WESTERN REFINING SOUTHWEST, INC.
GALLUP REFINERY

EPA ID NM No. NM000333211

FINAL
RCRA POST-CLOSURE PERMIT

OCTOBER 2013

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PART I: GENERAL PERMIT CONDITIONS

I.A AUTHORITY

This Permit is issued pursuant to the authority of the New Mexico Environment Department (NMED) under the New Mexico Hazardous Waste Act (HWA), NMSA 1978, §§ 74-4-1 through 74-4-14, in accordance with the New Mexico Hazardous Waste Management Regulations (HWMR), 20.4.1 NMAC.

Pursuant to the Resource Conservation and Recovery Act (RCRA), 42 U.S.C. §§ 6901 to 6992k, and 40 CFR Part 271 and Part 272, Subpart GG, the State of New Mexico, through the NMED, is authorized to administer and enforce the state hazardous waste management program under the HWA in lieu of the federal program.

This Permit contains terms and conditions that the NMED has determined are necessary to protect human health and the environment at the Gallup Refinery. (40 CFR § 270.32(b)(2)).

I.B PERMITTEE

The Secretary of the New Environment Department issues this Permit for Western Refining Southwest, Inc., hereinafter referred to as the Permittee, the owner and operator of Gallup Refinery (the Facility), with EPA ID No. NM 000333211, located in McKinley County, New Mexico.

In accordance with 40 CFR § 270.1(c), owners and operators of land treatment facilities (as defined in 20.4.1.100 NMAC incorporating 40 CFR § 260.10), also referred to as land treatment units, that received waste after July 26, 1982, must have a post-closure care permit. The RCRA Hazardous Waste Land Treatment Unit (LTU) at the Gallup Refinery, last received waste in November 1990. The LTU must address the applicable parts of 40 CFR Part 264, Subparts F and G regarding groundwater monitoring, corrective action, and post-closure care. This Post-Closure Care Permit (the Permit) identifies the activities that shall be performed at the Facility and is designed to meet RCRA post-closure care requirements in 40 CFR §§ 264.117 through 264.120.

I.C PERMITTED ACTIVITY

This Permit authorizes the Permittee to conduct post-closure care at the LTU which is a Hazardous Waste Management Unit (HWMU). This Permit also requires the Permittee to conduct corrective action activities and to conduct tasks in accordance with a schedule of compliance. A post-closure care permit was previously issued in 2000. This Permit establishes the general and specific standards for these activities, as required pursuant to the Hazardous Waste Act (HWA), and the New Mexico Hazardous Waste Management Regulations.

I.D CITATIONS

Wherever the Permit cites a provision of 20.4.1 NMAC or 40 CFR the Permit shall be deemed to incorporate the citation by reference, including all subordinate provisions of the cited provision, and make binding the full text of the cited provision. Hazardous waste management regulations are frequently cited throughout this Permit. The federal *Hazardous Waste Management*

Regulations, 40 CFR Parts 260 through 273, are generally cited rather than the *New Mexico Hazardous Waste Management Regulations*, 20.4.1 NMAC. The federal regulations are cited because only the federal regulations set forth the detailed regulatory requirements; the State regulations incorporate by reference, with certain exceptions, the federal regulations in their entirety. Citing only the federal regulations also serves to avoid encumbering each citation with references to two sets of regulations. However, it is the State regulations that are legally applicable and enforceable. Therefore, for the purpose of this Permit, and enforcement of its terms and conditions, all references to provisions of federal regulations that have been incorporated into the State regulations shall be deemed to include the State incorporation of those provisions.

I.E EFFECT OF PERMIT

Compliance with this Permit during its term constitutes compliance, for purposes of enforcement, with 20.4.1.500, 700 and 800 NMAC (incorporating 40 CFR Parts 264, 266 and 268), except for those requirements not included in this Permit under 40 CFR § 270.4(a), only for those management practices specifically authorized by this Permit. The Permittee must also comply with all applicable self-implementing provisions imposed by statute or rule, including 20.4.1.100, 200, 300, 400, 500, 700, and 800 NMAC (incorporating 40 CFR Parts 260, 261, 262, 263, 264, 266, and 268). Compliance with this Permit shall not constitute a defense to any Permit issued or any action brought under Sections 74-4-10, 74-4-10.1 or 74-4-13 of the HWA; Sections 3008(a), 3008(h), 3013, 7002(a) or 7003 of the Resource Conservation and Recovery Act (RCRA), as amended, 42 U.S.C. 6901 to 6922k; Sections 104, 106(a), and 107 of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), 42 U.S.C. 9601 to 9675; or any other law providing for protection of public health or the environment. This Permit does not convey any property rights of any sort or any exclusive privilege, nor authorize any injury to persons or property, any invasion of other private rights, or any infringement of State or local laws or regulation. Compliance with this Permit does not relieve the Permittee from the responsibility of complying with all applicable state or federal laws and regulations. [20.4.1.900 NMAC (incorporating 40 CFR §§ 270.4, 270.30(g) and 270.32(b)(1)); 20.4.1.901.A(11); and 1100 NMAC]

I.F EFFECT OF INACCURACIES IN PERMIT APPLICATION

This Permit is based on the information submitted in the Part B Permit application dated February 2010 (Application). Any inaccuracies found in the Application may be grounds for the termination, revocation and reissuance, or modification of this Permit pursuant to 40 CFR § 270.43(a)(2). Where and when the Permittee becomes aware that it failed to submit any relevant facts in the Application, or submitted incorrect information in the Application or in any report to the NMED, it shall promptly submit such facts or information pursuant to 40 CFR § 270.30(l)(11).

I.G PERMIT ACTIONS

I.G.1 Duration of Permit

This Permit shall be effective for a period of ten years from the effective date. The effective date of this Permit shall be 30 calendar days after notice of the NMED's decision has been served on the Permittee, or such later time as the NMED may specify. (40 CFR § 270.50(a) and 20.4.1.901.A(10) NMAC).

I.G.2 Permit Modification

This Permit may be modified for both routine and significant changes as specified in 40 CFR §§ 270.41 through 270.43, and any modification shall conform to the requirements specified in these regulations. The filing of a permit modification request by the Permittee, or the notification by the Permittee of planned changes or anticipated noncompliance, does not stay the applicability or enforceability of any permit condition. (40 CFR § 270.30(f)).

I.G.3 Permit Modification, Suspension, Revocation, or Termination

1. This Permit may be modified, suspended, revoked and reissued, or terminated for cause in accordance with provisions of the HWA, NMSA 1978, § 74-4-4.2 and 40 CFR §§ 270.41 through 270.43. The filing of a request by the Permittee for a Permit modification, or the notification of planned changes or anticipated noncompliance or, if suspension, or revocation is ordered by the NMED, shall not stay any Permit requirement, in accordance with 40 CFR § 270.30(f).
2. If at any time for any of the reasons specified in 40 CFR § 270.41, the NMED determines that modification of this Permit is necessary, the NMED may initiate a Permit modification or require the Permittee to request a Permit modification.
3. The Permittee may request permit modifications in accordance with 40 CFR § 270.42. All applicable requirements specified in 40 CFR § 270.42 and 20.4.1.900 NMAC shall be followed.
4. Modifications to the Permit do not constitute a reissuance of the Permit.

I.G.4 Unclassified Permit Modifications

Unless a permit modification is explicitly listed in Appendix I of 40 CFR § 270.42 as a Class 1 or 2 permit modification, the Permittee shall not submit the proposed permit modification as a Class 1 or 2 permit modification. The Permittee may only make such permit modification as a Class 3 modification, or may request a determination from the NMED that the proposed permit modification is reviewed and approved as a Class 1 or 2 modification in accordance with the requirements of 20.4.1.901 NMAC and 40 CFR § 270.42(d)(1).

I.G.5 Permit Re-Application

The Permittee shall submit an application for a new permit at least one hundred eighty (180) calendar days before the expiration date of this Permit, unless permission for a later date has

been granted by the NMED, pursuant to 40 CFR § 270.10(h)(1). (40 CFR § 270.10(h) and 270.30(b); 42 U.S.C. 6925(c)(3)).

I.G.6 Continuation of Expired Permit

The conditions in this Permit shall continue in force and effect until the effective date of a new permit if:

1. The Permittee has submitted a timely application under 40 CFR § 270.13, 40 CFR § 270.14, and the applicable sections in 40 CFR § 270.15 through 270.29, which is a complete application under 40 CFR § 270.10(c) for a new permit; and
2. The NMED, through no fault of the Permittee, does not issue a new permit with an effective date on or before the expiration date of the previous permit.

While this Permit is continued under this condition, it remains fully effective and enforceable. (40 CFR § 270.51(b)).

I.G.7 Permit Review by the NMED

The NMED will review the closure and post-closure requirements associated with the land disposal units addressed in this Permit five years after the effective date of Permit issuance and may modify this Permit as necessary pursuant to § 74-4-4.2 of the HWA and 40 CFR §§ 270.41 and 270.50(d). Such modification shall not extend the effective term of this Permit. Nothing shall preclude the NMED from reviewing and modifying any portion of this Permit, in accordance with applicable requirements, at any time during its term.

I.H PERMIT CONSTRUCTION

I.H.1 Severability

The provisions of this Permit are severable, and if any provision of this Permit or any application of any provision of this Permit due to any circumstance is held invalid, then the application of such provision to other circumstances and the remainder of this Permit shall not be affected thereby.

I.H.2 Conflict in Language

If there is a conflict between the language of a Permit Condition and the language of a Permit Attachment, then the language of the Permit Condition shall control the language in the Permit Attachment. This Permit and 40 CFR § 264, 266 and 268 establish the minimum requirements for the design, construction, operation, and maintenance of the Facility. Any language in an attachment, which states or implies discretion to not comply with the minimum requirements of this Permit or 40 CFR § 270.32(b)(1) is not effective and the requirements of this Permit and 40 CFR § 270.32(b)(1) shall control.

I.I DEFINITIONS

For the purposes of this Permit, terms used herein shall have the same meanings as those in the Hazardous Waste Act, the Resource Conservation and Recovery Act and their implementing regulations, unless this Permit specifically provides otherwise. Where a term is not defined in the Hazardous Waste Act, RCRA, or pursuant regulations, EPA guidelines or publications, or this Permit, the meaning associated with such a term shall be defined by a standard dictionary reference or the generally accepted scientific or industrial meaning of the term.

Administrative Record means the administrative record supporting and otherwise relating to the requirements of this Permit, compiled as of the effective date of this Permit, which forms the basis for the terms of this Permit. The Administrative Record includes the full record and those documents submitted in writing by the NMED, the Permittee, EPA or the public, as of the effective date of the Permit for inclusion in the Administrative Record. The Administrative Record is available for review at the New Mexico Environment Department Hazardous Waste Bureau.

Area of Concern (AOC) means any area having a known or suspected release of hazardous waste or hazardous constituents that is not from a solid waste management unit and that NMED has determined may pose a current or potential threat to human health or the environment. An area of concern may include buildings or structures at which releases of hazardous waste or constituents have not been remediated, including releases resulting from one time and accidental events.

Contaminant means any hazardous constituent listed in 40 CFR § Part 261, appendix VIII and 40 CFR Part 264, appendix IX; any groundwater contaminant listed in the New Mexico WQCC Regulations at 20.6.2.3103 NMAC; any toxic pollutant listed in the WQCC Regulations at 20.6.2.7.WW NMAC; methyl tertiary-butyl ether; polychlorinated biphenyls; and any other substance present in soil, sediment, rock, surface water, groundwater, or air for which the NMED determines that monitoring, other investigation, or a remedy is necessary to carry out the purposes of this Permit.

Corrective Action means all corrective action necessary to protect human health and the environment for all releases of hazardous or hazardous constituents from any Solid Waste Management Unit (SWMU) or Area of Concern at the Facility, regardless of the time at which waste was placed in the Unit, as required under HWA § 74-4-4.2(B) and 40 CFR § 264.101. Corrective Action entails any activity related to site assessment, investigation, remediation, characterization or monitoring including reporting and document submittals at SWMUs or AOCs, including activities related to off-site migration (20.4.2.7.I NMAC). Corrective Action may address releases to air, soil, sediment, surface water or groundwater.

Corrective Action Complete means the requirements for corrective action have been satisfied by the Permittee as determined by the NMED.

Day means a calendar day, unless specified as a business day. “Business day” means Monday through Friday, excluding all federal and New Mexico State holidays.

Discharge means the accidental or intentional spilling, leaking, pumping, pouring, emitting, emptying, or dumping of solid waste or hazardous waste into or onto any land or water.

Disposal means the discharge, deposit, injection, dumping, spilling, leaking, or placing of any solid waste or hazardous waste into or on any land or water so that such solid waste or hazardous waste or any constituent thereof may enter the environment or be emitted into the air or discharged into any waters, including groundwater.

EPA means the United States Environmental Protection Agency and any successor or predecessor agencies.

Extent of contamination means the horizontal and vertical area in which the concentrations of hazardous waste or constituents in the environmental media being investigated are above detection limits or background concentrations indicative of the region, whichever is appropriate, as determined by the NMED.

Facility means Gallup Refinery, EPA ID Number NM 000333211, owned by Western Refining Southwest, Inc. and located in McKinley County, New Mexico, including all contiguous land, and structures, other appurtenances, and improvements on the land, used for storage or disposal of hazardous waste. For the purposes of implementing corrective action under 40 CFR § 264.101, or RCRA Section 3008(h), or the HWA, NMSA 1978, § 74-4-10(E), the Facility includes all contiguous property under the control of the owner or operator (the Permittee) seeking a Permit under Subtitle C of RCRA, that is, 40 CFR Parts 260 through 273.

Groundwater means interstitial water, which occurs in saturated earth material.

Hazardous Waste for the purposes of corrective action for solid waste management units and areas of concern conducted pursuant to section 74-4-4.2(B) of the HWA, 40 CFR Part 264, subpart F, or 40 CFR § 270.32(b)(2), means a hazardous waste as defined in section 74-4-3(I) of the HWA. Hazardous waste, for the purposes of corrective action, includes, without limitation any "contaminant" defined in Section I.1 of the Permit and hazardous waste as defined in 40 CFR § 261.3, any ground water contaminant listed in the Water Quality Control Commission (WQCC) Regulations in 20.6.2.3103 NMAC, any toxic pollutant listed in 20.6.2.7 NMAC, any contaminant for which the EPA has promulgated a maximum contaminant level (MCL) at 40 CFR Parts 141 and 143, methyl tertiary butyl ether, polychlorinated biphenyls (PCBs), dioxins, and furans.

Hazardous Waste for all other purposes of this Permit, means a hazardous waste as defined in 40 CFR § 261.3.

Hazardous Constituent means any constituent identified in 40 CFR Part 261, Appendix VIII and any constituent identified in 40 CFR Part 264 Appendix IX.

HWA means the New Mexico Hazardous Waste Act, NMSA 1978, §§ 74-4-1 to 74-4-14.

Hazardous Waste Management Regulations (HWMR) means the New Mexico Hazardous Waste Management Regulations, 20.4.1 NMAC and all provisions of 40 CFR Parts 260 through 273 incorporated therein.

Interim Measures (IM) means actions that can be implemented to minimize or prevent migration of contaminants and to minimize or prevent actual or potential human or ecological exposure to contaminants while long-term, final corrective action remedies are evaluated and, if necessary, implemented.

Maximum Contaminant Level (MCL) means a maximum contaminant level under the Federal Safe Drinking Water Act, 42 U.S.C. §§ 300f to 300j-26, and the drinking water regulations promulgated thereunder.

NMED means the New Mexico Environment Department.

Off-site source means a generator of hazardous waste located within the United States of America, but outside the Permittee's Facility boundary.

Operator means the person responsible for the overall operation of the Facility. Western Refining Southwest, Inc. is the operator of Gallup Refinery.

Owner means the person who owns the Facility or part of a Facility. Western Refining Southwest, Inc. is the owner of Gallup Refinery.

Permittee means Western Refining Southwest, Inc.

RCRA means the federal Resource Conservation and Recovery Act, 42 U.S.C. §§ 6901 to 6992k, also known as the Solid Waste Disposal Act.

Release means any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing of hazardous wastes (including hazardous constituents) into the environment (including the abandonment or discarding of barrels, containers, and other closed receptacles containing hazardous wastes or constituents).

Secretary means the NMED Secretary or his or her designee or authorized representative.

Solid Waste Management Unit (SWMU) means any discernable unit or area at the Facility at which solid waste has been placed at any time, and from which the NMED determines there may be a risk of a release of hazardous waste or constituents, irrespective of whether the unit was intended for the management of solid waste. Placement of solid waste includes any units or area at the Facility at which solid waste has been routinely and systematically released.

Surface Impoundment means a facility or part of a facility which is a natural topographic depression, man-made excavation, or diked area formed primarily of earthen material (although it may be lined with man-made materials), which is designed to hold an accumulation of liquid wastes or wastes containing free liquids, and which is not an injection well. Examples of surface impoundments are holding, storage, settling, and aeration pits, ponds, and lagoons.

TAL Metals means the list of 23 inorganic target analytes defined by the EPA Contract Laboratory Program Statement of Work. The list consists of the following: aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, potassium, selenium, silver, sodium, thallium, vanadium, and zinc.

Upper Confidence Limit (UCL) means the 95 percent upper confidence limit of the mean value. The UCL shall be calculated following the methodology in EPA (1992, as updated) Supplemental Guidance to RAGS: Calculating the Concentration Term.

Upper Tolerance Limit (UTL) means the upper tolerance limit, which is a statistical estimate of the maximum concentration. The UTL shall be calculated in accordance with the Hazardous Waste Bureau Position Paper (March 2000, as updated) Use of Tolerance Intervals for Determining Inorganic Background Concentrations.

Water Quality Control Commission (WQCC) means the New Mexico Water Quality Control Commission, and any successor agencies, boards, or commissions.

Water Quality Control Commission Regulations means the regulations at 20.6.2 NMAC promulgated by the New Mexico Water Quality Control Commission governing the quality of groundwater and surface water in New Mexico.

I.J DUTIES AND REQUIREMENTS

I.J.1 Duty to Comply

The Permittee shall comply with all sections in this Permit, except to the extent and for the duration such noncompliance is authorized in an emergency permit, in accordance with the requirements of 40 CFR § 270.61. Any permit noncompliance, except under the terms of an emergency permit, constitutes a violation of the Hazardous Waste Act and RCRA and may subject the Permittee, its successors and assigns, officers, directors, employees, parents, or subsidiaries, to an administrative or civil enforcement action (40 CFR § 270.30(a)).

I.J.2 Enforcement

Any violation of a condition in this Permit may subject the Permittee or their officers, employees, successors, and assigns to:

1) a compliance order under § 74-4-10 of the HWA or § 3008(a) of RCRA (42 U.S.C. § 6928(a));
2) an injunction under § 74-4-10 of the HWA or § 3008(a) of RCRA (42 U.S.C. § 6928(a)), or § 7002(a) of RCRA (42 U.S.C. § 6972(a));
3) civil penalties under § 74-4-10 of the HWA or §§ 3008(a) and (g) of RCRA (42 U.S.C. §§ 6928(a) and (g)), or § 7002(a) of RCRA (42 U.S.C. § 6972(a));
4) criminal penalties under § 74-4-11 of the HWA or §§ 3008(d), (e), and (f) of RCRA (42 U.S.C. §§ 6928(d), (e), and (f)); or
5) some combination of the foregoing.

The list of authorities in this paragraph is not exhaustive and the NMED reserves the right to take any action authorized by law to enforce the requirements of this Permit.

I.J.3 Transfer of Permit

The Permittee shall not transfer this permit to any person except after prior written approval of the NMED.

This Permit may be transferred by the Permittee to a new owner or operator only if the Permit has been modified or revoked and reissued in accordance with the requirements of 40 CFR § 270.40(b) or 270.41(b)(2), to identify the new Permittee and incorporate such other requirements as may be necessary under HWA and RCRA. (40 CFR §§ 270.30(l)(3) and 270.40(a))

The Permittee may make changes in ownership or operational control of the Facility as a Class 1 modification after obtaining prior written approval of the NMED in accordance with 40 CFR § 270.40. The new owner or operator must submit a revised permit application no later than 90 calendar days prior to the scheduled change including a written agreement containing a specific date for transfer of permit responsibility between the current and new Permittee.

The new owner or operator shall demonstrate compliance with 40 CFR 264, Subpart H (Financial Requirements) within 6 months of the date of the change of ownership or operational control of the Facility. (40 CFR § 270.40(b)).

Before transferring ownership or operation of the Facility, the Permittee shall notify the new owner or operator in writing of the requirements of 40 CFR Part 264 and 40 CFR Part 270, and the HWA and shall provide the NMED with a copy of this notice. (40 CFR § 264.12(c))

I.J.4 Need to Halt or Reduce Activity Not a Defense

It shall not be a defense for the Permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in the Permit to maintain compliance with the condition of this Permit. (40 CFR § 270.30(c))

I.J.5 Property Rights

This Permit does not convey any property rights of any sort, or any exclusive privilege, pursuant to 40 CFR § 270.30(g).

I.J.6 Duty to Mitigate

In the event of noncompliance with this Permit, the Permittee shall take all reasonable steps to minimize releases to the environment and shall carry out such measures as are reasonable to prevent significant adverse impacts on human health or the environment. (40 CFR § 270.30(d))

I.J.7 Proper Operation and Maintenance

The Permittee shall at all times properly operate and maintain all facilities and systems of treatment, control, and related appurtenances which are installed or used by the Permittee to achieve compliance with the sections of this Permit. Proper operation and maintenance include effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls, including appropriate quality assurance and quality control procedures. (40 CFR § 270.30(e)).

I.J.8 Duty to Provide Information

The Permittee shall furnish to the NMED, within a reasonable time as specified by the NMED, any relevant information which the NMED may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this Permit, or to determine compliance with this Permit.

The Permittee shall also furnish to the NMED, upon request, copies of records required to be kept by this Permit. Information and records requested by the NMED pursuant to this condition

shall be provided in paper form or in an electronic format acceptable to the NMED or both as the NMED may specify (40 CFR § 264.74(a) and 40 CFR § 270.30(h)).

This Permit condition shall not be construed to limit in any manner the NMED's authority under § 74-4-4.3 of the HWA, §3007(a) of RCRA, or any other applicable law or regulation (40 CFR §§ 264.74(a) and 270.30(h)).

I.J.9 Inspection and Entry

The Permittee shall allow authorized representatives of the NMED, upon the presentation of credentials and at reasonable times, and under the conditions of this Permit, to:

1. enter upon the Permittee' premises where the permitted unit or activity is located or conducted or where records must be kept;
2. have access to and photograph any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required;
3. inspect any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required;
4. have access to, and copy, any records that must be kept; and
5. sample or monitor, for the purposes of ensuring Permit compliance or as otherwise authorized by the HWA or RCRA, any substances or parameters at any location.

(40 CFR § 270.30(i)).

This Permit Condition shall not be construed to limit in any manner the NMED's authority under 74-4-4.3 of HWA, 3007(a) of RCRA, or any other applicable law or regulation.

I.J.10 Compliance Schedules

The Permittee shall submit documents to the NMED for its approval, or perform other actions required by this Permit, in accordance with the schedule provided in Permit Attachment E (*Compliance Schedule*). (40 CFR §§ 270.30(l)(5) and 270.33(a)). If the action is not itself the submittal of a written document, the Permittee shall submit to the NMED a written notification of their compliance with the schedule no later than 14 days following the scheduled date.

I.J.11 Approval of Work Plans and Other Documents

All documents that the Permittee prepares under the terms of this Permit and submits to the NMED that are subject to the requirements of 20.4.2 NMAC shall be subject to the procedures set forth therein. NMED will provide the Permittee written notice of approval, approval with modifications, disapproval, denial or rejection of the submittal. If the submittal is disapproved, denied, or rejected NMED will provide the Permittee with written notice providing the reasons for such actions. Documents requiring NMED approval that are not subject to the requirements of 20.4.2 NMAC may be reviewed and approved, approved with modifications or directions, disapproved, denied, or rejected by the NMED.

Upon the NMED's written approval or direction, all submittals and associated schedules shall become enforceable as part of this Permit in accordance with the terms of the NMED's written

approval or direction, and such documents, as approved, including any modifications or direction, shall control over any contrary or conflicting requirements of this Permit. This provision does not affect any public process that is otherwise required by this Permit, the HWA, or its implementing regulations.

Failure to submit any of the work plans, schedules, reports, and other deliverable documents that the Permittee is required to prepare under this Permit in substantial compliance with this Permit, and according to the schedules or deadlines in this Permit, may subject the Permittee to enforcement action under § 74-4-10 of the HWA, or other applicable provisions of law, which may include fines, civil penalties, or suspension or revocation of the Permit.

The work plans may propose to the Department methods and procedures that differ from those in this Permit. Any such proposal shall be in writing, shall specifically identify each proposed method or procedure and explain how it differs from this Permit, and shall be accompanied by a written justification. If the Department approves in writing a work plan with such different method or procedure, the method or procedure of the approved work plan, rather than the method or procedure of this Permit, shall be applicable and enforceable. Any noncompliance with approved plans and schedules shall be noncompliance with this Permit.

I.J.12 Extensions of Time

The Permittee may seek an extension of time in which to perform a requirement of this Permit, for good cause, by sending a written request for extension of time and proposed revised schedule to the NMED. The request shall state the length of the requested extension and describe the basis for the request. NMED will respond in writing to any request for extension following receipt of the request. If the NMED denies the request for extension, it will state the reasons for the denial.

I.J.13 Force Majeure

If an event occurs that causes or may cause the Permittee to fail to meet any deadline in this Permit, regardless whether such failure is due to a force majeure, the Permittee shall submit a written notice to NMED no later than 10 business days after the date on which the Permittee first knew or reasonably should have known that the event might cause such delay. Within 15 days after submitting the written notice to NMED, the Permittee shall submit a written report to NMED stating the reasons for the delay; the anticipated length of the delay; an identification of the deadline that has been or will be delayed; a description of all actions taken or to be taken to prevent or minimize the delay; a schedule for those actions; and the rationale and supporting documentation for any claim that the delay is due to a force majeure.

The Permittee’s obligation to comply with the requirements of this Permit shall be deferred to the extent and for the duration that the failure in compliance is caused by a force majeure. For purposes of this Permit, force majeure is defined as an event or set of circumstances that are beyond the control of the Permittee, its employees, contractors, agents, or any other entity controlled by the Permittee, that delays or prevents performance of any of the Permittee’s obligations under this Permit. Force majeure does not include any increased costs of compliance or the Permitee’s financial inability to comply. If NMED agrees that the failure in compliance is

attributable to a force majeure, the applicable requirement will be modified or the time for compliance will be extended in writing by NMED.

PART II: GENERAL FACILITY CONDITIONS

II.A AUTHORIZED WASTES

The Permittee shall not accept hazardous waste for treatment, storage or disposal.

II.B SECURITY

The Permittee shall prevent the unknowing entry and minimize the possibility for the unauthorized entry of persons or livestock onto the Facility. (40 CFR § 264.14).

The Permittee shall ensure the Facility's security by implementing controlled entry into the Facility at all times via gates, stations, or other means (*e.g.*, attendants, locks or controlled roadway access). The Permittee shall maintain a fence at the refinery property boundary capable of restricting unauthorized access to the Facility property.

The Permittee shall maintain and ensure the effectiveness of all security fences, entry gates, and entry stations at the Facility.

II.C RECORDKEEPING AND REPORTING

The Permittee shall comply with the record keeping and reporting requirements specified throughout this Permit and at 40 CFR § 264.73.

II.C.1 Monitoring and Records

II.C.1.a Representative Sampling

For purposes of monitoring, the Permittee shall take samples and measurements representative of the monitored activity at the time of sampling in accordance with the procedures included in Permit Part III (*Post Closure Care for the LTU*) and Permit Part IV (*Corrective Action*). All samples and measurements of waste streams obtained by the Permittee under any condition in this Permit must be discrete and shall be representative of the waste, media, equipment or structure being sampled. To obtain a representative sample of a waste stream, the Permittee shall use an appropriate method from appendix I of 40 CFR Part 261 or an equivalent method approved by the NMED. Laboratory methods must be those specified in the current edition of *Test Methods for Evaluating Solid Waste Physical/Chemical Methods SW-846*, or an equivalent method. (40 CFR § 270.30(j)(1).

II.C.1.b Record Retention

The Permittee shall retain records of all monitoring information, including all calibration and maintenance records, copies of all reports and records required by this Permit and records of all data used to complete the permit application for a period of at least three (3) years from the date of the sample, measurement, report, record, certification, or application, in accordance with the

requirements of 40 CFR § 270.30(j)(2). This period may be extended by the NMED at any time and is automatically extended during the course of any unresolved enforcement action regarding this Facility.

II.C.1.c Monitoring Records Content

Pursuant to 40 CFR § 270.30(j)(3), records of monitoring information shall include:

1. The date, exact place, and time of sampling or measurement;
2. The name and qualification of the individual(s) who performed the sampling or measurements;
3. The name and address of the laboratory that performed the analysis;
4. The date(s) analyses were performed;
5. The name and qualification of the individual(s) who performed the analyses;
6. The measuring techniques, analytical techniques or methods used;
7. The results of such analysis including units of measurements;
8. Calibration data;
9. Quality control data;
10. Detection limits;
11. Data qualifiers; and
12. Data validation results.

(40 CFR § 270.30(j)(3)).

II.C.2 Reporting Requirements

II.C.2.a Reporting Activities

The Permittee shall give advance written notice to the NMED as soon as possible, of any planned physical alterations or additions to the permitted facility. (40 CFR § 270.30(l)(1)).

II.C.2.b Reporting Anticipated Noncompliance

The Permittee shall give advance written notice to the NMED as soon as possible, but no less than one week in advance of any activities which may result in noncompliance with the requirements of this Permit. (40 CFR § 270.30(l)(2)).

II.C.2.c 24 Hour and Subsequent Reporting

II.C.2.c.i Oral report

The Permittee shall report to the NMED any noncompliance which may endanger human health or the environment. Any such information shall be reported orally within 24 hours from the time the Permittee becomes aware of the circumstances. The oral report shall include:

a. Information concerning release of any hazardous waste that may cause an endangerment to public drinking water supplies; and

b. Any information of a release or discharge of hazardous waste or hazardous constituents, or of a fire or explosion at the Facility, that could threaten the environment or human health outside the Facility.

(40 CFR § 270.30(1)(6)(i)).

II.C.2.c.ii Content of description

The description of the occurrence and its cause shall include (40 CFR § 270.30(1)(6)(ii)):

a. A description of the noncompliance and its cause;

b. Name, address, and telephone number of the owner, operator, and name of responsible official;

c. Name, address, and telephone number of the Facility;

d. The period of the occurrence including exact date and time and, if the noncompliance has not been corrected, the anticipated time it is expected to continue;

e. Name and quantity of materials involved;

f. The extent of injuries, if any;

g. An assessment of actual or potential hazards to the environment and human health at and outside the Facility, where this is applicable;

h. Estimated quantity and disposition of recovered material that resulted from the incident; and

i. The steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance.

II.C.3 Non-Compliance Written Report

The Permittee shall also submit a written report within five calendar days from the time the Permittee becomes aware of the circumstance of any noncompliance. The written report shall contain the information required for an oral report under this Permit Section.

The NMED may allow submittal of the written report within 15 calendar days in lieu of the five day requirement above if justifiable cause is provided in advance. (40 CFR § 270.30(1)(6)(iii)).

II.C.4 Other Noncompliance

The Permittee shall report all other instances of noncompliance not otherwise required to be reported under Permit Section I.K.10, at the time monitoring reports are submitted. The reports shall contain the information listed in this Section (I.K.9). (40 CFR § 270.30(l)(10)).

II.C.5 Other Information

Whenever the Permittee becomes aware that he failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the NMED, the Permittee shall promptly submit such facts or information in writing to the NMED. (40 CFR § 270.30(l)(11)).

II.C.6 Signatory and certification requirement

The Permittee shall sign and certify all applications, reports, and other information submitted to or requested by the NMED or required by this Permit in accordance with 40 CFR §§ 270.11 and 270.30(k). This provision applies to applications, reports required under the Permit, and other substantive information requested by the Department for implementation or enforcement of the Permit.

II.C.7 Submissions to the Environment Department

The Permittee shall submit by certified mail or hand delivery all reports, notifications, or other submissions that are required by this Permit to be sent or given to the NMED. The submittals shall be in the form of two paper copies and one copy in electronic or other format acceptable to the NMED. The submissions should be sent by certified mail or hand delivered to:

Chief
Hazardous Waste Bureau
New Mexico Environment Department
2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505-6303
Telephone Number: 505-476-6000
Facsimile Number: 505-476-6030

Two hard (paper) copies and one electronic copy of these plans, reports, notifications, or other submissions shall be submitted to the NMED.

II.C.8 Confidential Information

The Permittee may claim confidentiality for any information required by this Permit, to the extent authorized by section 74-4-4.3.D NMSA 1978 and 40 CFR § 270.12. The Permittee shall segregate confidential material during all record keeping activities required under this Permit to facilitate NMED inspections under Permit Condition II.C.10.

II.C.9 Operating Record

The Permittee shall maintain an operating record at the Facility through the end of post closure care, unless otherwise specified, in accordance with the requirements of 40 CFR § 264.73 incorporated by 20.4.500 NMAC and modified at 20.4.1.501.A.(5) NMAC. The operating record shall include all items identified in the applicable provisions of 40 CFR § 264.73, and all items otherwise required to be kept in the operating record under the terms of this Permit. All documents must be made available to NMED upon request pursuant to 40 CFR § 264.74.

The Permittee shall incorporate into the Facility Operating Record, as soon as it becomes available, the following information:

(1) a copy of this Permit and its revisions and modifications as approved by NMED.

(2) copies of all documents, including approved work plans, reports and other submittals required by this Permit;

(3) inspection schedule, records and results as required in 40 CFR § 264.15, Permit Section II.C and Permit Attachment C (*Inspection Plan*);

(4) all monitoring reports and records required by this Permit, including but not limited to:

   a. records of all monitoring data used to complete Permit Application(s);

   b. all data gathered or generated during the closure or post-closure process; and

   c. all laboratory reports, drilling logs, bench-scale or pilot scale data;

(5) the biennial report in accordance with the requirements of 40 CFR § 264.75 and Permit Section II.C.12;

(6) annually-adjusted cost estimates for facility post-closure (40 CFR § 264.144(d)); and

(7) reports required under 40 CFR § 264.77.

II.C.10 Availability of Facility Operating Record

The Permittee shall furnish and make reasonably available for inspection, upon request by any officer, employee, or representative of the NMED, the Facility Operating Record and all other records required under 40 CFR Part 264 or this Permit. (40 CFR § 264.74(a) and pursuant to 74-4-4.3 NMSA 1978). Information and records requested by the NMED pursuant to this condition shall be made available for inspection in a paper or electronic format, or both, as specified by the NMED. (40 CFR § 270.32(b)(2)).

II.C.11 Operating Record Retention

The Permittee shall retain all records required by this Permit during the course of any unresolved enforcement action regarding the Facility or as required by the NMED. (40 CFR § 264.74(b)).

II.C.12 Biennial Report

The Permittee shall submit a biennial report, which includes all of the information specified in 40 CFR § 264.75 to the NMED by March 1 of each even numbered year.

II.D FINANCIAL ASSURANCE

The Permittee shall maintain financial assurance and comply with all applicable requirements of 40 CFR Part 264, Subpart H during the post-closure care period. The Permittee shall demonstrate continuous compliance with financial assurance requirements by providing documentation of financial assurance in compliance with 40 CFR §§ 264.145 and 264.151 in at least the amount of the cost estimate required by 40 CFR § 264.144. Changes to financial assurance mechanisms must be approved by the NMED.

II.D.1 Cost Estimate for Facility Post-Closure

The Permittee shall adjust the post-closure estimate for inflation within 60 days prior to the anniversary date of the establishment of the financial instrument used to comply with 40 CFR § 264.145.

The Permittee shall revise the post-closure cost estimate whenever there is a change to the Facility's Post-Closure Plan as required by 40 CFR § 264.144(c).

The Permittee shall keep in the operating record at the Facility the latest post-closure cost estimate to comply with 40 CFR § 264.144(d).

Financial assurance funds may be released, upon approval by the NMED, if the value of the financial assurance mechanism exceeds the remaining cost of post-closure care. The Permittee shall demonstrate to the NMED that the value of the financial assurance mechanism exceeds the remaining cost of post-closure care, in order for the NMED to approve a release of funds as required by 40 CFR § 264.145(a)(10).

The Permittee shall submit itemized bills to the NMED when requesting reimbursement for post-closure care under 40 CFR § 264.145(a)(11).

II.D.2 Cost Estimates for Corrective Action

Within 180 days of the effective date of this Permit, the Permittee shall submit to the NMED for approval a detailed written estimate, in current dollars, of the cost of hiring a third party to perform a cleanup of contaminant releases at or migrating from the Facility in accordance with this Permit (hereafter “Estimated Cost of the Work”). The initial Estimated Cost of the Work shall account for the total costs of post-closure care and monitoring the Land Treatment Unit and conducting the Facility Wide Groundwater Monitoring for a period of 20 years. The initial Estimated Cost of Work shall include all necessary costs, including operation and maintenance of any other in situ remediation systems, if installed, treatment and disposal of contaminated soil and groundwater, and sampling, analysis, and other monitoring costs. The Estimated Cost of Work shall include the costs of the implementation of the remedy by a third party for a solid waste management unit or area of concern if the NMED has selected the remedy for that unit or area. A third party is a party who (i) is neither a parent nor a subsidiary of the Permittee; and (ii) does not share a common parent or subsidiary with the Permittee. The Estimated Cost of Work shall not be reduced by the amount of any salvage value that may be realized from the sale of Facility real property, structures, equipment, vehicles, product, materials, or other assets associated with the Facility. The Estimated Cost of Work shall be prepared in accordance with

40 CFR § 264.101(b) and be substantially in compliance with the requirements of 40 CFR §§ 264.142 and 264.144.

II.D.3 Adjustments to Cost Estimates

The Permittee shall adjust the Estimated Cost of Work annually to add the costs of any remedy selected under Section IV.H.6 during the previous year; to subtract the costs of any work completed during the previous year; and to reflect any other changes in estimated costs based on the NMED's selection of any remedies, approved changes to the investigations or the remedies, data generated during investigations, inflation, and other factors. Each adjusted Estimated Cost of Work shall include all necessary costs. The Permittee shall submit to the NMED for approval an adjusted Estimated Cost of Work by January 31 of each year. Upon NMED approval, the annual date may be changed to coincide with the close of the fiscal year for the Permittee. The annual adjustments to the Estimated Cost of Work shall be prepared substantially in compliance with the requirements of 40 CFR §§ 264.142(b), 264.144(b), and 264.101(b).

In addition to the Annual Adjustment to the Estimated Cost of Work, the Permittee may petition the NMED for an interim reduction in the Estimated Cost of Work based on substantial work completed since the last annual adjustment. Any such petition shall include all supporting documentation, such as receipts and other cost documents.

II.D.4 Records of Cost Estimates

The Permittee shall keep records of the latest Estimated Cost of Work at the Facility for the duration of operation of the Facility, and for such additional time that offices are maintained at the Facility after closure as described in 40 CFR §§ 264.142(d) and 264.144(d).

II.D.5 Financial Assurance for Corrective Action

Within 90 days after the approval of the cost estimate, the Permittee shall establish, and shall thereafter continuously maintain, financial assurance for corrective action at the Facility in an amount equivalent to the current Estimated Cost of Work as specified by Permit Section II.D.2. The Permittee shall use one or more of the mechanisms set forth in 40 CFR §§ 264.143 and 264.145 to establish financial assurance. The Permittee shall establish and maintain such financial assurance substantially in compliance with 40 CFR §§ 264.143, 264.145, and 264.151, except that there shall be no "pay-in period" unless a required change in the cost estimate will result in an increase of at least one million dollars and the Permittee propose a pay-in-period that the NMED approves in writing. Changes in financial assurance mechanisms must be approved by the NMED.

The Permittee shall submit a signed copy of each financial assurance document to the NMED within thirty days after the document is executed.

II.D.6 Financial Test and Corporate Guarantee Requirements

The Permittee shall notify the NMED within 90 days after the end of the fiscal year of a determination by the guarantors chief financial officer that it no longer satisfies the financial test requirements set forth in 40 CFR § 264.145(f)(1). The Permittee shall provide to the NMED an

alternate mechanism to meet financial assurance responsibility requirements. (40 CFR § 264.145(f)(1)).

II.D.7 Incapacity of Permittee, Guarantors, or Financial Institutions

The Permittee shall notify the NMED by mail of the commencement of a voluntary or involuntary proceeding under Title 11 (Bankruptcy), U.S. Code, naming either of the Permittee as debtor, within 10 days after commencement of the proceeding. The Permittee shall make such notification if the trustee of a trust fund, the guarantor of a corporate guarantee, or the institution issuing a surety bond, a letter of credit, or an insurance policy is named as debtor. The Permittee shall make such notification in substantial compliance with 40 CFR § 264.148. The Permittee shall establish other financial assurance within 60 days after such an event. (40 CFR § 264.148(b)).

PART III: POST-CLOSURE CARE

III.A INTRODUCTION

This Permit implements post-closure care requirements for contaminated soil left in place at the land treatment unit (LTU). The LTU meets the definition of land treatment facility as described by 40 CFR § 260.10.

The post-closure care requirements shall remain in place for a minimum of 30 years after closure. The post-closure care period may be shortened or lengthened pursuant to 40 CFR § 264.117(a)(2). A groundwater monitoring program, consisting of monitoring and sampling monitoring wells in the vicinity of the LTU, is required to remain in place until completion of corrective action, i.e., demonstration of attainment of cleanup standards for three years, pursuant to 40 CFR §§ 264.97 and 264.98. Post-closure care groundwater monitoring shall be conducted in accordance with the *Facility-Wide Groundwater Monitoring Plan* as required by Permit Section IV.C.2. The Permittee shall summarize the results of groundwater monitoring conducted in each reporting period in the *Facility-Wide Groundwater Monitoring Report* required by Permit Section IV.C.3.

III.B POST-CLOSURE CARE REQUIREMENTS

The Facility is subject to post-closure permitting requirements pursuant to 40 CFR §§ 264.117 through 264.120 and Permit Attachment D (*Post Closure Care Plan*). The Permittee shall conduct the following activities:

1. Perform groundwater monitoring as specified herein;
2. Conduct corrective action as necessary to protect human health and the environment;
3. Inspect, maintain, and repair the vegetative cover, fencing, security signs and locks;
4. Maintain training, operating, inspection, monitoring, and other required records in the Facility Operating Record.

III.B.1 Post-Closure Activities

The Permittee shall comply with the requirements in 40 § CFR 264.280 during the post-closure care period of the LTU as follows:

1. Maintain the integrity and effectiveness of the final cover, including making repairs to the cover, as necessary, to correct the effects of settling, subsidence, erosion, or other events in accordance with 40 CFR § 264.280;
2. Prevent run-on and run-off from eroding or otherwise damaging the final cover in accordance with 40 CFR § 264.280;

The Permittee shall maintain security at the Facility during the post-closure care period, in accordance with the Post-Closure Care Plan as required by 40 CFR § 264.117(b). The Permittee shall not allow any use of the Facility that will disturb the integrity of the final cover or the function of the Facility's monitoring and corrective action systems during the post-closure care period in accordance with 40 CFR § 264.117(c). The Permittee shall inspect the components and structures at the LTU in accordance with the General Inspection Requirements as required by 40 CFR §§ 264.115 and 264.117.

Any observed cover damage shall be repaired within 60 days to a condition that meets or exceeds the original design. Fences, gates, locks, warning signs, and survey benchmarks and monuments shall be maintained and repaired within 60 days of discovery that maintenance or repair is needed. Activities may include, but are not limited to, removing excessive accumulations of wind-blown plants and debris, repairing broken wire sections and posts, repairing and oiling gates, cleaning or replacing locks, repairing or replacing warning signs, and removing excess soil and vegetation covering survey monuments. Maintenance records shall be maintained in the Operating Record.

Repairs and maintenance shall be undertaken to ensure protection of human health and the environment and mitigate any potential hazards. If an inspection reveals that a non-emergency problem has developed, the needed repairs, maintenance, or replacement shall be initiated within three days, unless circumstances beyond the control of the Permittee cause further delay. The Permittee shall limit any such delays to as short a time period as reasonably possible. Repairs shall not take longer than 60 days to complete. If a hazard appears imminent or a hazardous situation already exists, remedial action shall be initiated immediately. Any action taken pursuant to an inspection shall be noted on an inspection form. The Permittee shall report to the NMED any remedial activities related to an emergency within one (1) business day.

The Permittee shall monitor the groundwater, maintain all groundwater monitoring wells and comply with all other applicable requirements of the *Facility-wide Groundwater Monitoring Plan* and 40 CFR Part 264, Subpart F, during the post-closure period.

III.C GENERAL INSPECTION REQUIREMENTS

The Permittee shall inspect the LTU for deterioration and discharges which may cause or may lead to:

(1) a release of hazardous constituents to the environment; or

(2) a threat to human health.

(40 CFR § 264.15(a)).

The Permittee shall inspect the LTU to detect evidence of:

(1) Deterioration, malfunction, or improper operation of run-on and run-off control systems: and

(2) Improper functioning of erosion controls or deterioration of vegetative cover.

(40 CFR § 264.280(c) and 270.32(b)).

Inspections shall be conducted of all monitoring equipment, security devices, and structural equipment. (40 CFR § 264.15(b)(i)). Inspections shall evaluate the LTU for ponded water.

The Permittee shall implement the inspection program for the LTU in compliance with the maintenance schedule, recordkeeping, and response action commitments in Permit Attachment E (*Inspection Plan*).

A record of the inspections, including the date of the inspection and the need for repairs or maintenance must be maintained in the Facility Operating Record. If repairs are required, then the inspector issues a work order request for needed repairs. The Permittee shall maintain inspection checklists and work orders for all LTU inspections for at least three years.

III.C.1 Inspection Schedule

The Permittee shall conduct inspections to identify problems in time to correct them before they harm human health or the environment (40 CFR § 264.15(a)). The Permittee shall inspect the LTU weekly and after storm events (40 CFR § 264.280(c) and 270.32(b)).

The Permittee shall inspect the LTU and all associated structures in accordance with the inspection schedules contained in Permit Attachment C (*Inspection Plan*).

III.C.2 Repair of Structures

The Permittee shall remedy any deterioration or malfunction of structures discovered during an inspection. The Permittee shall mitigate such deterioration or malfunction within 24 hours of discovery of the problem. The Permittee shall immediately implement remedial action where a hazard is imminent or has already occurred (40 CFR § 264.15(c)).

III.C.3 Inspection Logs and Records

The Permittee shall record the results of the LTU inspection on an Inspection Form for each inspection conducted in accordance with Permit Attachment C (*Inspection Plan*). At a minimum, the form shall include the date and time of the inspection, an identification of any associated structures, the name of the inspector, a notation of the observations made, and the date and nature of any repairs or other remedial actions taken (40 CFR § 264.15(d)).

The Permittee shall ensure that these records are clearly legible, all handwritten information is in ink, and errors are crossed out with a single line, initialed, and dated by the individual making the correction. The Permittee shall maintain the inspection logs and records in a paper format at the Facility. The Permittee may transfer the inspection logs and records into an electronic format acceptable to the NMED. The inspection logs and records shall be retained in the Facility Operating Record for the period of time as specified in Permit Section II.C.1.b.

The Permittee shall record the following observations or actions in the Inspection Logs:

(1) the results of any preventive maintenance activities;

(2) any malfunctions and deterioration of the structure;

(3) any errors potentially affecting compliance with this Permit;

(4) any discharges of hazardous waste or hazardous constituents; and

(5) any occurrences that might cause or exacerbate contamination at the Facility.

III.D PREPAREDNESS AND PREVENTION

III.D.1 Operation and Maintenance of Facility

The Permittee shall maintain and operate the LTU to minimize the possibility of any unplanned, sudden or non-sudden release of hazardous waste or hazardous constituents to air, soil, ground water, or surface water, that could threaten human health or the environment (40 CFR § 264.31).

III.D.2 Required Equipment

The Permittee shall maintain at the Facility the earth moving equipment necessary to maintain berms surrounding the LTU.

III.D.3 Warning Signs

The Permittee shall ensure that eight warning signs surround the LTU that are visible from all approaches to the unit. (40 CFR § 264.14(c)). These warning signs shall be legible from a distance of 25 feet and shall state in English and Spanish "Danger – Unauthorized Personnel Keep Out."

III.E LAND TREATMENT UNIT MONITORING

The Corrective Action Program to address the release to soil or groundwater from the LTU, if detected during the post-closure care period, is described in Permit Part III.E.2.b. The plan for soil and groundwater monitoring will be specific to the contaminant detection event and is addressed in the Post Closure Care Plan (Attachment D) and Permit Part III, respectively.

III.E.1 Soil Monitoring

The Permittee shall comply with the sampling strategy for soils, consisting of a sampling program and, if necessary, further characterization, as described in Permit Section IV (Corrective Action). The Permittee shall notify NMED if there is a statistically significant increase in constituents of concern in the soils located in the zone of infiltration (ZOI), or the treatment zone (soils present in the LTU at depths less than five (5) feet below the ground surface). (40 CFR § 264.271(c)).

If the Permittee demonstrates an attainment of soil remediation standards for land treatment units in accordance with 40 CFR § 264.280, then the Permittee may submit a request to the NMED to shorten the post-closure care period for soil in accordance with 40 CFR § 264.117(a)(2)(i).

III.E.2 Groundwater Monitoring

The Permittee shall comply with the Detection Monitoring Program for groundwater specified in Permit Attachment D and in accordance with the applicable requirements of 40 CFR Part 264, Subpart F.

III.E.2.a Compliance with Standards

The concentration limits in the Groundwater Cleanup Levels listed in Permit Section IV.D.1 shall apply at the intercept of the uppermost aquifer, the monitoring wells at the LTU, and all other locations beneath the Facility.

The Permittee shall continue the Detection Monitoring Program until the post-closure care period is complete.

III.E.2.b Releases from the Land Treatment Unit

If the Permittee determines, pursuant to Permit Attachment D, Section D.2.a that there is a statistically significant increase of hazardous constituents below the treatment zone, the Permittee shall notify the NMED of this finding in writing within seven calendar days, indicating which constituents have shown statistically significant increases. The Permittee must apply for a permit modification within 90 days to address corrective action at the facility. (40 CFR §§ 264.278(f), 264.278(g), and 264.278(h)).

The Permittee need not submit the modification if the Permittee successfully demonstrates in writing to the NMED within 90 days, that a source other than the LTU caused the increase or that the increase resulted from an error in sampling analysis or evaluation. The Permittee shall:

1. Notify the NMED within seven (7) calendar days of determining a statistically significant increase below the treatment zone that he intends to make a determination under this paragraph;
2. With ninety (90) days, submit a report to the NMED demonstrating that a source other than the LTU caused the increase or that the increase resulted from an error in sampling, analysis, or evaluation;
3. Within ninety (90) days, submit to the NMED an application for a permit modification to make any appropriate changes to the unsaturated zone monitoring program at the Facility; and
4. Continue to monitor in accordance with the monitoring program established under this Permit Section (III) and Permit Attachment D (Post-Closure Care Plan). (40 CFR § 264.278(h)).

PART IV: CORRECTIVE ACTION

IV.A INTRODUCTION

This Part sets forth the requirements for the Permittee to conduct corrective action for all releases of hazardous waste or hazardous constituents at the Facility. The Permittee shall implement corrective action as necessary to protect human health and the environment from all releases of hazardous waste or hazardous constituents from hazardous waste management units, closed hazardous waste management units, and from any Solid Waste Management Unit (SWMU) or Area of Concern (AOC) at the Facility pursuant to § 3004(u) and (v) of RCRA, 42 U.S.C. § 6924(u) and (v); NMSA 1978, § 74-4-4.2(B) and 40 CFR Part 264, Subparts F and G. Hazardous waste management units are SWMUs subject to corrective action in accordance with 40 CFR § 264.101 except as specified at 40 CFR § 264.90.

IV.A.1 Corrective Action

Corrective action required pursuant to 40 CFR § 264.101, shall continue under this Permit for any period necessary to comply with the requirements specified in Part IV of this Permit.

IV.B GENERAL CONDITIONS

IV.B.1 Corrective Action beyond the Facility Boundary

The Permittee shall notify the NMED, orally and in writing in accordance with Permit Section II.C.2.c, upon discovering that a release of hazardous waste or hazardous constituents has migrated beyond the Facility boundary or has the potential to migrate beyond the Facility boundary.

In the event that hazardous waste or hazardous constituents migrate beyond the Facility boundary, the Permittee shall implement corrective action beyond the Facility boundary as necessary to protect human health and the environment, unless the Permittee demonstrates to the NMED that, despite the Permittee's best efforts, the Permittee is unable to obtain the necessary permission to undertake such actions. The Permittee is not relieved of any responsibility to clean up a release that has migrated beyond the Facility boundary where off-site access has been denied. On-site measures to address such releases shall be taken, to be determined on a case-by-case basis. (40 CFR § 264.101(c)).

IV.B.2 Off-Site Access

To the extent that any corrective action requirement of this Permit requires access to property not owned or controlled by the Permittee, the Permittee shall use its best effort to obtain access from the present owners of such property to conduct the required activities and to allow the NMED access to such property to oversee such activities. In the event that the Permittee does not obtain such access, the Permittee shall notify the NMED in writing regarding its best efforts and its failure to obtain such access.

IV.B.3 Newly Discovered Releases

The Permittee shall notify NMED in writing, within 15 calendar days of discovery, of any newly discovered SWMU or AOC. The notification shall include, at a minimum, the location of the newly discovered SWMU or AOC and all available information pertaining to the site history and nature of the release (e.g., media affected, hazardous waste or hazardous constituents released, magnitude of release). NMED may require the Permittee to submit a Release Assessment Report in accordance with Permit Section VI.F.1 to determine the status of the newly discovered SWMU or AOC. Alternatively, NMED may require an Investigation Work Plan for the newly discovered SWMU or AOC in accordance with Permit Section VI.H.1 without requiring a Release Assessment. If NMED determines that an Investigation Work Plan for a newly discovered SWMU or AOC is required, the Permittee shall modify this Permit to add the SMWU or AOC to Attachment 1 (SWMU and AOC Tables) in accordance with 40 CFR § 270.42.

The Permittee shall notify the NMED in writing of any field sampling or other field activities undertaken pursuant to any corrective action requirement of this Permit, and shall allow the NMED to collect split samples upon request of the NMED. For such sampling or other field activities, the Permittee shall notify the NMED no less than 15 days prior to the commencement of such sampling.

IV.B.4 Health and Safety Plan

The Permittee shall prepare Health and Safety Plans for all field activities. The Health and Safety Plans shall be prepared in accordance with all applicable provisions of this Permit and all local, State, and federal regulations and be developed as stand-alone documents.

IV.B.5 Recordkeeping

The Permittee shall maintain all monitoring data, including sampling procedures, records of field measurements, laboratory analytical data, quality assurance/quality control documents, chain-of-custody records, well completion reports, and periodic monitoring reports in the Facility Operating Record for a minimum of three years after the end of the operating life of the Facility and a minimum of three years after the end of any post-closure care periods

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IV.C SPECIAL CONDITIONS

IV.C.1 Identification of SWMUs and AOCs Requiring Corrective Action

Attachment G, Table G-1 (*SWMUs and AOCs Requiring Corrective Action*) lists SWMUs and AOCs at the Facility for which corrective action is required. Table G-1 will be modified to include any newly identified SWMUs and AOCs for tracking purposes. The Permittee shall submit to NMED a map that contains all SWMUs and AOCs listed in Attachment G within 90 days of the effective date of the Permit.

Attachment G, Table G-2 lists SWMUs and AOCs at the Facility for which corrective action is complete with controls.

Attachment G, Table G-3 (*Corrective Action Complete without Controls*) lists SWMUs at the Facility for which corrective action is complete without controls and that do not require monitoring.

IV.C.2 Facility-Wide Groundwater Monitoring Plan

The Permittee shall submit for the NMED's review, by the 1st of April each year, an updated facility-wide groundwater monitoring plan to fully characterize the nature and extent of groundwater contamination at, and migrating from, the Facility, and to monitor the effectiveness of interim containment and remediation systems. The groundwater monitoring plan shall be prepared in accordance with the format described in Permit Part IV.L. The groundwater monitoring plan shall provide for the acquisition of adequate data to establish background groundwater quality. The groundwater monitoring plan shall include, at a minimum:

a. A general description of the hydrogeologic system beneath the Facility,

b. A section or table to include, without limitation, a description of all existing monitoring wells, recovery wells, and any other required sampling locations specifying their exact location, date the wells were installed including ground elevation, top of casing elevation, well casing stickup length, well depth, well casing diameter, screened interval, screen length, and stratigraphic unit(s) intersected by the well screen;

c. A facility map showing all monitoring well locations. This map must be revised as necessary to reflect any well additions and well abandonments that occur during the year;

d. The sampling requirements must include the proposed frequency of sampling, sampling methodology, field water quality parameters to be measured, and chemical analytical methods;

e. A description of all sampling methods and procedures that will be applied during each monitoring event;

f. Identification of all field instruments proposed for use as well as calibration procedures.

g. The monitoring plan shall include monitoring and sampling of LTU wells (MW-1, MW-2, MW-4, and MW-5) to comply with 40 CFR 264 Subpart F (Post-Closure Care Monitoring).

The groundwater-monitoring plan shall be revised as investigations are completed and remedies are selected and implemented. The NMED may require additional monitoring, including the installation of additional monitoring wells or monitoring for additional parameters, as investigations proceed.

IV.C.3 Facility-Wide Groundwater Monitoring Reports

The Permittee shall submit to the NMED a Facility-Wide Groundwater Monitoring Report by September 1st each year that describes all the groundwater monitoring activities, including all

well abandonment procedures and activities, conducted in the previous year. The Report shall be prepared in accordance with the format described in Permit Section IV.L.

IV.D CLEANUP LEVELS

The NMED and the New Mexico Water Quality Control Commission (WQCC) have separately specified certain cleanup goals and methods of calculating cleanup levels. The NMED has also specified certain reporting requirements for sites where corrective action is required in response to releases to the environment. In general, the NMED has selected a human health target risk level of 10^{-5} for carcinogenic substances and a Hazard Index (HI) of 1.0 for non-carcinogenic substances as cleanup goals for establishing site-specific cleanup levels for one or more contaminants for which toxicological data are published. The Permittee shall follow the cleanup and screening levels described in this Permit Section in implementing the corrective action requirements of this Permit. In addition, cleanup levels for the protection of the environment shall address ecological risk consistent with the NMED guidance for assessing ecological risk as specified in Permit Section IV.F.

IV.D.1 Groundwater Cleanup Levels

The cleanup levels for all contaminants in groundwater shall be the WQCC groundwater quality standards, 20.6.2.3103 NMAC, the cleanup levels for toxic pollutants calculated in accordance with 20.6.2.7.WW NMAC, and the drinking water maximum contaminant levels (MCLs) adopted by EPA under the federal Safe Drinking Water Act (42 U.S.C. §§ 300f to 300j-26) or the New Mexico Environmental Improvement Board (EIB), 20.7.10 NMAC. If both a WQCC water quality standard and an MCL have been established for an individual substance, then the lower of the levels shall be the cleanup level for that substance.

The most recent version of NMED's Tap Water Screening Levels listed in Table A-1 of *Technical Background Document for Development of Soil Screening Levels* (as updated) shall be used to establish the cleanup level if either a WQCC standard or an MCL has not been established for a specific substance. In the absence of an NMED tap water screening level then the EPA *Regional Screening Levels for Chemical Contaminants at Superfund Sites* (RSLs) for tap water shall be used. If no WQCC groundwater standard or MCL has been established for a contaminant for which toxicological information is published, the Permittee shall use a target excess cancer risk level of 10^{-5} for carcinogenic substances and a HI of 1.0 for non-carcinogenic substances as the basis for proposing a cleanup level for the contaminant. If the background concentration of an inorganic constituent, as established in accordance with Permit Section IV.J.6, exceeds the standard then the cleanup level is the background concentration for that specific substance. Any cleanup level based on a risk assessment must be submitted to the NMED for its review and approval.

IV.D.1.a Groundwater Cleanup Level for Perchlorate

If, during the term of this Permit, the WQCC adopts a groundwater quality standard for perchlorate, or EPA or the EIB adopts an MCL for perchlorate, such standard or MCL shall be the cleanup level in accordance with Permit Section IV.D.1. If perchlorate is detected, the

Permittee shall evaluate the nature and extent of the perchlorate contamination. In the absence of a groundwater quality standard or MCL, if perchlorate is detected at concentrations at or greater than 4 µg/L, then the cleanup level shall be established using a HI of 1.0 in accordance with Permit Section IV.D.1 above.

IV.D.2 Soil Cleanup Levels

The NMED has specified soil-screening levels that are based on a target total excess cancer risk of 10^{-5} for carcinogenic substances and, for non-carcinogenic substances, a target HI of 1.0 for residential, industrial land use, and the construction worker scenarios. If the potential for migration to groundwater is applicable for a site, the NMED may determine that a dilution attenuation factor (DAF) of one or greater, as calculated using the NMED-approved methods, for contaminated soils is appropriate to achieve clean closure. This approach may apply at sites where the migration of contaminants through the soil column to groundwater has occurred or when the NMED determines that the potential exists for migration of contaminants through the soil column to groundwater. Soil cleanup levels shall be the target soil screening levels listed in the NMED's *Technical Background Document for Development of Soil Screening Levels* (as updated). If a NMED soil screening level has not been established for a substance for which toxicological information is published, the soil cleanup level shall be established using the most recent version of the EPA RSL for residential and industrial soil for compounds designated as "n" (non-carcinogen effects) or ten times the EPA RSL for compounds designated "c" (carcinogen effects). The cumulative risk shall not exceed a total excess cancer risk of 10^{-5} for carcinogenic substances and, for non-carcinogenic substances, a target HI of 1.0 at sites where multiple contaminants are present.

If the current and reasonably foreseeable future land use is one for which the NMED has not established soil screening levels, the Permittee may propose cleanup levels to the NMED based on a risk assessment and a target excess cancer risk level of 10^{-5} for carcinogenic substances or an HI of 1.0, based on current and reasonably foreseeable future land use (*e.g.*, residential, recreational, industrial, construction worker).

Should the Permittee be unable to achieve the Soil Cleanup Levels established under this section, they shall conduct risk assessments in accordance with Permit I.J.4. Any cleanup level based on a risk assessment must be submitted to the NMED for its review and approval.

IV.D.2.a Soil Cleanup Levels for Polychlorinated Biphenyls

The soil cleanup level for PCBs is either a default concentration of 1 milligram per kilogram (mg/kg) or a risk-based PCB concentration level established through performing a health risk assessment using a target excess cancer risk level of 10^{-5} for carcinogenic substances or an HI of 1.0. (NMED *Risk-based Remediation of Polychlorinated Biphenyls at RCRA Corrective Action Sites* (as updated)).

IV.D.3 Surface Water Cleanup Levels

The Permittee shall comply with the surface water quality standards outlined in the Clean Water Act (33 U.S.C. §§ 1251 to 1387), the New Mexico WQCC Regulations (20.6.2 NMAC), and the State of New Mexico Standards for Interstate and Intrastate Surface Waters (20.6.4 NMAC).

IV.E VARIANCE FROM CLEAN-UP LEVELS

The Permittee may seek a variance from a particular cleanup level in accordance with this Permit Section (IV.E).

IV.E.1 Water Quality Standards

For a cleanup level based on a water quality standard set by the WQCC, the Permittee may seek approval of an alternative abatement standard in accordance with the process specified in the WQCC Regulations, 20.6.2.4103.E and F NMAC.

IV.E.2 Other Cleanup Levels

For all other cleanup levels, the Permittee may seek approval of a variance from a cleanup level by submitting to the NMED a written request for a determination that attainment of the cleanup level is impracticable. The request must include a demonstration that attaining the cleanup level is technically or physically impossible or otherwise impractical using potential corrective action remedies. The request shall include, at a minimum, the following:

(1) a discussion of the effectiveness of potential corrective action remedies;

(2) a discussion of whether the proposed variance would result in a present or future hazard to public health or the environment;

(3) proposed alternate cleanup levels that are practical, based on potential corrective action remedies and a site-specific risk assessment;

(4) all supporting documentation and analyses; and

(5) any other information requested by the NMED.

If the NMED approves the Permittee's impracticability demonstration, it will notify the Permittee in writing, and such notice will describe the specific action to be taken by the Permittee.

IV.F ECOLOGICAL RISK CLEANUP LEVELS

The Permittee shall derive cleanup levels for each hazardous waste and hazardous constituent for each ecological zone at the Facility using the methodology in NMED's *Guidance for Assessing Ecological Risks Posed by Chemicals: Screening–Level Ecological Risk Assessment*. If the ecological risk evaluation indicates that a lower cleanup level for a hazardous waste or hazardous constituent in groundwater, soil, or surface water is necessary to protect environmental receptors, NMED may establish cleanup levels based on ecological risk for hazardous waste or hazardous constituents in groundwater, soil, or surface water that are lower than levels that are solely protective of human health.

IV.G PERMIT MODIFICATION FOR CORRECTIVE ACTION COMPLETE

The Permittee may submit to the NMED a request for a Class 3 permit modification to change the status of a SWMU or AOC from "corrective action required" to "corrective action complete." The permit modification will move the SWMU or AOC from Attachment G (*Listing of SMWUs and AOCs*), Table G-1 (*SWMUs and AOCs Requiring Corrective Action*) to Attachment G, Table G-2 (*Corrective Action Complete with Controls)* or Attachment G, Table G-3 (*Corrective Action Complete without Controls*) pursuant to the terms of this Permit.

The NMED's determination that corrective action is complete for a SWMU or AOC placed on either the *Corrective Action Complete with Controls* list or the *Corrective Action Complete without Controls* list will be subject to the NMED's reservation of rights for new information or unknown conditions. In the event the NMED seeks to require additional work at any SWMU or AOC contained on either of the two lists, the NMED will initiate a permit modification to remove the SWMU or AOC from the corrective action complete lists.

IV.G.1 Long-term Monitoring and Maintenance of SWMUs and AOCs

The Permittee shall submit a Long-term Monitoring and Maintenance Plan as part of the permit modification request, as described in Permit Section IV.G, to change the status of a SWMU or AOC from corrective action required (*i.e.,* listed in Attachment G, Table G-1) to corrective action complete with controls (*i.e.,* listed in Attachment G, Table G-2). The Plan shall describe the combination of ongoing measures required to ensure protection of human health and the environment, such as maintenance of physical or institutional controls, monitoring of environmental media, or other measures. Upon approval, such plans shall be included in Attachment I (*Long-term Monitoring and Maintenance Plans*).

IV.H CORRECTIVE ACTION PROCEDURES

The Permittee shall conduct corrective action at sites where releases of hazardous waste or hazardous constituents have occurred. If corrective action is necessary to protect human health or the environment, the NMED will direct the Permittee to complete one or more of the requirements included in this Permit Section (IV.H). The conditions listed below apply to all corrective action conducted under this Permit unless otherwise specified.

IV.H.1 Release Assessment

IV.H.1.a Release Assessment Report

If required by the NMED, the Permittee shall submit a Release Assessment Report from any SWMU or AOC as defined by 20.4.2.7(II) NMAC. Any revisions to the Release Assessment Report required by the NMED shall be submitted within 30 calendar days of receipt of the NMED's comments on the Release Assessment Report.

The Release Assessment Report shall, at a minimum, include the following information:

(1) location of unit(s) on a topographic map of appropriate scale, as required under 40 CFR § 270.14(b)(19);

(2) designation of type and function of unit(s);

(3) general dimensions, capacities and structural description of unit(s) (supply any available plans/drawings);

(4) dates that the unit(s) was operated;

(5) all available site history information;

(6) specifications of all wastes that have been managed at/in the unit(s) to the extent available. Include any available data on hazardous waste or hazardous constituents in the wastes; and

(7) all available information pertaining to any release of hazardous waste or hazardous constituents from such unit(s) (to include ground water data, soil analyses, air, and surface water data).

IV.H.1.b Requirement to Proceed

The NMED will review the Release Assessment Report to determine whether any further investigative action is required. The NMED will notify the Permittee of the need for confirmatory sampling, if necessary, or notify the Permittee that an Investigation Work Plan is required in accordance with the requirements in Permit Section IV.H5.a. The NMED will notify the Permittee of any corrective action complete decision.

IV.H.2 Interim Measures

IV.H.2.a NMED-Initiated Interim Measures

Upon written notification by the NMED, the Permittee shall prepare and submit an Interim Measures (IM) Work Plan where the NMED determines that interim measures are necessary to minimize or prevent the migration of hazardous waste or hazardous constituents and limit actual or potential human and environmental exposure to hazardous waste or hazardous constituents while long term corrective action remedies are evaluated and implemented. The Permittee shall submit its IM Work Plan to the NMED within 30 calendar days of the NMED's notification, unless another time period is specified by the NMED. Such interim measures may be conducted concurrently with any required corrective action. The Permittee shall prepare and submit IM Work Plans in accordance with the work plan format included in Permit Section IV.L (*Reporting Requirements*).

IV.H.2.b Permittee-Initiated Interim Measures

The Permittee may initiate interim measures at a unit by notifying the NMED, in writing, at least 30 calendar days prior to beginning the Interim Measures. The NMED will approve the Permittee-initiated IM, conditionally approve the IM, or require submittal of an IM Work Plan for the NMED approval prior to implementation of the IM.

IV.H.3 Emergency Interim Measures

The Permittee may determine, during implementation of site investigation activities, that emergency interim measures are necessary to address an immediate threat of harm to human

health or the environment. The Permittee shall notify the NMED within one business day of discovery of the facts giving rise to the threat, and shall propose emergency interim measures to address the threat. If the NMED approves the emergency interim measures in writing, the Permittee may implement the proposed emergency interim measures without submitting an IM Work Plan. If circumstances arise resulting in an immediate threat to human health or the environment such that initiation of emergency interim measures are necessary prior to obtaining written approval from the NMED, the Permittee shall notify the NMED within one business day of taking the emergency interim measure. The notification shall contain a description of the emergency situation, the types and quantities of contaminants involved, the emergency interim measures taken, and contact information for the emergency coordinator handling the situation. The notification shall also include a written statement justifying the need to take the emergency action without prior written approval from the NMED. This requirement shall not be construed to conflict with 40 CFR §§ 264.1(g)(8) or 270.61.

IV.H.4 IM Work Plan Requirements

The IM Work Plan shall ensure that the interim measures are designed to mitigate any current or potential threat(s) to human health or the environment and is consistent with, and integrated into, any final corrective measures at the Facility. The IM Work Plan shall include the interim measures objectives, procedures for implementation (including any designs, plans, or specifications), and schedules for implementation.

IV.H.4.a Interim Measures Implementation

IV.H.4.a.i Implementation and Completion of Approved IM Work Plan

The Permittee shall implement interim measures required under Permit Section IV.H.2 in accordance with the NMED-approved IM Work Plan. The Permittee shall complete interim measures within 180 calendar days of the start of implementation of the interim measure. The Permittee may submit a written request to the NMED to extend the period for implementation of the interim measure. The request must provide justification for the extension and a proposed schedule for completion of the interim measure. The NMED will notify the Permittee, in writing, of the approval or disapproval of the request within 30 calendar days of receipt of the IM implementation extension request.

IV.H.4.a.ii Notification of Changes

The Permittee shall give notice to the NMED as soon as possible of any planned changes, reductions or additions to the IM Work Plan required by the NMED under Permit Section IV.H.2.a or initiated by the Permittee in accordance with Permit Section IV.H.2b.

IV.H.4.a.iii Interim Measures Reports

The Permittee shall submit to the NMED for review and approval, within 90 calendar days of completion of interim measures, an IM Report summarizing the results of interim measure implementation. The IM Report shall contain, at a minimum, the following information:

(1) a description of interim measures implemented;

(2) summaries of results;

(3) summaries of all problems encountered during IM investigations;

(4) summaries of accomplishments and/or effectiveness of interim measures; and,

(5) copies of all relevant laboratory/monitoring data, maps, logs, and other related information.

IV.H.5 Corrective Action Investigations

IV.H.5.a Investigation Work Plan

IV.H.5.a.i Investigation Work Plan Submittal

The Permittee shall submit to NMED Investigation Work Plans for the SWMUs and AOCs identified in Attachment G (SWMUs and AOCs) in accordance with the schedule set forth in Permit Attachment E (Compliance Schedule).

IV.H.5.a.ii Investigation Work Plan Requirements

Investigation Work Plans shall meet the requirements specified in Permit Section IV.L (*Reporting Requirements*). Investigation Work Plans shall include schedules of implementation and completion of specific actions necessary to determine the nature and extent of contamination and the potential pathways of contaminant releases to the air, soil, surface water, and ground water. The Permittee shall provide sufficient justification and associated documentation that a release is not probable or has already been characterized if a unit or a media/pathway associated with a unit (ground water, surface water, soil, subsurface gas, or air) is not included in an Investigation Work Plan. Such deletions of a unit, medium, or pathway from the work plan(s) are subject to the approval of the NMED. The Permittee shall provide sufficient written justification for any omissions or deviations from the minimum requirements specified in Permit Section IV.L (*Reporting Requirements*). Such omissions or deviations are subject to the approval of the NMED. In addition, Investigation Work Plans shall include all investigations necessary to ensure compliance with 40 CFR § 264.101.

IV.H.5.a.iii Historical Documents

The Permittee shall submit to the NMED a summary of the historical information and assessment of potential contaminant releases relating to each unit in conjunction with the unit-specific Investigation Work Plan including the most complete, legible, extant (*i.e.*, existing) copies of all associated photographic imprints, maps, figures, drawings, tables, attachments, enclosures, appendices and other relevant supporting documentation. Such summaries shall be submitted as separate documents and not as part of the site-specific Investigation Work Plans.

IV.H.5.a.iv Investigation Work Plan Implementation

The Permittee shall implement Investigation Work Plans as approved by the NMED. The Permittee shall notify the NMED at least 15 days prior to any permit or corrective action-related field activity (*e.g.*, drilling, sampling).

IV.H.5.b Corrective Action Investigation Reports

The Permittee shall prepare and submit to the NMED Investigation Reports for the investigations conducted in accordance with Investigation Work Plans submitted under Permit Section IV.H.5.a. The Permittee shall submit the Investigation Reports to the NMED for review and approval in accordance with the schedules included in its approved Investigation Work Plans.

The Investigation Reports shall include an analysis and summary of all required investigations conducted under this Permit. The summary shall describe the type and extent of contamination at each unit investigated, including sources and migration pathways, identify all hazardous waste or constituents present in all media, and describe actual or potential receptors. The Investigation Report shall also describe the extent of contamination (qualitative and quantitative) in relation to background levels for the area. If the Investigation Report concludes that further work is necessary, the report shall include a schedule for submission of a work plan for the next phase of investigation.

IV.H.5.b.i Cleanup Levels

The Investigation Reports shall identify the applicable cleanup levels in accordance with Permit Sections IV.D for each hazardous waste or hazardous constituent found at each unit where corrective action is required. The Permittee shall propose in the Investigation Report or in a subsequent Risk Assessment or Corrective Measures Evaluation appropriate cleanup levels for those hazardous wastes or hazardous constituents without established cleanup levels based upon human and ecological risk.

IV.H.5.b.ii Requirement to Proceed

Based upon the NMED's review of the Investigation Report, the NMED will notify the Permittee of the need for further investigative action, if necessary, and inform the Permittee, if not already notified, of the need for a Corrective Measures Evaluation. The NMED will notify the Permittee if corrective action is complete. If the NMED determines that further investigation is necessary, the NMED will require the Permittee to submit a work plan for approval that includes a proposed schedule for additional investigation(s).

IV.H.5.c Risk Assessment

The Permittee shall attain the cleanup goals outlined in Permit Sections IV.D. If the NMED determines that the cleanup levels included in Permit Sections IV.D cannot be achieved at a site, the NMED will require performance of risk analyses to establish alternative cleanup levels. Such risk analyses shall be prepared in the format included in the Permit Section IV.L (*Reporting Requirements*). The Permittee shall submit to the NMED for approval a Risk Assessment Report in accordance with this Permit Section (IV.H.5.c) according to the schedule set forth by the NMED for sites where risk analyses are conducted.

IV.H.6 Corrective Measures Evaluation

IV.H.6.a General

The NMED will require corrective measures at a unit if the NMED determines, based on the Investigation Report and other relevant information available to the NMED, that there has been a release of contaminants into the environment at the site and that corrective action is necessary to protect human health or the environment from such a release. Upon making such a determination, the NMED will notify the Permittee in writing. The NMED will specify a date for the submittal of the necessary reports and evaluations in the written notification.

IV.H.6.b Corrective Measures Evaluation Report

Following written notification from the NMED that a corrective measures evaluation is required, the Permittee shall submit to the NMED for approval a Corrective Measures Evaluation Report. The Permittee shall follow the Corrective Measures Evaluation Report format outlined in Permit Section IV.L (*Reporting Requirements*). The corrective measures evaluation shall evaluate potential remedial alternatives and shall recommend a preferred remedy that will be protective of human health and the environment and that will attain the appropriate cleanup goals. The Corrective Measures Evaluation Report shall, at a minimum, comply with Permit Section IV.L (*Reporting Requirements*) and include the following:

(1) a description of the location, status, and current use of the site;

(2) a description of the history of site operations and the history of releases of contaminants;

(3) a description of site surface conditions;

(4) a description of site subsurface conditions;

(5) a description of on- and off-site contamination in all affected media;

(6) an identification and description of all sources of contaminants;

(7) an identification and description of contaminant migration pathways;

(8) an identification and description of potential receptors;

(9) a description of cleanup standards or other applicable regulatory criteria;

(10) an identification and description of a range of remedy alternatives;

(11) remedial alternative pilot or bench scale testing results;

(12) a detailed evaluation and rating of each of the remedy alternatives, applying the criteria set forth in Permit Section IV.H.6.d including costs for long-term monitoring and maintenance;

(13) an identification of a proposed preferred remedy or remedies;

(14) preliminary design criteria of the preferred remedy or remedies; and

(15) a proposed schedule for implementation of the preferred remedy.

IV.H.6.c Cleanup Standards

Following written notification from the NMED that a corrective measures evaluation is required, the Permittee shall submit to the NMED for approval a Corrective Measures Evaluation Report. The Permittee shall follow the Corrective Measures Evaluation Report format outlined in Permit Section IV.L (*Reporting Requirements*). The corrective measures evaluation shall evaluate each of the remedy alternatives. The Permittee shall select corrective measures that are capable of achieving the clean-up standards and goals outlined in Permit Sections IV.D (*Clean-up Levels*) including, as applicable, approved alternative clean-up goals established by a risk assessment.

IV.H.6.d Remedy Evaluation Criteria

IV.H.6.d.i Threshold Criteria

The Permittee shall evaluate each of the remedy alternatives for the following threshold criteria. To be selected, the remedy alternative must:

(1) be protective of human health and the environment;

(2) attain media cleanup standards;

(3) control the source or sources of releases so as to reduce or eliminate, to the extent practicable, further releases of contaminants that may pose a threat to human health and the environment; and

(4) comply with applicable standards for management of wastes.

IV.H.6.d.ii Remedial Alternative Evaluation Criteria

The Permittee shall evaluate each of the remedy alternatives for the factors described in this Permit Section (IV.H.6.d.ii). These factors shall be balanced in proposing a preferred alternative.

IV.H.6.d.iii Long-term Reliability and Effectiveness

The remedy shall be evaluated for long-term reliability and effectiveness. This factor includes consideration of the magnitude of risks that will remain after implementation of the remedy; the extent of long-term monitoring, or other management or maintenance that will be required after implementation of the remedy; the uncertainties associated with leaving contaminants in place; and the potential for failure of the remedy. The Permittee shall give preference to a remedy that reduces risks with little long-term management, and that has proven effective under similar conditions.

IV.H.6.d.iv Reduction of Toxicity, Mobility, or Volume

The remedy shall be evaluated for its reduction in the toxicity, mobility, and volume of contaminants. The Permittee shall give preference to a remedy that uses treatment to more completely and permanently reduce the toxicity, mobility, and volume of contaminants.

IV.H.6.d.v Short-Term Effectiveness

The remedy shall be evaluated for its short-term effectiveness. This factor includes consideration of the short-term reduction in existing risks that the remedy would achieve; the time needed to achieve that reduction; and the short-term risks that might be posed to the community, workers, and the environment during implementation of the remedy. The Permittee shall give preference to a remedy that quickly reduces short-term risks, without creating significant additional risks.

IV.H.6.d.vi Implementability

The remedy shall be evaluated for its implementability or the difficulty of implementing the remedy. This factor includes consideration of installation and construction difficulties; operation and maintenance difficulties; difficulties with cleanup technology; permitting and approvals; and the availability of necessary equipment, services, expertise, and storage and disposal capacity. The Permittee shall give preference to a remedy that can be implemented quickly and easily, and poses fewer and lesser difficulties.

IV.H.6.d.vii Cost

The remedy shall be evaluated for its cost. This factor includes a consideration of both capital costs, and operation and maintenance costs. Capital costs shall include, without limitation, construction and installation costs; equipment costs; land development costs; and indirect costs including engineering costs, legal fees, permitting fees, startup and shakedown costs, and contingency allowances. Operation and maintenance costs shall include, without limitation, operating labor and materials costs; maintenance labor and materials costs; replacement costs; utilities; monitoring and reporting costs; administrative costs; indirect costs; and contingency allowances for the entire anticipated post-closure care or long term monitoring period. All costs shall be calculated based on their net present value. Permittee shall give preference to a remedy that is less costly, but does not sacrifice protection of health and the environment.

IV.H.6.e Approval of Corrective Measures Evaluation Report

The NMED will review and approve the Corrective Measures Evaluation Report in accordance with Permit Section I.J.4. If the NMED disapproves the Corrective Measures Evaluation Report, the NMED will notify the Permittee in writing of the Corrective Measures Evaluation Report's deficiencies and specify a due date for submission of a revised Corrective Measures Evaluation Report. Upon receipt of such notification of disapproval, the Permittee shall submit to the NMED, within the specified time, a revised Corrective Measures Evaluation Report that corrects the deficiencies. If the NMED approves the Corrective Measures Evaluation Report, the NMED will notify the Permittee in writing.

IV.H.6.f Relationship to Corrective Action Requirements

The Corrective Measures Evaluation shall serve as a Corrective Measures Study for the purposes of RCRA compliance [*see* 55 Fed. Reg. 30875-77 (July 27, 1990) (proposed 40 CFR §§ 264.520 through 264.524)].

IV.H.6.g Statement of Basis

Upon approval of the Corrective Measures Evaluation Report, the NMED will select a remedy or remedies for the unit. The NMED may choose a different remedy from that recommended by the Permittee. The NMED will issue a Statement of Basis for selection of the remedy, and will receive public comment on the remedy. The public comment period will extend for at least 45 days from the date of the public notice of the Statement of Basis. The NMED will provide an opportunity for a public hearing on the remedy, at which all interested persons will be given a reasonable chance to submit data, views or arguments orally or in writing and to examine witnesses testifying at the hearing. The comment period will automatically be extended to the close of the public hearing. The public hearing will follow the hearing requirements under section 20.4.1.901.F NMAC. The NMED will select a final remedy and issue a response to public comments to all commenters, after the end of the public comment period. In selecting a remedy, the NMED will follow the public participation requirements applicable to remedy selection under 40 CFR §§ 270.41 through 270.42 and 20.4.1.901 NMAC.

The administrative record for the Facility will be made available to the public for review at the NMED's offices in Santa Fe, New Mexico. All significant written and signed comments, including e-mailed comments, will be considered by the NMED prior to approving a final remedy or remedies.

The NMED's decision on the final remedy or remedies shall follow the requirements under section 20.4.1.901 NMAC, Secretary's Decision. The NMED will issue a response to public comments at the time of the NMED's final decision.

IV.H.7 Corrective Measures Implementation

IV.H.7.a General

The Permittee shall implement the final remedy selected by the NMED.

IV.H.7.b Corrective Measures Implementation Plan

Within 90 days after the NMED's selection of a final remedy, or as otherwise specified by the schedule contained in the approved Corrective Measure Evaluation Report or as specified by a schedule required by the NMED in the written approval notification, the Permittee shall submit to the NMED for approval a Corrective Measures Implementation Plan outlining the design, construction, operation, maintenance, and performance monitoring for the selected remedy, and a schedule for its implementation. The implementation plan shall be submitted to the NMED for review in accordance with the procedures in Permit Section I.J.4. The Corrective Measures Implementation Plan shall, at a minimum, include the following elements:

(1) a description of the selected final remedy;

(2) a description of the cleanup goals and remediation system objectives;

(3) an identification and description of the qualifications of all persons, consultants, and contractors that will be implementing the remedy;

(4) detailed engineering design drawings and systems specifications for all elements of the remedy;

(5) a construction work plan;

(6) an operation and maintenance plan;

(7) the results of any remedy pilot tests;

(8) a plan for monitoring the performance of the remedy, including sampling and laboratory analysis of all affected media;

(9) a waste management plan;

(10) a proposed schedule for submission to the NMED of periodic progress reports; and

(11) a proposed schedule for implementation of the remedy.

IV.H.7.c Health and Safety Plan

The Permittee shall conduct all activities in accordance with a site-specific or facility-wide Health and Safety Plan during all construction, operation, maintenance, and monitoring activities conducted during corrective measures implementation.

IV.H.7.d Progress Reports

The Permittee shall submit to the NMED progress reports in accordance with the schedule approved in the Corrective Measures Implementation Plan. The progress reports shall, at a minimum, include the following information:

(1) a description of the remedy work completed during the reporting period;

(2) a summary of problems, potential problems, or delays encountered during the reporting period;

(3) a description of actions taken to eliminate or mitigate the problems, potential problems, or delays;

(4) a discussion of the remedy work projected for the next reporting period, including all sampling events;

(5) copies of the results of all monitoring, including sampling and analysis, and other data generated during the reporting period; and

(6) copies of all waste disposal records generated during the reporting period.

IV.H.8 Remedy Completion

IV.H.8.a Remedy Completion Report

Within 90 days after completion of remedy, the Permittee shall submit to the NMED a Remedy Completion Report. The report shall, at a minimum, include the following items:

(1) a summary of the work completed;

(2) a statement, signed by a registered professional engineer, that the remedy has been completed in accordance with the NMED approved work plan for the remedy;

(3) as-built drawings and specifications signed and stamped by a registered professional engineer;

(4) copies of the results of all monitoring, including sampling and analysis, and other data generated during the remedy implementation, if not already submitted in a progress report;

(5) copies of all waste disposal records, if not already submitted in a progress report; and

(6) a certification, signed by a responsible official stating: "I certify under penalty of law that this document and all attachments were prepared under my direction or supervision according to a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

IV.H.9 Accelerated Clean-up Process

If the Permittee identifies a corrective action or measure that, if implemented voluntarily, will reduce risks to human health and the environment to levels acceptable to the NMED, will reduce cost and/or will achieve cleanup of a SWMU, AOC or other contaminated location, ahead of schedule, the Permittee may implement the corrective measure as provided in this Permit Section (IV.H.9), in lieu of the process established in Permit Section IV.H.2. The accelerated cleanup process may only be used at sites to implement presumptive remedies (*see* 61 Fed. Reg. 19432, 19439-40)(May 1, 1996) at small-scale and relatively simple sites where groundwater contamination is not a component of the accelerated cleanup, where the remedy is considered to be the final remedy for the site, and where the field work will be accomplished within 180 days of the commencement of field activities. The proposed accelerated cleanup shall be documented in an Accelerated Corrective Measure Work Plan, which shall include:

(1) a description of the proposed remedial action, including details of the unit or activity that is subject to the requirements of this Permit;

(2) an explanation of how the proposed cleanup action is consistent with the overall corrective action objectives and requirements of this Permit;

(3) the methods and procedures for characterization and remediation sample collection and analyses; and

(4) a schedule for implementation and reporting on the proposed cleanup action.

The Permittee shall notify the NMED of the planned accelerated corrective measure a minimum of 30 days prior to the commencement of any accelerated field activity. The notification shall include the submittal of the Plan if not already submitted to the NMED. The accelerated clean-up process is subject to the limitations including in 20.4.2 NMAC.

IV.H.9.a Accelerated Corrective Measures Work Plan

The Permittee shall obtain approval of an Accelerated Corrective Measures Work Plan prior to implementation. The Permittee shall prepare the Work Plan in general accordance with the requirements of Permit Section IV.L (*Reporting Requirements*). The Work Plan shall be submitted to the NMED for review. If the NMED disapproves the Accelerated Corrective Measures Work Plan, the NMED will notify the Permittee in writing of the Plan's deficiencies and specify a due date for submission of a revised Accelerated Corrective Measures Work Plan. The Permittee shall include an implementation schedule in the revised Accelerated Corrective Measures Work Plan.

IV.H.9.b Accelerated Corrective Measures Implementation

The Permittee shall implement the accelerated corrective measures in accordance with the approved Accelerated Corrective Measures Work Plan. Within 90 days of completion of the accelerated corrective measures, the Permittee shall submit to the NMED for approval a Remedy Completion Report in a format approved by the NMED in general accordance with Permit Section IV.L (*Reporting Requirements*). If upon review, the NMED identifies any deficiencies in the Remedy Completion Report, the NMED will notify the Permittee in writing.

IV.I APPROVAL OF SUBMITTALS

All documents shall be subject to the review and approval procedures described in Permit Section I.J.11.

IV.J METHODS AND PROCEDURES

The Permittee shall submit to the NMED, for review and written approval, site-specific work plans for sites prior to the commencement of field activities where environmental investigation, corrective action, sampling or monitoring is being conducted or proposed. The site-specific work plans shall include the methods to be used to conduct all activities at each site or unit and shall be prepared in accordance with the format described in the Permit Section IV.L (*Reporting Requirements*). The Permittee shall provide notification to the NMED of corrective action field activities a minimum of 15 days prior to commencing the activity.

The methods used to conduct investigation, remediation, and monitoring activities shall be sufficient to fulfill the requirements of this Permit and provide accurate data for the evaluation of site conditions, the nature and extent of contamination and contaminant migration, and for remedy selection and implementation, where necessary. The methods presented in this Permit Section (IV.J) are minimum requirements for environmental investigation and sampling, and are not intended to include all methods that may be necessary to fulfill the requirements of this Permit. The methods for conducting investigations, corrective actions, and monitoring at the Facility must be determined based on the conditions and contaminants that exist at each site or unit.

IV.J.1 Standard Operating Procedures

The Permittee shall provide a brief description of investigation, sampling or analytical methods and procedures in documents submitted to the NMED that includes sufficient detail to evaluate

the quality of the acquired data. Facility standard operating procedures (SOPs) shall not be substituted for such descriptions.

IV.J.2 Investigation, Sampling, and Analysis Methods

IV.J.2.a Introduction and Purpose

This Permit Section (IV.J.2) provides minimum requirements for field investigations, sample collection, handling and screening procedures, field and laboratory sample analysis, and quality assurance procedures for samples of the medium being investigated or tested at the Facility.

The purpose of this Permit Section is to: 1) provide minimum requirements for drilling and sample collection in exploratory borings and other excavations; 2) provide minimum requirements for sampling of the target media; 3) provide minimum requirements for monitoring of groundwater and vadose zone conditions; and 4) identify minimum required screening, analytical, and quality assurance procedures that shall be implemented during field sampling activities and laboratory analyses.

The quality assurance procedures referenced in the previous paragraph include: 1) the Facility investigation data quality objectives; 2) the requirements for QA/QC to be followed during field investigations and by the analytical laboratories; and 3) the methodology for the review and evaluation of the field and laboratory QA/QC results and documentation.

IV.J.2.b Field Exploration Activities

Exploratory borings shall be advanced at locations specified in the NMED approved site-specific work plans. The NMED may require additional exploratory borings to fulfill the requirements of this Permit. Any additional boring locations, if required, will be determined or approved by the NMED. The depths and locations of all exploratory and monitoring well borings shall be specified in the site-specific work plans submitted to the NMED for approval prior to the start of the respective field activities. The NMED must approve proposed unit aggregates grouped for the purpose of site investigation, remediation, and/or monitoring activities.

IV.J.2.c Sub-Surface Features/Utility Geophysical Surveys

The Permittee shall conduct surveys to locate underground utilities, pipelines structures, drums, debris, and other buried features, including buried waste, in the shallow subsurface prior to the start of field exploration activities. The methods used to conduct the surveys, such as magnetometer, ground penetrating radar, resistivity, or other methods, shall be selected based on the characteristics of the site and the possible or suspected underground structures. The results of the surveys shall be included in the investigation reports submitted to the NMED.

IV.J.2.d Drilling and Soil, Rock, and Sediment Sampling

IV.J.2.d.i Drilling

Exploratory and monitoring well borings shall be drilled using the most effective, proven, and practicable method for recovery of undisturbed samples and potential contaminants. The NMED shall approve the drilling methods selected for advancement of each boring prior to the start of

field activities. Based on the drilling conditions, the borings shall be advanced using one of the following methods:

a. Hollow-stem auger

b. Air rotary

c. Direct Push Technology (DPT)

d. Other methods approved by NMED

Hollow-stem auger or DPT drilling methods are preferred if vapor-phase or VOC contamination is known or suspected to be present. The type of drilling fluid used, if necessary, shall be approved by the NMED prior to the start of drilling activities or prior to use at any site.

All drilling equipment shall be in good working condition and capable of performing the assigned task. Drilling rigs and equipment shall be operated by properly trained, experienced, and responsible crews. The Permittee is responsible for ensuring that contaminants from another site or facility are not introduced into the site under investigation due to malfunctioning equipment or poor site maintenance. The drilling equipment shall be properly decontaminated before drilling each boring.

Exploratory borings shall be advanced to unit- and location-specific depths specified or approved by the NMED. The Permittee shall propose drilling depths in the site-specific work plans submitted for each subject area. Unless otherwise specified by the NMED, the borings shall be advanced to the following minimum depths:

(1) in all borings, 5 ft below the deepest detected contamination based on field screening, laboratory analyses, and/or previous investigations at the site;

(2) Five feet below the base of structures such as piping or building sumps, footings or other building structures;

(3) Five feet below the shallow water table; and

(4) depths specified by the NMED based on regional or unit specific data needs.

The Permittee shall notify the NMED as early as practicable if conditions arise or are encountered that do not allow the advancement of borings to the depths specified by the NMED or proposed in an approved work plan so that alternative actions may be discussed. Precautions shall be taken to prevent the migration of contaminants between geologic, hydrologic, or other identifiable zones during drilling and well installation activities. Contaminant zones shall be isolated from other zones encountered in the borings.

The drilling and sampling shall be accomplished under the direction of a qualified engineer or geologist who shall maintain a detailed log of the materials and conditions encountered in each boring. Both sample information and visual observations of the cuttings and core samples shall be recorded on the boring log. Known site features and/or site survey grid markers shall be used as references to locate each boring prior to surveying the location as described in Permit Section IV.J.2.e. The boring locations shall be measured to the nearest foot, and locations shall be recorded on a scaled site map upon completion of each boring.

Trenching and other exploratory excavation methods shall follow the applicable general procedures outlined in this Permit Section. The particular methods proposed for use by the Permittee for exploratory excavation and sampling at any specific unit shall be included in the site-specific investigation work plan submitted to the NMED. The NMED will include any changes or additional requirements for conducting exploratory excavation and sampling activities at the subject unit in its response to the Permittee after review of the investigation work plans.

IV.J.2.d.ii Soil and Rock Sampling

Relatively undisturbed discrete soil and rock samples shall be obtained, where possible, during the advancement of each boring for the purpose of logging, field screening, and analytical testing. Generally, the samples shall be collected at the following intervals and depths:

(1) at 2.5-ft intervals, 5-ft intervals, continuously, or as approved by the NMED;

(2) at the depth immediately below the base of the unit structures and at the fill-native soil interface;

(3) at the maximum depth of each boring;

(4) at the depths of contacts or first encounter, observed during drilling, with geologic units of different lithology, changes in structural or textural characteristics, or zones of relatively higher or lower permeability;

(5) of soil or rock types relatively more likely to sorb or retain contaminants than surrounding lithology;

(6) at the depth of the first encounter, during drilling, with shallow or intermediate saturated zones;

(7) at intervals suspected of being source or contaminated zones;

(8) at the top of the regional aquifer; and

(9) at other intervals approved or required by the NMED.

The sampling interval for the borings may be modified, or samples may be obtained from a specific depth, based on field observations. A decontaminated split-barrel sampler lined with brass sleeves, a coring device, or other method approved by the NMED shall be used to obtain samples during the drilling of each boring.

A split barrel sampler lined with brass sleeves or a coring device is the preferred sampling method for borehole soil, rock, and sediment sampling. The following procedures should be followed if a split barrel sampler is used. Upon recovery of the sample, one or more brass sleeves shall be removed from the split barrel sampler and the open ends of the sleeves covered with Teflon tape or foil and sealed with plastic caps fastened to the sleeves with tape for shipment to the analytical laboratory. If brass sleeves are not used, a portion of the sample shall be placed in pre-cleaned, laboratory-prepared sample containers for laboratory chemical analysis. The remaining portions of the sample shall be used for logging and field screening, as described in Permit Section IV.J.2.d.

Discrete samples shall be collected for field screening and laboratory analyses. Homogenization of discrete samples collected for analyses other than for VOC and SVOC analyses shall be performed by the analytical laboratory, if necessary. The Permittee may submit site-specific, alternative methods for homogenization of samples in the field to the NMED for review and written approval.

Samples to be submitted for laboratory analyses shall be selected based on: 1) the results of the field screening or mobile laboratory analyses; 2) the position of the sample relative to groundwater, suspected releases, or site structures; 3) the sample location relative to former or altered site features or structures; 4) suspected migration pathways and the stratigraphy encountered in the boring; and 5) the specific objectives and requirements of this Permit and the approved site-specific work plan. The proposed number of samples and analytical parameters shall be included as part of the site-specific work plan submitted to the NMED for approval prior to the start of field investigation activities at each unit. The work plans shall allow for flexibility in modifying the project-specific tasks based on information obtained during the course of the investigation. Modifications to site-specific work plan tasks must be pre-approved in writing by the NMED.

IV.J.2.d.iii Sediment Sampling

Surface samples shall be collected using decontaminated, hand-held stainless steel coring device, Shelby tube, thin-wall sampler or other method approved by the NMED where surface or sediment sampling is conducted without the use of the drilling methods described in Section Iv.J.2.d.i above. The samples shall be transferred to pre-cleaned laboratory prepared containers for submittal to the laboratory. Samples obtained for volatiles analysis shall be collected using Encore® samplers, Shelby tubes, thin-wall sampler or other method approved by the NMED. Except in the case of the use of Encore® samplers, the ends of the samplers shall be lined with Teflon tape or aluminum foil and sealed with plastic caps fastened to the sleeves with tape for shipment to the analytical laboratory.

The physical characteristics of the sediment (such as mineralogy, ASTM soil classification, AGI (American Geological Institute) rock classification, moisture content, texture, color, presence of stains or odors, and/or field screening results), depth where each sample was obtained, method of sample collection, and other observations shall be recorded in the field log.

IV.J.2.d.iv Drill Cuttings (Investigation Derived Waste)

Drill cuttings, excess sample material and decontamination fluids, and all other investigation derived waste (IDW) shall be contained and characterized using methods based on the boring location, boring depth, drilling method, and type of contaminants suspected or encountered. Proposed IDW management shall be included with the unit-specific investigation work plan submitted to the NMED for approval prior to the start of field investigations. The NMED shall approve the method of containment for drill cuttings prior to the start of drilling activities. Borings not completed as groundwater or vapor monitoring wells shall be properly abandoned in accordance with the methods listed in Permit Section IV.K.6 or other method approved by the NMED. Borings completed as groundwater monitoring wells shall be constructed in accordance with the requirements described in Permit Section IV.K (*Well Construction Techniques*).

IV.J.2.d.v Logging of Soil/Rock and Sediment Samples

Samples obtained from all exploratory borings and excavations shall be visually inspected and the soil or rock type classified in general accordance with ASTM D2487 (Unified Soil Classification System) and D2488, or AGI Methods for soil and rock classification. Detailed logs of each boring shall be completed in the field by a qualified engineer or geologist. Additional information, such as the presence of water-bearing zones and any unusual or noticeable conditions encountered during drilling shall be recorded on the logs. Field boring logs, test pit logs, and field well construction diagrams shall be converted to the format acceptable for use in final reports submitted to the NMED. If requested, draft boring logs, test pit logs, and well construction diagrams shall be submitted to the NMED for review within 30 days after the completion of each boring or monitoring well.

IV.J.2.d.vi Soil, Rock, and Sediment Sample Field Screening

Samples obtained from borings shall be screened in the field for evidence of the potential presence of contaminants. Field screening results shall be recorded on the exploratory boring and excavation logs. Field screening results are used as a general guideline to determine the nature and extent of possible contamination. In addition, screening results shall be used to aid in the selection of soil, rock, sediment, and vapor-phase samples for laboratory analysis. The NMED recognizes that field screening alone will not detect the possible presence or full nature and extent of all contaminants that may be encountered at the site.

The primary screening methods to be used shall include: 1) visual examination; 2) headspace vapor screening for VOCs; and 3) metals screening using X-ray fluorescence (XRF). Additional screening for site- or release-specific characteristics such as pH, Total Petroleum Hydrocarbons (TPH), nitrates, or for other specific compounds using field test kits shall be conducted where appropriate.

Headspace vapor screening shall target VOCs and shall be conducted by placing a soil or rock sample in a plastic sample bag or a foil-sealed container allowing space for ambient air. The container shall be sealed and then shaken gently to expose the soil or rock to the air trapped in the container. The sealed container shall be allowed to rest for a minimum of five minutes while vapors equilibrate. Vapors present within the sample bag headspace will then be measured by inserting the probe of the instrument in a small opening in the bag or through the foil. The maximum value and the ambient air temperature shall be recorded on the field boring or test pit log for each sample. The monitoring instruments shall be calibrated each day to the manufacturer's standard for instrument operation. A photo-ionization detector (PID) equipped with a 10.6 or higher electron volt (eV) lamp, combustible gas indicator, or other instrument approved by the NMED shall be used for VOC field screening. The limitations, precision, and calibration procedures of the instrument to be used for VOC field screening shall be included in the site-specific investigation work plan prepared for each unit.

XRF may be used to screen soil, rock, or sediment samples for the presence of metals. XRF screening requires proper sample preparation and proper instrument calibration. Sample preparation and instrument calibration procedures shall be documented in the field logs. The methods and procedures for sample preparation and instrument calibration shall be approved by the NMED prior to the start of field activities. Field XRF screening results for selected metals

may be used in lieu of laboratory analyses upon written approval by the NMED; however, the results shall, at a minimum, be confirmed by laboratory analyses at a frequency of 20 percent (1 sample per every 5 analyzed by XRF analysis).

Field screening results are site- and boring-specific and the results vary with instrument type, media screened, weather conditions, moisture content, soil or rock type, and type of contaminant. The Permittee shall record on the field logs all conditions capable of influencing the results of field screening. The Permittee shall submit to the NMED conditions potentially influencing field screening results as part of the site-specific investigation, remediation, or monitoring reports.

At a minimum, the Permittee shall submit the samples with the greatest apparent degree of contamination, based on field observations and field screening, for laboratory analysis. The Permittee shall also use the location of the sample relative to groundwater, stratigraphic units or contacts, and the proximity to significant site or subsurface features or structures as a guideline for sample selection. In addition, the Permittee shall submit the samples with no or little apparent contamination, based on field screening, for laboratory analysis if the intention is to confirm that the base (or other depth interval) of a boring or other sample location is not contaminated.

IV.J.2.d.vii Soil, Rock, and Sediment Sample Types

The Permittee shall collect soil, rock, and sediment samples at the frequencies outlined in the site-specific investigation, corrective action, or monitoring work plans for each unit, or other site submitted by the Permittee for review and written approval by the NMED. The samples collected shall be representative of the media and site conditions being investigated or monitored. The Permittee shall collect QA/QC samples to monitor the validity of the soil, rock, and sediment sample collection procedures. Field duplicates will be collected at a rate of ten percent. The Permittee shall collect equipment blanks from all sampling apparatus at a frequency of ten percent for chemical analysis. Equipment blanks shall be collected at a frequency of one per day if disposable sampling equipment is used. The Permittee shall collect field blanks at a frequency of one per day for each medium (with the exception of air samples) at each unit, or other site. Reagent blanks shall be used if chemical analytical procedures requiring reagents are employed in the field as part of the investigation or monitoring program. The resulting data will provide information on the variability associated with sample collection, handling, and laboratory analysis operations. The blanks and duplicates shall be submitted for laboratory analyses associated with the project-specific contaminants, data quality concerns, and media being sampled.

IV.J.2.e Sample Point and Structure Location Surveying

The horizontal and vertical coordinates of the top of each monitoring well casing and the ground surface at each monitoring well location shall be determined by a registered New Mexico professional land surveyor in accordance with the State Plane Coordinate System (§§ 47-1-49 through 56 NMSA 1978)). The surveys shall be conducted in accordance with Sections 500.1 through 500.12 of the Regulations and Rules of the Board of Registration for Professional Engineers and Surveyors Minimum Standards for Surveying in New Mexico. Horizontal positions shall be measured to the nearest 0.1-ft, and vertical elevations shall be measured to the nearest 0.01-ft. The Permittee shall prepare site map(s), certified by a registered New Mexico

professional land surveyor, presenting all surveyed locations and elevations including relevant site features and structures for submittal with all associated reports to the NMED.

Site attributes (*e.g.*, soil sample locations, sediment sample locations, pertinent structures, as well as staked out sampling grids), shall be located by using the global positioning system (GPS), another the NMED-approved surveying system, or by using a registered New Mexico Registered Land Surveyor using the methods described in the paragraph above. If using GPS, horizontal locations shall be measured to the nearest 0.5 ft. The Permittee shall provide the NMED a statement of accuracy for survey data upon request.

IV.J.2.f Subsurface Vapor-Phase Monitoring and Sampling

Samples of subsurface vapors shall be collected from vapor monitoring points from both discrete zones, selected based on investigation and field screening results, and as total well subsurface vapor samples where required by the NMED. Subsurface vapor samples shall be collected using methods approved by the NMED that will produce reliable and representative results from the zones subject to investigation or monitoring.

NMED may require vapor sampling at sites where there is a potential for vapor-phase contamination to be present. Soil gas samples shall be obtained at the NMED-approved intervals for field screening and/or laboratory analyses. An inflatable packer shall be dropped to isolate the bottom two to three feet of the borehole. The isolated portion of the borehole shall be purged by slowly removing approximately five times the volume of the annular space beneath the packer, followed by a VOC measurement using a PID equipped with a 11.7 eV lamp, a combustible gas indicator or other instrument approved by the NMED. The data shall be logged and also used for determining the samples to be sent to an analytical laboratory.

The Permittee shall, as directed by the NMED, collect vapor samples for field measurement of the following during subsurface vapor monitoring activities:

(1) percent oxygen;

(2) organic vapors (using a photo-ionization detector with an 11.7 eV (electron volt) lamp, a combustible vapor indicator or other method approved by the NMED);

(3) percent carbon dioxide;

(4) static subsurface pressure; and

(5) other parameters (such as carbon monoxide and hydrogen sulfide) as required by the NMED.

The Permittee also shall collect vapor samples for laboratory analysis of the following as required:

(6) percent moisture;

(7) VOCs; and

(8) other analytes required by the NMED.

Vapor samples analyzed by the laboratory for percent moisture and VOCs shall be collected using SUMMA canisters or other sample collection method approved by the NMED. The

samples shall be analyzed for VOC concentrations by EPA Method TO-15, as it may be updated or equivalent VOC analytical method.

Field vapor measurements, the date and time of each measurement, and the instrument used shall be recorded on a vapor monitoring data sheet. The instruments used for field measurements shall be calibrated daily in accordance with the manufacturer's specifications and as described in Permit Section IV.J.2.l. The methods used to obtain vapor-phase field measurements and samples shall be approved by the NMED in writing prior to the start of air monitoring at each Facility site where vapor-phase monitoring is conducted.

IV.J.2.g Groundwater Monitoring

IV.J.2.g.i Groundwater Levels

Groundwater level and SPH thickness measurements shall be obtained at intervals required by the NMED. The method of water level and SPH thickness measurements shall be approved by the NMED. Groundwater and SPH levels also shall be obtained prior to purging in preparation for a sampling event. Measurement data and the date and time of each measurement shall be recorded on a site monitoring data sheet. The depth to groundwater and SPH thickness levels shall be measured to the nearest 0.01 ft. The depth to groundwater and SPH thickness shall be recorded relative to the surveyed well casing rim or other surveyed datum. A corrected water table elevation shall be provided in wells containing SPH by adding 0.8 times the measured SPH thickness to the calculated water table elevation. Groundwater and SPH levels shall be measured in all wells within 48 hours of the start of obtaining water level measurements. All automated and manual extraction of SPH and water from recovery wells, observation wells, and collection wells shall be discontinued for 48 hours prior to the measurement of water and product level. Groundwater levels shall be measured in all wells at the facility (or the number of wells otherwise specified in a NMED approved groundwater monitoring work plan) within 14 days of the commencement of the monitoring activities. The Permittee shall conduct periodic measuring events, the schedule for which shall be provided in the Facility-wide groundwater monitoring work plan.

IV.J.2.h Groundwater Sampling

Groundwater samples shall initially be obtained from newly installed monitoring wells between ten and 30 days after completion of well development. Groundwater monitoring and sampling shall be conducted at an interval approved by the NMED after the initial sampling event. The Permittee shall sample all saturated zones screened to allow entry of groundwater into each monitoring well during each sampling event (or as otherwise specified in the NMED approved Facility-wide groundwater monitoring work plan). All requests for variances from the groundwater sampling schedule shall be submitted to the NMED, in writing, no less than 30 days prior to the start of scheduled monitoring and sampling events. Groundwater samples shall be collected from all saturated zones, where possible, within exploratory borings not intended to be completed as monitoring wells prior to abandonment of the borings.

Water samples shall be analyzed in accordance with the NMED-approved groundwater monitoring work plan for one or more of the following general chemistry parameters as required by the NMED:

nitrate/nitrite	sulfate	chloride	sodium
dissolved CO_2	alkalinity	carbonate/bicarbonate	boron
fluoride	manganese	calcium	silicon
ferric/ferrous iron	ammonia	potassium	phosphorus/phosphate
sulfide	bromide	magnesium	methane
TKN	total organic carbon	total dissolved solids	

IV.J.2.h.i Well Purging

All zones in each monitoring well shall be purged by removing groundwater prior to sampling and in order to ensure that formation water is being sampled. Purge volumes shall be determined by monitoring, at a minimum, groundwater pH, specific conductance, dissolved oxygen concentrations, turbidity, redox potential, and temperature during purging of volumes and at measurement intervals approved by the NMED in writing. The groundwater quality parameters shall be measured using a flow-through cell and instruments approved by the NMED in writing. The volume of groundwater purged, the instruments used, and the readings obtained at each interval shall be recorded on the field monitoring log. In general, water samples may be obtained from the well after the measured parameters of the purge water have stabilized to within ten percent for three consecutive measurements. Well purging may also be conducted in accordance with the NMED's Position Paper "Use of Low-Flow and other Non-Traditional Sampling Techniques for RCRA Compliant Groundwater Monitoring" (October 30, 2001). The Permittee may submit, to the NMED for approval, a written request for a variance from the described methods of well purging for individual wells no later than 90 days prior to scheduled sampling activities. The NMED will respond to the request, in writing, within 60 days of receipt of the variance request.

IV.J.2.h.ii Groundwater Sample Collection

Groundwater samples shall be obtained from each well after a sufficient amount of water has been removed from the well casing to ensure that the sample is representative of formation water. Groundwater samples shall be obtained using methods approved by the NMED within 24 hours of the completion of well purging. Sample collection methods shall be documented in the field monitoring reports. The samples shall be transferred to the appropriate, clean, laboratory-prepared containers provided by the analytical laboratory. Sample handling and chain-of-custody procedures are described in Permit Section IV.J.2.i. Decontamination procedures shall be established for reusable water sampling equipment as described in Permit Section IV.J.2.k.

The methods for disposal of purge/decontamination water must be approved by the NMED prior to disposal. All purged groundwater and decontamination water shall be characterized prior to disposal unless it is disposed in the refinery wastewater treatment system upstream of the API Separator. Disposable materials shall be handled as described in Section IV.J.2.m.

Groundwater samples intended for metals analysis shall be submitted to the laboratory as total metals samples. If required by the NMED, the Permittee shall obtain groundwater samples for dissolved metals analysis to be filtered using disposable in-line filters with a mesh size approved by the NMED.

IV.J.2.h.iii Surface Water Sample Collection

If required, surface water samples shall be collected using methods approved by the NMED. Samples shall be collected in clean laboratory-prepared sampling containers. The methods and instruments used to measure field parameters shall be approved by the NMED prior to conducting surface water sampling. The sampling and monitoring techniques used and the measurements obtained shall be recorded in the field monitoring reports.

IV.J.2.h.iv Groundwater and Surface Water Sample Types

Groundwater samples shall be collected from each monitoring well and surface water samples shall be collected at predetermined locations. Field duplicates, field blanks, equipment rinsate blanks, reagent blanks, if necessary, and trip blanks shall be obtained for quality assurance during groundwater and surface water sampling activities. The samples shall be handled as described in Permit Section IV.J.2.i.

Field duplicate surface water and groundwater samples shall be obtained at a frequency of ten percent. At a minimum, one duplicate sample per sampling event shall always be obtained.

Field blanks shall be obtained at a frequency of no less than one per day per site or unit. Field blanks shall be generated by filling sample containers in the field with deionized water and submitting the samples, along with the groundwater or surface water samples, to the analytical laboratory for the appropriate analyses.

Equipment rinsate blanks shall be obtained for chemical analysis at the rate of five percent but no fewer than one rinsate blank per sampling day. Equipment rinsate blanks shall be collected at a rate of one per sampling day if disposable sampling apparatus is used. Rinsate samples shall be generated by rinsing deionized water through unused or decontaminated sampling equipment. The rinsate sample then shall be placed in the appropriate sample container and submitted with the groundwater or surface water samples to the analytical laboratory for the appropriate analyses.

Reagent blanks shall be obtained at a frequency of ten percent but no fewer than one per day per unit if chemical analyses requiring the use of chemical reagents are conducted in the field during water sampling activities.

Trip blanks shall accompany laboratory sample bottles and shipping and storage containers intended for VOC analyses. Trip blanks shall consist of a sample of analyte-free deionized water prepared by the laboratory and placed in an appropriate sample container. The trip blank shall be prepared by the analytical laboratory prior to the sampling event and shall be kept with the

shipping containers and placed with other water samples obtained from the site each day. Trip blanks shall be analyzed at a frequency of one for each shipping container of samples.

IV.J.2.i Sample Handling

At a minimum, the following procedures shall be used at all times when collecting samples during investigation, corrective action, and monitoring activities unless otherwise specified in a NMED-approved work plan:

(1) neoprene, nitrile, or other protective gloves shall be worn when collecting samples. New disposable gloves shall be used to collect each sample;

(2) all samples collected of each medium for chemical analysis shall be transferred into clean sample containers supplied by the project analytical laboratory with the exception of soil, rock, and sediment samples obtained in brass sleeves, shelby tubes, thin wall samplers, or in Encore™ samplers. Upon recovery of the sample collected using split barrel samplers with brass sleeves, the brass sleeves shall be removed from the split barrel sampler and the open ends of the sleeves shall be lined with Teflon tape or foil and sealed with plastic caps. The caps shall be fastened to the sleeve with tape for storage and shipment to the analytical laboratory. Samples collected in shelby tubes or thin wall samplers shall be capped in a similar fashion. The sample depth and the top of the sample shall be clearly marked. Sample container volumes and preservation methods shall be in accordance with EPA *SW-846* and established industry practices for use by accredited analytical laboratories. Sufficient sample volume shall be obtained for the laboratory to complete the method-specific QC analyses on a laboratory-batch basis; and

(3) sample labels and documentation shall be completed for each sample following procedures included in the site-specific work plans approved by the NMED. Immediately after the samples are collected, they shall be stored in a cooler with ice or other appropriate storage method until they are delivered to the analytical laboratory. Standard chain-of-custody procedures, as described in Permit Section IV.J.2.n.ii, shall be followed for all samples collected. All samples shall be submitted to the laboratory soon enough to allow the laboratory to conduct the analyses within the method holding times. All samples shall be submitted to the laboratory within 48 hours after their collection.

Shipment procedures shall include the following:

(4) individual sample containers shall be packed to prevent breakage and transported in a sealed cooler with ice or other suitable coolant or other EPA or industry-wide accepted method. The drainage hole at the bottom of the cooler shall be sealed and secured in case of sample container leakage. Temperature blanks shall be included with each shipping container;

(5) each cooler or other container shall be delivered directly to the analytical laboratory;

(6) glass bottles shall be separated in the shipping container by cushioning material to prevent breakage;

(7) plastic containers shall be protected from possible puncture during shipping using cushioning material;

(8) the chain-of-custody form and sample request form shall be shipped inside the sealed storage container to be delivered to the laboratory;

(9) chain-of-custody seals shall be used to seal the sample-shipping container in conformance with EPA protocol; and

(10) signed and dated chain-of-custody seals shall be applied to each cooler prior to transport of samples from the site.

IV.J.2.j In-Situ Testing

In-situ permeability tests, remediation system pilot tests, stream flow tests, and other tests conducted to evaluate site and subsurface conditions shall be designed to accommodate specific site conditions and to achieve the test objectives. The testing methods shall be approved, in writing, by the NMED prior to implementation. The tests shall be conducted in order to appropriately represent site conditions and in accordance with USGS, ASTM or other methods generally accepted by the industry. Detailed logs of all relevant site conditions and measurements shall be maintained during the testing events. If requested, a summary of the general test results, including unexpected or unusual test results and equipment failures or testing limitations shall be reported to the NMED within 30 days of completion of the test. The summary shall be presented in a format acceptable to the NMED and in general accordance with the report formats outlined in Permit Section IV.L (*Reporting Requirements*). A report summarizing the results of each test shall be submitted to the NMED within 120 days of completion of each test.

IV.J.2.k Decontamination Procedures

The objective of the decontamination procedures is to minimize the potential for cross-contamination. A designated decontamination area shall be established for decontamination of drilling equipment, reusable sampling equipment and well materials. The drilling rig shall be decontaminated prior to entering the site or unit. Drilling equipment or other exploration equipment that may come in contact with the borehole shall be decontaminated by steam cleaning, by hot-water pressure washing, or by other method approved by the NMED prior to drilling each new boring.

Sampling or measurement equipment, including but not limited to, stainless steel sampling tools, split-barrel or core samplers, well developing or purging equipment, groundwater quality measurement instruments, water level measurement instruments, and reusable vapor sampling equipment shall be decontaminated in accordance with the following procedures or other applicable methods approved by the NMED before each sampling attempt or measurement:

(1) brush equipment with a wire or other suitable brush, if necessary or practicable, to remove large particulate matter;

(2) rinse with potable tap water;

(3) wash with nonphosphate detergent or other detergent approved by the NMED (examples include Fantastik™, Liqui-Nox®) followed by a tap water rinse;

(4) rinse with 0.1 molar nitric acid (to remove trace metals, if necessary) followed by a tap water rinse;

(5) rinse with methanol (to remove organic compounds, if necessary) followed by a tap water rinse;

(6) rinse with potable tap water; and

(7) double rinse with deionized water.

All decontamination solutions shall be collected and stored temporarily as described in Permit Section IV.J.2.m. Decontamination procedures and the cleaning agents used shall be documented in the daily field log.

IV.J.2.l Field Equipment Calibration Procedures

Field equipment requiring calibration shall be calibrated to known standards, in accordance with the manufacturers' recommended schedules and procedures. At a minimum, calibration checks shall be conducted daily, or at other intervals approved by the NMED, and the instruments shall be recalibrated, if necessary. Calibration measurements shall be recorded in the daily field logs. If field equipment becomes inoperable, its use shall be discontinued until the necessary repairs are made. In the interim, a properly calibrated replacement instrument shall be used.

IV.J.2.m Collection and Management of Investigation Derived Waste

Investigation derived waste (IDW) includes general refuse, drill cuttings, excess sample material, water (decontamination, development and purge), and disposable equipment generated during the course of investigation, corrective action, or monitoring activities. All IDW shall be properly characterized and disposed of in accordance with all Federal, State, and local rules and regulations for storage, labeling, handling, transport, and disposal of waste. The Permittee shall include a description of anticipated management of IDW as part of the applicable work plan submitted to the NMED for approval prior to disposal of any IDW produced during investigation, corrective action, or monitoring activities. The Permittee may submit a request to the NMED to dispose of IDW on a case-by-case basis prior to submittal of the applicable work plan.

All water generated during sampling and decontamination activities shall be temporarily stored at satellite accumulation areas or transfer stations in labeled 55-gallon drums or other containers approved by the NMED until proper characterization and disposal can be arranged or the water is disposed in the refinery’s waste water treatment system upstream of the API Separator. The IDW may be characterized for disposal based on the known or suspected contaminants potentially present in the waste. The methods for waste characterization and disposal of IDW shall be approved by the NMED prior to removal from the temporary storage area.

IV.J.2.n Documentation of Field Activities

IV.J.2.n.i General

Daily field activities, including observations and field procedures, shall be recorded on appropriate forms. The original field forms shall be maintained at the Facility. Copies of the completed forms shall be maintained in a bound and sequentially numbered field file for reference during field activities. Indelible ink shall be used to record all field activities.

Photographic documentation of field activities shall be performed, as appropriate. The daily record of field activities shall include the following:

(1) site or unit designation;

(2) date;

(3) time of arrival and departure;

(4) field investigation team members including subcontractors and visitors;

(5) weather conditions;

(6) daily activities and times conducted;

(7) observations;

(8) record of samples collected with sample designations and locations specified;

(9) photographic log;

(10) field monitoring data, including health and safety monitoring if conditions arise that require modification of required work;

(11) equipment used and calibration records, if appropriate;

(12) list of additional data sheets and maps completed;

(13) an inventory of the waste generated and the method of storage or disposal; and

(14) signature of personnel completing the field record.

IV.J.2.n.ii Sample Custody

All samples collected for analysis shall be recorded in the field report or data sheets. Chain-of-custody forms shall be completed at the end of each sampling day, prior to the transfer of samples off site, and shall accompany the samples during shipment to the laboratory. A signed and dated custody seal shall be affixed to the lid of the shipping container. Upon receipt of the samples at the laboratory, the custody seals will be broken, the chain-of-custody form shall be signed as received by the laboratory, and the conditions of the samples shall be recorded on the form. The original chain-of-custody form shall remain with the laboratory and copies shall be returned to the relinquishing party. The Permittee shall maintain copies of all chain-of-custody forms generated as part of sampling activities. Copies of the chain-of-custody records (either paper copies or electronically scanned in PDF format) shall be included with all draft and final laboratory reports submitted to the NMED.

IV.J.3 Chemical Analyses

The Permittee shall submit all samples for laboratory analysis to accredited contract laboratories. The laboratories shall use the most recent EPA and industry-accepted extraction and analytical methods for chemical analyses for target analytes as the testing methods for each medium sampled. The Permittee shall use the most sensitive laboratory methods (with the lowest detection limits) available unless specific conditions preclude their use.

The Permittee shall submit a list of analytes and analytical methods to the NMED, for review and written approval as part of each site-specific investigation, corrective action, or monitoring work plan. The detection limits for each method shall be less than applicable background, screening, and regulatory cleanup levels. The preferred method detection limits are a maximum of 20 percent of the cleanup, screening, or background levels. Analyses conducted with detection limits that are greater than applicable background, screening, and regulatory cleanup levels shall be considered data quality exceptions and the reasons for the elevated detection limits shall be reported to the NMED. These data cannot be used for statistical analyses. All analytical data (non-detects, estimated blanks, and detects) shall be included in the electronic or magnetic copy of the investigation report in Microsoft™ Excel format with qualifiers as attached from the analytical laboratory. The summary tables shall include only detects of the data based on the corresponding qualifiers. The Permittee shall not censor the data based on detection limits, quantitation limits, or measurement uncertainty.

IV.J.3.a Laboratory QA/QC Requirements

The following requirements for laboratory QA/QC procedures shall be considered the minimum QA/QC standards for the laboratories employed by the Permittee that provide analytical services for environmental investigation, corrective action, and monitoring activities conducted at the Facility. The Permittee shall provide the names of the contract analytical laboratories and copies of the laboratory quality assurance manuals to the NMED within 90 days of awarding a contract for analytical services to any contract laboratory.

IV.J.3.a.i Quality Assurance Procedures

Contract analytical laboratories shall maintain internal quality assurance programs in accordance with EPA and industry-wide accepted practices and procedures. At a minimum, the laboratories shall use a combination of standards, blanks, surrogates, duplicates, matrix spike/matrix spike duplicates (MS/MSD), blank spike/blank spike duplicates (BS/BSD), and laboratory control samples to demonstrate analytical QA/QC. The laboratories shall establish control limits for individual chemicals or groups of chemicals based on the long-term performance of the test methods. In addition, the laboratories shall establish internal QA/QC that meets EPA's laboratory certification requirements. The specific procedures to be completed are identified in the following sections.

IV.J.3.a.ii Equipment Calibration Procedures and Frequency

The laboratories' equipment calibration procedures, calibration frequency, and calibration standards shall be in accordance with the EPA test methodology requirements and documented in the laboratories' quality assurance and SOP manuals. All instruments and equipment used by the laboratory shall be operated, calibrated, and maintained according to manufacturers' guidelines and recommendations. Operation, calibration, and maintenance shall be performed by personnel who have been properly trained in these procedures. A routine schedule and record of instrument calibration and maintenance shall be kept on file at the laboratory.

IV.J.3.a.iii Laboratory QA/QC Samples

Analytical procedures shall be evaluated by analyzing reagent or method blanks, surrogates, MS/MSDs, BS/BSDs, and laboratory duplicates, as appropriate for each method. The laboratory QA/QC samples and frequency of analysis to be completed shall be documented in the cited EPA or DOE test methodologies. At a minimum, the laboratory shall analyze laboratory blanks, MS/MSDs, BS/BSDs, and laboratory duplicates at a frequency of one in twenty for all batch runs requiring EPA test methods and at a frequency of one in ten for non-EPA test methods. Laboratory batch QA/QC samples shall be specific to the project.

IV.J.3.a.iv Laboratory Deliverables

The laboratory analytical data package submitted to the NMED shall be prepared in accordance with EPA-established Level II analytical support protocol. The laboratory analytical data package kept on file at the Facility shall be prepared in accordance with EPA-established Level III or IV analytical support protocol. The following shall be provided by the contract analytical laboratories to the Permittee in the analytical laboratory reports submitted to the Permittee either electronically, magnetically or in hard (paper) copy for each project:

(1) transmittal letter, including information about the receipt of samples, the testing methodology performed, any deviations from the required procedures, any problems encountered in the analysis of the samples, any data quality exceptions, and any corrective actions taken by the laboratory relative to the quality of the data contained in the report;

(2) sample analytical results, including sampling date; date of sample extraction or preparation; date of sample analysis; dilution factors and test method identification; soil, rock, or sediment sample results in consistent units (mg/kg) or micrograms per kilogram in dry-weight basis; water sample results in consistent units (milligrams per liter or micrograms per liter (μg/L)); vapor sample results in consistent units (ppm or $\mu g/m^3$); and detection limits for undetected analytes. Results shall be reported for all field samples, including field duplicates and blanks, submitted for analysis;

(3) method blank results, including detection limits for undetected analytes;

(4) surrogate recovery results and corresponding control limits for samples and method blanks (organic analyses only);

(5) MS/MSD and/or BS/BSD spike concentrations, percent recoveries, relative percent differences (RPDs), and corresponding control limits;

(6) laboratory duplicate results for inorganic analyses, including relative percent differences and corresponding control limits;

(7) sample chain-of-custody documentation;

(8) holding times and conditions;

(9) conformance with required analytical protocol(s);

(10) instrument calibration;

(11) blanks;

(12) detection/quantitation limits;

(13) recoveries of surrogates;

(14) variability for duplicate analyses;

(15) completeness; and

(16) data report formats.

The following data deliverables for organic compounds shall be required from the laboratory:

(17) a cover letter referencing the procedure used and discussing any analytical problems, deviations, and modifications, including signature from authority representative certifying to the quality and authenticity of data as reported;

(18) report of sample collection, extraction, and analysis dates, including sample holding conditions;

(19) tabulated results for samples in units as specified, including data qualification in conformance with EPA protocol, and definition of data descriptor codes;

(20) reconstructed ion chromatograms for gas chromatograph/mass spectrometry (GC/MS) analyses for each sample and standard calibration;

(21) selected ion chromatograms and mass spectra of detected target analytes (GC/MS) for each sample and calibration with associated library/reference spectra;

(22) gas chromatograph/electron capture device (GC/ECD) and/or gas chromatograph/flame ionization detector (GC/FID) chromatograms for each sample and standard calibration;

(23) raw data quantification reports for each sample and calibrations, including areas and retention times for analytes, surrogates, and internal standards;

(24) a calibration data summary reporting calibration range used and a measure of linearity [include decafluorotriphenylphosphine (DFTPP) and p-bromofluorobenzene (BFB) spectra and compliance with tuning criteria for GC/MS;

(25) final extract volumes (and dilutions required), sample size, wet-to-dry weight ratios, and instrument practical detection/quantitation limit for each analyte;

(26) analyte concentrations with reporting units identified, including data qualification in conformance with the CLP Statement of Work (SOW) (include definition of data descriptor codes);

(27) quantification of analytes in all blank analyses, as well as identification of method blank associated with each sample;

(28) recovery assessments and a replicate sample summary, including all surrogate spike recovery data with spike levels/concentrations for each sample and all MS/MSD results (recoveries and spike amounts); and

(29) report of tentatively identified compounds with comparison of mass spectra to library/reference spectra.

The following data deliverables for inorganic compounds shall be required from the laboratory:

(30) a cover letter referencing the procedure used and discussing any analytical problems, deviations, and modifications; including signature from authority representative certifying to the quality and authenticity of data as reported;

(31) report of sample collection, digestion, and analysis dates, with sample holding conditions;

(32) tabulated results for samples in units as specified, including data qualification in conformance with the CLP SOW (including definition of data descriptor codes);

(33) results of all method QA/QC checks, including inductively coupled plasma (ICP) Interference Check Sample and ICP serial dilution results;

(34) tabulation of instrument and method practical detection/quantitation limits;

(35) raw data quantification report for each sample;

(36) a calibration data summary reporting calibration range used and a measure of linearity, where appropriate;

(37) final digestate volumes (and dilutions required), sample size, and wet-to-dry weight ratios;

(38) quantification of analytes in all blank analyses, as well as identification of method blank associated with each sample; and

(39) recovery assessments and a replicate sample summary, including post-digestate spike analysis; all MS data (including spike concentrations) for each sample, if accomplished; all MS results (recoveries and spike amounts); and laboratory control sample analytical results).

The Permittee shall present summary tables of these data and Level II QA/QC results to the NMED in the formats described in Permit Section IV.L (*Reporting Requirements*). The raw analytical data, including calibration curves, instrument calibration data, data calculation work sheets, and other laboratory support data for samples from this project, shall be compiled and kept on file at the Facility for reference. The Permittee shall make the data and all Level III or Level IV QA/QC data available to the NMED upon request.

IV.J.3.b Review of Field and Laboratory QA/QC Data

The Permittee shall evaluate the sample data, field, and laboratory QA/QC results for acceptability with respect to the data quality objectives (DQOs). Each group of samples shall be compared with the DQOs and evaluated using data validation guidelines contained in EPA guidance documents, the latest version of *SW-846*, and industry-accepted QA/QC methods and procedures.

The Permittee shall require the laboratory to notify the Facility project manager of data quality exceptions within one business day of discovery in order to allow for sample re-analysis, if possible. The Facility project manager shall contact the NMED within one business day of receipt of laboratory notification of data quality exceptions that may affect the ability to meet the objectives of the investigation or compliance activity in order to discuss the implications and determine whether the data will still be considered acceptable or if sample re-analysis or

resampling is necessary. The Facility project manager shall summarize the results of the discussion with the NMED project leader regarding the data quality exceptions in a memorandum. The Permittee shall submit the memorandum to the NMED by fax or electronic mail within three business days of the conclusion of the data quality discussion.

IV.J.3.c Blanks, Field Duplicates, Reporting Limits, and Holding Times

IV.J.3.c.i Blanks

The analytical results of field blanks and field rinsate blanks shall be reviewed to evaluate the adequacy of the equipment decontamination procedures and the possibility of cross-contamination caused by decontamination of sampling equipment. The analytical results of trip blanks shall be reviewed to evaluate the possibility for contamination resulting from the laboratory-prepared sample containers or the sample transport containers. The analytical results of laboratory blanks shall be reviewed to evaluate the possibility of contamination caused by the analytical procedures. If contaminants are detected in field or laboratory blanks, the sample data shall be qualified, as appropriate.

IV.J.3.c.ii Field Duplicates

Field duplicates shall consist of 2 samples either split from the same sample device or collected sequentially. Field duplicate samples shall be collected at a minimum frequency of 10 percent of the total number of samples submitted for analysis. RPDs for field duplicates shall be calculated. A precision of no more than 20 percent for duplicates shall be considered acceptable for soil, rock, and sediment sampling conducted at the Facility. The analytical DQO for precision shall be used for water duplicates.

IV.J.3.c.iii Method Reporting Limits

Method reporting limits for sample analyses for each medium shall be established at the lowest level practicable for the method and analyte concentrations and shall not exceed soil, groundwater, surface water, or vapor emissions background levels, cleanup standards, and screening levels. The preferred method detection limits are a maximum of 20 percent of the background, screening, or cleanup levels. Detection limits that exceed established soil, groundwater, surface water, or air emissions cleanup standards, screening levels, or background levels and are reported as “not detected” shall be considered data quality exceptions and an explanation for the exceedance and its acceptability for use shall be provided.

IV.J.3.c.iv Holding Times

The Permittee shall review the sampling, extraction, and analysis dates to confirm that extraction and analyses were completed within the recommended holding times, as specified by EPA protocol. Appropriate data qualifiers shall be noted if holding times were exceeded.

IV.J.3.d Representativeness and Comparability

IV.J.3.d.i Representativeness

Representativeness is a qualitative parameter related to the degree to which the sample data represent the relevant specific characteristics of the media sampled. The Permittee shall implement procedures to assure representative samples are collected and analyzed, such as repeated measurements of the same parameter at the same location over several distinct sampling events. The Permittee shall note any procedures or variations that may affect the collection or analysis of representative samples and shall qualify the data.

IV.J.3.d.ii Comparability

Comparability is a qualitative parameter related to whether similar sample data can be compared. To assure comparability, the Permittee shall report analytical results in appropriate units for comparison with other data (past studies, comparable sites, screening levels, and cleanup standards), and shall implement standard collection and analytical procedures. Any procedure or variation that may affect comparability shall be noted and the data shall be qualified.

IV.J.3.e Laboratory Reporting, Documentation, Data Reduction, and Corrective Action

Upon receipt of each laboratory data package, data shall be evaluated against the criteria outlined in the previous sections. Any deviation from the established criteria shall be noted and the data will be qualified. A full review and discussion of analytical data QA/QC and all data qualifiers shall be submitted as appendices or attachments to investigation and monitoring reports prepared in accordance with Permit Section IV.L (*Reporting Requirements*). Data validation procedures for all samples shall include checking the following, when appropriate:

(1) holding times;

(2) detection limits;

(3) field equipment rinsate blanks;

(4) field blanks;

(5) field duplicates;

(6) trip blanks;

(7) reagent blanks;

(8) laboratory duplicates;

(9) laboratory blanks;

(10) laboratory matrix spikes;

(11) laboratory matrix spike duplicates;

(12) laboratory blank spikes;

(13) laboratory blank spike duplicates; and

(14) surrogate recoveries.

If significant quality assurance problems are encountered, appropriate corrective action shall be implemented. All corrective action shall be defensible and the corrected data shall be qualified.

IV.J.4 Site-Specific Human Health Risk Assessment

Should the Permittee be unable to meet the cleanup levels in Permit Section IV.D, they shall conduct a site-specific risk assessment in accordance with current and acceptable EPA, Regional EPA, and NMED guidance and methodology (as updated). If the NMED determines that a human health risk assessment work plan is necessary, the Permittee shall submit to the NMED for its review and approval a work plan that includes, at a minimum, the site-specific exposure assumptions and any additional sampling needed to support the risk assessment. The Permittee shall prepare a Human Health Risk Assessment Report in support of corrective action.

IV.J.4.a Human Health Risk Assessment Methods

A risk assessment may be required for human receptors that are potentially exposed to site-related chemicals in environmental media. The risk assessment shall contain a conceptual site model (CSM), which shall aid in understanding and describing each site. The CSM shall address the following components:

(1) identification of suspected sources;

(2) identification of contaminants;

(3) identification of contaminant releases;

(4) identification of transport mechanisms;

(5) identification of affected media;

(6) identification of land use scenarios;

(7) identification of potential receptors under current land use scenario;

(8) identification of potential receptors under future land use scenario; and

(9) identification of potential routes of exposure.

Potential human receptors under current and/or future land use scenarios may include residential, industrial, construction, and recreational. Other special receptors may be required on a site-specific basis.

IV.J.4.a.i Exposure Pathways

The identification of exposure pathways shall include of discussion of all potential pathways and justify whether the pathways are complete. Pathways that shall be considered include soil, groundwater, air, surface water, sediment, and biota. An evaluation of the potential for contaminants to migrate from soil to groundwater shall also be provided. The risk assessment shall also address exposure mechanisms for each exposure pathway, including ingestion, inhalation, dermal, and inhalation of volatile organic compounds volatilized from soil and/or groundwater.

IV.J.4.a.ii Data Quality Assurance

The risk assessment shall include an evaluation of analytical data and the usability of the data in the assessment. Data validation shall be conducted in accordance with current EPA guidelines. The evaluation of data shall also include a comparison of detection limits with appropriate and current risk-based screening levels, if MDLs are inconsistent and do not achieve the requirements of Permit Section IV.J.3 (Chemical Analyses).

IV.J.4.a.iii Constituents of Potential Concern

Appropriate EPA and/or the NMED guidance shall be used to identify constituents of potential concern (COPCs). With the exception of chemicals attributed to field or laboratory contamination, all analytes detected in sampled media (*i.e.*, soil, air, surface water, groundwater, biota, and/or sediment) shall be retained or eliminated as COPCs using one or more of the following processes:

(1) site attribution analysis;

(2) essential nutrients; and/or

(3) risk-based toxicity screen.

Unless sufficient evidence and special circumstances can be provided by the Permittee, all detected organics not attributable to field or laboratory contamination shall be retained and treated as site-related chemicals.

Inorganics detected in site media shall be compared to an appropriate background data set to determine if concentrations are present at levels significantly above background. The site attribution analysis may consist of a tiered approach as follows:

(4) comparison of maximum site concentrations to a background reference value (*e.g.*, upper tolerance limit, UTL);

(5) if the site maximum exceeds the background reference value, and sample size is sufficient, statistically compare the site data set to the background data set using appropriate statistical analyses (*e.g.*, Wilcoxon Rank Sum Test). If the sampling size is not sufficient to perform statistical analysis, a comparison of the maximum site concentration to the maximum background concentrations shall be used;

(6) conduct a graphical analysis of site data and background data (*e.g.*, histograms and/or box and whisker plots);

(7) conduct a geochemical analysis of site data to a background reference chemical; and/or

(8) evaluate essential nutrients and compare to recommended daily allowances and/or upper intake limits.

All inorganics for which the site attribution analyses indicate are present above natural background shall be retained as COPCs for the risk assessments.

IV.J.4.a.iv Exposure Point Concentrations

The Permittee shall determine exposure point concentrations (EPCs) that are representative of the concentrations of chemicals in each given medium to which a receptor may be exposed. Current EPA methodology for handling non-detects and replicates in the risk assessment shall be applied. EPA recommends a 95% or greater estimate of the upper confidence limit (UCL ≥ 95%) on the arithmetic mean be used as an EPC for chronic exposures. If conditions are identified where acute exposures must be evaluated, the maximum detected site concentration shall be used as the EPC.

The EPCs shall be determined using statistical analyses that are data distribution and size dependent. EPA and/or the NMED accepted guidance and methodologies shall be used, such as the ProUCL software.

EPCs shall be calculated for soil, groundwater, surface water, sediment, and biota.

EPA does not recommend estimating intakes for the air inhalation pathway, but rather compares estimated volatile/particulate air concentrations adjusted for exposure frequencies, duration, and time. For inhalation of volatiles/particulates from soil, EPCs shall be determined based upon the current EPA and/or NMED methodology, based upon the volatilization factor or particulate emission factor. Indoor air concentrations shall be determined using EPA and NMED accepted approaches, such as the EPA-recommended Johnson and Ettinger model.

IV.J.4.a.v Toxicity Assessment

The Permittee shall use the most recently available toxicity factors to calculate carcinogenic and noncarcinogenic risks/hazards based upon the currently acceptable hierarchy of sources for toxicity data.

IV.J.4.a.vi Risk Characterization

The Permittee shall quantitatively estimate the potential for carcinogenic (risk) and non-carcinogenic (hazard) effects for all chemicals with toxicity data and provide a discussion of uncertainties associated with the risk assessment. Cumulative effects for risk and hazard for all media and pathways shall be determined.

For those chemicals without toxicity data, appropriate surrogate data may be applied. If surrogate toxicity data are not available, risks/hazards shall be qualitatively addressed in the uncertainties section of the report.

IV.J.4.a.vii Uncertainties

The Permittee shall provide an uncertainties section that discusses all assumptions, professional judgments, and data which may result in uncertainties in the final estimates of risk and hazard. The uncertainties shall also discuss whether risks/hazards may have been under or overestimated due to the assumptions made in the assessment.

IV.J.5 Site-Specific Ecological Risk Assessment Methods

If the screening level ecological risk assessment indicates unacceptable risk, then the Permittee shall conduct a site-specific ecological risk assessment. If the NMED determines that an ecological risk assessment work plan is necessary, the Permittee shall submit to the NMED for its review and approval a work plan that includes, at a minimum, the site-specific exposure assumptions and any additional sampling needed to support the risk assessment. In addition, the Permittee shall prepare a site-specific Ecological Risk Assessment Report in support of corrective action. The assessment shall be conducted using EPA and/or the NMED approved guidance and methodologies. The ecological risk assessment shall follow the same methodologies outlined above in the human health risk assessment for determining constituent of potential ecological concern (COPEC) and data quality assurance.

IV.J.6 Determination of Background

The Permittee shall determine an appropriate background data set for inorganic constituents at the site. The Permittee shall determine whether one or more background data sets are appropriate depending on soil types and geology at the site. Background concentrations for groundwater shall be collected from up-gradient wells. The background data set shall be representative of natural conditions unaffected by site activities and shall be statistically defensible. A sufficient number of background samples shall be collected for use in the risk assessment, including conducting site attribution analyses and comparison of data sets.

The Permittee shall provide summary statistics for background metals concentrations in each medium of concern and include the following information:

(1) number of detects;

(2) total number of samples;

(3) frequency of detection;

(4) minimum detected concentration;

(5) maximum detected concentration;

(6) minimum sample quantitation limit (SQL);

(7) maximum SQL;

(8) arithmetic mean;

(9) median;

(10) standard deviation; and

(11) coefficient of variation.

The Permittee shall determine the 95% upper tolerance limit (UTL) for each metal using a distribution-based statistical method.

IV.J.6.a Comparing Site Data to Background

The 95% UTL for each metal shall be used as the background reference value for use in screening assessments and determining whether metals are present in the subject media (*e.g.*, soil, groundwater, surface water, and sediment) due to site activities. The site maximum detected concentration shall be compared to the 95% UTL for each metal. If the site maximum detected concentration is greater than the background reference value, then additional site attribution analyses shall be conducted.

Site attribution analyses shall be conducted in accordance with Permit Section IV.J.4 and current EPA and/or the NMED accepted guidance. The site attribution analyses shall consist of a statistical comparison of the background data set to the site data set, if sufficient samples are available, using distribution based tests such as the Wilcoxon Rank Sum Test.

If the results of the site attribution analyses indicate that the metal is present at the site above naturally occurring levels, then the Permittee shall include that metal as a site contaminant.

IV.K MONITORING WELL CONSTRUCTION REQUIREMENTS

IV.K.1 Types of Monitoring Wells

Two types of groundwater monitoring wells may be installed at the Facility: single completion (containing one screened interval) and with NMED approval, double-screened wells. General drilling procedures are presented in Permit Section IV.K.2 and monitoring well construction requirements are presented in Permit Section IV.K.3.

IV.K.2 Drilling Methods

Groundwater monitoring wells and piezometers must be designed and constructed in a manner which will yield high quality samples, ensure that the well will last the duration of the project, and ensure that the well will not serve as a conduit for contaminants to migrate between different stratigraphic units or aquifers. The design and construction of groundwater monitoring wells shall comply with the guidelines established in various EPA RCRA guidance, including, but not limited to:

(1) U.S. EPA, *RCRA Groundwater Monitoring: Draft Technical Guidance*, EPA/530-R-93-001 (November 1992);

(2) U.S. EPA, *RCRA Groundwater Monitoring Technical Enforcement Guidance Document*, OSWER-9950.1 (September 1986); and

(3) Aller, L., Bennett, T.W., Hackett, G., Petty, R.J., Lehr, J.H., Sedoris, H., Nielsen, D.M., and Denne, J.E., *Handbook of Suggested Practices for the Design and Installation of Groundwater Monitoring Wells*, EPA 600/4-89/034 (1989).

A variety of methods are available for drilling monitoring wells. While the selection of the drilling procedure is usually based on the site-specific geologic conditions, the following issues shall also be considered:

(4) drilling shall be performed in a manner that minimizes impacts to the natural properties of the subsurface materials;

(5) contamination and cross-contamination of groundwater and aquifer materials during drilling shall be avoided;

(6) the drilling method shall allow for the collection of representative samples of rock, unconsolidated materials, and soil;

(7) the drilling method shall allow the Permittee to determine when the appropriate location for the screened interval(s) has been encountered; and

(8) the drilling method shall allow for the proper placement of the filter pack and annular sealants. The borehole diameter shall be at least 4 inches larger in diameter than the nominal diameter of the well casing and screen to allow adequate space for placement of the filter pack and annular sealants.

The drilling method shall allow for the collection of representative groundwater samples. Drilling fluids (which includes air) shall be used only when minimal impact to the surrounding formation and groundwater can be ensured.

A brief description of the different drilling methods that may be appropriate for the construction of monitoring wells at the Facility follows. Many of these methods may be used alone, or in combination, to install monitoring wells at the Facility. While the selection of the specific drilling procedure will usually depend on the site-specific geologic conditions, justification for the method selected must be provided to the NMED.

IV.K.2.a Hollow-Stem Auger

The hollow-stem continuous flight auger consists of a hollow, steel shaft with a continuous, spiraled steel flight welded onto the exterior site of the stem. The stem is connected to an auger bit and, when rotated, transports cuttings to the surface. The hollow stem of the auger allows drill rods, split-spoon core barrels, Shelby tubes, and other samplers to be inserted through the center of the auger so that samples may be retrieved during the drilling operations. The hollow stem also acts to temporarily case the borehole, so that the well screen and casing (riser) may be inserted down through the center of the augers once the desired depth is reached, minimizing the risk of possible collapse of the borehole. A bottom plug or pilot bit can be fastened onto the bottom of the augers to keep out most of the soils and/or water that have a tendency to clog the bottom of the augers during drilling. Drilling without a center plug is acceptable provided that the soil plug, formed in the bottom of the auger, is removed before sampling or installing well casings. The soil plug can be removed by washing out the plug using a side discharge rotary bit, or augering out the plug with a solid-stem auger bit sized to fit inside the hollow-stem auger. In situations where heaving sands are a problem, potable water may be poured into the augers to equalize the pressure so that the inflow of formation materials and water shall be held to a minimum when the bottom plug is removed. The hollow-stem auger method is best suited for drilling shallow overburden wells.

IV.K.2.b Air Rotary/Air Down-The-Hole Hammer/ODEX

The air rotary method consists of a drill pipe or drill stem coupled to a drill bit that rotates and cuts through soils and rock. The cuttings produced from the rotation of the drilling bit are transported to the surface by compressed air, which is forced down the borehole through the drill

pipe and returns to the surface through the annular space (between the drill pipe and the borehole wall). The circulation of the compressed air not only removes the cuttings from the borehole but also helps to cool the drill bit. The use of air rotary drilling is best suited for hard-rock formations. In soft unconsolidated formations, casing is driven to keep the formation from caving. When using air rotary, the air compressor shall have an in-line filter system to filter the air coming from the compressor. The filter system shall be inspected regularly to insure that the system is functioning properly. In addition, a cyclone velocity dissipater or similar air containment/dust-suppression system shall be used to funnel the cuttings to one location instead of allowing the cuttings to discharge uncontrolled from the borehole. Air rotary that employs the dual-tube (reverse circulation) drilling system is acceptable because the cuttings are contained within the drill stem and are discharged through a cyclone velocity dissipater to the ground surface.

The injection of air into the borehole during air rotary drilling has the potential to alter the natural properties of the subsurface. This can occur through air-stripping of the VOCs in both soil and groundwater in the vicinity of the borehole, altering the groundwater geochemical parameters (*e.g.*, pH and redox potential), and potentially increasing biodegradation of organic compounds in the aquifer near the borehole. These factors may prevent the well from yielding groundwater samples that are representative of in-situ conditions.

In hard, abrasive, consolidated rock, a down-the-hole hammer may be more appropriate than the air rotary method. In this method, compressed air is used to actuate and operate a pneumatic hammer as well as lift the cuttings to the surface and cool the hammer bit. One drawback of the down-the-hole hammer is that oil is required in the air stream to lubricate the hammer-actuating device, and this oil could potentially contaminate the soil in the vicinity of the borehole and the aquifer.

The ODEX method is a variation of the air rotary method in which a casing-driving technique is used in combination with air rotary drilling. With the ODEX system, the drill bit extends outward and reams a pilot hole large enough for a casing assembly to slide down behind the drill bit assembly. As a result, casing is advanced simultaneously while drilling the hole.

IV.K.2.c Water Rotary and Mud Rotary

The water and mud rotary drilling methods consist of rotary drilling techniques where water or drilling mud is used as the circulating fluid. In both methods, the circulating fluid is pumped down through the drill pipe and is returned back up the borehole through the annular space. The circulating fluid stabilizes the borehole, cools the drill bit, and carries the drill cuttings up to the surface. While the water and mud rotary drilling techniques are rapid and effective drilling methods, the recognition of water-bearing zones is hampered by the addition of water into the system. Mud rotary drilling methods are discouraged if the well is to be used for monitoring of water quality.

Mud rotary drilling is similar to water rotary drilling with the exception that mud additives are added to the water to change the properties (*e.g.*, density, viscosity, yield point, gel strength, fluid-loss-control effectiveness, and lubricity) of the circulating fluid. Drilling muds provide greater borehole stabilization than water alone. There are several types of mud presently available, including bentonite, barium sulfate, organic polymers, cellulose polymers, and

polyacrylamides. While drilling muds enhance the stability of the borehole and allow for drilling in formations not appropriate to other methods, they can adversely affect the hydrologic properties and geochemistry of the aquifer. For example, drilling fluid invasion and the buildup of borehole filter cake may reduce the effective porosity of the aquifer in the vicinity of the borehole. In addition, bentonite drilling muds may affect the pH of groundwater and organic polymer drilling muds have been observed to facilitate bacterial growth, which reduces the reliability of sampling results. If polymer emulsions are to be used in the drilling program at the Facility, polymer dispersion agents shall be used at the completion of the drilling program to remove the polymers from the boreholes. For example, if EZ Mud® is used as a drilling additive, a dispersant (*e.g.*, BARAFOS® or five percent sodium hypochlorite) shall be used to disperse and chemically break down the polymer prior to developing and sampling the well. If drilling fluids are used as part of well installation, the Permittee must demonstrate that all data acquired from the well is representative of existing subsurface conditions using methods approved by the NMED. The NMED may require additional sampling and testing periodically to ensure that the data collected is not affected by residual drilling fluids.

IV.K.3 Well Construction/Completion Methods

IV.K.3.a Well Construction Materials

Well construction materials shall be selected based on the goals and objectives of the proposed monitoring program and the geologic conditions at the site. When selecting well construction materials, the primary concern shall be selecting materials that will not contribute foreign constituents or remove contaminants from the groundwater. Other factors to be considered include the tensile strength, compressive strength, and collapse strength of the materials; length of time the monitoring well will be in service; and the material's resistance to chemical and microbiological corrosion. Generally, if the monitoring program requires the analysis of only organic constituents, stainless steel should be used. However, if the monitoring program requires only inorganic constituent analyses, polyvinyl chloride (PVC) materials may be used. PVC (other than rigid PVC as provided below) should not be used for monitoring wells where organic constituents will be analyzed due to its potential for sorption and leaching of contaminants.

Well screen and casing materials acceptable for the construction of RCRA monitoring wells include stainless steel (304 or 316), rigid PVC (meeting American National Standards Institute/National Sanitation Foundation Standard 14), and fluoropolymer materials (polytetrafluoroethylene, fluorinated ethylene propylene, and polyvinylidene). In addition, there are other materials available for the construction of monitoring wells including acrylonitrile butadiene styrene (ABS), fiberglass-reinforced plastic (FRP), black iron, carbon steel, and galvanized steel, but these materials are not recommended for use in long term monitoring wells due to their low resistance to chemical attack and potential contribution of contamination to the groundwater. However, these materials may be used in the construction of monitoring wells where they will not be in contact with the groundwater that will be sampled (*e.g.,* carbon steel pipe used as surface casing).

IV.K.3.b Well Construction Techniques

IV.K.3.b.i Single-cased Wells

The borehole shall be bored, drilled, or augered as close to vertical as possible, and checked with a plumb bob, level, or appropriate downhole logging tool. Slanted boreholes shall not be acceptable unless specified in the design. The borehole shall be of sufficient diameter so that well construction can proceed without major difficulties. To assure an adequate size, a minimum two-inch annular space is required between the casing and the borehole wall (or the hollow-stem auger wall). The two-inch annular space around the casing will allow the filter pack, bentonite seal, and annular grout to be placed at an acceptable thickness. Also, the two-inch annular space will allow up to a 1.5-inch outer diameter tremie pipe to be used for placing the filter pack, bentonite seal, and grout at the specified intervals.

It may be necessary to over-drill the borehole so that any soils that have not been removed (or that have fallen into the borehole during augering or drill stem retrieval) will fall to the bottom of the borehole below the depth where the filter pack and well screen are to be placed. Normally, three to five ft is sufficient for over-drilling shallow wells. Deep wells may require deeper over-drilling. The borehole can also be over-drilled to allow for an extra space for a well sump to be installed. If the borehole is over-drilled deeper than desired, it can be backfilled to the designated depth with bentonite pellets or the filter pack.

The well casings (riser assembly) should be secured to the well screen by flush-jointed threads or other appropriate connections and placed into the borehole and plumbed by the use of centralizers, a plumb bob, or a level. No petroleum-based lubricating oils or grease shall be used on casing threads. Teflon tape can be used to wrap the threads to insure a tight fit and minimize leakage. No glue of any type shall be used to secure casing joints. Teflon “O” rings can also be used to ensure a tight fit and minimize leakage. “O” rings made of materials other than Teflon are not acceptable if the well will be sampled for organic compound analyses. Before the well screen and casings are placed at the bottom of the borehole, at least six inches of filter material shall be placed at the bottom to serve as a firm footing. The string of well screen and casing should then be placed into the borehole and plumbed. If centralizers are used, they shall be placed below the well screens and above the bentonite annular seals so that the placement of the filter pack, overlying bentonite seal, and annular grout will not be hindered. Centralizers placed in the wrong locations can cause bridging during material placement. If installing the well screen and casings through hollow-stem augers, the augers shall be slowly extracted as the filter pack, bentonite seal, and grout are tremied or poured into place. The gradual extraction of the augers will allow the materials being placed in the augers to flow out of the bottom of the augers into the borehole. If the augers are not gradually extracted, the materials will accumulate at the bottom of the augers causing potential bridging problems. After the string of well screen and casing is plumb, the filter material shall be placed around the well screen (preferably by the tremie pipe method) up to the designated depth. After the filter pack has been installed, the bentonite seal shall be placed directly on top of the filter pack up to the designated depth or a minimum of two ft above the filter pack, whichever is greater. After the bentonite seal has hydrated for the specified time, the annular grout shall be pumped by the tremie method into the annular space around the casings (riser assembly) up to within two feet of the ground surface or below the frost line, whichever is greater. The grout shall be allowed to cure for a minimum of

24 hours before the surface pad and protective casing are installed. After the surface pad and protective casing are installed, bumper guards (guideposts) shall be installed (if necessary).

IV.K.3.b.ii Double-cased Wells

Double-cased wells should be constructed when there is reason to believe that interconnection of two aquifers by well construction may cause cross contamination, or when flowing sands make it impossible to install a monitoring well using conventional methods. A pilot borehole should be advanced through the overburden and the contaminated zone into a clay, confining layer, or bedrock. An outer casing (surface or pilot casing) shall be placed into the borehole and sealed with grout. The borehole and outer casing should extend into tight clay a minimum of two ft or into competent bedrock a minimum of one foot. The total depth into the clay or bedrock will vary depending upon the plasticity of the clay and the extent of weathering and fracturing of the bedrock. The size of the outer casing shall be of sufficient inside diameter to contain the inner casing and the two-inch annular space. In addition, the borehole shall be of sufficient size to contain the outer casing and the two-inch minimum outer annular space, if applicable.

The outer casing shall be grouted by the tremie method from the bottom of the borehole to within two ft of the ground surface. The grout shall be pumped into the annular space between the outer casing and the borehole wall. This can be accomplished by either placing the tremie pipe in the annular space and pumping the grout from the bottom of the borehole to the surface, or placing a grout shoe or plug inside the casing at the bottom of the borehole and pumping the grout through the bottom grout plug and up the annular space on the outside of the casing. The grout shall consist of a Type I Portland cement and bentonite or other approved grout to provide a rigid seal. A minimum of 24 hours shall be allowed for the grout plug (seal) to cure before attempting to drill through it. When drilling through the seal, care shall be taken to avoid cracking, shattering, and washing out of the seal. If caving conditions exist so that the outer casing cannot be sufficiently sealed by grouting, the outer casing shall be driven into place and a grout seal placed in the bottom of the casing.

IV.K.3.b.iii Bedrock Wells

The installation of monitoring wells into bedrock can be accomplished in two ways. The first method is to drill or bore a pilot borehole through the soil overburden into the bedrock. An outer casing is installed into the borehole by setting it into the bedrock, and grouting it into place. After the grout has set, the borehole can be advanced through the grout seal into the bedrock. The preferred method of advancing the borehole into the bedrock is rock coring. Rock coring makes a smooth, round hole through the seal and into the bedrock without cracking or shattering the seal. Roller cone bits are used in soft bedrock, but extreme caution should be taken when using a roller cone bit to advance through the grout seal in the bottom of the borehole because excessive water and bit pressure can cause cracking, eroding (washing), and/or shattering of the seal. Low volume air hammers may be used to advance the borehole, but they have a tendency to shatter the seal because of the hammering action. If the structural integrity of the grout seal is in question, a pressure test can be utilized to check for leaks. If the seal leaks, the seal is not acceptable. When the drilling is complete, the finished well will consist of an open borehole from the ground surface to the bottom of the well. The major limitation of open borehole bedrock wells is that the entire bedrock interval serves as the monitoring zone.

The second method is to install the outer surface casing and drill the borehole into bedrock, and then install an inner casing and well screen with the filter pack, bentonite seal, and annular grout. The well is completed with a surface protective casing and concrete pad. This well installation method gives the flexibility of isolating the monitoring zone(s) and minimizing inter-aquifer flow. In addition, it gives structural integrity to the well, especially in unstable areas (*e.g.*, steeply dipping shales) where the bedrock has a tendency to shift or move when disturbed.

IV.K.3.c Well Screen and Filter Pack Design

Well screens and filter packs shall be designed to accurately sample the aquifer zone that the well is intended to sample, minimize the passage of formation materials (turbidity) into the well, and ensure sufficient structural integrity to prevent the collapse of the intake structure. The selection of the well screen length depends upon the objective of the well. Piezometers and wells where only a discrete flow path is monitored are generally completed with short screens (two ft or less). While monitoring wells are usually constructed with longer screens (usually five to ten ft), they shall be kept to the minimum length appropriate for intercepting a contaminant plume. The screen slot size shall be selected to retain from 90 to 100 percent of the filter pack material in artificially filter packed wells, and from 50 to 100 percent of the formation material in naturally packed wells. All well screens shall be factory wire-wrapped or machine slotted.

A filter pack shall be used when: 1) the natural formation is poorly sorted; 2) a long screen interval is required or the screen spans highly stratified geologic materials of widely varying grain sizes; 3) the natural formation is uniform fine sand, silt, or clay, 4) the natural formation is thin-bedded; 5) the natural formation is poorly cemented sandstone; 6) the natural formation is highly fractured or characterized by relatively large solution channels; 7) the natural formation is shale or coal that will act as a constant source of turbidity to groundwater samples; or 8) the diameter of the borehole is significantly greater than the diameter of the screen. The use of natural formation material as a filter pack is only recommended when the natural formation materials are relatively coarse-grained, permeable, and uniform in grain size.

Filter pack materials shall consist of clean, rounded to well-rounded, hard, insoluble particles of siliceous composition (industrial grade quartz sand or glass beads). The required grain-size distribution or particle sizes of the filter pack materials shall be selected based upon a sieve analysis of the aquifer materials or the formation to be monitored, or the characteristics of the aquifer materials using information acquired during previous investigations.

Where sieve analyses are used to select the appropriate filter pack particle size, the results of a sieve analysis of the formation materials are plotted on a grain-size distribution graph, and a grain-size distribution curve is generated. The 70 percent retained grain size value should be multiplied by a factor between four and six (four for fine, uniform formations and six for coarse, non-uniform formations). A second grain-size distribution curve is then drawn on the graph for this new value, ensuring that the uniformity coefficient does not exceed 2.5. The filter pack that shall be used will fall within the area defined by these two curves.

Once the filter pack size is determined, the screen slot size shall be selected to retain at least 90 percent of the filter pack material. The Permittee may propose the use of a pre-determined well screen slot size and filter pack for monitoring wells in the site-specific work plans submitted to the NMED.

The filter pack shall be installed in a manner that prevents bridging and particle-size segregation. Filter packs placed below the water table shall be installed by the tremie pipe method. Filter pack materials shall not be poured into the annular space unless the well is shallow (*e.g.*, less than 30 ft deep) and the filter pack material can be poured continuously into the well without stopping. At least two inches of filter pack material shall be installed between the well screen and the borehole wall, and two ft of material shall extend above the top of the well screen. A minimum of six-inches of filter pack material shall also be placed under the bottom of the well screen to provide a firm footing and an unrestricted flow under the screened area. In deep wells (*e.g.*, greater than 200 ft deep), the filter pack may not compress when initially installed. As a result, filter packs may need to be installed as high as five ft above the screened interval in these situations. The precise volume of filter pack material required shall be calculated and recorded before placement, and the actual volume used shall be determined and recorded during well construction. Any significant discrepancy between the calculated and actual volume shall be explained. Prior to installing the filter pack annular seal, a one to two-ft layer of chemically inert fine sand shall be placed over the filter pack to prevent the intrusion of annular sealants into the filter pack.

IV.K.3.d Annular Sealant

The annular space between the well casing and the borehole must be properly sealed to prevent cross-contamination of samples and the groundwater. The materials used for annular sealants shall be chemically inert with respect to the highest anticipated concentration of chemical constituents expected in the groundwater at the Facility. In general, the permeability of the sealing material shall be one to two orders of magnitude lower than the least permeable parts of the formation in contact with the well. The precise volume of annular sealants required shall be calculated and recorded before placement, and the actual volume shall be determined and recorded during well construction. Any significant discrepancy between the calculated volume and the actual volume shall be explained.

During well construction, an annular seal shall be placed on top of the filter pack. This seal shall consist of a high solids (10-30 percent) bentonite material in the form of bentonite pellets, granular bentonite, or bentonite chips. The bentonite seal shall be placed in the annulus through a tremie pipe if the well is deep (greater than 30 ft), or by pouring directly down the annulus in shallow wells (less than 30 ft). If the bentonite materials are poured directly down the annulus (which is an acceptable method only in wells less than 30 feet deep), a tamping device shall be used to ensure that the seal is emplaced at the proper depth and the bentonite has not bridged higher in the well casing. The bentonite seal shall be placed above the filter pack a minimum of two ft vertical thickness. The bentonite seal shall be allowed to completely hydrate in conformance with the manufacturer's specifications prior to installing the overlying annular grout seal. The time required for the bentonite seal to completely hydrate will differ with the materials used and the specific conditions encountered, but is generally a minimum of four to 24 hours.

A grout seal shall be installed on top of the filter pack annular seal. The grout seal may consist of a high solids (30 percent) bentonite grout, a neat cement grout, a cement/bentonite grout, or other suitable seal material that is approved by the NMED. The grout shall be pumped under pressure (not gravity fed) into the annular space by the tremie pipe method, from the top of the

filter pack annular seal to within a few feet of the ground surface. The tremie pipe shall be equipped with a side discharge port (or bottom discharge for grouting at depths greater than 100 feet) to minimize damage to the filter pack or filter pack annular bentonite seal during grout placement. The grout seal shall be allowed to cure for a minimum of 24 hours before the concrete surface pad is installed. All grouts shall be prepared in accordance with the manufacturer's specifications. High solids (30 percent) bentonite grouts shall have a minimum density of 10 pounds per gallon (as measured by a mud balance) to ensure proper setup. Cement grouts shall be mixed using six and one-half to seven gallons of water per 94-pound bag of Type I Portland cement. Bentonite (five to ten percent) may be added to delay the setting time and reduce the shrinkage of the grout.

IV.K.4 Well Development

All monitoring wells shall be developed to create an effective filter pack around the well screen, correct damage to the formation caused by drilling, remove fine particles from the formation near the borehole, and assist in restoring the natural water quality of the aquifer in the vicinity of the well. Development stresses the formation around the screen, as well as the filter pack, so that mobile fines, silts, and clays are pulled into the well and removed. Development is also used to remove any foreign materials (*e.g.*, water, drilling mud) that may have been introduced into the borehole during the drilling and well installation activities, and to aid in the equilibration that will occur between the filter pack, well casing, and the formation water. The development of a well is extremely important to ensuring the collection of representative groundwater samples.

Newly installed monitoring wells shall not be developed for at least 48 hours after the surface pad and outer protective casing are installed. This will allow sufficient time for the well materials to cure before the development procedures are initiated. A new monitoring well shall be developed until the column of water in the well is free of visible sediment, and the pH, temperature, turbidity, and specific conductivity have stabilized. In most cases, the above requirements can be satisfied. However, in some cases, the pH, temperature, and specific conductivity may stabilize but the water remains turbid. In this case, the well may still contain well construction materials, such as drilling mud in the form of a mud cake or formation soils that have not been washed out of the borehole. Thick drilling mud cannot be flushed out of a borehole with one or two well volumes of flushing. Instead, continuous flushing over a period of several days may be necessary to complete the well development. If the well is pumped dry, the water level shall be allowed to sufficiently recover before the next development period is initiated. The common methods used for developing wells include:

(1) pumping and over-pumping;

(2) backwashing;

(3) surging (with a surge block);

(4) bailing;

(5) jetting; and

(6) airlift pumping.

These development procedures can be used, either individually or in combination, to achieve the most effective well development. However, the most favorable well development methods include pumping, over-pumping, bailing, surging, or a combination of these methods. Well development methods and equipment that alter the chemical composition of the groundwater shall not be used. Development methods that involve adding water or other fluids to the well or borehole, or that use air to accomplish well development should be avoided, if possible. Approval shall be obtained from the NMED prior to introducing air, water, or other fluids into the well for the purpose of well development. If water is introduced to a borehole during well drilling and completion, then the same or greater volume of water shall be removed from the well during development. In addition, the volume of water withdrawn from a well during development shall be recorded, and the Permittee shall use their best efforts to avoid pumping wells dry during development activities.

IV.K.5 Surface Completion

Monitoring wells may be completed either as flush-mounted wells, or as above-ground completions. A surface seal shall be installed over the grout seal and extended vertically up the well annulus to the land surface. The lower end of the surface seal shall extend a minimum of 1 foot below the frost line to prevent damage from frost heaving. The composition of the surface seal shall be neat cement or concrete. In above-ground completions, a three-foot wide, four-inch thick concrete surface pad shall be installed around the well at the same time the protective casing is installed. The surface pad shall be sloped so that drainage will flow away from the protective casing and off the pad. In addition, a minimum of one inch of the finished pad shall be below grade or ground elevation to prevent washing and undermining by soil erosion.

A locking protective casing shall be installed around the well casing (riser) to prevent damage or unauthorized entry. The protective casing shall be anchored in the concrete surface pad below the frost line and extend several inches above the well riser stickup. A weep hole shall be drilled into the protective casing just above the top of the concrete surface pad to prevent water from accumulating and freezing inside the protective casing around the well riser. A cap shall be placed on the well riser to prevent tampering or the entry of foreign materials, and a lock shall be installed on the protective casing to provide security. If the wells are located in an area that receives traffic, a minimum of three bumper guards consisting of steel pipes three to four inches in diameter and a minimum of five-foot length should be installed. The bumper guards should be installed to a minimum depth of two feet below the ground surface in a concrete footing and extend a minimum of three feet above ground surface. The pipes should be filled with concrete to provide additional strength. The pipes should be painted a bright color to reduce the possibility of vehicular damage.

If flush-mounted completions are required (*e.g.*, in active roadway areas), a protective structure such as a utility vault or meter box should be installed around the well casing. In addition, measures should be taken to prevent the accumulation of surface water in the protective structure and around the well intake. These measures should include outfitting the protective structure with a steel lid or manhole cover that has a rubber seal or gasket, and ensuring that the bond between the cement surface seal and the protective structure is watertight.

IV.K.6 Well Abandonment

All well abandonment must be conducted in accordance with 19.27.4 NMAC. Wells are usually abandoned when they are no longer required in the monitoring network or when they are damaged beyond repair. The goal of well abandonment is to seal the borehole in such a manner that the well cannot act as a conduit for migration of contaminants from the ground surface to the aquifer or between aquifers. To properly abandon a well, the preferred method is to completely remove the well casing and screen from the borehole, clean out the borehole, and backfill with a cement or bentonite grout, neat cement, or concrete. The well abandonment procedure must also comply with current EPA well abandonment guidance.

For wells with small diameter casing, abandonment shall be accomplished by overdrilling the well with a large diameter hollow-stem auger. After the well has been overdrilled, the well casing and grout can be lifted out of the ground with a drill rig, and the remaining filter pack can be drilled out. The open borehole can then be pressure grouted (via the tremie pipe method) from the bottom of the borehole to the ground surface. After the grout has cured, the top two ft of the borehole shall be filled with concrete to insure a secure surface seal.

Several other well abandonment procedures are available for wells with larger diameter screens and casings. One method is to force a drill stem with a tapered wedge assembly or a solid-stem auger into the well casing and pull the casing out of the ground. However, if the casing breaks or the well cannot be pulled from the ground, the well will have to be grouted in place. To abandon a well in place, a tremie pipe shall be placed at the lowest point in the well (at the bottom of the screen or in the well sump). The entire well is then pressure grouted from the bottom of the well upward. The pressurized grout will be forced out through the well screen into the filter pack and up the inside of the well casing sealing off all breaks and holes in the casing. Once the well is grouted, the casing is cut off even with the ground surface and covered with concrete.

If a PVC well cannot be abandoned due to internal casing damage (*e.g.*, the tremie pipe cannot be extended to the bottom of the screen), it may be necessary to drill out the casing with a roller cone or drag bit using the wet rotary drilling method, or grind out the casing using a solid-stem auger equipped with a carbide tooth bit. Once the casing is removed, the open borehole can be cleaned out and pressure grouted from the bottom of the borehole upward.

IV.K.7 Documentation

All information on the design, construction, and development of each monitoring well shall be recorded and presented on a boring log, a well construction log, and well construction diagram. The well construction log and well construction diagram shall include the following information:

(1) well name/number;

(2) date/time of well construction;

(3) borehole diameter and well casing diameter;

(4) well depth;

(5) casing length;

(6) casing materials;

(7) casing and screen joint type;

(8) screened interval(s);

(9) screen materials;

(10) screen slot size and design;

(11) filter pack material and size;

(12) filter pack volume (calculated and actual);

(13) filter pack placement method;

(14) filter pack interval(s);

(15) annular sealant composition;

(16) annular sealant placement method;

(17) annular sealant volume (calculated and actual);

(18) annular sealant interval(s);

(19) surface sealant composition;

(20) surface seal placement method;

(21) surface sealant volume (calculated and actual);

(22) surface sealant interval;

(23) surface seal and well apron design and construction;

(24) well development procedure and turbidity measurements;

(25) well development purge volume(s) and stabilization parameter measurements;

(26) type and design and construction of protective casing;

(27) well cap and lock;

(28) ground surface elevation;

(29) survey reference point elevation on well casing;

(30) top of monitoring well casing elevation; and

(31) top of protective steel casing elevation.

IV.L REPORTING REQUIREMENTS

IV.L.1 General

The purpose of this Permit Section is to provide the reporting requirements and report formats for corrective action activities at all SWMUs, AOCs, and permitted units required under this Permit. This Permit Section is not intended to provide reporting requirements for every potential corrective action conducted at the Facility; therefore, the formats for all types of reports are not

presented below. The described formats include the general reporting requirements and formats for site-specific investigation work plans, investigation reports, periodic monitoring reports, risk assessment reports, and corrective measures evaluations. The Permittee shall generally consider the reports to be the equivalents of RCRA Facility Investigation (RFI) work plans, RFI reports, periodic monitoring reports, risk assessments, Corrective Measures Study (CMS) plans, and CMS reports, for the purposes of RCRA compliance. The Permittee shall include detailed, site-specific requirements in all SWMU, AOC, permitted unit and facility-wide investigation work plans, investigation reports, monitoring reports, and corrective measures evaluations. All plans and reports shall be prepared with technical and regulatory input from the NMED. All work plans, reports and other documents shall be submitted to the NMED in the form of two paper copies and one copy in electronic or other format acceptable to the NMED. The Permittee shall submit maps and figures in a format specified by the NMED (*e.g.*, *shp, *dwg).

The reporting requirements listed in this attachment do not include all sections that may be necessary to complete each type of report listed and may include sections that are not relevant for a specific site action. The Permittee or the NMED may determine that additional sections may be needed to address additional site-specific issues or information collected during corrective action or monitoring activities not listed below. However, the Permittee must submit variations of the general report format and the formats for reports not listed in this Permit Section (IV.L) in outline form to the NMED for approval prior to submittal of the reports. The NMED will approve or disapprove, in writing, the proposed report outline within 90 days of receipt of the outline. If the NMED disapproves the report outline, the NMED will notify the Permittee, in writing, of the outline's deficiencies and will specify a date for submittal of a revised report outline. All reports submitted by the Permittee shall follow the general approach and limitations for data presentation described in this attachment.

IV.L.2 Investigation Work Plan

The Permittee shall prepare work plans for site investigations or corrective action activities at the Facility using the general outline below. The minimum requirements for describing proposed activities within each section are included. All research, locations, depths and methods of exploration, field procedures, analytical results, data collection methods, and schedules shall be included in each work plan. In general, interpretation of data acquired during previous investigations shall be presented only in the background sections of the work plans. The other text sections of the work plans shall be reserved for presentation of anticipated site-specific activities and procedures relevant to the project. The general work plan outline is described below.

IV.L.2.a Title Page

The title page shall include the type of document; Facility name; SWMU or AOC name, site, and any other unit name; and the submittal date. A signature block providing spaces for the names and titles of the responsible Facility representatives shall be provided on the title page in accordance with 40 CFR § 270.11(d)(1).

IV.L.2.b Executive Summary (Abstract)

The executive summary or abstract shall provide a brief summary of the purpose and scope of the investigation to be conducted at the subject site. The Facility, SWMU or AOC name, site name, any other unit name, and location shall be included in the executive summary.

IV.L.2.c Table of Contents

The table of contents shall list all text sections, tables, figures, and appendices or attachments included in the work plan. The corresponding page numbers for the titles of each section of the work plan shall be included in the table of contents.

IV.L.2.d Introduction

The introduction shall include the Facility name, unit location, and unit status (*e.g.*, closed, corrective action). General information on the current site usage and status shall be included in this section. A brief description of the purpose of the investigation and the type of site investigation to be conducted shall be provided in this section.

IV.L.2.e Background

The background section shall describe relevant background information. This section shall briefly summarize historical site uses including the locations of current and former site structures and features. A labeled figure shall be included in the document showing the locations of current and former site structures and features. The locations of pertinent subsurface features such as pipelines, underground tanks, utility lines, and other subsurface structures shall be included in the background summary and labeled on the figure, unless none exist.

This section shall identify potential receptors, including groundwater, and include a brief summary of the type and characteristics of all waste and all contaminants managed or released at the site, the known and possible sources of contamination, the history of releases or discharges of contamination, and the known extent of contamination. This section shall include brief summaries of results of previous investigations, if conducted, including references to pertinent figures, data summary tables, and text in previous reports. At a minimum, detections of contaminants encountered during previous investigations shall be presented in table format, with an accompanying figure showing sample locations. References to previous reports shall include page, table, and figure numbers for referenced information. Summary data tables and site plans showing relevant investigation locations shall be included in the Tables and Figures sections of the document, respectively.

IV.L.2.f Site Conditions

IV.L.2.f.i Surface Conditions

A section on surface conditions shall provide a brief detailed description of current site topography, features and structures including a description of topographic drainages, man-made drainages, vegetation, erosional features, and basins. It shall also include a detailed description of current site usage and any current operations at the site. In addition, descriptions of features located in surrounding sites that may have an impact on the subject site regarding sediment

transport, surface water run-off, or contaminant fate and transport shall be included in this section.

IV.L.2.f.ii Subsurface Conditions

A section on subsurface conditions shall provide a brief, detailed description of the site conditions observed during previous subsurface investigations, including relevant soil horizons, stratigraphy, presence of groundwater, and other relevant information. A site plan showing the locations of all borings and excavations advanced during previous investigations shall be included in the Figures section of the work plan. A brief description of the anticipated stratigraphic units that may be encountered during the investigation may be included in this subsection if no previous investigations have been conducted at the site.

IV.L.2.g Scope of Activities

A section on the scope of activities shall briefly describe a list of all anticipated activities to be performed during the investigation including background information research, health and safety requirements that may affect or limit the completion of tasks, drilling, test pit or other excavations, well construction, field data collection, survey data collection, chemical analytical testing, aquifer testing, remediation system pilot tests, and IDW storage and disposal.

IV.L.2.h Investigation Methods

A section on investigation methods shall provide a description of all anticipated locations and methods for conducting the activities to be performed during the investigation. This section shall include research methods, health and safety practices that may affect the completion of tasks, drilling methods, test pit or other excavation methods, sampling intervals and methods, well construction methods, field data collection methods, geophysical and land survey methods, field screening methods, chemical analytical testing, materials testing, aquifer testing, pilot tests, and other proposed investigation and testing methods. This information may also be summarized in table format, if appropriate.

IV.L.2.i Monitoring and Sampling Program

A section on monitoring and sampling shall provide a description of the groundwater, ambient air, subsurface vapor, remediation system, engineering controls, and other monitoring and sampling programs currently being implemented at the site.

IV.L.2.j Schedule

A section shall set forth the anticipated schedule for completion of field investigation, pilot testing, and monitoring and sampling activities. In addition, this section shall set forth a schedule for submittal of reports and data to the NMED including a schedule for submitting all status reports and preliminary data.

IV.L.2.k Tables

The following summary tables may be included in the investigation work plans, if previous investigations have been conducted at the site:

(1) summaries of regulatory criteria, background, and applicable cleanup levels (may be included in the analytical data tables instead of as separate tables);

(2) summaries of historical field survey location data;

(3) summaries of historical field screening and field parameter measurements of soil, rock, sediments, groundwater, surface water, and air quality data;

(4) summaries of historical soil, rock, or sediment laboratory analytical data shall include the analytical methods, detection limits, and significant data quality exceptions that could influence interpretation of the data;

(5) summaries of historical groundwater elevation and depth to groundwater data. The table shall include the monitoring well depths, the screened intervals in each well, and the dates and times measurements were taken;

(6) summaries of historical groundwater laboratory analytical data. The analytical data tables shall include the analytical methods, detection limits, and significant data quality exceptions that could influence interpretation of the data;

(7) summary of historical surface water laboratory analytical data. The analytical data tables shall include the analytical methods, detection limits, and significant data quality exceptions that could influence interpretation of the data;

(8) summary of historical air sample screening and chemical analytical data. The data tables shall include the screening instruments used, laboratory analytical methods, detection limits, and significant data quality exceptions that could influence interpretation of the data; and

(9) summary of historical pilot or other test data, if applicable, including units of measurement and types of instruments used to obtain measurements.

Data presented in the tables shall include information on dates of data collection, analytical methods, detection limits, and significant data quality exceptions. The analytical data tables shall include only detected analytes and data quality exceptions that could potentially mask detections.

IV.L.2.l Figures

The following figures shall be included with each investigation work plan for each site, including presentation of data where previous investigations have been conducted. All figures must include an accurate bar scale and a north arrow. An explanation shall be included on each figure for all abbreviations, symbols, acronyms, and qualifiers. All maps shall contain a date of preparation.

(1) a vicinity map showing topography and the general location of the site relative to surrounding features and properties;

(2) a site plan that presents pertinent site features and structures, underground utilities, well locations, and remediation system locations and details. Off-site well locations and other relevant features shall be included on the site plan, if appropriate. Additional site plans

may be required to present the locations of relevant off-site well locations, structures, and features;

(3) figures showing historical and proposed soil boring or excavation locations and sampling locations;

(4) figures presenting historical soil sample field screening and laboratory analytical data if applicable;

(5) figures presenting the locations of all existing and proposed borings and vapor monitoring well locations;

(6) figures showing all existing and proposed wells and piezometers, presenting historical groundwater elevation data, and indicating groundwater flow directions;

(7) figures presenting historical groundwater laboratory analytical data, if applicable. The chemical analytical data corresponding to each sampling location can be presented in tabular form on the figure or as an isoconcentration map;

(8) figures presenting historical and proposed surface water sample locations and field measurement data, if applicable;

(9) figures presenting historical surface water laboratory analytical data, if applicable;

(10) figures showing historical and proposed air or vapor sampling locations and presenting historical air quality data, if applicable;

(11) figures presenting historical pilot and other testing locations and data, where applicable, including site plans and graphic data presentation; and

(12) figures presenting geologic cross-sections, based on outcrop and borehole data acquired during previous investigations, if applicable.

IV.L.2.m Appendices

A description of IDW management shall be included as an appendix to the investigation work plan. The results of historical investigations required in this Permit shall be submitted with the investigation work plan as a separate document. Additional appendices may be necessary to present additional data or documentation not listed above.

IV.L.3 Investigation Report

The Permittee shall prepare investigation reports at the Facility using the general outline below. The Investigation Report shall be the reporting mechanism for presenting the results of completed Investigation Work Plans. This Permit Section (IV.L.3) describes the minimum requirements for reporting on site investigations. All data collected during each site investigation event in the reporting period shall be included in the reports. In general, interpretation of data shall be presented only in the background, conclusions and recommendations sections of the reports. The other text sections of the reports shall be reserved for presentation of facts and data without interpretation or qualifications. The general report outline is provided below.

IV.L.3.a Title Page

The title page shall include the type of document; Facility name; SWMU or AOC name, site, and any other unit name; and the submittal date. A signature block providing spaces for the names and titles of the responsible Facility representatives shall be provided on the title page in accordance with 40 CFR § 270.11(d)(1).

IV.L.3.b Executive Summary (Abstract)

The executive summary or abstract shall provide a brief summary of the purpose, scope, and results of the investigation; site names; and location. In addition, this section shall include a brief summary of conclusions included in the report based on the investigation data collected and recommendations for future investigation, monitoring, remedial action or site closure.

IV.L.3.c Table of Contents

The table of contents shall list all text sections, subsections, tables, figures, and appendices or attachments included in the report. The corresponding page numbers for the titles of each section of the report shall be included in the table of contents.

IV.L.3.d Introduction

The introduction section shall include the Facility name, unit location, and unit status (*e.g.*, closed, corrective action). General information on the site usage and status shall be included in this section. A brief description of the purpose of the investigation, the type of site investigation conducted, and the type of results presented in the report also shall be provided in this section.

IV.L.3.e Background

The background section shall describe relevant background information. This section shall briefly summarize historical site uses including the locations of current and former site structures and features. A labeled figure shall be included in the document showing the locations of current and former site structures and features. The locations of any subsurface features such as pipelines, underground tanks, utility lines, and other subsurface structures shall be included in the background summary and labeled on the figure, as appropriate. In addition, this section shall include a brief summary of the possible sources of contamination, the history of releases or discharges of contamination, the known extent of contamination, and a general summary of the results of previous investigations including references to previous reports. The references to previous reports shall include page, table, and figure numbers for referenced information. A site plan, showing relevant investigation locations, and summary data tables shall be included in the Figures and Tables sections of the document, respectively.

IV.L.3.f Scope of Activities

A section on the scope of activities shall briefly describe all activities performed during the investigation event including background information research, implemented health and safety measures that affected or limited the completion of tasks, drilling, test pit or other excavation methods, well construction methods, field data collection, survey data collection, chemical analytical testing, aquifer testing, remediation system pilot tests, and IDW storage or disposal.

IV.L.3.g Field Investigation Results

A section shall provide a summary of the procedures used and the results of all field investigation activities conducted at the site including the dates that investigation activities were conducted, the type and purpose of field investigation activities performed, field screening measurements, logging and sampling results, pilot test results, construction details, and conditions observed. Field observations or conditions that altered the planned work or may have influenced the results of sampling, testing, and logging shall be reported in this section. The following sections shall be included.

IV.L.3.h Site Conditions

IV.L.3.h.i Surface Conditions

A section on surface conditions shall provide a brief detailed description of current site topography, features and structures including a description of topographic drainages, man-made drainages, vegetation, erosional features, and basins. It shall also include a detailed description of current site usage and any current operations at the site. In addition, descriptions of features located in surrounding sites that may have an impact on the subject site regarding sediment transport, surface water run-off, or contaminant fate and transport shall be included in this section.

IV.L.3.h.ii General Subsurface Conditions

A section on subsurface conditions shall provide a brief, detailed description of the general site conditions observed during the subsurface investigations, including relevant soil horizons, stratigraphy, presence of groundwater, and other relevant information. A site plan showing the locations of all borings and excavations advanced during the investigation and, as applicable, previous investigations shall be included in the Figures section of the work plan. A brief description of the stratigraphic units that were observed during the investigation shall be included in this subsection if no previous investigations have been conducted at the site.

IV.L.3.i Exploratory Drilling or Excavation Investigations

A section shall describe the locations, methods, and depths of subsurface explorations. The description shall include the types of equipment used, the logging procedures, the soil or rock classification system used to describe the observed materials, exploration equipment decontamination procedures, and conditions encountered that may have affected or limited the investigation.

A description of the site conditions observed during subsurface investigation activities shall be included in this section, including soil horizon and stratigraphic information. Site plans showing the locations of all borings and excavations shall be included in the Figures Section of the report. Boring and test pit logs for all exploratory borings and test pits shall be presented in an appendix or attachment to the report.

IV.L.3.j Exploratory and Monitoring Well Boring Geophysical Logging

A section shall describe the methods, dates of measurement, depth intervals measured, and the results of geophysical logging. The relative merits and limitations of each geophysical logging method employed shall be discussed, along with any field conditions or instrument malfunctions that occurred that may have affected the results of the geophysical logging.

IV.L.3.k Subsurface Conditions

A section on subsurface conditions shall describe known subsurface lithology and structures, based on observations made during the current and previous subsurface investigations, including interpretation of geophysical logs and as-built drawings of man-made structures. A description of any known locations of pipelines and utility lines and observed geologic structures shall also be included in this section. A site plan showing boring and excavation locations and the locations of the site's above- and below-ground structures shall be included in the Figures Section of the report. In addition, cross-sections shall be constructed, if appropriate, to provide additional visual presentation of site or regional subsurface conditions.

IV.L.3.l Monitoring Well Construction and Boring or Excavation Abandonment

A section shall describe the methods and details of monitoring well construction and the methods used to abandon or backfill exploratory borings and excavations. The description shall include the dates of well construction, boring abandonment, or excavation backfilling. In addition, well construction diagrams shall be included in an appendix or attachment with the associated boring logs for monitoring well borings. The Permittee may submit well abandonment reports as an appendix to the investigation report.

IV.L.3.m Groundwater Conditions

A section shall describe groundwater conditions observed beneath the subject site and relate local groundwater conditions to regional groundwater conditions. A description of the depths to water, aquifer thickness, and groundwater flow directions shall be included in this section for alluvial groundwater, shallow perched groundwater, intermediate perched groundwater, and regional groundwater, as appropriate to the investigation. Figures showing well locations, surrounding area, and groundwater elevations and flow directions for each hydrologic zone shall be included in the Figures Section of the report.

IV.L.3.n Surface Water Conditions

A section shall describe surface water conditions and include a description of surface water run-off, drainage, surface water sediment transport, and contaminant transport in surface water as suspended load and as a dissolved phase in surface water via natural and man-made drainages, if applicable. A description of contaminant fate and transport shall be included, if appropriate.

IV.L.3.o Surface Air and Subsurface Vapor Conditions

A section shall describe surface air and subsurface vapor monitoring and sampling methods used during the site investigation. It shall also describe observations made during the site investigation regarding subsurface flow pathways and the subsurface air-flow regime.

IV.L.3.p Materials Testing Results

A section shall discuss the materials testing results, such as core permeability testing, grain size analysis, or other materials testing results. Sample collection methods, locations, and depths shall also be included. Corresponding summary tables shall be included in the Tables Section of the report.

IV.L.3.q Pilot Testing Results

A section shall discuss the results of any pilot tests. Pilot tests are typically conducted after initial subsurface investigations are completed and the need for additional investigation or remediation has been evaluated. Pilot tests, including aquifer tests and remediation system pilot tests, shall be addressed through separate work plans and pilot test reports. The format for pilot test work plans and reports shall be approved by the NMED prior to submittal.

IV.L.3.r Regulatory Criteria

A section shall set forth the cleanup standards, risk-based screening levels, and risk-based cleanup goals for each pertinent medium at the subject site. The appropriate cleanup levels for each site shall be included if site-specific levels have been established at separate Facility sites or units. A table summarizing the applicable cleanup standards or levels or inclusion of applicable cleanup standards or levels in the data tables shall be included as part of the document. The risk assessment, if conducted, shall be presented in a separate document or in an appendix to this report. If cleanup or screening levels calculated in the NMED-approved risk evaluation are employed, the risk evaluation document shall be referenced and shall include pertinent page numbers for referenced information.

IV.L.3.s Site Contamination

A section shall provide a description of sampling intervals and methods for detection of surface and subsurface contamination in soils, rock, sediments, groundwater, and surface water, and as vapor-phase contamination. Only factual information shall be included in this section. Interpretation of the data shall be reserved for the summary and conclusions sections of the report. Tables summarizing all sampling, testing, and screening results for detected contaminants shall be prepared in a format approved by the NMED. The tables shall be presented in the Tables Section of the report.

IV.L.3.s.i Soil, Rock, and Sediment Sampling

A section shall describe the sampling of soil, rock, and sediment. It shall include the dates, locations and methods of sample collection; sampling intervals; sample logging methods; screening sample selection methods; and laboratory sample selection methods including the

collection depths for samples submitted for laboratory analyses. A site plan showing the sample locations shall be included in the Figures Section of the report.

IV.L.3.s.ii Soil, Rock, and Sediment Sample Field Screening Results

A section shall describe the field screening methods used during the investigation and the field screening results. Field screening results also shall be presented in summary tables in the Tables Section of the document. The limitations of field screening instrumentation and any conditions that influenced the results of field screening shall be discussed in this section.

IV.L.3.s.iii Soil, Rock, and Sediment Sampling Analytical Results

A section shall summarize the results of laboratory analysis for soil, rock, and sediment samples. It shall also describe the analytical methods used and provide a comparison of the analytical results to background levels, cleanup standards, or established cleanup levels for the site. The laboratory results also shall be presented in summary tables in the Tables Section of the document. Field conditions and sample collection methods that could potentially affect the analytical results shall be described in this section. If appropriate, soil analytical data shall be presented with sample locations on a site plan and included in the Figures Section of the report.

IV.L.3.s.iv Groundwater Sampling

A section on groundwater sampling shall describe the dates, locations, depths, and methods of sample collection; methods for sample logging; and methods for screening and laboratory sample selection. A map showing all sites and surrounding area well locations shall be included in the Figures Section of the report.

IV.L.3.s.v Groundwater General Chemistry

A section on the general groundwater chemistry shall describe the results of measurement of field purging parameters and field analytical measurements. Field parameter measurements and field analytical results also shall be presented in summary tables in the Tables Section of the document. The limitations of field measurement instrumentation and any conditions that may have influenced the results of field screening shall be discussed in this section. As determined by the Permittee and the NMED, relevant water chemistry concentrations shall be presented as data tables or as iso-concentration contours on a map included in the Figures Section of the report.

IV.L.3.s.vi Groundwater Chemical Analytical Results

A section shall summarize the results of groundwater chemical analyses. It shall describe the groundwater chemical analytical methods and analytical results. It shall also provide a comparison of the data to cleanup standards or established cleanup levels for the site. The rationale or purpose for altering or modifying the groundwater sampling program outlined in the site investigation work plan shall also be provided in this section. Field conditions shall be described in this section that may have affected the analytical results during sample collection. Tables summarizing the groundwater laboratory, field, and field sample QA/QC chemical analytical data; applicable cleanup levels; and modifications to the groundwater sampling program shall be provided in the Tables Section of the report. Relevant contaminant

concentrations shall be presented as individual analyte concentrations, data tables, or as isoconcentration contours on a map included in the Figures Section of the report.

IV.L.3.s.vii Surface Water Sampling

A section shall describe the surface water sampling and shall include the dates, times, locations, depths, and methods of sample collection. It shall also describe methods for sample logging, sample-screening methods, and laboratory sample selection methods. A map showing all surface-water sampling locations shall be included in the Figures Section of the report.

IV.L.3.s.viii Surface Water General Chemistry

A section on the surface water general chemistry shall describe the results of measurement of field parameters and field analytical measurements. Field parameter measurements and field analytical results also shall be presented in summary tables in the Tables Section of the document. The limitations of field measurement instrumentation and any conditions that influenced the results of field screening shall be discussed in this Section. Relevant water chemistry concentrations shall be presented as data tables on a map included in the Figures Section of the report.

IV.L.3.s.ix Surface Water Chemical Analytical Results

A section shall summarize the results of surface water chemical analyses. It shall describe the analytical methods and analytical results, and provide a comparison of the data to the cleanup standards or established background or cleanup levels for the site. The rationale or purpose for altering or modifying the surface-water sampling program outlined in the site investigation work plan also shall be provided in this section. Field conditions that may have affected the analytical results during sample collection shall be described in this section. Tables summarizing the surface water laboratory, field, and analytical field sample QA/QC analytical data; applicable cleanup levels; and modifications to the surface-water sampling program shall be provided in the Tables Section of the report. Relevant contaminant concentrations shall be presented as individual analyte concentrations or as data tables on a map included in the Figures Section of the report.

IV.L.3.s.x Air and Subsurface Vapor Sampling

A section shall describe the air and subsurface vapor sampling. It shall describe the dates, locations, depths or elevations above ground surface, methods of sample collection, methods for sample logging, and methods for laboratory sample selection. A map showing all air sampling locations shall be provided in the Figures Section of the report.

IV.L.3.s.xi Air and Subsurface Vapor Field Screening Results

A section shall describe the air and subsurface vapor field screening results. It shall describe the field screening methods used for ambient air and subsurface vapors during the investigation. Field screening results shall also be presented in summary tables in the Tables Section of the report. The locations of ambient air and subsurface vapor screening sample collection shall be presented on a site plan included in the Figures Section of the report. The limitations of field

screening instrumentation and any conditions that influenced the results of field screening shall be discussed in this Section.

IV.L.3.s.xii Air and Subsurface Vapor Laboratory Analytical Results

A section shall describe the results of air and subsurface vapor laboratory analysis. It shall describe the air sampling laboratory analytical methods and analytical results, and provide a comparison of the data to emissions standards or established cleanup or emissions levels for the site. The rationale or purpose for altering or modifying the air monitoring or sampling program outlined in the site investigation work plan also shall be provided in this section. Field conditions that may have affected the analytical results during sample collection shall be described in this section. Tables summarizing the air sample laboratory, field, and analytical field sample QA/QC data; applicable cleanup levels or emissions standards; and modifications to the air sampling program shall be provided in the Tables Section of the report. Relevant contaminant concentrations shall be presented as individual analyte concentrations, data tables, or as iso-concentration contours on a map included in the Figures Section of the report.

IV.L.3.t Conclusions

A section shall provide a brief summary of the investigation activities and a discussion of the conclusions of the investigation conducted at the site. In addition, this section shall provide a comparison of the results to applicable cleanup or screening levels, and to relevant historical investigation results and analytical data. Potential receptors, including groundwater, shall be identified and discussed. An explanation shall be provided with regard to data gaps. A risk assessment may be included as an appendix to the investigation report; however, the risk assessment shall be presented in the Risk Assessment format described in Permit Section IV.L.5. References to the risk assessment shall be presented only in the summary and conclusions sections of the Investigation Report.

IV.L.3.u Recommendations

A section shall discuss the need for further investigation, corrective measures, risk assessment and monitoring, or recommendations for corrective action completed, based on the conclusions provided in the Conclusions section. It shall include explanations regarding additional sampling, monitoring, and site closure. A corresponding schedule for further action regarding the site shall also be provided. No action recommendations shall include the anticipated schedule for submittal of a petition for a permit modification.

IV.L.3.v Tables

A section shall provide the following summary tables as applicable:

(1) tables summarizing regulatory criteria, background levels, and applicable cleanup levels (this information may be included in the analytical data tables instead of as separate tables);

(2) tables summarizing field survey location data. Separate tables shall be prepared for well locations and individual medium sampling locations except where the locations are the same for more than 1 medium;

(3) tables summarizing field screening and field parameter measurements of soil, rock, sediments, groundwater, surface water, and air quality data;

(4) a table summarizing soil, rock, and/or sediment laboratory analytical data. It shall include the analytical methods, detection limits, and significant data quality exceptions that would influence interpretation of the data;

(5) a table summarizing the groundwater elevations and depths to groundwater and if present separate phase hydrocarbons (SPH). The table shall include the monitoring well depths and the screened intervals in each well;

(6) a table summarizing the groundwater laboratory analytical data. The analytical data tables shall include the analytical methods, detection limits, and significant data quality exceptions that would influence interpretation of the data;

(7) a table summarizing the surface water laboratory analytical data. The analytical data tables shall include the analytical methods, detection limits, and significant data quality exceptions that would influence interpretation of the data;

(8) a table summarizing the air sample screening and laboratory analytical data. The data tables shall include the screening instruments used, laboratory analytical methods, detection limits, and significant data quality exceptions that would influence interpretation of the data;

(9) tables summarizing the pilot test data, if applicable, including units of measurement and types of instruments used to obtain measurements; and

(10) a table summarizing any materials test data.

With prior approval from the NMED, the Permittee may combine one or more of the tables. Data presented in the tables shall include the current data, dates of data collection, analytical methods, detection limits, and significant data quality exceptions. The summary analytical data tables shall include only detected analytes and data quality exceptions that could potentially mask detections.

IV.L.3.w Figures

A section shall provide the following figures as applicable:

(1) a vicinity map showing topography and the general location of the subject site relative to surrounding features and properties;

(2) a site plan that presents any pertinent site features and structures, underground utilities, well locations, and remediation system location(s) and details. Off-site well locations and other relevant features shall be included on the site plan. Additional site plans may be required to present the locations of relevant off-site well locations, structures and features;

(3) figures showing boring or excavation locations and sampling locations;

(4) figures presenting soil sample field screening and laboratory analytical data;

(5) figures displaying the locations of all newly installed and existing wells and borings;

(6) figures presenting monitoring well and piezometer locations, groundwater elevation data, and groundwater flow directions;

(7) figures presenting groundwater laboratory analytical data, including any past data requested by the NMED. The laboratory analytical data corresponding to each sampling location may be presented in table form on the figure or as an isoconcentration map;

(8) figures presenting surface water sample locations and field measurement data including any past data requested by the NMED;

(9) figures presenting surface water laboratory analytical data including any past data requested by the NMED. The laboratory analytical data corresponding to each sampling location may be presented in table form on the figure;

(10) figures showing air sampling locations and presenting air quality. The field screening or laboratory analytical data corresponding to each sampling location may be presented in table form on the figure or as an isoconcentration map;

(11) figures presenting geologic cross-sections based on outcrop and borehole data; and

(12) figures presenting pilot test locations and data, where applicable, including site plans or graphic data presentation.

All figures shall include an accurate bar scale and a north arrow. An explanation shall be provided on each figure for all abbreviations, symbols, acronyms, and qualifiers. All maps shall have a date.

IV.L.3.x Appendices

Each investigation report shall include the following appendices. Additional appendices may be necessary to present data or documentation not listed below.

IV.L.3.x.i Field Methods

An appendix shall provide detailed descriptions of the methods used to acquire field measurements of each medium that was surveyed or tested during the investigation. This appendix shall include exploratory drilling or excavation methods, the methods and types of instruments used to obtain field screening, field analytical or field parameter measurements, instrument calibration procedures, sampling methods for each medium investigated, decontamination procedures, sample handling procedures, documentation procedures, and a description of field conditions that affected procedural or sample testing results. Methods of measuring and sampling during pilot tests shall be reported in this appendix, if applicable. Geophysical logging methods shall be discussed in a separate section of this appendix. Investigation derived waste (IDW) storage and disposal methods shall also be discussed in this appendix. Copies of IDW disposal documentation shall be provided in a separate appendix.

IV.L.3.x.ii Boring/Test Pit Logs and Well Construction Diagrams

An appendix shall provide boring logs, test pit logs, or other excavation logs, and well construction details. In addition, a key to symbols and a soil or rock classification system shall

be included in this appendix. Geophysical logs shall be provided in a separate section of this appendix.

IV.L.3.x.iii Analytical Program

An appendix shall discuss the analytical methods, a summary of data quality objectives, and the data quality review procedures. A summary of data quality exceptions and their effect on the acceptability of the field and laboratory analytical data with regard to the investigation and the site status shall be included in this appendix along with references to the case narratives provided in the laboratory reports.

IV.L.3.x.iv Analytical Reports

An appendix shall provide the contract laboratory final analytical data reports generated for the investigation. The reports shall include all chain-of-custody records and Level II QA/QC results provided by the laboratory. The final laboratory reports and data tables shall be provided electronically in a format approved by the NMED. Paper copies (or copies electronically scanned in PDF format) of all chain-of-custody records shall be provided with the reports.

IV.L.3.x.v Other Appendices

Other appendices containing additional information shall be included as required by the NMED or as otherwise appropriate.

IV.L.4 Periodic Monitoring Report

The Permittee shall use the following guidance for preparing periodic monitoring reports. The reports shall present the reporting of periodic groundwater, surface water, vapor, and remediation system monitoring at the Facility. The following sections provide a general outline for monitoring reports, and also provide the minimum requirements for reporting for specific Facility sites, areas, and regional monitoring. All data collected during each monitoring and sampling event in the reporting period shall be included in the reports. In general, interpretation of data shall be presented only in the background, conclusions, and recommendations sections of the reports. The other text sections of the reports shall be reserved for presentation of facts and data without interpretation or qualifications.

IV.L.4.a Title Page

The title page shall include the type of document; Facility name; SWMU or AOC name, site, any other unit name; and the submittal date. A signature block providing spaces for the names and titles of the responsible Facility representatives shall be provided on the title page in accordance with 40 CFR § 270.11(d)(1).

IV.L.4.b Executive Summary (Abstract)

The executive summary or abstract shall provide a brief summary of the purpose, scope, and results of the monitoring conducted at the subject site during the reporting period. The SWMU, AOC and site name, location, and/or area designation shall be included in the executive

summary. In addition, this section shall include a brief summary of conclusions based on the monitoring data collected.

IV.L.4.c Table of Contents

The table of contents shall list all text sections, subsections, tables, figures, and appendices or attachments included in the report. The corresponding page numbers for the titles of each section of the report shall be included in the table of contents.

IV.L.4.d Introduction

The introduction section shall include the Facility name, unit location, and unit status as applicable (*e.g.* closed, corrective action). General information on the site usage and status shall be included in this section. A brief description of the purpose of the monitoring, type of monitoring conducted, and the type of results presented in the report also shall be provided in this section.

IV.L.4.e Scope of Activities

A section on the scope of activities shall briefly describe all activities performed during the monitoring event or reporting period including field data collection, analytical testing, remediation system monitoring, if applicable, and purge/decontamination water storage and disposal.

IV.L.4.f Regulatory Criteria

A section on regulatory criteria shall provide information regarding applicable cleanup standards, risk-based screening levels and risk-based cleanup goals for the subject site. A separate table summarizing the applicable screening levels or standards or inclusion of the applicable cleanup standards or screening levels in the data tables can be substituted for this section. The appropriate cleanup or screening levels for each site shall be included, if site-specific levels have been established at separate sites. Risk-based evaluation procedures, if used to calculate cleanup or screening levels, must either be included as an attachment or referenced. The specific document and page numbers must be included for all referenced materials.

IV.L.4.g Monitoring Results

A section shall provide a summary of the results of monitoring conducted at the site. This section shall include the dates and times that monitoring was conducted, the measured depths to groundwater, directions of groundwater flow, field air and water quality measurements, contaminant surveys, static pressures, field measurements, and a comparison to previous monitoring results. Field observations or conditions that may influence the results of monitoring shall be reported in this section. Tables summarizing vapor-monitoring parameters, groundwater elevations, depths to groundwater measurements, and other field measurements can be substituted for this section. The tables shall include all information required in Permit Section IV.L.4.k.

IV.L.4.h Analytical Data Results

A section shall discuss the results of the chemical analyses. It shall provide the dates of sampling, the analytical methods, and the analytical results. It shall also provide a comparison of the data to previous results and to background levels, cleanup standards, or established cleanup levels for the site. The rationale or purpose for altering or modifying the monitoring and sampling program shall be provided in this section. A table summarizing the laboratory analytical data, QA/QC data, applicable cleanup levels, and modifications to the sampling program can be substituted for this section. The tables shall include all information required in Permit Section IV.L.4.k.

IV.L.4.i Remediation System Monitoring

A section shall discuss the remediation system monitoring. It shall summarize the remediation system's capabilities and performance. It shall also provide monitoring data, treatment system discharge sampling requirements, and system influent and effluent sample analytical results. The dates of operation, system failures, and modifications made to the remediation system during the reporting period shall also be included in this section. A summary table may be substituted for this section. The tables shall include all information required in Permit Section IV.L.4.k.

IV.L.4.j Summary

A summary section shall provide a discussion and conclusions of the monitoring conducted at the site. In addition, this section shall provide a comparison of the results to applicable cleanup levels, and to relevant historical monitoring and laboratory analytical data. An explanation shall be provided with regard to data gaps. A discussion of remediation system performance, monitoring results, modifications, if applicable, and compliance with discharge requirements shall be provided in this section. Recommendations and explanations regarding future monitoring, remedial actions, or site closure, if applicable, shall also be included in this section.

IV.L.4.k Tables

A section shall provide the following summary tables for the media sampled:

(1) a table summarizing the regulatory criteria (a Regulatory Criteria text section may be substituted for this table or the applicable cleanup levels may be included in the analytical data tables);

(2) a table summarizing groundwater elevations and depths to groundwater data. The table shall include the monitoring well depths, the screened intervals in each well, and the dates and times of measurements;

(3) a table summarizing field measurements of surface water quality data;

(4) a table summarizing field measurements of vapor monitoring data (must include historical vapor monitoring data as described above);

(5) a table summarizing field measurements of groundwater quality data (must include historical water quality data as described above);

(6) a table summarizing vapor sample analytical data (must include historical vapor sample analytical data as described above);

(7) a table summarizing surface water analytical data (must include historical surface water analytical data as described above);

(8) a table summarizing groundwater analytical data (must include historical groundwater analytical data as described above); and

(9) a table summarizing remediation system monitoring data, if applicable (must include historical remediation system monitoring data as described above).

With prior approval from the NMED, the Permittee may combine one or more of the tables. Data presented in the tables shall include the current sampling and monitoring data plus data from the three previous monitoring events or, if data from less than three monitoring events is available, data acquired during previous investigations. Remediation system monitoring data also shall be presented. The dates of data collection shall be included in the tables. Summary tables may be substituted for portions of the text. The analytical data tables shall include only detected analytes and data quality exceptions that could potentially mask detections.

IV.L.4.l Figures

The section shall include the following figures:

(1) a vicinity map showing topography and the general location of the subject site relative to surrounding features or properties;

(2) a site plan that presents pertinent site features and structures, well and piezometer locations, and remediation system location(s) and features. Off-site well locations and pertinent features shall be included on the site plan, if practical. Additional site plans may be required to present the locations of relevant off-site well locations, structures, and features;

(3) figures presenting the locations of piezometer, monitoring and other well locations, groundwater elevation data, and groundwater flow directions;

(4) figures presenting groundwater analytical data for the current monitoring event. The analytical data corresponding to each sampling location may be presented as individual concentrations or in table form on the figure or as an iso-concentration map;

(5) figures presenting surface water sampling locations and analytical data for the current monitoring period if applicable;

(6) figures presenting vapor sampling locations and analytical data for the current monitoring event if applicable. The analytical data corresponding to each sampling location may be presented as individual concentrations or in table form on the figure or as an iso-concentration map; and

(7) figures presenting geologic cross-sections based on outcrop and borehole data, if applicable.

All figures shall include an accurate bar scale and a north arrow. An explanation shall be provided on each figure for all abbreviations, symbols, acronyms, and qualifiers. All figures shall have a date.

IV.L.4.m Appendices

Each monitoring report shall include the following appendices. Additional appendices may be necessary to present data or documentation not listed below.

IV.L.4.m.i Field Methods

An appendix shall include the methods used to acquire field measurements of groundwater elevations, vapor and water quality data, and vapor, surface water and groundwater samples. It shall include the methods and types of instruments used to measure depths to water, air or headspace parameters, flow measurements, and water quality parameters. In addition, decontamination, well purging techniques, well sampling techniques, and sample handling procedures shall be provided in this appendix. Methods of measuring and sampling remediation systems shall be reported in this appendix, if applicable. Purge and decontamination water storage and disposal methods shall also be presented in this appendix. Copies of purge and decontamination water disposal documentation shall be provided in a separate appendix, if applicable.

IV.L.4.m.ii Analytical Program

An appendix shall discuss the analytical program. It shall include the analytical methods, a summary of data quality objectives, and data quality review procedures. A summary of data quality exceptions and their effect on the acceptability of the analytical data with regard to the monitoring event and the site status shall be included in this appendix along with references to case narratives provided in the laboratory reports.

IV.L.4.m.iii Analytical Reports

An appendix shall provide the analytical reports and shall include the contract laboratory final chemical analytical data reports generated during this reporting period. The reports must include all chain-of-custody records and Level II QA/QC results provided by the laboratory. The laboratory final reports and data tables shall be provided electronically in a format approved by the NMED. Paper copies (or electronically scanned in PDF format) of all chain-of-custody records shall be provided with the reports.

IV.L.5 Risk Assessment Report

The Permittee shall prepare risk assessment reports for sites requiring corrective action at the Facility using the format listed below. This Permit Section (IV.L.5) provides a general outline for risk assessments and also lists the minimum requirements for describing risk assessment elements. In general, interpretation of data shall be presented only in the Background, Conceptual Site Model, and Conclusions and Recommendations Sections of the reports. The other text sections of the Risk Assessment report shall be reserved for presentation of sampling results from all investigations, conceptual and mathematical elements of the risk assessment, and

presentations of toxicity information and screening values used in the risk assessment. The general risk assessment outline, applicable to both human health and ecological risk assessments, is provided below.

IV.L.5.a Title Page

The title page shall include the type of document; Facility name; SWMU or AOC name, site, and any other unit name; and the submittal date. A signature block providing spaces for the names and titles of the responsible Facility representatives shall be provided on the title page in accordance with 40 CFR § 270.11(d)(1).

IV.L.5.b Executive Summary (Abstract)

The executive summary or abstract section shall provide a brief summary of the purpose and scope of the risk assessment of the subject site. The executive summary shall also briefly summarize the conclusions of the risk assessment. The Facility, SWMU, AOC, and site names; location shall be included in the executive summary.

IV.L.5.c Table of Contents

The table of contents shall list all text sections, subsections, tables, figures, and appendices or attachments included in the risk assessment. The corresponding page numbers for the titles of each unit of the report shall be included in the table of contents.

IV.L.5.d Introduction

The introduction section shall include the Facility name, unit location, and unit status (*e.g.*, closed, corrective action). General information on the current site usage and status shall be included in this section.

IV.L.5.e Background

The background section shall describe relevant background information. This section shall briefly summarize historical site uses including the locations of current and former site structures and features. A labeled figure shall be included in the document showing the locations of current and former site structures and features.

IV.L.5.f Site Description

A section shall describe current site topography, features and structures including topographic drainages, man-made drainages, erosional features, current site uses, and other data relevant to assessing risk at the site. Depth to groundwater and direction of groundwater flow shall be included in this section. The presence and location of surface water bodies such as any springs or wetlands shall be noted in this section. Photographs of the site may be incorporated into this section. Ecological features of the site shall be described here, including type and amount of vegetative cover, observed and expected wildlife receptors, and level of disturbance of the site. A topographical map of the site and vicinity of the site showing habitat types, boundaries of each habitat, and any surface water features shall be included in the Figures Section of the document.

IV.L.5.g Sampling Results

A section shall discuss the results of the sampling at the site. It shall include a description of the history of releases of contaminants, the known and possible sources of contamination, and the vertical and lateral extent of contamination present in each medium. This section shall include summaries of sampling results of all investigations including site plans (included in the Figures Section of the report) showing locations of detected contaminants. This section shall reference pertinent figures, data summary tables, and references in previous reports. References to previous reports shall include page, table, and figure numbers for referenced information. Summaries of sampling data shall include for each constituent: the maximum value detected, the detection limit, the 95 percent upper confidence level (UCL) of the mean value detected (if applicable to the data set), and whether the 95 percent UCL of the mean was calculated based on a normal or lognormal distribution. Background values used for comparison to inorganic constituents at the site shall be presented here. The table of background values should appear in the Tables Section of the document and include actual values used as well as the origin of the values (*e.g.* Facility-wide, UCL, upper tolerance level (UTL)). This section shall also include a discussion of how "non-detect" sample results were handled in the averaging of data.

IV.L.5.h Conceptual Site Model

A section shall present the conceptual site model. It shall include information on the expected fate and transport of contaminants detected at the site. This section shall provide a list of all sources of contamination at the site. Sources that are no longer considered to be ongoing but represent the point of origination for contaminants transported to other locations shall be included. The discussion of fate and transport shall address potential migration of each contaminant in each medium, potential breakdown products and their migration, and anticipated pathways of exposure for human or ecological receptors. Diagrammatic representations of the conceptual site model shall appear in the Figures Section of the document.

For human health risk assessments, the conceptual site model shall include the current and reasonably foreseeable future land use and residential land use for all risk assessments. All values for exposure parameters and the source of those values shall be included in table format and presented in the Tables Section of the document.

Conceptual site models presented for ecological risk assessments shall identify assessment endpoints and measurement receptors for the site. The discussion of the model shall explain how the measurement receptors for the site are protective of the wildlife receptors identified by the Permittee in the Site Description Section (*see* Permit Section IV.L.5.f).

IV.L.5.i Risk Screening Levels

A section shall present the actual screening values used for each contaminant for comparison to all human health and ecological risk screening levels. The NMED's SSLs for residential and industrial soil shall be used to screen soil for human health using EPA's *Risk Assessment Guidance for Superfund (RAGS), Volume I, Part A, 1989* as updated. For those contaminants not appearing on the NMED's SSL table, the EPA Regional Screening Levels soil screening value adjusted to meet the NMED's risk goal of 10^{-5} for total risk for carcinogens shall be used to screen the site for human health risks. Screening for ecological risk shall be conducted using

U.S. EPA's ECO-SSLs, or derive a screening level using the methodology in the NMED's *Guidance for Assessing Ecological Risks Posed by Chemicals: Screening–Level Ecological Risk Assessment. (*Version 2.0)(July 2008). If no valid toxicological studies exist for a particular receptor or contaminant, the contaminant/receptor combination shall be addressed using qualitative methods. If a NMED-approved site-specific risk scenario is used for the human health risk assessment, this section shall include all toxicity information and exposure assessment equations used for the site-specific scenario as well as the sources for that information. Other regulatory levels applicable to screening the site, such as drinking water Maximum Contaminant Levels (MCLs), shall also be included in this section.

IV.L.5.j Risk Assessment Results

A section shall present all risk values, hazard quotients (HQ), and HIs for human health based on current and reasonably foreseeable future land use. Where the current or reasonably foreseeable future land use is not residential, risk values, HQs, and HIs for a residential land use scenario shall also be calculated and reported. The residential scenario shall be used for comparison purposes only, unless the land use becomes residential. This section shall also present the HQ and HI for each contaminant for each ecological receptor.

IV.L.5.j.i Uncertainty analysis

A section shall include discussion of qualitative, semi-quantitative, and quantitative uncertainty in the risk assessment and estimate the potential impact of the various uncertainties.

IV.L.5.k Conclusions and Recommendations

A section shall include the interpretation of the results of the risk assessment and any recommendations for future disposition of the site. This section may include additional information and considerations that the Permittee believe are relevant to the analysis of the site.

IV.L.5.l Tables

A section shall provide the following summary tables, as appropriate:

(1) a table presenting background values used for comparison to inorganic constituents at the site. The table shall include actual values used as well as the origin of the values (Facility-wide, UCL, UTL, or maximum);

(2) a table summarizing sampling data shall include, for each constituent, all detected values above background, the maximum value detected, the 95 percent UCL of the mean value detected (if applicable to the data set), and whether that 95 percent UCL of the mean was calculated based on a normal or lognormal distribution;

(3) a table of all screening values used and the sources of those values.

(4) a table presenting all risk values, HQs, and HIs under current and reasonably foreseeable future land use for human health;

(5) if residential use is not a current or reasonably foreseeable future land use, a table presenting all risk values, HQs, and HIs under a residential land use scenario for human health shall be included for comparison purposes;

(6) a table presenting the HQ and HI for each contaminant for each ecological receptor; and

(7) a table presenting values for exposure parameters and the source of the values.

With prior approval from the NMED, the Permittee may combine one or more of the tables. Data presented in the summary tables shall include information on detection limits and significant data quality exceptions. The analytical data tables shall include only detected analytes and data quality exceptions that could potentially mask detections.

IV.L.5.m Figures

A section shall present the following figures for each site, as appropriate:

(1) a vicinity map showing topography and the general location of the subject site relative to surrounding features or properties;

(2) for human health risk assessments, a site plan that presents pertinent site features and structures, underground utilities, well locations, and remediation system location(s) and its details. Off-site well locations and other relevant features shall be included on the site plan if practical. Additional site plans may be required to present the locations of relevant off-site well locations, structures, and features;

(3) for ecological risk assessments, a topographical map of the site and vicinity of the site showing habitat types, boundaries of each habitat, and any surface water features; and

(4) conceptual site model diagrams for both human health and ecological risk assessments.

With prior approval from the NMED, the Permittee may combine one or more of the figures. All figures shall include an accurate bar scale and a north arrow. An explanation shall be provided on each figure for all abbreviations, symbols, acronyms, and qualifiers.

IV.L.5.n Appendices

Each risk assessment report shall include appendices containing supporting data. Appendices may include the results of statistical analyses of data sets and comparisons of data, full sets of results of all sampling investigations at the site, or other data as appropriate.

IV.L.6 Corrective Measures Evaluation Report

The Permittee shall prepare corrective measures evaluations for sites requiring corrective measures using the format listed below. This Permit Section (IV.L.6) provides a general outline for corrective measures evaluations and also lists the minimum requirements for describing corrective measures when preparing these documents. All investigation summaries, site condition descriptions, corrective action goals, corrective action options, remedial options selection criteria, and schedules shall be included in the corrective measures evaluations. In general, interpretation of historical investigation data and discussions of prior interim activities shall be presented only in the background sections of the corrective measures evaluations. At a minimum, detections of contaminants encountered during previous site investigations shall be presented in the corrective measures evaluations in table format with an accompanying site plan showing sample locations. The other text sections of the corrective measures evaluations shall be reserved for presentation of corrective action-related information regarding anticipated or

potential site-specific corrective action options and methods relevant to the project. The general corrective measures evaluation outline is provided below.

IV.L.6.a Title Page

The title page shall include:

(1) the type of document;

(2) facility name;

(3) area designation;

(4) SWMU or AOC name, site, and any other unit name; and

(5) the submittal date.

A signature block providing spaces for the names and titles of the responsible Facility representatives shall be provided on the title page in accordance with 40 CFR § 270.11(d)(1).

IV.L.6.b Executive Summary (Abstract)

This executive summary or abstract shall provide a brief summary of the purpose and scope of the corrective measures evaluation to be conducted at the subject site. The executive summary or abstract shall also briefly summarize the conclusions of the evaluation. The SWMU, AOC, and site names, and location shall be included in the executive summary.

IV.L.6.c Table of Contents

The table of contents shall list all text sections, subsections, tables, figures, and appendices or attachments included in the corrective measures evaluation. The corresponding page numbers for the titles of each section of the report shall be included in the table of contents.

IV.L.6.d Introduction

The Introduction Section shall include the Facility name, site location, and site status (*e.g.* closed, corrective action). General information on the current site usage and status shall be included in this Section. A brief description of the purpose of the corrective measures evaluation and the corrective action objectives for the project also shall be provided in this Section.

IV.L.6.e Background

The Background Section shall describe the relevant background information. This Section shall briefly summarize historical site uses including the locations of current and former site structures and features. A labeled figure shall be included in the document showing the locations of current and former site structures and features. The locations of any subsurface features such as pipelines, underground tanks, utility lines, and other subsurface structures shall be included in this Section and labeled on the site plan, as appropriate.

This Section shall include contaminant and waste characteristics, a brief summary of the history of contaminant releases, known and possible sources of contamination, and the vertical and lateral extent of contamination present in each medium. This Section shall include brief summaries of results of previous investigations, including references to pertinent figures, data

summary tables, and text in previous reports. References to previous reports shall include page, table, and figure numbers for referenced information. Summary tables and site plans showing relevant investigation locations shall be referenced and included in the Tables and Figures Sections of the document, respectively.

IV.L.6.f Site Conditions

IV.L.6.f.i Surface Conditions

A section on surface conditions shall describe current and historic site topography, features, and structures, including a description of topographic drainages, man-made drainages, vegetation, and erosional features. It shall also include a description of current uses of the site and any current operations at the site. This section shall also include a description of those features that could potentially influence corrective action option selection or implementation such as archeological sites, wetlands, or other features that may affect remedial activities. In addition, descriptions of features located in surrounding sites that may have an effect on the subject site regarding sediment transport, surface water run-off or contaminant transport shall be included in this section. A site plan displaying the locations of all pertinent surface features and structures shall be included in the Figures Section of the corrective measures evaluation.

IV.L.6.f.ii Subsurface Conditions

A section on subsurface conditions shall describe the site conditions observed during previous subsurface investigations. It shall include relevant soil horizon and stratigraphic information, groundwater conditions, fracture data, and subsurface vapor information. A site plan displaying the locations of all borings and excavations advanced during previous investigations shall be included in the Figures Section of the corrective measures evaluation. A brief description of the stratigraphic units anticipated to be present beneath the site may be included in this section if stratigraphic information is not available from previous investigations conducted at the site.

IV.L.6.g Potential Receptors

IV.L.6.g.i Sources

A section shall provide a list of all sources of contamination at the subject site where corrective measures are to be considered or required. Sources that are no longer considered to be releasing contaminants at the site, but may be the point of origination for contaminants transported to other locations, shall be included in this section.

IV.L.6.g.ii Pathways

A section shall describe potential migration pathways that could result in either acute or chronic exposures to contaminants. It shall include such pathways as utility trenches, paleochannels, surface exposures, surface drainages, stratigraphic units, fractures, structures, and other features. The migration pathways for each contaminant and each relevant medium should be tied to the potential receptors for each pathway. A discussion of contaminant characteristics relating to fate and transport of contaminants through each pathway shall also be included in this section.

IV.L.6.g.iii Receptors

A section shall provide a listing and description of all anticipated potential receptors that could possibly be affected by the contamination present at the site. Potential receptors shall include human and ecological receptors, groundwater, and other features such as pathways that could divert or accelerate the transport of contamination to human receptors, ecological receptors, and groundwater.

IV.L.6.h Regulatory Criteria

A section shall set forth the applicable cleanup standards, risk-based screening levels, and risk-based cleanup goals for each pertinent medium at the subject site. The appropriate cleanup levels for each site shall be included, if site-specific levels have been established at separate sites or units. A table summarizing the applicable cleanup standards or levels, or inclusion of applicable cleanup standards or levels in the summary data tables shall be included in the Tables Section of the document. The risk assessment shall be presented in a separate document or in an appendix to this report. If cleanup or screening levels calculated in a risk evaluation are employed, the risk evaluation document shall be referenced including pertinent page numbers for referenced information.

IV.L.6.i Identification of Corrective Measures Options

A section shall identify and describe potential corrective measures for source, pathway, and receptor controls. Corrective measures options shall include the range of available options including, but not limited to, a no action alternative, institutional controls, engineering controls, in-situ and on-site remediation alternatives, complete removal, and any combination of alternatives that would potentially achieve cleanup goals.

IV.L.6.j Evaluation of Corrective Measures Options

A section shall provide an evaluation of the corrective measures options identified in Permit Section IV.L.6.i. The evaluation shall be based on the applicability, technical feasibility, effectiveness, implementability, impacts to human health and the environment, and cost of each option. A table summarizing the corrective measures alternatives and the criteria listed below shall be included in the Tables Section of the document. The general basis for evaluation of corrective measures options is defined below.

IV.L.6.j.i Applicability

Applicability addresses the overall suitability for the corrective action option for containment or remediation of the contaminants in the subject medium for protection of human health and the environment.

IV.L.6.j.ii Technical Practicability

Technical practicability describes the uncertainty in designing, constructing, and operating a specific remedial alternative. The description shall include an evaluation of historical applications of the remedial alternative including performance, reliability, and minimization of hazards.

IV.L.6.j.iii Effectiveness

Effectiveness assesses the ability of the corrective measure to mitigate the measured or potential impact of contamination in a medium under the current and projected site conditions. The assessment also shall include the anticipated duration for the technology to attain regulatory compliance. In general, all corrective measures described above will have the ability to mitigate the impacts of contamination at the site, but not all remedial options will be equally effective at achieving the desired cleanup goals to the degree and within the same time frame as other options. Each remedy shall be evaluated for both short-term and long-term effectiveness.

IV.L.6.j.iv Implementability

Implementability characterizes the degree of difficulty involved during the installation, construction, and operation of the corrective measure. Operation and maintenance of the alternative shall be addressed in this section.

IV.L.6.j.v Human Health and Ecological Protectiveness

This category evaluates the short-term (remedy installation-related) and long-term (remedy operation-related) hazards to human health and the environment of implementing the corrective measure. The assessment shall include whether the technology will create a hazard or increase existing hazards and the possible methods of hazard reduction.

IV.L.6.j.vi Cost

This section shall discuss the anticipated cost of implementing the corrective measure. The costs shall be divided into:

(1) capital costs associated with construction, installation, pilot testing, evaluation, permitting, and reporting of the effectiveness of the alternative; and

(2) continuing costs associated with operating, maintaining, monitoring, testing, and reporting on the use and effectiveness of the technology.

IV.L.6.k Selection of Preferred Corrective Measure

The Permittee shall propose the preferred corrective measure(s) at the site and provide a justification for the selection in this section. The proposal shall be based upon the ability of the remedial alternative to:

(1) achieve cleanup objectives in a timely manner;

(2) protect human and ecological receptors;

(3) control or eliminate the sources of contamination;

(4) control migration of released contaminants; and

(5) manage remediation waste in accordance with State and Federal regulations.

The justification shall include the supporting rationale for the remedy selection, based on the factors listed in Permit Section IV.L.6.j and a discussion of short- and long-term objectives for

the site. The benefits and possible hazards of each potential corrective measure alternative shall be included in this section.

IV.L.6.l Design Criteria to Meet Cleanup Objectives

The Permittee shall present descriptions of the preliminary design for the selected corrective measures in this section. The description shall include appropriate preliminary plans and specifications to effectively illustrate the technology and the anticipated implementation of the remedial option at the subject area. The preliminary design shall include a discussion of the design life of the alternative and provide engineering calculations for proposed remediation systems.

IV.L.6.m Schedule

A section shall set forth a proposed schedule for completion of remedy-related activities such as bench tests, pilot tests, construction, installation, remedial excavation, cap construction, installation of monitoring points, and other remedial actions. The anticipated duration of corrective action operations and the schedule for conducting monitoring and sampling activities shall also be presented. In addition, this section shall provide a schedule for submittal of reports and data to the NMED, including a schedule for submitting all status reports and preliminary data.

IV.L.6.n Tables

A section shall present the following summary tables, as appropriate:

(1) a table summarizing regulatory criteria, background, and/or the applicable cleanup standards;

(2) a table summarizing historical field survey location data;

(3) tables summarizing historical field screening and field parameter measurements of soil, rock, sediments, groundwater, surface water, and air quality data;

(4) tables summarizing historical soil, rock, or sediment laboratory analytical data. The summary tables shall include the analytical methods, detection limits, and significant data quality exceptions that would influence interpretation of the data;

(5) a table summarizing historical groundwater elevation and depth to groundwater data and if present SPH. The table shall include the monitoring well depths and the screened intervals in each well;

(6) tables summarizing historical groundwater laboratory analytical data. The analytical data tables shall include the analytical methods, detection limits, and significant data quality exceptions that would influence interpretation of the data;

(7) tables summarizing historical surface water laboratory analytical data if applicable. The analytical data tables shall include the analytical methods, detection limits, and significant data quality exceptions that would influence interpretation of the data;

(8) tables summarizing historical air sample screening and analytical data. The data tables shall include the screening instruments used, laboratory analytical methods, detection

limits, and significant data quality exceptions that would influence interpretation of the data;

(9) tables summarizing historical pilot or other test data, if applicable, including units of measurement and types of instruments used to obtain measurements;

(10) a table summarizing the corrective measures alternatives and evaluation criteria; and

(11) a table presenting the schedule for installation, construction, implementation and reporting of selected corrective measures.

With prior approval of the NMED, the Permittee may combine one or more of the tables. Data presented in the summary tables shall include information on dates of sample collection, analytical methods, detection limits, and significant data quality exceptions. The analytical data tables shall include only detected analytes and data quality exceptions that could potentially mask detections.

IV.L.6.o Figures

A section shall present the following figures for each site, as appropriate:

(1) a vicinity map showing topography and the general location of the subject site relative to surrounding features or properties;

(2) a unit site plan that presents pertinent site features and structures, underground utilities, well locations, and remediation system locations and details. Off-site well locations and other relevant features shall be included on the site plan if practical. Additional site plans may be required to present the locations of relevant off-site well locations, structures, and features;

(3) figures showing historical soil boring or excavation locations and sampling locations.

(4) figures presenting historical soil sample field screening and laboratory analytical data, if appropriate;

(5) figures showing all existing wells including vapor monitoring wells and piezometers. The figures shall present historical groundwater elevation data and indicate groundwater flow directions;

(6) figures presenting historical groundwater laboratory analytical data including past data, if applicable. The analytical data corresponding to each sampling location may be presented as individual concentrations, in table form on the figure or as an iso-concentration map;

(7) figures presenting historical surface water sample locations and analytical data including past data, if applicable. The laboratory analytical data corresponding to each sampling location may be presented as individual concentrations or in table form on the figure;

(8) figures presenting historical air sampling locations and presenting air quality data. The field screening or laboratory analytical data corresponding to each sampling location may be presented as individual concentrations, in table form on the figure or as an iso-concentration map;

(9) figures presenting historical pilot or other test locations and data, where applicable, including site plans or graphic data presentation;

(10) figures presenting geologic cross-sections based on outcrop and borehole data, if applicable;

(11) figures presenting the locations of existing and proposed remediation systems;

(12) figures presenting existing remedial system design and construction details; and

(13) figures presenting preliminary design and construction details for preferred corrective measures.

All figures must include an accurate bar scale and a north arrow. An explanation shall be provided on each figure for all abbreviations, symbols, acronyms, and qualifiers. All figures shall have a date.

IV.L.6.p Appendices

Each corrective measures evaluation shall include, as appropriate, as an appendix, the management plan for waste, including investigation derived waste, generated as a result of construction, installation, or operation of remedial systems or activities conducted. Each corrective measures evaluation shall include additional appendices presenting relevant additional data, such as pilot or other test or investigation data, remediation system design specifications, system performance data, or cost analyses as necessary.