Nevada
Environmental
Management
Operations Activity

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National Nuclear Security Administration

Recommendations and Justifications for Modifications To Downgrade Use Restrictions Established under the U.S. Department of Energy, National Nuclear Security Administration Nevada Field Office *Federal Facility Agreement and Consent Order*

Controlled Copy No.: _
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October 2013

/s/ Joseph P. Johnston, N-I CO 10/08/2013

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RECOMMENDATIONS AND JUSTIFICATIONS FOR MODIFICATIONS TO DOWNGRADE USE RESTRICTIONS ESTABLISHED UNDER THE U.S. DEPARTMENT OF ENERGY, NATIONAL NUCLEAR SECURITY ADMINISTRATION NEVADA FIELD OFFICE *FEDERAL FACILITY AGREEMENT AND CONSENT ORDER*

U.S. Department of Energy, National Nuclear Security Administration
Nevada Field Office
Las Vegas, Nevada

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NATIONAL NUCLEAR SECURITY ADMINISTRATION NEVADA FIELD OFFICE
FEDERAL FACILITY AGREEMENT AND CONSENT ORDER

Approved by: /s/ Tiffany A. Lantow Date: 10/09/2013

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Approved by: /s/ Robert F. Boehlecke Date: 10/09/2013

Robert F. Boehlecke
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List of Acronyms and Abbreviations

Ac	Actinium
Am	Americium
B(a)A	Benzo(a)anthracene
BAP	Benzo(a)pyrene
B(b)F	Benzo(b)fluoranthene
bgs	Below ground surface
Bi	Bismuth
BMP	Best management practice
CADD	Corrective action decision document
CAI	Corrective action investigation
CAIP	Corrective action investigation plan
CAS	Corrective action site
CAU	Corrective action unit
Co	Cobalt
COC	Contaminant of concern
COPC	Contaminant of potential concern
CR	Closure report
Cs	Cesium
CWD	Contaminated waste dump
DBA	Dibenzo(a,h)anthracene
Decon	Decontamination
DoD	U.S. Department of Defense
DOE	U.S. Department of Energy
DQO	Data quality objective
DRO	Diesel-range organics
EPA	U.S. Environmental Protection Agency

List of Acronyms and Abbreviations *(Continued)*

Eu	Europium
FAL	Final action level
FFACO	*Federal Facility Agreement and Consent Order*
ft	Foot
gal	Gallon
GIS	Geographic Information Systems
GRO	Gasoline-range organics
hr/yr	Hours per year
IA	Industrial Area
ID	Identification
m^2	Square meter
MDC	Minimum detectable concentration
mg/kg	Milligrams per kilogram
M&O	Management and operating
mrem	Millirem
mrem/IA-yr	Millirem per Industrial Area year
mrem/OU-yr	Millirem per Occasional Use Area year
mrem/yr	Millirem per year
N/A	Not applicable
NAC	*Nevada Administrative Code*
NCRP	National Council on Radiation Protection and Measurements
NDEP	Nevada Division of Environmental Protection
NNSA/NFO	U.S. Department of Energy, National Nuclear Security Administration Nevada Field Office
NNSS	Nevada National Security Site
OU	Occasional Use Area
PAL	Preliminary action level

List of Acronyms and Abbreviations *(Continued)*

Pb	Lead
PCB	Polychlorinated biphenyl
pCi/g	Picocuries per gram
PRG	Preliminary remediation goal
Pu	Plutonium
RBCA	Risk-based corrective action
RBSL	Risk-based screening level
RCRA	*Resource Conservation and Recovery Act*
RDX	Royal demolition explosive
RMA	Radioactive material area
ROTC	Record of Technical Change
RRMG	Residual radioactive material guideline
RSL	Regional screening level
RW	Remote Work Area
Sr	Strontium
SSTL	Site-specific target level
SVOC	Semivolatile organic compound
TCC	Test Cell C
TCE	Trichloroethene
TCLP	Toxicity Characteristic Leaching Procedure
TED	Total effective dose
Th	Thorium
Tl	Thallium
TPH	Total petroleum hydrocarbons
TSCA	*Toxic Substances Control Act*
U	Uranium

List of Acronyms and Abbreviations (Continued)

UCL	Upper confidence limit
UGTA	Underground Test Area
UR	Use restriction
USAF	U.S. Air Force
UST	Underground storage tank
VOC	Volatile organic compound

1.0 Purpose

Many *Federal Facility Agreement and Consent Order* (FFACO) Use Restrictions (URs) and Administrative URs have been established at various corrective action sites (CASs) as part of FFACO (1996, as amended) corrective actions. Since the signing of the FFACO in 1996, practices and procedures relating to the implementation of risk-based corrective action (RBCA) have evolved. This document is part of an effort to reevaluate 37 FFACO and Administrative URs against the current *Soils Risk-Based Corrective Action Evaluation Process* (NNSA/NSO, 2012b) (referred to in this document as the RBCA criteria). The Soils RBCA document is being used instead of the *Industrial Sites Project Establishment of Final Action Levels* (NNSA/NSO, 2006c) because the Soils RBCA document has the most current definitions of work scenarios, and the latest discussions regarding chemical and radiological risk-based corrective actions. Based on this evaluation, the URs were sorted into the following categories:

1. Where sufficient information exists to determine that the current UR may be removed or downgraded based on RBCA criteria.

2. Where sufficient information exists to determine that the current UR should not be changed when evaluated against the RBCA criteria.

3. Where sufficient information does not exist to evaluate the current UR against the RBCA criteria.

After reviewing 37 existing FFACO and Administrative URs, 11 URs addressed in this document have sufficient information to determine that these current URs may be downgraded to Administrative URs based on the RBCA criteria. This document presents recommendations on modifications to existing URs that will be consistent with the RBCA criteria.

2.0 Process

The evaluations of URs presented in this document will result in one of the following actions:

1. Modification of the current UR to appropriately control risks posed by the site.
2. Removal of the current UR because contamination is not present at the site above risk-based final action levels (FALs).

All URs are established to protect site workers and the public from inadvertent contact with contaminants of concern (COCs). A COC is defined as any contaminant from an FFACO release that is present at a concentration that exceeds the corresponding FAL. For some of the existing URs, the FALs were established using the preliminary action level (PAL) values. The chemical PALs were established using the U.S. Environmental Protection Agency (EPA) Region 9 preliminary remediation goals (PRGs) for chemical constituents (EPA, 2004 and earlier). Radionuclide PALs were established using the National Council on Radiation Protection and Measurements (NCRP) Report No. 129, Table 2.1, "Construction, Commercial, Industrial" land use scenario column for a 25-millirem (mrem) dose constraint (NCRP, 1999), unless otherwise noted. PALs for total petroleum hydrocarbons (TPH) were established at 100 milligrams per kilograms (mg/kg), as listed in the *Nevada Administrative Code* (NAC) 445A.2272 (NAC, 2008). The PALs used as the basis for the current URs being reevaluated were calculated based on an Industrial Area (IA) land-use exposure scenario.

The PALs have been modified since the signing of the FFACO in 1996. Also, some of the URs were established before the RBCA process was developed. The RBCA process provides a methodology for determining risk-based FALs based on the establishment of a future land-use exposure scenario that may be different from the IA scenario. The data used to define the need for the original URs were compared to FALs developed using the current RBCA process to reevaluate the need for a UR and, if needed, the type of UR.

Two types of URs can be established: FFACO URs and Administrative URs. The FFACO URs are established at CASs where a contaminant is present at a concentration or dose exceeding the corresponding FAL. FFACO URs require warning signs to be posted at the perimeter corners of the CAS and periodic inspections. Other protective measures—such as fences, landfill boundary

monuments, and polychlorinated biphenyl (PCB) or radiation postings—may also be implemented at FFACO URs. If a UR is proposed for a CAS, a determination must be made regarding the type of UR. If the contamination is above FALs, then an FFACO UR is implemented. If the contamination is below FALs but above PALs, then an Administrative UR is implemented. This is done to protect against an inadvertent exposure in case some future use of the site would cause the presence of a full-time worker. Administrative URs do not require onsite postings or physical barriers, and do not require periodic inspections (NNSA/NFO, 2013b). Both types of URs are recorded in the FFACO database; the Management and Operating (M&O) Contractor Geographic Information Systems (GIS); and the U.S. Department of Energy (DOE), National Nuclear Security Administration Nevada Field Office (NNSA/NFO) Corrective Action Unit (CAU)/CAS files.

2.1 Scope

The URs addressed in this document are listed in Table 2-1 and shown in Figure 2-1. If the UR is being recommended for modification, the following criteria were met:

- The size and depth of the contaminant plume have been adequately defined.
- Where the UR basis included TPH contamination, both volatile organic compound (VOC) and semivolatile organic compound (SVOC) results are available for the samples with the maximum TPH concentrations.
- The concentrations of the contaminants are below the FALs.

These sites are addressed in Sections 3.0 through 12.0 and include the following information:

- The CAS description as listed in the FFACO database.
- The current UR description as listed in the corresponding FFACO closure document.
- The basis for current UR, as listed in the corresponding FFACO closure document, including the analytical results driving the decision.
- The basis for UR modification based on the current RBCA process.

Table 2-1
Use Restrictions
(Page 1 of 2)

CAU	CAS	CAS Description	Date Original UR Implemented	Basis for Modification	Recommended Modification
137	01-08-01	Waste Disposal Site	03/20/2007	The 95% UCL TED is below the 25-mrem/yr dose constraint for both IA and OU exposures, but because there may be buried non-metallic debris or fill material as indicated by geophysical surveys, an Administrative UR will protect against inadvertent exposure.	Change to Administrative UR.
	07-23-02	Radioactive Waste Disposal Site		The 95% UCL TED is below the 25-mrem/yr dose constraint for both IA and OU exposures, but because there may be buried non-metallic debris or fill material as indicated by geophysical surveys, an Administrative UR will protect against inadvertent exposure.	Change to Administrative UR.
204	05-18-02	Chemical Explosives Storage	04/17/2006	Average TED of the area is below the 25-mrem/IA-yr dose constraint, but there is depleted uranium present at the site; an Administrative UR will protect against an inadvertent exposure to the depleted uranium.	Change to Administrative UR.
	05-33-01	Kay Blockhouse		Radiological activities are below the OU RRMGs; TED for the U-238 is below the 25-mrem/OU-yr constraint; lead and RDX results are below their respective FALs.	Change to Administrative UR for lead and RDX; remove radiological constituents from UR.
261	25-05-01	Leachfield	05/30/2001	Average TED of the area is below the 25-mrem/yr dose constraint; SVOC results are below OU FALs.	Change to Administrative UR for SVOCs; remove radiological constituents from UR.

Table 2-1
Use Restrictions
(Page 2 of 2)

CAU	CAS	CAS Description	Date Original UR Implemented	Basis for Modification	Recommended Modification
357	10-09-06	Mud Pit; Stains; Material	05/11/2005	Radiological activities are below the OU RRMGs; TED for the Co-60 is below the 25-mrem/OU-yr constraint.	Change to Administrative UR.
528	25-27-03	Polychlorinated Biphenyls Surface Contamination	10/17/2006	PCB results are below the OU FALs; hazardous constituents of TPH-DRO and TPH-GRO not detected above PALs.	Change PCB URs to Administrative URs; remove TPH URs.
529	25-23-17	Contaminated Wash (Parcel E)	11/18/2004	Radiological activities are below the OU RRMGs; TED for the Cs-137 is below the 25-mrem/OU-yr constraint.	Change to Administrative UR.
543	06-07-01	Decon Pad	01/28/2008	PCB results are below the OU FALs.	Change to Administrative UR.
	15-23-03	Contaminated Sump, Piping		PCB results are below the OU FALs; radiological activities are below the OU RRMGs; TED for the Pu-238 is below the 25-mrem/OU-yr constraint.	Change to Administrative UR.
554	23-02-08	USTs 23-115-1,2,3/Spill 530-90-002	07/19/2005	One sample indicated need for corrective action, but sample was collected from 380 ft bgs and poses no risk to potential receptor; an Administrative UR will protect workers from inadvertent exposure to deep subsurface contamination.	Change to Administrative UR.

bgs = Below ground surface
Co = Cobalt
Cs = Cesium
Decon = Decontamination
DRO = Diesel-range organics
ft = Foot
GRO = Gasoline-range organics
mrem/IA-yr = Millirem per Industrial Area year
mrem/OU-yr = Millirem per Occasional Use Area year
mrem/yr = Millirem per year
OU = Occasional Use Area
Pu = Plutonium
RDX = Royal demolition explosive
RRMG = Residual radioactive material guideline
TED = Total effective dose
U = Uranium
UCL = Upper confidence limit
UST = Underground storage tank

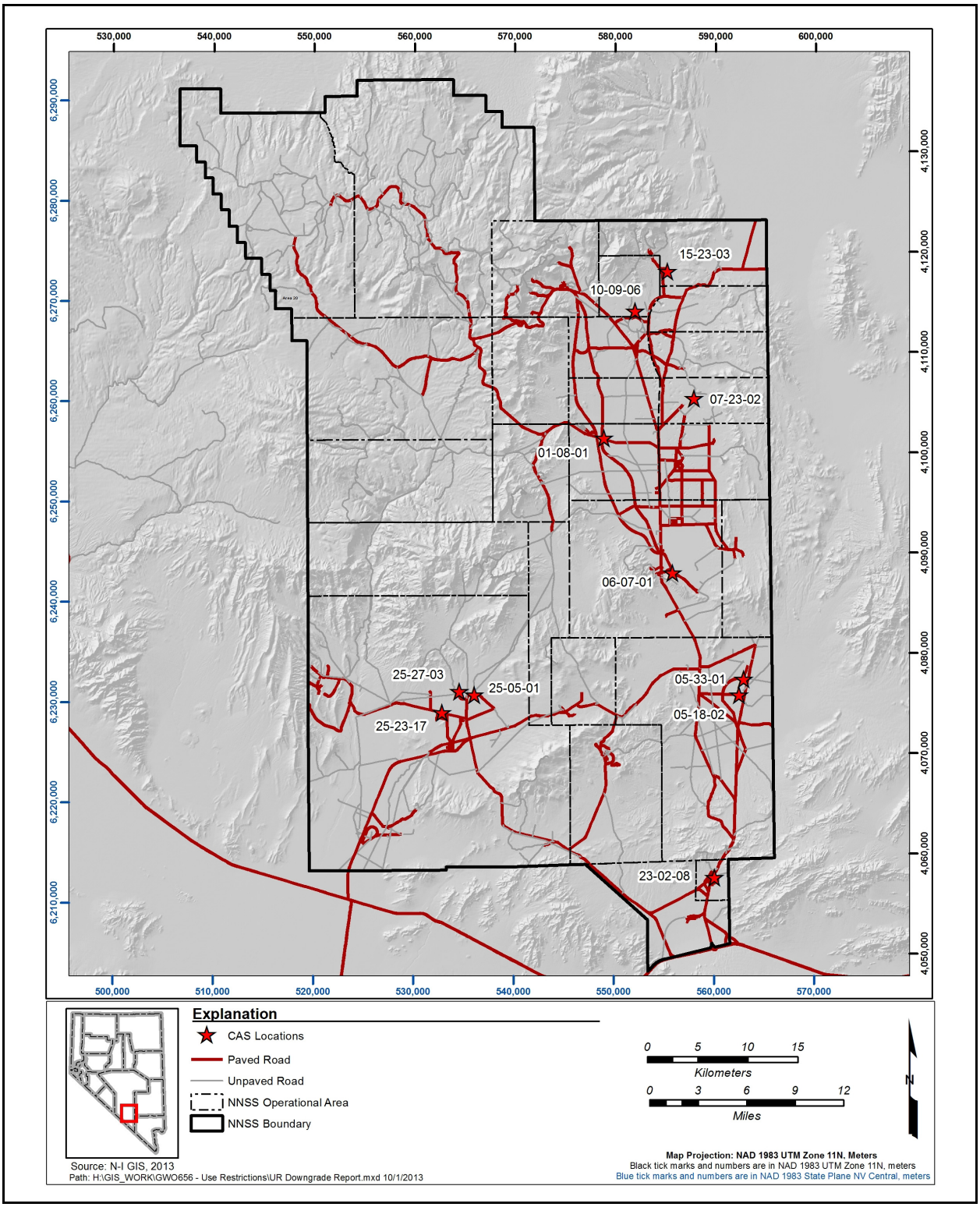

Figure 2-1
UR CAS Locations

2.2 Action Levels

The current RBCA process used to establish FALs is described in the *Soils Risk-Based Corrective Action Evaluation Process* (NNSA/NSO, 2012b). This process conforms to NAC Section 445A.227 (NAC, 2012a), which lists the requirements for sites with soil contamination. For the evaluation of corrective actions, NAC Section 445A.22705 (NAC, 2012b) recommends the use of ASTM International Method E 1739 (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 (i.e., FALs) or to establish that corrective action is not necessary."

This RBCA process defines three tiers (or levels) of evaluation involving increasingly sophisticated analyses:

- **Tier 1 evaluation.** Tier 1 risk-based screening levels (RBSLs) are the generic (non-site-specific) PALs defined in the data quality objective (DQO) process and listed in the FFACO plans. These are compared to contamination levels at source areas.
- **Tier 2 evaluation.** Tier 2 site-specific target levels (SSTLs) are calculated using site-specific inputs and receptor exposure scenarios. Total TPH concentrations will not be used for risk-based decisions under Tier 2 or Tier 3. Rather, the individual hazardous constituents will be compared to the SSTLs.
- **Tier 3 evaluation.** Tier 3 SSTLs are calculated using site-specific inputs to more sophisticated chemical fate/transport and probabilistic models. These are compared to contamination levels at points of compliance.

The comparison of laboratory results to the revised FALs is used to evaluate the need for and the type of UR at each site. The revised FALs are defined (along with the basis for their definition) in each of the subsequent UR sections.

2.2.1 Tier 1-Based FALs

All FALs based on a Tier 1 evaluation were defined as the PALs listed in the following subsections.

2.2.1.1 Chemical PALs

Historical

Except as noted herein, the chemical PALs were historically defined as the EPA Region 9 PRGs for chemical contaminants in industrial soils (EPA, 2004 and earlier). Background concentrations for *Resource Conservation and Recovery Act* (RCRA) metals were used instead of PRGs when natural background concentrations exceed the PRG, which is often the case with arsenic on the Nevada National Security Site (NNSS).

Current

The EPA Region 9 PRGs are updated approximately semiannually (EPA, 2013a). Current chemical PALs are now derived from current EPA Region 9 regional screening levels (RSLs).

2.2.1.2 Total Petroleum Hydrocarbon PALs

Historical

The PAL for TPH was 100 mg/kg as listed in NAC 445A.2272 (NAC, 2008).

Current

On August 24, 2009, new regulations pertaining to assessment and corrective action at leaking underground storage tanks and other remediation sites were approved by the Nevada Legislative Committee (NAC, 2008). For TPH contamination, PALs are now established for the individual specific hazardous constituents of TPH, because TPH is an inconsistent mixture of many chemical compounds that do not have established RSLs (NNSA/NSO, 2012b).

2.2.1.3 Radionuclide PALs

Historical

The PALs for radiological contaminants (other than tritium) were based on the NCRP Report No. 129 recommended screening limits for construction, commercial, and industrial land-use scenarios (NCRP, 1999) scaled to a 25-mrem/yr dose constraint (Murphy, 2004) and the generic guidelines for residual concentration of radionuclides in DOE Order 5400.5 (DOE, 1993). These PALs were based

on the construction, commercial, and industrial land-use scenarios provided in the guidance and were appropriate for the NNSS based on future land use scenarios (NCRP, 1999). The PAL for tritium is based on the Underground Test Area (UGTA) Activity limit of 400,000 picocuries per liter for discharge of water containing tritium (NNSA/NSO, 2009).

Current

All radiological action levels are based on the 25-mrem/yr TED constraint. Action levels can be established for each radioisotope. The action levels represent the concentration in soil for a specific radionuclide that would result in a 25-mrem/yr TED to a receptor for a specific exposure time. The radionuclide-specific action levels are referred to as RRMGs and are expressed in picocuries per gram (pCi/g). The RRMGs are dependent upon exposure time and exposure pathway. Therefore, separate sets of RRMGs have been developed for the exposure scenarios of IA, Remote Work Area (RW), and OU; and for the internal exposure pathway and the combination of all pathways (internal and external dose) (NNSA/NFO, 2013a). The revised PALs use the RBCA criteria RRMG tables for the combined internal and external dose. The RRMGs are calculated using the RESRAD computer code (Yu et al., 2001). The RESRAD methodology is cited in DOE Order 458.1 (DOE, 2011) for dose assessment and for the determination of guidelines to be used in the cleanup of contaminated sites.

2.2.2 Tier 2-Based FALs

All FALs established based on a Tier 2 evaluation were calculated using one of the following site-specific exposure scenarios, as defined in the *Soils Risk-Based Corrective Action Evaluation Process* (NNSA/NSO, 2012b):

- **Industrial Area.** Worker will be exposed to the site full time (250 days per year, 8 hours per day for 25 years). This exposure scenario assumes continuous industrial use of a site where workers are present full time (e.g., a site located at Mercury).

- **Remote Work Area.** Worker will be exposed to the site part time (up to 336 hours per year [hr/yr] for 25 years). This exposure scenario assumes non-continuous work activities at a site where workers are present part time (e.g., a site located near a substation that workers might visit for inspection and maintenance).

- **Occasional Use Area.** Worker will be exposed to the site occasionally (up to 80 hr/yr for 5 years). This exposure scenario is for sites where workers are present occasionally (e.g., an open desert area with no facilities or regular work areas).

The Tier 2 evaluation starts by evaluating site-specific land use and potential receptors to determine appropriate exposure scenarios and determine the most exposed individual. Then Tier 2 SSTLs are calculated using site-specific inputs to standard risk equations (for chemical contaminants), using pre-calculated RRMGs based on the RW or OU exposure scenarios, or calculating RRMGs based on site-specific RESRAD input parameters (including site-specific exposure scenarios). The Tier 2 SSTLs are then compared to individual sample results from reasonable points of exposure (as opposed to the source areas as is done in Tier 1) or to the 95 percent UCL of the mean concentration or activity of sample results collected from random sample locations representative of the exposure area. Points of exposure or exposure areas are defined as those locations or areas at which an individual or population may come in contact with a COC originating from a release site. Tier 2-based FALs do not include an action level for petroleum hydrocarbon as a whole (e.g., TPH). Instead, the risk posed by TPH (not yet established) is addressed as the risk posed by the individual hazardous constituents of TPH present at the site.

The following contaminants of potential concern (COPCs) are defined as the hazardous constituents of TPH diesel fuel (NNSA/NSO, 2012b):

- 1,3,5-Trimethylbenzene
- 1-Methylnaphthalene
- 2-Methylnaphthalene
- Anthracene
- Benzo(a)anthracene [B(a)A]
- Benzene
- Benzo(a)pyrene [BAP]
- Benzo(b)fluoranthene [B(b)F]
- Benzo(k)fluoranthene
- Benzo(g,h,i)perylene
- Chrysene
- Ethylbenzene
- Fluoranthene
- Fluorene
- Indeno(1,2,3-cd)pyrene
- Naphthalene
- n-Nonane
- n-Propylbenzene
- o-Xylene
- Phenanthrene

- Pyrene
- Toluene

The following COPCs are defined as the hazardous constituents of TPH gasoline (NNSA/NSO, 2012b):

- 1,2,4-Trimethylbenzene
- 1,3,5-Trimethylbenzene
- 1,3-Butadiene
- 1-Methylnaphthalene
- 2-Methylnaphthalene
- Benzene
- Cyclohexane
- Ethylbenzene
- Methyl-tert-butylether
- Naphthalene
- n-Hexane
- n-Pentane
- Toluene
- Xylenes

The hazardous constituents of TPH diesel and TPH gasoline are included in the list of reported analytical results from the VOC and SVOC analytical methods. Therefore, when all VOC and SVOC analyte results are below PALs, TPH diesel and TPH gasoline can be considered to be within acceptable exposure levels.

Samples that contain a chemical contaminant that exceeds an IA worker PAL are evaluated for FAL DQO decisions based on an evaluation of additive toxicity or carcinogenic risk from multiple contaminants. This multiple contaminant analysis was conducted by summing the ratios of each carcinogenic- or toxicity-based contaminant concentration to its corresponding FAL for qualifying samples (exceeding a PAL). If the sum of the carcinogenic- or toxicity-based ratios exceeds 1.0, then a corrective action will be required.

2.3 Modified UR Decision Basis

Most CASs were closed originally using the IA land-use exposure scenario. The CASs discussed in this report are being evaluated with the assumption that the future land use is OU, and therefore that

exposure scenario will be used to revise FALs for comparison to the original results. The recommendation to modify the UR will be based on the following decision statements:

- If the site contains a contaminant exceeding a FAL, based on the site-specific foreseeable future land-use exposure scenario (Section 2.2.2), the current FFACO UR will remain.

Otherwise:

- If the site does not contain a contaminant exceeding a FAL, based on the site-specific exposure scenario, the UR may be downgraded to an Administrative UR or may be removed.

Otherwise:

- If the site contains a contaminant exceeding an IA PAL, an Administrative UR will be implemented. Changing to an Administrative UR would eliminate ongoing inspection and maintenance requirements (e.g., no requirement for fencing or signage).

2.4 Modification of URs

All FFACO and Administrative URs were established in an approved FFACO closure document (e.g., Corrective Action Decision Document [CADD]/Closure Report [CR] or CR).

Changes to approved FFACO documents are in the form of an addendum, an errata sheet, or Record of Technical Change (ROTC). Addenda are used when extensive corrections/additions to a section or multiple sections of an FFACO document are necessary.

Approval of this document will constitute approval of the UR modifications recommended for each UR addressed herein. After approval, an ROTC to each of the associated closure documents (that originally established each UR) will be prepared and submitted as DOE NNSA/NFO FFACO records. These ROTCs will comprise the following:

- The ROTC (signed by the Industrial Sites Activity Lead, the NNSA/NFO Environmental Operations Manager and the Nevada Division of Environmental Protection [NDEP])
- CAU-specific additional information from this report
- UR information for the Administrative UR
- UR aerial photograph with the coordinates of the Administrative UR

As applicable, requirements for inspecting and maintaining the modified URs will be lifted, and the postings and signage, at each site specific to the FFACO UR, will be removed. Fencing and posting may be present at these sites that are unrelated to the FFACO UR, such as for radiological control purposes, as required by the *Nevada National Security Site Radiological Control Manual* (NNSA/NSO, 2012a).

3.0 CAU 137, CAS 01-08-01 – Waste Disposal Site

3.1 CAS Description

CAS 01-08-01 is northeast of the intersection of Pahute Mesa Road and Orange Road in Area 1 of the NNSS. The fenced site is approximately 6.2 acres. Although identified as a waste disposal site, it is thought that the area was used to stage waste and debris from atmospheric nuclear testing activities conducted in the area. The site is within 0.63 miles from the Apple-2 tower tests. Waste and debris from these tests may have been staged at the location of CAS 01-08-01. The site was not posted for radiological control. Waste and debris stored at the site has been removed, possibly under the 1980s Waste Consolidation Program. Coordinates of Site 1C, cleaned up in 1982, correspond with the Global Positioning System coordinates of CAS 01-08-01 (NNSA/NSO, 2007).

A geophysical survey was conducted to identify subsurface anomalies that might indicate the presence of buried debris or waste. The results of the surveys identified two areas that may contain buried non-metallic waste or fill material. The geophysical report, however, concluded that a buried waste disposal site was not present at this CAS (NNSA/NSO, 2007).

To implement the UR at CAS 01-08-01, sections of fencing along the entire southwestern side and portions of the southeastern side required repair or complete reconstruction. The site was originally fenced with three-strand barbed wire, but due to the length of the sections for installation and difficulty in handling barbed wire, new two-strand plastic wire was installed (NNSA/NSO, 2007).

3.2 Current UR Description

The future use of any land related to this CAU is restricted from any DOE or U.S. Air Force (USAF) activity that may alter or modify the containment control as approved by the State of Nevada and identified in the CAU CR or other CAU 137 documentation, unless appropriate concurrence is obtained in advance. Ten UR signs were placed every 200 ft along the fence line of the CAS. Site monitoring requirements for the UR include annual visual inspections of UR signs and fencing (NNSA/NSO, 2007).

3.3 Basis for Current UR

Samples were analyzed for VOCs, SVOCs, TPH-DRO, RCRA metals, beryllium, PCBs, gamma spectroscopy, isotopic U, isotopic Pu, and strontium (Sr)-90. The analytical results for soil samples collected at the Waste Disposal Site indicated that no VOCs, SVOCs, TPH-DRO, RCRA metals, beryllium, or PCBs were detected above PALs. The radionuclides Cs-137, europium (Eu)-152, and Pu-239 exceeded their respective PALs.

The PALs for the radionuclides were established in the Corrective Action Investigation Plan (CAIP) (NNSA/NSO, 2005d) and are based on NCRP Report No. 129 recommended screening limits for construction, commercial, industrial land-use scenarios (NCRP, 1999) using a 25-mrem/yr dose constraint (Murphy, 2004) and the generic guidelines for residual concentration of radionuclides in DOE Order 5400.5 (DOE, 1993). Table 3-1 contains analytical results of all COCs at CAS 01-08-01 that are the basis for the current UR. The sample matrix for all samples is soil.

Table 3-1
Sample Results for COCs at CAS 01-08-01
Used To Establish Current UR

Sample ID	Depth (ft bgs)	Cs-137	Eu-152	Pu-239
		PAL 12.2 pCi/g	PAL 5.7 pCi/g	PAL 12.7 pCi/g
137A004	0.0 - 0.5	--	24.2	34.3
137A007	0.0 - 0.5	--	20.5	14.8
137A009	0.0 - 0.5	--	51.4	56.3
137A017	0.0 - 0.5	--	21.3 (J)	23.2
137A021	0.0 - 0.5	--	17 (J)	--
137A039	0.75 - 1.0	12.5	58.2 (J+)	--
137A043	1.5 - 2.0	--	21.2	--

ID = Identification

J = Estimated value.
J+ = Result is an estimated quantity but the result may be biased high.
-- = No detects above original action levels.

3.4 Basis for UR Modification

The assumption for this CAS is that the future land use is OU, which assumes non-continuous work activities at a site and that the worker will be exposed to the site contaminants for up to 80 hr/yr for 5 years (NNSA/NSO, 2012b). This CAS was evaluated under EPA probabilistic sampling rules. Under these rules, all samples have equal weight and each location has an equal chance of being selected. Although individual sample results may be elevated, this system is designed to reflect contaminant conditions of the site as a whole. Protection from a false negative decision error is provided by conservatively using the 95 percent UCL of contaminant results for decision making. Table 3-2 lists the TED for the COCs at this CAS and demonstrates that the 95 percent UCL TED is below the 25-mrem/yr constraint for the OU exposure scenario.

Table 3-2
TED for the COCs at CAS 01-08-01

	IA Exposure Scenario	OU Exposure Scenario	Units
Average	3.8	0.2	mrem/yr
Standard Deviation	7.47	0.4	mrem/yr
Number of Samples	28	28	None
95% UCL	6.2	0.3	mrem/yr
Minimum Number of Samples Required	3.6	1.4	mrem/yr

3.5 Proposed Modification

Although the 95 percent UCL TED at this CAS is below the 25-mrem/yr dose constraint for both the IA and OU exposure scenarios, there may be buried non-metallic debris or fill material as indicated by geophysical surveys. Therefore, an Administrative UR should be implemented. Remove the FFACO UR and postings, and discontinue annual inspection and maintenance requirements at this site. These modifications will not affect or modify any non-FFACO requirements at this site.

4.0 CAU 137, CAS 07-23-02 – Radioactive Waste Disposal Site

4.1 CAS Description

CAS 07-23-02 is in the west–central portion of Area 7 just east of the U-7i Crater. The fenced site is approximately 1.43 acres. The site is the location of former contaminated waste dump (CWD) 7A. Waste and debris that may have originated from one or more of five underground tests or one or more of 30 atmospheric tests conducted within the vicinity of the site may have been stored at CWD 7A. This waste and debris has been removed under the 1980s Waste Consolidation Program. The site is posted with signs labeled "Underground Radioactive Material." The fused silica (Trinity glass) identified at several locations on the site indicates a possible relationship with the nearby atmospheric testing. The fused silica found at CAS 07-23-02 is associated with wastes stored at the CAS from these tests (NNSA/NSO, 2007).

A geophysical survey was conducted to identify subsurface anomalies that might indicate the presence of buried debris or waste. The results of the surveys identified two areas that may contain buried non-metallic waste or fill material. The geophysical report, however, concluded that a buried waste disposal site was not present at this CAS (NNSA/NSO, 2007).

To implement the UR at CAS 07-23-02, several activities were required to secure the site against unauthorized entry. Sections of fencing along the southeastern side and the northwestern side required repair or complete reconstruction. Portions of the north and east sides of the site were fenced with three-strand barbed wire. All new wire was installed along the northwest, west, and south sides of the site using two-strand plastic wire (NNSA/NSO, 2007).

4.2 Current UR Description

The future use of any land related to this CAU is restricted from any DOE or USAF activity that may alter or modify the containment control, as approved by the State of Nevada and identified in the CAU 137 documentation, unless appropriate concurrence is obtained in advance. Six UR signs were placed every 200 ft along the fence line of the CAS. Site monitoring requirements for the UR include annual visual inspections of UR signs and fencing, and maintenance as needed (NNSA/NSO, 2007).

4.3 Basis for Current UR

Samples were analyzed for VOCs, SVOCs, TPH-DRO, RCRA metals, beryllium, PCBs, gamma spectroscopy, isotopic U, isotopic Pu, and Sr-90. No VOCs, SVOCs, TPH-DRO, PCBs, RCRA metals, or beryllium were detected above PALs. The analytical results for soil samples indicate the presence of Eu-152 and Pu-239 contamination exceeding the PALs.

The PALs for the radionuclides were established in the CAIP (NNSA/NSO, 2005d) and are based on NCRP Report No. 129 recommended screening limits for construction, commercial, industrial land-use scenarios (NCRP, 1999) using a 25-mrem/yr dose constraint (Murphy, 2004) and the generic guidelines for residual concentration of radionuclides in DOE Order 5400.5 (DOE, 1993). Table 4-1 contains analytical results for Eu-152 and Pu-239 at CAS 07-23-02 that are the basis for the current UR. The sample matrix for all samples is soil.

Table 4-1
Sample Results for COCs at CAS 07-23-02
Used To Establish Current UR

Sample Location	Sample ID	Depth (ft bgs)	Eu-152	Pu-239
			PAL 5.7 pCi/g	PAL 12.7 pCi/g
E07	137E008	0.0 - 0.5	6.79 (J)	--
E15	137E016	0.0 - 0.5	98 (J)	75 (J)
E18	137E019	0.0 - 0.5	46.4 (J)	23.3 (J)
E19	137E020	0.0 - 0.5	81.4 (J)	29.9 (J)
E20	137E021	0.0 - 0.5	16.6 (J)	--
E21	137E022	0.0 - 0.5	--	13.7 (J)
	137E023	0.0 - 0.5	--	17.2 (J)

J = Estimated value.
-- = No detects above original action levels.

4.4 Basis for UR Modification

The assumption for this CAS is that the future land use is OU, which assumes non-continuous work activities at a site and that a worker will be exposed to the site contaminants for up to 80 hr/yr for 5 years (NNSA/NSO, 2012b). This CAS was evaluated under EPA probabilistic sampling rules.

Under these rules, all samples have equal weight and each location has an equal chance of being selected. Although individual sample results may be elevated, this system is designed to reflect contaminant conditions of the site as a whole. Protection from a false negative decision error is provided by conservatively using the 95 percent UCL of contaminant results for decision making. Table 4-2 lists the TED for the COCs at this CAS and demonstrates that the 95 percent UCL TED is below the 25-mrem/yr constraint for the OU exposure scenario.

Table 4-2
TED for the COCs at CAS 07-23-02

	IA Exposure Scenario	OU Exposure Scenario	Units
Average	7.5	0.4	mrem/yr
Standard Deviation	17.29	0.9	mrem/yr
Number of Samples	25	25	None
95% UCL	13.4	0.7	mrem/yr
Minimum Number of Samples Required	13.2	1.4	mrem/yr

4.5 Proposed Modification

Although the 95 percent UCL TED at this CAS is below the 25-mrem/yr dose constraint for both the IA and OU exposure scenarios, there may be buried non-metallic debris or fill material as indicated by geophysical surveys. Therefore, an Administrative UR should be implemented. Remove the FFACO UR and postings, and discontinue annual inspection and maintenance requirements at this site. These modifications will not affect or modify any non-FFACO requirements at this site.

5.0 CAU 204, CAS 05-18-02 – Chemical Explosives Storage

5.1 CAS Description

CAS 05-18-02, Chemical Explosives Storage, consists of the Sugar Bunker, a smaller adjacent bunker, and two cellar units that are adjacent to the south end of the Sugar Bunker. This bunker was used for various nonnuclear experiments conducted during the voluntary nuclear testing moratorium from 1958 to 1961. The area of the bunker is approximately 2,160 square feet. The Sugar Bunker is constructed of concrete and steel. There is a large ventilation system on the north end outside the entrance to the bunker. Inside the bunker, the floor is concrete. Steel beams are visible in the ceiling. Two cellar units, located to the south of the bunker, are constructed of steel coverings that are accessible from the southern exterior. The area surrounding the bunker is included in this CAS and comprises approximately 2 acres (NNSA/NSO, 2004b).

During closure activities, both bunker doors were closed and secured. The existing fence was repaired, and where needed, new fencing was installed to define the CAS boundary. In addition, the area was radiologically surveyed, and the existing radioactive material area (RMA) was extended to the CAS boundary and appropriately posted by the Radiological Control Demarcation and Maintenance program (NNSA/NSO, 2006a).

5.2 Current UR Description

The future use of any land related to this CAU is restricted from any DOE or USAF activity that may alter or modify the containment control as approved by the State of Nevada and identified in the CAU CR or other CAU documentation unless appropriate concurrence is obtained in advance. Twelve UR warning signs were posted along the existing fence; fencing is not required for the UR. Site monitoring requirements for the FFACO UR include annual visual inspections of UR signs (NNSA/NSO, 2006a).

5.3 Basis for Current UR

Environmental samples were analyzed for VOCs, SVOCs, RCRA metals, beryllium, TPH-DRO, TPH-GRO, PCBs, gamma spectroscopy, isotopic U, isotopic Pu, Sr-90, and explosives. Not all

samples were analyzed for the full suite of analytes. No VOCs, SVOCs, TPH-DRO, TPH-GRO, PCBs, RCRA metals, beryllium, isotopic Pu, Sr-90, or explosive were detected above PALs. The analytical results for soil samples indicate the presence of thorium (Th)-234, U-234, U-235, and U-238 contamination exceeding the PALs. Because Th-234 is a short-lived (24-day half-life) product of U-238, the two radionuclides should be in equilibrium through having the same activity; therefore, U-238 is considered the COC at this CAS (NNSA/NSO, 2004b). Table 5-1 contains analytical results of all COCs at CAS 05-18-02 that are the basis for the current UR. The sample matrix for all samples is soil.

Table 5-1
Sample Results for COCs at CAS 05-18-02 Used To Establish Current UR

Sample ID	Depth (ft bgs)	Th-234	U-234	U-235	U-238
		PAL 63.2 pCi/g	PAL 85.9 pCi/g	PAL 10.5 pCi/g	PAL 63.2 pCi/g
204D003	0.0 - 0.5	1,150 ± 190	284 ± 46 (J)	27.1 ± 6.6 (J)	1,400 ± 220 (J)
204D004	0.0 - 0.5	184 ± 31	--	--	212 ± 29
204D006	0.0 - 0.5	326 ± 55 (J)	202 ± 35 (J)	19 ± 4.5 (J)	780 ± 130 (J)
204D008	0.0 - 0.5	--	--	--	152 ± 24 (J)
204D010	0.0 - 0.5	266 ± 44	--	--	312 ± 45
204D012	0.0 - 0.5	91 ± 15	--	--	180 ± 26
204D018	0.0 - 0.5	71 ± 12	--	--	--
204D019	0.0 - 0.5	74 ± 13	--	--	70 ± 9.3
204D040A	7.0 - 8.0	84 ± 10	--	--	90 ± 16 (Y2, M3)
204D051	0.0 - 0.5	195 ± 24	107 ±19 (Y2, M3)	10.9 ± 2.8 (Y2, M3)	552 ± 92 (Y2, M3)
204D072	0.0 - 0.5	--	--	--	80 ± 14 (Y2, M3)
204D080	0.0 - 0.5	102 ± 12	--	--	117 ± 19 (M3)
204D083	0.0 - 0.5	116 ± 14	--	--	178 ± 29 (M3)
204D086	0.0 - 0.5	249 ± 30	86 ± 15 (M3)	--	303 ± 51 (M3)
204D093	1.0 - 2.0	--	--	--	193 ± 31 (M3)

J = Estimated value.
M3 = The requested minimum detectable concentration was not met, but the reported activity is greater than the reported minimum detectable concentration.
Y2 = Chemical yield outside default limits.
-- = No detects above original action levels.

The PALs for radiological contaminants were established in the ROTC to the CAIP (NNSA/NSO, 2004f) and were based on the NCRP Report No. 129 recommended screening limits for construction, commercial, and industrial land use scenarios (NCRP, 1999) scaled from 25- to 15-mrem/yr dose and the generic guidelines for residual concentration of radionuclides in DOE Order 5400.5 (DOE, 1993).

5.4 Basis for UR Modification

The assumption for this CAS is that the future land use is IA. The present-day radiological activities of U-234, U-235, and U-238 were calculated using the standard decay equation; the decay calculations take into account the half-life of the radionuclide and the time since the samples were originally collected. Radionuclide-specific FALs are referred to as RRMGs. These revised RRMGs are based on the 25-mrem/yr TED constraint, which represents the concentrations in soil for a specific radionuclide that would result in a 25-mrem/yr TED to a receptor for a specific exposure time.

Table 5-2 presents the present-day radiological activities, the revised IA RRMGs, and the TED of the radionuclides, which demonstrate that the TED is below the 25-mrem/yr TED constraint for the IA exposure scenario. Although the TED for sample 204D003 is close to the 25-mrem/yr TED constraint, the average dose of the four sample locations within the 1,000-square-meter (m^2)-diameter area surrounding sample 204D003 (per instructions in NNSA/NSO, 2012b) is 9.3 mrem/IA-yr (Figure 5-1). The average dose of the sample locations highlighted in Figure 5-1 is 5.6 mrem/IA-yr, which is below the 25-mrem/yr TED constraint.

5.5 Proposed Modification

Although the average TED of the area is below the 25-mrem/yr TED constraint, it was decided that rather than eliminating the FFACO UR at this CAS, the FFACO UR will be downgraded to an Administrative UR. This is because depleted U is present at the site. The Administrative UR will protect against an inadvertent exposure to the depleted U. Therefore, remove the FFACO UR and postings from this site; discontinue annual inspections; and change to an Administrative UR. These modifications will not affect or modify any non-FFACO requirements at this site.

Table 5-2
Present-Day Radiological Activities, IA RRMGs, and TED for COCs at CAS 05-18-02

Sample ID	Depth (ft bgs)	U-234	U-235	U-238	TED (mrem/IA-yr)
		IA RRMG 22,080 pCi/g	IA RRMG 284.0 pCi/g	IA RRMG 1,581 pCi/g	
204D003	0.0 - 0.5	284	27.1	1,400	24.85
204D004	0.0 - 0.5	--	--	212	3.35
204D006	0.0 - 0.5	202	19	780	14.24
204D008	0.0 - 0.5	--	--	152	2.4
204D010	0.0 - 0.5	--	--	312	4.93
204D012	0.0 - 0.5	--	--	180	2.85
204D019	0.0 - 0.5	--	--	70	1.11
204D040A	7.0 - 8.0	--	--	90	1.42
204D051	0.0 - 0.5	107	10.9	552	9.81
204D072	0.0 - 0.5	--	--	80	1.27
204D080	0.0 - 0.5	--	--	117	1.85
204D083	0.0 - 0.5	--	--	178	2.81
204D086	0.0 - 0.5	85	--	303	4.89
204D093	1.0 - 2.0	--	--	193	3.05

-- = No detects above original action levels.

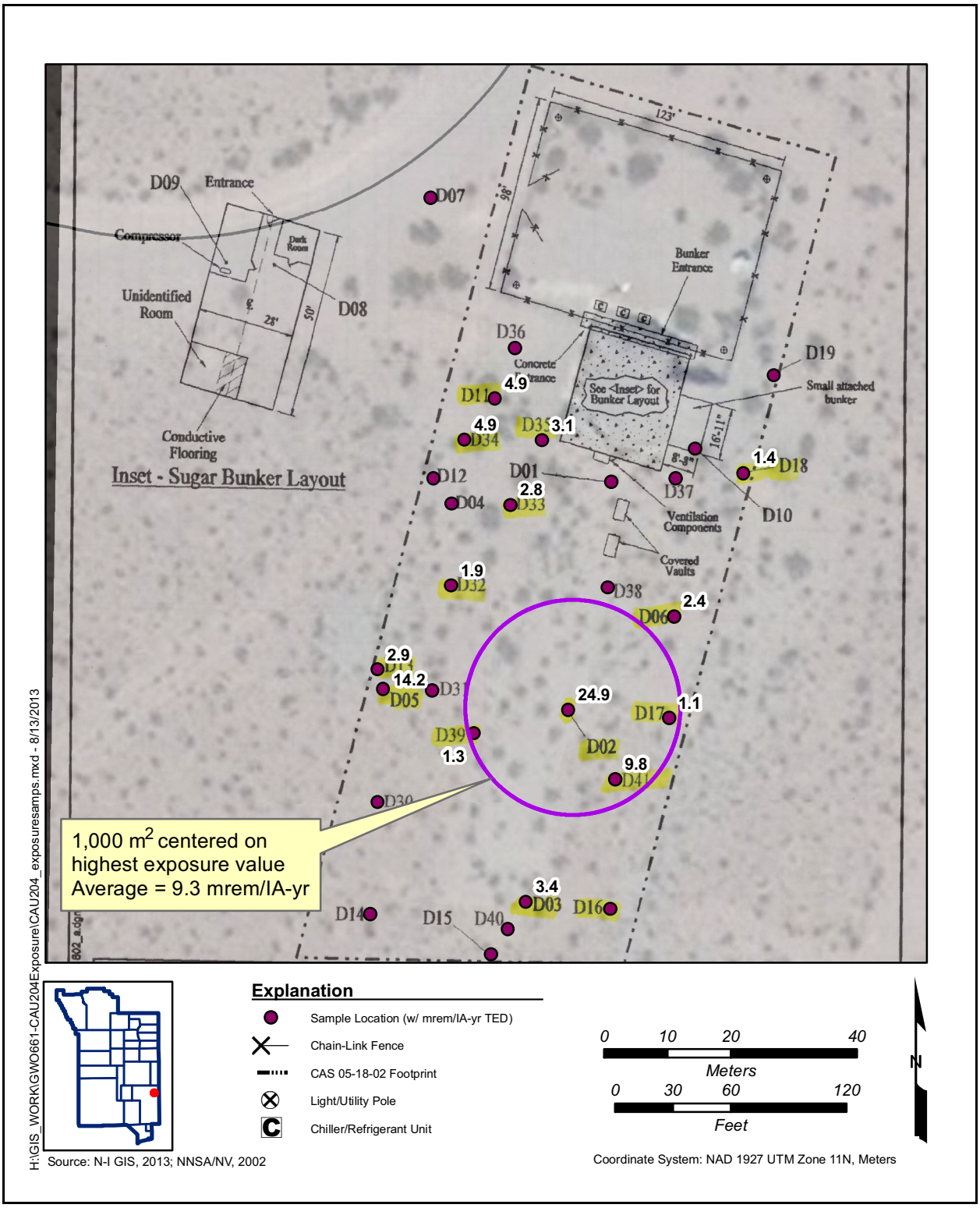

Figure 5-1
CAS 05-18-02 Sample Locations with IA-yr TED

6.0 CAU 204, CAS 05-33-01 – Kay Blockhouse

6.1 CAS Description

CAS 05-33-01, Kay Blockhouse, consists of an area of approximately 11 acres and includes the Kay Blockhouse, two burn pits with steel frames, one burn pit with a soil berm, two open pits, two steel-lined subsurface pits, one berm with embedded piping, one berm with piping debris, a burn area with a large concrete block with an embedded steel prong, and one open pit with a concrete foundation at the north end. The Kay Blockhouse was constructed in 1951 and was used as an instrumentation bunker for Operation Ranger, a series of five atmospheric nuclear tests. The burn pits and other surface features within the CAS boundary were not part of the nuclear testing. The Kay Blockhouse is constructed of concrete with a wooden entryway door. The details of the construction of the floor are unknown (NNSA/NSO, 2004b).

During closure activities, lead- and radiologically impacted soil was removed, and verification samples were collected. Friable asbestos material was removed from the burn pits; the asbestos and steel frames from the burn pits were disposed of at the Area 23 Sanitary Landfill. In addition, the two steel-lined pits were filled with native soil and capped with 1.5 ft of concrete. The bunker was secured by installing security fencing and a gate around the entrance to the bunker. The RMA was reestablished and fenced with T-post and wire-rope fencing (NNSA/NSO, 2006a).

6.2 Current UR Description

The future use of any land related to this CAU is restricted from any DOE or USAF activity that may alter or modify the containment control as approved by the State of Nevada and identified in the CAU CR or other CAU documentation unless appropriate concurrence is obtained in advance. Eleven UR warning signs were posted along the fence. Site monitoring requirements for the FFACO UR include annual visual inspections of UR signs and fencing, and maintenance as needed (NNSA/NSO, 2006a).

6.3 Basis for Current UR

Site characterization samples were collected for VOCs, SVOCs, RCRA metals, beryllium, TPH-DRO and TPH-GRO, PCBs, gamma spectroscopy, isotopic Pu, isotopic U, Sr-90, and explosives. The

radionuclides actinium (Ac)-228, bismuth (Bi)-212, lead (Pb)-212, thallium (Tl)-208, Th-234, and U-238 exceeded the PALs; lead and RDX also exceeded the PALs. Asbestos-containing material was discovered in the steel-lined burn pits, the steel-framed burn pit, and the burn pit with soil berm, at concentrations ranging from 1 to 20 percent asbestos. Table 6-1 contains analytical results of all COCs at CAS 05-33-01 that are the basis for the current URs. The sample matrix for all samples is soil.

The PALs for radiological contaminants were established in the ROTC to the CAIP (NNSA/NSO, 2004f) and were based on the NCRP Report No. 129 recommended screening limits for construction, commercial, and industrial land use scenarios (NCRP, 1999) scaled from 25- to 15-mrem/yr dose and the generic guidelines for residual concentration of radionuclides in DOE Order 5400.5 (DOE, 1993).

6.4 Basis for UR Modification

The revised FAL for RDX was calculated using the OU exposure scenario. The FAL for RDX was revised using the EPA Region 9 RSLs for Chemical Contaminants at Superfund Sites Calculator (EPA, 2013b) and the latest input values (NNSA/NFO, 2013c). The OU scenario assumes occasional work activities at the site, and that a worker will be on the site for an equivalent of 80 hr/yr (or 10 days) for 5 years. (NNSA/NSO, 2012b).

Only the IA or RW exposure scenarios are used to calculate a Tier 2 action level for lead (NNSA/NFO, 2013c) using the EPA Adult Lead Methodology calculator (EPA, 2003). The RW FAL will be used for lead. The RW scenario assumes non-continuous work activities at a site and that a worker will be exposed to the site contaminants for up to 336 hr/yr (or 42 days) (NNSA/NSO, 2012b).

The present-day radiological activities were calculated using the standard decay equation; the decay calculations take into account the half-life of the radionuclide and the time since the samples were originally collected. The OU RRMGs are based on the 25-mrem/yr TED constraint, which represents the concentrations in soil for a specific radionuclide that would result in a 25-mrem/yr TED to a receptor for a specific exposure time.

Table 6-1
Sample Results for COCs at CAS 05-33-01 Used To Establish Current UR

Sample ID	Depth (ft bgs)	Lead	RDX	Ac-228	Bi-212	Pb-212	Tl-208	Th-234	U-238
		PAL 750 mg/kg	PAL 16 mg/kg	PAL 5 pCi/g	PAL 5 pCi/g	PAL 5 pCi/g	PAL 5 pCi/g	PAL 63.2 pCi/g	PAL 63.2 pCi/g
204E034	0.0 - 0.5	2,300	--	--	--	--	--	--	--
204E036	0.0 - 0.5	1,300	170	29.1 ± 5.2	27.1 ± 8.2	31.1 ± 5.3	8.3 ± 1.6	--	--
204E037	0.0 - 0.5	1,200	--	--	--	--	--	--	--
204E040	0.0 - 0.5	--	--	--	--	--	--	--	65.6 ± 9.2
204E050	0.0 - 0.5	--	--	--	--	--	--	--	72.5 ± 9.6
204E189	0.0 - 0.5	--	--	--	--	--	--	66.6 ± 8.7	64 ±11 (Y2, M3)
204E190	0.0 - 0.5	--	--	--	--	--	--	67.4 ± 8.4	--
204E212	0.0 - 0.5	--	--	--	--	--	--	--	77 ± 14 (Y2)
204E220	0.0 - 0.5	--	--	--	--	--	--	95 ± 12	87 ± 14 (M3)

MDC = Minimum detectable concentration

M3 = The requested MDC was not met, but the reported activity is greater than the reported MDC.
Y2 = Chemical yield outside default limits.
-- = No detects above action levels.

Because the half-lives of Bi-212, Tl-208, Pb-212, and Th-234 are so short and these radionuclides decay rapidly, the present-day radiological activities for the radionuclides are effectively 0 pCi/g. The radionuclides Th-234 and U-238 are reflective of the same contaminants; therefore, only U-238 had the present-day activities calculated.

The present-day radiological activities, OU RRMGs, and the TED for the U-238 are listed in Table 6-2, which demonstrates that the TED of U-238 is below the 25-mrem/yr TED constraint for the OU exposure scenario. The lead and RDX results and their revised FALs are also listed in Table 6-2, which demonstrates that the lead and RDX results are below their respective FALs.

Table 6-2
Revised FALs, Present-Day Radiological Activities, OU RRMGs, and TED for COCs at CAS 05-33-01

Sample ID	Depth (ft bgs)	Lead	RDX	U-238	TED (mrem/OU-yr)
		RW FAL 8,356 mg/kg	OU FAL 2,960 mg/kg	OU RRMG 31,190 pCi/g	
204E034	0.0 - 0.5	2,300	--	--	N/A
204E036	0.0 - 0.5	1,300	170	--	N/A
204E037	0.0 - 0.5	1,200	--	--	N/A
204E040	0.0 - 0.5	--	--	65.6	0.05
204E050	0.0 - 0.5	--	--	72.5	0.06
204E189	0.0 - 0.5	--	--	64	0.05
204E212	0.0 - 0.5	--	--	77	0.06
204E220	0.0 - 0.5	--	--	87	0.07

N/A = Not applicable

-- = No detects above action levels.

6.5 Proposed Modification

Remove the FFACO UR and postings from this site; discontinue annual inspections; and change to an Administrative UR for lead and RDX. Because the present-day U-238 activity is below the IA PAL of 1,581 pCi/g, the radionuclides (U-238) may be removed from this UR. These modifications will not affect or modify any non-FFACO requirements at this site.

7.0 CAU 261, CAS 25-05-01 – Leachfield

7.1 CAS Description

CAS 25-05-01, Leachfield, is an area with dimensions of approximately 75 by 55 ft and is located south of Building 3124, which is southwest and adjacent to Test Cell A. Test Cell A was operational during the 1960s to test nuclear rocket reactors in support of the Nuclear Rocket Development Station. Various operations within Building 3124, from 1962 through 1972, have resulted in liquid waste releases to the leachfield (DOE/NV, 1998a).

Closure activities included excavating impacted soil near the initial fallout, backfilling the excavation, removing sludge in the leachfield septic tank, and cementing the leachfield septic tank and distribution box. The soil in the leachfield was closed in place, and administrative controls, URs, and postings were implemented to prevent intrusive activities over the leachfield soil (DOE/NV, 2001).

7.2 Current UR Description

The future use of any land related to this CAU is restricted from any DOE or USAF activity that may alter or modify the containment control, as approved by the State of Nevada and identified in the CAU CR or other CAU documentation, unless appropriate concurrence is obtained in advance. Four UR signs were placed at the four corners of the CAS and attached to the fence. Annual inspections of the fencing and postings are required, with maintenance of fencing and signs as needed (DOE/NV, 2001).

7.3 Basis for Current UR

Soil samples were analyzed for the VOCs, SVOCs, TPH-DRO/oil, RCRA metals, PCBs, gamma spectroscopy, Sr-90, isotopic U, isotopic Pu, and isotopic americium (Am). Sludge and liquid samples from the septic tank were analyzed for the above constituents, along with Toxicity Characteristic Leaching Procedure (TCLP) for VOCs, SVOCs, and RCRA metals. The PALs for chemical constituents, radionuclides, and TPH were established in the CAIP and in the *Work Plan for Leachfield Corrective Action Units: Nevada Test Site and Tonopah Test Range, Nevada*

(DOE/NV, 1998a and b). TPH-DRO; the SVOCs B(a)A, BAP, and B(b)F; and the radionuclides Cs-137 and Sr-90 were detected above PALs in the soil samples.

Although chemical and radiological constituents were detected above PALs in the sludge and liquid septic tank samples, the septic tank was emptied and rinsed during closure activities. Therefore, the UR is not based on these samples.

Table 7-1 contains analytical results of all COCs at CAS 25-05-01 that are the basis for the current UR. The sample matrix for all samples is soil.

7.4 Basis for UR Modification

The assumption for this CAS is that the future land use is OU, which assumes non-continuous work activities at a site and that a worker will be exposed to the site contaminants for up to 80 hr/yr for 5 years (NNSA/NSO, 2012b). Revised B(a)A, BAP, and B(b)F FALs were calculated using the OU exposure scenario using the EPA Region 9 RSLs for Chemical Contaminants at Superfund Sites Calculator (EPA, 2013b) and the latest input values (NNSA/NFO, 2013c). The revised FALs associated with the TPH contamination were established based on the PALs of hazardous constituents of TPH-DRO as described in Section 2.2.2. In addition, cumulative effects were examined by conducting a multiple contaminant analysis by summing the ratios of each carcinogenic contaminant concentration to its corresponding FAL for qualifying samples results that exceeded a PAL. Samples collected from CAS 25-05-01 contained contamination exceeding the PAL. The sums of the carcinogenic ratios for all samples collected from this CAS were less than 1.0 and require no further corrective action. No contaminants are present at this site in concentrations exceeding the revised OU FALs.

The present-day Cs-137 and Sr-90 activities were calculated using the standard decay equation; the decay calculations take into account the half-life of the radionuclide and the time since the samples were originally collected. The RRMGs are based on the 25-mrem/yr TED constraint, which represents the concentrations in soil for a specific radionuclide that would result in a 25-mrem/yr TED to a receptor for a specific exposure time.

Table 7-1
Sample Results for COCs at CAS 25-05-01 Used To Establish Current UR

Sample Location	Sample ID	Depth (ft bgs)	TPH-DRO	B(a)A	BAP	B(b)F	Cs-137	Sr-90
			PAL 100 mg/kg	PAL 3.6 mg/kg	PAL 0.36 mg/kg	PAL 3.6 mg/kg	Background Concentration[a] 0.4 - 7.0 pCi/g	Background Concentration[b] 0.01 - 1.17 pCi/g
L-3.3	TCA10030	0.0 - 1.0	--	--	2.4	--	--	--
	TCA10031	2.5 - 3.5	--	--	0.93 (J)	--	--	--
L-3.6	TCA10039	0.0 - 1.0	130 (J)	14 (J)	9.8 (J)	18 (J)	--	--
L-2.1	TCA10045	0.0 - 1.0	--	--	2.2	--	--	--
L-1.4	TCA10068	0.0 - 1.0	--	--	2.3 (J)	--	--	1.55 ± 0.6
L-1.1	TCA10082	0.0 - 1.0	160	23 (J)	17 (J)	26 (J)	--	--
	TCA10083	0.0 - 1.0	170	22 (J)	18 (J)	27 (J)	--	--
IO-3	TCA10099	0.25 - 1.25	--	--	--	--	10.6 ± 1.8	2.34 ± 0.5

[a]Background concentration listed or derived in *Off-Site Radiation Exposure Review Project, Phase II Soils Program* (McArthur and Miller, 1989).
[b]Background concentration listed in *Environmental Monitoring Report for the Proposed Ward Valley California Low-Level Radioactive Waste Facility* (U.S. Ecology and Atlan-Tech, 1991).

J = Estimated value.
-- = No detects above action levels.

The corrective action investigation (CAI) results and revised OU FALs for B(a)A, BAP, and B(b)F are listed in Table 7-2; the present-day radiological activities, OU RRMGs, and TED are also listed. As indicated in Table 7-2, the B(a)A, BAP, and B(b)F results are below the OU FALS, and the TED of the radionuclides is below the 25-mrem/yr TED constraint for the OU exposure scenario.

7.5 Proposed Modification

Remove the FFACO UR and postings from this site; discontinue annual inspections; and change to an Administrative UR for SVOCs. Because the present-day Cs-137 activity is below the IA PAL of 81 pCi/g and the Sr-90 activity is below the IA PAL of 7,847 pCi/g, the radionuclides may be removed from this UR. These modifications will not affect or modify any non-FFACO requirements at this site.

Table 7-2
Revised OU FALs, Present-Day Radiological Activities, OU RRMGs, and TED for COCs at CAS 25-05-01

Sample Location	Sample ID	Depth (ft bgs)	B(a)A	BAP	B(b)F	Cs-137	Sr-90	TED (mrem/OU-yr)
			OU FAL 264 mg/kg	OU FAL 26.4 mg/kg	OU FAL 264 mg/kg	OU RRMG 1,626 pCi/g	OU RRMG 151,400 pCi/g	
L-3.3	TCA10030	0.0 - 1.0	--	2.4	--	--	--	N/A
	TCA10031	2.5 - 3.5	--	0.93 (J)	--	--	--	N/A
L-3.6	TCA10039	0.0 - 1.0	14 (J)	9.8 (J)	18 (J)	--	--	N/A
L-2.1	TCA10045	0.0 - 1.0	--	2.2	--	--	--	N/A
L-1.4	TCA10068	0.0 - 1.0	--	2.3 (J)	--	--	1.2	0.00
L-1.1	TCA10082	0.0 - 1.0	23 (J)	17 (J)	26 (J)	--	--	N/A
	TCA10083	0.0 - 1.0	22 (J)	18 (J)	27 (J)	--	--	N/A
IO-3	TCA10099	0.25 - 1.25	--	--	--	8	1.8	0.12

J = Estimated value.
-- = No detects above action levels.

8.0 CAU 357, CAS 10-09-06 – Mud Pit; Stains; Material

8.1 CAS Description

CAS 10-09-06, Mud Pit; Stains; Material, is a mud pit located east of the U-10am #5 potential crater in Area 10. This mud pit is believed to have supported drilling of the experimental hole U-10am #5 completed on June 21, 1969, and associated with the Tun-D Test conducted on December 10, 1969, and sponsored by Lawrence Livermore National Laboratory. It is assumed that this mud pit was used during the pretest drilling of U-10am #5. The drilling mud and associated constituents are the primary source of potential contamination and were the focus of the CAI. Drilling mud was not consistently present within this mud pit, but a spill area was identified in the northern portion of the mud pit. The spill area appeared to be drilling mud or bentonite/cement grout, and was sampled as part of this investigation. Closure activities at this CAS included removing surface debris, implementing an FFACO UR, and posting UR signs (NNSA/NSO, 2005a).

8.2 Current UR Description

The future use of any land related to this CAU is restricted from any DOE or USAF activity that may alter or modify the containment control, as approved by the State of Nevada and identified in the CAU CR or other CAU documentation, unless appropriate concurrence is obtained in advance. Four UR signs are posted on the fence surrounding the CAS. Annual inspections of the fence and postings are required, with maintenance as needed (NNSA/NSO, 2005a).

8.3 Basis for Current UR

Decision I surface soil samples were analyzed for VOCs, SVOCs, RCRA metals, TPH-DRO, PCBs, gamma spectroscopy, isotopic U, isotopic Pu, and Sr-90. Decision II samples were analyzed only for gamma spectroscopy. Co-60 was the only COC present that exceeded the PAL. The PALs for the radionuclides were based on NCRP Report No. 129 recommended screening limits for construction, commercial, industrial land-use scenarios (NCRP, 1999); the values provided in this source document were scaled to 15-mrem/yr dose. Table 8-1 contains analytical results for Co-60 at CAS 10-09-06 that are the basis for the current UR. The sample matrix for all samples is soil.

Table 8-1
Sample Results for Co-60 at CAS 10-09-06
Used To Establish Current UR

Sample ID	Depth (ft bgs)	Co-60
		PAL 1.61 pCi/g
357K002	0.0 - 0.5	5.04 (G)
357K003	0.0 - 0.5	5.33 (G)
357K004	0.0 - 0.5	4.12 (G)
357K005	0.0 - 0.5	140 (G)
357K006	1.5 - 2.0	2.41 (G)

G = Sample density differs by more than 15% of laboratory control sample density.

8.4 Basis for UR Modification

The assumption for this CAS is that the future land use is OU, which assumes non-continuous work activities at a site and that a worker will be exposed to the site contaminants for up to 80 hr/yr for 5 years (NNSA/NSO, 2012b). The present-day Co-60 activities were calculated using the standard decay equation; the decay calculations take into account the half-life of the radionuclide and the time since the samples were originally collected. The radionuclide RRMG for Co-60 is based on the 25-mrem/yr TED constraint, which represents the concentrations in soil for a specific radionuclide (e.g., Co-60) that would result in a 25-mrem/yr TED to a receptor for a specific exposure time. Table 8-2 presents the present-day Co-60 activities, OU RRMG, and the TED, which indicates that the TED for Co-60 is below the 25-mrem/yr TED constraint for the OU exposure scenario.

8.5 Proposed Modification

Remove the FFACO UR and postings from this CAS; discontinue the annual inspections; and change to an Administrative UR. These modifications will not affect or modify any non-FFACO requirements at this site. Note that the half-life of Co-60 is 5.27 years, and after an additional seven years, the Co-60 activity will be below the IA PAL; therefore, no UR will be required. Administrative controls should be reevaluated after approximately seven years.

Table 8-2
Present-Day Radiological Activities, OU RRMG, and TED
for Co-60 at CAS 10-09-06

Sample ID	Depth (ft bgs)	Co-60	TED (mrem/OU-yr)
		OU RRMG 409 pCi/g	
357K002	0.0 - 0.5	1.8	0.11
357K003	0.0 - 0.5	1.9	0.12
357K004	0.0 - 0.5	1.4	0.09
357K005	0.0 - 0.5	48.9	2.99
357K006	1.5 - 2.0	0.8	0.05

9.0 CAU 528, CAS 25-27-03 – Polychlorinated Biphenyls Surface Contamination

9.1 CAS Description

CAU 528 is located in Area 25 of the NNSS. The CAS consists of the Substation #3 electrical transformer concrete pad and the soil adjacent to Test Cell C (TCC) west to Topopah Wash, and the soil within the fenced area of TCC to the north, east, and south (NNSA/NSO, 2004c). Substation #3 is a former location of three 100 kilovolt-ampere, oil-filled and self-cooling, transformers (NNSA/NSO, 2003a).

Results from the CAI indicated that 12 areas were impacted with TPH or PCBs, or both. The areas were labeled Areas 1 through 12. During closure activities, approximately 9.5 cubic yards of soil impacted with PCBs above the *Toxic Substances Control Act* (TSCA) action level of 25 mg/kg was excavated from Area 7; the concrete pad was removed and disposed of; PCB verification samples were collected; and the excavations were backfilled. The verification sample results indicated that the concentration of PCBs in the remaining soil was below the TSCA action level of 25 mg/kg. UR signs were posted at all areas to warn against intrusive activities if the soils contained concentrations of PCBs above 1 mg/kg and/or TPH above 100 mg/kg (NNSA/NSO, 2006b).

9.2 Current UR Description

The future use of any land related to this CAU is restricted from any DOE or USAF activity that may alter or modify the containment control, as approved by the State of Nevada and identified in the CAU CR or other CAU documentation, unless appropriate concurrence is obtained in advance.

UR warning signs are posted at Areas 1 through 6 and Areas 8 through 12. Area 7 lies within the UR boundary of Area 11. Areas 1, 5, and 6 are use restricted for TPH. Areas 2 and 3 and 7 through 12 are use restricted for PCBs. Area 4 is use restricted for TPH and PCBs. Site monitoring requirements for the UR include annual inspections for the first five years (from 2007 through 2011), then inspections once every five years, beginning in 2016, for a total of 30 years. The inspections consist of visual observations to verify the signs are in good repair and that the UR has been maintained (NNSA/NSO, 2006b).

9.3 Basis for Current UR

Samples from CAS 25-27-03 were analyzed for VOCs, SVOCs, RCRA metals, beryllium, TPH-DRO, TPH-GRO, PCBs, gamma spectroscopy, isotopic U, and Sr-90. Not all samples were analyzed for the full suite. The PALs were not exceeded in any of the soil samples except for TPH-DRO and PCBs; Aroclor 1260 was the only PCB detected in the soil samples. Tier 2 evaluations were not performed for the TPH-DRO.

Table 9-1 contains TPH-DRO and Aroclor 1260 analytical results at CAS 25-27-03 that are the basis for the current UR. The sample matrix for all samples is soil.

Table 9-1
Sample Results for COCs at CAS 25-27-03 Used To Establish Current UR
(Page 1 of 2)

Sample Location	Sample ID	Depth (ft bgs)	TPH-DRO	Aroclor 1260
			PAL 100 mg/kg	PAL 0.74 mg/kg
A02	528A004	0.0 - 0.5	130 (H, Z)	--
A03	528A002RR1	0.0 - 0.5	--	4.7 (J)[a]
A07	528A003	0.0 - 0.5	330 (H, Z)	--
	528A003RR1	0.0 - 0.5	--	1.2 (J)[a]
A09	528A040	0.0 - 0.5	270 (H, Z)	--
A11	528A006RR1	0.0 - 0.5	--	1.1 (J)[a]
A15	528A015	0.0 - 0.5	160 (H, Z)	--
A20	528A017RR1	0.0 - 0.5	--	2.0 (J)[a]
A22	528A032RR1	0.0 - 0.5	--	7.5 (J)[a]
A25	528A019	0.0 - 0.5	220 (H, Z)	--
A36	528A023	0.0 - 0.5	--	1.3 (J)[a]
A39	528A007	0.0 - 0.5	--	16.0 (J)[a]
	528A196	1.0 - 2.0	--	2.1 (J)[a]
A40	528A010RR1	0.0 - 0.5	--	0.99 (J)[a]
A41	528A008RR1	0.0 - 0.5	--	0.99 (J)[a]
A62	528A213RR1	0.0 - 0.5	--	9.7 (J)[a]
A66	528A107	0.0 - 0.5	--	30.0 (J)[a]
	528A114	1.0 - 2.0	--	2.4 (J)[a]

Table 9-1
Sample Results for COCs at CAS 25-27-03 Used To Establish Current UR
(Page 2 of 2)

Sample Location	Sample ID	Depth (ft bgs)	TPH-DRO	Aroclor 1260
			PAL 100 mg/kg	PAL 0.74 mg/kg
A67	528A108	0.0 - 0.5	--	1.4 (J)[a]
	528A115	1.0 - 2.0	--	2.6 (J)[a]
A68	528A109	0.0 - 0.5	--	1.5 (J)[a]
A69	528A110	0.0 - 0.5	--	2.3 (J)[a]
	528A111	0.0 - 0.5	--	1.6 (J)[a]
A70	528A112	0.0 - 0.5	--	9.7 (J)[a]
	528A124	1.0 - 2.0	--	3.9 (J)[a]
A71	528A113	0.0 - 0.5	--	1.8 (J)[a]
A72	528A116	0.0 - 0.5	--	0.84 (J)[a]
A74	528A118	0.0 - 0.5	--	1.3 (J)[a]
A75	528A121	0.0 - 0.5	--	2.2 (J)[a]
A79	528A126	0.0 - 0.5	--	0.78
A81	528A130	0.0 - 0.5	--	0.79
A82	528A131	0.0 - 0.5	--	2.1 (J)[a]
A88	528A137	0.0 - 0.5	--	1.1 (J)[a]
	528A186	1.0 - 2.0	--	0.82 (J)[a]
A89	528A138	0.0 - 0.5	--	0.89
A92	528A142	0.0 - 0.5	--	1.9 (J)[a]
A94	528A145	0.0 - 0.5	--	1.1 (J)[a]
	528A146	0.0 - 0.5	--	1.2 (J)[a]
A95	528A147	0.0 - 0.5	--	3.4 (J)[a]
A115	528A248RR1	0.0 - 0.5	--	1.7 (J)[a]

[a]Qualifier added to laboratory data; record accepted. Surrogates diluted out.

H = Fuel pattern was in the heavier end of the retention time window for the analyte of interest.
Z = A significant fraction of the reported result did not resemble the patterns of the following petroleum hydrocarbon products: gasoline, JP-4, JP-8, diesel, mineral spirits, motor oil, Stoddard solvent, and Bunker C.
J = Estimated value.
-- = No detects above original action levels.

9.4 Basis for UR Modification

The assumption for this CAS is that the future land use is OU, which assumes non-continuous work activities at a site and that a worker will be exposed to the site contaminants for up to 80 hr/yr for 5 years (NNSA/NSO, 2012b). Revised FALs were calculated for Aroclor 1260 using the EPA Region 9 RSLs for Chemical Contaminants at Superfund Sites Calculator (EPA, 2013b) and latest input values (NNSA/NFO, 2013c).

The CAI results and revised Aroclor 1260 FAL are listed in Table 9-2, which demonstrates that none of the results exceed the revised Aroclor 1260 FAL, based on an OU land-use scenario.

Table 9-2
Revised OU FAL for Aroclor 1260 at CAS 25-27-03
(Page 1 of 2)

Sample Location	Sample ID	Depth (ft bgs)	Aroclor 1260
			OU FAL 93 mg/kg
A03	528A002RR1	0.0 - 0.5	4.7 (J)[a]
A07	528A003RR1	0.0 - 0.5	1.2 (J)[a]
A11	528A006RR1	0.0 - 0.5	1.1 (J)[a]
A20	528A017RR1	0.0 - 0.5	2.0 (J)[a]
A22	528A032RR1	0.0 - 0.5	7.5 (J)[a]
A36	528A023	0.0 - 0.5	1.3 (J)[a]
A39	528A007	0.0 - 0.5	16.0 (J)[a]
	528A196	1.0 - 2.0	2.1 (J)[a]
A40	528A010RR1	0.0 - 0.5	0.99 (J)[a]
A41	528A008RR1	0.0 - 0.5	0.99 (J)[a]
A62	528A213RR1	0.0 - 0.5	9.7 (J)[a]
A66	528A107	0.0 - 0.5	30.0 (J)[a]
	528A114	1.0 - 2.0	2.4 (J)[a]
A67	528A108	0.0 - 0.5	1.4 (J)[a]
	528A115	1.0 - 2.0	2.6 (J)[a]
A68	528A109	0.0 - 0.5	1.5 (J)[a]
A69	528A110	0.0 - 0.5	2.3 (J)[a]
	528A111	0.0 - 0.5	1.6 (J)[a]

Table 9-2
Revised OU FAL for Aroclor 1260 at CAS 25-27-03
(Page 2 of 2)

Sample Location	Sample ID	Depth (ft bgs)	Aroclor 1260
			OU FAL 93 mg/kg
A70	528A112	0.0 - 0.5	9.7 (J)[a]
	528A124	1.0 - 2.0	3.9 (J)[a]
A71	528A113	0.0 - 0.5	1.8 (J)[a]
A72	528A116	0.0 - 0.5	0.84 (J)[a]
A74	528A118	0.0 - 0.5	1.3 (J)[a]
A75	528A121	0.0 - 0.5	2.2 (J)[a]
A79	528A126	0.0 - 0.5	0.78
A81	528A130	0.0 - 0.5	0.79
A82	528A131	0.0 - 0.5	2.1 (J)[a]
A88	528A137	0.0 - 0.5	1.1 (J)[a]
	528A186	1.0 - 2.0	0.82 (J)[a]
A89	528A138	0.0 - 0.5	0.89
A92	528A142	0.0 - 0.5	1.9 (J)[a]
A94	528A145	0.0 - 0.5	1.1 (J)[a]
	528A146	0.0 - 0.5	1.2 (J)[a]
A95	528A147	0.0 - 0.5	3.4 (J)[a]
A115	528A248RR1	0.0 - 0.5	1.7 (J)[a]

[a]Qualifier added to laboratory data; record accepted. Surrogates diluted out.

J = Estimated value.

Area 4 was initially sampled for the full suite of analytes, including PCBs, TPH-DRO, TPH-GRO, VOCs, and SVOCs. The highest concentration of TPH-DRO was at the Decision I sample location; at this location, no VOCs or SVOCs concentrations exceeded the PALs. Hazardous constituents of TPH-DRO and TPH-GRO were not detected in any of the samples at concentrations greater than their respective PALs (NNSA/NSO, 2004c); therefore, no VOCs or SVOCs are present at Area 4 in concentrations exceeding the FALs.

The samples collected at Areas 1, 5, and 6 were analyzed only for TPH-DRO and TPH-GRO; there were no samples collected and analyzed for VOCs and SVOCs. There are no Tier 2 FALs for TPH, and total TPH concentrations are not to be used for risk-based decisions under Tier 2 or Tier 3. Rather, the individual hazardous constituents of TPH are compared to the SSTLs, however, there were no VOC or SVOC results to compare to PALs or to conduct Tier 2 evaluations.

In July 2013, samples were collected at Areas 1, 5, and 6 at the previous sample locations and depths which had the highest TPH-DRO concentrations. These samples were analyzed for TPH-DRO, VOCs, and SVOCs. The TPH-DRO concentrations ranged from 2 to 6.6 mg/kg. The VOC and SVOC concentrations were compared to the IA EPA RSLs; the results did not exceed the RSLs, and the FALs were established at the PAL concentrations. Therefore, there are no VOCs or SVOCs present in the soil at Areas 1, 5, and 6 in concentrations exceeding the FALs.

9.5 Proposed Modification

For all PCB use restricted areas, change the FFACO UR to an Administrative UR, and remove signs and inspection requirements.

Remove the TPH FFACO UR at Area 4; change the PCB FFACO UR to an Administrative UR; and remove signs and inspection requirements.

Remove the TPH FFACO URs at Areas 1, 5, and 6; and remove signs and inspection requirements.

These modifications will not affect or modify any non-FFACO requirements at this site.

10.0 CAU 529, CAS 25-23-17 – Contaminated Wash (Parcel E)

10.1 CAS Description

CAS 25-23-17, Contaminated Wash, is the only CAS in CAU 529 and is located in Area 25 of the NNSS. The CAS was divided into nine parcels because of the large area impacted by past operations and the complexity of the source areas. The CAS was subdivided into separate parcels based on separate and distinct releases as determined and approved in the DQO process and CAIP (NNSA/NSO, 2003b).

Parcel E, buried contaminated soil area 2, is located on the eastern bank of Topopah Wash in the northeastern portion of CAS 25-23-17 and is well outside the boundary of the 100-year floodplain for Topopah Wash. This parcel consists of a former natural drainage located northwest of TCC and is the suspected burial site for contaminated surface soil associated with Phoebus 1A Test decontamination activities. Contaminated soil adjacent to the concrete pad at TCC was reportedly removed with a front-end loader and pushed into a gully northwest of TCC. Available information did not reveal the exact location of the gully, or indicate that the soil was removed at a later date or covered with clean soil; however, it is expected that the area was covered with a clean layer of soil to prevent wind erosion (NNSA/NSO, 2004a).

During closure activities, a wire fence was installed around the entire area of Cs-137 contamination exceeding the PAL at Parcel E, and UR signs were posted to provide additional measures to address site containment (NNSA/NSO, 2004a).

10.2 Current UR Description

The future use of any land related to this CAU is restricted from any DOE or U.S. Department of Defense (DoD) activity that may alter or modify the containment control as approved by the State of Nevada and identified in the CAU CR or other CAU documentation unless appropriate concurrence is obtained in advance.

Four UR signs were placed on each side of the fence bordering the CAS. The post-closure inspections of the Parcel E UR consist of annual visual inspections. Visual inspections of the wire fence, T-posts,

and signage are conducted to verify that they are intact, undisturbed, and in good condition, with maintenance as needed (NNSA/NSO, 2004a).

10.3 Basis for Current UR

Most samples were analyzed for gamma spectroscopy, while six select samples were analyzed for PCBs, beryllium, gamma spectroscopy, isotopic U, and Sr-90. Only the radionuclide Cs-137 exceeded the PAL. The PALs for all radioisotopes, except those covered by DOE Order 5400.5 (DOE, 1993), were derived from the construction, commercial, industrial land-use scenario in Table 2.1 of the NCRP Report No. 129 (NCRP, 1999). The values provided in this source document are based on a 25-mrem/yr dose but were scaled to a 15-mrem/yr dose for this CAI. Table 10-1 contains analytical results for Cs-137 at CAS 25-23-17 (Parcel E) that are the basis for the current UR. The sample matrix for all samples is soil.

Table 10-1
Sample Results for Cs-137 at CAS 25-23-17 (Parcel E)
Used To Establish Current UR

Sample ID	Depth (ft bgs)	Cs-137
		PAL 7.3 pCi/g
529E004	3.0 - 4.0	42.8
529E022	6.0 - 7.0	26.6 (J)[a]
529E016	6.0 - 7.0	306 (J)[a]

[a]Qualifier added to laboratory data; record accepted. Duplicate precision analysis (relative percent difference) outside control limits.

J = Estimated value.

10.4 Basis for UR Modification

The assumption for this CAS is that future land use is OU. The present-day Cs-137 activity was calculated using the standard decay equation; the decay calculations take into account the half-life of the radionuclide and the time since the samples were originally collected. The revised RRMG is based on the 25-mrem/yr TED constraint, which represents the concentrations in soil for a specific radionuclide (e.g., Cs-137) that would result in a 25-mrem/yr TED to a receptor for a specific

exposure time. The present-day Cs-137 activities, OU RRMG, and TED are listed in Table 10-2, which demonstrates that the TED of Cs-137 is below the 25-mrem/yr TED constraint for the OU exposure scenario.

Table 10-2
Present-Day Radiological Activities, OU RRMG, and TED
for Cs-137 at CAS 25-23-17 (Parcel E)

Sample ID	Depth (ft bgs)	Cs-137	TED (mrem/OU-yr)
		OU RRMG 1,626 pCi/g	
529E004	3.0 - 4.0	35.6	0.55
529E022	6.0 - 7.0	22.1	0.34
529E016	6.0 - 7.0	254.4	3.91

10.5 Proposed Modification

Remove the FFACO UR and postings, and annual inspection and maintenance requirements from this site; and change to Administrative UR. These modifications will not affect or modify any non-FFACO requirements at this site. Note that after approximately 50 years, the Cs-137 activity will be below the IA PAL.

11.0 CAU 543, CAS 06-07-01 – Decon Pad

11.1 CAS Description

CAS 06-07-01, Decon Pad, is located at the Decontamination Facility in Area 6. The CAS consists of the effluent collection and distribution systems for Buildings 6-605, 6-606, and 6-607, which include two 1,000-gallon (gal) septic tanks, two ground-level sumps and associated piping, the concrete foundation of Building 6-605, floor drains, drain trenches, and cleanouts.

The Area 6 Decontamination Facility was built in 1971 and was designed to decontaminate vehicles, equipment, and clothing that had become radiologically contaminated during nuclear testing activities. Additionally, the facility managed mixed and radioactive waste generated from these decontamination processes. The Area 6 Decontamination Facility is located along the southwest edge of Yucca Lake in Area 6 of the NNSS. From 1971 through 1992, hazardous, radioactive, and sanitary wastes were generated within several buildings and originally discharged via process waste lines, septic systems, and sumps to the Area 6 Decontamination Pond. The Area 6 Decontamination Facility remained operational until 2001, and is currently inactive and abandoned. Additionally, a portion of the facility yard was used as a contaminated materials storage area where equipment and materials awaited decontamination. As a result, portions of the facility yard are posted as "Contamination Areas" (NNSA/NSO, 2004d).

During closure activities, the use-restricted area was fenced and posted, and a UR was implemented for PCBs and radioactivity. As best management practices (BMPs), two septic tanks, two sumps, and their contents were removed and disposed of as mixed waste; sediment from the Building 6-605 floor drain trenches was removed and disposed of as mixed waste; the floor drain trenches, a diversion box, and seven cleanouts were grouted to grade; and numerous containers and other surface debris were segregated according to waste stream and disposed of appropriately as either low-level waste or sanitary waste (NNSA/NSO, 2008).

11.2 Current UR Description

The future use of any land related to this CAU is restricted from any DOE or USAF activity that may alter or modify the containment control as approved by the State of Nevada and identified in the

CAU CR or other CAU documentation unless appropriate concurrence is obtained in advance. Nine UR warning signs were placed around the fence enclosing the UR. Annual inspections are required at CAS 06-07-01 and consist of visual inspections of the fencing and postings to verify that the fence is in good condition, that the postings are in place and readable, and that the UR is maintained (NNSA/NSO, 2008).

11.3 Basis for Current UR

Decision I environmental sampling activities included the collection of random and biased surface and subsurface soil samples surrounding the septic system components, the Building 6-605 concrete foundation, and the storage yard at this CAS. Samples were analyzed for VOCs, SVOCs, RCRA metals, beryllium, TPH-DRO and TPH-GRO, PCBs, gamma spectroscopy, isotopic U, isotopic Pu, Sr-90, and pesticides.

Only Aroclor 1254 and Aroclor 1260 contamination exceeded the PALs of 0.74 mg/kg (NNSA/NSO, 2005c). No VOCs, SVOCs, TPH-GRO, RCRA metals, or beryllium were detected above PALs. Although TPH-DRO results exceeded the action level of 100 mg/kg, the individual VOC and SVOC constituents of TPH-DRO did not exceed their respective FALs; therefore, TPH-DRO was not considered a COC. Although the pesticide dieldrin and the radionuclide Cs-137 exceeded their PALs, a Tier 2 evaluation was conducted, and dieldrin and Cs-137 did not exceed the site-specific FALs. Therefore, dieldrin and Cs-137 are not considered COCs.

Table 11-1 contains analytical results of all COCs at CAS 06-07-01 that are the basis for the current UR. The sample matrix for all samples is soil.

11.4 Basis for UR Modification

The assumption for this CAS is that the future land use is OU, which assumes non-continuous work activities at a site and that a worker will be exposed to site contaminants for up to 80 hr/yr for 5 years (NNSA/NSO, 2012b). Revised FALs were calculated for Aroclor 1254 and Aroclor 1260 using the OU exposure scenario using the EPA Region 9 RSLs for Chemical Contaminants at Superfund Sites Calculator (EPA, 2013b) and the latest input values (NNSA/NFO, 2013c). Table 11-2 presents the sample results that are the basis for the current UR and demonstrate that Aroclor 1254 and Aroclor 1260 results do not exceed the revised OU FALs.

Table 11-1
Sample Results for PCBs at CAS 06-07-01 Used To Establish Current UR

Sample Location	Sample ID	Sample Depth (ft bgs)	Aroclor 1254	Aroclor 1260
			PAL 0.74 mg/kg	PAL 0.74 mg/kg
A05	543A005	0.0 - 0.5	--	0.84
A10	543A010	0.0 - 0.5	--	0.75
A60	543A041	0.0 - 0.5	--	0.80
	543A042	0.0 - 0.5	--	0.80
A60A	534A058	0.0 - 0.5	--	1.7
A60B	534A059	0.0 - 0.5	0.86	2.6
A60C	543A060	0.0 - 0.5	0.86	5.6
A61	543A004	0.0 - 0.5	2.5	3.4
A61A	543A050	0.0 - 0.5	1.8	1.9
A61B	534A051	0.0 - 0.5	2.8	2.4
A62	543A045	0.0 - 0.5	--	6.7
A62C	543A054	0.0 - 0.5	--	3.1
	543A055	0.0 - 0.5	--	2.4
A63	543A046	0.0 - 0.5	--	5.7
A63B	543A048	0.0 - 0.5	--	3.2
A63C	543A049	0.0 - 0.5	--	1.0
A72	543A029	0.0 - 0.5	1.8 (J)[a]	4.6 (J)[a]
A72A	543A033	0.0 - 0.5	--	2.2 (J)[a]
	543A068	2.0 - 2.5	--	1.0
A72D	543A061	0.0 - 0.5	--	4.1
A73	543A030	N/A	--	0.85
A73A	543A057	3.3 - 4.0	--	1.2

[a]Qualifier added to laboratory data; record accepted. Surrogates diluted out.

J = Estimated value.
-- = No detects above original action levels.

11.5 Proposed Modification

Remove the FFACO UR and postings, and annual inspection requirements from this site; and change to an Administrative UR. These modifications will not affect or modify any non-FFACO requirements at this site.

Table 11-2
Revised OU FALs for PCBs at CAS 06-07-01

Sample Location	Sample ID	Sample Depth (ft bgs)	Aroclor 1254	Aroclor 1260
			OU FAL 93 mg/kg	OU FAL 93 mg/kg
A05	543A005	0.0 - 0.5	--	0.84
A10	543A010	0.0 - 0.5	--	0.75
A60	543A041	0.0 - 0.5	--	0.80
	543A042	0.0 - 0.5	--	0.80
A60A	534A058	0.0 - 0.5	--	1.7
A60B	534A059	0.0 - 0.5	0.86	2.6
A60C	543A060	0.0 - 0.5	0.86	5.6
A61	543A004	0.0 - 0.5	2.5	3.4
A61A	543A050	0.0 - 0.5	1.8	1.9
A61B	534A051	0.0 - 0.5	2.8	2.4
A62	543A045	0.0 - 0.5	--	6.7
A62C	543A054	0.0 - 0.5	--	3.1
	543A055	0.0 - 0.5	--	2.4
A63	543A046	0.0 - 0.5	--	5.7
A63B	543A048	0.0 - 0.5	--	3.2
A63C	543A049	0.0 - 0.5	--	1.0
A72	543A029	0.0 - 0.5	1.8 (J)[a]	4.6 (J)[a]
A72A	543A033	0.0 - 0.5	--	2.2 (J)[a]
	543A068	2.0 - 2.5	--	1.0
A72D	543A061	0.0 - 0.5	--	4.1
A73	543A030	N/A	--	0.85
A73A	543A057	3.3 - 4.0	--	1.2

[a]Qualifier added to laboratory data; record accepted. Surrogates diluted out.

J = Estimated value.
-- = No detects above original action levels.

12.0 CAU 543, CAS 15-23-03 – Contaminated Sump, Piping

12.1 CAS Description

CAS 15-23-03, Contaminated Sump, Piping, is located approximately 875 ft south of the Building 15-06 foundation at the EPA Farm. The EPA Farm was constructed in Area 15 of the NNSS as a fully functional dairy to support various studies including the transport of radioiodine from the environment to man, the uptake by plants of long-lived fission products, and metabolism studies. This CAS consists of a sump measuring approximately 25 by 25 by 6 ft deep, with concrete sides and an unlined bottom and approximately 60 ft of associated piping to the distribution box north of the sump. The sump and piping were installed in 1972 to accept nonradioactive or low-level radioactive wastes from the metabolism and slaughter rooms inside Laboratory Building 15-06; CAS 15-23-03 received effluents from the Laboratory Building (NNSA/NSO, 2004d).

Video surveys were conducted inside approximately 60 ft of piping leading from the distribution box to the sump to identify any breaches or residual material in the piping, and to verify the presence and extent of piping. No breaches or residual material were identified in the piping (NNSA/NSO, 2005c); therefore, the piping was left in place during closure activities. Closure activities at the CAS included removing and disposing of miscellaneous debris, filling the sump with native soil and compacting the soil, and posting UR signs around the perimeter of the sump (NNSA/NSO, 2008).

12.2 Current UR Description

The future use of any land related to this CAU is restricted from any DOE or USAF activity that may alter or modify the containment control, as approved by the State of Nevada and identified in the CAU CR or other CAU documentation, unless appropriate concurrence is obtained in advance. The UR applies to the sump and underground piping between the sump and former location of a distribution box. The UR applies to PCB and radiological contamination of the sump and underground piping. Five UR signs and four underground radioactive material area signs were placed around the perimeter of the sump on posts adjacent to the existing fence. Fencing is not required for this UR, but annual inspections are required to ensure the UR signs are intact and legible (NNSA/NSO, 2008).

12.3 Basis for Current UR

A total of 14 soil samples were collected and submitted for laboratory analysis. Samples were analyzed for VOCs, SVOCs, RCRA metals, beryllium, TPH-DRO, TPH-GRO, PCBs, gamma spectroscopy, isotopic U, isotopic Pu, Sr-90, pesticides, and herbicides. Only Aroclor 1248, Aroclor 1260, and Pu-238 exceeded the PALs. The PALs for the PCBs were established in the EPA Region 9 Risk-Based PRGs for chemical constituents in industrial soils (EPA, 2002). The PALs for the radionuclides were established in the CAIP Record of Technical Change CAIP-2 (NNSA/NSO, 2005e) and are based on NCRP 25-mrem/yr dose-based levels (NCRP, 1999) and the recommended levels for certain radionuclide in DOE Order 5400.5 (DOE, 1993).

Table 12-1 contains analytical results of all COCs at CAS 15-23-03 that are the basis for the current UR. The sample matrix for all samples is soil.

Table 12-1
Sample Results for COCs at CAS 15-23-03 Used To Establish Current UR

Sample ID	Sample Depth (ft bgs)	Aroclor 1248	Aroclor 1260	Pu-238
		PAL 0.74 mg/kg	PAL 0.74 mg/kg	PAL 13.0 pCi/g
543G001	0.0 - 1.0	1.1	1.2	--
543G004	0.0 - 0.5	--	--	8,800 (M3)

M3 = The requested MDC was not met, but the report activity is greater than the reported MDC.
-- = No detects above action levels.

12.4 Basis for UR Modification

The assumption for this CAS is that the future land use is OU, which assumes non-continuous work activities at a site and that a worker will be exposed to the site contaminants for up to 80 hr/yr for 5 years (NNSA/NSO, 2012b). Revised FALs were calculated for the Aroclor 1248 and Aroclor 1260 using the OU exposure scenario using the EPA Region 9 RSLs for Chemical Contaminants at Superfund Sites Calculator (EPA, 2013b) and the latest input values (NNSA/NFO, 2013c).

The present-day Pu-238 activity was calculated using the standard decay equation which takes into account the half-life of the radionuclide and the time since the samples were originally collected. The revised RRMG are based on the 25-mrem/yr TED constraint. As indicated in Table 12-2, the Aroclor 1248 and Aroclor 1260 results are below the OU FALs, and the TED of Pu-238 is below the 25-mrem/yr TED constraint for the OU exposure scenario.

Table 12-2
Revised OU FALs, Present-Day Radiological Activities, OU RRMG, and TED for COCs at CAS 15-23-03

Sample ID	Sample Depth (ft bgs)	Aroclor 1248	Aroclor 1260	Pu-238	TED (mrem/OU-yr)
		OU FAL 93 mg/kg	OU FAL 93 mg/kg	OU RRMG 74,940 pCi/g	
543G001	0.0 - 1.0	1.1	1.2	--	N/A
543G004	0.0 - 0.5	--	--	8,459.1	2.82

-- = No detects above action levels.

12.5 Proposed Modification

Remove the FFACO UR, postings, and annual inspection requirements from this site; and change to an Administrative UR. These modifications will not affect or modify any non-FFACO requirements at this site.

13.0 CAU 554, CAS 23-02-08 – USTs 23-115-1,2,3/ Spill 530-90-002

13.1 CAS Description

CAS 23-02-08 is located in Area 23 of the NNSS and comprises one or more fuel oil release(s) from former USTs to the ground surface and/or surrounding shallow subsurface soils. The USTs were located off the northwest corner of Building 115, which was the Mercury Steam Plant. Two of the three former USTs were 15,000-gal capacity tanks and were installed in 1951 with the construction of the Steam Plant. These tanks were removed in December 1977 and replaced with similar sized tanks in January 1978. The third tank was a 10,000-gal capacity and was installed in 1965 during construction of the western addition to the Steam Plant. In 1983, all tank operations were discontinued at Building 115 when the Steam Plant was taken out of operation. All three tanks and associated piping were removed in December 1989, and the excavation was backfilled in March 1990. Building 115 and the surrounding components were demolished and removed in 2003 (NNSA/NSO, 2004e). The building pad and CAS 23-02-08 are located on a lot between Tumbler Avenue to the north and Ranger Avenue to the south, and are bordered by a pedestrian sidewalk and Snapper Road to the west (NNSA/NSO, 2005b).

13.2 Current UR Description

The future use of any land related to this CAU is restricted from any DOE or USAF activity that may alter or modify the containment control as approved by the State of Nevada and identified in the CAU CR or other CAU documentation unless appropriate concurrence is obtained in advance. The UR was put into place as a BMP and is for unauthorized intrusive activities below 10 ft. Six UR signs were placed around the boundary of the CAS; no fencing is required per the UR paperwork. Site monitoring requirements for the UR include annual visual inspections of UR signs (NNSA/NSO, 2005b).

13.3 Basis for Current UR

Soil samples from 10 boreholes were collected at CAS 23-02-08 and were submitted for laboratory analysis. Most environmental samples were analyzed for VOCs, SVOCs, RCRA metals, TPH-DRO,

TPH-GRO, PCBs, and gamma spectroscopy. Certain environmental samples were also analyzed for a modified suite consisting of VOCs, SVOCs, and TPH-DRO.

The soil samples results for TPH-DRO and TPH-GRO exceeded the NDEP action level of 100 mg/kg. The concentrations of the VOC trichloroethene (TCE), and the SVOCs BAP and dibenzo(a,h)anthracene (DBA) exceeded the PALs. There were no other contaminants with soil concentrations greater than the PALs. A Tier 2 evaluation was completed for BAP, DBA, TCE, and hazardous constituents of diesel, and Tier 2 site-specific FALs were established. The concentrations of BAP, DBA, TCE, and the hazardous constituents of diesel were below the FALs; therefore, these analytes were not considered COCs at this CAS.

Although TPH-GRO was detected in two samples, based on inspection of the sample chromatograms, it appeared that TPH-GRO was not present in the samples. The TPH-DRO concentrations in these samples were high enough to cause the earlier eluting components of diesel to be quantitated at TPH-GRO. Diesel has earlier eluting components and at high concentrations can give a "false positive" for TPH-GRO. Therefore, TPH-GRO was not considered a COC at this CAS (NNSA/NSO, 2005b).

Table 13-1 contains analytical results of all COCs at CAS 23-02-08 that are the basis for the current UR. The sample matrix for all samples is soil.

13.4 Basis for UR Modification

Samples from CAS 23-02-08 contained contamination exceeding the PAL. The sums of the carcinogenic ratios for all but one sample collected from this CAS were less than 1.0 and require no further corrective action. The sum of the carcinogenic ratios for one sample collected from this CAS was slightly greater than 1.0, indicating the need for corrective action. However, this sample was collected from a depth of 380 ft bgs. The risk associated with this contamination is limited to a receptor being exposed to media 380 ft bgs. This could only occur through significant drilling activity. As this does not present a risk to any potential receptor under current or foreseeable land use at this site, and as such an activity would be restricted under an Administrative UR, the downgrade of the FFACO UR to an Administrative UR will provide the protection to inadvertent exposure to this deep subsurface contamination.

Table 13-1
Sample Results for COCs at CAS 23-02-08 Used To Establish Current UR

Sample Location[a]	Sample ID	Sample Depth (ft bgs)	TPH-GRO	TPH-DRO
			PAL 100 mg/kg	PAL 100 mg/kg
A01	554A002	14.0 - 15.0	--	5,800 (J)[b]
	554A003	14.0 - 15.0	--	6,100 (J)[b]
	554A005	150.0 - 151.0	--	16,000 (J)[b]
	554A009	198.0 - 199.0	--	8,100 (J)[b]
	554A011	240.0 - 241.0	--	16,000 (J)[b]
	554A012	290.0 - 291.0	--	7,200 (J)[b]
	554A013	310.0 - 311.0	120	7,000 (J)[b]
	554A014	340.0 - 342.0	240	9,300 (J)[b]
	554A015	380.0 - 382.0	--	26,000 (J)[b]
A04	554A021	99.0 - 100.0	--	16,000 (J)[b]
	554A04109	108.0 - 109.0	--	23,000 (J)[b]
	554A04149	148.0 - 149.0	--	6,300
	554A04199	198.0 - 199.0	--	3,200 (J)[b]
	554A04200	198.0 - 199.0	--	3,800 (J)[b]
	554A04249	248.0 - 249.0	--	2,400
A07	554A07301	300.0 - 301.0	--	150

[a]Sample location indicates different boreholes.
[b]Qualifier added to laboratory data; record accepted. Surrogate diluted out.

J = Estimated value.
-- = No detects above original action levels.

13.5 Proposed Modification

Although one sample indicates the need for corrective action, this sample was collected at 380 ft bgs and does not present a risk to any potential receptor under current or foreseeable land use at this site. An Administrative UR will protect site workers from inadvertent exposure to deep subsurface contamination and will prevent future, more intensive use of the area. Therefore, remove the FFACO UR and associated postings; discontinue the annual inspections and maintenance requirements; and change to an Administrative UR. These modifications will not affect or modify any non-FFACO requirements at this site.

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Appendix A

Nevada Division of Environmental Protection Comments

(2 Pages)

ndep NEVADA DIVISION OF ENVIRONMENTAL PROTECTION
protecting the future for generations

STATE OF NEVADA
Department of Conservation & Natural Resources
DIVISION OF ENVIRONMENTAL PROTECTION

Brian Sandoval, Governor
Leo M. Drozdoff, P.E., Director
Colleen Cripps, Ph.D., Administrator

September 30, 2013

Robert F. Boehlecke, Manager
Environmental Management Operations
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RE: Review of Final Recommendations and Justifications for Modifications to Downgrade Use Restrictions Established Under the U.S. Department of Energy, National Nuclear Security Administration, Nevada Field Office, *Federal Facility Agreement and Consent Order*, Revision 0, August 2013

Dear Mr. Boehlecke,

The Nevada Division of Environmental Protection, Bureau of Federal Facilities (NDEP) staff has received and reviewed the above-referenced final document. NDEP's review of this document has indicated several major concerns and comments as noted below. These concerns/comments should be addressed in Revision 1 of the above-referenced document.

- Because of the impact of the recent heavy rain events, and taking into consideration the limited site characterization and potential for release based upon extreme topography and lack of site stabilization at CAU 383, NDEP perceives the proposed UR downgrade of the three CASs, based upon changing the land use scenario and resulting in the discontinuation of annual inspections, as being less protective of human health and the environment when compared to the status quo. As such, NDEP does not approve of the downgrade request for this particular CAU.

- In Section 2.0 of the document, an overview map showing CAU locations of the proposed downgrades would be helpful.

- In Section 2.0, page 2, paragraph 3: Can the data used originally to establish URs be representatively utilized as input to RBCA model? For example, these downgrades are almost entirely (except e.g., CAS 07-23-02) based on predicted and not measured radiological activity and many of the original sample values were estimated. Also, is the UR downgrade process subject to existing QA requirements for the Soils Activity? Please provide a brief data quality assessment for the UR downgrade 'process'.

- In Section 2.1, page 3, Table 2-1: NDEP suggests the addition of two columns to the table summarizing details for each CAU; the date the original UR was implemented, and; the basis for modification (brief).
- In Section 2.2.2, page 9, paragraph 2: NDEP suggests the addition of a sentence(s) clarifying acceptable exposure levels when one or more VOC and SVOC analyte results are above PALs.

- In section 4.4, page 17, Table 4-3: In the column TED vs. Pu-239 for Sample ID 137E043, the stated value 23.38 mrem/IA-yr is only 1.72 mrem lower than the TED constraint. What is the accuracy and error of the measurement method?

If you have any questions regarding this matter contact me at (702) 486-2850 ext. 233.

Sincerely,

/s/ Jeff MacDougall

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