UNCONTROLLED

FEDERAL FACILITY AGREEMENT AND CONSENT ORDER (FFACO)
RECORD OF TECHNICAL CHANGE (ROTC)

Corrective Action Unit (CAU) Number: 415
CAU Description: Project 57 No. 1 Plutonium Dispersion (NTTR)
CAU Owner: Soils - Environmental Restoration (ER)

ROTC No. DOE/NV--1581-ROTC 2 **Page** 1 of 10

Document Type Closure Report (CR) **Date** 11/19/2019

The following technical changes (including justification) are requested by:

Tiffany Gamero
Requestor Name

Long-Term Monitoring Activity Lead
Requestor Title

Description of Change:

1. This ROTC replaces the Use Restriction (UR) information listed in the documentation for CAU 415.

   UR forms have been updated to list all UR requirements, including but not limited to: post-closure site controls (signs, fencing, etc.), inspection and maintenance requirements, and Geographic Information Systems (GIS) coordinate information. The UR requirements and form(s) included in this ROTC represent the current corrective action requirements for each Corrective Action Site (CAS) in this CAU and supersede information concerning corrective action and post-closure requirements in existing documentation.

Justification:

1. Some changes in the UR requirements from those found in closure documents have been subsequently modified in letters, memos, and inspection reports. This has resulted in difficulty in determining current post-closure requirements. A review of the post-closure requirements for this CAU has been conducted to ensure that all requirements have been identified and documented on the new UR form. The new UR form was developed to be inclusive of all requirements for long-term monitoring and standardize information contained in the URs consistent with current protocols.

Schedule Impacts:

No impacts to schedule.

FEDERAL FACILITY AGREEMENT AND CONSENT ORDER (FFACO)
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ROTC No. DOE/NV--1581-ROTC 2 **Page** 2 of 10

Document Type Closure Report (CR) **Date** 11/19/2019

ROTC applies to the following document(s):

- U.S. Department of Energy, Environmental Management Nevada Program. 2017. Closure Report for Corrective Action Unit 415: Project 57 No. 1 Plutonium Dispersion (NTTR), Nevada Test and Training Range, Nevada, Rev. 0, DOE/NV--1581. Las Vegas, NV.
- ROTC-1 for CAU 415 CR (DOE/NV--1581), dated 03/15/2018.

FEDERAL FACILITY AGREEMENT AND CONSENT ORDER (FFACO)
RECORD OF TECHNICAL CHANGE (ROTC)

Corrective Action Unit (CAU) Number: 415
CAU Description: Project 57 No. 1 Plutonium Dispersion (NTTR)
CAU Owner: Soils - Environmental Restoration (ER)

ROTC No. DOE/NV--1581-ROTC 2 **Page** 3 of 10

Document Type Closure Report (CR) **Date** 11/19/2019

Approvals:

/s/ Wilhelm R. Wilborn Date 12/9/19
Kevin Cabble for
Activity Lead
Environmental Management (EM) Nevada Program

/s/ Wilhelm R. Wilborn Date 12/9/19
Bill Wilborn
Deputy Program Manager, Operations
Environmental Management (EM) Nevada Program

/s/ Mark McLane Date 12/18/19
FOR Christine Andres
Chief, Bureau of Federal Facilities
Nevada Division of Environmental Protection (NDEP)

U.S. Department of Energy, Environmental Management Nevada Program
Use Restriction Information

General Information

Use Restriction (UR) Type(s): Both FFACO and Administrative

Corrective Action Unit (CAU) Number & Description: 415 - Project 57 No. 1 Plutonium Dispersion (NTTR)

Corrective Action Site (CAS) Number & Description: NAFR-23-02 - Pu Contaminated Soil

CAU/CAS Owner: Soils - ER

Note: N/A

Section I. *Federal Facility Agreement and Consent Order* (FFACO) UR

Basis for FFACO UR

Summary Statement: This FFACO UR is established to protect workers from inadvertent exposure to radiological contaminants that were released at this site. Radiological contaminants are present that exceed final action levels under the Industrial Area (2,000 hours per year) exposure scenario.

FFACO UR Physical Description

Surveyed Area (UTM, Zone 11, NAD 83, meters):

UR Boundary	UR Point[1]	Easting[2]	Northing[2]
FFACO Boundary	1	597,682	4,130,544
	2	596,462	4,130,545
	3	596,462	4,131,383
	4	597,679	4,131,381
	5	597,682	4,130,544

[1]UR Points are listed clockwise beginning at the southernmost point. If multiple points share the southernmost Northing coordinate, the easternmost point is listed as Point 1.

[2]UR Coordinate values presented herein were captured in North American Datum of 1983, and rounded to the nearest meter when necessary; due to that rounding, coordinates may not reflect the original precision of values contained within the source GIS data set.

Boundary Applies to: Both Surface and Subsurface

Starting Depth: 0 **Ending Depth:** 5

U.S. Department of Energy, Environmental Management Nevada Program
Use Restriction Information

Depth Unit: Meters

Survey Source: GIS

FFACO UR Requirements

Site Controls:

This FFACO UR is recorded as described in **Section IV. Recordation Requirements** to restrict activities within the area by the coordinates listed above and depicted in the attached figure without prior notification of NDEP unless the activities are conducted under the provisions of 10 CFR, Part 835, Occupational Radiation Protection and 10 CFR, Part 851, Worker Safety and Health Program.

Control	Criteria
Signage	Present and legible.

Inspection Frequency: Annual

Additional Considerations:

Consideration	Criteria
None	None

Requirements Comments: N/A

Section II. Administrative UR

Basis for Administrative UR

Summary Statement: This Administrative UR is established to protect workers should future land use result in increased exposure to site contaminants. Radiological contaminants are assumed to be present that exceed action levels under the Industrial Area (2,000 hours per year) exposure scenario. Removable contamination is present that exceeds the criteria for establishing a Contamination Area.

U.S. Department of Energy, Environmental Management Nevada Program
Use Restriction Information

Administrative UR Physical Description

Surveyed Area (UTM, Zone 11, NAD 83, meters):

UR Boundary	UR Point[1]	Easting[2]	Northing[2]
Admin Boundary	1	598,488	4,130,384
	2	596,405	4,130,393
	3	595,453	4,132,244
	4	596,158	4,132,927
	5	598,507	4,131,206
	6	598,488	4,130,384

[1]UR Points are listed clockwise beginning at the southernmost point. If multiple points share the southernmost Northing coordinate, the easternmost point is listed as Point 1.

[2]UR Coordinate values presented herein were captured in North American Datum of 1983, and rounded to the nearest meter when necessary; due to that rounding, coordinates may not reflect the original precision of values contained within the source GIS data set.

Boundary Applies to: Surface

Starting Depth: 0 **Ending Depth:** 5

Depth Unit: Centimeters

Survey Source: GIS

Administrative UR Requirements

Administrative URs do not require onsite postings or other physical barriers, and they do not require periodic inspections or maintenance.

Site Controls:

This Administrative UR is recorded as described in **Section IV. Recordation Requirements** to restrict activities within the area defined by the coordinates listed above and depicted in the attached figure without prior notification of NDEP unless the activities are conducted under the provisions of 10 CFR, Part 835, Occupational Radiation Protection and 10 CFR, Part 851, Worker Safety and Health Program.

U.S. Department of Energy, Environmental Management Nevada Program
Use Restriction Information

Section III. Supporting Documentation

UR Source Document(s)

ROTC 2 for CAU 415 CR (DOE/NV--1581), dated 11/19/2019.

ROTC-1 for CAU 415 CR (DOE/NV--1581), dated 03/15/2018.

U.S. Department of Energy, Environmental Management Nevada Program. 2017. Closure Report for Corrective Action Unit 415: Project 57 No. 1 Plutonium Dispersion (NTTR), Nevada Test and Training Range, Nevada, Rev. 0, DOE/NV--1581. Las Vegas, NV.

Attachments

- FFACO UR Boundary Map (UTM, Zone 11, NAD 83 meters)
- Administrative UR Boundary Map (UTM, Zone 11, NAD 83 meters)

Section IV. Recordation Requirements

Recordation:

The above UR(s) are recorded in the:

- FFACO Database
- NNSA M&O Contractor GIS
- USAF (Nellis Air Force Base Range Operations) GIS
- EM Nevada Program CAU/CAS Files

Section V. EM Nevada Program Approval

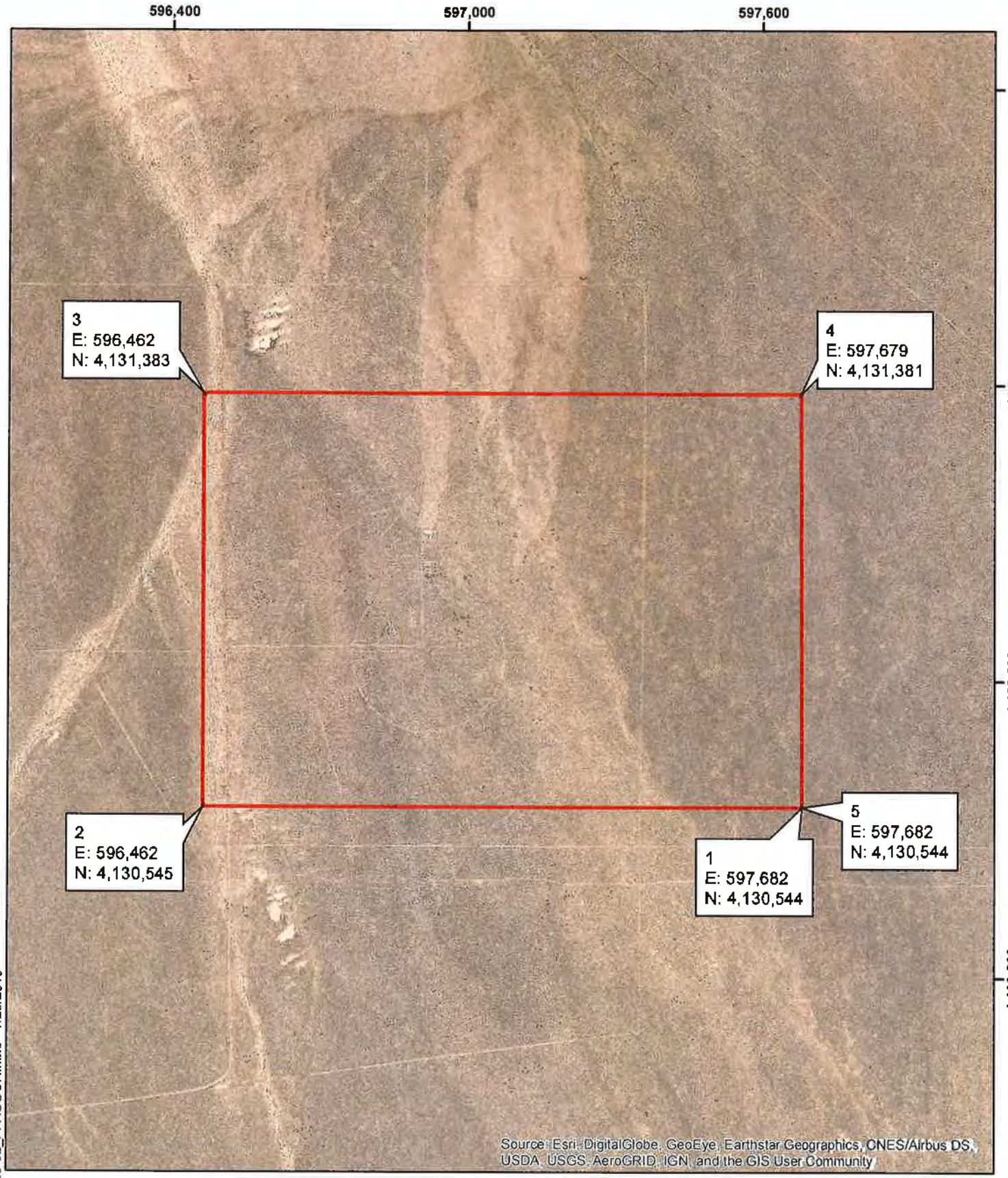
/s/ Tiffany Gamero

Date: 12/5/2019

Tiffany Gamero

Activity Lead

EM Nevada Program



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CAU 415, CAS NAFR-23-02
Pu Contaminated Soil
FFACO UR Boundary

Explanation

FFACO UR

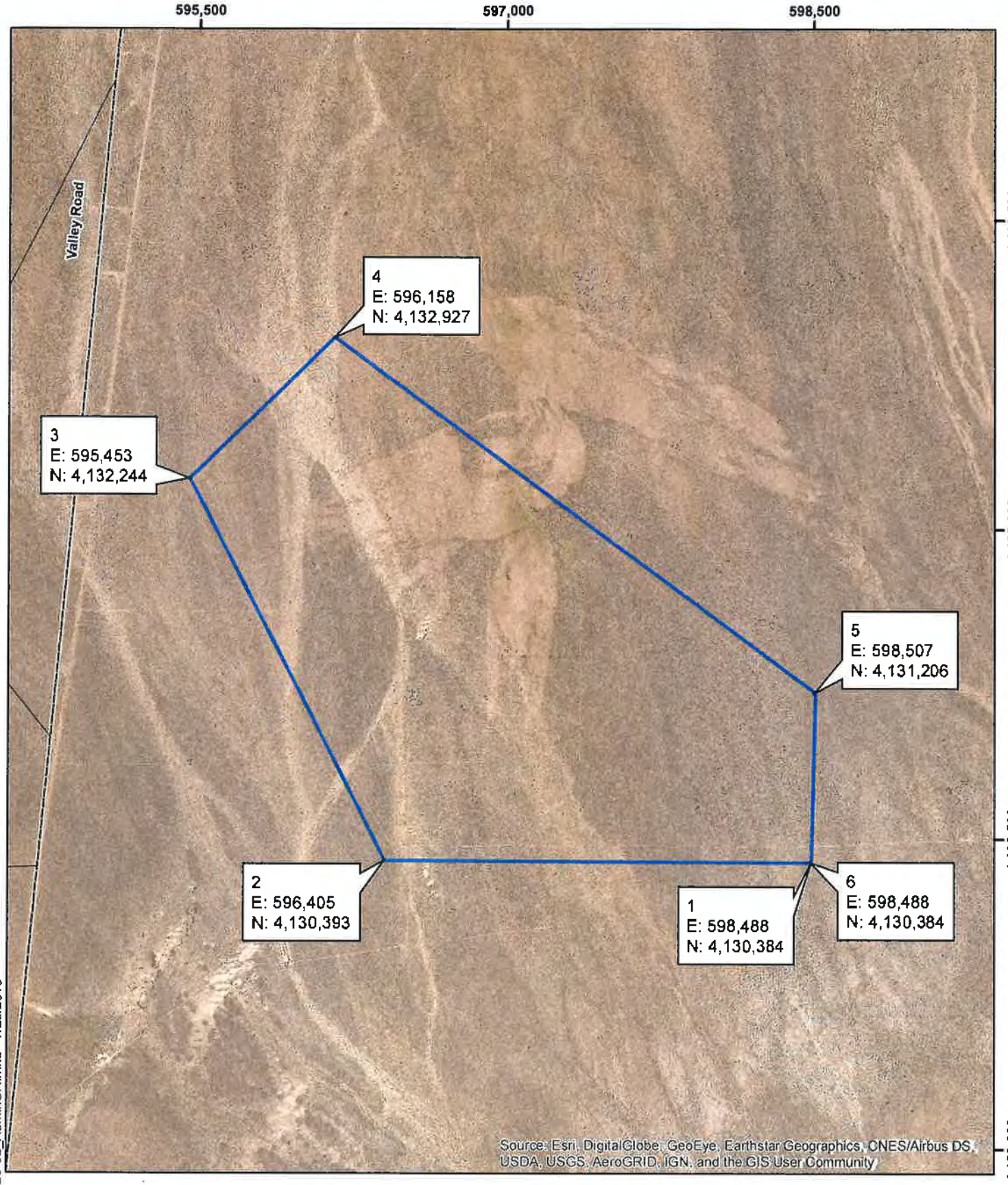
0 100 200 400 Meters

0 250 500 1,000 Feet

N

Source: Navarro GIS, 2019

Coordinate System: NAD 1983 UTM Zone 11N, Meter



H:\415\GPS\CAS\NAFR-23-02_AdminUR.mxd - 7/23/2019

CAU 415, CAS NAFR-23-02
Pu Contaminated Soil
Administrative UR Boundary

Explanation

- Administrative UR
- Unimproved Road
- Trail

0 250 500 1,000 Meters

0 1,000 2,000 4,000 Feet

N

Source: Navarro GIS, 2019

Coordinate System: NAD 1983 UTM Zone 11N, Meter

Supplemental Information Figure

Additional supplemental information on site features was not present in previous iterations of this Use Restriction (UR), therefore a supplemental information figure is not attached. If additional information on site features is required for this site, please contact the Federal Facility Agreement and Consent Order (FFACO) Database Administrator.

RECORD OF TECHNICAL CHANGE

Technical Change No. DOE/NV--1581-ROTC-1 Page 1 of 16

Activity Name Corrective Action Unit (CAU) 415: Project 57 No. 1 Plutonium Dispersion (NTTR)

Date March 15, 2018

The following technical changes (including justification) are requested by:

Pat Matthews	Soils Project Manager, Navarro
(Name)	(Title)

The waste disposal paperwork for the polychlorinated biphenyl (PCB) oil generated during the CAU 415 corrective action was not available when the Final CAU 415 Closure Report (CR) was submitted. Per the CAU 415 CR, an addendum was to be written once the waste disposal paperwork for the PCB oil was received. Because the Department of Energy (DOE) Federal Facility Agreement and Consent Order (FFACO) Coordinator identified that an ROTC would be more appropriate than an Addendum, this ROTC is being submitted in lieu of an Addendum. Additionally, there were two comments received from the Nevada Division of Environmental Protection (NDEP) in which clarification was requested on text within the Use Restriction (UR) Form and Section D.3.0 which are included in this ROTC.

Description of Change:

1. Updated Table 3-1. The table was edited to replace "TBD" with "11/22/07" and "Pending" with Certificate of Incineration."
2. Edited Section D.3.0 to read, "The plutonium activities used for dose calculations shown in Table D.3-1 were inferred from the associated gamma spectrometry results for Am-241 in accordance with the Soils RBCA document (NNSA/NFO, 2014a) and 'Characterization of Plutonium Activities in Soil' (Kidman et al., 2015). Due to the heterogeneity of plutonium in soils at the NNSS, this provides estimates of plutonium soil activities that are more representative of site conditions than the raw analytical results for plutonium reported in the SAFER plan (NNSA/NFO, 2014b). The other radionuclide activities shown in Table D.3-1 are those reported in the SAFER plan for analytical results exceeding the MDCs."
3. Replaced original Appendix E with the attached Appendix E, which has the following changes:
   - Removed the note on the cover page, and updated the number of total pages.
   - Added the Onsite Waste Transport Manifest, Uniform Hazardous Waste Manifest, and Certificate of Incineration for the PCB transformer oil generated during the CAU 415 corrective action.
4. Edited the last sentence of the Summary Statements on the FFACO and Administrative UR Form to read, "The analytical results and locations of all samples are presented in the SAFER Plan and CR for CAU 415."

Justification:

1. The date and type of disposal document for the PCB oil was not known when the Final CR was submitted.
2. Clarification was needed to link the analytical results from the SAFER to the analytical results presented in Table D.3-1.
3. The waste disposal paperwork for the PCB oil was received after the CR was submitted.
4. The locations of the analytical results and sample locations for CAU 415 needed to be clarified.

The task time will be Unchanged by approximately 0 days.

Applicable Activity-Specific Document(s): U.S. Department of Energy, Environmental Management Nevada Program. 2017. *Closure Report for Corrective Action Unit 415: Project 57 No. 1 Plutonium Dispersion (NTTR), Nevada Test and Training Range, Nevada*, Rev. 0. DOE/NV—1581. Las Vegas, NV.

Approved By:	/s/ Kevin Cabble Activity Lead	Date 3/15/18
	/s/ Wilhelm R. Wilborn Acting Deputy Program Manager, Operations	Date 3/27/2018
	/s/ Christine Andres NDEP	Date 3/15/18

Table 3-1
Waste Summary Table

Waste Stream	Container Number	Waste Types				Waste Disposition			
		Hazardous	Hydrocarbon	PCB	Radioactive	Disposal Facility	Waste Volume	Disposal Date	Disposal Doc[a]
LLW (IDW Debris)	415A01, 415A02, 415A03	No	No	No	Yes	Area 5 RWMC	23.3 ft^3	03/08/2017	CD
LLW (Metal Debris)	415T01 through 415T07	No	No	No	Yes	Area 5 RWMC	115 ft^3	03/29/2017	CD
Transformer Oil	415U01	No	Yes	Yes	No	Offsite Treatment	6.4 ft^3	11/22/2017	Certificate of Incineration

[a]Copies of waste disposal documents are located in Appendix E.

CD = Certificate of Disposal
ft^3 = Cubic foot
RWMC = Radioactive Waste Management Complex
TBD = To be determined

D.3.0 Radionuclide Activities Used in Dose Calculations

The plutonium activities used for dose calculations shown in Table D.3-1 were inferred from the associated gamma spectrometry results for Am 241 in accordance with the Soils RBCA document (NNSA/NFO, 2014a) and "Characterization of Plutonium Activities in Soil" (Kidman et al., 2015). Due to the heterogeneity of plutonium in soils at the NNSS, this provides estimates of plutonium soil activities that are more representative of site conditions than the raw analytical results for plutonium reported in the SAFER Plan (NNSA/NFO, 2014b). The other radionuclide activities shown in Table D.3-1 are those reported in the SAFER Plan for analytical results exceeding the MDCs.

D.4.0 References

R.L. Kidman, M. Knop, and D. Sloop. 2015. "Characterization of Plutonium Activities in Soil - 15429," WM2015 Conference, Phoenix, AZ, March 15–19.

U.S. Department of Energy, National Nuclear Security Administration Nevada Field Office. 2014a. *Soils Risk-Based Corrective Action Evaluation Process*, Rev. 1, DOE/NV 1475-Rev. 1. Las Vegas, NV.

U.S. Department of Energy, National Nuclear Security Administration Nevada Field Office. 2014b. *Streamlined Approach for Environmental Restoration for Corrective Action Unit 415: Project 57 No. 1 Plutonium Dispersion, Nevada National Security Site, Nevada*, Rev. 0, DOE/NV--1520. Las Vegas, NV.

Appendix E

Waste Disposition Documentation

(5 Pages)

COPY

Certificate of Disposal

This is to certify that the Waste Stream No. LITN-000000006, Revision 16, shipment number ITL17004 with container numbers 567A01; 567A02; 567A03; 414R01; 414R02; 414R03; 415A01; 415A02; 415A03; and 153A02 was shipped and received at the Nevada National Security Site Radioactive Waste Management Complex in Area 5 for disposal as stated below.

Mark Heser	Navarro	Waste Coordinator
Shipped by	Organization	Title
/s/ Mark Heser		3/6/17
Signature		Date
E. Takahashi	NSTec	Sr Scientist
Received by	Organization	Title
/s/ E. Takahashi		03/08/2017
Signature		Date

/s/ E. Takahashi

Certificate of Disposal

.This is to certify that the Waste Stream No. LITN-000000006, Revision 16, shipment number ITL17005 with container numbers 415T01; 415T02; 415T03; 415T04; 415T05; 415T06; and 415T07 was shipped and received at the Nevada National Security Site Radioactive Waste Management Complex in Area 5 for disposal as stated below.

Mark Heser	Navarro	Waste Coordinator
Shipped by	Organization	Title
/s/ Mark Heser		3/29/17
Signature		Date
E TAKAHASHI 3/29/17	NSTec	Sr Scientist
Received by	Organization	Title
/s/ E. Takahashi		03/29/2017
Signature		Date

NSTec Form FRM-0266

ONSITE WASTE TRANSPORT MANIFEST

04/04/13 Rev. 05

Manifest Document No.: 1 7 N 1 6

Page 1 of 1

Generation/Out-of-Service Date: 12/18/16

1. Generator's Name, Organization, and Location: (Please Print)
Navarro / Mark Heser
NNSS Area 6 Bldg 6-909 High Bay
5S0B 9201

Generator's Phone : (702) 295-2124

2. Receiving Facility, Organization, Location: (Please Print)
Hazardous Waste Storage Unit
WGS / Hazardous Waste Operations, H130
NNSS Area 5, Bldg. 5-20

Contact Phone: (702) 506-7639

3a. Transporter Name: (Please Print)
Brett Bushnell

Transport Date: 05/17/17

3b. Vehicle I.D. Number: G63-1569M

	4. U.S. D.O.T. Description, Include: EPA Waste Code and Package Tracking Numbers.	HM		5. Containers No.	5. Containers Type	6. Total Quantity	7. Unit Wt./Vol. (P or K)
a	UN2315, Polychlorinated biphenyls, liquid, 9, III # NS-NSS-17-0045.	X		1	DM	.394 179	P K
b							
c							
d							
e							
f							
g							

Use continuation pages for additional items, as necessary.

8. Special Handling Instructions/Additional Information: 24-Hour emergency contact: 702-295-0311 / Secondary: C.Heiman, 219-671-3391 (Name & phone no.)

a) ERG 171. 55-gal DM containing PCB contaminated transformer oil. 1A1/X1.8/300. O.S.D. 12/18/16
Container # 415 U01

8a. This is to certify that the above named materials are properly classified, described, packaged, marked, labeled, and are in proper condition for transportation according to the applicable regulations of the Department of Transportation.

Brett Bushnell /s/ Brett Bushnell 05/17/17
Printed Name / Signature Date

9. Released by: Mark HESER /s/ Mark Heser — Date: 05/17/17
Printed Name Signature

10. Received for Transport by: Brett Bushnell /s/ Brett Bushnell — Date: 05/17/17
Printed Name Signature

11. Discrepancy Indication:

12. Disposal/Accumulation Site Signature: *(Acknowledges acceptance of waste)* — Date:
Brett Bushnell /s/ Brett Bushnell 05/17/17
Printed Name Signature

Please print or type. (Form designed for use on elite (12-pitch) typewriter.) Form Approved. OMB No. 2050-0039

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator ID Number: NV2890090001 | 2. Page 1 of: 1 | 3. Emergency Response Phone: (702) 295-0311 | 4. Manifest Tracking Number: 000956496 FLE

GENERATOR

5. Generator's Name and Mailing Address:
NSTEC on behalf of the U.S. DOE
P.O. Box 98521, m/s NLV083
LAS VEGAS, NV 89193
Generator's Phone: (702) 295-7365

Generator's Site Address (if different than mailing address):
NSTEC on behalf of the U.S. DOE
Nevada National Security Site; Hwy 95, m/s NLV083
Mercury, NV 89023

6. Transporter 1 Company Name: AJ Metler Hauling and Rigging | U.S. EPA ID Number: TNR-000011247

7. Transporter 2 Company Name | U.S. EPA ID Number:

8. Designated Facility Name and Site Address:
U.S. ECOLOGY
Hwy 95, 12 mi. south of Beatty
Beatty, NV 89003
Facility's Phone: (800) 239-3943 | U.S. EPA ID Number: NVZ330010000

9a. HM	9b. U.S. DOT Description (including Proper Shipping Name, Hazard Class, ID Number, and Packing Group (if any))	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	13. Waste Codes		
X	1. UN2315, Polychlorinated biphenyls, liquid, 9, III	1	DM	179	K			
X	2. NA3082, Hazardous waste, liquid, n.o.s. (silver), 9, III	1	DM	314	P	D011		
X	3. NA3082, Hazardous waste, liquid, n.o.s. (silver), 9, III	4	DF	182	P	D011		
	4.							

14. Special Handling Instructions and Additional Information
1) ERG 171; NNSA-NSS-17-0045; Out-of-Service Date 12/18/16; MP070251629-9.
2) ERG 171; NNSA-NSS-17-0017; MP07-011-1013-1.
3) ERG 171; NNSA-NSS-17-0018, -0019, -0089, & -0090; MP07-011-1013-1. NNSA Load #17010.

15. **GENERATOR'S/OFFEROR'S CERTIFICATION:** I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations. If export shipment and I am the Primary Exporter, I certify that the contents of this consignment conform to the terms of the attached EPA Acknowledgment of Consent.
I certify that the waste minimization statement identified in 40 CFR 262.27(a) (if I am a large quantity generator) or (b) (if I am a small quantity generator) is true.

Generator's/Offeror's Printed/Typed Name: Cirilo Carlos Gonzales on behalf of the U.S. DOE | Signature: /s/ Signature on file | Month: 9 | Day: 12 | Year: 17

INT'L

16. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter signature (for exports only): Date leaving U.S.:

TRANSPORTER

17. Transporter Acknowledgment of Receipt of Materials

Transporter 1 Printed/Typed Name: Frank Silva | Signature: /s/ Frank Silva | Month: 9 | Day: 12 | Year: 17

Transporter 2 Printed/Typed Name | Signature | Month | Day | Year

DESIGNATED FACILITY

18. Discrepancy

18a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

Manifest Reference Number:

18b. Alternate Facility (or Generator) | U.S. EPA ID Number
Facility's Phone:

18c. Signature of Alternate Facility (or Generator) | Month | Day | Year

19. Hazardous Waste Report Management Method Codes (i.e., codes for hazardous waste treatment, disposal, and recycling systems)

1.	2.	3.	4.
H141	H132	H132	

20. Designated Facility Owner or Operator: Certification of receipt of hazardous materials covered by the manifest except as noted in Item 18a

Printed/Typed Name: Melissa Mee | Signature: /s/ Signature on file | Month: 09 | Day: 12 | Year: 17

EPA Form 8700-22 (Rev. 3-05) Previous editions are obsolete. DESIGNATED FACILITY TO DESTINATION STATE (IF REQUIRED)

US Ecology Nevada, Inc.
P.O Box 578
Beatty, Nevada 89003

Phone: (800) 239-3943
(775) 553 2203
Fax: (775) 553 2125

US Ecology Nevada, Inc.

a *US Ecology Inc.* company

Generator Mailing Address:
NATIONAL SECURITY TECHNOLOGIES, LLC (NSTEC)
P.O. BOX 98521, MAIL STOP NLV083
LAS VEGAS, NV 89193

Generator Site Address:
NSTEC ON BEHALF OF THE US NNSA
NEVADA TEST SITE HWY 95
MERCURY, NV 89023

CERTIFICATE OF INCINERATION

The following Waste(s) received on uniform hazardous waste manifest no. 000956496FLE/000956496FLE, pg. 1, ln. 1 was disposed by incineration at VEOLIA ES TECHNICAL SOLUTIONS, EPA# TXD000838896 on 11/22/2017, on manifest number 016703097JJK. Reference Certificate of Disposal number: 812434.

1 55 GALLON DRUM

PCB OIL(>50PPM)

PCB Disposal Info: 55 gallons disposed.

Under civil and criminal penalties of law for making or submission of fraudulent statements or representations [18 U.S.C 1001 and 15 U.S.C 2615], I certify that the information contained in or accompanying this document is true, accurate, and complete. As to the identified sections(s) of this document for which I cannot pesonally verify truth and accuracy, I certify as the company official having supervisory responsibility for the person who, acting under my direction, made the verification that this information is true, accurate and complete.

Printed Name: JOHN DYER

Signature: /s/ John Dyer

Title: COMPLIANCE MANAGER

Reference Number : 17091109086-000956496FLE-1-1

Customer: MISSION SUPPORT AND TEST SERVICES, LLC (MSTS) - (F

Use Restriction Information

CAU Number/Description: CAU 415, Project 57 No. 1 Plutonium Dispersion (NTTR)
Applicable CAS Number/Description: CAS NAFR-23-02, Pu Contaminated Soil

Contact (DOE AL/Activity): EM Soils Federal Activity Lead

FFACO Use Restriction Physical Description:

Surveyed Area (UTM, Zone 11, NAD 83, meters):

UR Points	Northing	Easting
Southeast	4,130,544	597,682
	4,130,545	596,462
	4,131,383	596,462
	4,131,381	597,679

Depth: Surface to 15 ft bgs

Survey Source (GPS, GIS, etc): GIS

Basis for FFACO UR(s):

Summary Statement: This FFACO use restriction (UR) is established based on the potential to receive a radiological dose exceeding 25 mrem/yr from surface contamination and a disposal trench that is present at this site. Based on the current land use, which is an assumed maximum exposure period of 2,000 hours per year, the maximum calculated dose rate in surface soil within this UR was 14,600 mrem/yr. Dose was not calculated for the material in the disposal trench but is assumed to exceed the action level of 25 mrem/yr. This UR also protects workers from inadvertent exposure to removable contamination that exceeds the criteria for establishing a High Contamination Area (HCA). The maximum concentration of any radionuclide detected in surface soil samples that could contribute more than 10 percent of the Industrial Area action level is presented in the contaminants table below. Unsampled locations may contain higher levels. The analytical results and locations of all samples are presented in the SAFER Plan and CR for CAU 415.

Contaminants Table:

Maximum Concentration of Contaminants for CAU 415 CAS NAFR-23-02, Pu Contaminated Soil			
Constituent	**Maximum Concentration**	**Industrial Area Action Level**	**Units**
Americium-241	128,000	2,110	pCi/g
Plutonium-238	36,900	4,510	pCi/g
Plutonium-239/240	2,000,000	4,120	pCi/g
Plutonium-241	1,010,000	200,000	pCi/g

Site Controls: Activities that would cause a site worker to be exposed to site radiological contamination for a period of more than that required to receive a dose of 25 mrem/yr (defined above) are restricted within the area defined by the coordinates listed above and depicted in the attached figure without prior notification of NDEP unless the activities are conducted under the provisions of 10 CFR Part 835. The FFACO UR is recorded in the FFACO database, M&O Contractor GIS, the DOE Environmental Management (EM) Nevada Program CAU/CAS files, and the U.S. Air Force GIS. Warning signs for the FFACO UR are posted outside the administrative UR boundary.

Use Restriction Information

Administrative Use Restriction Physical Description*:

Surveyed Area (UTM, Zone 11, NAD 83, meters):

UR Points	Northing	Easting
Southeast	4,130,384	598,488
	4,130,393	596,405
	4,132,244	595,453
	4,132,927	596,158
	4,131,206	598,507

Depth: Surface to 5 cm bgs

Survey Source (GPS, GIS, etc): N/A

*Coordinates for the Administrative Use Restriction exclude the area defined by the FFACO Use Restriction coordinates.

Basis for Administrative UR(s):

Summary Statement: This administrative use restriction (UR) protects workers from inadvertent exposure to removable contamination that exceeds the criteria for establishing a Contamination Area (CA). Based on the current land use, which is an assumed maximum exposure period of 2,000 hours per year, the maximum calculated dose rate in surface soil within this UR was less than 1 mrem/yr. The maximum concentration of significant contaminants detected in soil samples is presented in the contaminants table below. Unsampled locations may contain higher levels. The analytical results and locations of all samples are presented in the SAFER Plan and CR for CAU 415.

Contaminants Table:

Maximum Concentration of Contaminants for CAU 415 CAS NAFR-23-02, Pu Contaminated Soil			
Constituent	**Maximum Concentration**	**Industrial Area Action Level**	**Units**
Americium-241	48.3	2,110	pCi/g
Plutonium-238	13.9	4,510	pCi/g
Plutonium-239/240	754	4,120	pCi/g
Plutonium-241	382	200,000	pCi/g

Site Controls: Activities are restricted within the area defined by the coordinates listed above and depicted in the attached figure without prior notification of NDEP unless the activities are conducted under the provisions of 10 CFR Part 835. This administrative UR is recorded in the FFACO database, M&O Contractor GIS, the DOE Environmental Management (EM) Nevada Program CAU/CAS files, and the U.S. Air Force GIS.

UR Maintenance Requirements (applies to the FFACO UR):

Description: Warning signs for the FFACO UR will be inspected to ensure postings are in place, intact, and legible. Signs will be repaired or replaced as needed.

Inspection/Maintenance Frequency: Inspections will be conducted annually.

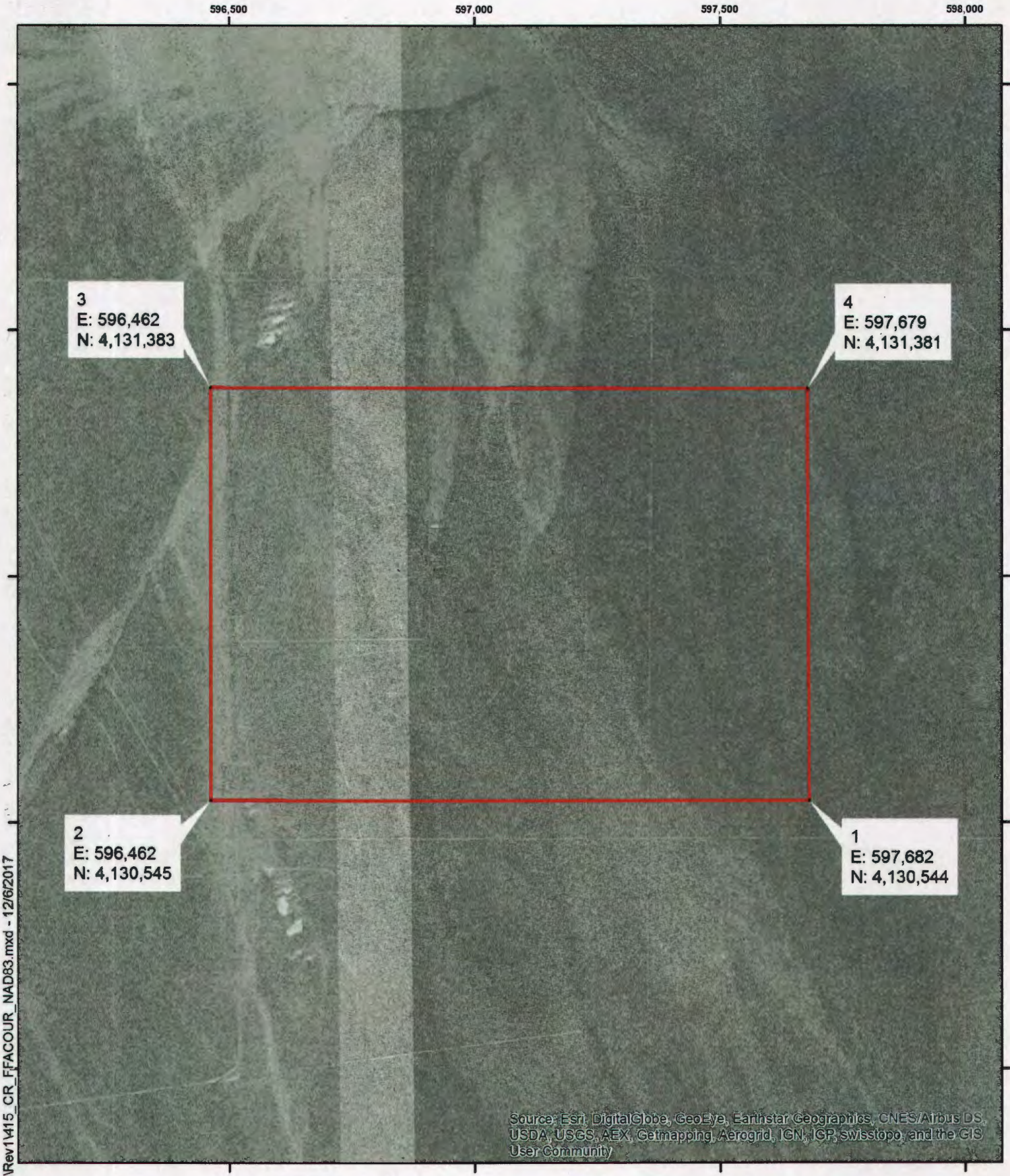
Use Restriction Information

The future use of any land related to this Corrective Action Unit (CAU), as described by the above surveyed location, is restricted from any DOE or Air Force activity that may alter or modify the containment control as approved by the state and identified in the CAU CR or other CAU documentation unless appropriate concurrence is obtained in advance.

Comments: None

Submitted By: /s/ Kevin Cabble **Date:** 3-15-18

Note: Effective upon acceptance of closure documents by NDEP



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CAU 415, CAS NAFR-23-02
Pu Contaminated Soil
FFACO UR Boundary

Explanation

FFACO UR

0 50 100 200 300 Meters

0 250 500 1,000 Feet

N

Source: Navarro GIS, 2017

Coordinate System: NAD 1983 UTM Zone 11N, Meter

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CAU 415, CAS NAFR-23-02
Pu Contaminated Soil
Administrative UR Boundary

Explanation

Administrative UR

0 200 400 800 Meters

0 500 1,000 2,000 Feet

N

Source: Navarro GIS, 2017

Coordinate System: NAD 1983 UTM Zone 11N, Meter

Environmental
Management
Nevada Program

DOE/NV--1581

Closure Report for Corrective Action Unit 415: Project 57 No. 1 Plutonium Dispersion (NTTR) Nevada Test and Training Range, Nevada

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December 2017

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CLOSURE REPORT
FOR CORRECTIVE ACTION UNIT 415:
PROJECT 57 NO. 1 PLUTONIUM DISPERSION (NTTR)
NEVADA TEST AND TRAINING RANGE, NEVADA

U.S. Department of Energy,
Environmental Management Nevada Program
Las Vegas, Nevada

Controlled Copy No.: UNCONTROLLED

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December 2017

CLOSURE REPORT
FOR CORRECTIVE ACTION UNIT 415:
PROJECT 57 NO. 1 PLUTONIUM DISPERSION (NTTR)
NEVADA TEST AND TRAINING RANGE, NEVADA

Approved by: /s/ Kevin J. Cabble Date: 12/7/17

Kevin J. Cabble
Soils Activity Lead
EM Nevada Program

Approved by: /s/ Robert F. Boehlecke Date: 12/7/17

Robert F. Boehlecke
Program Manager
EM Nevada Program

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List of Acronyms and Abbreviations

Am	Americium
BMP	Best management practice
CA	Contamination area
CAI	Corrective action investigation
CAS	Corrective action site
CAU	Corrective action unit
CD	Certificate of Disposal
CFR	*Code of Federal Regulations*
cm	Centimeter
Co	Cobalt
COC	Contaminant of concern
COPC	Contaminant of potential concern
cpm	Counts per minute
CR	Closure report
Cs	Cesium
CSM	Conceptual site model
DOE	U.S. Department of Energy
DQA	Data quality assessment
DQI	Data quality indicator
DQO	Data quality objective
EM	Environmental Management
EPA	U.S. Environmental Protection Agency
FAL	Final action level
FFACO	*Federal Facility Agreement and Consent Order*
FIDLER	Field instrument for the detection of low-energy radiation
ft^3	Cubic foot

List of Acronyms and Abbreviations (Continued)

gal	Gallon
GIS	Geographic Information Systems
HCA	High contamination area
IA-yr	Industrial Area year
IDW	Investigation-derived waste
LLW	Low-level waste
m^3	Cubic meter
MDC	Minimum detectable concentration
mg/kg	Milligrams per kilogram
mi^2	Square mile
M&O	Management and operating
MOB	Multiples of background
mrem/IA-yr	Millirem per Industrial Area year
mrem/yr	Millirem per year
NAD	North American Datum
NDEP	Nevada Division of Environmental Protection
NNSS	Nevada National Security Site
NTTR	Nevada Test and Training Range
PCB	Polychlorinated biphenyl
pCi/g	Picocuries per gram
POC	Performance Objective Criteria
PPE	Personal protective equipment
PSM	Potential source material
Pu	Plutonium
QA	Quality assurance
QAP	Quality Assurance Plan

List of Acronyms and Abbreviations *(Continued)*

QC	Quality control
r^2	Coefficient of determination
RBCA	Risk-based corrective action
RCRA	*Resource Conservation and Recovery Act*
RSL	Regional Screening Level
RWMC	Radioactive waste management complex
SAFER	Streamlined Approach for Environmental Restoration
TBD	To be determined
TCLP	*Toxicity Characteristic Leaching Procedure*
TED	Total effective dose
Th	Thorium
TLD	Thermoluminescent dosimeter
TRS	Terrestrial radiological survey
TSCA	Toxic Substances Control Act
U	Uranium
UR	Use restriction
USAF	U.S. Air Force
UTM	Universal Transverse Mercator

Executive Summary

This Closure Report (CR) presents information supporting the closure of Corrective Action Unit (CAU) 415: Project 57 No. 1 Plutonium Dispersion, which is located on Range 4808A of the Nevada Test and Training Range (NTTR). This CR complies with the requirements of the *Federal Facility Agreement and Consent Order* (FFACO) that was agreed to by the State of Nevada; U.S. Department of Energy (DOE), Environmental Management; U.S. Department of Defense; and DOE, Legacy Management. CAU 415 comprises one corrective action site (CAS): NAFR-23-02, Pu Contaminated Soil.

The purpose of this CR is to provide justification and documentation supporting the recommendation that no further corrective action is needed for CAU 415 based on the implementation of the corrective action of Closure in Place.

Corrective action closure activities were performed from December 2015 through December 2016, as set forth in the *Streamlined Approach for Environmental Restoration* (SAFER) *Plan for Corrective Action Unit 415: Project 57 No. 1 Plutonium Dispersion*; and in accordance with the *Soils Activity Quality Assurance Plan*, which establishes requirements, technical planning, and general quality practices. The approach for the closure of CAU 415 was to make data quality objective (DQO) decisions based on the types of releases present and to implement corrective actions. To facilitate DQO decisions, all identified releases (i.e., CAS components) were organized into the following study groups (SGs):

- SG1, Pu-contaminated soil
- SG2, Disposal trench
- SG3, Drainage system
- SG4, Pole-mounted transformers

The investigation results and DQO decisions were evaluated for each study group.

The CAU 415 dataset of investigation results was evaluated based on a data quality assessment. This assessment demonstrated the dataset is complete and acceptable for use in fulfilling the DQO data needs.

Investigation results were evaluated against final action levels (FALs) established in this document. A radiological dose FAL of 25 millirem per year was established based on the Industrial Area exposure scenario (2,000 hours of annual exposure). Radiological dose exceeding the FAL is present at the SG1 Pu-contaminated soil study group, thus requiring corrective action. It was assumed that radionuclides were present at levels that require corrective action within the SG2 disposal trench study group. The SG3 drainage system was determined not to contain contaminants of concern (COCs) and not to require corrective action in the SAFER Plan. The SG4 pole-mounted transformers were assumed to contain polychlorinated biphenyls that could release COCs to the soil and required corrective action.

Closure in place for the Pu-contaminated soil and disposal trench study groups was accomplished by posting signs and recording the FFACO use restriction in the FFACO database; the DOE Environmental Management (EM) Nevada Program CAU/CAS files; the management and operating contractor Geographic Information Systems; and the U.S. Air Force Geographic Information Systems. The pole-mounted transformers were removed as a corrective action, and verification soil samples were collected from the soil beneath each transformer.

The corrective actions were implemented as stipulated in the SAFER Plan, and verification sample results confirm the completion of corrective actions. The implemented corrective actions meet all requirements for closure of the site. Based on the implementation of these corrective actions, the DOE EM Nevada Program provides the following recommendations:

- No further corrective actions are necessary for CAU 415.
- The Nevada Division of Environmental Protection should issue a Notice of Completion to the DOE EM Nevada Program for closure of CAU 415.
- CAU 415 should be moved from Appendix III to Appendix IV of the FFACO.

1.0 Introduction

This Closure Report (CR) presents information supporting closure of Corrective Action Unit (CAU) 415, Project 57 No. 1 Plutonium Dispersion, which is located on Range 4808A of the Nevada Test and Training Range (NTTR). CAU 415 consists of a single corrective action site (CAS), NAFR-23-02, Pu Contaminated Soil. Because the CAU has only one CAS, the CAS nomenclature is generally not used in this CR. Instead, the CAS is referred to as CAU 415 throughout this document.

CAU 415 consists of the atmospheric release of radiological contaminants to surface soil from the Project 57 safety experiment conducted in 1957. The safety experiment released plutonium (Pu), uranium (U), and americium (Am) to the surface soil over an area of approximately 1.9 square miles (mi^2). A detailed discussion of the history of this CAU is presented in the *Streamlined Approach for Environmental Restoration* (SAFER) *Plan for Corrective Action Unit 415*: *Project 57 No. 1 Plutonium Dispersion, Nevada National Security Site, Nevada* (NNSA/NFO, 2014b).

To facilitate data quality objective (DQO) decisions (see Section 1.3.2), all identified releases were organized into the following study groups (SGs):

- **SG1, Pu-contaminated soil.** This study group consists of the atmospheric deposition of radiological contaminants to surface soil from the Project 57 safety experiment conducted in 1957. The safety experiment released detectable levels of radiological contamination to the surface soil over an area of approximately 1.9 mi^2. This area is currently fenced and posted as a radiological contamination area.

- **SG2, Disposal trench.** Vehicles and debris contaminated by Project 57 experiment were subsequently buried in a disposal trench at the southwest corner of the inner fence.

- **SG3, Drainage system.** Two natural drainage channels exit the southwest corner of the outer fence at CAU 415 and terminate at a large man-made earthen retention basin.

- **SG4, Pole-mounted transformers.** Seven pole-mounted transformers, potentially filled with transformer oil containing polychlorinated biphenyls (PCBs), are present at CAU 415.

The corrective actions described in this document were implemented in accordance with the *Federal Facility Agreement and Consent Order* (FFACO) (1996, as amended) that was agreed to by the State of Nevada: U.S. Department of Energy (DOE), Environmental Management: U.S. Department of Defense; and DOE, Legacy Management.

1.1 Purpose

The purpose of this CR is to provide documentation and justification that no further corrective action is needed for the closure of CAU 415 based on the implementation of corrective actions. This justification is based on historical knowledge of the site and the results of the corrective action investigation (CAI). CAI activities reported in the SAFER Plan (NNSA/NFO, 2014b) were completed in accordance with the *Soils Activity Quality Assurance Plan* (QAP) (NNSA/NSO, 2012b), which establishes requirements, technical planning, and general quality practices. The evaluation of investigation results and the risk associated with site contamination was conducted in accordance with the *Soils Risk-Based Corrective Action* (RBCA) *Evaluation Process* (NNSA/NFO, 2014a). The CAI data support the corrective action of closure in place, as proposed in the SAFER Plan.

1.2 Scope

The closure verification activities for CAU 415 were completed by demonstrating through sample analytical results the nature and extent of contaminants of concern (COCs) at any study group. For radiological releases, a COC is defined as the presence of radionuclides that jointly present a dose to a receptor exceeding a final action level (FAL) of 25 millirem per year (mrem/yr). For chemical releases, a COC is defined as the presence of a contaminant above its corresponding FAL. The presence of a COC requires a corrective action. A corrective action is also required if a waste present within a release site contains a contaminant that, if released to soil, would cause the soil to contain a COC. Such a waste is considered to be potential source material (PSM) as defined in the Soils RBCA document (NNSA/NFO, 2014a).

Corrective actions were conducted to address contamination levels exceeding a FAL. Verification samples were collected to demonstrate the completion of the corrective action of removal of the pole-mounted transformers. The closure activities were completed in accordance with the SAFER Plan (NNSA/NFO, 2014b) and in accordance with the Soils QAP (NNSA/NSO, 2012b) and approved quality assurance (QA) programs, which establish requirements, technical planning, and general quality practices. The verification sample results and the risk associated with site contamination were evaluated in accordance with the Soils RBCA document (NNSA/NFO, 2014a).

1.3 CR Contents

This CR is divided into the following sections and appendices:

- Section 1.0, "Introduction," summarizes the purpose, scope, and contents of this CR.
- Section 2.0, "Closure Activities," summarizes the closure activities, deviations from the SAFER Plan, the actual schedule, and the site conditions following completion of corrective actions.
- Section 3.0, "Waste Disposition," discusses the wastes generated and entered into an approved waste management system as a result of the corrective action.
- Section 4.0, "Closure Verification Results," describes verification activities and results.
- Section 5.0, "Conclusions and Recommendations," provides the conclusions and recommendations along with the rationale for their determination.
- Section 6.0, "References," provides a list of all referenced documents used in the preparation of this CR.
- Appendix A, *DQOs as Developed in the* SAFER Plan*,* provides the DQOs as presented in Appendix B of the CAU 415 SAFER Plan.
- Appendix B, *Closure Certification*, documents the specific closure activities completed for the CAU.
- Appendix C, *As-Built Documentation*, identifies the as-built drawings for each CAS.
- Appendix D, *Confirmation Sampling Test Results*, provides a description of the verification sampling activities and closure results.
- Appendix E, *Waste Disposition Documentation*, documents disposal of items removed during closure activities.
- Appendix F, *Modifications to the Post-closure Plan*, documents any modifications to the Post-closure Plan.
- Appendix G, *Use Restrictions*, documents the use restrictions (URs).
- Appendix H, *Nevada Division of Environmental Protection* (NDEP) *Comments*, contains responses to NDEP comments on the draft version of this document.

1.3.1 Applicable Programmatic Plans and Documents

All investigation activities were performed in accordance with the following documents:

- SAFER Plan for CAU 415, Project 57 No. 1 Plutonium Dispersion (NNSA/NFO, 2014b)
- Soils Activity QAP (NNSA/NSO, 2012b)
- Soils RBCA document (NNSA/NFO, 2014a)
- FFACO (1996, as amended)

1.3.2 Data Quality Objectives

This section contains a summary of the DQO process that is presented in Appendix A. The DQOs were developed to identify data needs, clearly define the intended use of the environmental data, and design a data collection program that will satisfy these purposes.

The problem statement for CAU 415 is as follows: "Information on the nature and extent of potential contamination needs to be evaluated for the closure of CAU 415." To address this problem, the resolution of two decision statements is required:

- **Decision I.** "Does contamination exist at the release site that exceeds FALs?"
- **Decision II.** "Have the CAU 415 closure objectives been met?"

The CAU 415 closure objectives are defined as follows:

- For SG1, the Pu-contaminated soil, the closure objective is to determine the corrective action boundary (i.e., the area exceeding 25 millirem per Industrial Area year [mrem/IA-yr] and the area exceeding high contamination area [HCA] conditions).

- For SG2, the disposal trench, the closure objective is to determine the extent of the buried contaminated vehicles and debris, defined as the extent of the anomalies detected in the geophysical survey.

- For SG3, the drainage system, it has been determined that no contaminants are present in soil above the FAL; therefore, Decision II is not required.

- For SG4, the pole-mounted transformers, the closure objective is removal of the transformers.

The presence of a COC or the assumption of the presence of a COC would require additional soil removal or administrative controls (i.e., a UR).

1.3.3 Data Quality Assessment Summary

The SAFER Plan (NNSA/NFO, 2014b) contains the DQOs as agreed to by decision makers before the implementation of closure activities. The DQO process ensures that the right type, quality, and quantity of data will be available to support verification decisions with an appropriate level of confidence.

A data quality assessment (DQA) was conducted that evaluated the degree of acceptability and usability of the reported data in the decision-making process. This DQA is presented in Section 4.1. Using both the DQO and DQA processes helps to ensure that DQO decisions are sound and defensible.

Based on this evaluation, the nature and extent of COCs at CAU 415 have been adequately identified to verify the completion of corrective actions. Information generated during the investigation supports the conceptual site model (CSM) assumptions, and the data collected met the DQOs and support their intended use in the decision-making process.

2.0 Closure Activities

The SAFER Plan (NNSA/NFO, 2014b) identified the presumed corrective action for CAU 415 as closure in place. In order to supplement existing data and determine whether site closure objectives have been achieved, additional data were collected at CAU 415 as part of the closure activities. Results of verification sampling for CAU 415 are presented in Appendix D.

2.1 Description of Corrective Action Activities

The following subsections describe specific investigation activities conducted at each study group.

2.1.1 SG1 (Pu-Contaminated Soil)

Corrective action activities at SG1 included establishing a 25-mrem/IA-yr boundary around the land area where surface soil contamination would result in a dose above 25 mrem/IA-yr. Section 4.3.1 of the CAU 415 SAFER Plan (NNSA/NFO, 2014b) presents the results of the CAI, how dose was estimated from those results, and information on how the 25-mrem/IA-yr boundary was established. The CAI dose estimates and the resulting 25-mrem/IA-yr boundary are shown in Figure 2-1.

A corrective action boundary for SG1 was established as the 25-mrem/IA-yr boundary and was expanded to include the area where HCA conditions are present and the radiological contamination is assumed to exceed the FAL. The resulting corrective action boundary for SG1 is shown in Figure 2-2. An FFACO UR was established at the SG1 corrective action boundary and recorded in the FFACO database, the DOE Environmental Management (EM) Nevada Program CAU/CAS files, the management and operating (M&O) contractor Geographic Information Systems (GIS), and the U.S. Air Force (USAF) GIS.

Information gathered during the closure activities supports and validates the CSM as presented in the SAFER Plan. No modification to the CSM was needed.

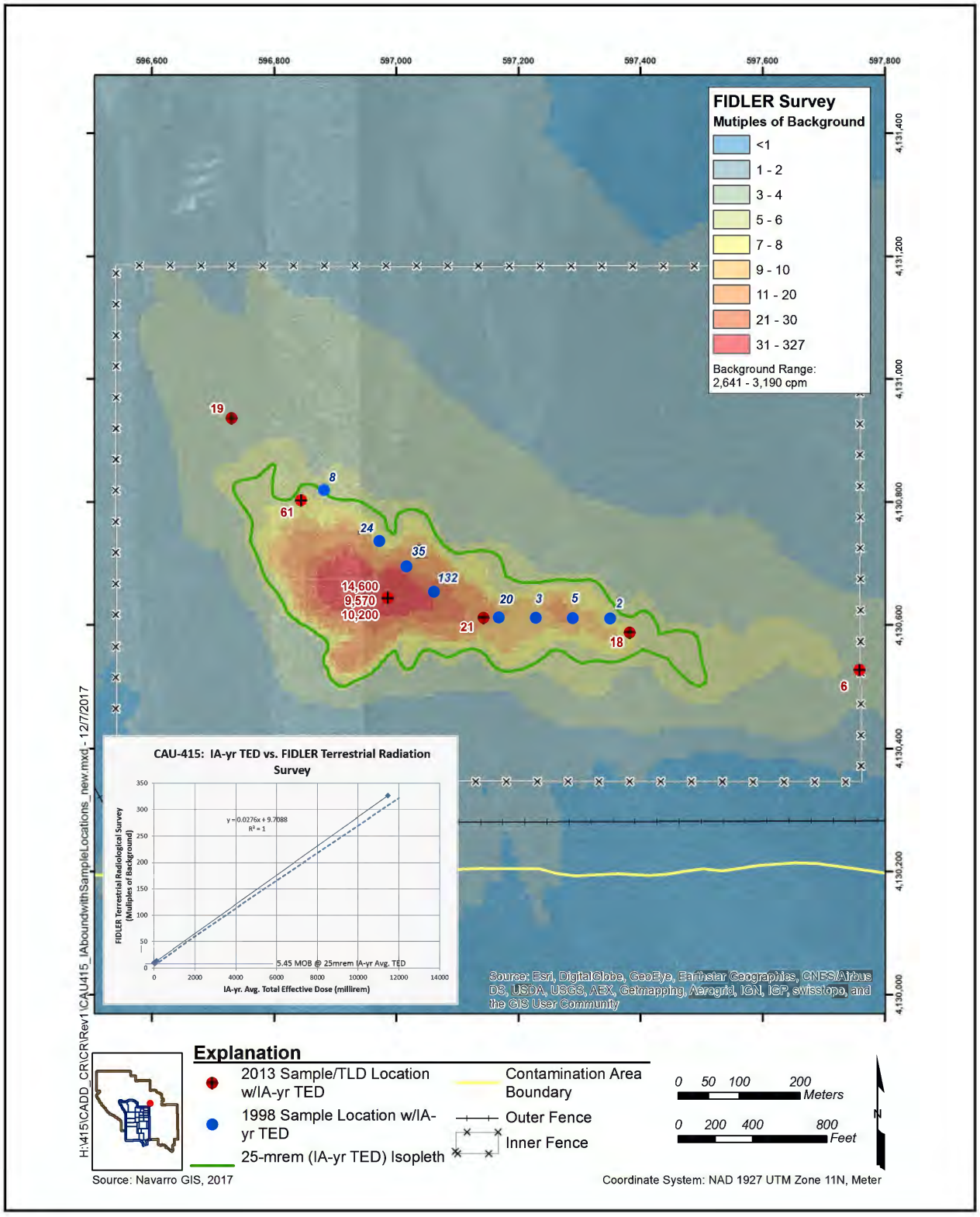

Figure 2-1
CAU 415 25-mrem/IA-yr Boundary

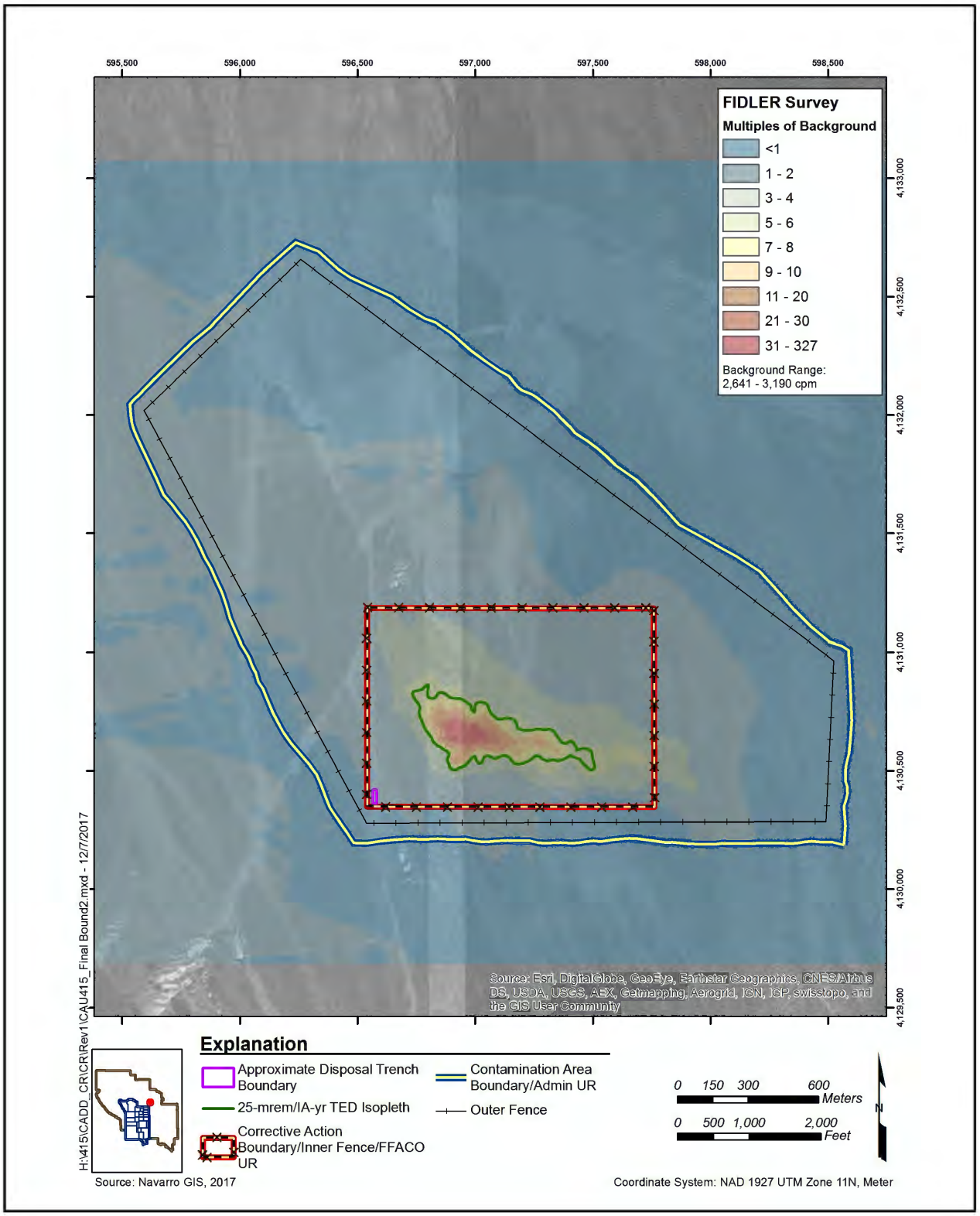

Figure 2-2
CAU 415 FFACO UR Boundary

2.1.2 SG2 (Disposal Trench)

Corrective action activities at SG2 included conducting a geophysical survey of the area of disturbed soil at the southwest corner of the inner fence. As presented in the SAFER Plan (NNSA/NFO, 2014b), results of the survey show a series of four linear anomalies oriented along a line running north to south. There is a potential fifth anomaly, of lower strength, immediately south of the four anomalies. The survey results are consistent with the historical account of the vehicle burial trench and piles of miscellaneous contaminated material that were reportedly buried in the trench. The results of the geophysical survey are shown in Figure 2-3.

For SG2, a corrective action of establishing an FFACO UR was implemented for the land area where the geophysical survey indicated the presence of buried material. Because this area is included within the corrective action boundary established for SG1, it was included in the FFACO UR for SG1.

Information gathered during the closure activities supports and validates the CSM as presented in the SAFER Plan. No modification to the CSM was needed.

2.1.3 SG3 (Drainage System)

In accordance with the CAU 415 SAFER Plan (NNSA/NFO, 2014b), corrective action activities were not required for SG3, as no contamination exceeding a FAL is present. The analytical sample results from the drainage system samples are presented in the SAFER Plan.

2.1.4 SG4 (Pole-Mounted Transformers)

Corrective action activities at SG4 included the removal of seven pole-mounted transformers and the collection of surface soil samples from the soil beneath each transformer. Because no biasing factors were identified (e.g., soil staining), samples were collected at locations biased to be directly beneath each transformer. One surface (0- to 5-centimeter [cm]) grab sample was collected at each sample location (Locations Out 1; Out 2; and A01 through A05). All samples were analyzed for PCBs. The sample locations are shown on Figure 2-4. The analytical results for PCBs in samples that exceeded the minimum detectable concentrations (MDCs) are shown in Table 2-1. No results exceeded the FAL. Therefore, no further corrective action for SG4 is required. Additional sampling information is presented in Appendix D.

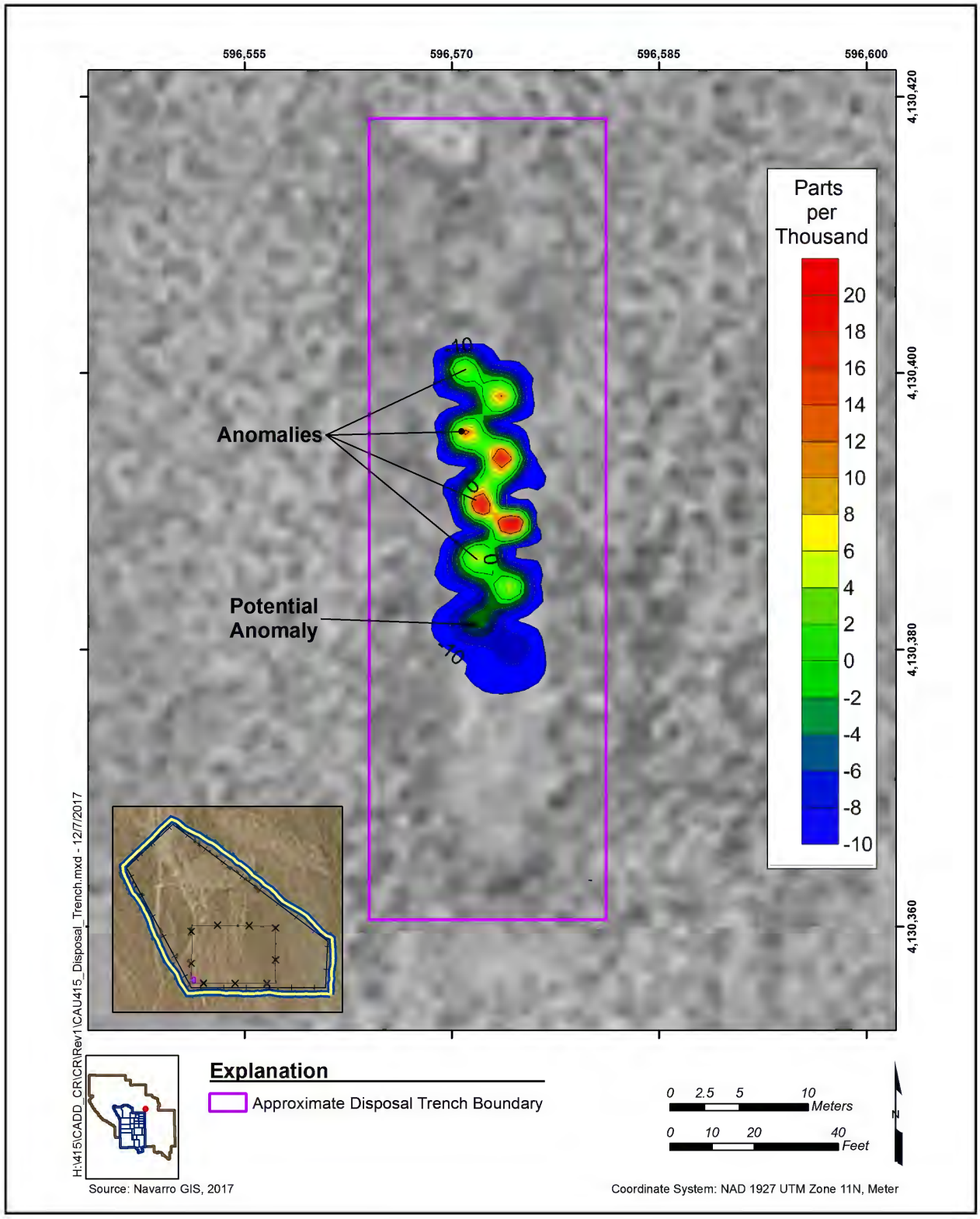

Figure 2-3
CAU 415 Geophysical Survey

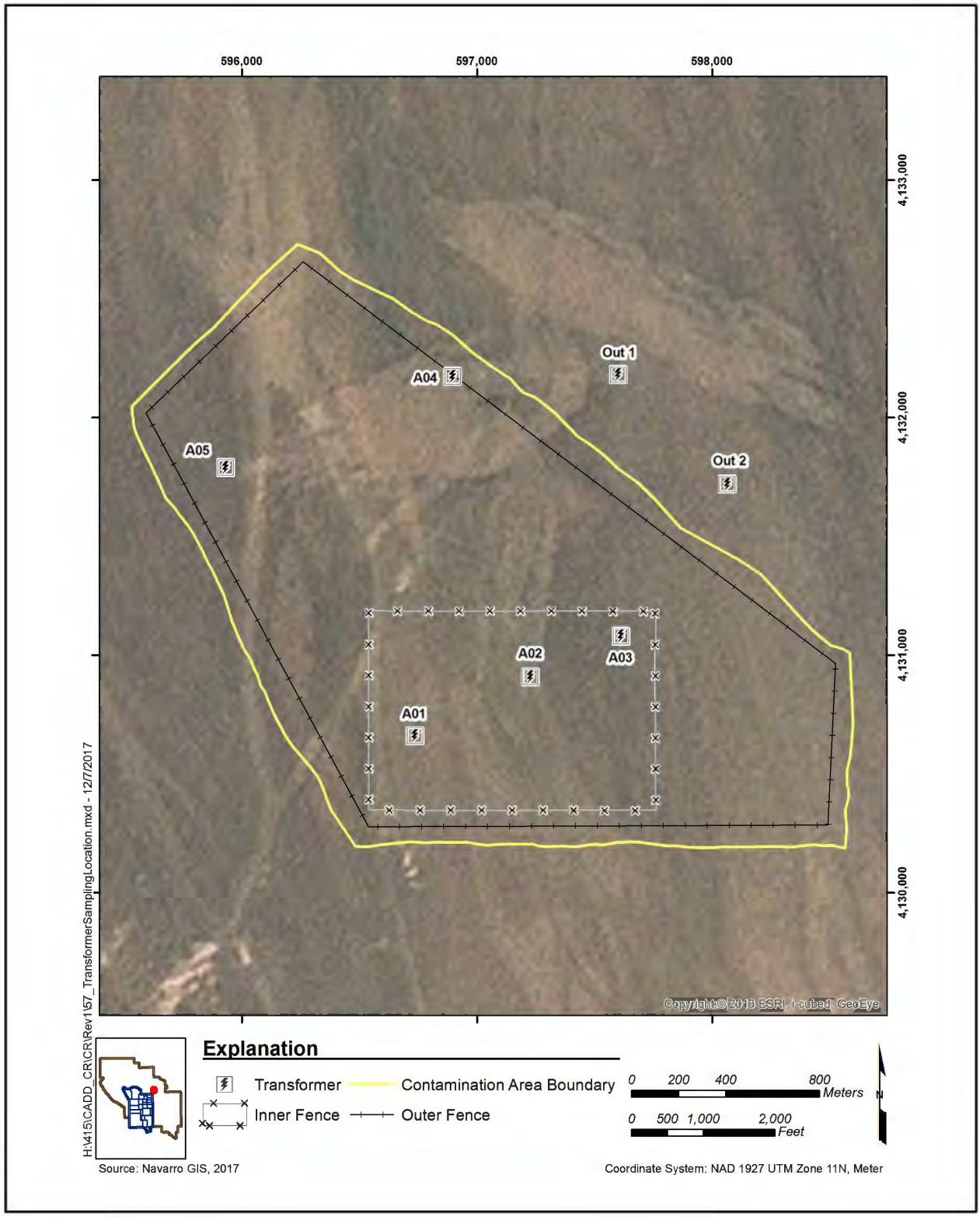

Figure 2-4
CAU 415 Transformer Sample Locations

2.2 Deviations from SAFER Plan as Approved

All closure activities were implemented as planned in the SAFER Plan (NNSA/NFO, 2014b). The SAFER Plan requirements were met for this CAU. No deviations from the CAU 415 SAFER Plan were necessary. Although the SAFER Plan states that no soil sampling is required for the soil beneath the pole-mounted transformers, additional verification sampling was conducted at SG4 to ensure that soil contamination of the contaminants of potential concern (COPCs) identified in the SAFER Plan for SG4 (PCBs) do not exceed a FAL following removal of the transformers. Because visible soil staining or other biasing factors are not present, one verification sample was collected from the soil beneath each transformer. The FALs for PCBs were established as the Tier 1 action level defined in the SAFER Plan as the U.S. Environmental Protection Agency (EPA) Region 9 Regional Screening Levels (RSLs) for chemical contaminants in industrial soils (EPA, 2017). The information gathered during the CAI supports the CSM as presented in the SAFER Plan. Therefore, no revisions were necessary to the CSM. This change did not have any impacts to DQO decisions.

Table 2-1
Sample Results for PCBs (mg/kg)

Sample Location	Sample Number	Aroclor 1254	Aroclor 1260
FALs		**0.97**	**0.99**
Out 2	AB5A022	0.00622 (J)	0.0292
Out 1	AB5A023	--	--
A01	AB5A024	0.00499 (J)	0.00574
A02	AB5A025	--	--
A03	AB5A026	--	--
A04	AB5A027	0.00196 (J)	0.00650
A05	AB5A028	0.00396	0.00430 (J)

J = Estimated value.
-- = Non-detect

2.3 Corrective Action Schedule as Completed

Table 2-2 provides a timeline of major activities that support closure of CAU 415.

Table 2-2
Corrective Action Schedule for CAU 415

Date	Activity
December 2013 and April 2014	FIDLER surveys were conducted within SG1 and SG3. Soil sampling and TLD placement was conducted at SG1. Soil sampling was conducted at SG3. A geophysical survey of SG2 was conducted.
December 2015	Soil sampling of soil beneath transformers was conducted at SG4.
December 2016	Transformer removal and waste disposition was conducted at SG4.

FIDLER = Field instrument for the detection of low-energy radiation
TLD = Thermoluminescent dosimeter

2.4 Site Plans/Survey Plat

As-built drawings were not required for CAU 415 closure activities. Sample locations are shown in Figure 2-4, and the FFACO corrective action boundary is shown in Figure 2-2. The FFACO UR map is presented in Appendix G.

3.0 Waste Disposition

This section addresses the characterization, management, and disposition of remediation wastes generated at CAU 415. Waste management activities were conducted as specified in the SAFER Plan (NNSA/NFO, 2014b).

3.1 Generated Wastes

The wastes listed in Table 3-1 were generated during the closure activities at CAU 415. Wastes were segregated to the greatest extent possible, and waste minimization techniques were integrated into the field activities to reduce the amount of waste generated. Controls were in place to minimize the use of hazardous materials and to avoid the unnecessary generation of hazardous and/or mixed waste.

The amount, type, and source of waste placed into each container were recorded in waste management records that are maintained in the CAU 415 file and submitted to a Records System that is compliant with DOE Order 243.1B, Administrative Change 1 (DOE, 2013). The executed waste shipping and disposal documentation for CAU 415 is included in Appendix E.

Wastes generated during the corrective action activities were segregated into the following waste streams:

- Low-level waste (LLW) investigation-derived waste (IDW), which included debris consisting of plastic sheeting, glass/plastic sample jars, personal protective equipment (PPE), sampling scoops, and disposable aluminum pans generated during the investigation activities performed at the site.
- LLW debris, consisting of seven empty transformer carcasses (i.e., metal debris) that were removed from CAU 415.
- *Toxic Substances Control Act* (TSCA)-regulated waste consisting of transformer oil contaminated with PCBs.

Table 3-1
Waste Summary Table

Waste Stream	Container Number	Waste Types				Waste Disposition			
		Hazardous	Hydrocarbon	PCB	Radioactive	Disposal Facility	Waste Volume	Disposal Date	Disposal Doc[a]
LLW (IDW Debris)	415A01, 415A02, 415A03	No	No	No	Yes	Area 5 RWMC	23.3 ft^3	03/08/2017	CD
LLW (Metal Debris)	415T01 through 415T07	No	No	No	Yes	Area 5 RWMC	115 ft^3	03/29/2017	CD
Transformer Oil	415U01	No	Yes	Yes[b]	No	Offsite Treatment	6.4 ft^3	TBD	Pending

[a]Copies of waste disposal documents are located in Appendix E.

CD = Certificate of Disposal
ft^3 = Cubic foot
RWMC = Radioactive Waste Management Complex
TBD = To be determined

3.2 Waste Characterization and Disposal

Waste characterization was based on process knowledge, radiological surveys, and analytical results of direct and/or associated samples. A brief description of the amounts and characterization information for each waste stream is provided below.

Low-Level Radioactive Waste

The three drums of debris waste were characterized as containing low-level radioactive waste attributed to residual radioactive contamination adhering to the waste. The radiological characterization for this waste stream was based on the results of radiological surveys and/or analytical data from associated soil samples that identified radionuclides at CAU 415. These data were used to calculate the overall activity and activity concentration in each waste container. Process knowledge was also used to characterize the waste. The process knowledge included a visual inspection of the PPE and sampling equipment conducted before packaging. The visual inspection verified that the PPE and sampling equipment did not contain any discoloration or staining, which might indicate the items may have become contaminated with hazardous and/or chemical contamination. The visual inspections did not identify any cross-contamination or nonconforming items. Therefore, the three drums of debris waste were characterized as LLW.

The seven drums containing empty transformer carcases were characterized as LLW based on the results of the radiological surveys completed on the exterior surfaces of each transformer. A review of the radiological survey results for the exterior of the transformer carcasses indicated that five of the transformers had elevated radiological readings that exceeded the residual surface contamination values listed in Table 4-2 of the *Nevada National Security Site* (NNSS) *Radiological Control Manual* (NNSA/NSO, 2012a). As a conservative measure, due to radiological contamination on the exterior of the transformers, all seven transformers were characterized as LLW debris. Because the contents of each of the transformers were drained of all free-flowing liquids, the transformer carcasses meet the definition of a PCB-contaminated article and were disposed of in accordance with 40 *Code of Federal Regulations* (CFR) 761.60 (b)(6)(ii)(A)(2) (CFR, 2017b). Therefore, the transformer carcases were characterized as non-*Resource Conservation and Recovery Act (*RCRA) and non-PCB regulated.

A total of three, 55-gallon (gal) drums (23.3 ft^3) of IDW (e.g., PPE/debris) waste (container numbers 415A01, 415A02, and 415A03) were generated and shipped for disposal during the corrective action activities.

A total of seven drums of contaminated metal debris (115 ft^3) consisting of empty transformer carcasses (container numbers 415T01 through 415T07) were generated and shipped for disposal during the corrective action activities.

All LLW debris generated was shipped to the Area 5 RWMC in accordance with requirements in the *Nevada National Security Site Waste Acceptance Criteria* (NNSA/NFO, 2016).

Transformer Oil

A total of one, 55-gal drum (6.4 ft^3) containing TSCA-regulated transformer oil (container number 415U01) was generated and transferred to the M&O contractor for offsite treatment and disposal at an approved treatment, storage, and disposal facility. Characterization of the transformer oil was based on the analytical results of samples collected directly from each transformer. A review of the analytical results for RCRA-regulated metal constituents indicated that there were no chemical constituents that exceeded the RCRA regulatory limits when converted to a TCLP equivalent. Therefore, the transformer oil inside these transformers was characterized as non-RCRA regulated. The results of the PCB analysis indicated that the PCB concentration for transformer number four was reported at 73 milligrams per kilogram (mg/kg), which exceeds the regulatory limit of 50 mg/kg (CFR, 2017b). Because the analytical results for the transformer oil for six out of the seven transformers had reported PCB results at various concentrations and because the history of the transformers is not well documented, as a conservative measure, all of the oil removed from each of the seven transformers was characterized as PCB contaminated. A review of the radiochemical results of the oil indicated that the only radioisotopes detected were U-234, U-235/236, and U-238. The results for each reported radioisotope were all less than 1 picocurie per gram (pCi/g), which meet the limits of the Performance Objective Criteria (POC) (BN, 1995). Therefore, the oil inside each transformer was characterized as non-radioactive PCB-contaminated waste. The transformer oil analytical results above MDCs are presented in Tables 3-2 through 3-4. Disposal of the transformer oil is currently pending. Waste disposal documentation will be included as an addendum to this CR upon receipt from the treatment/disposal facility.

Table 3-2
Transformer Oil Sample Results for PCBs (mg/kg)

Sample Number	Aroclor 1260
AB5A502	73
AB5A503	7.85
AB5A504	7.55
AB5A505	7.78
AB5A506	7.93
AB5A507	19.4

Table 3-3
Transformer Oil Sample Results for RCRA Metals (mg/kg)

Sample Number	Barium	Selenium
AB5A501	0.0975 (J)	--
AB5A506	--	0.529 (J)

J = Estimated value.
-- = Non-detect

Table 3-4
Transformer Oil Sample Results for Isotopes (pCi/g)

Sample Number	U-234	U-235/236	U-238
AB5A501	--	0.0541	--
AB5A502	0.0978	--	0.0838
AB5A503	0.102	0.0803	0.0959
AB5A504	0.0969	--	0.139
AB5A505	--	0.0413	0.0668
AB5A506	0.0898	0.0904	0.0898
AB5A507	0.0717	--	0.0687

-- = Non-detect

Motor Oil

A total of one, 10-gal drum (1.1 ft^3) of motor oil (container number 415U03) was generated during the decommissioning of the bucket truck. The motor oil was transferred to the M&O contractor for offsite recycling during the corrective action activities. The motor oil was characterized using process knowledge and analytical results of a direct sample collected from the motor oil. The process knowledge included a review of the safety data sheet for the motor oil used in the bucket truck. There were no RCRA-regulated hazardous constituents or PCB constituents identified on the safety data sheets.

As part of the radiological survey plan for the unrestricted release of the bucket truck, the motor oil was drained and sampled for radiochemical constituents to verify no internal contamination. A review of the radiochemical results of the motor oil indicated that there were no radioisotopes detected above the MDC. Because no radionuclides were detected in the analytical results of the motor oil, the motor oil waste meets the limits of the POC (BN, 1995).

Because the motor oil does not contain hazardous or radioactive contaminants, it was recycled and not disposed of as waste.

4.0 Closure Verification Results

All corrective actions were implemented as specified in the SAFER Plan (NNSA/NFO, 2014b) including the removal of the seven pole-mounted transformers. Verification soil samples were collected below each transformer to verify COCs are not present in the soil. The verification sample results are presented in Appendix D. Verification sample results demonstrate that contaminants are not present in concentrations greater than the FALs, and no further corrective action is required for these locations.

4.1 Data Quality Assessment

The DQA process is the scientific evaluation of the actual investigation results to determine whether the DQO criteria were met and whether DQO decisions can be resolved at the desired level of confidence. The DQO process ensures that the right type, quality, and quantity of data will be available to support the resolution of those decisions at an appropriate level of confidence. Using both the DQO and DQA processes helps to ensure that DQO decisions are sound and defensible.

The DQA involves five steps that begin with a review of the DQOs and end with an answer to the DQO decisions. These steps are briefly summarized as follows:

1. *Review DQOs and Sampling Design*. Review the DQO process to provide context for analyzing the data. State the primary statistical hypotheses; confirm the limits on decision errors for committing false-negative (Type I) or false-positive (Type II) decision errors; and review any special features, potential problems, or any deviations to the sampling design.

2. *Conduct a Preliminary Data Review*. A preliminary data review should be performed by reviewing QA reports and inspecting the data both numerically and graphically, validating and verifying the data to ensure that the measurement systems performed in accordance with the criteria specified, and using the validated dataset to determine whether the quality of the data is satisfactory.

3. *Select the Test*. Select the test based on the population of interest, population parameter, and hypotheses. Identify the key underlying assumptions that could cause a change in one of the DQO decisions.

4. *Verify the Assumptions*. Perform tests of assumptions. If data are missing or censored, determine the impact on DQO decision error.

5. *Draw Conclusions from the Data*. Perform the calculations required for the test.

The DQA presented in this document is only for the verification sample data generated during the closure activities for SG4 as presented in Section 2.1.4. The DQA for the CAI data is presented in Appendix F of the CAU 415 SAFER Plan (NNSA/NFO, 2014b).

4.1.1 Review DQOs

The DQO decisions are presented with the DQO provisions to limit false-negative or false-positive decision errors. The PCB FALs are based on the EPA Region 9 RSLs for chemical contaminants in industrial soils (EPA, 2017).

4.1.1.1 Decision I

The Decision I statement as presented in the SAFER Plan (NNSA/NFO, 2014b) is as follows: "Does contamination exist at the release site that exceeds FALs?" Any contaminant that is present (or is assumed to be present) at concentrations exceeding its corresponding FAL will be defined as a COC. A COC may also be defined as a contaminant that, in combination with other like contaminants, is determined to jointly pose an unacceptable risk based on a multiple contaminant analysis (NNSA/NFO, 2014a). If a COC is detected, then Decision II must be resolved.

As presented in the CAU 415 SAFER Plan, Decision I for SG4 was resolved by the assumption that the transformers contained PCBs that would meet the definition of PSM and require corrective action. Decision I is also being applied in this DQA to the verification samples collected from soil directly beneath each transformer.

4.1.1.2 Decision II

Decision II as presented in the SAFER Plan (NNSA/NFO, 2014b) is as follows: "Have the CAU closure objectives been met?" As stated in the SAFER Plan, the CAU 415 closure objectives for the pole-mounted transformers (SG4) is removal of the transformers. This closure objective was met by the removal of the transformers during the closure activities. The lateral and vertical extent of

contamination at SG4 was determined as the physical extent of the transformers. The information required to predict potential remediation waste types for SG4 was provided by the analytical results from samples of the dielectric transformer fluid. For the verification sampling, the Decision II statement is, "Is there sufficient information to determine the corrective action boundary?"

4.1.1.3 DQO Provisions To Limit False-Negative Decision Error

A false-negative decision error (when it is concluded that contamination exceeding FALs is not present when it actually is) was controlled by meeting the following criteria:

1) For Decision I, having a high degree of confidence that sample locations selected will identify COCs if present anywhere within the study group (judgmental sampling).

2) Having a high degree of confidence that analyses conducted will be sufficient to detect any COCs present in the samples.

3) Having a high degree of confidence that the dataset is of sufficient quality and completeness.

Criterion 1 (Confidence Judgmental Sample Locations Identify COCs)

Verification samples were collected from locations that were selected based on the likelihood of being contaminated with any fluid leaking from the transformers. A visual survey was conducted below each transformer to identify any visual indication of potential contamination such as any discoloration. As no biasing indicators were identified, sample locations were selected directly beneath each transformer.

Criterion 2 (Confidence in Detecting COCs Present in Samples)

The analytical method chosen during the DQO process for SG4 was PCBs as the analysis required to detect the COPCs that were defined as the contaminants that could reasonably be expected at the site that could contribute to a dose or risk exceeding FALs. The COPC of PCBs was identified based on process knowledge.

Sample results were assessed against the acceptance criterion for the data quality indicator (DQI) of sensitivity as defined in the Soils Activity QAP (NNSA/NSO, 2012b). The sensitivity acceptance

criterion is that all detection limits are less than their corresponding FALs. All of the analytical detection limits were less than their corresponding FALs. Therefore, the DQI for sensitivity has been met for PCB results and no data were qualified for sensitivity.

Criterion 3 (Confidence that Dataset is of Sufficient Quality and Complete)

To satisfy the third criterion, the dataset was assessed against the acceptance criteria for the DQIs of precision, accuracy, comparability, completeness, and representativeness, as defined in the Soils Activity QAP (NNSA/NSO, 2012b). The DQI acceptance criteria are presented in Section 1.5.5 of the Soils Activity QAP. The individual DQI results are presented in the following subsections.

Precision

Precision was evaluated as described in Section 1.5.5 and Section 4.2 of the Soils Activity QAP (NNSA/NSO, 2012b). As no PCB data were qualified for precision, the precision rate for PCBs met the criterion of 80 percent.

Accuracy

Accuracy was evaluated as described in Section 1.5.5 and Section 4.2 of the Soils Activity QAP (NNSA/NSO, 2012b). As no PCB data were qualified for accuracy, the accuracy rate for PCBs met the criterion of 80 percent.

Representativeness

Sampling and analytical requirements were consistent with the DQO process identified in Appendix B of the SAFER Plan (NNSA/NFO, 2014b). During this process, appropriate locations were selected that enabled the samples collected to be representative of the population parameters identified in the DQO (the most likely locations to contain contamination [judgmental sampling]). The sampling locations identified in the Criterion 1 discussion meet this criterion.

Comparability

Field sampling was performed and documented in accordance with approved procedures that are comparable to standard industry practices. Approved analytical methods and procedures per DOE were used to analyze, report, and validate the data. These are comparable to other methods used not only in industry and government practices, but most importantly are comparable to other

investigations conducted for the NNSS and NTTR. Therefore, CAU 415 datasets are considered comparable to other datasets generated using these same standardized DOE procedures, thereby meeting DQO requirements.

Also, standard, approved field and analytical methods ensured that data were appropriate for comparison to the investigation action levels specified in the SAFER Plan (NNSA/NFO, 2014b).

Completeness

The Soils Activity QAP (NNSA/NSO, 2012b) defines acceptable criteria for completeness to be that the dataset is sufficiently complete to be able to make the DQO decisions. This is initially evaluated as 80 percent of release-specific analytes identified having valid results. As none of the PCB results were rejected (either qualified as rejected or data that failed the criterion of sensitivity), the dataset for CAU 415 has met the general completeness criteria and sufficient information is available to make the DQO decisions.

4.1.1.4 DQO Provisions To Limit False-Positive Decision Error

The false-positive decision error was controlled by assessing the potential for false-positive analytical results. QA/QC samples such as method blanks were used to determine whether a false-positive analytical result may have occurred. This provision is evaluated during the data validation process and appropriate qualifications are applied to the data when applicable. There were no data qualifications that would indicate a potential false-positive analytical result.

The use of disposable sampling equipment also minimized the potential for cross contamination that could lead to a false-positive analytical result.

4.1.2 Sampling Design

No sampling was required in the SAFER Plan (NNSA/NFO, 2014b). However, judgmental samples were collected from beneath each transformer as described in Section 2.1.4.

4.1.3 Conduct a Preliminary Data Review

A preliminary data review was conducted by reviewing QA reports and inspecting the data. The contract analytical laboratories generate a QA nonconformance report when data quality does not meet contractual requirements. All data received from the analytical laboratories met contractual requirements, and a QA nonconformance report was not generated. Data were validated and verified to ensure that the measurement systems performed in accordance with the criteria specified in the Soils Activity QAP (NNSA/NSO, 2012b). The validated dataset quality was found to be satisfactory.

4.1.4 Select the Test and Identify Key Assumptions

For PCB chemical contamination, the test for making DQO decisions was the comparison of the maximum analyte result to the corresponding FAL. The PCB FALs were based on an exposure duration to a site worker using the Industrial Area exposure scenario. Based on the results of PCB soil samples, the FAL is not exceeded at any sample location. Sample results are presented in Appendix D.

The key assumptions that could impact a DQO decision are listed in Table 4-1.

4.1.5 Verify the Assumptions

The results of the verification sampling support the key assumptions identified in the CAU 415 DQOs and Table 4-1. All data collected support the CSM, and no revisions to the CSM were necessary.

4.1.6 Other DQO Commitments

The SAFER Plan (NNSA/NFO, 2014b) made the following commitments:

Commitment: Remove the pole-mounted transformers as part of site closure.

- **Result.** The transformers were removed during the closure activities.

4.1.7 Draw Conclusions from the Data

The following subsections resolve the two DQO decisions for each of the CAU 415 study groups.

Table 4-1
Key Assumptions

Exposure Scenario	Industrial Area
Affected Media	Surface soil
Location of Contamination/Release Points	Surface soil from leaking transformers.
Transport Mechanisms	Percolation of precipitation through subsurface media serves as the major driving force for vertical migration of contaminants. Surface water runoff may provide for the transportation of some contaminants within or outside the footprints of the releases. Wind may cause limited resuspension and transport of windborne contaminants.
Preferential Pathways	Lateral transport is expected to dominate over vertical due to large potential evapotranspiration demands and low precipitation amounts. The depth to the uppermost aquifer precludes groundwater as a significant pathway.
Lateral and Vertical Extent of Contamination	Contamination is expected to be contiguous to the release points. Concentrations are expected to decrease with distance and depth from the source. Lateral and vertical extent of contamination exceeding FALs is assumed to be within the spatial boundaries.
Groundwater Impacts	None.
Future Land Use	Industrial activities.
Other DQO Assumptions	The pole-mounted transformers are assumed to contain PCBs that could release COCs to the soil in excess of a FAL.

4.1.7.1 Decision Rules for Both Decision I and II

Decision rule. If COC contamination is found that is inconsistent with the CSM or extends beyond the spatial boundaries identified in the SAFER Plan (NNSA/NFO, 2014b), then work will be suspended and the investigation strategy will be reconsidered, else the decision will be to continue sampling.

- **Result.** No COCs were identified during the closure activities.

4.1.7.2 Decision Rules for Decision I

Decision rule. If the population parameter of any COPC in the Decision I population of interest exceeds the corresponding FAL, then Decision II will be resolved and a corrective action will be determined, else no further investigation is needed for that COPC in that population.

- **Result.** No PCB result exceeded a FAL, and no further action is necessary.

4.1.8 Decision-Supporting Data Quality

4.1.8.1 Visual Surveys

Visual surveys were used to determine the biasing of sample locations by the identification of discoloration associated with leaking of transformer liquids onto the ground surface below the pole-mounted transformers. The criteria for the visual survey are indicators such as discoloration or any other indication of potential contamination. This information does not have inherent data quality properties but was agreed to in the DQOs as the identification of the biasing criteria by the field personnel.

4.2 Use Restrictions

As presented in the SAFER Plan (NNSA/NFO, 2014b), radiological contaminants were detected or assumed to be present above the FAL at SG1, Pu-contaminated soil; and at SG2, disposal trench. PCBs were also assumed to be present above their associated FALs at SG4, pole-mounted transformers. However, the pole-mounted transformers were removed under a corrective action and verification sampling of the soil beneath the transformers demonstrate that no contamination remains exceeding a FAL. Therefore, further corrective action is only necessary for SG1, Pu-contaminated soil and at SG2, disposal trench. As the presumed corrective action alternative selected in the SAFER Plan is closure in place, an FFACO UR was implemented. Activities that would cause a site worker to be exposed to site radiological contamination within the FFACO UR are restricted within the area defined by the coordinates listed in the FFACO UR and depicted in the figure attached to the UR without prior notification of NDEP unless the activities are conducted under the provisions of 10 CFR Part 835 (CFR, 2017a). The FFACO UR is recorded in the FFACO database, the DOE EM Nevada Program CAU/CAS files, the M&O contractor GIS, and the USAF GIS. Warning signs that encompass the FFACO UR were posted outside the administrative UR boundary shown in Figure 2-2.

An administrative UR was also established to prevent inadvertent exposure of workers to radioactivity if a more intensive use of the site were to be considered in the future. As a best management practice (BMP), this administrative UR was established based on the assumed potential to receive a dose exceeding 25 mrem/yr in the area identified as exhibiting removable contamination at levels exceeding the criterion for a contamination area (CA) (Figure 2-2). Activities that would

cause a site worker to be exposed to site radiological contamination are restricted within the areas defined by the coordinates listed in the administrative UR and depicted in the figure attached to the UR without prior NDEP notification unless the activities are conducted under the provisions of 10 CFR Part 835 (CFR, 2017a). This administrative UR is recorded in the FFACO database, the DOE EM Nevada Program CAU/CAS files, the M&O contractor GIS, and the USAF GIS.

The Use Restriction Information form and figures showing the UR boundary for each CAS are included in Appendix G. Post-closure requirements are summarized in Section 5.2.

The corrective actions for CAU 415 are based on the assumption that activities on the NTTR will be limited to those that are industrial in nature and that the NTTR will maintain controlled access (i.e., restrict public access and residential use). Should the future land use of the NTTR change such that these assumptions are no longer valid, additional evaluation may be necessary.

5.0 Conclusions and Recommendations

Corrective actions for CAU 415 were implemented as presented in the SAFER Plan (NNSA/NFO, 2014b).

5.1 Conclusions

The Pu-contaminated surface soil at CAU 415 contains COCs that exceed the radiological FAL of 25 mrem/IA-yr and removable contamination at levels exceeding HCA criteria. Additionally, subsurface soils in the disposal trench are assumed to contain contamination that exceed FALs. The corrective action of closure in place with an FFACO UR was implemented as discussed in the SAFER Plan (NNSA/NFO, 2014b).

As stated in the SAFER Plan, DOE may implement appropriate BMPs—such as installing a soil cover, monuments, or landmarks—in addition to the required corrective actions.

5.2 Post-Closure Requirements

The FFACO UR implemented will protect site workers from inadvertent exposure. The FFACO UR is defined and shown in Appendix G. The CAU 415 FFACO UR requires post-closure inspections. Inspections will be performed annually to verify that UR warning signs are in place, intact, and legible. Signs will be repaired or replaced as needed.

All URs are recorded in the FFACO database, the DOE EM Nevada Program CAU/CAS files, the M&O contractor GIS, and the USAF GIS. The development of URs for CAU 415 are based on an industrial land use of 2,000 hours per year. Any proposed activity within a use restricted area that would result in a more intensive use of the site would require NDEP notification.

5.3 Recommendations

No further corrective action is required at CAU 415 based upon implementation of corrective actions. The corrective actions for CAU 415 are based on the assumption that activities on the NTTR will be limited to those that are industrial in nature and that the NTTR will maintain controlled access

(i.e., restrict public access and residential use). Should the future land use of the NTTR change such that these assumptions are no longer valid, additional evaluation may be necessary.

The DOE EM Nevada Program requests that NDEP issue a Notice of Completion for this CAU and approve transferring the CAU from Appendix III to Appendix IV of the FFACO. The DOE, under its regulatory authority for management of radioactive waste materials associated with environmental remediation activities, approves these actions (USC, 2012).

6.0 References

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Appendix A

DQOs as Developed in the SAFER Plan

Note: This appendix contains the DQOs presented in SAFER Plan and consists of Appendix B of the SAFER Plan. Therefore, cross-references, page numbers, and header information in this appendix refer to the original document.

B.1.0 Introduction

The DQO process described in this appendix is a seven-step strategic systematic planning method used to plan data collection activities and define performance criteria for the CAU 415, Project 57 No. 1 Plutonium Dispersion (NTTR) field investigation. The DQOs are designed to ensure that the data provide sufficient and reliable information to identify, evaluate, and technically defend the appropriate corrective actions, to provide sufficient data to implement the corrective actions, and to verify that closure was achieved.

The DQOs, as presented in this appendix, were developed by NDEP, NNSA/NFO, and other stakeholders. The seven steps of the DQO process presented in Sections B.2.0 through B.8.0 were developed in accordance with *Guidance on Systematic Planning Using the Data Quality Objectives Process* (EPA, 2006).

In general, the procedures used in the DQO process provide the following:

- A method to establish performance or acceptance criteria, which serve as the basis for designing a plan for collecting data of sufficient quality and quantity to support the goals of a study.
- Criteria that will be used to establish the final data collection design, such as
  - the nature of the problem that has initiated the study and a conceptual model of the environmental hazard to be investigated;
  - the decisions or estimates that need to be made, and the order of priority for resolving them;
  - the type of data needed; and
  - an analytic approach or decision rule that defines the logic for how the data will be used to draw conclusions from the study findings.
- Acceptable quantitative criteria on the quality and quantity of the data to be collected, relative to the ultimate use of the data.
- A data collection design that will generate data meeting the quantitative and qualitative criteria specified. A data collection design specifies the type, number, location, and physical quantity of samples and data, as well as the QA and QC activities that will ensure that sampling design and measurement errors are managed sufficiently to meet the performance or acceptance criteria specified in the DQOs.

B.2.0 Step 1 - State the Problem

Step 1 of the DQO process defines the problem that requires study, identifies the planning team, and develops a conceptual model of the environmental hazards to be investigated.

The problem statement for CAU 415 is "Information on the nature and extent of potential contamination needs to be evaluated for the closure of CAU 415."

B.2.1 Planning Team Members

The DQO planning team consists of representatives from NDEP and NNSA/NFO and other stakeholders. The DQO planning team met on January 28, 2014, and conducted the DQO meeting.

B.2.2 Conceptual Site Model

The CSM is used to organize and communicate information about site characteristics. It reflects the best interpretation of available information at a point in time. The CSM is a primary vehicle for communicating assumptions about release mechanisms, potential migration pathways, or specific constraints. It provides a summary of how and where contaminants are expected to move and what impacts such movement may have. It is the basis for assessing how contaminants could reach receptors both in the present and future. The CSM describes the most probable scenario for current conditions at the site and defines the assumptions that are the basis for identifying appropriate sampling strategy and data collection methods. An accurate CSM is important as it serves as the basis for all subsequent inputs and decisions throughout the DQO process.

The CSM was developed for CAU 415 using information from the physical setting, potential contaminant sources, release information, historical background information, knowledge from similar sites, and physical and chemical properties of the potentially affected soil and COPCs.

The CSM consists of the following:

- Potential contaminant releases, including soil subsequently affected
- Release mechanisms (i.e., the conditions associated with the release)

- Potential contaminant source characteristics, including contaminants suspected to be present and contaminant-specific properties
- Site characteristics, including physical, topographical, and meteorological information
- Migration pathways and transport mechanisms that describe the potential for migration and where the contamination may be transported
- The locations of points of exposure where individuals or populations may come in contact with a COC associated with a release
- Routes of exposure where contaminants may enter the receptor

If additional elements are identified during the CAI that are outside the scope of the CSM, the situation will be reviewed and a recommendation will be made as to how to proceed. In such cases, NDEP will be notified and given the opportunity to comment on, or concur with, the recommendation.

Table B.2-1 provides information on CSM elements that will be used throughout the remaining steps of the DQO process. Figure B.2-1 depicts a representation of the conceptual pathways to receptors from CAU 415 sources. Figure B.2-2 depicts a graphical representation of the CSM.

Table B.2-1
CSM Description of Elements for Each Release in CAU 415
(Page 1 of 2)

CAS Identifier	NAFR-23-02
Site Status	Inactive and abandoned
Exposure Scenario	Industrial
Sources of Potential Soil Contamination	Atmospheric deposition of radionuclides from safety test; leaking containers/transformer, and surface and subsurface disposal of discarded contaminated equipment and materials
Location of Contamination/ Release Point	Surface and subsurface soil surrounding and downgradient of GZ and surface and subsurface soil from leaking containers/transformers
Amount Released	Unknown
Affected Media	Surface, shallow subsurface, and subsurface soil; drainage sediments
Potential Contaminants[a]	Pu-239/240, Am-241, U-238, PCBs

Table B.2-1
CSM Description of Elements for Each Release in CAU 415
(Page 2 of 2)

CAS Identifier	NAFR-23-02
Transport Mechanisms	Percolation of precipitation through subsurface media serves as the major driving force for vertical migration of contaminants. Surface water runoff may provide for the transportation of some contaminants within or outside the footprints of the releases. Wind may cause limited resuspension and transport of windborne contaminants.
Migration Pathways	Lateral transport expected to dominate over vertical due to large PET demands and low precipitation amounts. The depth to the uppermost aquifer precludes groundwater as a significant pathway.
Lateral and Vertical Extent of Contamination	Contamination, if present, is expected to be contiguous to the release points. Concentrations are expected to decrease with distance and depth from the source. Lateral and vertical extent of contamination exceeding FALs is assumed to be within the spatial boundaries.
Exposure Pathways	The potential for contamination exposure is limited to industrial workers, and military and emergency services personnel conducting training or response actions. These human receptors may be exposed to COPCs through oral ingestion or inhalation of, or dermal contact (absorption) with soil and/or debris due to inadvertent disturbance of these materials, or irradiation by radioactive materials.

[a]PCBs are potential soil contaminants associated only with the pole-mounted transformers.

PET = Potential evapotranspiration

B.2.2.1 Release Sources

The primary release source specific to CAU 415 is the safety experiment device. Some of the contamination associated with the release may have been translocated due to mechanical disturbance of the soil (e.g., decontamination activities that were part of the experiment) or due to migration with eroding soil particles (e.g., surface water flow through natural drainages). Other potential release sources include radioactive debris from the test infrastructure that is remaining on the surface or that has been buried in a disposal trench (e.g., contaminated vehicles), and pole-mounted transformers that potentially contain PCB dielectric fluids. Additional information on releases specific to each release site is presented in Sections 2.1 and 2.2.4.4.

The most likely locations of the contamination and releases to the environment are the soils directly below or adjacent to the CSM surface and subsurface components (i.e., soils impacted by the atmospheric release, soils impacted by leaking transformers).

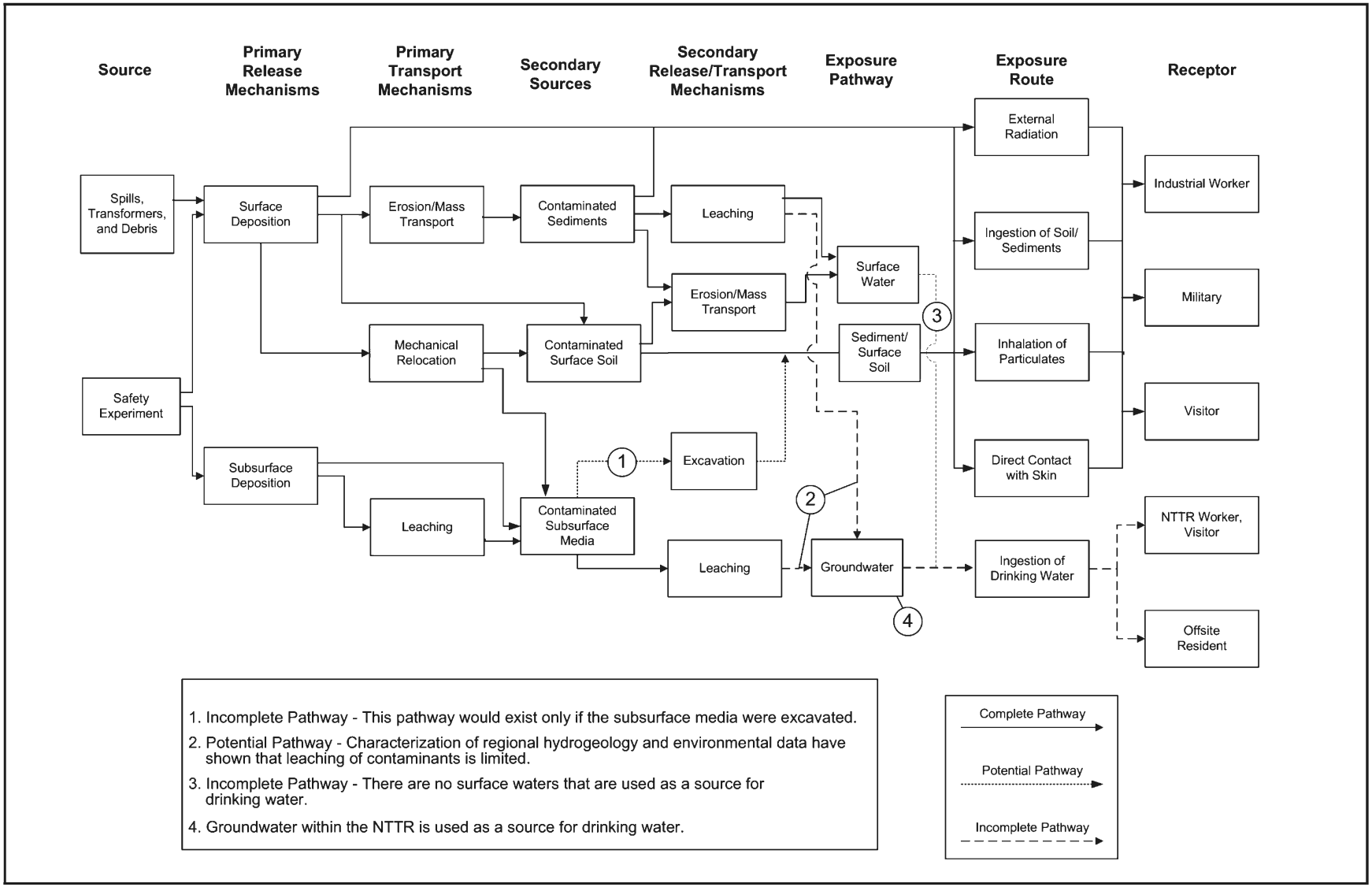

Figure B.2-1
CAU 415 CSM Pathways to Receptors

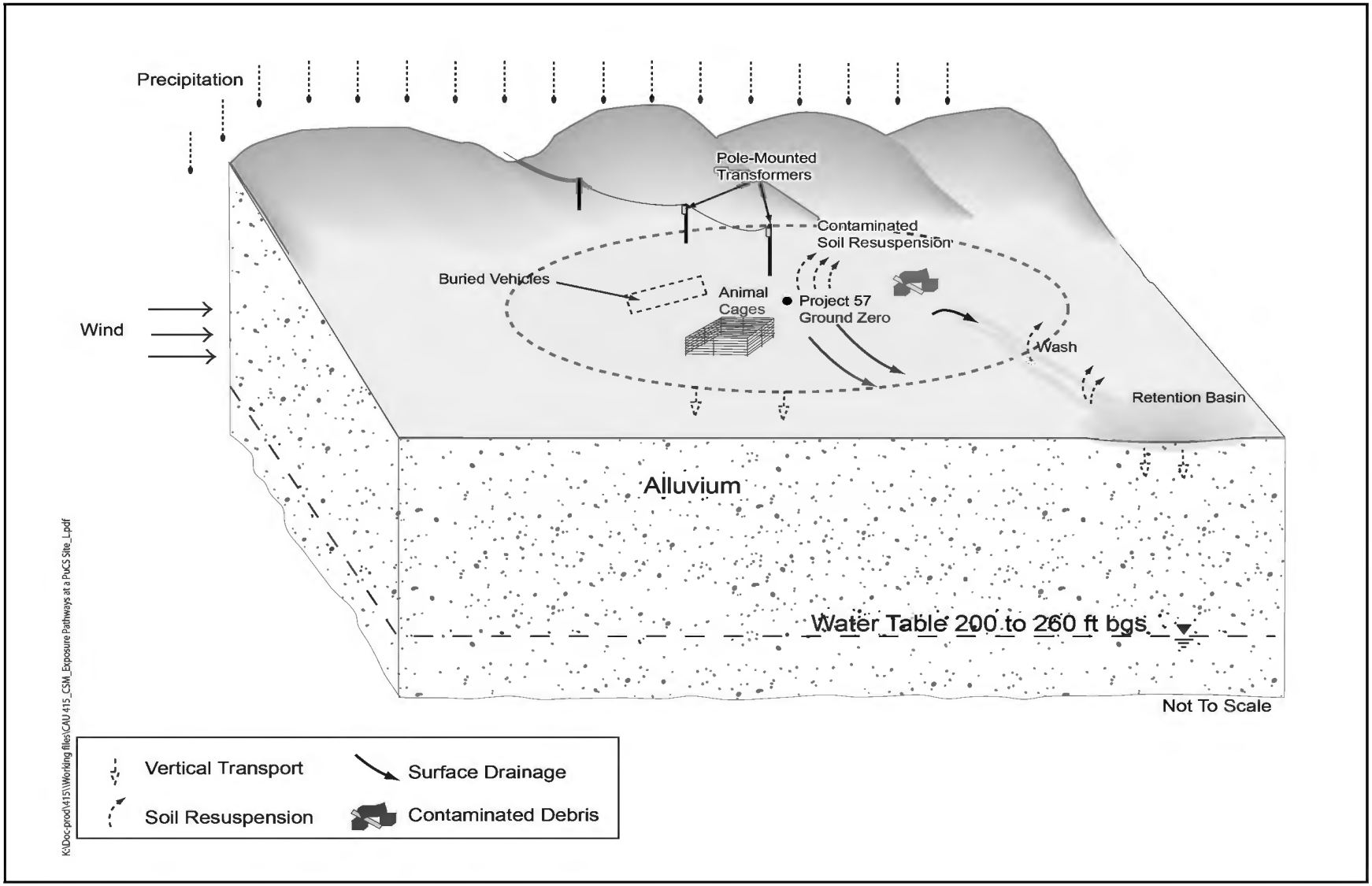

Figure B.2-2
CSM for CAU 415

B.2.2.2 Potential Contaminants

The release-specific COPCs are defined as the contaminants reasonably expected at the site that could contribute to a dose or risk exceeding FALs. Based on the nature of the releases identified in Section 2.1 and previous investigation results presented in Section 2.2, the contaminants listed in Table B.2-2 could reasonably be suspected to be present at CAU 415.

These COPCs were identified during the planning process through the review of site history, process knowledge, personnel interviews, past investigation efforts (where available), and inferred activities associated with the releases (including those that may be discovered during further investigation). Records indicate that during the Project 57 experiment, the only materials known to have been released from the safety experiment were radioactive materials. Pu, U, and Am are the primary contaminants released during the safety experiment and are expected to be found in the soil, on debris (e.g., animal cages), on the buried vehicles, and in the drainages and retention basin. Radionuclide concentrations are expected to decrease with distance from GZ. It is assumed that RCRA constituents are not present at the site at concentrations above regulatory limits based on historical documents and experience at other safety experiment sites. Two transformers were discovered during the 2013 investigation; four others were identified in 2014. The transformers are presently located near the top of power poles. Based on historical use of PCB-containing dielectric fluids in transformers from the 1950s, the transformers potentially contain or once contained PCB dielectric fluids. The COPCs applicable to Decision I for CAU 415 are listed in Table B.2-2.

B.2.2.3 Contaminant Characteristics

Contaminant characteristics include, but are not limited to, solubility, density, and adsorption potential. In general, contaminants with low solubility, high affinity for soil, and high density can be expected to be found relatively close to release points. Based on knowledge of the Project 57 safety experiment and other similar safety experiments conducted on the NNSS, the anticipated primary contaminants in soil at CAU 415 include Pu, Am, and depleted U. The oxides of these radionuclides are relatively insoluble in water and have a high affinity for soil particles in the desert environment.

Table B.2-2
Contaminants of Potential Concern[a]

COPCs	Pu-Contaminated Soil	Disposal Trench	Drainage System	Pole-Mounted Transformers
Organic COPCs				
PCBs	--	--	--	X
Radionuclide COPCs				
U-234	X	X	X	--
U-235/236	X	X	X	--
U-238	X	X	X	--
Pu-238	X	X	X	--
Pu-239/240	X	X	X	--
Pu-241	X	X	X	--
Am-241	X	X	X	--

[a]The COPCs are the contaminants that, based on process knowledge and historical documentation, are likely to be present.

X = COPC associated with this CAU component.
-- = COPC not associated with this CAU component.

PCBs are also relatively immobile if released to the environment. If released to the soil, PCBs are tightly adsorbed to soil particles and do not leach significantly; however biodegradation of PCBs occurs very slowly in the environment.

Based upon conclusions of a contaminant travel time analysis for CAU 415, the radionuclide contaminants at CAU 415 are moderately to highly adsorbed on the valley-fill alluvial materials present at the site (N-I, 2013). Utilizing conservative input parameters based on regional groundwater models, an analysis of contaminant travel time through the subsurface to the water table suggests that the residual radioactive U and Pu contamination on the ground surface at the CAU 415 site will travel 0.76 m and 0.38 m, respectively, over a 1,000-year time period. And, using the highest mobility rate, the U and Pu contamination will not reach the water table for 46,000 years, and 93,000 years, respectively (N-I, 2013).

B.2.2.4 Site Characteristics

Site characteristics are defined by the interaction of physical, topographical, and meteorological attributes and properties. Physical properties include permeability, porosity, hydraulic conductivity, degree of saturation, sorting, chemical composition, and organic content. Topographical and meteorological properties and attributes include slope stability, precipitation frequency and amounts, precipitation runoff pathways, drainage channels and ephemeral streams, and evapotranspiration potential.

The CAU 415 site is situated in the high desert region of south–central Nevada. Meteorological data specific to the CAU 415 site have been collected since 2011 at two meteorological stations located on the east side of the CA fence. Meteorological parameters being measured by these stations include wind direction and speed, air temperature, relative humidity, and precipitation. At present, the available data include approximately one year of monitoring data that may or may not be representative of the typical meteorological conditions at the site. These data indicate that winter is dominated by northerly winds, while the summer season has both northerly and southwest winds. Winds above 19 miles per hour (mph) from both northerly and southwesterly directions during both seasons were noted. Typical of a Great Basin Desert location, the CAU 415 site is exposed to large diurnal temperature ranges with infrequent precipitation events. The total precipitation during the first year of monitoring was less than 3 in.

Additional meteorological data that represent several years of monitoring in a comparable desert environment at Yucca Flat on the NNSS are presented for comparison. These data may be more representative of the typical (or average) meteorological conditions expected to be encountered at CAU 415. Elevations range from about 910 m (3,000 ft) above mean sea level in the south and east, rising to 2,230 m (7,300 ft) in the mesa areas toward the northern and western boundaries. The average annual precipitation at the weather station at Yucca Flat is 7.42 in. (18.8 cm) (French, 1985; Schaeffer, 1968). At Yucca Flat, the average annual daily minimum temperature is 22 degrees Celsius (°C) (72 degrees Fahrenheit [°F]), and the average annual daily maximum is 38 °C (100 °F). Recorded extremes are 43 °C (110 °F) and -26 °C (-15 °F). Temperatures in excess of 38 °C (100 °F) can be expected June through September, while temperatures at or near freezing have been recorded in all months except July and August (DRI, 1988). The average annual wind speed at Yucca Flat is 13 kilometers per hour (km/hr) (8.1 mph), and the prevailing wind direction is from the north, except

in May through August, when the winds are primarily from the south–southwest. April is the windiest month, with wind speeds averaging 14 km/hr (9 mph); however, gusts in excess of 80 km/hr (50 mph) have been recorded in every month.

The CAU 415 site is within the Death Valley Groundwater Flow System. Groundwater under the site flows southward toward the Ash Meadows Discharge Area. The depth to groundwater in the area of the CAU 415 site is estimated to be approximately 200 to 260 ft (61 to 79 m) (NNSA/NSO, 2011), and is provided by the depth of the water table at the Stewart 2 (HTH) well, located 1.4 kilometers southwest of the site (N-I, 2013).

No permanent surface waters are associated with the CAU 415 site. Natural drainage for the area is generally from the northwest to the southeast, moving toward the Groom Lake playa. The site drainage patterns observed on aerial photographs of the CAU 415 site suggest that surface runoff may lead from the GZ area to a retention basin, located adjacent to the Stewart 2 (HTH) well, southwest of the fenced area.

B.2.2.5 Migration Pathways and Transport Mechanisms

Migration pathways include the lateral migration of potential contaminants across surface soils/sediments and vertical migration of potential contaminants through subsurface soils. Contaminants present in ephemeral washes are subject to much higher transport rates than contaminants present in other surface areas. These ephemeral washes are generally dry but are subject to infrequent stormwater flows. Stormwater flow events provide an intermittent mechanism for both vertical and lateral transport of contaminants. Contaminated sediments entrained by these stormwater events would be carried by the drainage channel flow to locations where the flowing water loses energy and the sediments drop out. These locations are visually identifiable as sedimentation areas.

Other migration pathways for contamination from the site include windborne material and materials displaced from maintenance activities (e.g., fence repair, road maintenance). Contaminants may also be moved through mechanical disturbance due to maintenance or construction activities at the site. Specifically, this can include activities such as decontamination and demolition of facilities, investigation and resolution of CASs, and disassembly and removal of equipment and support structures.

Migration is influenced by the chemical characteristics of the contaminants (presented in Section B.2.2.3) and the physical characteristics of the vadose zone material (presented in Section B.2.2.4). In general, the radiological contaminants that are reasonably expected to be present at CAU 415 (i.e., Pu, Am, U) have low solubilities and high affinity for soil. The physical characteristics of the vadose zone material generally include medium and high adsorptive capacities; low moisture contents (i.e., available water-holding capacity); and relatively long distances to groundwater (e.g., 200 to 260 ft). Based on these physical and chemical factors, contamination is expected to be found relatively close to release points.

Infiltration and percolation of precipitation serve as a driving force for downward migration of contaminants. However, due to high PET (annual PET at the Area 3 Radioactive Waste Management Site on the NNSS has been estimated at 62.6 in. [Shott et al., 1997]), and limited precipitation for this region (7.42 in. [French, 1985; Schaeffer, 1968]), percolation of infiltrated precipitation does not provide a significant mechanism for vertical migration of contaminants to groundwater (Section B.2.2.3).

Subsurface migration pathways at CAU 415 are expected to be predominately vertical, although spills or leaks at the ground surface may also have limited lateral migration before infiltration. The depth of infiltration will be dependent upon the type, volume, and duration of the discharge; as well as the presence of relatively impermeable layers that could modify vertical or lateral transport pathways, both on the ground surface (e.g., concrete) and in the subsurface (e.g., caliche layers).

B.2.2.6 Exposure Scenarios

Human receptors may be exposed to COPCs through oral ingestion or inhalation of, or dermal contact (absorption) with soil or debris due to inadvertent disturbance of these materials, or external irradiation by radioactive materials. Onsite workers, military personnel, and possibly site visitors may be potential receptors of contaminants from onsite water supply wells. These onsite receptors may be potentially exposed to radionuclides and other hazardous materials in groundwater through oral ingestion, dermal contact, irradiation, or inhalation. Existing monitoring programs of the water supply wells limits the potential for this exposure scenario. The closest well to the CAU 415 site, Stewart 2 (HTH), is a monitoring well and is not a source of drinking water.

The CAU 415 site is in a remote location with controlled access that precludes use as a regularly assigned work area. However, as agreed to by the CAU 415 stakeholders, a conservative land use scenario that assumes an exposure duration of 2,000 hours per year was selected for evaluation of the site. As defined in the Soil RBCA document (NNSA/NFO, 2014), this is the Industrial Use Area exposure scenario that assumes worker exposure to site contaminants for 250 days per year, 8 hours per day for 25 years.

B.3.0 Step 2 - Identify the Goal of the Study

Step 2 of the DQO process states how environmental data will be used in meeting objectives and solving the problem, identifies study questions or decision statement(s), and considers alternative outcomes or actions that can occur upon answering the question(s).

B.3.1 Decision Statements

As agreed to by the CAU 415 stakeholders, the selected corrective action for CAU 415 is closure in place with URs. The decision was based on the assumption that existing data are sufficient to support closure in place. If it is determined that existing data are not sufficient, the stakeholders will be consulted and a revised closure strategy for CAU 415 will be developed. Otherwise, CAU 415 will be closed in place, and the details of closure will be presented in the CR.

For CAU 415, the Decision I statement is as follows:

- "Does contamination exist at the release site that exceeds FALs?"

In order to resolve Decision I, the presence of contamination at levels exceeding the FAL is defined as the condition where the most exposed human receptor (conservatively assumed to be an Industrial Worker) has the potential for exposure to a contaminant exceeding a FAL, to receive a TED in excess of 25 mrem/yr, or the presence of HCA conditions. Based upon review of the available data, the following has been determined:

- Surface soils in the GZ area of CAU 415 contain COCs that exceed the FAL; therefore, Decision I is resolved.
- HCA conditions exist within the inner fence, and the fence line conservatively bounds the area.

The DQO process resulted in the assumption that corrective action is required in the area exhibiting HCA conditions (the area within the inner fence). Figure B.3-1 shows the HCA boundary. Decision I is considered resolved, because HCA conditions are known to exist within the inner fence, and the fence line conservatively bounds the area.

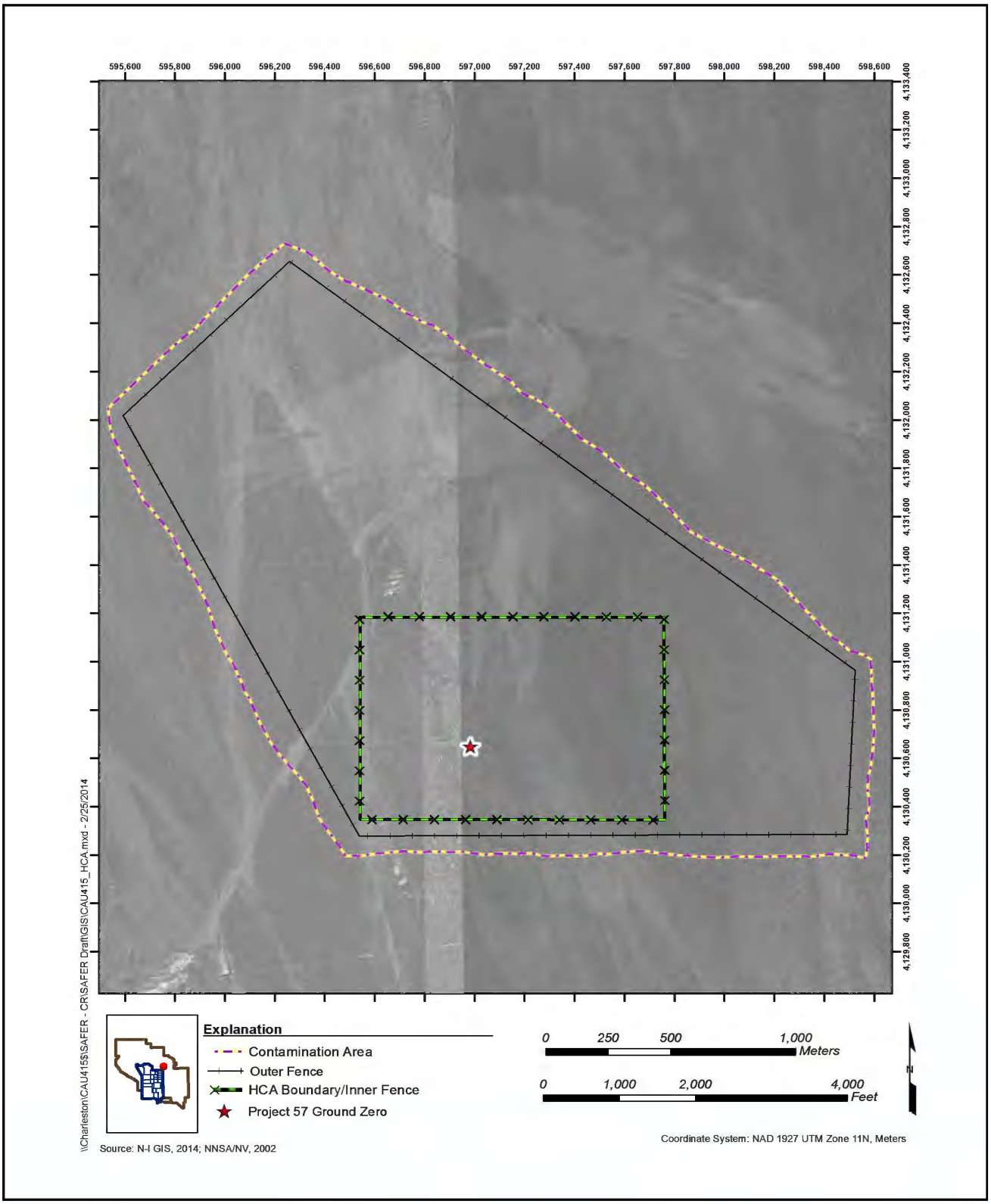

Figure B.3-1
CAU 415 HCA Boundary

- Subsurface soils in the disposal trench are assumed to contain COCs that exceed FALs. Therefore, Decision I is resolved.

- The natural drainages originating from the GZ area and the retention basin were investigated in December 2013. Completion of both a visual survey and radiological (FIDLER) survey did not identify any elevated radiological readings or other biasing factors. Therefore, Decision I is resolved for the drainage system, as there are no contaminants present above a FAL.

- The pole-mounted transformers at CAU 415 potentially contain dielectric fluids with PCBs. Visual inspection of the pole-mounted transformers in 2013 did not indicate any evidence of leaks or soil staining in the area below the transformers. However, because the transformers have the potential to release COCs to the soil in excess of a FAL, corrective action (removal of the transformers) is required.

As information exists that the conditions described above are present, Decision I is resolved; corrective action is required; and Decision II must be resolved.

The Decision II statement is as follows:

- "Have the CAU 415 closure objectives been met?"

The CAU 415 closure objectives are defined as follows:

- For the Pu-contaminated soil, the closure objective is to determine the corrective action boundary (i.e., the area exceeding 25 mrem/IA-yr and the area exceeding HCA conditions).

- For the disposal trench, the closure objective is to determine the lateral extent of the buried contaminated vehicles and debris, defined as the extent of the anomalies detected in the geophysical survey.

- For the drainage system, it has been determined that no contaminants exist above a FAL; therefore, Decision II is not required.

- For the pole-mounted transformers, the closure objective is removal of the transformers.

If sufficient data are not available to meet the closure objectives, then site conditions will be reevaluated, and further consultation with NDEP and the stakeholders is required.

B.3.2 Alternative Actions to the Decisions

This section identifies actions that may be taken to solve the problem depending on the possible outcomes of the investigation.

B.3.2.1 Alternative Actions to Decision I

For the Pu-contaminated soil and the disposal trench, if it is determined that sufficient data are not available to make a corrective action decision, then the stakeholders will be consulted and a revised closure strategy for CAU 415 will be developed. If the available existing data are sufficient, then corrective action is required, and the details of closure will be presented in the CR.

For the drainage system, no FAL is exceeded; further assessment is not required; and no corrective action is necessary.

For the pole-mounted transformers, if contaminants exceeding a FAL are not present, then corrective action is not required. Because it is assumed that contaminants are present, and a FAL is exceeded, the corrective action to remove the transformers will be conducted.

B.3.2.2 Alternative Actions to Decision II

For the Pu-contaminated soil and disposal trench, if the lateral and vertical extent of the area exceeding 25 mrem/yr or HCA conditions have not been defined, then the CAU 415 stakeholders will be consulted and a revised closure strategy will be developed.

For the drainage system, it has been determined that no contaminants exist above a FAL; therefore, Decision II is not required. For the pole-mounted transformers, the corrective action of removal will be conducted; therefore, Decision II is resolved.

If sample analytical results are not sufficient to characterize all generated wastes, then additional waste characterization samples may be collected. If available information is not sufficient to evaluate the potential for migration of COC contamination beyond the corrective action boundary, then additional information may be necessary. If sufficient information is not available to confirm that closure objectives have been met, then further consultation with NNSA/NFO, NDEP, and the stakeholders is required. Otherwise, collection of additional information is not required.

B.4.0 Step 3 - Identify Information Inputs

Step 3 of the DQO process identifies the information needed, determines sources for information, and identifies sampling and analysis methods that will allow reliable comparisons with FALs.

B.4.1 Information Needs

Sufficient information exists to determine that corrective action is required for the following release components:

1. Soils in the GZ area of CAU 415 are present that exceed the FALs.
2. HCA conditions are present within the inner fenced area of the site. Therefore, an HCA boundary has been conservatively established at the inner fence.
3. Based on process and historical information, buried contamination is assumed to exceed the FALs in the disposal trench.
4. The pole-mounted transformers are assumed to contain PCBs exceeding a FAL.

Investigation of the drainages originating from the CAU 415 GZ did not identify any elevated radiological readings or other biasing factors. Therefore, no corrective action is necessary for the drainage system.

Decision II will be resolved using the following methods:

- For the Pu-contaminated soil, the 25 mrem/IA-yr boundary will be established through the correlation of TED at sample locations and radiation survey results. A boundary will then be established at the radiation survey isopleth that corresponds to the 25-mrem/yr FAL. An HCA boundary has been conservatively established at the inner fence that bound the area with known HCA conditions.
- For the disposal trench, buried contamination is assumed to exceed the FALs. The extent of contamination will be determined using the results of the geophysical survey that delineate the extent of the buried anomalies.
- For the pole-mounted transformers, the transformers will be removed, therefore resolving Decision II.

For investigation-derived waste (IDW) and potential remediation wastes (if generated), samples of the waste or environmental media must provide sufficient information to characterize the wastes for disposal. If additional information is needed to confirm that closure objectives have been met, then further consultation with NNSA/NFO, NDEP and the stakeholders is required.

B.4.2 Sources of Information

Previous investigation data—including aerial and ground-based surveys, soil sampling, and TLD data—provide valuable information to evaluate Decision I and II. This information includes the following:

- ***Ground-Based Radiological Surveys***. Multiple ground-based radiological surveys have been conducted at the CAU 415 site since completion of the test in 1957.
  - Loose, unbound survey forms were found in the historical records for surveys conducted in December 1964 (Author Unknown, 1964); May 1970 (Author Unknown, 1970); May 1991 (Author Unknown, 1991); August 1992 (REECo, 1992); and September 1996 (BN, 1996). These surveys targeted the fenced area around CAU 415 GZ.
  - In May 1993, an *in situ* survey was conducted in support of a soil sampling effort (Colton, 1993). The presence of Am-241 was detected at 91 of the 93 locations, ranging in activity from 1 to 543,700 pCi/g.
  - In December 2013, a ground-based radiological survey was conducted in support of site investigation activities at the CAU 415 site. The survey consisted of a GPS-assisted continuous scanning survey using a FIDLER instrument. The survey included transects along radials from the GZ outward to beyond the CA fence line.
- ***Aerial Radiological Surveys***. Aerial radiological surveys were conducted in 1977 (Fritzsche, 1979) and 1997 (NNSA/NSO, 2009). The surveys were conducted using helicopters that flew at an altitude of 100 ft (30 m) (1979 survey) and 50 ft (15 m) (1997 survey) above the ground surface. The 1997 Am survey results are presented in Figure 2-2.
- ***Soil Sampling and TLD Results.*** Analytical data were collected from soil sampling events conducted in 1998 and 2013 at CAU 415. In addition to the soil samples collected during the 2013 site investigation, TLDs were placed at each sample location to calculate external dose.

B.5.0 Step 4 - Define the Boundaries of the Study

Step 4 of the DQO process defines the target population of interest and its relevant spatial boundaries, specifies temporal and other practical constraints associated with sample/data collection, and defines the sampling units on which decisions or estimates will be made.

B.5.1 Target Populations of Interest

The population of interest to resolve Decision I (Does contamination exist at the release site that exceeds FALs?) for the Pu-contaminated soil is any location within the site that is contaminated with any contaminant above a FAL. For the disposal trench, it is the presence of buried radiological contamination. The population of interest for the drainage system is any sedimentation area within the drainage system that is contaminated with any contaminant above a FAL. For the pole-mounted transformers, the population of interest is the transformers that are assumed to contain PCBs that, if released, could cause soil to exceed the FALs. As information exists that all of these conditions are present, Decision I is resolved.

The populations of interest to resolve Decision II (Have the CAU 415 closure objectives been met?) are as follows:

- For the Pu-contaminated soil, it is the set of locations bounding contamination exceeding a FAL in lateral and vertical directions.
- For the disposal trench, it is the lateral extent of the buried radiologically contaminated vehicles and debris.
- For the drainage system, it is the extent of the sedimentation area.
- For the pole-mounted transformers, it is the extent of the area contaminated above the FALs.
- For IDW and remediation wastes, the population of interest is the data required to characterize the waste for disposal.

B.5.2 Spatial Boundaries

Spatial boundaries are the maximum lateral and vertical extent of expected contamination that can be supported by the CSM. For CAU 415 the maximum vertical extent is expected to be 15 ft, and the

lateral extent is expected to be 2 miles (mi). Although it is estimated that 95 percent of the Pu from the safety test is located within the top 5 cm of soil (Essington et al., 1976), the maximum vertical extent of contamination is based upon the depth of the vehicle burial in the disposal trench, which is estimated at 15 ft. The lateral boundary of contamination is based upon the extent of detectable activity measured by the 1997 aerial radiological survey of the CAU 415 site (NNSA/NSO, 2009). The extent of the radioactivity measured by the aerial radiological survey extends to the east and to the northwest approximately 2 to 3 mi. The lateral boundary also encompasses the entire area within the present CA. The Decision II spatial boundaries are summarized as follows:

- **Vertical.** 15 ft bgs
- **Lateral.** 2 mi from GZ

COCs found beyond these boundaries may indicate a flaw in the CSM and may require reevaluation of the CSM before the investigation can continue.

B.5.3 Practical Constraints

Practical constraints (e.g., activities by other organizations, utilities, important cultural resources, threatened or endangered animals and plants, unstable or steep terrain, and/or access restrictions) may prevent the ability to investigate this site. Practical constraints that have been identified specific to CAU 415 include military activities at or near the site that will preclude access to the site.

B.5.4 Define the Sampling Units

The scale of decision making refers to the smallest, most appropriate area or volume for which decisions will be made. The scale of decision making in Decision I is the contamination associated with a specific release or CAU component. The presence of a COC associated with a release will cause the determination that the release requires further evaluation. The scale of decision making for Decision II is defined as a contiguous area containing a COC originating from a release. Resolution of Decision II requires this contiguous area to be bounded laterally and vertically.

B.6.0 Step 5 - Develop the Analytic Approach

Step 5 of the DQO process specifies appropriate population parameters for making decisions, defines action levels, and generates an "If … then … else" decision rule that defines the conditions under which possible alternative actions will be chosen. This step also specifies the parameters that characterize the population of interest, specifies the FALs, and confirms that the analytical detection limits are capable of detecting FALs.

B.6.1 Population Parameters

Population parameters are the parameters that will be compared to action levels.

Decision I. For the Pu-contaminated soil, the population parameter is the calculated TED from each location or the presence of HCA conditions. For the disposal trench, the population parameter is TED in the subsurface soil in the trench, which is assumed to exceed the FAL. For the drainage system, the population parameter is the calculated TED from each location. For the transformers, the population parameter is dielectric fluids containing contaminants that, if released, could cause future soil contamination at levels exceeding a FAL.

Decision II. For the Pu-contaminated soil, the population parameters include (1) for radiological dose, the correlation value (r^2 value) resulting from the relationship of the calculated TED with the radiological survey results; and (2) for removable contamination, the area that meets HCA conditions. For the disposal trench, the population parameter is geophysical survey results. For the transformers, the population parameter is the area of soil that exceeds the FAL.

B.6.2 Preliminary Action Levels

The PALs presented in this section are to be used for site screening purposes. They are not necessarily intended to be used as cleanup action levels or FALs. However, they are useful in screening out contaminants that are not present in sufficient concentrations to warrant further evaluation and, therefore, streamline the consideration of remedial alternatives.

The FALs will be established using the RBCA process described in the Soils RBCA document (NNSA/NFO, 2014). This process conforms with NAC 445A.227, which lists the requirements for sites with soil contamination (NAC, 2012a). For the evaluation of corrective actions, NAC 445A.22705 (NAC, 2012b) requires the use of ASTM Method E1739 (ASTM, 1995) to "conduct an evaluation of the site, based on the risk it poses to public health and the environment, to determine the necessary remediation standards or to establish that corrective action is not necessary." For the evaluation of corrective actions, the FALs are established as the necessary remedial standard. The RBCA process as described in the Soils RBCA document defines three tiers (or levels) of evaluation involving increasingly sophisticated analyses.

The comparison of laboratory results to FALs and the evaluation of potential corrective actions will be included in the investigation report. The FALs will be defined (along with the basis for their definition) in the CR.

B.6.2.1 Chemical PALs

Except as noted herein, the chemical PALs are defined as the Region 9 Regional Screening Levels for chemical contaminants in industrial soils (EPA, 2013). Background concentrations for RCRA metals will be used instead of screening levels when natural background concentrations exceed the screening level (e.g., arsenic on the NNSS). Background is considered the average concentration plus two standard deviations of the average concentration for sediment samples collected by the Nevada Bureau of Mines and Geology throughout the NTTR (formerly the Nellis Air Force Range) (NBMG, 1998; Moore, 1999). For detected chemical COPCs without established screening levels, the protocol used by EPA Region 9 in establishing screening levels (or similar) will be used to establish PALs. If used, this process will be documented in the CR. Because no environmental media was identified with the potential for chemical contamination, action levels for chemical constituents were not used in evaluating DQO decisions.

B.6.2.2 Radionuclide PALs

The PAL for radioactive contaminants is a TED of 25 mrem/yr, based upon the Industrial Area exposure scenario. Because the CAU 415 stakeholders agreed to use an Industrial Area land use

scenario, the radionuclide PALs were established as the FALs for CAU 415. The Industrial Area exposure scenario is defined in the Soils RBCA document (NNSA/NFO, 2014).

The TED is calculated as the sum of external dose and internal dose. External dose is determined directly from TLD measurements. Internal dose is determined by comparing analytical results from soil samples to RRMGs that were established using the RESRAD computer code (Yu et al., 2001). The RRMGs are radionuclide-specific values for radioactivity in surface soils. The RRMG is the value, in picocuries per gram of surface soil, for a particular radionuclide that would result in an internal dose of 25 mrem/yr to a receptor (under the appropriate exposure scenario) independent of any other radionuclide (assuming that no other radionuclides contribute dose). In the RESRAD calculation, several input parameters are not specified so that site-specific information can be used. The default and site-specific input parameters used in the RESRAD calculation of RRMGs for each exposure scenario and the RRMG values are presented in the Soils RBCA document (NNSA/NFO, 2014).

B.6.3 Decision Rules

Decision I Rules

- If the radiological dose or removable contamination levels are inconsistent with the CSM or extend beyond the spatial boundaries identified in the DQOs, then work will be suspended and the closure strategy will be reconsidered.
- For the Pu-contaminated soil and the disposal trench, if the radiological dose exceeds the FAL or HCA conditions exist, then corrective action is required, else no further action.
- For the drainage system, if the radiological dose exceeds the FAL, then corrective action is required, else no further action.
- If debris is present that contains contaminants that, if released, have the potential to cause future soil contamination at levels exceeding a FAL, then a corrective action is required, else no further action.

Decision II Rules

- For the Pu-contaminated soil, drainage system, and transformers, if available information is adequate to determine the extent of radiological dose above the FAL and the extent of HCA conditions, then the corrective action boundary can be established, else further consultation with NDEP and the stakeholders is required.

- For the disposal trench, if the geophysical survey results define the lateral extent of the buried contaminated vehicles and debris, then close in place with URs, else further consultation with NDEP and the stakeholders is required.

- If sufficient information is not available to determine potential remediation waste types and evaluate the feasibility of remediation alternatives, additional waste characterization samples may be collected, else no further investigation will be necessary.

B.7.0 Step 6 - Specify Performance or Acceptance Criteria

Step 6 of the DQO process defines the decision hypotheses, specifies controls against false rejection and false acceptance decision errors, examines consequences of making incorrect decisions from the test, and places acceptable limits on the likelihood of making decision errors.

B.7.1 Decision Hypotheses

The baseline condition (i.e., null hypothesis) and alternative condition for Decision I are as follows:

- **Baseline condition.** The baseline condition assumes COCs are present exceeding a FAL. For the Pu-contaminated soil component, sufficient information exists to determine the presence of dose exceeding a FAL and the presence of HCA conditions. For the disposal trench component, it is assumed that the buried contaminated vehicles and debris exceed a FAL based upon historical information. For the pole-mounted transformers, it is assumed the transformers contain a COC exceeding a FAL. Decision I has been resolved for all three release components.

- **Alternative condition.** Decision I has been resolved for all three release components. Therefore, there is no alternative condition to consider.

The baseline condition (i.e., null hypothesis) and alternative condition for Decision II are as follows:

- **Baseline condition.** The extent of a COC has not been defined; therefore, CAU 415 closure objectives have not been met.

- **Alternative condition.** The extent of a COC has been defined; therefore, CAU 415 closure objectives have been met.

Decisions and/or criteria have false-negative or false-positive errors associated with their determination. The impact of these decision errors and the methods that will be used to control these errors are discussed in the following subsections. In general terms, confidence in DQO decisions will be established qualitatively by the following:

- Developing a CSM (based on process knowledge) that is agreed to by stakeholder participants during the DQO process.
- Testing the validity of the CSM based on investigation results.
- Evaluating the quality of data based on DQI parameters.

B.7.2 False-Negative Decision Error

The false-negative decision error would mean deciding that a COC is not present when it actually is (Decision I), or deciding that the extent of a COC has been defined when it has not (Decision II). In both cases, the potential consequence is an increased risk to human health and environment.

The false-negative decision error (where consequences are more severe) for CAU 415 is controlled by the following criteria:

- *For Pu-contaminated soil and the drainage system*:
  - For Decision I, having a high degree of confidence that the data will identify a COC if present anywhere within the release.
  - Having a high degree of confidence that the analyses conducted were sufficient to detect any COCs present in the samples.
  - Having a high degree of confidence that the dataset is of sufficient quality and completeness.
  - For Decision II, having a high degree of confidence that the data identify the extent of COCs.
  - Using an established methodology for calculating TED (NNSA/NFO, 2014).
- *For the disposal trench and the pole-mounted transformers*:
  - For Decision I, conservative assumptions are being made to assume the presence of COCs that exceed the FAL.
  - For Decision II for the disposal trench, having a high degree of confidence that the physical extent of the geophysical anomalies bounds the COC contamination. For the pole-mounted transformers, having a high degree of confidence that the extent of the COC contamination in soil was identified.

B.7.3 False-Positive Decision Error

The false-positive decision error would mean deciding that a COC is present when it is not, or a COC is unbounded when it is not, resulting in increased costs, overly conservative corrective action boundaries, or implementation of unnecessary administrative or engineering controls.

For the Pu-contaminated soil and the drainage system, false-positive results could be due to overly conservative estimates for the calculation of TED to determine corrective action boundaries and/or inaccurate inputs.

To control against false-positive error, the following actions will be implemented:

- TED will be determined based on available historical and recent site investigation data.
- Readily accepted, established, and approved procedures will be used to calculate TED and determine the corrective action boundary for CAU 415.

For the disposal trench, false-positive results would mean that the assumed contamination in the disposal trench is either not present at all or present to a lesser extent than identified with the geophysical survey. To control against false-positive error, a thorough instrument check was performed before and after the geophysical survey. The operator who conducted the survey was trained and qualified to conduct the geophysical survey, and there is high confidence that the instrument used to conduct the survey was capable of detecting buried metallic objects in the trench. A false-positive decision error would have little to no impact to environmental risk.

For the pole-mounted transformers, false-positive results would mean that the transformers were incorrectly identified as containing a contaminant (i.e., PCBs) exceeding a FAL. Because the transformers are assumed to contain PCB-dielectric fluid and will be removed, there is no additional environmental risk.

B.8.0 Step 7 - Develop the Plan for Obtaining Data

Step 7 of the DQO process selects and documents a design that will produce data that exceeds performance or acceptance criteria. In order to resolve Step 7 of the DQO process, the following actions will be implemented:

- Existing available information will be evaluated to resolve DQO decisions for the Pu-contaminated soil and the disposal trench components.
- The corrective action of removal will be implemented for the pole-mounted transformers.

Section B.8.1 contains information about gathering and evaluating the necessary existing data to resolve DQO decisions for the Pu-contaminated soil and the disposal trench components. Section B.8.2.2 contains general information regarding the pole-mounted transformers. All debris is evaluated against the criteria listed in the Soils RBCA document (NNSA/NFO, 2014) to determine the need for corrective action. For the pole-mounted transformers, the corrective action of removal will be conducted. Visual survey of the pole-mounted transformers did not indicate any biasing factors indicating the presence of COCs in surface soils.

B.8.1 Decision I

B.8.1.1 Pu-Contaminated Soil and Disposal Trench

The objective of the CAI for the Pu-contaminated soil is as follows:

1. Compile and evaluate current relevant data to determine the radiation survey isopleth that correlates to the 25-mrem/yr boundary, based upon the Industrial Area exposure scenario.
2. Define the corrective action boundary that bounds the area exceeding HCA criteria.

The objective of the CAI for the disposal trench component is as follows:

1. Define the extent of the anomalies detected in the geophysical survey of the trench to bound the extent of COC contamination exceeding the FAL.

The relevant data for determination of the Industrial Area, HCA, and disposal trench boundaries will come from the following sources:

- Aerial radiation surveys
- Ground-based radiological surveys
- Analytical data
- TLD data
- Historical and technical data from the Safety Experiment Program
- Geophysical survey

After data gathering and compilation, the data are evaluated for quality. If existing data and/or data quality are found to be insufficient, then further consultation with NDEP and the stakeholders is required. A DQA was conducted for CAU 415 and is presented in Appendix F. This assessment concluded that soil and TLD data are acceptable for use in making DQO decisions for CAU 415.

Figure B.8-1 shows the TEDs at sample locations from the 1998 and 2013 investigation activities at CAU 415.

B.8.1.2 Pole-Mounted Transformers

The pole-mounted transformers are assumed to contain dielectric fluids with PCBs and will be removed from the poles and sampled for waste disposition. See Figure 2-8 for the location of the transformers at CAU 415. Because visible soil staining or other biasing factors are not present, no soil sampling is required.

B.8.1.3 Drainage System

The natural drainages originating from the GZ area and the retention basin were investigated in December 2013. Completion of both a visual survey and radiological (FIDLER) survey did not identify any elevated radiological readings or other biasing factors. Therefore, Decision I is resolved for the drainage system, as there are no contaminants present above a FAL

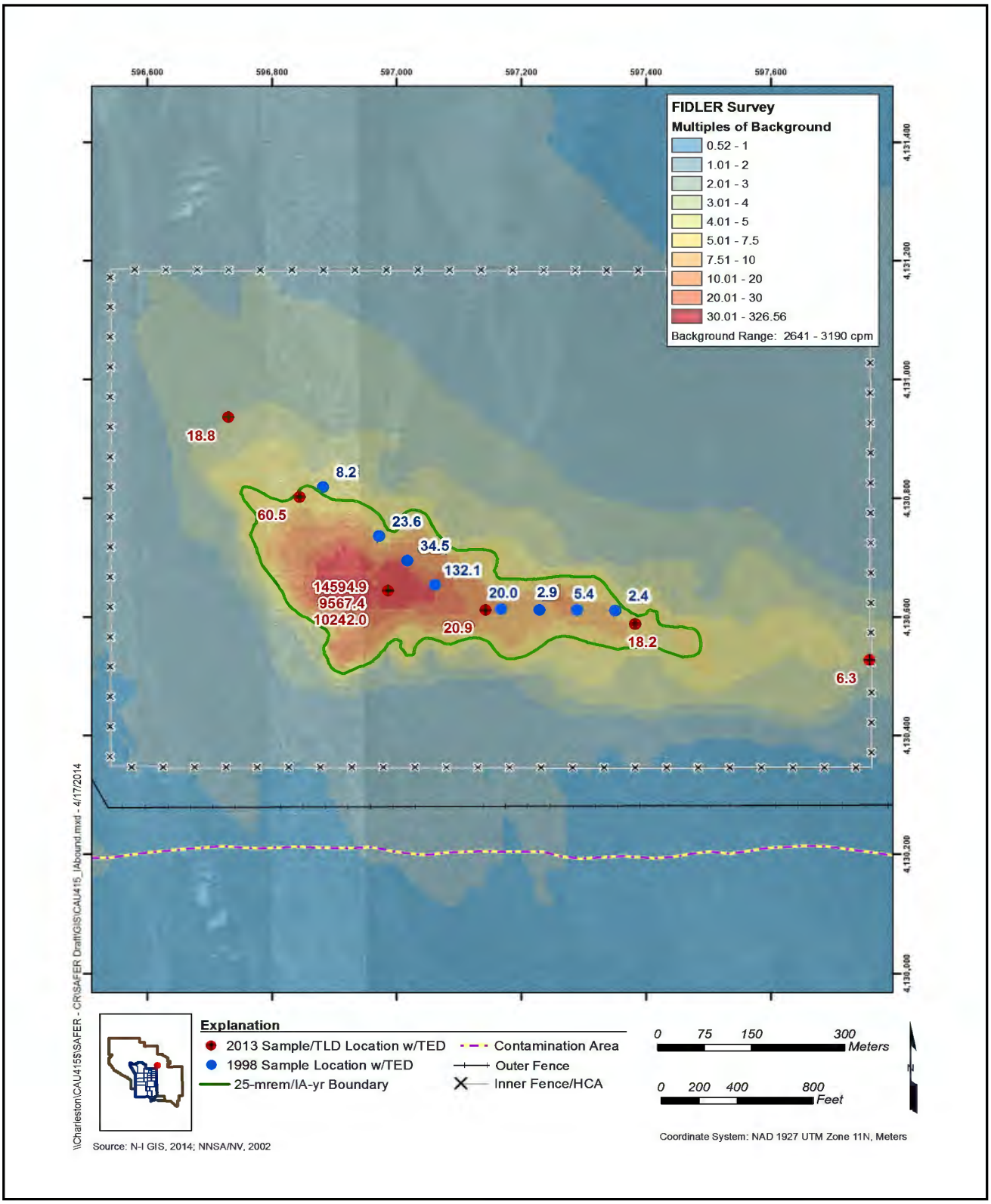

Figure B.8-1
CAU 415 TED (mrem/IA-yr)

B.8.2 Decision II

B.8.2.1 Pu-Contaminated Soil and Disposal Trench

To meet the DQI of representativeness for Decision II for the Pu-contaminated soil release, data must be sufficient to determine the corrective action boundary for the area exceeding 25 mrem/IA-yr and the area exceeding HCA conditions. Decision II for the burial trench is based upon the geophysical data required to determine the extent of the anomalies.

B.8.2.2 Pole-Mounted Transformers

For the pole-mounted transformers, Decision II is unnecessary, following the corrective action of removal of the potentially PCB-containing transformers.

B.8.2.3 Drainage System

For the drainage system, it has been determined that no contaminants exist above a FAL; therefore, Decision II is not required.

B.9.0 References

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N-I, see Navarro-Intera, LLC.

N-I GIS, see Navarro-Intera Geographic Information Systems.

NNSA/NFO, see U.S. Department of Energy, National Nuclear Security Administration Nevada Field Office.

NNSA/NSO, see U.S. Department of Energy, National Nuclear Security Administration Nevada Site Office.

NNSA/NV, see U.S. Department of Energy, National Nuclear Security Administration Nevada Operations Office.

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Appendix B

Closure Certification

B.1.0 Closure Certification

Certification of closure is required for permitted or interim status hazardous waste facilities, and is not applicable to CAU 415.

Appendix C

As-Built Documentation

C.1.0 As-Built Documentation

The corrective actions selected for CAU 415 did not include any engineered controls. Therefore, as-built documentation is not applicable to CAU 415.

Appendix D

Confirmation Sampling Test Results

D.1.0 Introduction

No verification samples were required in the SAFER Plan (NNSA/NFO, 2014). Although not required in the SAFER Plan, verification samples were collected from the soil beneath the pole-mounted transformers to demonstrate completion of clean closure activities associated with the transformers. This appendix presents the analytical results for these verification soil samples. Details of the sampling activity are provided in Section 2.1.4 of this document.

The complete field documentation and laboratory data—including field activity daily logs, sample collection logs, analysis request/chain-of-custody forms, laboratory certificates of analyses, and analytical results—are retained in CAU 415 files as hard copy documents or electronic media.

D.2.0 Verification Sampling Results

All verification soil samples were submitted for PCB analyses. PCB results are reported as individual concentrations that are comparable to the individual PCB FALs as established in Section 2.2. The analytical results for PCBs in samples that exceeded the MDCs are shown in Table D.2-1.

Table D.2-1
Sample Results for PCBs (mg/kg)

Sample Location	Sample Number	Aroclor 1254	Aroclor 1260
FALs		**0.97**	**0.99**
Out 2	AB5A022	0.00622 (J)	0.0292
Out 1	AB5A023	--	--
A01	AB5A024	0.00499 (J)	0.00574
A02	AB5A025	--	--
A03	AB5A026	--	--
A04	AB5A027	0.00196 (J)	0.00650
A05	AB5A028	0.00396	0.00430 (J)

J = Estimated value.
-- = Non-detect

D.3.0 Radionuclide Activities Used in Dose Calculations

The plutonium activities used for dose calculations shown in Table D.3-1 were inferred from the associated gamma spectrometry results for Am-241 in accordance with the Soils RBCA document (NNSA/NSO, 2014) and "Characterization of Plutonium Activities in Soil" (Kidman et al., 2015). Due to the heterogeneity of plutonium in soils at the NNSS, this provides estimates of plutonium soil activities that are more representative of site conditions. The other radionuclide activities shown in Table D.3-1 are those reported from analytical results exceeding the MDCs.

Table D.3-1
Radionuclide Activities Used in Dose Calculations (pCi/g)

Sample Location	Sample Number	Sample Depth (cm bgs)	Am-241	Cs-137	Co-60	Pu-238	Pu-239/240	Pu-241	Th-232	U-234	U-235	U-238
E1	AB5A001	0-5	134	0.3	-	38.6	2,090	1,060	1.6	0.6	-	0.5
E2	AB5A002	0-5	163	1.0	-	46.9	2,550	1,290	2.1	0.5	-	0.5
E3	AB5A003	0-5	48.3	0.6	-	13.9	754	382	1.4	0.3	-	0.4
NW1	AB5A004	0-5	528	0.7	-	152	8,250	4,180	1.9	0.4	-	0.6
NW2	AB5A005	0-5	185	0.6	-	53.3	2,890	1,460	2.5	0.4	-	0.5
GZ1	AB5A006	0-5	128,000	-	9	36,900	2,000,000	1,010,000	-	-	-	7.2
GZ2	AB5A007	0-5	83,800	-	12	24,100	1,310,000	663,000	-	-	-	-
GZ3	AB5A008	0-5	89,700	-	13	25,800	1,400,000	710,000	-	2.8	-	3.7
DS1	AB5A010	0-10	0.4	0.8	-	0.1	6.1	3.1	2.2	0.7	-	0.8
	AB5A011	10-20	-	0.9	-	-	-	-	2.1	0.7	-	0.8
	AB5A012	20-30	0.5	1.1	-	0.1	7.9	4.0	2.1	0.6	-	0.7
DS2	AB5A013	0-10	-	0.2	-	-	-	-	2.2	0.7	-	0.8
	AB5A014	10-20	-	0.2	-	-	-	-	2.3	0.8	0.0	0.6
	AB5A015	20-30	-	0.2	-	-	-	-	2.2	0.7	0.1	0.6
	AB5A017	0-10	-	0.2	-	-	-	-	2.1	0.7	-	0.8
DS3	AB5A016	0-10	-	0.4	-	-	-	-	2.2	0.7	0.1	0.7
	AB5A018	10-20	-	-	-	-	-	-	1.9	0.8	-	0.8
	AB5A019	20-30	-	-	-	-	-	-	1.9	0.7	-	0.7
DS4	AB5A020	0-10	-	0.3	-	-	-	-	2.1	0.7	-	0.7
	AB5A021	10-20	-	-	-	-	--	-	2.0	0.7	0.1	0.7

-- = Not detected above MDCs

Cs = Cesium
Co = Cobalt
Th = Thorium

D.4.0 References

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Appendix E

Waste Disposition Documentation

(2 Pages)

Note: The waste treatment/disposal documentation for the transformer oil will be provided in an addendum

COPY

Certificate of Disposal

This is to certify that the Waste Stream No. LITN-000000006, Revision 16, shipment number **ITL17004** with container numbers **567A01; 567A02; 567A03; 414R01; 414R02; 414R03; 415A01; 415A02; 415A03; and 153A02** was shipped and received at the Nevada National Security Site Radioactive Waste Management Complex in Area 5 for disposal as stated below.

Mark Heser	Navarro	Waste Coordinator
Shipped by	Organization	Title
/s/ Mark Heser		3/8/17
Signature		Date
E. TAKAHASHI	NSTec	SR SCIENTIST
Received by	Organization	Title
/s/ E. Takahashi		03/08/2017
Signature		Date

Certificate of Disposal

.This is to certify that the Waste Stream No. LITN-000000006, Revision 16, shipment number **ITL17005** with container numbers **415T01; 415T02; 415T03; 415T04; 415T05; 415T06; and 415T07** was shipped and received at the Nevada National Security Site Radioactive Waste Management Complex in Area 5 for disposal as stated below.

Mark Heser	Navarro	Waste Coordinator
Shipped by	Organization	Title
/s/ Mark Heser		3/29/17
Signature		Date
E TAKAHASHI, 3/29/17	NSTec	Sr Scientist
Received by	Organization	Title
/s/ E. Takahashi		03/29/2017
Signature		Date

Appendix F

Modifications to the Post-closure Plan

F.1.0 Modifications to the Post-closure Plan

There are no modifications to the post-closure plan presented in Section 5.2 of this document.

Appendix G

Use Restrictions

G.1.0 Use Restrictions

Attachment G-1 of this appendix provides details of the URs and figures of the UR and administrative UR boundary. The UR forms provide information derived from CAI results to assist in the future evaluation of human health and safety risks to potential users of the use restricted area.

Attachment G-1

Use Restrictions

(7 Pages)

Use Restriction Information

CAU Number/Description: CAU 415, Project 57 No. 1 Plutonium Dispersion (NTTR)
Applicable CAS Number/Description: CAS NAFR-23-02, Pu Contaminated Soil

Contact (DOE AL/Activity): EM Soils Federal Activity Lead

FFACO Use Restriction Physical Description:

Surveyed Area (UTM, Zone 11, NAD 83, meters):

UR Points	Northing	Easting
Southeast	4,130,544	597,682
	4,130,545	596,462
	4,131,383	596,462
	4,131,381	597,679

Depth: Surface to 15 ft bgs

Survey Source (GPS, GIS, etc): GIS

Basis for FFACO UR(s):

Summary Statement: This FFACO use restriction (UR) is established based on the potential to receive a radiological dose exceeding 25 mrem/yr from surface contamination and a disposal trench that is present at this site. Based on the current land use, which is an assumed maximum exposure period of 2,000 hours per year, the maximum calculated dose rate in surface soil within this UR was 14,600 mrem/yr. Dose was not calculated for the material in the disposal trench but is assumed to exceed the action level of 25 mrem/yr. This UR also protects workers from inadvertent exposure to removable contamination that exceeds the criteria for establishing a High Contamination Area (HCA). The maximum concentration of any radionuclide detected in surface soil samples that could contribute more than 10 percent of the Industrial Area action level is presented in the contaminants table below. Unsampled locations may contain higher levels. The analytical results and locations of all samples are presented in the CR for CAU 415.

Contaminants Table:

Maximum Concentration of Contaminants for CAU 415 CAS NAFR-23-02, Pu Contaminated Soil			
Constituent	**Maximum Concentration**	**Industrial Area Action Level**	**Units**
Americium-241	128,000	2,110	pCi/g
Plutonium-238	36,900	4,510	pCi/g
Plutonium-239/240	2,000,000	4,120	pCi/g
Plutonium-241	1,010,000	200,000	pCi/g

Site Controls: Activities that would cause a site worker to be exposed to site radiological contamination for a period of more than that required to receive a dose of 25 mrem/yr (defined above) are restricted within the area defined by the coordinates listed above and depicted in the attached figure without prior notification of NDEP unless the activities are conducted under the provisions of 10 CFR Part 835. The FFACO UR is recorded in the FFACO database, M&O Contractor GIS, the DOE Environmental Management (EM) Nevada Program CAU/CAS files, and the U.S. Air Force GIS. Warning signs for the FFACO UR are posted outside the administrative UR boundary.

Use Restriction Information

Administrative Use Restriction Physical Description*:

Surveyed Area (UTM, Zone 11, NAD 83, meters):

UR Points	Northing	Easting
Southeast	4,130,384	598,488
	4,130,393	596,405
	4,132,244	595,453
	4,132,927	596,158
	4,131,206	598,507

Depth: Surface to 5 cm bgs

Survey Source (GPS, GIS, etc): N/A

*Coordinates for the Administrative Use Restriction exclude the area defined by the FFACO Use Restriction coordinates.

Basis for Administrative UR(s):

Summary Statement: This administrative use restriction (UR) protects workers from inadvertent exposure to removable contamination that exceeds the criteria for establishing a Contamination Area (CA). Based on the current land use, which is an assumed maximum exposure period of 2,000 hours per year, the maximum calculated dose rate in surface soil within this UR was less than 1 mrem/yr. The maximum concentration of significant contaminants detected in soil samples is presented in the contaminants table below. Unsampled locations may contain higher levels. The analytical results and locations of all samples are presented in the CR for CAU 415.

Contaminants Table:

Maximum Concentration of Contaminants for CAU 415 CAS NAFR-23-02, Pu Contaminated Soil			
Constituent	**Maximum Concentration**	**Industrial Area Action Level**	**Units**
Americium-241	48.3	2,110	pCi/g
Plutonium-238	13.9	4,510	pCi/g
Plutonium-239/240	754	4,120	pCi/g
Plutonium-241	382	200,000	pCi/g

Site Controls: Activities are restricted within the area defined by the coordinates listed above and depicted in the attached figure without prior notification of NDEP unless the activities are conducted under the provisions of 10 CFR Part 835. This administrative UR is recorded in the FFACO database, M&O Contractor GIS, the DOE Environmental Management (EM) Nevada Program CAU/CAS files, and the U.S. Air Force GIS.

UR Maintenance Requirements (applies to the FFACO UR):

Description: Warning signs for the FFACO UR will be inspected to ensure postings are in place, intact, and legible. Signs will be repaired or replaced as needed.

Inspection/Maintenance Frequency: Inspections will be conducted annually.

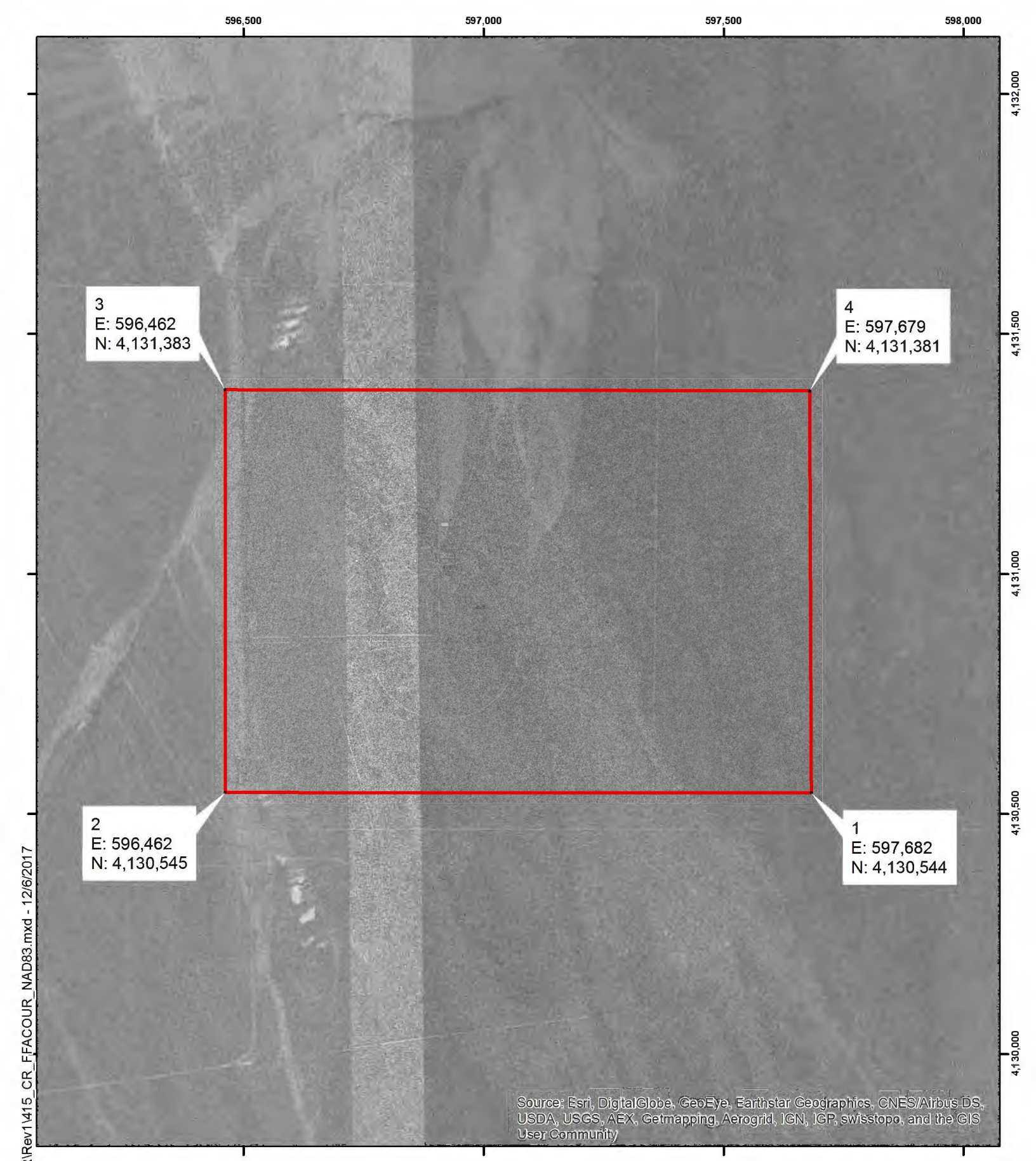
Use Restriction Information

The future use of any land related to this Corrective Action Unit (CAU), as described by the above surveyed location, is restricted from any DOE or Air Force activity that may alter or modify the containment control as approved by the state and identified in the CAU CR or other CAU documentation unless appropriate concurrence is obtained in advance.

Comments: None

Submitted By: /s/ Kevin J. Cabble **Date:** 12/07/2017

Note: Effective upon acceptance of closure documents by NDEP



CAU 415, CAS NAFR-23-02
Pu Contaminated Soil
FFACO UR Boundary

Explanation

FFACO UR

0 50 100 200 300 Meters

0 250 500 1,000 Feet

N

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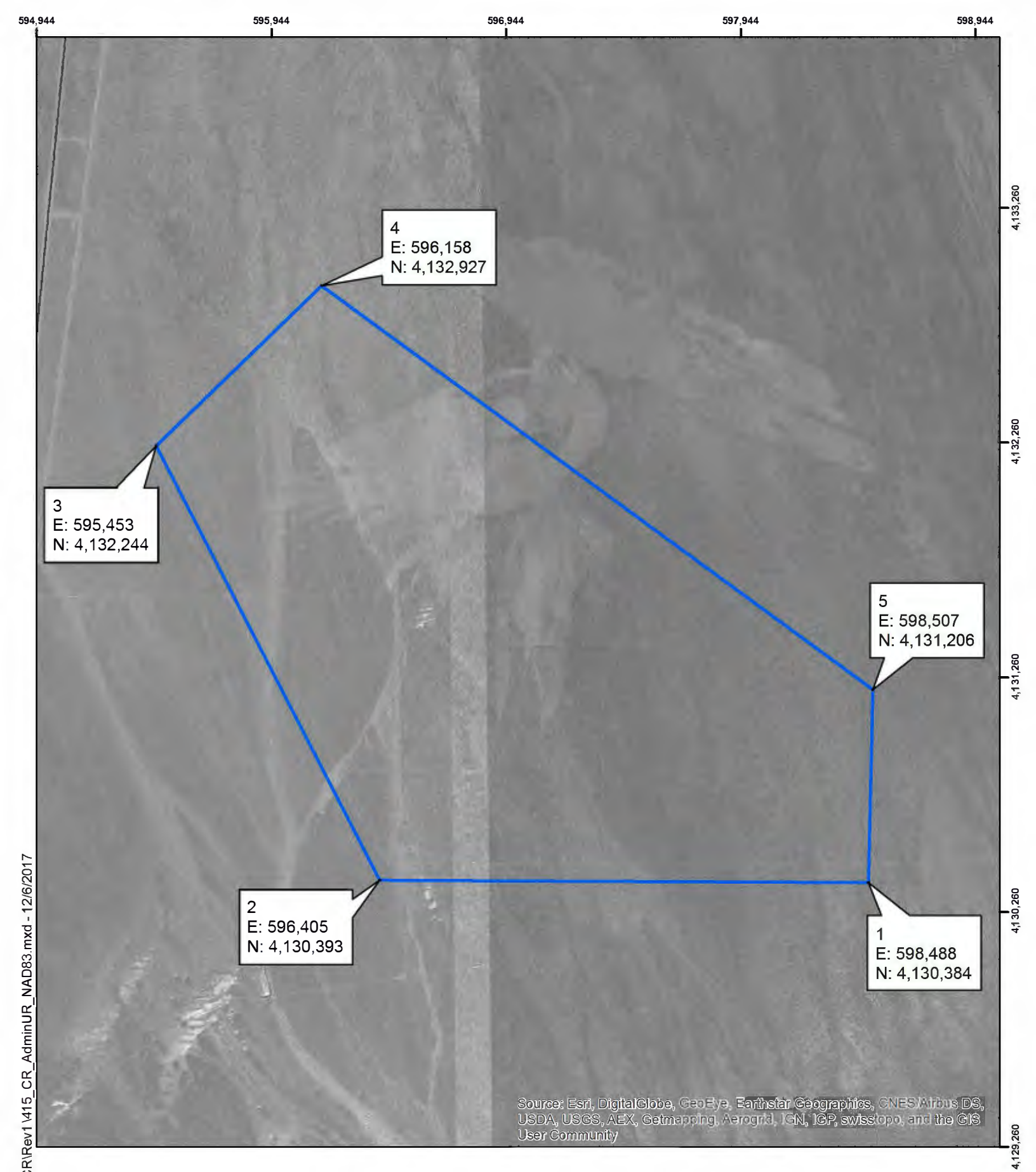
Source: Navarro GIS, 2017

Coordinate System: NAD 1983 UTM Zone 11N, Meter

Uncontrolled When Printed



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CAU 415, CAS NAFR-23-02
Pu Contaminated Soil
Administrative UR Boundary

Explanation

Administrative UR

0 200 400 800 Meters

0 500 1,000 2,000 Feet

N

Source: Navarro GIS, 2017

Coordinate System: NAD 1983 UTM Zone 11N, Meter

Uncontrolled When Printed

U.S. Department of Energy
Environmental Management
Nevada Program
P.O. Box 98518
Las Vegas, NV 89193-8518

OCT 18 2017

TRANSMITTAL OF USE RESTRICTION INFORMATION FOR CORRECTIVE ACTION UNIT (CAU) 415: PROJECT 57 NO. 1 PLUTONIUM DISPERSIO (NTTR)

Enclosed is the use restriction information for the subject CAU to record in the U. S. Air Force Geographic Information System (GIS). The information includes the surveyed location of the land subject to the use restriction and a site aerial photo.

CAU #	Description	CAS #	Description	Action Requested
415	Project 57 No. 1 Plutonium Dispersion (NTTR)	NAFR-23-02	Pu Contaminated Soil	Record Federal Facility Agreement and Consent Order (FFACO) Use Restriction
415	Project 57 No. 1 Plutonium Dispersion (NTTR)	NAFR-23-02	Pu Contaminated Soil	Record Administrative (Admin) Use Restriction

Please submit a copy of the recordation to Carol Dinsman, EM Operations Support, when complete.

Please contact Carol Dinsman at (702) 295-2342 if further information on this matter is needed.

/s/ Wilhelm R. Wilborn

Bill R. Wilborn
Acting Deputy Program Manager, Operations
EM Nevada Program

EMO:12550.CD

Enclosures:
As stated

cc w/o encl. via email.:
Chris Andres, NDEP
Mark McLane, NDEP
Jeff Fraher, DTRA/CXTS
Navarro Central Files
Brian Allen, NSTec
Kari Stringfellow, NSTec
NSTec Correspondence Management
Rob Boehlecke, EM
Kevin Cabble, EM
Tiffany Lantow, EM
FFACO Group, EM
NFO Read File

Appendix H

Nevada Division of Environmental Protection Comments

(4 Pages)

NEVADA ENVIRONMENTAL MANAGEMENT OPERATIONS ACTIVITY
DOCUMENT REVIEW SHEET

1. Document Title/Number: Draft Closure Report for Corrective Action Unit 415: Project 57 No. 1 Plutonium Dispersion, Nevada Test and Training Range, Nevada	2. Document Date: August 30, 2017
3. Revision Number: 0	4. Originator/Organization: Navarro
5. Responsible DOE NNSA/NFO Activity Lead: Kevin Cabble	6. Date Comments Due: September 29, 2017
7. Review Criteria: Full	
8. Reviewer/Organization Phone No.: Chris Andres, NDEP, (702) 486-2850, ext. 232	9. Reviewer's Signature:

10. Comment Number/Location		11. Type[a]	12. Comment	13. Comment Response	14. Accept/Reject
1.	Section 4.2, Page 28, 1st Partial Paragraph, Last Sentence		If there are no physical site controls required to be placed for the administrative use restriction, how will any worker who finds themselves in the vicinity of the area where there is an assumed potential to receive a dose exceeding 25mrem/yr of removable contaminations actually know they are in, or may enter, the removable contamination area? Can warning signs not be placed on the outer fence?	Based on the location of the FFACO UR being inside the contamination area, the FFACO UR warning signs will be placed outside the outer fence. The last sentence of the first paragraph of Section 4.2 was replaced with the following: "Warning signs that encompass the FFACO UR were posted outside the administrative UR boundary shown in Figure 2-2. Deleted: "No physical site controls are required for this administrative UR." at the end of the second paragraph of Section 4.2.	
2.	Section 5.1, Page 29, 2nd Paragraph		Is there any possible timeframe known for the implementation of appropriate BMP's?	Implementation schedules for the BMPs can be provided to NDEP. However, access to this site is very tentative, and forecasting dates may be problematic.	

[a]Comment Types: M = Mandatory, S = Suggested.
Return Document Review Sheets to NNSA/NFO Environmental Management Operations Activity, Attn: QAC, M/S NSF 505

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3.	Appendix E, Onsite Waste Transport Manifest		Please indicate the Certificate of Destruction/Disposal for the one drum of PCB contaminated transformer oil in the Final CR.	Added the following statement to the Appendix E cover page: "Note: The waste treatment/disposal documentation for the transformer oil will be provided in an addendum." Added the following sentence to the end of the Transformer Oil section of Section 3.2: "Disposal of the transformer oil is currently pending. Waste disposal documentation will be included as an addendum to this CR upon receipt from the treatment/disposal facility." Revised Table 3-1 to reflect the changes above.	

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10. Comment Number/Location		11. Type[a]	12. Comment	13. Comment Response	14. Accept/Reject
4.	Appendix G, Use Restriction Information, Page 1 of 3, Contaminates Table		The last sentence in the **Summary Statement** states, "The analytical results and locations of all samples are presented in the SAFER Plan for CAU 415." A search of the SAFER could only locate the value stated for Americium-241 (128,000 pCi/g). This was found in Table 2-2 of the SAFER. The other three values listed in the CR table cannot be found in the SAFER. Please correct this discrepancy.	Replaced this sentence with the following: "The analytical results and locations of all samples are presented in Appendix D." Section D.3.0 and Table D.3-1 were added to the CR to provide the inferred Pu activities. Section D.3-0 states the following: "The plutonium activities used for dose calculations shown in Table D.3-1 were inferred from the associated gamma spectrometry results for Am-241 in accordance with the Soils RBCA document (NNSA/NSO, 2014) and "Characterization of Plutonium Activities in Soil" (Kidman et al., 2015). Due to the heterogeneity of plutonium in soils at the NNSS, this provides estimates of plutonium soil activities that are more representative of site conditions. The other radionuclide activities shown in Table D.3-1 are those reported from analytical results exceeding the MDCs."	
5.	Appendix G, Use Restriction Information, Page 2 of 3, Contaminates Table		The last sentence in the **Summary Statement** states, "The analytical results and locations of all samples are presented in the SAFER Plan for CAU 415." A search of the SAFER could only locate the value stated for Americium-241 (128,000 pCi/g). This was found in Table 2-2 of the SAFER. The other three values listed in the CR table cannot be found in the SAFER. Please correct this discrepancy.	See response to Comment #4.	

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6.	Appendix G, Use Restriction Information, Page 2 of 3, Site Controls, Last Sentence		Please see Comment No. 1, above.	The last sentence of the FFACO UR Site Controls section ("Warning signs for the FFACO UR are posted outside the boundary of the UR area.") was replaced with the following: "Warning signs for the FFACO UR are posted outside the administrative UR boundary." Deleted the following sentence at the end of the Administrative UR Site Controls section: "No physical site controls are required for this administrative UR."	

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