ATTACHMENT 1

FLUID MANAGEMENT PLAN FOR THE UNDERGROUND TEST AREA PROJECT

U.S. Department of Energy
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Nevada Site Office
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FLUID MANAGEMENT PLAN FOR THE UNDERGROUND TEST AREA PROJECT

Approved by: /s/ Wilhelm R. Wilborn Date: 5/20/2009

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List of Acronyms and Abbreviations

BoFF	Bureau of Federal Facilities
CAIP	Corrective action investigation plan
CAU	Corrective action unit
CFR	*Code of Federal Regulations*
DOE	U.S. Department of Energy
ERP	Environmental Restoration Project
FFACO	*Federal Facility Agreement and Consent Order*
FMP	Fluid Management Plan
HNO_3	Nitric acid
L	Liter
MCL	Maximum contaminant level
mL	Milliliter
mg/L	Milligrams per liter
N/A	Not applicable
NDEP	Nevada Division of Environmental Protection
NNSA/NSO	U.S. Department of Energy, National Nuclear Security Administration Nevada Site Office
NTS	Nevada Test Site
pCi/L	Picocuries per liter
RCRA	*Resource Conservation and Recovery Act*
TSDF	Treatment, storage, and disposal facility
UGTA	Underground Test Area

Definitions

Containment - A structure made of earthen materials or fabricated from metal or other suitable material that is designed to contain fluids generated from well-site activities. Typical containment structures identified in this plan are unlined sumps, lined sumps, and tanks.

Discharge - The physical process whereby fluids are released from the "flow line or discharge line" during drilling, well development, testing or sampling operations. Discharges are typically routed to appropriate containment structures (e.g., lined sump, unlined sump before final disposal). Fluids discharged for disposal purposes must meet applicable fluid management criteria.

Disposal - The act of discharging fluids with no intention of further management. Onsite disposal options include discharge to an infiltration area, unlined sump, or the ground surface and evaporation in lined sumps.

Fluid Management Plan (FMP) Criteria - An established standard or contaminant level used to make decisions for discharge within this plan. Different standards apply to different contaminants (e.g. Safe Drinking Water Standards, Maximum Contaminant Level, and Nevada Drinking Water Standards).

Fluid Transfer - The physical transfer of well-derived fluids from one appropriate fluid containment structure to another sump or area. Fluids may be conveyed using mechanical means or gravity means through appropriate piping or hoses.

Ground Surface - The natural relatively undisturbed condition of an area of soil or bedrock.

Infiltration Area - An area of the ground surface with defined boundaries that has been designated to discharge and infiltrate well fluids meeting applicable fluid management criteria.

Lined Sump - An engineered, constructed, earthen structure designed for the storage of well fluids that may exceed applicable fluid management criteria. Sump construction includes the placement of an appropriate liner material to ensure containment of the fluids and solids.

Unlined Sump - An engineered, constructed, earthen structure designed for the storage and infiltration of well fluids meeting applicable fluid management criteria. Sump construction may accommodate the introduction of a liner, if required, as part of the specific well-site operational strategy.

1.0 Introduction

The U.S. Department of Energy (DOE), National Nuclear Security Administration Nevada Site Office (NNSA/NSO) Environmental Restoration Project (ERP) Underground Test Area (UGTA) Sub-Project was formed to characterize the risk posed to human health and the environment as a result of underground nuclear testing activities at the Nevada Test Site (NTS). The UGTA Sub-Project investigation sites have been grouped into corrective action units (CAUs) in accordance with the *Federal Facility Agreement and Consent Order* (FFACO) (1996, as amended February 2008). At the time of this writing, the CAUs under the UGTA Sub-Project are CAU 97 (Yucca Flat/Climax Mine), CAU 98 (Frenchman Flat), CAU 99 (Rainier Mesa/Shoshone Mountain), CAU 101 (Central Pahute Mesa), and CAU 102 (Western Pahute Mesa). Site investigations are typically conducted in accordance with a Corrective Action Investigation Plan (CAIP), which defines the objectives and execution of a proposed CAU investigation. A primary UGTA Sub-Project objective is to gather data to characterize the aquifers beneath the NTS and adjacent lands. The investigations proposed under the UGTA Sub-Project may involve drilling new wells, recompleting existing wells, and testing and/or sampling wells. The location, depth, and construction of an individual well or well cluster by the UGTA Project will vary based on the scientific and technical objectives of the particular investigation.

1.1 Scope

This Fluid Management Plan (FMP) will be used in lieu of an NDEP-approved water pollution control permit for management of all fluids produced during the drilling, construction, development, testing, experimentation, and/or sampling of wells conducted by the UGTA Sub-Project. The FMP provides guidance for managing fluids generated during UGTA investigation activities and provides the criteria by which fluids may be discharged on site. Although the Nevada Division of Environmental Protection (NDEP), Bureau of Federal Facilities (BoFF), is not a signatory to this FMP, they are involved in the negotiation of the contents of this plan and approve the conditions contained within. The scope of this FMP includes well locations on and off the NTS that are associated with the UGTA CAUs. All fluids produced during the drilling, construction, development, testing, experimentation, and/or sampling of wells supporting the UGTA Sub-Project shall be managed in accordance with this FMP.

The major elements of this FMP are: 1) establishment of a well-site operations strategy, 2) site design/layout, 3) monitoring of contamination indicators (monitoring program), 4) sump characterization (sump sampling program), 5) fluid management decision criteria and fluid disposition, and 6) reporting requirements.

2.0 Proposed Investigation

This FMP serves as the governing document for all fluid-producing activities conducted to support UGTA CAU investigations. For this FMP, investigation activities are considered either 1) drilling activities or 2) other well-site activities.

2.1 Drilling Activities

Drilling activities that advance the borehole involve only those that disturb or penetrate new subsurface formation(s). Presumably, groundwater and rock cuttings generated as part of these operations are from geologic formations that are uncharacterized with regard to their chemical and radiological nature. Occasionally, well recompletion may involve advancing boreholes into new subsurface formations. Any activity that involves penetrating new subsurface formation(s) (e.g., advancing the hole) shall be considered a "drilling" activity for purposes of this FMP.

2.2 Other Well-Site Activities

Other well-site activities include those that encounter subsurface formations that were previously penetrated or contacted in some way. Examples of other well-site activities that typically occur without advancement of the borehole include cleaning and conditioning the borehole; performing circulation of the borehole; conducting fishing and wash-over operations; performing well completion operations, such as casing and stemming annular materials; developing wells; and testing and conducting periodic groundwater sampling events. Well completion designs and associated well construction activities will vary depending on well-specific objectives. The activities may include setting the immediate casing; running a completion string to a specified depth; and/or isolating productive zones with gravel, cement, packers, and sliding sleeves. Other activities may be conducted within a discrete period (e.g., a one-day well sampling event) or over a span of time (e.g., a series of well purging and testing activities that spans months). Many of the wells drilled or recompleted under the UGTA Sub-Project may support long-term monitoring programs and may be sampled periodically. Sampling activities at UGTA Sub-Project well sites are also covered under this FMP. Typically, well sampling involves purging the well while fluids are produced. The volume of fluids produced will vary from well to well.

3.0 Well-Site Operational Strategy

The well-site operational strategy is site-specific and will vary based on the available historical knowledge, background contamination, anticipated fluid production, potential for encountering contamination, and the scientific and technical objectives of the investigation.

The first step in the process is to establish the well location. Second, determine whether the well is inside or outside the NTS boundaries. Third, determine whether the well will follow a far-field or near-field well-site operational strategy.

The far- and near-field designations refer to the potential for encountering radioactive contamination in the well. A comprehensive assessment of historical information (or process knowledge) that may be relevant to the site operational strategy must be conducted. Information used to support this decision may include, but shall not be limited to, the following:

- Proximity of the proposed well(s) to the location of an underground nuclear detonation
- Hydrogeologic setting of the proposed well and surrounding areas
- The potential for chemical or radiological contamination in the groundwater due to underground testing
- Documentation or interviews pertaining to historical site operations
- Analytical and/or site monitoring data associated with the well or surrounding area wells
- Groundwater flow and transport modeling results
- Other applicable process/historical knowledge

Figure 3-1 outlines the process to follow in preparing for a fluid-producing investigation activity under this FMP. This process shall be completed before beginning the investigation activity. There are four basic well-site operational strategies identified in this FMP: Far-field at NTS (Section 4.0), Far-field outside NTS (Section 5.0), Near-field at NTS (Section 7.0), and Near-field outside NTS (Section 8.0).

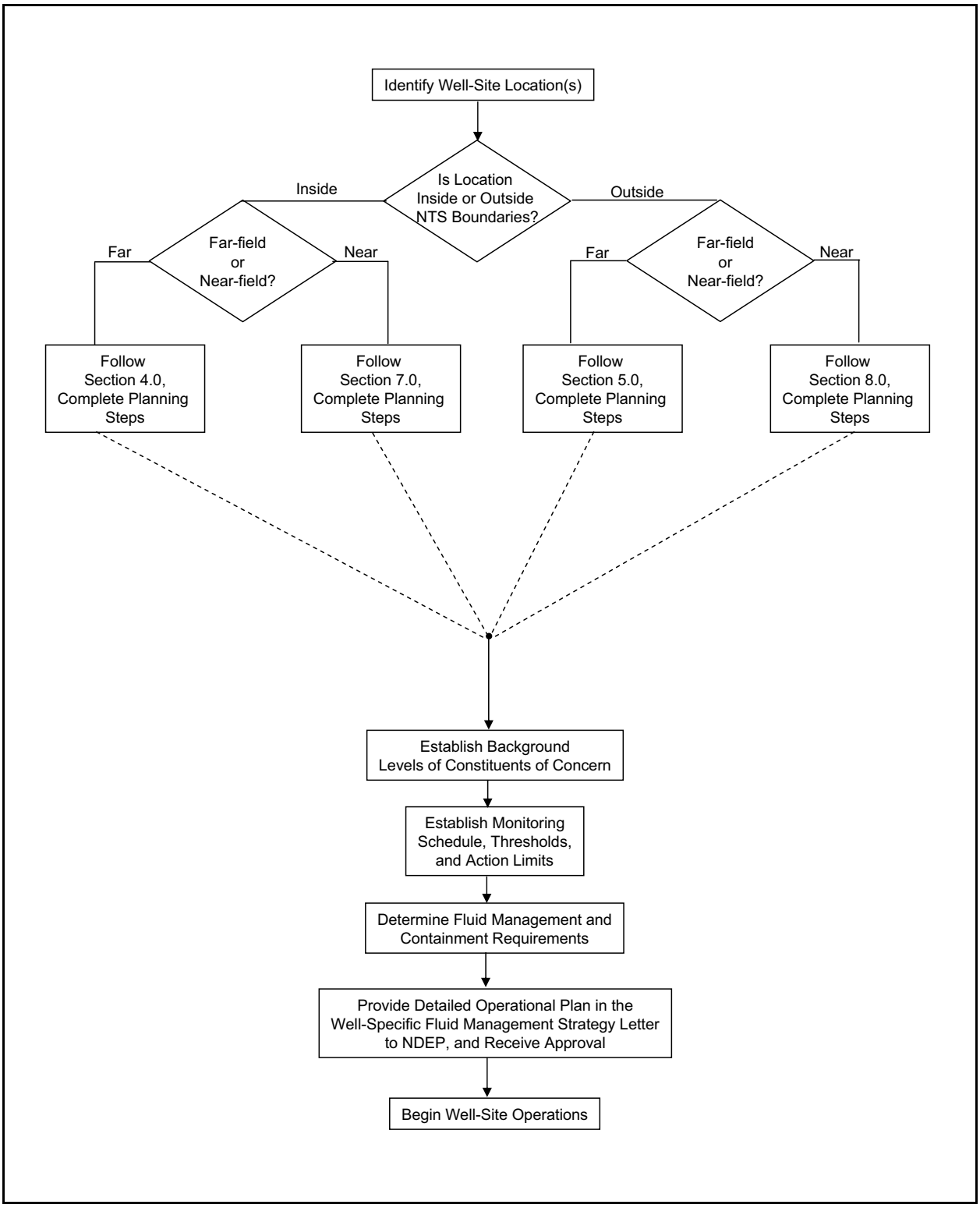

Figure 3-1
Fluid Management Planning Process

3.1 Well-Specific Fluid Management Strategy Letter

Develop a Well-Specific Fluid Management Strategy Letter for submittal to NDEP. The letter will identify the well-site operational strategy (e.g., Near-field at NTS) and discuss supporting rationale. Site-specific information, specifics pertaining to the nature and configuration of the planned fluid containment, and transition contingencies will be identified in the letter. Using the applicable section (as identified in Figure 3-1), develop the Well-Specific Fluid Management Strategy Letter. The following information may be incorporated into the letter:

- Establish expected levels of contaminants or constituents of concern in groundwater background, if applicable.

- Establish monitoring requirements (initial and operational). The monitoring program supports the daily management of fluids produced during an investigation activity. This monitoring program is based on the use of the contamination indicators (tritium and/or lead) to make decisions regarding fluid containment and/or the progression of investigation operations. Decisions are based on analysis that is performed on site while operations proceed. Based on its physical and chemical properties, tritium has been chosen as the indicator for radioactive contamination. Tritium is a radioactive isotope that is readily transported in groundwater. Tritium provides the earliest detection of groundwater contamination resulting from underground testing. Lead has been chosen as the indicator for chemical contamination in groundwater at UGTA near-field designated well sites. This is because lead-laden “racks” were commonly used in the design and construction of underground nuclear tests, and lead was also used as shielding in the design of some underground nuclear devices. Either of these sources may have contributed to lead contamination in groundwater.

- Determine on site monitoring frequency, contamination thresholds, and action levels.

- Establish configuration of site discharge areas (e.g., unlined sump, lined sump, boundaries of infiltration area) and site-specific fluid containment requirements. Figure 3-2 depicts a typical well-site layout detailing the drill-rig pad, discharge lines, lined or unlined sumps, and surface area discharge. The configuration may be modified based on the site-specific information and identified in the strategy letter.

- Identify potential access points to infiltration area (roads), and designate posting requirements.

- Establish notification requirements.

- Field operations will not generate discharge fluids until NDEP approves the strategy letter.

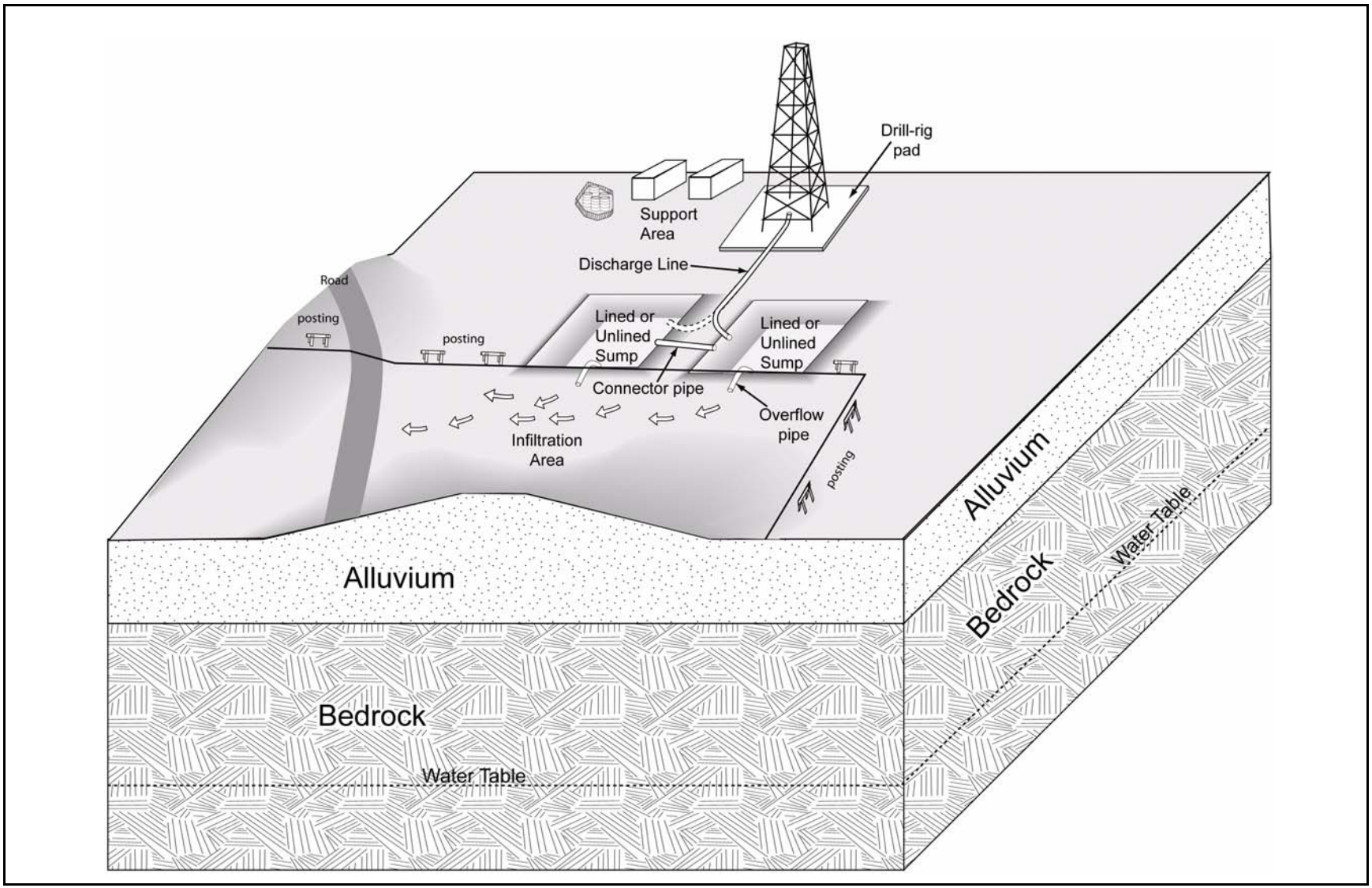

Figure 3-2
Well-Site Layout Example

The initial operational strategy for a particular well site will be applied to all subsequent well-site activities, such as aquifer tests or routine sampling, unless site process knowledge or other site factors change. For example, if a well was drilled under a near-field strategy and site conditions continue to support this determination, subsequent investigation activities must proceed under a near-field strategy, unless an alternate strategy can be justified.

If NNSA/NSO ERP plans to operate a particular investigation activity using a different strategy than that initially determined for the well site, NNSA/NSO ERP shall notify NDEP. Such notification may be provided via telephone, fax, or email and will be followed by a formal letter describing any NDEP approved operational changes.

4.0 Fluid Management Strategy for Far-field at NTS

At far-field wells on the NTS, radioactive constituents or metals contamination from underground testing are not expected to be encountered in excess of 20 × FMP Criteria (see Appendix A). Historically, far-field wells constructed do not exceed fluid quality parameters for discharging fluids to a constructed unlined sump or unrestricted ground discharge to an infiltration area. The far-field strategy involves analyzing contaminant indicators (tritium and lead, if necessary) through monitoring and containing fluids in sumps. For this operational strategy, investigation activities are considered either activities that advance the borehole (Section 4.1) as part of drilling operations or other well-site activities (Section 4.2).

4.1 Well Drilling Activities

Drilling activities that advance the borehole involve only those that penetrate or disturb new subsurface formation(s). Presumably, groundwater and rock cuttings generated as part of these operations are from geologic formations that are uncharacterized with regard to their chemical and radiological nature.

4.1.1 Fluid Containment

Under a far-field strategy at NTS, fluids may be discharged directly from the well to the ground surface, an unlined sump, a lined sump, or aboveground containment (e.g., Baker tank). The type of fluid management is based on available process knowledge and is identified in the Well-Specific Fluid Management Strategy Letter approved by NDEP.

In a typical far-field scenario, two sumps (or infiltration basins) are constructed. An equalizing pipe may be constructed between the basins to allow for the transfer of fluids from one basin to the other. An overflow pipe may be constructed in one of the sumps to allow for discharge to the infiltration area (ground surface). To avoid human contact with discharge fluids, access to the sumps and infiltration area will be controlled and posted while drilling/field operations are underway. Figure 3-2 offers an example of a typical fluid containment configuration. In some situations, one sump may be lined as a contingency if monitoring identifies fluids that do not meet far-field fluid management criteria.

4.1.2 Monitoring Program

The monitoring program supports the daily management of fluids produced during an investigation activity. This program is based on the use of tritium as a contamination indicator to make decisions regarding fluid containment and/or the progression of investigation operations.

Monitoring results are not used to support final fluid disposition decisions; rather, monitoring results prompt daily operational decisions. Figure 4-1 outlines the FMP decision points within the monitoring program for far-field well sites at NTS. The NNSA/NSO ERP shall be notified immediately when tritium monitoring meets or exceeds the established action level. Notification of subsequent monitoring results to NNSA/NSO ERP and NDEP shall follow established protocol. Monitoring results will be available to NDEP in accordance with Section 9.0 of this FMP.

4.1.2.1 Lead Monitoring

The potential for metals from underground testing to be present in drilling fluids in a far-field well is remote. Monitoring for lead is not required unless it was identified in the Well-Specific Fluid Management Strategy Letter.

4.1.2.2 Tritium Monitoring

While advancing the borehole at a far-field site, a tritium screening sample will be collected every hour at the discharge line. Any reduction or elimination of tritium monitoring shall be based on process knowledge and approval from NNSA/NSO ERP and NDEP. Because tritium can move with groundwater, tritium is the indicator used during operations of the far-field strategy. The NDEP will be notified via telephone, fax, or email when tritium monitoring levels reach or exceed 200,000 picocuries per liter (pCi/L); this is a courtesy notification only and will not result in operations being altered or suspended. If tritium monitoring levels exceed 400,000 pCi/L, NNSA/NSO ERP will be notified; subsequently, NNSA/NSO will notify NDEP. Discharge will be routed to a lined sump, and the transition strategy will be implemented as identified in Section 6.0 of this FMP.

4.2 Other Well-Site Activities

Other well-site activities include those that encounter subsurface formations that were previously penetrated or contacted in some way. Examples of other well-site activities that typically occur without advancement of the borehole include cleaning and conditioning the borehole; performing circulation of the borehole; conducting fishing and wash-over operations; performing well completion operations, such as casing and stemming annular materials; developing wells; and testing and conducting periodic sampling events. Well completion designs and associated well construction activities will vary depending on well-specific objectives and may include setting intermediate casing; running a completion string to a specified depth; and/or isolating productive zones with gravel, cement, packers, and sliding sleeves. Other activities may be conducted within a discrete period (e.g., a one-day well sampling event) or over a span of time (e.g., a series of well purging and testing activities that spans months).

4.2.1 Fluid Containment

Fluid containment options during other well-site activities operating under the far-field strategy will typically be the same as those described in Section 4.1. The infiltration area and/or unlined sump area will be posted while in use to control access. Previously constructed sumps will be visually inspected before use. The inspection will be recorded in the site-specific well logbook.

4.2.2 Monitoring

During other well-site activities, a tritium sample will be collected once daily at the discharge line. Monitoring samples may be analyzed on or off site but will, at a minimum, be analyzed weekly. Additional samples may be taken, as needed. Further reduction or elimination of tritium monitoring shall be based on process knowledge and approval from NNSA/NSO ERP and NDEP.

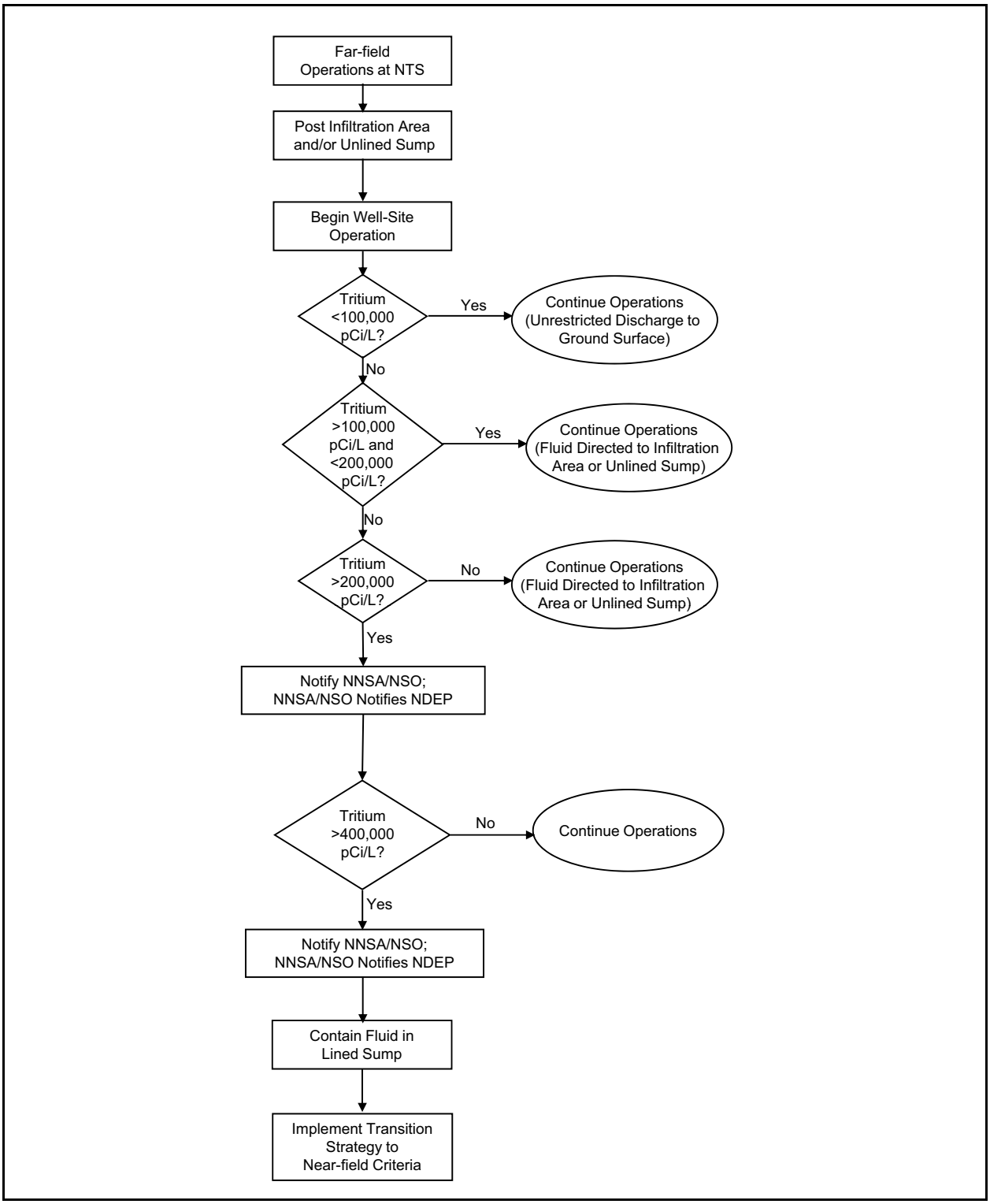

Figure 4-1
Far-field at NTS Monitoring Decision Diagram

5.0 Fluid Management Strategy for Far-field outside NTS

At far-field wells, radioactive constituents or metals contamination from underground testing are not expected to be encountered in excess of 20 × FMP Criteria (see Appendix A). Historically, far-field wells constructed do not exceed fluid quality parameters for discharging fluids to a constructed unlined sump or unrestricted ground discharge to an infiltration area. The far-field strategy involves analyzing contaminant indicators (tritium and lead, if necessary) through monitoring and containing fluids in sumps. For this operational strategy, investigation activities are considered either activities that advance the borehole as part of drilling operations or other well-site activities.

5.1 Well Drilling Activities

Drilling activities that advance the borehole involve only those that penetrate or disturb new subsurface formation(s). Presumably, groundwater and rock cuttings generated as part of these operations are from geologic formations that are uncharacterized with regard to their chemical and radiological nature.

5.1.1 Fluid Containment

Under a far-field strategy outside the NTS, fluids may be discharged directly from the well to the ground surface, an unlined sump, a lined sump, or aboveground containment (e.g., Baker tank). The type of fluid containment required is based on available process knowledge and is identified in the Well-Specific Fluid Management Strategy Letter approved by NDEP.

In a typical far-field scenario, two sumps may be constructed. An equalizing pipe may be constructed between the basins to allow transfer of fluids from one basin to the other. An overflow pipe may be constructed in one of the sumps to allow for discharge to the ground surface or infiltration area. To avoid human contact with discharge fluids, access to the sump and/or infiltration area will be controlled and posted when evaporation/infiltration is operational. Figure 3-2 offers an example of a typical fluid containment configuration. In some situations, one sump may be lined as a contingency if monitoring identifies fluids that do not meet fluid management criteria.

5.1.2 Monitoring Program

The monitoring program supports the daily management of fluids produced during an investigation activity. This program is based on the use of tritium as a contamination indicator to make decisions regarding fluid containment and/or the progression of investigation operations. Based on its physical and chemical properties, tritium has been chosen as the indicator for radioactive contamination. Tritium is a radioactive isotope that is readily transported in groundwater and provides the earliest detection of groundwater contamination resulting from underground testing.

Monitoring results are not used to support final fluid disposition decisions; rather, monitoring results prompt daily operational decisions. Figure 5-1 outlines decision points within monitoring program for far-field well sites outside the NTS. The NNSA/NSO ERP shall be notified immediately when tritium monitoring meets or exceeds the established action level. Notification of subsequent monitoring results to NNSA/NSO ERP and NDEP shall follow established protocol.

5.1.2.1 Lead Monitoring

The potential for metals from underground testing to be present in drilling fluids in a Far-field well is remote. Monitoring for lead is not required unless it was identified in the Well-Specific Fluid Management Strategy Letter.

5.1.2.2 Tritium Monitoring

Background levels for radioisotopes found in nearby wells may be established during planning. If fluid samples from other nearby wells naturally exceed 15 pCi/L gross alpha and/or 50 pCi/L gross beta, then the background level can supersede the 15 pCi/L gross alpha and 50 pCi/L gross beta limits for fluid discharge to ground surface. The expected background levels for gross alpha and beta and alternative action levels at a particular well site will be described in the Well-Specific Fluid Management Strategy Letter and approved by NDEP.

While advancing the borehole at a far-field site, a tritium screening sample will be collected every hour at the discharge line. Reduction or elimination of tritium monitoring shall be based on process knowledge and approval from NNSA/NSO ERP and NDEP. Discharge fluids with tritium levels less than 20,000 pCi/L are unrestricted for discharge. Fluids containing greater than or equal to

20,000 pCi/L to less than 400,000 pCi/L of tritium, greater than or equal to 15 pCi/L to less than 300 pCi/L gross alpha, or greater than or equal to 50 pCi/L to less than 1,000 pCi/L gross beta shall be discharged to a fenced or posted unlined sump, or to a fenced or posted infiltration area with controlled access until such time that the discharge fluid has infiltrated into the soil or evaporated.

Natural background levels of radioisotopes (as established and approved during planning) may modify the decision criteria. The NDEP will be notified via telephone, fax, or email when tritium monitoring levels reach or exceed 20,000 pCi/L; this is a courtesy notification only and will not result in operations being altered or suspended. Figure 5-1 outlines the decision points in the monitoring program for far-field well sites outside the NTS. If tritium monitoring levels exceed 400,000 pCi/L, NNSA/NSO ERP will be notified; subsequently, NNSA/NSO will notify NDEP. Discharge will be routed to a lined sump, and the transition strategy will be implemented as identified in Section 6.0 of this FMP. Monitoring results will be available to NDEP in accordance with Section 9.0.

5.2 Other Well-Site Activities

Other well-site activities include those that encounter subsurface formations that were previously penetrated or contacted in some way. Examples of other well-site activities that typically occur without advancement of the borehole include cleaning and conditioning the borehole; performing circulation of the borehole; conducting fishing and wash-over operations; performing well completion operations, such as casing and stemming annular materials; developing wells; and testing and conducting periodic sampling events. Well completion designs and associated well construction activities will vary depending on well-specific objectives and may include setting intermediate casing; running a completion string to a specified depth; and/or isolating productive zones with gravel, cement, packers, and sliding sleeves. Other activities may be conducted within a discrete period (e.g., a one-day well sampling event) or over a span of time (e.g., a series of well purging and testing activities that span months).

5.2.1 Fluid Containment

Fluid containment options during other well-site activities operating under the far-field strategy will typically be the same as those described in Section 5.1.1. To avoid human contact with discharge fluids, access to the unlined sump and infiltration area will be controlled and posted during

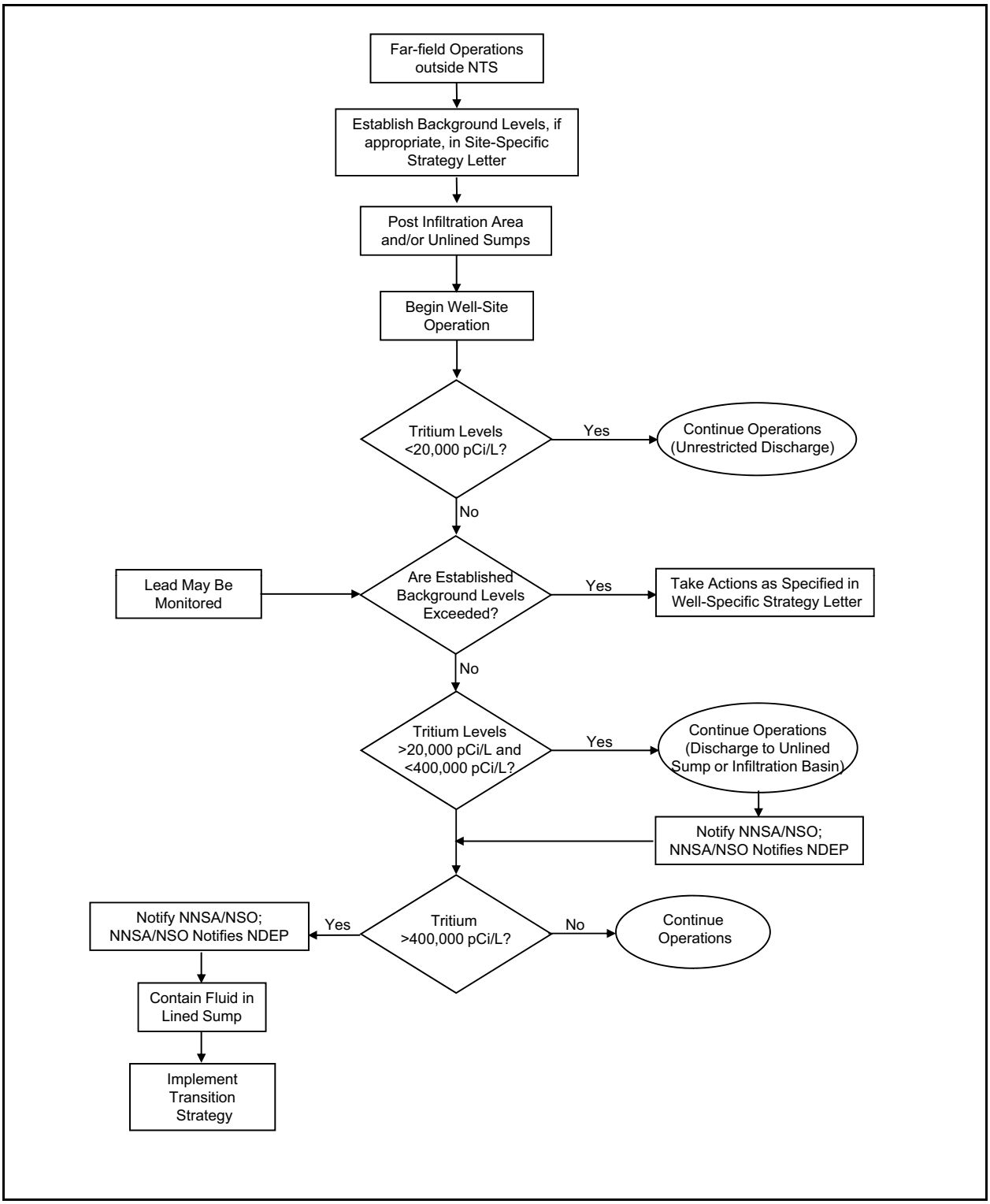

Figure 5-1
Far-field outside NTS Monitoring Decision Diagram

evaporation/infiltration operations. Previously constructed sumps will be visually inspected before use. The inspection will be recorded in the site-specific well logbook.

5.2.2 Monitoring

During other well-site activities, a tritium sample will be collected once daily at the discharge line. Monitoring samples may be analyzed on or off site but will, at a minimum, be analyzed weekly or as stated in the Well-Specific Fluid Management Strategy Letter. Further reduction or elimination of tritium monitoring shall be based on process knowledge and approval from NNSA/NSO ERP and NDEP.

6.0 Transition Strategy

A transition to near-field well strategy is required if monitoring at a designated far-field well site (at NTS or off site) reveals tritium concentrations that exceed the fluid management criteria (i.e., concentrations greater than 400,000 pCi/L) or decision criteria identified in the Well-Specific Fluid Management Strategy Letter. If the well location does not have the appropriate fluid containment available (i.e., lined sump or portable tank tritium monitoring levels exceed 400,000 pCi/L), NNSA/NSO ERP will be notified; subsequently, NNSA/NSO will notify NDEP. Discharge will be routed to a lined sump, and the transition strategy will be implemented.

The following transition strategy may be employed to transition well-site operations from a far-field strategy to a near-field strategy.

- The well site will change to a near-field site, with tritium being monitored hourly and lead monitored every eight hours.
- A minimum of one single-lined sump may be constructed to contain fluids that exceed the tritium action level.
- The action levels and subsequent actions taken when these levels are exceeded remain the same as in the near-field strategy.
- When the monitoring of tritium and/or lead meets or exceeds the established action level, NNSA/NSO ERP shall be notified immediately, subsequently NNSA/NSO will notify NDEP.

Notification of subsequent monitoring results to NNSA/NSO ERP and NDEP shall follow established protocol.

7.0 Fluid Management Strategy for Near-field at NTS

Contaminated fluids are more likely to be encountered at near-field well locations. The near-field fluid management strategy provides reasonable assurance that fluids produced at these wells will be managed in compliance with applicable state and federal regulations. The near-field strategy involves analyzing (tritium and lead) regularly and containing fluids in lined sumps. For this operational strategy, investigation activities are considered either drilling operations, activities that advance the borehole, or other well-site activities.

7.1 Well Drilling Activities

Drilling activities that advance the borehole involve only those that penetrate or disturb new subsurface formation(s). Presumably, groundwater and rock cuttings generated as part of these operations are from geologic formations that are uncharacterized with regard to their chemical and radiological nature.

7.1.1 Fluid Containment

Sump construction and use decisions will be based in part on predicted fluid volumes, background constituents, and the potential for radiological and/or chemical contamination in the well. Once near-field discharge criteria is exceeded, the discharge of fluids to the ground surface or to an infiltration area or unlined sump at a near-field well site is generally not anticipated; however, this practice may be approved on a case-by-case basis as identified in the Well-Specific Fluid Management Strategy Letter and approved by NDEP. Figure 3-2 provides a typical fluid containment configuration. Site-specific characteristics and restrictions will determine the actual site layouts that are described in the letter. To avoid human contact with discharge fluids, access to the sump and infiltration area will be controlled and posted while evaporation/infiltration is operational.

The following example describes a near-field sump construction and use scenario. This scenario may be considered generally applicable to the given site conditions; however, actual sump construction and use may vary among well sites.

In a near-field scenario, two lined sumps may be constructed, with drilling fluids discharged to the first sump until that point when radiological or chemical contamination is encountered in the well. Once monitored fluids exceed applicable FMP criteria, fluid discharge is routed to the second lined sump. A sample is collected from the first sump and analyzed at a laboratory for FMP analytical parameters (Appendix B). The comparison of sample results with FMP criteria will dictate whether the fluids from the first sump may be discharged directly to an infiltration area, unlined sump, or to the ground surface. The fluid volume in the second sump when filled will undergo the same procedure. If fluids fail to meet the criteria for discharge to a unlined sump, infiltration area or ground surface, the fluids will remain in the lined sump to allow for evaporation.

7.1.2 Monitoring Program

The monitoring program supports the daily management of fluids produced during an investigation activity. This program is based on the use of the contamination indicators (tritium and/or lead) to make decisions regarding fluid containment and/or the progression of investigation operations. Decisions are based on analyses that are performed while operations proceed.

Figure 7-1 outlines the decision points in the monitoring program for near-field well sites at NTS. Monitoring results are not typically used to support final fluid disposition decisions; rather, monitoring results prompt daily operational decisions. For example, in a near-field scenario, the tritium action level of 400,000 pCi/L (20 × FMP Criteria) would prompt the diversion of fluids to a lined sump. Similarly, the lead action level of 3 milligrams per liter (mg/L) indicates when fluid lead concentrations are approaching the *Resource Conservation and Recovery Act* (RCRA) hazardous waste concentration (5 mg/L).

Fluids generated during near-field operations will be analyzed for lead and tritium while the borehole is being advanced. Monitoring may be initiated in vadose zone drilling to account for possible prompt injection phenomenon encountered above the groundwater table.

The NNSA/NSO ERP shall be notified immediately when monitoring of tritium and/or lead meets or exceed the established action level; subsequently, NNSA/NSO will notify NDEP. Notification of subsequent monitoring results to NNSA/NSO ERP and NDEP shall follow established protocol. Monitoring results will be made available to NDEP in accordance with Section 9.0 of this FMP.

7.1.2.1 Tritium Monitoring

During advancement of the borehole, a tritium screening sample will be collected and analyzed hourly from the return discharge line. The NNSA/NSO will notify NDEP via telephone, fax, or email when tritium monitoring levels reach or exceed 200,000 pCi/L; this is a courtesy notification only and will not result in operations being altered or suspended. The action level for tritium is 400,000 pCi/L (see Appendix A). If this level is exceeded during borehole advancement activities, NNSA/NSO ERP will be notified, and NNSA/NSO will subsequently notify NDEP that fluids will be discharged to a lined sump, and the well site will be considered and managed as "radiologically contaminated" from that point forward, unless proven otherwise.

7.1.2.2 Lead Monitoring

A sample for lead screening/analysis shall be collected from the return discharge line once every eight hours while the borehole is being advanced. Monitoring samples may be analyzed on or off site but will, at a minimum, be analyzed daily. Lead may be monitored with a digital voltammeter, colorimetric method, or other appropriate method.

Background levels for metals may be identified in the Well-Specific Fluid Management Strategy Letter that is submitted to NDEP for approval. Any site-specific changes to the sampling protocols detailed below will be identified in the strategy letter.

Lead is monitored primarily to ensure that the RCRA level for lead (5 mg/L) is not exceeded. Exceeding the RCRA level for lead may result in the generation of a hazardous or mixed waste in the sump(s). Therefore, the lead monitoring method must be capable of indicating lead at concentrations of less than 5 mg/L. To provide early warning of lead levels approaching the RCRA standard, the level of 3 mg/L was chosen as the initial decision point for lead monitoring under this FMP. That is, if lead concentrations detected are 3 mg/L or greater, the confirmatory sampling protocol will be initiated. The detection of lead at any concentration less than 5 mg/L will not prompt the shutdown of operations; only a confirmed lead concentration of 5 mg/L mandates that fluid generating operations cease.

If a quantitative method is used to monitor lead, the action level for lead is 3 mg/L. If a semiquantitative method is employed, any indication of the presence of lead shall serve as the action

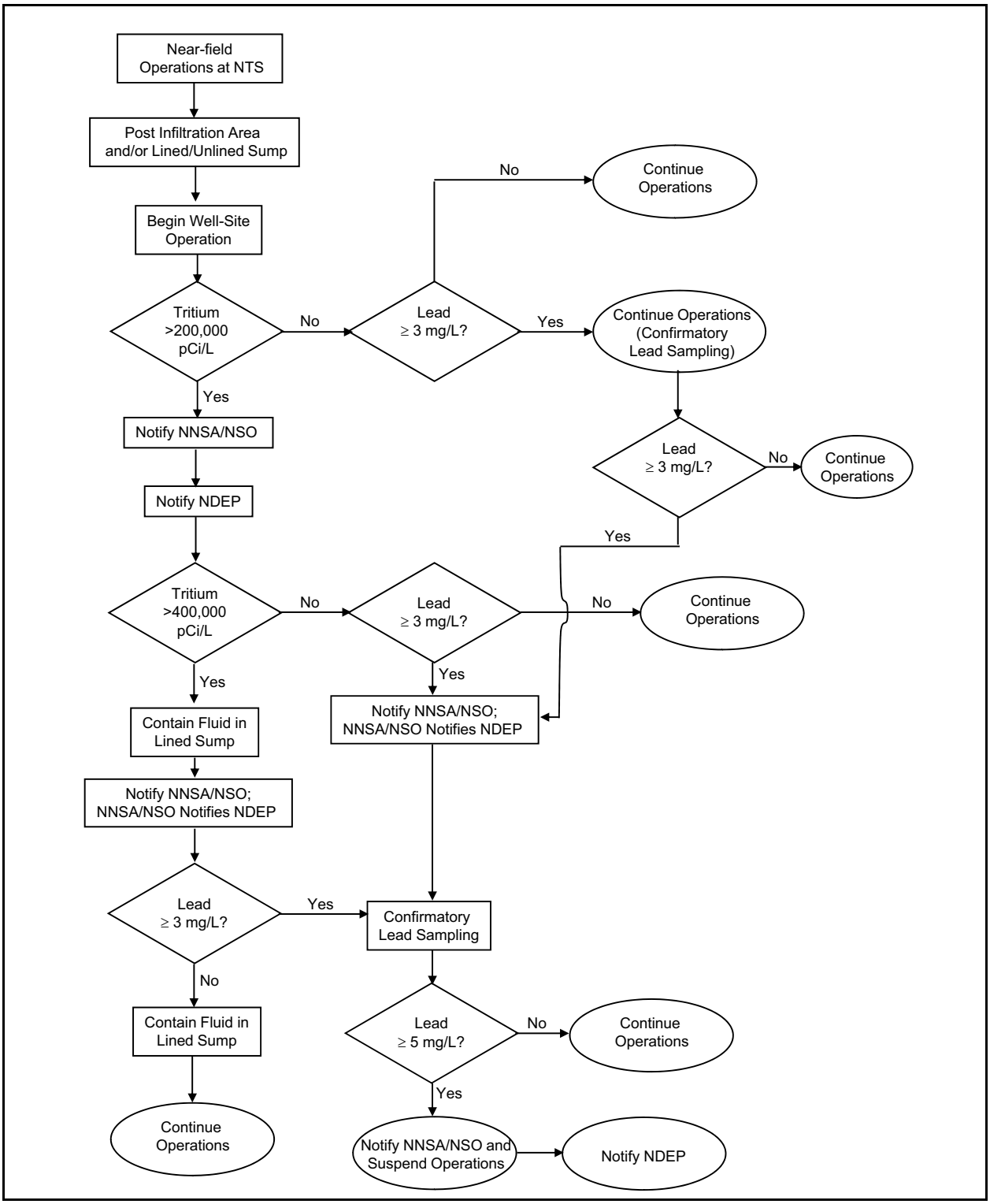

Figure 7-1
Near-field at NTS Monitoring Decision Diagram

level and prompt confirmatory sampling. In the following example, the lead "action level" referred to is associated with the RCRA hazardous waste lead level. The example describes confirmatory sampling to be initiated when the lead action level is exceeded.

If a monitoring sample yields lead concentrations at or above the action level, an additional discharge line sample shall be collected immediately and analyzed. If this confirmatory sample yields lead concentrations less than the action level, the regular eight-hour monitoring schedule shall resume. If the confirmatory sample results in lead concentrations at or above the action level, a composite sample shall be collected immediately from the active sump. The first sump sample shall be analyzed for lead. If the sump sample results fall below the action level, regular eight-hour discharge monitoring shall resume. If the sump sample yields lead levels at or above the action level, drilling operations shall cease and a composite sump sample shall be obtained for laboratory analysis (see Appendix B).

7.1.3 Fluid Management Decision Criteria

The fluid management decision criteria used to determine the options for final fluid disposition are identified in Appendix A. These criteria are based on the Nevada Drinking Water Standards, federal standards, and NDEP guidance. Using UGTA historical knowledge, the following parameters were selected for establishing fluid quality for arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver, tritium, gross alpha, and gross beta. Fluid management decision criteria indicate the thresholds at which fluid disposal decisions are made. The decision criteria are based on the concentration of dissolved constituents. Samples collected in accordance with the sump sampling program will be analyzed for total and dissolved RCRA metals, gross alpha, gross beta, and tritium (see Appendix B). Only the dissolved metals results will be compared with Appendix A limits when making fluid disposal decisions.

In Appendix A, the 5 × FMP Criteria limits represent the maximum constituent concentrations below which fluids may be discharged to the ground surface. That is, if all radiological parameters and dissolved metals in Appendix A are less than 5 × FMP Criteria, fluids may be discharged directly to the ground surface. Similarly, if all parameters in Appendix A are less than 20 × FMP Criteria limits, fluids may be discharged into an infiltration area or unlined sump.

Note: The 5 × and 20 × FMP Criteria values in Appendix A are simply multipliers of the identified values. That is, the drinking water standards are the basis for development of the 5 × and 20 × FMP Criteria values.

Only the 5 × and 20 × FMP Criteria values in Appendix A will be used to make discharge/disposal decisions at near-field wells at NTS. The drinking water standards themselves are included in Appendix A as a point of reference only and will not be compared directly with fluid analytical results to make discharge/disposal decisions.

7.1.4 Sump Sampling Program

The primary purpose of this sampling program is to determine final fluid disposition. The collection of samples for laboratory analysis (Appendix B) applies to fluids contained or stored in sumps. The analytical results received from the laboratory are compared to the limits in Appendix A to allow the discharge of fluids to an unlined sump, infiltration area, or the ground surface.

If a sump is used to contain drilling fluids from an investigation activity, a sump sample shall be collected and analyzed to determine proper fluid disposition of the fluids. The primary purpose of these samples is to characterize the contained fluids. While fluids are being added to the sumps, as during borehole advancement or well completion, a sample does not need to be collected. However, once operations that affect containment volume have ceased or a change in fluid containment is to occur, a sample must be collected for laboratory analysis. The sample must be collected from the sump where fluids were discharged (active sump), and from all sumps to which fluids may have been transferred in the course of the immediate investigation activity. Samples shall be collected, or appropriate analytical data available, for each containment that holds fluid at a site before discharging or the project vacating the site. Contained fluids will be analyzed for the parameters listed in Appendix B.

7.1.5 Fluid Disposition

This section discusses fluid disposition options for fluids that are contained/stored in a lined sump. Appendix C illustrates the general decision flow process for the disposal of fluids. This FMP allows the discharge of investigation fluids on site when specific fluid criteria are met. The options for

onsite disposal of investigation fluids are an unlined sump, infiltration area, and the ground surface. An infiltration area is a predestinated bounded area on the ground surface within which fluids may be discharged. The "ground surface" refers to the natural or relatively undisturbed condition of an area of surface soil or rock. Access to the infiltration area or sump will be controlled and posted when active.

Decisions on fluid disposition are based on laboratory sample results, as compared to fluid decision criteria. In no event will fluids be discharged to an infiltration area or the ground surface from a lined sump if fluid decision criteria (as provided in Appendix A) are not met. The onsite disposal options for fluids stored in lined sumps are:

- **Direct discharge to the ground surface**. Fluids documented to be less than 5 × FMP Criteria for all required FMP analytical parameters may be discharged to the ground surface. Caution shall be taken to ensure that erosion is controlled.

- **Discharge to an infiltration area or unlined sump**. Fluids documented to be less than 20 × FMP Criteria for all required FMP analytical parameters may be discharged to an infiltration area or unlined sump.

If fluids do not meet the fluid decision criteria for discharge/disposal on site, then fluid disposal options include 1) onsite containment in lined sumps or 2) transport for disposal off site. The criteria for these options are as follows:

- **Onsite containment in a lined sump.** Fluids documented to contain RCRA metals below hazardous waste limits found in the RCRA standards in the most recent version of Title 40 *Code of Federal Regulations* (CFR) Part 261.24 (CFR, 2008) and radiological parameters greater than 20 × FMP Criteria will be allowed to evaporate in lined sumps on site. Alternatively, these fluids may be transported off site via portable tanks to another lined sump for storage or transported to a NTS or a permitted commercial treatment, storage, and disposal facility (TSDF).

- **Transportation to NTS or offsite TSDF**. Fluids documented to contain any RCRA metal above its respective hazardous waste limit found in the RCRA standards in the most recent version of 40 CFR 261.24 (CFR, 2008) would result in the suspension of operations. These fluids would be managed as hazardous (or mixed) waste in accordance with the most current version of the State of Nevada hazardous waste regulations and applicable DOE Orders. The NNSA/NSO ERP and NDEP will be notified immediately if fluids are documented to be hazardous or mixed waste. The fluids may be pumped from the lined sumps and transported to an appropriate storage area on the NTS, or may be transported directly to a permitted commercial TSDF.

The appropriate fluid disposal option will be chosen based on a comparison of the appropriate laboratory analytical data with the fluid management decision criteria specific to each option. As indicated, the concentrations of fluid management parameters outlined in Appendix A shall not exceed 20 × FMP Criteria if the fluids are to be discharged to an infiltration area or unlined sump. Fluids intended for discharge to the ground surface must not exceed 5 × FMP Criteria.

7.2 Other Well-Site Activities

Other well-site activities include those that encounter subsurface formations that were previously penetrated or contacted in some way. Examples of other well-site activities that typically occur without advancement of the borehole include cleaning and conditioning the borehole; performing circulation of the borehole; conducting fishing and wash-over operations; performing well completion operations, such as casing and stemming annular materials; developing wells; and testing and conducting periodic sampling events. Well completion designs and associated well construction activities will vary depending on well-specific objectives and may include setting intermediate casing; running a completion string to a specified depth; and/or isolating productive zones with gravel, cement, packers, and sliding sleeves. Other activities may be conducted within a discrete period (e.g., a one-day well sampling event) or over a span of time (e.g., a series of well purging and testing activities that span months).

7.2.1 Fluid Containment

Fluid containment options during other well-site activities in the NTS operating under the near-field strategy will typically be the same as those described in Section 7.1.1. Lined sumps used during borehole advancement may be used for fluid containment during well development, testing, and periodic sampling activities. Previously constructed sumps will be visually inspected before use. The inspection will be recorded in the site-specific well logbook.

If well-site conditions have changed from near-field to far-field, alternate fluid containment options will be available during other well-site activities, to include discharge to an unlined sump, infiltration area, or to the ground surface. The NNSA/NSO ERP will notify NDEP of any change in well-site operation strategy or any deviations from the Well-Specific Fluid Management Strategy Letter.

7.2.2 Monitoring

The primary difference between monitoring during borehole advancement and during other well-site activities is the frequency of monitoring sample collection. In a near-field scenario during other well-site activities, a minimum of one tritium sample and one lead sample will be collected daily from the discharge line and, at a minimum, analyzed weekly. The results of each sample will be used to make decisions regarding fluid containment and/or the progression of investigation operations. See Section 7.1.2 for detailed information on tritium and lead monitoring in a near-field scenario.

7.2.3 Fluid Management Decision Criteria

The fluid management decision criteria in Appendix A are to be used to determine the options for final disposition of fluids generated during other well-site activities. See Section 7.1.3 for further detail.

7.2.4 Sump Sampling Program

The sump sampling program for other well-site activities is the same as that during borehole advancement. A sump sample shall be collected once fluid-producing operations have ceased. For example, in a near-field situation, if a well is being purged in preparation for periodic sampling, fluids may be discharged to a lined sump. A sump sample will be collected from the sump to which fluids were discharged (active sump) and from all sumps to which fluids may have been transferred in the course of the activity. Sump samples shall be collected, or appropriate analytical data available, for each containment that holds fluid at a site before discharging or the project vacating the site. Sump fluids will be analyzed for the parameters listed in Appendix B.

7.2.5 Fluid Disposition

The same decision process for fluid disposition of near-field drilling fluids is to be implemented for fluids generated during other well-site activities. See Section 7.1.5 for further detail.

8.0 Fluid Management Strategy for Near-field outside NTS

Contaminated fluids are less likely to be encountered at well locations outside the NTS. The fluid management strategy provides reasonable assurance that fluids produced at these wells will be managed in compliance with applicable state and federal regulations. The near-field strategy involves analyzing monitoring results (tritium and lead) regularly and containing fluids in sumps.

For this operational strategy, investigation activities are considered either drilling operations, activities that advance the borehole, or other well-site activities.

8.1 Well Drilling Activities

Drilling activities that advance the borehole involve only those that penetrate or disturb new subsurface formation(s). Presumably, groundwater and rock cuttings generated as part of these operations are from geologic formations that are uncharacterized with regard to their chemical and radiological nature.

8.1.1 Fluid Containment

Fluid containment under a near-field strategy outside the NTS will be identified in the Well-Specific Fluid Management Strategy Letter. Sump construction and use decisions will be based in part on predicted fluid volumes, background contaminants, and the potential for radiological and/or chemical contamination in the well. Once near-field discharge criteria are met, the discharge of fluids to the ground surface, unlined sump, or to an infiltration area at a near-field well site is generally not anticipated; however, this practice may be approved on a case-by-case basis as identified in the Well-Specific Fluid Management Strategy Letter and approved by NDEP.

Figure 3-2 provides a typical fluid containment configuration. Site-specific characteristics and restrictions will determine the actual site layouts that are described in the letter. To avoid human contact with discharge fluids, access to the infiltration area and sumps will be controlled and posted during evaporation/infiltration is operational.

The following example describes a near-field sump construction and use scenario. This scenario may be considered generally applicable to the given site conditions; however, actual sump construction and use may vary among well sites.

> In a near-field scenario, two lined sumps may be constructed, with drilling fluids discharged to the first sump until that point when radiological or chemical contamination is encountered in the well. Once fluids exceed applicable FMP criteria, discharge fluids are diverted to the second lined sump. A sample is then collected from the first sump and analyzed at a laboratory for FMP parameters. The comparison of sample results with FMP criteria will dictate whether the fluids from the first sump may be discharged directly to an unlined sump, infiltration area, or to the ground surface. The fluid volume in the second sump when filled will undergo the same procedure.

8.1.2 Monitoring Program

The monitoring program supports the daily management of fluids produced during an investigation activity. This program is based on the use of the contamination indicators, tritium and/or lead, to make decisions regarding fluid containment and/or the progression of investigation operations. Decisions are based on analyses that are performed while operations proceed.

Figure 8-1 outlines the decision points in the monitoring program for near-field well sites outside the NTS. Monitoring results are not typically used to support final fluid disposition decisions; rather, monitoring results prompt daily operational decisions.

Fluids generated during near-field operations will be analyzed for lead and tritium while the borehole is being advanced. Monitoring may be initiated in vadose zone drilling to account for possible prompt injection phenomenon encountered above the groundwater table. For example, in a near-field scenario, the tritium action level of 400,000 pCi/L (20 × FMP Criteria) would prompt the diversion of fluids to a lined sump. Similarly, the lead action level of 3 mg/L indicates when fluid lead concentrations are approaching the RCRA hazardous waste concentration (5 mg/L).

The NNSA/NSO ERP shall be notified immediately when monitoring of tritium and/or lead meets or exceeds the established action level; subsequently, NNSA/NSO will notify NDEP. Notification of subsequent monitoring results to NNSA/NSO ERP and NDEP shall follow established protocol. Monitoring results will be available to NDEP in accordance with Section 9.0 of this FMP.

8.1.2.1 Tritium Monitoring

During advancement of the borehole, a tritium screening sample will be collected hourly and analyzed from the discharge line. The NDEP will be notified via telephone, fax, or email when tritium monitoring levels reach or exceed 200,000 pCi/L; this is a courtesy notification only and will not result in operations being altered or suspended. The action level for tritium is 400,000 pCi/L (see Appendix A). If this level is exceeded during borehole advancement activities, NNSA/NSO ERP will be notified, and NNSA/NSO will subsequently notify the NDEP that fluids will be discharged to a lined sump, and the well site will be considered and managed as "radiologically contaminated" from that point forward, unless proven otherwise.

8.1.2.2 Lead Monitoring

A lead sample shall be collected from the return discharge line once every eight hours while the borehole is being advanced. Monitoring samples may be analyzed on or off site but will, at a minimum, be analyzed daily. Lead may be monitored with a digital voltammeter, colorimetric method, or other appropriate method.

Background levels for metals may be identified in the Well-Specific Fluid Management Strategy Letter that is submitted to NDEP for approval. Any site-specific changes to the sampling protocols detailed below will be identified in the strategy letter. Lead is monitored primarily to ensure that the RCRA level for lead (5 mg/L) is not exceeded. Exceeding the RCRA level for lead may result in the generation of a hazardous or mixed waste in the sump(s). Therefore, the lead monitoring method must be capable of indicating lead at concentrations of less than 5 mg/L. To provide early warning of lead levels approaching the RCRA standard, the level of 3 mg/L was chosen as the initial decision point for lead monitoring under this FMP. That is, if lead concentrations detected are 3 mg/L or greater, the confirmatory sampling protocol will be initiated. The detection of lead at any concentration less than 5 mg/L will not prompt the shutdown of operations; only a confirmed lead concentration of 5 mg/L mandates that fluid generating operations cease.

If a quantitative method is used to monitor lead, the action level for lead is 3 mg/L. If a semiquantitative method is employed, any indication of the presence of lead shall serve as the action level and prompt confirmatory sampling. In the following example, the lead "action level" referred to

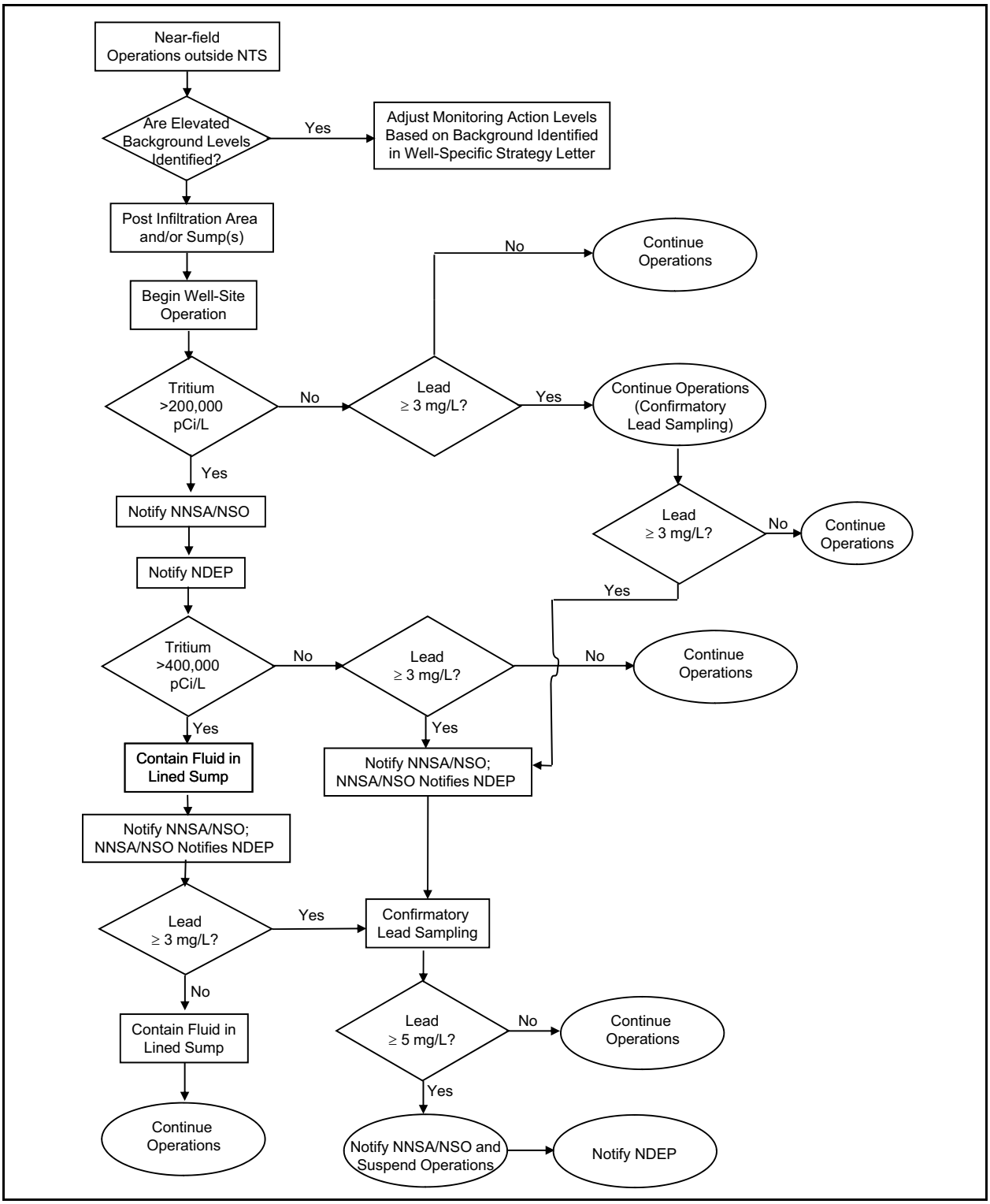

Figure 8-1
Near-field outside NTS Monitoring Decision Diagram

is associated with the RCRA hazardous waste lead level. The example describes confirmatory sampling to be initiated when the lead action level is exceeded.

> If a monitoring sample yields lead concentrations at or above the action level, an additional discharge line sample shall be collected immediately and analyzed. If this confirmatory sample yields lead concentrations less than the action level, the regular eight-hour monitoring schedule shall resume. If the confirmatory sample results in lead concentrations at or above the action level, a composite sample shall be collected immediately from the active sump. The first sump sample shall be analyzed for lead. If the sump sample results fall below the action level, regular eight-hour discharge monitoring shall resume. If the sump sample yields lead levels at or above the action level, drilling operations shall cease and a composite sump sample shall be obtained for laboratory analysis (see Appendix B).

8.1.3 Fluid Management Decision Criteria

The fluid management decision criteria used to determine the options for final fluid disposition are identified in Appendix A. These criteria are based on the Nevada Drinking Water Standards, federal standards, and NDEP guidance. Using UGTA historical knowledge, the following parameters were selected for establishing fluid quality for arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver, tritium, gross alpha, and gross beta. Fluid management decision criteria indicate the thresholds at which fluid disposal decisions are made. The decision criteria are based on the concentration of dissolved constituents. Samples collected in accordance with the sump sampling program will be analyzed for total and dissolved RCRA metals, gross alpha, gross beta, and tritium (see Appendix B). Only the dissolved metals results will be compared with Appendix A limits when making fluid disposal decisions.

In Appendix A, the 5 × FMP Criteria limits represent the maximum constituent concentrations below which fluids may be discharged to the ground surface. That is, if all radiological parameters and dissolved metals in Appendix A are less than 5 × FMP Criteria, fluids may be discharged directly to the ground surface. Similarly, if all parameters in Appendix A are less than 20 × FMP Criteria limits, fluids may be discharged into an unlined sump or infiltration area.

Note: The 5 × and 20 × FMP Criteria values in Appendix A are simply multipliers of the identified values. That is, the drinking water standards and other standards are the basis for development of the 5 × and 20 × FMP Criteria values.

Only the 5 × and 20 × FMP Criteria values in Appendix A will be used to make discharge/disposal decisions at near-field wells outside NTS. The standards themselves are included in Appendix A as a point of reference only and will not be compared directly with fluid analytical results to make discharge/disposal decisions.

8.1.4 Sump Sampling Program

The primary purpose of this sampling program is to determine final fluid disposition. The collection of samples for laboratory analysis applies to fluids contained or stored in sumps. The analytical results received from the laboratory are compared to the limits in Appendix A to allow the discharge of fluids to an unlined sump, infiltration area, or the ground surface.

Background readings for metals can be used to raise the discharge criteria to ground surface limits, but fluids above background or FMP Criteria up to 20 × FMP Criteria must be discharged to at least a fenced or posted unlined sump or infiltration area. Fluids containing greater than or equal to 20 × FMP Criteria levels shall be discharged to a fenced and lined sump or containment vessel.

If a sump is used to contain drilling fluids from an investigation activity, a sump sample shall be collected and analyzed to determine proper fluid disposition of the sump fluids. The primary purpose of these samples is to characterize the contained fluids. While fluids are being added to the sumps, as during borehole advancement or well completion, a sample does not need to be collected. However, once operations that affect containment volume have ceased or a change in fluid containment is to occur, a sample must be collected for laboratory analysis. The sample must be collected from the sump to which fluids were discharged (active sump), and from all sumps to which fluids may have been transferred in the course of the immediate investigation activity. Samples shall be collected, or appropriate analytical data available, for each containment that holds fluid at a site before discharging or the project vacating the site. Contained fluids will be analyzed for the parameters listed in Appendix B.

8.1.5 Fluid Disposition

This section discusses fluid disposition options for fluids that are contained/stored in a lined sump. This FMP allows the discharge of investigation fluids on site when specific fluid criteria are met. The

options for onsite disposal of investigation fluids are an infiltration area, unlined sump, and the ground surface. An infiltration area is a predesignated bounded area on the ground surface within which fluids may be discharged. The "ground surface" refers to the natural or relatively undisturbed condition of an area of surface soil or rock. Decisions on fluid disposition are based on laboratory sample results, as compared to fluid decision criteria. In no event will fluids be discharged to an infiltration area or the ground surface from a lined sump if fluid decision criteria as provided in Appendix A of this document are not met. The onsite disposal options for fluids stored in lined sumps are:

- **Direct discharge to the ground surface**. Fluids documented to be less than FMP Criteria for all required FMP analytical parameters may be discharged to the ground surface. Caution shall be taken to ensure that erosion is controlled.

- **Discharge to an infiltration area or unlined sump**. Fluids documented to be less than 20 × FMP Criteria for all required FMP analytical parameters may be discharged to an infiltration area or unlined sump.

If fluids do not meet the fluid decision criteria for discharge/disposal on site, then fluid disposal options include 1) onsite containment in lined sumps or 2) transport for disposal off site. The criteria for these options are as follows:

- **Onsite containment in a lined sump.** Fluids documented to contain RCRA metals below hazardous waste limits found in the RCRA standards in the most recent version of Title 40 CFR Part 261.24 (CFR, 2008) and radiological parameters greater than 20 × FMP Criteria will be allowed to evaporate in lined sumps on site. Alternatively, these fluids may be transported off site via portable tanks to another lined sump for storage, or transported to a NTS or a permitted commercial TSDF.

- **Transportation to NTS or offsite TSDF**. Fluids documented to contain any RCRA metal above its respective hazardous waste limit found in the RCRA standards in the most recent version of Title 40 CFR Part 261.24 (CFR, 2008) would result in the suspension of operations. These fluids would be managed as hazardous (or mixed) waste in accordance with the most current version of the State of Nevada hazardous waste regulations and applicable DOE Orders. The NNSA/NSO ERP and NDEP will be notified immediately if fluids are documented to be hazardous or mixed waste. The fluids may be pumped from the lined sumps and transported to an appropriate storage area on the NTS, or may be transported directly to a permitted commercial TSDF.

Appendix C illustrates the general decision flow process for the disposal of fluids. The appropriate fluid disposal option will be chosen based on a comparison of the appropriate laboratory analytical

data with the fluid management decision criteria specific to each option. As indicated, the concentrations of fluid management parameters outlined in Appendix A shall not exceed 20 × FMP Criteria if the fluids are to be discharged to an infiltration area or unlined sump. Fluids intended for discharge to the ground surface must not exceed 5 × FMP Criteria or the background levels identified in the Well-Specific Fluid Management Strategy Letter.

8.2 Other Well-Site Activities

Other well-site activities include those that encounter subsurface formations that were previously penetrated or contacted in some way. Examples of other well-site activities that typically occur without advancement of the borehole include cleaning and conditioning the borehole; performing circulation of the borehole; conducting fishing and wash-over operations; performing well completion operations, such as casing and stemming annular materials; developing wells; and testing and conducting periodic sampling events. Well completion designs and associated well construction activities will vary depending on well-specific objectives and may include setting intermediate casing; running a completion string to a specified depth; and/or isolating productive zones with gravel, cement, packers, and sliding sleeves. Other activities may be conducted within a discrete period (e.g., a one-day well sampling event) or over a span of time (e.g., a series of well purging and testing activities that span months).

8.2.1 Fluid Containment

Fluid containment options during other well-site activities outside the NTS operating under the near-field strategy will typically be the same as those described in Section 8.1.1. Lined sumps used during borehole advancement may be used for fluid containment during well development, testing, and periodic sampling activities.

If well-site conditions have changed from near-field to far-field, alternate fluid containment options will be available during other well-site activities, to include discharge to an infiltration area, unlined sump, or to the ground surface. The NNSA/NSO ERP will notify NDEP of any change in well-site operation strategy or any deviations from the Well-Specific Fluid Management Strategy Letter.

8.2.2 Monitoring

The primary difference between monitoring during borehole advancement and during other well-site activities is the frequency of monitoring sample collection. In a near-field scenario during other well-site activities, a minimum of one tritium sample and one lead sample will be collected daily from the discharge line and, at a minimum, analyzed weekly. The results of each sample will be used to make decisions regarding fluid containment and/or the progression of investigation operations. See Section 8.1.2 for detailed information on tritium and lead monitoring in a near-field scenario.

8.2.3 Fluid Management Decision Criteria

The fluid management decision criteria in Appendix A are to be used to determine the options for final disposition of fluids generated during other well-site activities. See Section 8.1.3 for further detail.

8.2.4 Sump Sampling Program

The sump sampling program for other well-site activities is the same as that during borehole advancement. A sump sample shall be collected once fluid-producing operations have ceased. For example, in a near-field situation, if a well is being purged in preparation for periodic sampling, fluids may be discharged to a lined sump. A sump sample will be collected from the sump to which fluids were discharged (active sump) and from all sumps to which fluids may have been transferred in the course of the activity. Sump samples shall be collected, or appropriate analytical data available, for each containment that holds fluid at a site before discharging or the project vacating the site. Sump fluids will be analyzed for the parameters listed in Appendix B.

8.2.5 Fluid Disposition

The same decision process for fluid disposition of near-field drilling fluids is to be implemented for fluids generated during other well-site activities. See Section 8.1.5 for further detail.

9.0 Reporting Requirements

The NNSA/NSO ERP shall comply with the following reporting requirements for all investigation activities covered under this FMP that are undertaken to support the UGTA Sub-Project:

- **Fluid Release Reporting**. The NDEP shall be notified if fluids in excess of 20 × FMP Criteria limits, as defined by this FMP, are discharged into an unlined sump, infiltration area, or beyond the confines of a lined sump in volumes greater than 1 cubic meter (264 gallons). Such notification must be provided by telephone before the end of the next business day following verification of the incident. Telephone notification shall be followed by a written report that includes elements described in spill reporting regulations within 10 calendar days.

- **Hazardous or Mixed Waste Generation**. The NDEP will be notified immediately if laboratory results indicate that mixed or hazardous waste has been generated in an unlined or lined sump. Non-emergency actions that constitute deviations to this FMP will be reported to NDEP before implementing the action. Emergency actions that are taken that constitute deviations to this FMP will be reported verbally to NDEP within 24 hours of implementation of the action, and a written report will be provided to NDEP within 10 working days of the action.

- **Strategy Letter**. The NNSA/NSO ERP will submit to NDEP a Well-Specific Fluid Management Strategy Letter as defined in Section 3.0 for approval before beginning well-site activities.

- **Well-Site Activity Reporting (Morning Reports)**. The synopsis of well-site activities occurring within a 24-hour period (i.e., the morning report) shall be transmitted (fax or electronic mail) to NDEP each day for all activities covered under this FMP. Fluid releases not reportable under "Fluid Release Reporting" above will be discussed in the morning reports.

All correspondence to NDEP shall be addressed to:

NDEP Bureau Chief
2030 E. Flamingo Road, Suite 230
Las Vegas, NV 89119

All field and laboratory data generated to support UGTA Sub-Project well construction activities will be archived and made available for inspection by NDEP upon request. The following data will be

generated and retained on file. These data shall be made available to the appropriate NDEP staff for inspection upon request:

- Legible copies of daily drilling progress reports and daily well-site activities
- Volumetric measurements of fluids generated during each stage of well construction
- Makeup water delivery and usage during each stage of well construction
- Onsite fluid monitoring data
- Laboratory analytical data with supplemental quality assurance/quality control and chain of custody records
- Process materials (e.g., cement, grout, casing, screens, packing, drilling fluids) and drilling additive usage, and equipment decontamination

10.0 References

CFR, see *Code of Federal Regulations.*

Code of Federal Regulations. 2008. Title 40 CFR Part 261.24, "Toxicity Characteristic." Washington, DC: U.S. Government Printing Office.

FFACO, see *Federal Facility Agreement and Consent Order.*

Federal Facility Agreement and Consent Order. 1996 (as amended February 2008). Agreed to by the State of Nevada; U.S. Department of Energy, Environmental Management; U.S. Department of Defense; and U.S. Department of Energy, Legacy Management.

Appendix A

Fluid Management Decision Criteria Limits

Table A.1-1
Fluid Management Decision Criteria Limits

FMP Parameters	RCRA Levels (mg/L)	FMP Criteria (mg/L)	5 × FMP Criteria[a] (mg/L)	20 × FMP Criteria[b] (mg/L)
Arsenic	5.0	0.010	0.050	0.2
Barium	100.0	2	10	40
Cadmium	1.0	0.005	0.025	0.1
Chromium	5.0	0.100	0.500	2
Lead	5.0	0.015	0.075	0.3
Selenium	1.0	.050	0.250	1
Silver	5.0	0.100	0.500	2
Mercury	0.2	0.002	0.010	0.04
Gross Alpha	N/A	15 pCi/L[c]	75 pCi/L	300 pCi/L
Gross Beta	N/A	50 pCi/L[c]	250 pCi/L	1,000 pCi/L
Tritium	N/A	20,000 pCi/L[c]	100,000 pCi/L	400,000 pCi/L

[a]Limit for discharge to the ground surface
[b]Limit for discharge to an unlined sump or infiltration area
[c]Limit for discharge to the ground surface for far-field wells outside NTS or as designated in the Well-Specific Fluid Management Strategy Letter

N/A = Not applicable

Appendix B

Analytical Laboratory Requirements for Fluid Management Samples

Table B.1-1
Analytical Laboratory Requirements for Fluid Management Samples

Parameter	Reporting Detection Limit	RCRA Levels[a]	SDWA Drinking Water Standards (MCLs)[b,c,d]	Units	Analytical Method[e, f]	Maximum Holding Time[g]	Preservative[g]	Container Type[g]
Total:								
Arsenic	0.01	5.0	0.01	mg/L	SW-846 6010/6020	6 months	HNO_3 to pH <2	(1) 1-L polyethylene or glass
Barium	0.1	100	2.0					
Cadmium	0.005	1.0	0.005					
Chromium	0.01	5.0	0.1					
Lead	0.003	5.0	0.015					
Selenium	0.005	1.0	0.05					
Silver	0.01	5.0	0.1h					
Mercury	0.0002	0.2	0.002	mg/L	SW-846 7470	28 days	HNO_3 to pH <2	(1) 1-L polyethylene or glass
Dissolved:								
Arsenic	0.01	5.0	0.01	mg/L	SW-846 6010/6020	6 months	Field/Lab Filtration HNO_3 to pH < 2	(1) 1-L polyethylene or glass
Barium	0.1	100	2.0					
Cadmium	0.005	1.0	0.005					
Chromium	0.01	5.0	0.1					
Lead	0.003	5.0	0.015					
Selenium	0.005	1.0	0.05					
Silver	0.01	5.0	0.1h					
Mercury	0.0002	0.2	0.002	mg/L	SW-846 7470	28 days	Field/Lab Filtration HNO_3 to pH < 2	(1) 1-L polyethylene or glass
Gross Alpha	10	N/A	15	pCi/L	EPA 900.0 or equivalent	6 months	Field/Lab Filtration HNO_3 to pH < 2	(1) 1-L polyethylene
Gross Beta	<15	N/A	50[d]	pCi/L	EPA 900.0 or equivalent	6 months	Field/Lab Filtration HNO_3 to pH < 2	(1) 1-L polyethylene
Tritium	1,000	N/A	20,000	pCi/L	EPA 906.0 or equivalent	6 months	Field or Lab Filtration	(1) 125-mL amber glass

[a]40 CFR Part 261.24, Table 1 (CFR, 2009d)
[b]40 CFR Parts 141.23 and 141.62 (CFR, 2009b)
[c]40 CFR Part 141.66 (c), Table A and 141.26 (i) (CFR, 2009b)
[d]The MCL for gross beta is calculated and referenced in the *Federal Register,* Vol. 65, No. 236 (EPA, 2000).
[e]*Prescribed Procedures for Measurement of Radioactivity in Drinking Water* (EPA, 1980).
[f]SW-846-Online (EPA, 2008)
[g]40 CFR Part 136.3 (e), Table II (CFR, 2009a)
[h]The MCL for silver is a secondary drinking water MCL found in 40 CFR Part 143.3 (CFR, 2009c).

HNO_3 = Nitric acid
L = Liter
mg = Milligram
pCi = Picocurie

Notes:
1. Filtration and preservation should be performed in the field; if field filtration is not feasible, samples will be sent to the laboratory for subsequent filtering and preservation.
2. Maximum contaminant level (MCL) = The highest level of a contaminant that is allowed in drinking water. The MCLs are set as close to MCL goals as feasible using the best available treatment technology and taking cost into consideration.

References

CFR, see *Code of Federal Regulations.*

Code of Federal Regulations. 2009a. Title 40 CFR Part 136, "Guidelines Establishing Test Procedures for the Analysis of Pollutants." Washington, DC: U.S. Government Printing Office.

Code of Federal Regulations. 2009b. Title 40 CFR Part 141, "National Primary Drinking Water Regulations." Washington, DC: U.S. Government Printing Office.

Code of Federal Regulations. 2009c. Title 40 CFR Part 143, "National Secondary Drinking Water Regulations." Washington, DC: U.S. Government Printing Office.

Code of Federal Regulations. 2009d. Title 40 CFR Part 261, "Identification and Listing of Hazardous Waste." Washington, DC: U.S. Government Printing Office.

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U.S. Environmental Protection Agency. 1980. *Prescribed Procedures for Measurement of Radioactivity in Drinking Water,* EPA 600/4-80-032. Cincinnati, OH: Environmental Monitoring and Support Laboratory Office of Research and Development.

U.S. Environmental Protection Agency. 2000. "National Primary Drinking Water Regulations; Radionuclides; Final Rule," 7 December. In *Federal Register,* Vol. 19, No. 236.

U.S. Environmental Protection Agency. 2008. *SW-846 On-Line, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods.* As accessed at http://www.epa.gov/epaoswer/hazwaste/test/main.htm on 17 March 2009.

Appendix C

Decision Diagrams for Fluid Disposal

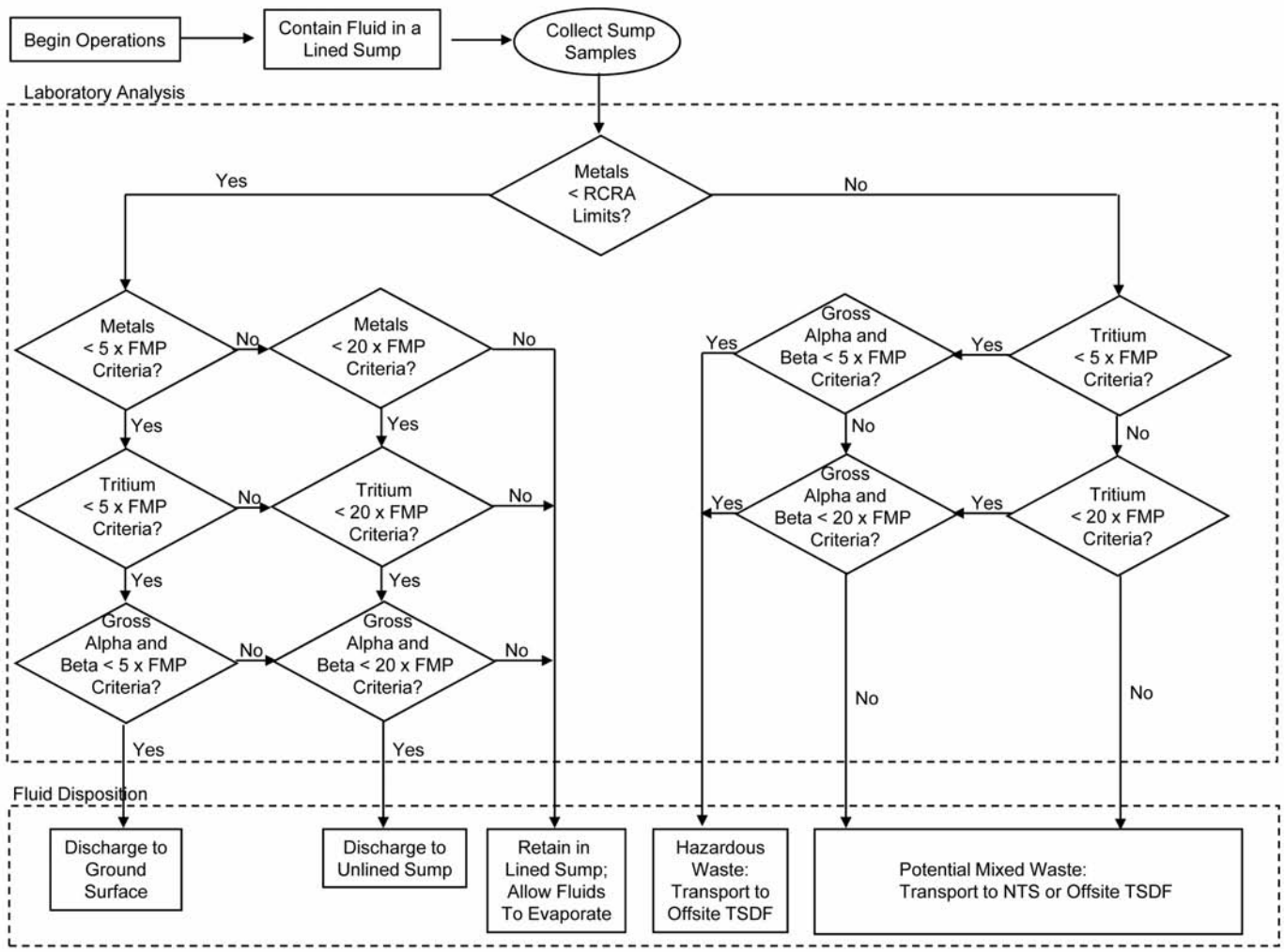

Figure C.1-1
NTS Decision Diagram for Fluid Disposal

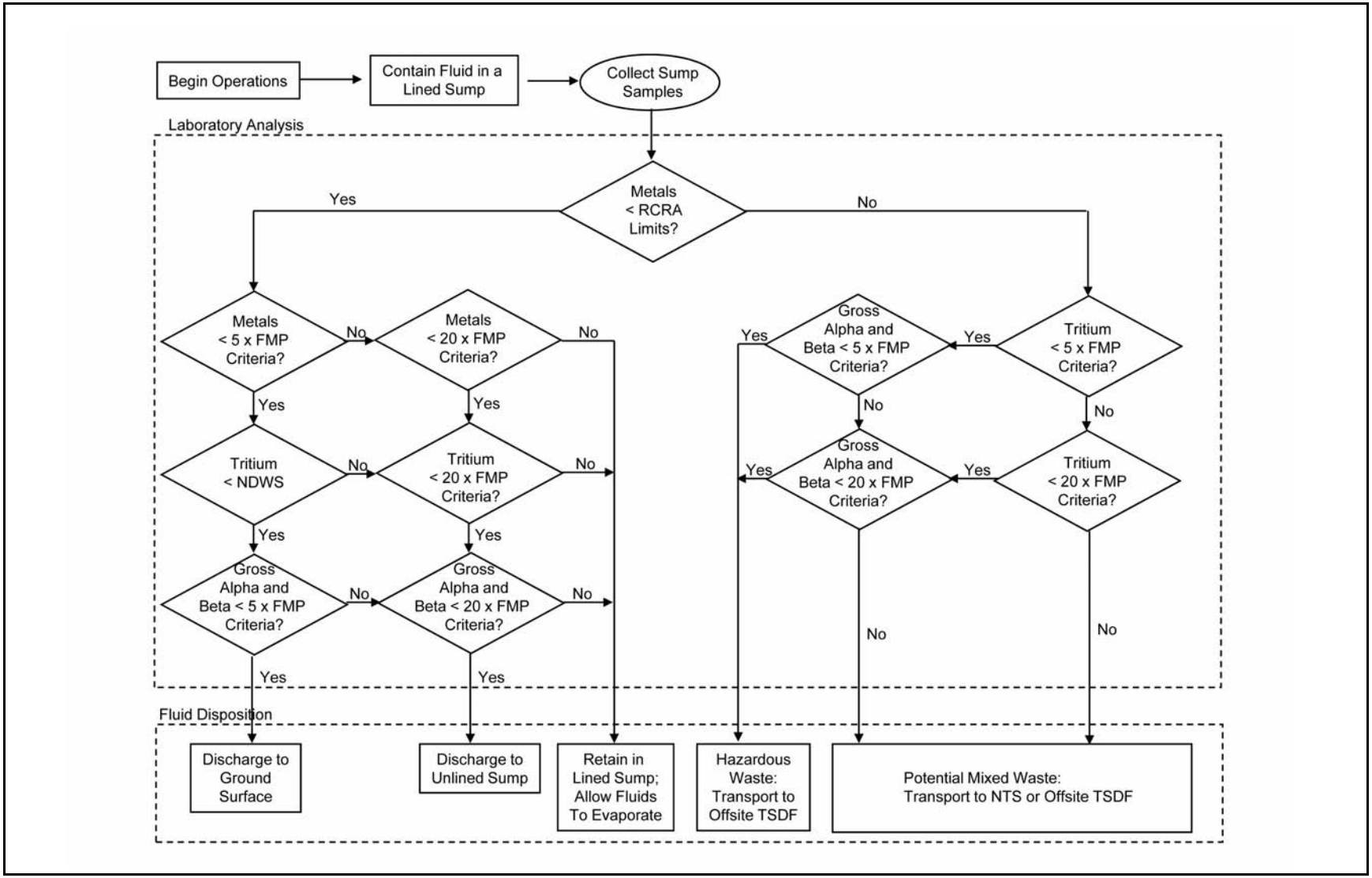

Figure C.1-2
Off NTS Decision Diagram for Fluid Disposal

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