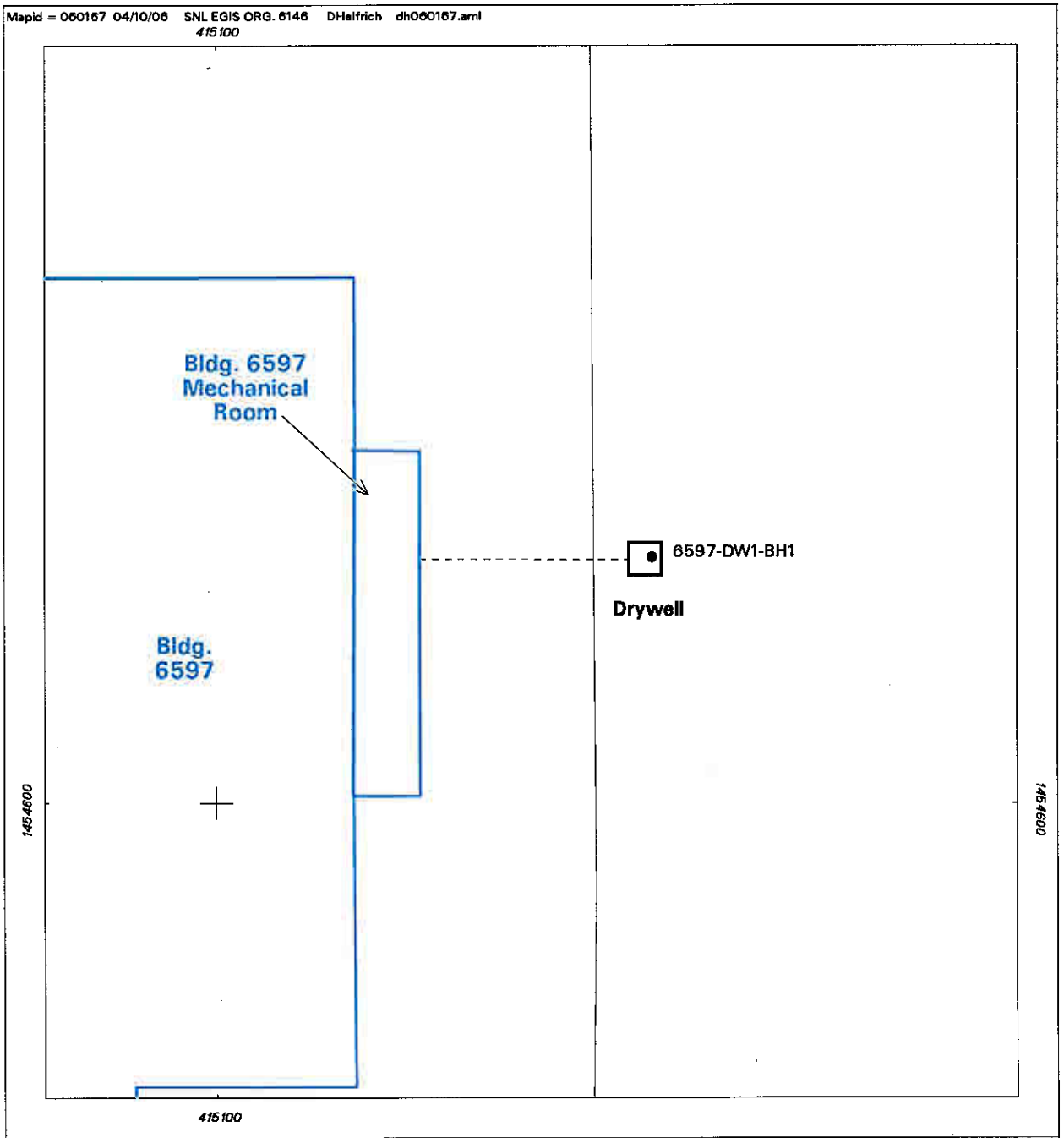
For the radiological COC (uranuim-235) a total effective dose equivalent (TEDE) was calculated that results in a TEDE of 1.7E-2 millirem (mrem)/year (yr). The estimated excess cancer risk is 1.6E-7.

The exposure pathway analysis established that no pathway exists for exposure of ecological species to contaminants at AOC 1113. All COCs are located at depths greater than 5 ft bgs. Therefore, no COCs are considered to be COPECs.

In conclusion, human health and ecological risks are acceptable under a residential land-use scenario.

Basis for Determination

AOC 1113 has been characterized or remediated in accordance with current applicable state and/or federal regulations, and the available data indicate that contaminants pose an acceptable level of risk under current and projected future land use.



Legend

- Soil Boring Location
- Drywell
- Drain Line
- Building / Structure
- Edge of Pavement

Figure 27
Site Map of Drain and Septic Systems (DSS) AOC 1113, Building 6597 Drywell, TA-V

0 10 20
Scale in Feet

0 2.4 4.8
Scale in Meters

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Table 27
Risk Assessment Values for AOC 1113 Nonradiological COCs

COC	Maximum Concentration (mg/kg)	Industrial Land-Use Scenario[a]		Residential Land-Use Scenario[a]	
		Hazard Index	Cancer Risk	Hazard Index	Cancer Risk
Inorganic					
Barium	303 J	0.00	–	0.06	–
Cyanide	0.573	0.00	–	0.00	–
Organic					
Acetone	0.256	0.00	–	0.00	–
2-Butanone	0.106 J	0.00	–	0.00	–
Ethylbenzene	0.00248 J	0.00	2E-10	0.00	4E-10
bis(2-Ethylhexyl) phthalate	3.92	0.00	2E-8	0.00	9E-8
2-Hexanone	0.142 J	0.00	–	0.00	–
HMX	0.106 J	0.00	–	0.00	–
4-Methyl-2-pentanone	0.0217 J	0.00	–	0.00	–
Nitrobenzene	1.41 J	0.02	–	0.08	–
2-Nitrotoluene	0.0921 J	0.00	–	0.00	–
Tetrachloroethene	0.0161 J	0.00	5E-9	0.00	1E-8
Toluene	0.0256	0.00	–	0.00	–
Xylene	0.0119 J	0.00	–	0.00	–
Total		**0.02**	**3E-8**	**0.14**	**1E-7**

[a]EPA 1989.
AOC = Area of Concern.
COC = Constituent of concern.
EPA = U.S. Environmental Protection Agency.
HMX = Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine.
J = Estimated concentration.
mg/kg = Milligram(s) per kilogram.

AOC 1120, Building 6643 Drywell

Site Location

AOC 1120 is located in TA-III on federally owned land controlled by KAFB and permitted to the DOE. The site is located approximately 1.4 miles southeast of the entrance to TA-III and is on the southeast side of Building 6643 (Figure 28). The abandoned drywell consisted of an approximately 7-ft-deep by 7-ft-square, unlined hole with approximately 4 ft of gravel in the bottom and a 2-inch inlet line entering 3 ft bgs. Construction details are based upon engineering drawings, site inspections and a backhoe excavation of the unit. The drywell received discharges from Building 6643, approximately 70 ft to the northwest.

Operational History

Available information indicates that Building 6643 was constructed in 1989, and it is assumed the drywell was constructed at the same time. Building 6643 is currently known as the Laser

Optics Test Facility. Because operational records are not available, the site investigation was planned to be consistent with other drain and septic system investigations and to sample for all possible COCs that may have been released during facility operations. In 1991, Building 6643 was connected to an extension of the COA sanitary sewer system. The drywell influent line was disconnected and capped and the system was abandoned in place concurrent with this change.

The COCs include RCRA metals, hexavalent chromium, cyanide, PCBs, HE compounds, VOCs, SVOCs and radionuclides.

Evaluation of Relevant Information

Three assessment investigations have been conducted at this site. In March 2002, a backhoe was used to physically locate the buried drywell (Investigation 1). In April and May 2002, a passive soil-vapor survey was conducted to determine whether areas of significant VOC contamination were present in soil around the drywell (Investigation 2). In August 2002, subsurface soil samples were collected from a boring drilled through the center of, and beneath, the drywell (Investigation 3). These investigations are discussed in the following sections.

Investigation 1—Backhoe Excavation

On March 20, 2002, a backhoe was used to determine the location, dimensions, and average depth of the drywell. The drywell was determined to consist of an approximately 7-ft-deep by 7-ft-square, unlined hole with approximately 4 ft of gravel in the bottom and a 2-inch inlet line entering the unit from the north at 3 ft bgs. No visible evidence of stained or discolored soil or odors was observed during the excavation. No samples were collected during the backhoe excavation at the site.

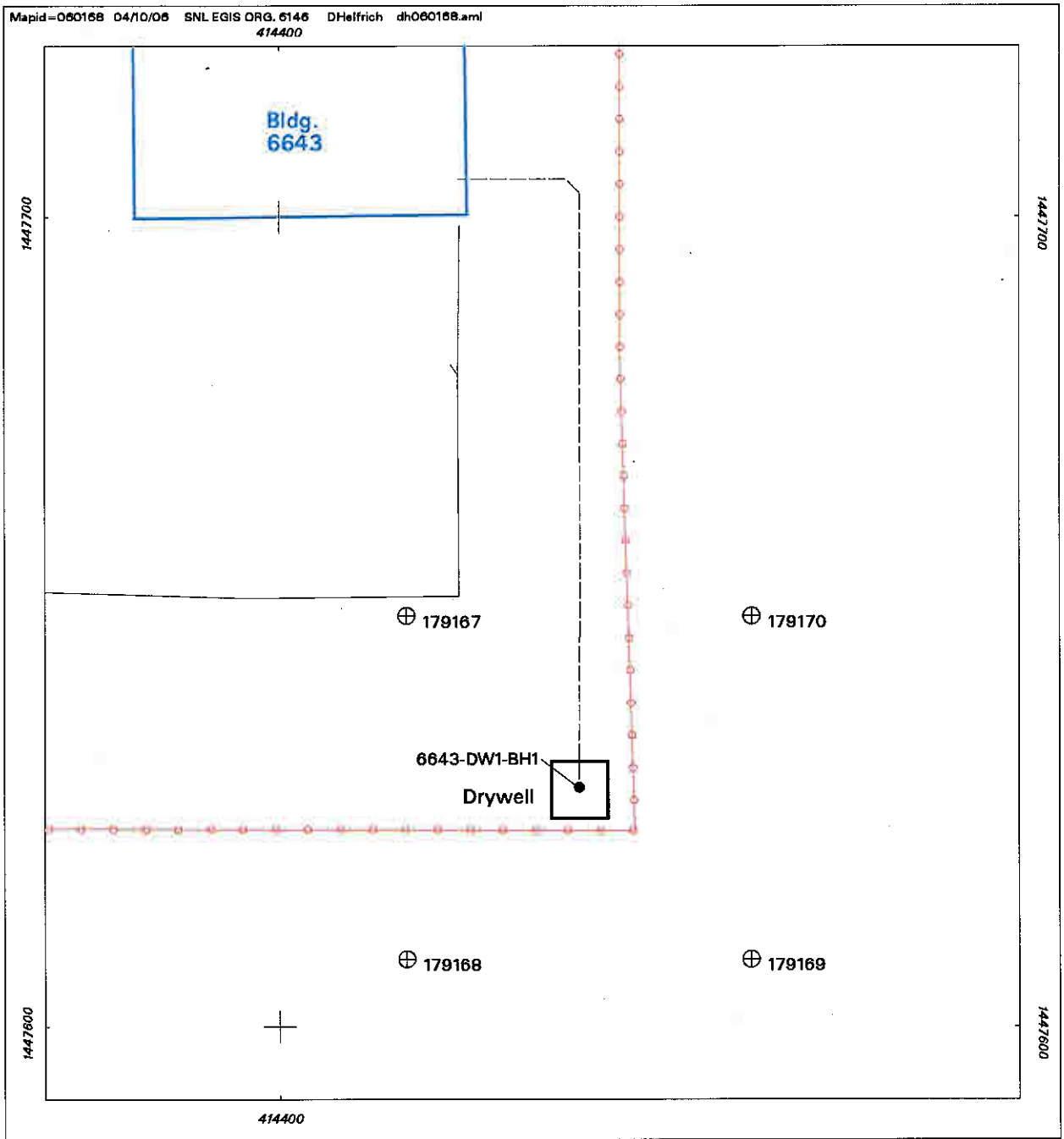
Investigation 2—Passive Soil-Vapor Sampling

In April and May 2002, a passive soil-vapor survey was conducted in the Building 6643 drywell area. This survey was conducted to determine whether significant VOC contamination was present in soil at the site.

A total of four GS passive soil-vapor samplers were installed in the drywell area on April 29, 2002, and retrieved on May 14, 2002. The GS samplers were analyzed for a total of 30 individual or groups of VOCs, including TCE, BTEX, tetrachloroethene and cis- and trans-dichloroethene. Low to trace-level (but quantifiable) amounts of 10 individual or groups of VOCs were detected in the GS samplers.

Investigation 3—Soil Sampling

Once the drywell was located, soil sampling was conducted. On August 22, 2002, soil samples were collected from a borehole drilled through, and beneath, the drywell. An auger drill rig was used to sample the borehole at two depth intervals. The shallow sample interval started at the base of the gravel aggregate in the bottom of the drywell, and the lower (deep) interval started 5 ft below the top of the upper interval. The soil boring location is shown on Figure 28.



Legend

- Soil Boring Location
- Gore-Sorber Sample Location
- Drywell
- Fence
- Edge of Pavement
- Building / Structure
- Septic Drain Line

Figure 28
Site Map of Drain and Septic Systems (DSS) AOC 1120, Bldg. 6643 Drywell, TA-III

0 10 20
Scale in Feet

0 2.4 4.8
Scale in Meters

N

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Two VOCs, 2-butanone and methylene chloride, were detected in both soil samples collected; however, they were not detected in the TB associated with these samples. Toluene was detected only in the TB associated with these samples. Eleven SVOCs were detected in the 8-ft-bgs sample and none were detected in the 13-ft-bgs sample. Neither PCBs nor HE compounds were detected in any soil samples collected. Cyanide was detected in both samples collected. None of the RCRA metal concentrations detected in these samples exceeded their Department-approved background concentrations. For radionuclides, no activities above background level were detected in any sample analyzed. However, although not detected, the MDA for uranium-235 for one of the uranium-235 analyses exceeded the background activity levels because the standard gamma spectroscopy count time for soil samples (6,000 seconds) was not adequate to achieve a lower and more appropriate MDA. Regardless, the MDA was sufficiently low that the Department accepts the sampling results. No gross alpha or beta activity above background levels was detected in any of the samples.

A risk screening assessment was performed using maximum nonradiological COC concentrations to evaluate the potential for adverse health effects for industrial and residential land-use scenarios. For both the industrial and residential land-use scenarios, the total human health HI and estimated excess cancer risk meet Department requirements (Table 28).

For the radiological COC (uranuim-235) a total effective dose equivalent (TEDE) was calculated that results in a TEDE of 1.7E-2 millirem (mrem)/year (yr). The estimated excess cancer risk is 1.6E-7.

The exposure pathway analysis established that no pathway exists for exposure of ecological species to contaminants at AOC 1120. All COCs are located at depths greater than 5 ft bgs. Therefore, no COCs are considered to be COPECs.

In conclusion, human health and ecological risks are acceptable under a residential land-use scenario.

Basis for Determination

AOC 1120 has been characterized or remediated in accordance with current applicable state and/or federal regulations, and the available data indicate that contaminants pose an acceptable level of risk under current and projected future land use.

Table 28
Risk Assessment Values for AOC 1120 Nonradiological COCs

COC	Maximum Concentration (mg/kg)	Industrial Land-Use Scenario[a]		Residential Land-Use Scenario[a]	
		Hazard Index	Cancer Risk	Hazard Index	Cancer Risk
Inorganic					
Cyanide	0.0669 J	0.00		0.00	
Organic					
2-Butanone	0.015	0.00		0.00	
Acenaphthene	0.00816 J	0.00		0.00	
Benzo(a)anthracene	0.0461	0.00	2E-8	0.00	7E-8
Benzo(a)pyrene	0.0344	0.00	2E-7	0.00	6E-7
Benzo(g,h,i)perylene	0.0194 J	0.00	9E-8	0.00	3E-7
Benzo(k)fluoranthene	0.0578	0.00	3E-9	0.00	9E-9
Chrysene	0.0446	0.00	2E-10	0.00	7E-10
Fluoranthene	0.105	0.00		0.00	
Fluorene	0.205	0.00		0.00	
Indeno(1,2,3-cd)pyrene	0.0272 J	0.00	1E-8	0.00	4E-8
Methylene Chloride	0.00225 J	0.00	1E-8	0.00	3E-8
Phenanthrene	0.0969	0.04		0.12	
Pyrene	0.0913	0.00		0.00	
Total		**0.04**	**3E-7**	**0.12**	**1E-6**

[a]EPA 1989.
AOC = Area of Concern.
COC = Constituent of concern.
EPA = U.S. Environmental Protection Agency.
J = Estimated concentration.
mg/kg = Milligram(s) per kilogram.

J. References

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