STATE OF ARKANSAS
ARKANSAS DEPARTMENT OF ENVIRONMENTAL QUALITY

FINAL

RCRA HAZARDOUS WASTE PERMIT 8H–RN2

Aerojet Rocketdyne, Inc. and Highland Industrial Park, Inc.
Calhoun County, Arkansas
Effective June 2015
(Updated 1/9/2019)

RENEWAL PERMIT SIGN-OFF SHEET

Permittees:	Aerojet Rocketdyne, Inc. and Highland Industrial Park, Inc.
Operator:	Aerojet Rocketdyne, Inc.
Owner:	Highland Industrial Park, Inc.
Facility Location:	East Camden, Calhoun County, Arkansas
EPA I.D. Number:	ARD091088283
AFIN:	07-00035
Permit Number:	SW-RN2

Pursuant to the Federal Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976 (RCRA), as amended (42 USC 6901 et seq.), the Hazardous and Solid Waste Amendments of 1984 (HSWA), the Arkansas Hazardous Waste Management Act (A. C. A. §8-7-201 et seq.), as amended, the Arkansas Remedial Action Trust Fund Act (A.C.A. §8-7-501 et seq.), as amended, and the Arkansas Pollution Control and Ecology Commission (APC&EC) Regulation No. 23, a final Renewal Permit is issued by the Arkansas Department of Environmental Quality (ADEQ) to Aerojet Rocketdyne, Inc. and Highland Industrial Park, Inc. (Permittees), to operate a hazardous waste management facility located in East Camden, Calhoun County, Arkansas. APC&EC Regulation No. 23 (Regulation No. 23), as adopted June 22, 2012, and effective August 12, 2012, has incorporated verbatim all applicable hazardous waste federal regulations formerly cited in permits by "40 CFR" part number but now cited by the equivalent Regulation No. 23 section number, unless specifically noted otherwise.

The Permittee's location is summarily described as follows:

> East Walton Road, Highland Industrial Park, Latitude: 33 degrees 36 minutes 44.05 seconds North, Longitude: 92 degrees 49 minutes 44.31 seconds West.

The Permittee shall comply with all terms and conditions of this Renewal Permit. This Renewal Permit consists of the conditions contained in Regulation No. 23, Sections 260 through 266, 268, and 270 and 40 CFR Part 124, as specified in the Renewal Permit. Applicable regulations are those which are in effect on the date of issuance of the Renewal Permit, in accordance with Regulation No. 23 §270.32(c). Nothing contained herein shall negate the Permittee's duty to comply with the regulations and this Renewal Permit, or ADEQ's ability to enforce the regulations and this Renewal Permit. This Renewal Permit is based on the information submitted in the RCRA Part A and Part B Application, dated November 4, 2014, (hereafter referred to as the Renewal Permit Application), is accurate, and the facility will be operated as specified in the Renewal Permit Application and this Renewal Permit.

Any inaccuracies found in the submitted information may be grounds for the termination, revocation, and reissuance, or modification of this Renewal Permit in accordance with Regulation No. 23 §270.41 and §270.43 and for enforcement action. The Permittee shall inform ADEQ of any deviation from or changes in the information in the Renewal Permit Application which would affect the Permittee's ability to comply with the applicable regulations or Permit conditions.

1 Sign-Off Sheet

Double click on the image above to view and print.

The Director reserves the right to amend or add conditions to this Renewal Permit, as necessary to be protective of human health and the environment.

This Renewal Permit, which incorporates Modules I, II, XII(b), XIV, and XV as conditions herein, shall be effective on service of notice of the Renewal Permit decision, as specified in APC&EC Regulation No. 8 (Administrative Procedures), Part 2, Section 2.1.10(b), and shall remain in effect for a period of ten (10) years from the effective date unless revoked and reissued under Regulation No. 23 §270.41, terminated under Regulation No. 23 §270.43, continued in accordance with Regulation No. 23 §270.51(a) and §270.51(d) or modified under Regulation No. 23 §270.41.

For the purposes of resolving conflicts between requirements to which the Permittee is subject, the following hierarchy and order of authority will govern in the Permittee's duty to comply: Regulations promulgated under Regulation No. 23; Special Conditions (Module XV); General Facility Conditions (Module II); General Permit Conditions (Module I); Conditions/standards specific to activity (Modules XII(b) and XIV) and Part B Permit Renewal Application, Volumes 1 and 2.

Instructions:

Attach this Permit Renewal Sign-Off Sheet to the front of Permit 8H-RN2.

Issued this 25th Day of June, 2015

Tammie J. Eymard, CHEC
Hazardous Waste Division
Arkansas Department of Environmental Quality

Right to Adjudicatory Hearing:

This final permitting decision may be appealed by filing a written Request for Commission Review and Adjudicatory Hearing with the Secretary of the Commission within 30 days of the Certificate of Service (mailing) below (as stipulated in Regulation 8, Section 2.1.10). If you want to appeal this matter, your appeal must be filed in accordance with Arkansas Pollution Control & Ecology Commission's (APC&EC or Commission) Regulation No. 8, available at: www.adeq.state.ar.us. If you have any questions regarding the appeal procedure, please contact your attorney. All appeal procedures must be filed with the Commission's Secretary who is located at 101 E. Capitol, Suite 205, Little Rock, AR 72201. For directions to the Commission's office, call (501) 682-7890.

ADEQ's decision to approve this RCRA Permit Renewal to permit 8H-RN2 is final for purposes of appeal as of the date indicated in the Certificate of Service (mailing) below:

I, Kelli Johnson, hereby certify that a copy of this Notice of Decision has been mailed by first class mail to Ms. Terri Wehling, Environmental Operations Manager, P.O. Box 1036 Camden, AR 71711-1056, on or before this 25th day of June, 20 15.

Kelli Johnson
Signature of person mailing this notice

2 Sign-Off Sheet

Double click on the image above to view and print.

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RENEWAL PERMIT FOR AEROJET ROCKETDYNE, INC.
AND HIGHLAND INDUSTRIAL PARK, INC.
A RESOURCE CONSERVATION AND RECOVERY ACT (RCRA)
HAZARDOUS WASTE MANAGEMENT FACILITY

PERMIT ORGANIZATION

This RCRA Permit 8H-RN2 is divided into the following sections:

(1) A permit sign-off sheet setting forth the basic legal authority for issuing the Renewal Permit;

(2) Modules I and II containing general permit and facility conditions which must be met by all hazardous waste management facilities; and

(3) Modules XII(b), XIV, and XV containing specific permit conditions applicable to Aerojet Rocketdyne, Inc. and Highland Industrial Park, Inc.

FACILITY DESCRIPTION

Aerojet Rocketdyne, Inc. leases approximately 1,400 acres of land from Highland Industrial Park, Inc. The facility is located inside Highland Industrial Park near the city of East Camden in Calhoun County, Arkansas. Aerojet Rocketdyne, Inc. produces solid rocket propellants and motors, related components for rocket and missile systems, warheads and other ordnance, and the propellants for automobile air bag systems.

SUMMARY OF PERMIT OPERATIONS

Hazardous Waste Renewal Permit 8H-RN2 includes the conditions required for Aerojet Rocketdyne, Inc. to operate a Thermal Treatment Area (TTA). The TTA is constructed to prevent contact of the waste, treatment by-products, and hazardous substances with soil and surface water. The TTA includes twenty-four (24) open (burn) thermal treatment units (OTTU's or burn pans), two (2) burn cages, and one (1) rocket static firing fixture. Each of the twenty-seven (27) units is equipped with a rain cover, to prevent wind and rain from carrying the ash out of the units. The TTA also features two small miscellaneous treatment units, the motor case firing block and the igniter firing device. The TTA, at the time of closure, will be closed in accordance with an approved closure plan. Closure of the former Open Burn Unit Area is underway at the time this Permit has been issued, and is being performed in accordance with the approved closure plan.

HSWA CORRECTIVE ACTION

The Hazardous and Solid Waste Amendments of 1984 (HSWA) require operators of hazardous waste management facilities to investigate releases from Solid Waste Management Units (SWMUs) and to implement a corrective action program for releases of hazardous constituents if such have occurred. A visual inspection and records research was performed for all SWMUs identified at the facility, and further investigations had been recommended for some of the SWMUs.

The Renewal Permit includes Module XII(b) which lists the SWMUs identified at the facility, details the investigating and reporting requirements, and provides corrective action processes for remediation of any releases of hazard constituents from the SWMUs, if determined necessary for protection of public health and the environment.

This Renewal Permit contains corrective action requirements for the portion of Highland Industrial Park leased to Aerojet Rocketdyne, Inc. (operator). ADEQ has in the past, and will continue in the future, to utilize the State's authorized RCRA authority to require corrective action from operators of other leased parcels of Highland Industrial Park that have RCRA permits.

The facility has completed a Focused RCRA Facility Investigation (FRFI). The investigation included the Washout Building (Chaparral, Building 52) soil, the Four Reactive Waste Open Burn Pits soil and site wide groundwater. This investigation was summarized in the facility wide RCRA facility investigation (RFI). The areas studied in the FRFI have been included in all subsequent documents required by the Corrective Action module.

ADEQ issued a final Remedial Action Decision Document (RADD) in October 2012. The RADD describes the Corrective Measures to be installed at the facility to address historical releases of perchlorate to soils, shallow groundwater, and surface water. The Corrective Measures Implementation was initiated in August 2013.

SUMMARY OF THE PERMIT CONDITIONS

Module I - General Permit Conditions

Module I sets forth the standard procedural conditions that are applicable to all hazardous waste management facilities. The justification for these proposed permit conditions is found in APC&EC Regulation No. 23 '270.30.

Module II - General Facility Conditions

Module II sets forth the general facility conditions applicable to all storage, treatment, incineration, and land disposal facilities. The regulatory basis for these conditions is found in APC&EC Regulation No. 23, Section 264, Subsections A through E, G, and H.

Module XII(b) - Special Conditions for Corrective Action Related to Solid Waste Management Units

Module XII(b) contains conditions applicable to the corrective action of Solid Waste Management Units (SWMUs) (past or present) at the facility. Module XII(b) is issued as a specific condition of Aerojet Rocketdyne, Inc. obtaining an operating permit for hazardous waste management. The regulatory basis for these conditions is contained in APC&EC Regulation No. 23, Section 264, Subsection F, and APC&EC Regulation No. 23, Section 270.

Module XIV – Treatment of Energetic Wastes

Module XIV sets forth the conditions applicable to the daily operation and maintenance of the open burn unit. This module requires the facility to conduct an environmental assessment for the Thermal Treatment Area under certain conditions. This module also includes a compliance schedule (see Module XIV, Section I). The regulatory basis for these conditions is contained in

APC&EC Regulation No. 23, Section 264, Subsection X. An initial Environmental Assessment was completed and approved prior to operation of the Thermal Treatment Area. If additional treatment units are added to the permit or if operation of the Thermal Treatment Area adversely impacts the site environmental media, a new Environmental Assessment will be conducted.

Module XV – Special Conditions

Module XV contains a condition that requires Aerojet Rocketdyne, Inc. to collect surface soil samples (using an EPA recommended statistically valid sampling method to determine the sampling grid) at the time of closure of the TTA to evaluate the effects, if any, of operating the TTA.

End of Permit Summary Sheet

MODULE I - GENERAL PERMIT CONDITIONS

A. EFFECT OF PERMIT

The Permittee is allowed to treat hazardous waste in accordance with the conditions of this Permit. Any storage/treatment/disposal of hazardous waste which requires a permit and which is not specifically authorized in this Permit is prohibited. Subject to APC&EC Regulation No. 23 §270.4, compliance with this Permit generally constitutes compliance, for purposes of enforcement, with Subtitle C of RCRA as amended, the Arkansas Remedial Action Trust Fund Act (A.C.A. §8-7-501), as amended, and the Arkansas Hazardous Waste Management Act (A.C.A. §8-7-201 et seq.), as amended. Issuance of a RCRA permit consists of a permit issued by ADEQ which addresses the provisions of the RCRA program and the Hazardous and Solid Waste Amendments of 1984 (HSWA) for which ADEQ is authorized by EPA for the administration of the programs.

Issuance of this Permit does not convey any property rights of any sort or any exclusive privilege; nor does it authorize any injury to persons or property, any invasion of other private rights, or any infringement of state or local law or Regulations. Compliance with the terms of this Permit does not constitute a defense to any order issued or any action brought under Sections 3008(a), 3008(h), 3013, or 7003 of RCRA; Sections 106(a), 104, or 107 of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (42 U.S.C. 9601 et seq., commonly known as CERCLA), as amended, the Arkansas Hazardous Waste Management Act (A.C.A. §8-7-201 et seq.), as amended, or any other law providing for protection of public health or the environment. [APC&EC Regulation No. 23 §270.4(b) and (c); §270.30(g)]

B. PERMIT ACTIONS

1. Permit Modification, Revocation and Reissuance, and Termination

This Permit may be modified, revoked and reissued, or terminated for cause, as specified in APC&EC Regulation No. 23 §270.41, §270.42, and §270.43. The filing of a request for a permit modification, revocation and reissuance, or termination, or the notification of planned changes or anticipated noncompliance on the part of the Permittee, does not stay the applicability or enforceability of any permit condition. [APC&EC Regulation No. 23 §270.30(f)]

2. Permit Renewal

This Permit may be renewed as specified in APC&EC Regulation No. 23 §270.30(b) and Permit Module I, Condition E.2. Review of any application for a Permit renewal shall consider improvements in the state of control and measurement technology, as well as changes in applicable APC&EC Regulations. [APC&EC Regulation No. 23 §270.30(b)]

3. Fees and Costs

i. Permit Application: Any person who applies for a permit for the construction, operation, or post closure care of a hazardous waste management facility or unit shall submit as part of said application a money order or cashiers check payable to the ADEQ to cover permit fees in accordance with the APC&EC Regulation No. 23 §6(a).

ii. Permit Modification Applications: All permit modification applications other than Class 1 Modifications as defined at APC&EC Regulation No. 23 § 270.42, must be accompanied by a money order or cashiers check payable to the ADEQ. The fee shall be 50% of the base permit application fee as set forth APC&EC Regulation No. 23 §6(a). If additional waste management activities are applied for or operating capacities increased, an additional waste management fee shall be calculated from APC&EC Regulation No. 23 §6(b) and added to the modification fee total. [APC&EC Regulation No. 23 §6(e)]

iii. Annual Permit Maintenance Fee: Any person who holds a permit for the construction, operation, or post closure care of a hazardous waste management facility or unit shall submit annually no later than the effective date of this permit a money order or cashiers check payable to the ADEQ to cover annual permit maintenance fees in accordance with the APC&EC Regulation No. 23 §6(a).

iv. Annual Monitoring/Inspection Fee: All treatment, storage, and disposal facilities shall submit annually a money order or cashiers check payable to the ADEQ to cover applicable monitoring and inspection fees in accordance with APC&EC Regulation No. 23 §6(n) and add any applicable inspection and monitoring fees for generators of hazardous waste in accordance with APC&EC Regulation No. 23 §6(o) to (q) into the total by January 1 of every year.

v. Annual Fees on the Generation of Hazardous Waste: Every person who generates hazardous waste shall submit annually a money order or cashiers check payable to the ADEQ to cover the applicable fee according to APC&EC Regulation No. 23 §6(aa)(1)(ii) by July 1 of every year.

C. SEVERABILITY

The provisions of this Permit are severable, and if any provision of this Permit, or the application of any provision of this Permit to any circumstance is held invalid, the application of such provision to other circumstances and the remainder of this Permit shall not be affected thereby. [40 CFR 124.16(a) and APC&EC Regulation No. 23§3(b)]

D. DEFINITIONS

For purposes of this Permit, terms used herein shall have the same meaning as those in APC&EC Regulation No. 23 Sections 260.10 and 270.2, unless this Permit specifically provides otherwise; where terms are not defined in the regulations or the Permit, the meaning associated with such terms shall be defined by a standard dictionary reference or the generally accepted scientific or industrial meaning of the term. "Director" means the Director of ADEQ or designee or authorized representative. The Director, or designee, of ADEQ is the authorized representative for all permit condition enforcement, reports, notifications, and other submission requirements.

E. DUTIES AND REQUIREMENTS

1. Duty to Comply

The Permittee shall comply with all conditions of this Permit, except to the extent and for the duration such noncompliance is authorized by an Emergency Permit. Any Permit noncompliance, other than noncompliance authorized by an Emergency Permit, constitutes a violation of RCRA and is grounds for an enforcement action; for Permit termination, revocation and reissuance, or modification; or for denial of a Permit renewal application. [APC&EC Regulation No. 23 §270.30(a)]

2. Duty to Reapply

If the Permittee wishes to continue an activity allowed by this Permit after the expiration date of this Permit, the Permittee shall submit a complete application for a new Permit at least one hundred eighty (180) calendar days prior to Permit expiration. [APC&EC Regulation No. 23 §§270.10(h) and 270.30(b)]

3. Permit Expiration

This Permit shall be effective for a fixed term not to exceed ten years. This Permit and all conditions herein will remain in effect beyond the Permit's

expiration date, if the Permittee has submitted a timely, complete application (see APC&EC Regulation No. 23 §270.10, and §270.13 through §270.28) and, through no fault of the Permittee, the Director or designee has not issued a new permit. [APC&EC Regulation No. 23 §§270.50 and 270.51]

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 order to maintain compliance with the conditions of this Permit. [APC&EC Regulation No. 23 §270.30(c)]

5. 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. [APC&EC Regulation No. 23 §270.30(d)]

6. Proper Operation and Maintenance

The Permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the Permittee to achieve compliance with the conditions of this Permit. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls, including appropriate quality assurance/quality control procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of this Permit. [APC&EC Regulation No. 23 §270.30(e)]

7. Duty to Provide Information

The Permittee shall furnish to the Director or designee, within a reasonable time, any relevant information which the Director or designee may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this Permit, or to determine compliance with this Permit. This requirement to maintain and make available (at the facility) all records as necessary to comply with the conditions of this Permit shall apply to contractors and sub-contractors of the Permittee. The Permittee shall also furnish to the Director or designee, upon request, copies of records required to be kept by this Permit. [APC&EC Regulation No. 23 §§264.74(a) and 270.30(h)]

8. Inspection and Entry

The Permittee shall allow the Director, designee, or an authorized representative, upon the presentation of credentials and other documents, as may be required by law, to:

[APC&EC Regulation No. 23 §270.30(i)]

a. Enter at reasonable times upon the Permittee's premises where a regulated facility or activity is located or conducted, or where records shall be kept under the conditions of this Permit;

b. Have access to and copy, at reasonable times, any records that shall be kept under the conditions of this Permit;

c. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Permit including all corrective action work; and

d. Sample or monitor, at reasonable times, for the purposes of assuring Permit compliance or as otherwise authorized by RCRA or HSWA and A.C.A. §8-7-209(a)(7), any substances or parameters at any location.

9. Monitoring and Records

a. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity. The method used to obtain a representative sample shall be the appropriate method from Appendix I of APC&EC Regulation No. 23, Section 261, or an equivalent method approved by the Director or designee. Laboratory methods shall be those specified in *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods*, SW-846, as revised; 40 CFR Part 136 – Guidelines Establishing Test Procedures for the Analysis of Pollutants; *RCRA Ground-Water Monitoring Technical Enforcement Guidance Document, 1986;* OSWER Directive 9950.1; or an equivalent method, as specified in the Waste Analysis Plan, Section B of the Permit Renewal Part B Application, and as approved by the Director or designee. [APC&EC Regulation No. 23 §270.30(j)(1)]

b. The Permittee shall retain records of all monitoring information, copies of all reports and records required by this Permit, the certification required by APC&EC Regulation No. 23 §264.73(b)(9), and records of all data used to complete the application for this Permit until approved closure of the facility. [APC&EC Regulation No. 23 §270.30(j)(2)]

c. Records of monitoring information shall specify: [APC&EC Regulation No. 23 §270.30(j)(3)]

(1) The date(s), exact place, and time(s) of sampling or measurement(s);

(2) The individual(s) who performed the sampling or measurements;

(3) The date(s) analyses were performed;

(4) The individual(s) who performed the analyses;

(5) The analytical technique(s) or method(s) used; and

(6) The results of such analyses.

10. Reporting Planned Changes

The Permittee shall give notice to the Director or designee as soon as possible, of any planned physical alterations or additions to the Permitted facility. [APC&EC Regulation No. 23 §270.30(l)(1)]

11. Reporting Anticipated Noncompliance

The Permittee shall give advance notice to the Director or designee of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements. [APC&EC Regulation No. 23 §270.30(l)(2)]

12. Certification of Construction or Modification

The Permittee may not commence, after the effective date of this Permit, to treat hazardous waste in new units, unit expansions, or modified units until the Permittee has submitted to the Director or designee, by certified mail or hand delivery, a letter signed by the Permittee and an Arkansas Registered Professional Engineer stating that the facility has been constructed or modified in compliance with the Permit including Module XV, Special Conditions [APC&EC Regulation No. 23 §270.30(l)(2)(i)]; and:

a. The Director or designee has inspected the modified or newly constructed facility and finds it is in compliance with the conditions of the Permit; or

b. The Director or designee has either waived the inspection or has not within fifteen (15) calendar days notified The Permittee of his intent to inspect. [APC&EC Regulation No. 23 §270.30(l)(2)(ii)(B)]

13. Transfer of Permits

a. This Permit is not transferable to any person, except after notice to the Director or designee. The Director or designee may require modification or revocation and reissuance of the Permit pursuant to APC&EC Regulation No. 23 §270.40. [APC&EC Regulation No. 23 §270.30(l)(3)]

b. Changes in the ownership or operational control of the Permittee may be made as a Class 1 modification with prior written approval of the

Director or designee in accordance with APC&EC Regulation No. 23 §§270.42 and 270.30(l)(3). A written agreement containing a specific date for transfer of permit responsibility between the current and new permittees shall be submitted to the Director or designee. The Permittee shall be responsible for the requirements of APC&EC Regulation No. 23 Section 264, Subsection H until the new owner or operator has demonstrated that he or she is complying with the requirements of Subsection H. The Director or designee will notify the Permittee that the Permittee is no longer responsible for Subsection H requirements when the new owner or operator has demonstrated compliance with Subsection H requirements. Before transferring ownership or operation of the facility during its operating life, the Permittee shall notify the new owner or operator in writing of the requirements of APC&EC Regulation No. 23, Sections 264 and 270 and this Permit. [APC&EC Regulation No. 23 §270.30(l)(3) and §264.12(c)]

The Permittee shall also meet the additional requirements of Sections §§270.7(g) and 270.10(l) of APC&EC Regulation No. 23 regarding ownership change and new partial owners.

14. Twenty-Four Hour Reporting

a. The Permittee shall report to the Director or designee 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 report shall include the following: [APC&EC Regulation No. 23 §270.30(l)(6)(i)]

(1) Information concerning release of any hazardous waste that may cause an endangerment to public drinking water supplies.

(2) Any information of a release or discharge of hazardous waste, or of a fire or explosion from the hazardous waste management facility which could threaten the environment or human health outside the facility.

b. The description of the occurrence and its cause shall include: [APC&EC Regulation No. 23 §270.30(l)(6)(ii)]

(1) Name, address, and telephone number of the owner or operator;

(2) Name, address, and telephone number of the facility;

(3) Date, time, and type of incident;

(4) Name and quantity of materials involved;

(5) The extent of injuries, if any;

(6) An assessment of actual or potential hazards to the environment and human health outside the facility, where this is applicable; and

(7) Estimated quantity and disposition of recovered material that resulted from the incident.

c. A written submission shall also be provided within five (5) calendar days of the time the Permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period(s) of noncompliance (including exact dates and times); whether the noncompliance has been corrected; and, if not, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance. The Director or designee may waive the five (5) calendar day written notice requirement in favor of a written report within fifteen (15) calendar days. [APC&EC Regulation No. 23 §270.30(l)(6)(iii)]

15. Other Noncompliance

The Permittee shall report all other instances of noncompliance not otherwise required to be reported above in Permit Module I, Conditions E.10 - E.14, at the time monitoring reports are submitted. The reports shall contain the information listed in Permit Module I, Condition E.14. [APC&EC Regulation No. 23 §270.30(l)(10)]

16. Other Information

Whenever the Permittee becomes aware that it failed to submit any relevant facts in the Part B Application, or submitted incorrect information in a permit application, or in any report to the Director or designee, the Permittee shall promptly submit such facts or information. [APC&EC Regulation No. 23 §270.30(l)(11)]

17. Request for Additional Authority

The Permittee may, if appropriate, request implementation of ADEQ's authority pursuant to the Remedial Action Trust Fund Act of 1985, as amended, for purposes of implementing remedial activities and for entitlement to rights of contribution.

F. SIGNATORY REQUIREMENT

All applications, reports, or information submitted to or requested by the Director or designee, his designee, or authorized representative, shall be signed and certified in accordance with APC&EC Regulation No. 23 §§270.11 and 270.30(k).

G. REPORTS, NOTIFICATIONS, AND SUBMISSIONS TO THE DIRECTOR

All reports, notifications, or other submissions which are required by this Permit to be sent or hand-delivered to the Director or designee should be sent by certified mail or hand-delivered to:

Chief

Hazardous Waste Division

Arkansas Department of Environmental Quality

5301 Northshore Drive

North Little Rock, AR 72118-5317

H. CONFIDENTIAL INFORMATION

The Permittee may claim confidential any trade secrets required to be submitted by this Permit. The Director or designee shall determine which records are confidential. Any record not deemed confidential shall be marked "REJECTED" and promptly returned to the person submitting such information. [APC&EC Regulation No. 23 §270.12]

I. DOCUMENTS TO BE MAINTAINED AT THE FACILITY

The Permittee shall maintain at the facility, until closure is completed and certified by an independent, Arkansas Registered Professional Engineer and has been reviewed and approved by the ADEQ, the following documents and all amendments, revisions, and modifications to these documents:

1. Waste Analysis Plan, as required by APC&EC Regulation No. 23 §264.13 and this Permit;
2. Inspection schedules, as required by APC&EC Regulation No. 23 §264.15(b)(2) and this Permit;
3. Personnel training documents and records, as required by APC&EC Regulation No. 23 §264.16(d) and (e) and this Permit;
4. Contingency Plan, as required by APC&EC Regulation No. 23 §264.53(a) and this Permit;
5. Operating record, as required by APC&EC Regulation No. 23 §264.73 and of this Permit including but not limited to Module II, L.1;
6. Closure Plan, as required by APC&EC Regulation No. 23 §264.112(a) and this Permit;
7. Annually-adjusted cost estimate for facility closure, as required by APC&EC Regulation No. 23 §264.142(d) and this Permit;

8. Post-Closure Plan, as required by APC&EC Regulation No. 23 §264.118(a) and this Permit;

9. Annually-adjusted cost estimate for closure and post-closure, as required by APC&EC Regulation No. 23 §264.144(d) and this Permit;

10. Arkansas Registered Professional Engineer certified "as built" drawings and specifications for the facility's regulated constructed units, as regulated under this permit and required by APC&EC Regulation No. 23 §270.30(l)(2)(i);

11. All corrective action documents developed as a requirement of Module XII(b) or alternative corrective action procedure or authority;

12. Arkansas Registered Professional Engineer certified "as built" drawings for all corrective measures facilities including, but not limited to, monitoring well locations, closure facilities, et cetera, developed as a requirement of Module XII(b). Monitoring wells must be drilled by a driller licensed by the Arkansas Commission on Water Well Construction and the boring logs from the monitoring wells must be certified by a professional geologist registered to practice geology in the State of Arkansas;

13. A facility map which is kept current (annual) showing all regulated units and HSWA Solid Waste Management Units (SWMUs) and the status of all RCRA units (operating, post-closure etc.) and HSWA corrective action work;

14. All other documents required by Permit Module I, Condition E.9, and all other applicable required information; and

15. Documentation of the attempt to provide written arrangements to familiarize police, fire departments, and emergency response teams with the layout of the facility, properties of the hazardous waste handled at the facility and associated hazards, places where facility personnel would normally be working, entrances to and roads inside the facility, and possible evacuation routes as required by APC&EC Regulation No. 23 §264.37.

END OF MODULE I

MODULE II - GENERAL FACILITY CONDITIONS

A. DESIGN AND OPERATION OF FACILITY

The Permittee shall construct, maintain, and operate the facility to minimize the possibility of a fire, explosion, or any unplanned, sudden, or non-sudden release of hazardous waste constituents to air, soil, sediment, surface water or groundwater which could threaten human health or the environment. [APC&EC Regulation No. 23 §264.31]

B. RECEIPT OF HAZARDOUS WASTE

The Permittee may receive hazardous waste from Aerojet Rocketdyne, Inc. owned off-site sources. The amount of off-site waste processed in the Thermal Treatment Area (TTA) may not exceed five percent (5%) of the facility's annual operating capacity, as defined for a noncommercial hazardous waste facility. [APC&EC Regulation No. 23 §260.10]

C. GENERAL WASTE ANALYSIS

The Permittee shall follow the waste analysis procedures required by APC&EC Regulation No. 23 §264.13, as well as those described in the Waste Analysis Plan, Section B of the Renewal Permit Part B Application.

The Permittee shall verify the analysis of each waste stream annually as part of its quality assurance program, in accordance with *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods*, EPA Publication SW-846, or equivalent methods approved by the Director or designee (See Permit Module I, Condition E.9., Duties and Requirements).

At a minimum, the Permittee shall maintain proper functional instruments, use approved sampling and analytical methods, verify the validity of sampling and analytical procedures, and perform correct calculations. If the Permittee uses a contract laboratory to perform analyses, then the Permittee shall inform the laboratory in writing that it shall operate under the waste analysis conditions set forth in this Permit. Any contract laboratory used must be certified by ADEQ pursuant to A.C.A. § 8-2-201.

D. SECURITY

The Permittee shall comply with the security requirements of APC&EC Regulation No. 23 §264.14(b), §264.14(c), and Section C-1 of the Renewal Permit Part B Application. Security provisions needed to implement the performance standard of APC&EC Regulation No. 23 §264.14(a) and to ensure compliance with APC&EC Regulation 23 §264.14(b) shall include:

1. 24-hour security system that includes fences or guards, or alarms or locked areas, or location within a larger secured or otherwise inaccessible area or combinations of the above;

2. “DANGER – KEEP OUT” signs posted on all sides of the open burning area;
3. Controlled entry and number of personnel in the open burn area; and
4. “NO ENTRY” signs posted during actual operations.

E. GENERAL INSPECTION REQUIREMENTS

[APC&EC Regulation No. 23 §264.15]

1. The Permittee shall inspect TTA units prior to each use; and shall follow the inspection schedule set out in Section C of the Renewal Permit Part B Application (At least weekly).

2. The Permittee shall **IMMEDIATELY** upon discovery of any deterioration, damage from use, or malfunction of a TTA unit take such unit out of service by means of appropriate administrative procedures and work practices and the following:

   a. Where a hazard is imminent or has already occurred, remedial action must be taken **IMMEDIATELY** (i.e. begin containing the release, controlling ingress, notifying emergency response parties, etc…); and

   b. For non-imminent hazards, the Permittee shall submit within five (5) calendar days to the ADEQ a work plan that ensures the conditions of APC&EC Regulation No. 23 §264.15(c) and Section C-2(b) of the Renewal Permit Part B Application are met.

3. The Permittee shall keep TTA units out of service (from the above condition) until repairs are complete.

4. Records of inspection or repairs shall be kept as a condition of this Permit by the Permittee until approved closure of the facility.

F. PERSONNEL TRAINING

The Permittee shall conduct personnel training as described in Section E-1 of the Renewal Permit Part B Application. The Permittee shall maintain training documents and records for all employees, contractors, and subcontractors who transfer, handle, sort, mix, treat, or dispose of hazardous waste until approved closure of the facility. [APC&EC Regulation No. 23 §264.16]

G. SPECIAL PROVISIONS FOR IGNITABLE, REACTIVE, OR INCOMPATIBLE WASTE

The Permittee shall follow the procedures for handling ignitable, reactive, and incompatible wastes set forth in Section C-4 of the Renewal Permit Part B Application. Specific handling procedures for treatment of the energetic wastes at the facility include: [APC&EC Regulation No. 23 §264.17(a)]

1. Incompatible wastes are segregated during storage, transportation, and treatment operations;

2. The quantity of waste treated during a single event is limited;

3. The burn pans, burn cages and rocket firing fixture are connected to the facility electrical grounding network to minimize the potential for accidental ignition of the energetic waste;

4. Waste treatment operations at the facility are discontinued whenever lightning is reported within a ten mile radius of the plant site;

5. Smoking is prohibited at the facility; and

6. A "Hot Work Permit" controls the use of welding equipment, spark-producing equipment or tools that are not approved for normal use at the facility.

H. LOCATION STANDARDS

The Permittee shall operate and maintain the facility to prevent washout of any hazardous waste as specified in the drawings and specifications in Section A-3(b) of the Renewal Permit Part B Application. [APC&EC Regulation No. 23 §264.18(b) (1)]

I. PREPAREDNESS AND PREVENTION

1. Required Equipment

   At a minimum, the Permittee shall maintain at the facility the equipment set forth in the Contingency Plan, Section D of the Renewal Permit Part B Application. [APC&EC Regulation No. 23 §264.32]

2. Testing and Maintenance of Equipment

   The Permittee shall test and maintain the equipment set forth in Section C-3(f) of the Renewal Permit Part B Application to assure its proper operation in time of emergency. This test will be completed on a weekly basis. [APC&EC Regulation No. 23 §264.33]

3. Access to Communications or Alarm System

   The Permittee shall maintain access to the communications or alarm system as set forth in Section C-3(c) of the Renewal Permit Application. [APC&EC Regulation No. 23 §264.34]

4. Arrangements with Local Authorities

   The Permittee shall maintain arrangements with state and local authorities, as appropriate for the type of waste handled at the facility and the potential need for emergency response services of the state and local authorities. If state or local officials refuse to enter into preparedness and prevention arrangements with the Permittee, the Permittee shall document this refusal in the operating record. [APC&EC Regulation No. 23 §264.37]

J. CONTINGENCY PLAN

1. Implementation of Plan

   The Permittee shall IMMEDIATELY carry out the provisions of the Contingency Plan, Section D of the Renewal Permit Part B Application, whenever there is a fire, explosion, or other release of hazardous waste or constituents which could threaten human health or the environment. [APC&EC Regulation No. 23 §264.51(b)]

2. Copies of Plan

   The Permittee shall maintain a copy of the Contingency Plan at the facility and shall provide a copy to all local police departments, fire departments, hospitals, and state and local emergency assistance teams. [APC&EC Regulation No. 23 §264.53]

3. Amendments to Plan

   The Permittee shall review and IMMEDIATELY amend, if necessary, the Contingency Plan in accordance with APC&EC Regulation No. 23 §264.54 and §270.42.

4. Emergency Coordinator

   A trained emergency coordinator shall be available at all times either on the facility premises or on call in case of an emergency. [APC&EC Regulation No. 23 §§264.16(f) and 264.55]

   The names, addresses, and phone numbers of all persons qualified to act as emergency coordinators shall be supplied to the Director or designee at the time of certification. [APC&EC Regulation No. 23 §264.52(d)]

K. MANIFEST SYSTEM

The Permittee shall comply with the manifest requirements of APC&EC Regulation No. 23 §264.71, §264.72, and §264.76.

L. RECORDKEEPING AND REPORTING

In addition to the recordkeeping and reporting requirements specified elsewhere in this Permit, the Permittee shall do the following:

1. Operating Record

   i. The Permittee shall maintain a written operating record; and

   ii. The operating record shall include the following but not be limited to:

a. A description and the quantity of each hazardous waste received, and the method(s) and date(s) of its treatment, storage, or disposal at the facility as required by APC&EC Regulation No. 23 Appendix I;

b. The location of each hazardous waste within the facility and the quantity at each location. For all facilities, this information must include cross-references to specific manifest document numbers, if the waste was accompanied by a manifest;

c. Records and results of waste analyses performed as specified in APC&EC Regulation No. 23 §§264.13, 264.17, and 268.7;

d. Summary reports and details of all incidents that require implementing the contingency plan as specified in APC&EC Regulation No. 23 §264.56(j);

e. Records and results of inspections as required by APC&EC Regulation No. 23 §264.15(d);

f. Monitoring, testing or analytical data, and corrective action where required by APC&EC Regulation No. 23 §264, Subsection F and §§264.19, 264.191, 264.193, 264.195, and 264.602;

g. All closure cost estimates under APC&EC Regulation No. 23 §264.142;

h. A certification by the permittee no less often than annually, that the permittee has a program in place to reduce the volume and toxicity of hazardous waste that he generates to the degree determined by the permittee to be economically practicable; and the proposed method of treatment, storage or disposal is that practicable method currently available to the permittee which minimizes the present and future threat to human health and the environment;

i. Treatment facility records.

(1) For on-site hazardous waste, the information contained in the notice (except the manifest number), and the certification and demonstration if applicable, required by the generator or the owner or operator under APC&EC Regulation No. 23 §268.7;

(2) For off-site hazardous waste, a copy of the notice, and the certification and demonstration, if applicable, required by the generator or the owner or operator under APC&EC Regulation No. 23 §268.7;

j. Any records required under APC&EC Regulation No. 23 §264.1(j)(13); and

k. Certifications as required by APC&EC Regulation No. 23 §264.196(f) must be maintained in the operating record until the approved closure of the facility.

2. Annual Report

The Permittee shall comply with the annual reporting requirements of APC&EC Regulation No. 23 §264.75 by preparing and submitting the report no later than March 1 of every year.

M. GENERAL CLOSURE REQUIREMENTS

1. Performance Standard

The Permittee shall close the facility, as required by APC&EC Regulation No. 23 §264.111 and in accordance with the Closure Plans, Sections F and G of the Renewal Permit Part B Application. [APC&EC Regulation No. 23 §264.110]

2. Amendment to Closure Plan

a. The Permittee shall submit to the ADEQ for approval within thirty (30) calendar days of the effective date of this Permit revised Closure and Partial Closure Plans. [Completed July 24, 2015]

b. The Permittee shall amend the Closure and Partial Closure Plans whenever necessary. [APC&EC Regulation No. 23 §264.112(c)]

3. Notification of Closure

The notice of final closure for the former Open Burn Unit Area was received by ADEQ on February 9, 2009. [APC&EC Regulation No. 23 §264.112(d)]

The Permittee shall notify the Director or designee in writing at least forty-five

(45) calendar days prior to the date on which Permittee expects to begin final closure of the TTA. [APC&EC Regulation No. 23 §264.112(d)]

4. Time Allowed for Closure

Within ninety (90) calendar days after receiving the final volume of hazardous waste, the Permittee shall treat or remove from the TTA, all hazardous waste and shall complete closure activities, in accordance with the Closure Plans, Sections F, of the Renewal Permit Part B Application. Final closure of the former OBU Area shall be completed in accordance with the Closure Plan, Section G of the Renewal Permit Part B Application [APC&EC Regulation No. 23 §264.113]

5. Disposal or Decontamination Equipment, Structures, and Soils

During partial and final closure periods, the Permittee shall decontaminate or properly dispose of all contaminated equipment, structures, and soils, as required by the Closure Plans, Sections F and G of the Renewal Permit Part B Application. [APC&EC Regulation No. 23 §264.114]

6. Certification of Closure

The Permittee shall certify that the facility has been closed in accordance with the specifications in the Closure Plan. Within sixty (60) calendar days of completion of closure activities, Aerojet Rocketdyne, Inc. must submit a Closure Certification Report for ADEQ review and approval. [APC&EC Regulation No. 23 §264.115]

7. RESERVED

N. SPECIFIC CONDITIONS

1. Waste Minimization

The Permittee shall submit to ADEQ a certified report (according to APC&EC Regulation No. 23 §270.11) in writing annually by December 1, for the previous year ending September 30, that complies with the following: [APC&EC Regulation No. 23 §264.73(b)(9)]

a. The Permittee shall have a program in place to reduce the volume and toxicity of all hazardous wastes which are generated by the Permittee's facility's operation to the degree determined to be economically practicable; and the proposed method of treatment, storage, or disposal is that practical method currently available to the Permittee which minimizes the present and future threat to human health and the environment. This certified report shall address the items below:

i. Any written policy or statement that outlines goals, objectives, and/or methods for source reduction and recycling of hazardous waste at the facility;

ii. Any employee training or incentive programs designed to identify and implement source reduction and recycling opportunities;

iii. Any source reduction and/or recycling measures implemented in the last five years or planned for the near future;

iv. An itemized list of the dollar amounts of capital expenditures (plant and equipment) and operating costs devoted to source reduction and recycling of hazardous waste;

v. Factors that have prevented implementation of source reduction and/or recycling;

vi. Sources of information on source reduction and/or recycling received at the facility (e.g., local government, trade associations, suppliers, etc.);

vii. An investigation of additional waste minimization efforts which could be implemented at the facility. This investigation shall analyze the potential for reducing the quantity and toxicity of each waste stream through production reformulation, recycling, and all other appropriate means. The analysis shall include an assessment of the technical feasibility, cost, and potential waste reduction for each option;

viii. The Permittee shall submit a flow chart or matrix detailing all hazardous waste it produces, by quantity and type and by building or area; and

ix. The Permittee shall demonstrate the need to use those processes which could produce a particular hazardous waste due to a lack of alternative processes that would produce less volume of hazardous waste.

b. The Permittee shall include this certified report in the operating record until approved closure of the facility.

2. Dust Suppression

The Permittee shall not use waste, used oil, or any other material which is contaminated with dioxin, polychlorinated biphenyls (PCBs), or any other hazardous waste (other than a waste identified solely on the basis of ignitability) for dust suppression or road treatment. [APC&EC Regulation No. 23 §§266.23(b) and 279.82]

3. Permit Review

This Permit may be reviewed at any time (A.C.A. §8-7-220) and shall be modified as necessary as provided by APC&EC Regulation No. 23 §270.41.

4. Reserved

O. **RESERVED**

P. **GENERAL CONTINGENT POST-CLOSURE REQUIREMENTS**

1. The Permittee shall submit to ADEQ for approval a Post-Closure Plan within sixty (60) calendar days of the effective date of this permit that is contingent on clean closure NOT being achieved during closure activities. [Permit condition fulfilled in August 2015 with the submittal of a revised Closure Plan which eliminated the Post-Closure activities.]

2. Post-Closure Care Period

The Permittee shall begin post-closure care for each unit that is not clean closed after completion of closure of the unit and continue for thirty (30) years after that date. Post-closure care shall be in accordance with Regulation No. 23 §264.117 and the Post-Closure Plan in the Part B Application, unless the time period is reduced as provided in Regulation No. 23 §264.117(a)(2)(i) or extended as provided in Regulation No. 23 §264.117(a)(2)(ii).

3. Post-Closure Security

The Permittee shall maintain security at the facility during the post-closure care period in accordance with the Post-Closure Plan in the Part B Application. [Regulation No. 23 §264.117(b)]

4. Amendment to Post-Closure Plan

The Permittee shall amend the Post-Closure Plan whenever necessary and submit to the ADEQ for review and approval within five (5) calendar days after modification. [APC&EC Regulation No. 23 §264.118(d)]

5. Post-Closure Notices

a. No later than sixty (60) calendar days after certification of closure of each hazardous waste disposal unit, the Permittee shall submit to the local zoning authority, or the authority with jurisdiction over local land use, and to ADEQ, records of the type and quantity of hazardous waste disposed within each cell or disposal unit. [APC&EC Regulation No. 23 §264.119(a)]

b. Within sixty (60) calendar days of certification of closure of the first hazardous waste disposal unit and the last hazardous waste disposal unit, the Permittee shall do the following:

i. Record a notation on the deed to the facility property; and [APC&EC Regulation No. 23 §264.119(b)(1)]

ii. Submit a certification to the ADEQ that a notation has been recorded. [APC&EC Regulation No. 23 §264.119(b)(2)]

c. The Permittee shall submit a request to ADEQ and obtain a Permit modification prior to post-closure removal of hazardous wastes, hazardous waste residues, liners, or contaminated soils. [APC&EC Regulation No. 23 §264.119(c)]

6. Certification of Completion of Post-Closure Care

The Permittee shall submit to ADEQ for approval within sixty (60) calendar days of completion of the established post-closure care period for each unit a certification that the post-closure care period was performed in accordance with the specifications in the Post-Closure Plan. Documentation supporting the certification report shall be kept until the Director or designee releases the owner or operator from the financial assurance requirements for post-closure care. [APC&EC Regulation No. 23 §264.120]

Q. FINANCIAL ASSURANCE

1. Cost Estimate for Facility Closure

a. The Permittee's initial closure and post-closure cost estimate, prepared in accordance with APC&EC Regulation No. 23 §264.142, §264.144 is specified in Section G-2 of the Renewal Permit Part B Application.

b. The Permittee shall adjust and submit annually to ADEQ for review and approval the closure cost estimate and post-closure cost estimate adjusted for inflation no sooner than sixty (60) calendar days prior and no later than thirty (30) days prior to the anniversary date of the establishment of the financial instrument(s) used to comply with APC&EC Regulation No. 23 §264.143 and Permit Module II, Condition Q.3, Liability Requirements, or when using an approved state-required mechanism, upon such date as required by the state. [APC&EC Regulation No. 23 §264.142(b)]

c. The Permittee shall revise and submit for ADEQ approval the closure cost estimate and post-closure cost estimate whenever there is a change in the facility's Closure Plan or Post-Closure Plan as required by APC&EC Regulation No. 23 §264.142(c) and §264.144(c).

d. The Permittee shall keep at the facility the latest closure cost estimate and post-closure cost estimate until approved closure of the facility. [APC&EC Regulation No. 23 §264.142(d) and §264.144(d)]

2. Financial Assurance for Facility Closure/Post-Closure

The Permittee shall demonstrate continuous compliance with APC&EC Regulation No. 23 §264.143, §264.145, and §264.146 by providing documentation of financial assurance, as required by APC&EC Regulation No. 23 §264.143, §264.145, §264.146, §264.147, or §264.149 in no less than the amount of the most current cost estimates required by Permit Module II, Condition Q.1., Cost Estimate for Facility Closure/Post-Closure. The Permittee's method of financial assurance as shown in the Renewal Permit Part B Application is the surety bond. Changes in a financial assurance mechanism shall be approved by the Director or designee pursuant to APC&EC Regulation No. 23 §264.143

3. Liability Requirements

The Permittee shall have and maintain liability coverage for sudden accidental occurrences of at least $1 million per occurrence, with an annual aggregate of at least $2 million, exclusive of legal defense costs. [APC&EC Regulation No. 23 §264.147(a)] The Permittee shall submit annually to ADEQ for approval the financial mechanism used to comply with this condition no sooner than sixty (60) calendar days and no later than thirty (30) calendar days prior to the anniversary of the mechanism.

4. Cost Estimate for Corrective Action

a. The Permittee shall, within ninety (90) calendar days of the effective date of this Permit, submit a detailed and itemized cost estimate for the corrective actions required in Permit Module XII(b) to the Director or designee for concurrence. Such estimate shall be based on costs to the Permittee of hiring a third party to perform the corrective actions. (A third party is a party who is neither a parent nor a subsidiary of the Permittee).

b. The cost estimates for Corrective Action under Permit Module XII(b) shall be reviewed and evaluated in the same manner as for the closure and post-closure cost estimates required in Module II Condition Q.1 of this permit. Adjustments to the cost estimates shall be made during the annual evaluation and are necessary due to:

i. Inflation, as determined using the procedures outlined in APC&EC Regulation No. 23 §264.142(b); and

ii. Changes in the corrective actions and as various tasks of the investigation, remedy selection, design and implementation work are completed allowing more accurate cost estimates.

5. Financial Assurance for Corrective Action

a. The Permittee shall financially assure the corrective actions required pursuant to Permit Module XII(b) by use of a Surety Bond, Letter of Credit, Closure Insurance, Trust Fund, Financial Test or Corporate Guarantee, or a combination of these as outlined in APC&EC Regulation No. 23 §264.143 and following the procedures as required pursuant to Permit Module II, Condition Q.2. The phasing of financial assurance for corrective action may be allowed with prior approval of the Director or designee for specific work phases. This condition will not apply to previously completed work.

b. "Phasing" financial assurance for corrective action may be considered, subject to approval by the Director or designee, when a final Remedial Action Decision for corrective action at the facility has not yet been made or approved, in order to reduce the uncertainty of costs for which the Permittee must provide financial assurance. Phased Financial Assurance for Corrective Action shall consist of two (2) phases: Phase I shall address the costs of investigating conditions at the facility, and evaluating the appropriate courses of remedial actions. Phase II shall include the costs of designing appropriate corrective measures and implementing the selected remedy pursuant to the Remedial Action Decision Document (RADD), to include any necessary operations and maintenance (O&M) activities. The Corporate Financial Test, Corporate Guarantee, or Corrective Action Trust Fund may not be used as mechanisms when financial assurance for corrective action is phased.

c. In phasing these cost estimates, the Permittee shall first estimate and provide compliant financial assurance for Phase I pursuant to Permit Module II, Condition Q.5.b. Within 180 days of the issuance of a Remedial Action Decision Document (RADD), the Permittee is then responsible for establishing compliant financial assurance for Phase II.

d. Mechanism Selection

i. The Permittee shall, within ninety (90) calendar days of the effective date of this Permit, submit to the Director or designee for approval the wording of a Corrective Action Financial Assurance (CAFA) Instrument(s). The Director or designee shall be named as third party beneficiary of any Corrective Action Trust Fund which may be established.

ii. The Permittee shall within one hundred eighty (180) calendar days of the effective date of this Permit, submit an executed

CAFA Instrument(s) as approved by the Director or designee pursuant to Permit Module II, Condition Q.5.a above.

iii. In the event a Trust Fund is selected as the CAFA Instrument, the Permittee shall fund the Trust Fund in accordance with the following:

1. The pay-in period for the Trust Fund shall be the estimated time frame to complete the work addressed, or ten (10) years, whichever is shorter.

2. The initial payment into the Trust Fund shall be made within one hundred eighty (180) calendar days of the effective date of this Permit.

3. Annually, on the anniversary of the initial payment, the Permittee shall make payments into the Trust Fund for the duration of the pay-in period.

4. The amount of the payments into the Trust Fund shall be determined by the following formula:

$$\frac{CE - CV}{Y} = \text{payment}$$

where CE is the most recent estimate of the required Trust Fund Balance, CV is the current value of the Trust Fund, and Y is the number of years remaining in the pay-in period.

5. The Corrective Action Trust Fund shall be additionally guaranteed with a Surety Bond, Letter of Credit, Closure Insurance, or a combination of these.

6. Changes in Financial Assurance Mechanisms

a. Changes in financial assurance mechanisms shall be approved by the Director or designee pursuant to APC&EC Regulation No. 23 §264.143.

b. Any changes of financial assurance instruments shall be considered a Class 1 permit modification, subject to prior approval of the Director or designee.

7. Incapacity of Owners or Operators, Guarantors, or Financial Institutions

The Permittee shall comply with APC&EC Regulation No. 23 §264.148 whenever necessary.

R. **RESERVED**

S. **RESERVED**

END OF MODULE II

MODULE III - STORAGE IN CONTAINERS

A. MODULE HIGHLIGHTS

The Permittee operates the following facilities under this permit:

Waste Storage Magazine (WSM): This building, designated as building #103, is located at the southwest corner of the East Camden facility. The WSM is a pre-manufactured steel magazine with the following dimensions: 40 feet long, 13.5 feet wide, and 10 feet high. The sides, back and top of the WSM are covered with earthen berms for safety purposes. The WSM is used to store hazardous wastes prior to treatment in the Thermal Treatment Area (TTA).

B. PERMITTED AND PROHIBITED WASTE IDENTIFICATION

1. The Permittee may only store wastes listed in the Part A Application that are designated as S01 (*i.e.* a storage code).

Table III.B.1 – Container Storage Capacity in the WSM

Unit	Container Storage Capacity (gal)
Building 103	7,920

Note 1. Description of Containers within the WSM: metal, plastic, and fiberboard containers ranging in capacity from1-gallon to 55-gallons; cardboard and wooden boxes and crates; and/or other DOT-approved shipping containers.

Note 2. Description of Hazardous Wastes: reactive waste, propellant, explosive & pyrotechnic (PEP) waste, and reactive wastewater sludge**.**

2. Any newly listed waste may not be stored by the Permittee until a permit modification application is approved to add it as an acceptable waste.
3. Ignitable, Reactive, or Incompatible wastes shall be managed and handled by the Permittee according to section C-4 (General Hazard Prevention) of the latest revision of the Part B application.

C. CONDITION OF CONTAINERS

1. If a container holding hazardous waste is not in good condition (e.g., severe rusting, apparent structural defects) or if it begins to leak, the Permittee shall transfer the hazardous waste from such container to a container that is in good condition or otherwise manage the waste in compliance with the conditions of this Permit. [Regulation No. 23 §264.171]

D. COMPATIBILITY OF WASTE WITH CONTAINERS

1. The Permittee shall assure that containers used to store hazardous waste are constructed of or lined with a material which will not react with, and are otherwise compatible with, the hazardous waste to be stored so that the ability of the container to contain the waste is not impaired. [Regulation No. 23 §264.172]

E. MANAGEMENT OF CONTAINERS

1. The Permittee shall keep all containers closed during storage, except when it is necessary to add or remove waste, and shall not open, handle, or store containers in a manner which may rupture the container or cause it to leak. [Regulation No. 23 §264.173]

F. CONTAINMENT SYSTEMS

1. The Permittee shall construct and maintain the secondary containment systems for any containers that could potentially contain free liquids within the WSM in accordance with the details included in the Part B Application in section J. [Regulation No. 23 §264.175]

G. INSPECTION SCHEDULES AND PROCEDURES

1. The Permittee shall inspect the container area weekly in accordance with the Inspection Schedule, Section C-3 (Operating Procedure for WSM) of the Part B Application, to detect leaking containers and deterioration of containers and the containment system caused by corrosion and other factors. [Regulation No. 23 §264.174]

H. RECORDKEEPING

1. The Permittee shall place the results of all inspection records, waste analyses and trial tests in the facility operating record. [Regulation No. 23 §264.73]

I. CLOSURE

1. At closure of the container area, The Permittee shall remove all hazardous waste and hazardous waste residues from the containment system in accordance with the procedures in the Closure Plan in Section K of the Part B Application. [Regulation No. 23 §264.178]

J. SPECIAL CONTAINER PROVISIONS FOR IGNITABLE OR REACTIVE WASTE

1. The Permittee shall not locate containers holding ignitable waste within 50 feet of the facility's property line. In addition, these shall not be placed within 300 feet of a public right-of-way as required by Regulation No. 23 §264.18(g)(2). [Regulation No. 23 §264.176]
2. The Permittee shall take precautions to prevent accidental ignition of ignitable

waste and follow the procedures specified in Section C of the Part B Application. [Regulation No. 23 §264.17(a) and §264.176]

3. The permittee shall take precautions to prevent accidental reaction of reactive waste and follow the procedures specified in Section C of the Part B Application. [Regulation No. 23 §264.17(a) and §264.176]
4. Containers of ignitable waste can be stacked no more than two high.

K. SPECIAL CONTAINER PROVISIONS FOR INCOMPATIBLE WASTE

1. The Permittee shall not place incompatible wastes, or incompatible wastes and materials, in the same container unless the procedures in Regulation No. 23 §264.17(b) are followed. [Regulation No. 23 §264.177(a)]
2. The Permittee shall not place hazardous waste in an unwashed container that previously held an incompatible waste or material. [Regulation No. 23 §264.177(b)]
3. The Permittee shall separate containers of incompatible wastes. [Regulation No. 23 §264.177(c)]

L. COMPLIANCE SCHEDULE

N/A.

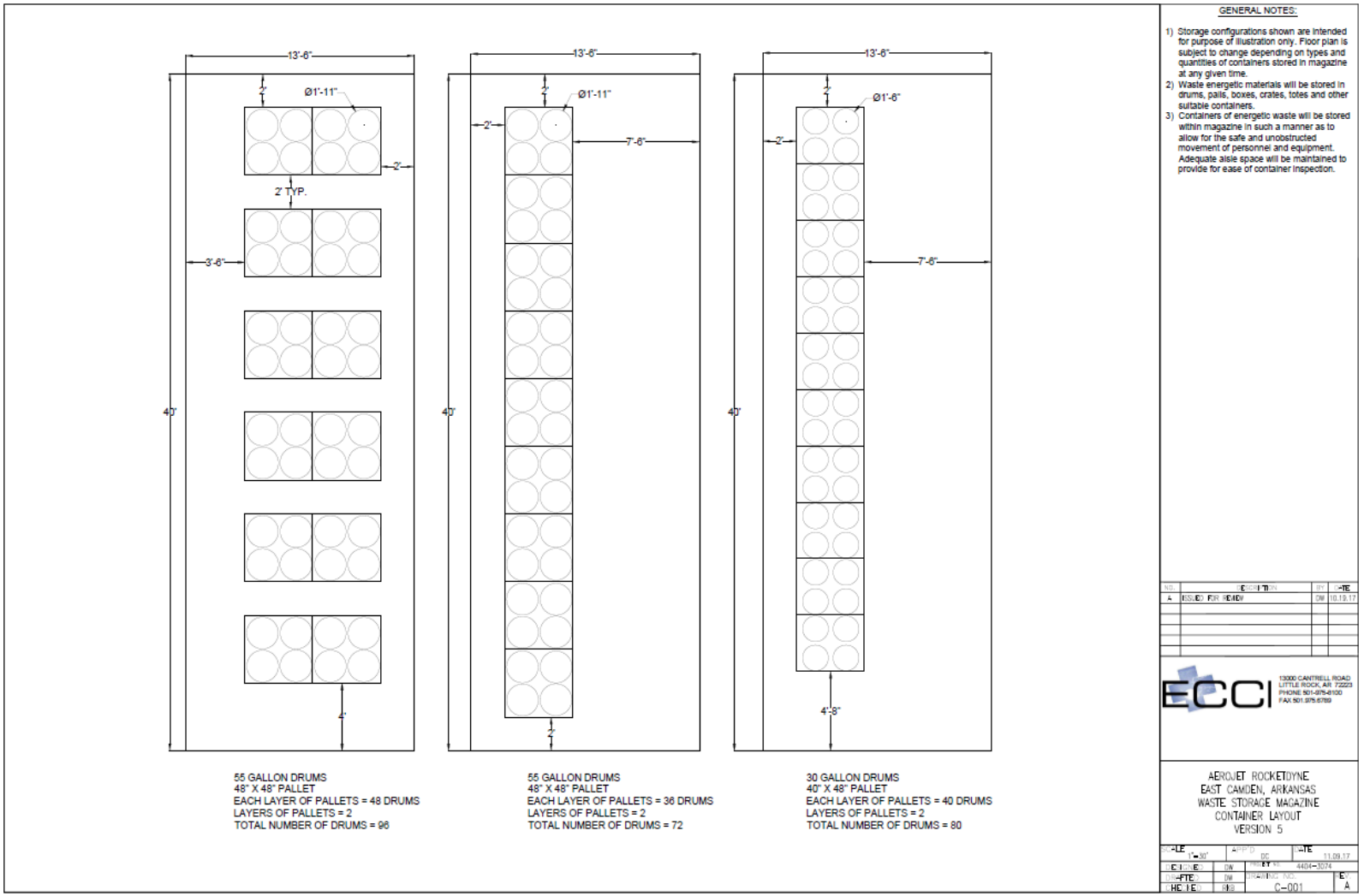
M. SPECIAL CONDITIONS FOR CONTAINER STORAGE FACILITIES

1. Containers within the WSM shall not be stacked more than 2 containers high.
2. All flooring including curbing shall be maintained to prevent cracks and gaps. In addition, all damage, including minor scratches that breach the impermeable coating shall be repaired as quickly as practicable. Weekly inspections shall be performed to check the integrity of the coating.
3. The Permittee shall maintain twenty-four (24) inches minimum clear working aisle spacing between rows and drums and to the inside of closest curbs or walls as depicted in Figure 1 (see attached).
4. The permittee shall not exceed a maximum of 96 (55 gallon) drums stored inside the WSM.
5. A total equivalent volume of 7,920 gallons of assorted containers may be stored within the WSM as long as conditions M.3 and M.4 are met.

N. AIR EMISSION STANDARDS

1. The Permittee shall manage all hazardous waste placed in a container in accordance with the requirements of Regulation No. 23, Section 264, Subsection CC.

Figure 1. Waste Storage Container Layout



END OF MODULE III

MODULE XII(b) - SPECIAL CONDITIONS FOR CORRECTIVE ACTION RELATED TO SOLID WASTE MANAGEMENT UNITS

NOTE: This Permit Module XII(b) remains intact as a module of the Renewal Permit due to other documentation references to this module and its sections. A significant portion of this module has been completed.

A. DEFINITIONS

For purposes of Module XII(b), the following definitions shall apply:

"Area of Concern (AOC)" means any area where an actual or potential release of hazardous waste, hazardous constituents, or hazardous substances, which is not from a solid waste management unit, is occurring and ADEQ determines to pose an actual or potential threat to human health or the environment.

"Facility" means all contiguous property under the control of the owner or operator seeking a permit under Subtitle C of RCRA and the Arkansas Hazardous Waste Management Act.

"Hazardous Constituent" means any constituent identified in Appendix VIII of APC&EC Regulation No. 23, Section 261, or any constituent identified in Appendix IX of APC&EC Regulation No. 23, Section 264.

"Hazardous Substance" means (A) any substance designated pursuant to Section 311(b)(2)(A) of the Federal Water Pollution Control Act (Public Law 92-500); any element, compound, mixture, solution, or substance designated pursuant to Section 102 of Title 1 of the federal Comprehensive Environmental Response, Compensation, and Liability Act of 1989 (Public Law 96-510); any hazardous waste, including polychlorinated biphenyls (PCBs), as defined by the Arkansas Hazardous Waste Management Act, as amended, §8-7-201 et seq., and the APC&EC Regulations promulgated thereunder; any toxic pollutant listed under Section 307(a) of the Federal Water Pollution Control Act; any hazardous air pollutant listed under Section 112 of the federal Clean Air Act; and any hazardous chemical substance or mixture regulated under Section 7 of the federal Toxic Substances Control Act; and (B) any other substance or pollutant designated by the Arkansas Hazardous Waste Management Act or by APC&EC Regulations of ADEQ.

"Hazardous Waste" means a hazardous waste as defined in APC&EC Regulation No. 23 §261.3.

"Release" means any spilling, leaking, pouring, emitting, emptying, discharging, injecting, pumping, 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 hazardous constituents).

"Solid Waste Management Unit" (SWMU) means any discernible unit at which solid wastes have been placed at any time, irrespective of whether the unit was intended for the management of solid or hazardous waste. Such units include, but are not limited to, any area at a facility at which solid wastes have been routinely and systematically released.

If, subsequent to the issuance of this Permit, these terms are redefined in promulgated APC&EC Regulations, the Director or designee may, at his discretion, apply the new definition to this Permit.

B. STANDARD CONDITIONS

1. Section 3004(u) of RCRA, as amended by HSWA, and APC&EC Regulation No. 23 §264.101 require that permits issued after November 8, 1984, address corrective action for releases of hazardous waste, hazardous constituents, or hazardous substances from any SWMU at the facility, regardless of when the waste was placed in the unit.

   Section 3004 (v) of RCRA, as amended by HSWA, and APC&EC Regulation No. 23 §264.101 require corrective action beyond the facility boundary, where necessary to protect human health and the environment, unless the owner or operator was unable to obtain the necessary permission to undertake such actions. The Permittee is not relieved of all responsibility to clean up a release that has migrated beyond the facility boundary where off site access is denied.

2. Failure to submit the information required in Permit Module XII(b) or falsification of any submitted information is grounds for termination of this Permit (as provided by APC&EC Regulation No. 23 §270.43) and/or other actions. The Permittee shall ensure that all plans, reports, notifications, and other submissions to the Director or designee required in Permit Module XII(b) are signed and certified in accordance with APC&EC Regulation No. 23 §270.11. One (1) printed copy and one (1) compact disc copy of each of these plans, reports, notifications or other submissions shall be submitted by Certified Mail or hand delivered to:

   Chief, Hazardous Waste Division

   Arkansas Dept. of Environmental Quality

   5301 Northshore Drive

   North Little Rock, AR 72218-5317

3. All plans and schedules required by these conditions are, upon approval of the Director or designee, incorporated into this Permit by reference and become an enforceable part of this Permit. Any noncompliance with such approved plans

and schedules shall be termed noncompliance with this Permit. Extensions of the due dates for submittals may be granted by the Director or designee in accordance with the permit modification process under APC&EC Regulation No. 23 §270.42.

The required information under this permit shall include each item specified under RFI Tasks I-V and CMS Tasks VI-IX and CMI Tasks X-XIII. Since these required items are essential elements of this Permit, failure to submit any of these elements or submission of inadequate or insufficient information may subject the Permittee to enforcement action under Section 3008 of RCRA and/or the Arkansas Hazardous Waste Management Act which may include fines, suspension, or revocation of the permit.

If the Director or designee determines that further actions beyond those provided in Permit Module XII(b) or changes to that which is stated herein, are warranted, the Director or designee may modify Permit Module XII(b) according to the permit modification processes under APC&EC Regulation No. 23 §270.41.

4. All raw data, such as laboratory reports, drilling logs, bench-scale or pilot-scale data, and other supporting information gathered or generated during activities undertaken pursuant to Permit Module XII(b) shall be maintained at the facility during the term of this Permit, including any reissued Permits.

5. For purposes of Permit Module XII(b), should the Permittee take exception to all or part of a disapproval or conditional approval of any plan or report required by this module, the Permittee may invoke the dispute resolution process outlined below:

    a. The Permittee and the Director or designee shall in good faith attempt to resolve expeditiously and informally all disputes or differences of opinion. If the parties are unable to informally resolve the dispute within ten calendar days of the receipt of the disapproval decision or directive which is the subject of dispute, the Permittee shall provide written notice to the Director or designee of the invocation of dispute resolution. The Permittee shall provide the written notice no later than the twentieth calendar day after receipt of the disapproval decision or directive. The notice shall set forth the specific points of the dispute, the position the Permittee is maintaining should be adopted as consistent with the Permit's requirements, the basis therefore, and any matters which it considers necessary for the Director or designee's proper determination. Within ten calendar days of receipt of the written notice, the Director or designee will provide to the Permittee a written statement of its decision on the pending dispute, which shall be incorporated into the final Permit unless the Permittee requests an opportunity for a conference in accordance with Paragraph b. of this section. The

existence of a dispute as defined herein, and the consideration of such matters which are placed into dispute shall not excuse, toll or suspend any compliance obligation or deadline not in dispute during the pending dispute resolution process including continuance of Module XII(b) work not otherwise dependent on the dispute at hand.

b. If the Permittee objects to any determination by the Director or designee regarding the disputed issue(s), the Permittee shall within ten calendar days of its receipt of the Director or designee's decision pursuant to Paragraph a. of this section, notify the Director or designee in writing of its objections and may request the Director or designee to convene an informal conference for the purpose of discussing the Permittee's objections and the reasons for the Director or designee's determination. After this conference, the Director or designee will state in writing his decision regarding the factual issues in dispute. Such decision shall be the final resolution of the dispute and shall be implemented by the Permittee in accordance with the schedule contained in the final decision.

C. REPORTING REQUIREMENTS

1. The Permittee shall submit to the Director or designee signed semi-annual progress reports of all activities (e.g., SWMU Assessment, Interim Measures, RCRA Facility Investigation, Corrective Measures Study, Corrective Measures Implementation) conducted pursuant to the provisions of Permit Module XII(b) beginning no later than ninety (90) calendar days from the effective date of this Permit. These reports shall contain:

   a. a description of the work completed;

   b. summaries of all findings, including summaries of laboratory data;

   c. summaries of all problems or potential problems encountered during the reporting period and actions taken to rectify problems; and

   d. projected work for the next reporting period.

2. Copies of other reports (e.g., inspection reports), drilling logs, and laboratory data shall be made available to the Director or designee upon request.

3. As specified under Permit Module XII(b), Conditions F and G, the Director or designee may require the Permittee to conduct new or more extensive assessments, investigations, or studies, as needed, based on information provided in these progress reports or other supporting information.

D. **NOTIFICATION REQUIREMENTS FOR AND ASSESSMENT OF NEWLY-IDENTIFIED SOLID WASTE MANAGEMENT UNIT(S) (SWMUS)**

1. The Permittee shall notify the Director or designee, in writing, of any newly-identified SWMU(s) (i.e., a SWMU or potential SWMU not specifically identified within this Permit or the Part B Application). This notification must be submitted no later than fifteen (15) calendar days after discovery. The notification shall include the following items, to the extent available:

   a. the location of the newly-identified SWMU in relation to other SWMUs;

   b. the type and function of the unit;

   c. the general dimensions, capacities, and structural description of the unit (supply available drawings);

   d. the period during which the unit was operated;

   e. the specifics on wastes that have been or are being managed at the SWMU, to the extent available; and

   f. the results of any sampling and analysis required for the purpose of determining whether releases of hazardous wastes, including hazardous substances, have occurred, are occurring, or are likely to occur from this unit.

2. Based on the results of this Notification, the Director or designee will determine the need for further investigations or corrective measures at any newly-identified SWMU(s) covered in the Notification. If the Director or designee determines that such investigations are needed, the Director or designee may require the Permittee to prepare a plan for such investigations. This plan will be reviewed for approval as an RFI Workplan under Permit Module XII(b), Condition H., RFI Report and Summary, and, where possible, any previously approved RFI Workplan should be modified as necessary and adopted for use for newly identified SWMUs in order to expedite the work.

E. **NOTIFICATION REQUIREMENTS FOR NEWLY-DISCOVERED RELEASES AT SWMU(S)**

The Permittee shall notify the Director or designee, in writing, of any release(s) of hazardous waste or hazardous substances discovered during the course of ground water monitoring, field investigation, environmental auditing, or other activities undertaken after the commencement of the RFI, no later than fifteen (15) calendar days after discovery. Such newly-discovered releases may be from newly-identified units, from units for which, based on the findings of the RFA, the Director or designee has previously determined that no further investigation was necessary, or from units investigated or discovered as part of RFI. The Director or designee may require further

investigation and/or Interim Measures for the newly-identified release(s).

F. DESCRIPTION OF CURRENT CONDITIONS REPORT (DOCC) AND RCRA FACILITY INVESTIGATION (RFI) WORKPLAN

1. Within ninety (90) days after the effective date of this Permit, the Permittee shall submit to the Director or designee a Description of Current Conditions Report (DOCC) describing the current conditions at the facility as outlined in the RFI Scope of Work, Permit Module XII(b), Condition Q., Scope of Work for a RFI, Task I. This Report may be limited to information not in the Part B Application or to recent information not addressed in the RCRA Facility Assessment (RFA). Any previously submitted information shall be referenced and summarized as appropriate to completely detail the current conditions at the facility. Results of any previous investigations and any other investigations required by state or local authorities may be included in this DOCC if they address any of the requirements of this Permit. The DOCC shall address the background information pertinent to the facility and the nature and extent of contamination.

   [DOCC APPROVED OCTOBER 1, 2004]

2. The DOCC shall identify all areas of potential interim measures which may be necessary to protect human health and the environment with proposed schedule of implementation.

   [DOCC APPROVED OCTOBER 1, 2004]

3. On or before one hundred twenty (120) days after the effective date of this Permit, the Permittee shall-submit to the Director or designee for review and approval an RFI Workplan as outlined in Permit Module XII(b), Condition Q, Task II. The RFI Workplan must address those units, releases of hazardous waste containing hazardous substances, and media of concern which, based on the results of the RFA or other information, require further investigation. The RFI Workplan shall be the implementing document for the work outlined in Permit Module XII(b), Condition Q, Tasks III and IV. The scope of the RFI shall include, but not be limited to, the SWMU's listed in Table 1, and potential releases to all media. The SWMU's are to be investigated to determine the necessity of corrective action. The RFI Workplan must include a concise schedule for completing the Task III and IV work and require the RFI Report in no more than sixty (60) calendar days after completion of Tasks III and IV. An interim RFI Report can be required by the Director or designee as soon as sufficient information is available for the most significant units which will obviously require corrective action in order to protect human health and the environment.

Table 1 - Solid Waste Management Units (SWMU)

and Areas of Concern (AOC)

SWMU No.	Description
1	46 Waste Satellite Accumulation Points (SAPs)
2	16 Propellant Wastewater Sumps
3	Main Container Storage Area (Bldg. A-12)
4	31 Chemical Waste Storage Sites (SAPs)
5	Wastewater Neutralization Sump (Bldg. B-28)
6	Used Oil Collection Pan & SAP (Bldg. 2-SH-2)
7	Casting Tooling Wastewater Tank (Bldg. M-8)
8	2 Solvent Reclamation Units
9	Washout Bldg. (Chaparral, Bldg. 52)
AOC No.	**Description**
1	Empty Drum Storage Area
2	Historic Underground Storage Tank
3	Drainage Ditch for Bldg. M-8
4	Drainage Area for Bldg. M-8
5	Area Adjacent Navy Landfill (located on land leased by Permittee)
6	Potential Total Petroleum Hydrocarbon Impacts
7	Potential Perchlorate Impacts
8	Scrap Boneyard
9	Potential Solvent Impacts
10	AST's

a. The RFI Workplan shall describe the objectives of the investigation and

the overall technical and analytical approach to completing all actions necessary to characterize the nature, direction, rate, movement, and concentration of releases of hazardous waste including hazardous substances from specific units or groups of units, and their actual or potential receptors. The RFI Workplan shall detail all proposed activities and procedures to be conducted at the facility, the schedule for implementing and completing such investigations, the qualifications of personnel performing or directing the investigations, including contractor personnel, and the overall management of the RFI. The Scope of Work for a RFI is outlined in Condition Q. of this module.

[RFI WORKPLAN APPROVED MARCH 25, 2005]

b. The RFI Workplan shall discuss sampling and data collection quality assurance and data management procedures, including formats for documenting and tracking data and other results of investigations, and health and safety procedures.

[RFI WORKPLAN APPROVED MARCH 25, 2005]

c. The RFI Workplan shall include a plan for further developing any existing site-wide monitoring well network. If the Director or designee determines based on the DOCC or the RFA report that ground water contamination is likely, the Director or designee may require the Permittee to submit a ground water monitoring plan in the RFI Workplan. The plan shall include:

i. A review of all known past or present Solid Waste Management Units and all known spills;

ii. A review of any existing ground water monitoring well network;

iii. A plan and implementation schedule for plugging and abandoning any monitoring wells that are determined not to be useful in a site-wide well network;

iv. A plan and implementation schedule for installing such additional monitoring wells as may be needed to complete the proposed site-wide well network for the aquifer above the confining zone.

[RFI WORKPLAN APPROVED MARCH 25, 2005]

4. After the Permittee submits the RFI Workplan, the Director or designee will approve, disapprove, or modify the RFI Workplan in writing. If the Director or designee approves the plan, the Permittee shall immediately initiate implementation of the plan according to the schedule contained therein. All

approved work plans become incorporated into this Permit.

In the event of disapproval (in whole or in part) of the plan, the Director or designee will specify any plan deficiencies in writing. The Permittee shall modify the plan to correct these within 30 days of receipt of the disapproval by the Director or designee. The modified plan shall be submitted in writing to the Director or designee for review. Should the Permittee take exception to all or part of the disapproval, the Permittee may invoke dispute resolution as outlined by Permit Module XII(b), Condition B.5., above. Where appropriate, all other work not subject to dispute resolution may be specified by the Director or designee to proceed independent of the dispute process. If necessary to accomplish matters of noted deficiencies or of dispute resolution, the Director or designee will make further modifications as required.

If the Director or designee modifies the plan, this modified plan becomes the approved RFI Workplan. If the modified plan is not the result of dispute resolution but is modified due to Director or designee review, the modified plan is also subject to the dispute resolution rights of the Permittee as described above. The Permittee shall immediately initiate implementation of the approved RFI Workplan according to the schedule contained therein.

[RFI WORKPLAN APPROVED MARCH 25, 2005]

5. The Director or designee shall review for approval, as supplements to the RFI Workplan, any plans developed pursuant to Permit Module XII(b), Condition D., addressing further investigations of newly-identified SWMUs or new releases from previously-identified units. In the event that the RFI Workplan and supplements do not call for applicable work of Permit Module XII(b), Condition Q., Tasks II-V, the requirements of Condition Q., Tasks II-V must be met. The RFI Workplan must include a concise schedule for completing the Tasks III and IV work and require the RFI Report within 60 days of Tasks III and IV work completion.

[RFI REPORT APPROVED JUNE 24, 2009]

G. RFI WORKPLAN IMPLEMENTATION

Upon receipt of written approval from the Director or designee for the RFI Workplan, the Permittee shall begin implementation of the RFI according to the Schedules specified in the approved or modified RFI Workplan. The RFI shall be conducted in accordance with the approved RFI Workplan and accomplish all appropriate work outlined in Permit Module XII(b), Condition Q., Tasks III and IV. The Permittee shall implement the RFI Workplan and undertake the facility investigation in accordance with the following:

1. Development of the RFI Workplan and reporting of data shall be consistent with

the RCRA Facility—Investigation Guidance Document (OSWER Directive 9502.00-6 (D)) May 1989 or the equivalent thereof;

2. ADEQ reserves the right to split samples. The Permittee shall notify ADEQ at least 10 days prior to any sampling activity;

3. When developing ground water related investigations, the Permittee shall follow the RCRA Groundwater Monitoring Technical Enforcement Guidance Document (EPA OSWER Directive 9950-1, September 1986) or the equivalent thereof, to determine methods and materials that are acceptable to ADEQ;

4. Any major deviations from the approved RFI Workplan which are necessary during implementation of the investigations must be approved by the Director or designee and fully documented and described in the progress reports and in the RFI Report.

H. **RFI REPORT AND SUMMARY**

1. Within sixty (60) calendar days after the completion of the RFI, Tasks III and IV as shown in the RFI Workplan schedule, the Permittee shall submit an RFI Report. The RFI Report shall describe the procedures, methods, and results of all investigations of SWMUs and their releases, including information on the type and extent of contamination at the facility, sources and migration pathways, and actual or potential receptors. The RFI Report shall present all information gathered under the approved RFI Workplan, and include an investigative analysis as described under Permit Module XII(b), Condition Q., Task IV. The Report must contain adequate information to support corrective action studies at the facility to eventually implement a remedy if necessary.

2. After the Permittee submits the RFI Report, the Director or designee shall either approve or disapprove the Report in writing.

If the Director or designee approves the RFI Report, the Permittee shall mail a notice that the RFI Report has been approved to all individuals on the facility mailing list established pursuant to 40 CFR 124.10(c)(1)(ix), within fifteen (15) calendar days of receipt of approval. This notice shall indicate where a copy of the report can be found and who to contact for more information.

If the Director or designee determines the RFI Final Report does not fully detail the objectives stated under Permit Module XII(b), Condition Q., the Director or designee may disapprove the RFI Report. If the Director or designee disapproves the Report, the Director or designee will notify the Permittee in writing of the Report's deficiencies and specify a due date for submittal of a revised Final Report. Once approved, the Permittee shall mail a notice that the RFI Report has been approved to all individuals on the facility mailing list as specified above.

If the Director or designee determines the RFI Final Report fulfills the requirements of the RFI Workplan, but that additional information or data is required, the Director or designee may require the Permittee to conduct additional investigations as necessary. In addition, the RFI Report may be used by the Director or designee to implement specific interim measures as necessary to protect the public health and the environment. Failure to properly implement the RFI Workplan and resulting in an unapprovable RFI Report may subject the Permittee to enforcement action and should not relieve the Permittee of the responsibility to implement partial CMS Tasks VI through IX work as directed or interim measures stipulated by the Director or designee as necessary to protect human health and the environment.

[RFI REPORT APPROVED JUNE 24, 2009]

I. INTERIM MEASURES

This condition is to provide for unforeseen interim measures that may arise after permit issuance. The interim measures Appendices A - E apply to work under this condition as applicable, as guidance for interim measures outside the normal RFI/CMS process.

1. If during the course of any activity initiated under Permit Module XII(b), the Director or designee determines that a release or potential release of hazardous substances from a SWMU poses a threat to human health and the environment, the Director or designee may specify corrective action interim measures. The Director or designee may determine the specific measure, including potential permit modifications and the schedule for implementing the required measures which may forego RFI and CMS tasks as appropriate. The Director or designee will notify the Permittee in writing of the requirement to perform such interim measures. The Director or designee may modify Permit Module XII(b) according to the permit modification procedures under APC&EC Regulation No. 23 §270.41, to incorporate such interim measures into the Permit, but actual implementation can begin immediately for the goal of protecting human health and the environment.

2. The following factors will be considered by the Director or designee in determining the need for interim measures:

    a. time required to develop and implement a final remedy;

    b. actual and potential exposure to human and environmental receptors;

    c. actual and potential contamination of drinking water supplies and sensitive ecosystems;

    d. the potential for further degradation of the medium absent interim measures;

    e. presence of hazardous waste in containers that may pose a threat of

release;

f. presence and concentration of hazardous wastes, including hazardous substances, in soil that have the potential to migrate to ground water or surface water;

g. weather conditions that may affect the current levels of contamination;

h. risks of fire, explosion, or accident; and

i. other situations that may pose threats to human health and the environment.

J. DETERMINATION OF NO FURTHER ACTION (NFA)

1. Based on the results of the RFI and other relevant information, the Permittee may submit an application to the Director or designee for a Class 3 permit modification under APC&EC Regulation No. 23 §270.42(c) to terminate the RFI/CMS process for a specific unit or units. This permit modification application must contain information demonstrating that there are no releases of hazardous wastes or hazardous substances from a particular SWMU at the facility that poses a threat to human health and the environment, as well as information required in APC&EC Regulation No. 23 §270.42(c), which incorporates by reference APC&EC Regulation No. 23 §270.13 through §270.21, §270.26, and §270.63.

   If, based upon review of the Permittee's request for a permit modification, the results of the RFI, and other information, including comments received during the sixty (60) day public comment period required for Class 3 permit modifications, the Director or designee determines that releases or suspected releases which were investigated either are non-existent or do not pose a threat to human health and the environment, the Director or designee may grant the requested modification.

2. A determination of no further action shall not preclude the Director or designee from requiring continued or periodic monitoring of air, soil, ground water, or surface water, when site-specific circumstances indicate that release of hazardous wastes including hazardous substances are likely to occur, and as necessary to protect human health and the environment.

3. A determination of no further action shall not preclude the Director or designee from requiring further investigations, studies, or remediation at a later date, if new information or subsequent analysis indicates a release or likelihood of a release from a SWMU at the facility that is likely to pose a threat to human health or the environment. In such a case, the Director or designee may initiate a Class 3 permit modification according to APC&EC Regulation No. 23 §270.41, to rescind the determination made in accordance with Permit Module XII(b), Condition J.

K. CORRECTIVE MEASURES STUDY (CMS) PLAN

1. If, after review of the RFI Report, the Director or designee has reason to believe that a SWMU has released concentrations of hazardous substances, or if the Director or designee determines that contaminants present a threat to human health and the environment given site-specific exposure conditions, the Director or designee may require a CMS and shall notify the Permittee in writing. The notification may also specify remedial alternatives to be evaluated by the Permittee during the CMS.

2. The Permittee shall submit a CMS Plan to the Director or designee within sixty (60) calendar days from notification of the requirement to conduct a CMS. The CMS Plan will be as necessary to implement the CMS, Tasks VI-IX as described in Permit Module XII(b), Condition R. The CMS Plan shall provide the following information:

   a. a description of the general approach to investigation and potential remedies;

   b. a definition of the overall objectives of the study;

   c. the specific plans for evaluating remedies to ensure compliance with remedy standards;

   d. the schedule for conducting the study;

   e. the proposed format for the presentation of information; and

   f. a schedule for completion of the CMS Tasks VII-IX.

3. After the Permittee submits the CMS Plan, the Director or designee will either approve or disapprove the Plan. If the Plan is not approved, the Director or designee will notify the Permittee in writing of the Plan's deficiencies and specify a due date for submittal of the revised Plan. If this Plan is not approved, the Director or designee may revise the Plan and notify the Permittee of the revisions. The Director or designee revised Plan becomes the approved Plan.

   [CMS APPROVED OCTOBER 6, 2011]

L. CORRECTIVE MEASURES STUDY (CMS)

No later than fifteen (15) calendar days after the Permittee has received written approval from the Director or designee for the CMS Plan, the Permittee shall begin to implement the CMS according to the schedules specified in the CMS Plan. The CMS shall be conducted in accordance with the approved Plan and as necessary to satisfy the requirements of Permit Module XII(b), Condition R., Scope of Work for a CMS, Tasks VII and VIII, sufficient to prepare an approvable CMS Report (Task IX of Condition R.).

[CMS APPROVED OCTOBER 6, 2011]

M. CMS REPORT AND DRAFT REMEDIAL ACTION DECISION DOCUMENT (RADD)

1. Within sixty (60) calendar days after the completion of the CMS, the Permittee shall submit a CMS Report. The CMS Report shall summarize the results of the investigations for each remedy studied and of any bench-scale or pilot tests conducted. The CMS Report must include an evaluation of each remedial alternative. The CMS Report shall present all information gathered under the approved CMS Plan. The report must contain adequate information to support the Director or designee in the remedy selection decision-making process and shall be sufficient for concise remedy selection and design without further investigation or study.

2. If the Director or designee determines that the CMS Report does not fully satisfy the information requirements specified under Permit Module XII(b), Condition R., the Director or designee may disapprove the CMS Report. If the Director or designee disapproves the Report, the Director or designee shall notify the Permittee in writing of deficiencies in the report and specify a due date for submittal of a revised CMS Report. If this revised report is not approved, the Director or designee may revise the report as necessary to require specific corrective actions and notify the Permittee of the revisions.

Failure to properly implement the CMS Plan and resulting in an unapprovable CMS Report may subject the Permittee to enforcement action and shall not relieve the Permittee of the responsibility to implement partial CMI Tasks X through XIII work as directed by the Director or designee as necessary to protect human health and the environment.

3. A schedule for implementation of all corrective measures designs and construction must be included and shall address interim measures as appropriate. The Director or designee may implement corrective action interim measures as necessary to protect human health and the environment.

4. As part of the Director or designee's review and approval/disapproval of the CMS, he will choose the particular remedy for each unit or group of units and he can concur with the Permittee's selected remedy or he can choose another remedy, or combination of remedies, as appropriately justified. This shall be accomplished through a Draft RADD as described in Permit Module XII(b), Condition R., Task IX.C. The Draft RADD shall be subject to public comment as described in the following paragraph:

The Director or designee shall prepare a thirty (30) day Public Notice to solicit public comments on the CMS Report and the Corrective Measure selection through

the Draft RADD. The Director or designee will consider the public comments as set out in the Draft RADD prior to approval of the CMS Report and corrective measure(s) for preparing a Final RADD. The Permittee shall bear the cost of the Public Notice. The CMS Report revised by the Director or designee becomes the approved Report.

5. Based on the comments from the Public Notice for the RADD, the Director or designee may require the Permittee to evaluate additional remedies or particular elements of one or more proposed remedies.

6. Based on the CMS Report and the comments from the public for the RADD, the Director or designee will then develop the Final RADD which will approve the CMS phase, as modified, and will become the controlling document for all Corrective Measures Implementation and resulting Corrective Measures Designs.

N. CORRECTIVE MEASURES IMPLEMENTATION AND FINAL RADD

1. The Draft RADD shall include a proposed schedule for implementing the corrective measures design and construction as set by the CMS work or by the Director or designee through modifications of the CMS Report. It shall be finalized based on public comments and must be implemented within 15 days of the Director or designee's notification of the Final RADD and final approval of the CMS Report as modified for the Final RADD.

2. The Corrective Measures Implementation (CMI) must be carried out to meet the requirements of Permit Module XII(b), Condition S., Tasks X-XIII, and to comply with the Final RADD.

[FINAL RADD APPROVED OCTOBER 23, 2012; CMI IMPLEMENTED AUGUST 1, 2013]

O. MODIFICATION OF THE PERMIT

1. If at any time the Director or designee determines that modification of Permit Module XII(b) is necessary, a modification may be initiated according to the procedures of APC&EC Regulation No. 23 §270.41 and §270.42.

2. Modifications to Permit Module XII(b) do not constitute a reissuance of the Permit.

P. RFI/CMS SUBMISSION SUMMARY (SEE CONDITIONS Q. & R. FOR DETAILED RFI/CMS WORK)

[FINAL RADD APPROVED OCTOBER 23, 2012]

RFI Report and Summary	60 calendar days after completion of RFI Tasks III & IV

Interim Measures Plan for interim measures required after permit issuance	30 calendar days after notification
CMS Plan (Task VI)	60 calendar days after notification of requirement to perform CMS
CMS (Tasks VII and VIII)	per schedule in CMS Plan
CMS Report (Task IX)	60 calendar days after completion of CMS VII & VIII
Demonstration of Financial Assurance for Selected Remedy	120 calendar days after permit modification for remedy

Note: Failure of the Permittee to meet any submittal time frame of Permit Module XII(b), Condition P., RFI/CMS Submission Study, without written approval of the Director or designee to do otherwise, will be adequate justification for enforcement action against the Permittee and shall not be justification for not continuing other work or interim measures required by the Director or designee.

Q. **SCOPE OF WORK FOR A RCRA FACILITY INVESTIGATION (RFI)**

[FINAL RADD APPROVED OCTOBER 23, 2012]

PURPOSE

The purpose of a RFI is to determine the nature and extent of releases of hazardous waste or hazardous substances from SWMUs. This process shall begin upon issuance of this permit, and may also be invoked upon the notification of the Director or designee by the Permittee of the discovery of newly identified SWMUs or releases from SWMUs. The Director or designee may require implementation of corrective action interim measures at any time as necessary to protect human health and the environment which may forego the detailed RFI/CMS Tasks I through VIII as appropriate and as approved or stipulated by the Director or designee. The Permittee shall furnish all personnel, materials, and services necessary for, or incidental to, performing the RFI. If the Permittee believes that certain requirements of the Scope of Work are not applicable, the specific requirements

shall be identified and the rationale for inapplicability shall be provided.

SCOPE

The RFI consists of five tasks:

Task I: DOCC

A. Facility Background

B. Nature and Extent of Contamination

C. Current and Past Interim Measures

Task II: RFI Workplan

A. Data Collection Quality Assurance Plan

B. Data Management Plan

C. Health and Safety Plan

D. Community Relations Plan

E. Project Management Plan

Task III: Facility Investigation

A. Environmental Setting

B. Source Characterization

C. Contamination Characterization

D. Potential Receptor Identification

Task IV: Investigative Analysis

A. Data Analysis

B. Protection Standards

Task V: Reports:

A. DOCC and Workplan

B. Progress

C. RFI Report

The required information shall include each item specified under RFI Tasks I-V. Since these required items are essential elements of this Permit, failure to submit any of these elements or submission of inadequate or insufficient information may subject Permittee to enforcement action under Section 3008 of RCRA and/or the Arkansas Hazardous Waste Management Act which may include fines, suspension, or revocation of the permit.

TASK I:DESCRIPTION OF CURRENT CONDITIONS

The Permittee shall submit to the Director or designee a DOCC providing the background information pertinent to the facility, contamination, and any type of on-going corrective action as set forth below. This report may be limited to information not in the Part B Application or to recent information not addressed in the RFA.

A. FACILITY BACKGROUND

The report shall summarize the regional location, pertinent boundary features, general facility physiography, hydrogeology, and historical use of the facility for the treatment, storage or disposal of solid and hazardous waste. Information from existing reports and studies is acceptable for any requirement in this Permit, as long as the source of this information is documented and it is pertinent and reflective of current conditions, and meets the format for the RFI investigations. The report shall include:

1. Map(s) depicting the following:
    a. general geographic location;
    b. property lines, with the owners of all adjacent property clearly indicated;
    c. topography, waterways, all wetlands, floodplains, water features, drainage patterns;
    d. all solid waste management units;
    e. all known past solid or hazardous waste treatment, storage, and disposal areas regardless of whether they were active on November 19, 1980;
    f. surrounding land uses (residential, commercial, agricultural, recreational); and
    g. the location of all production and ground water monitoring wells. These wells shall be clearly labeled and ground and top of casing elevations included (these elevations may be included as an attachment).

All maps shall be of sufficient detail and accuracy to locate and report all current and future work performed at the site. The maps shall comply with the requirements of APC&EC Regulation No. 23 §270.14(b)(19).

2. A history and description of ownership and operation, solid and hazardous waste generation, treatment, storage, and disposal activities at the facility.
3. Approximate dates or periods of past waste spills, identification of the materials spilled, the amount spilled, the location where spilled, and a description of the response actions conducted (local, State, or Federal response units or private parties), including any inspection reports or technical reports generated as a result of the response.

4. Documentation of all interim measures which were or are being undertaken at the facility other than those specified in this permit.

5. A reference of all environmental, geologic, and hydrogeologic studies performed by all parties, at or near the facility, with a short summary of purpose, scope, and significant findings thereof.

6. A reference of all environmental permits, applied for and/or received, the purpose thereof, and a short summary of requirements except for the provisions of this Permit.

B. NATURE AND EXTENT OF CONTAMINATION

The Permittee shall include in the DOCC the existing information on the nature and extent of contamination.

1. The Permittee's report shall summarize all possible source areas of contamination, including all solid waste management units. For each area, the Permittee shall identify the following:

   a. location of unit/area (which shall be depicted on a facility map);

   b. quantities of solid and hazardous wastes;

   c. hazardous waste, mixture of radioactive/hazardous wastes, and hazardous substances, to the extent known; and

   d. identification of areas where additional information is necessary.

2. The Permittee shall prepare an assessment and description of the existing degree and extent of contamination. This should include:

   a. available monitoring data and qualitative information on locations and levels of contamination at the facility;

   b. all potential migration pathways including information on geology, pedology, hydrogeology, physiography, hydrology, water quality, meteorology, and air quality; and

   c. the potential impact(s) on human health and the environment, including demography, ground water and surface water use, and land use.

C. CURRENT AND PAST INTERIM MEASURES

The Permittee shall document and report on all interim measures taken which were or are being undertaken at the facility other than those specified in the Permit. This shall include:

1. objectives of the interim measures (how the measure is mitigating a potential threat to human health and the environment and/or is consistent with and

integrated into any long term solution at the facility);

2. design, construction, operation, and maintenance requirements;
3. schedules for design, construction, and monitoring; and
4. schedule for progress reports.

TASK II: RFI WORKPLAN REQUIREMENTS

The Permittee shall prepare an RFI Workplan to investigate all SWMUs identified in Permit Module XII(b), Condition F.3., DOCC and RFI Workplan, Table 1, as well as any newly identified SWMU's contained in the DOCC or for which the Permittee has notified the Director or designee. This RFI Workplan shall include the development of several plans, which shall be prepared concurrently. During the RFI, it may be necessary to revise the RFI Workplan to increase or decrease the detail of information collected to accommodate the facility specific situation. The RFI Workplan shall include the following:

A. DATA COLLECTION QUALITY ASSURANCE PLAN

The Permittee shall prepare a plan to document all monitoring procedures: sampling, field measurements, and sample analysis performed at the facility during the investigation to characterize the environmental setting, source, and contamination, so as to ensure that all information, data, and resulting decisions are technically sound, statistically valid, and properly documented.

1. Data Collection Strategy

The strategy section of the Data Collection Quality Assurance Plan shall include but not be limited to the following:

a. description of the intended uses for the data, and the necessary level of precision and accuracy for these intended uses;

b. description of methods and procedures to be used to assess the precision, accuracy and completeness of the measurement data;

2. Sampling and Field Measurements

The Sampling and Field Measurements Section of the Data Collection Quality Assurance Plan shall at least discuss:

a. selecting appropriate sampling and field measurements locations, depths, etc.;

b. providing a statistically sufficient number of sampling and field measurement sites;

c. determining conditions under which sampling or field measurements should be conducted;

d. determining which parameters are to be measured and where;

e. selecting the frequency of sampling and length of sampling period;

f. selecting the types of sample (e.g., composites vs. grabs) and number of samples to be collected;

g. measures to be taken to prevent contamination of sampling or field measurements equipment and cross contamination between sampling points;

h. documenting field sampling operations and procedures;

i. selecting appropriate sample containers;

j. sample preservation; and

k. chain-of-custody.

3. The Sample Analysis shall include:

a. chain-of-custody procedures;

b. sample storage procedures and holding times;

c. sample preparation methods;

d. analytical procedures;

e. calibration procedures and frequency;

f. data reduction, validation and reporting; and

g. internal quality control checks, laboratory performance and systems audits and frequency.

B. DATA MANAGEMENT PLAN

The Permittee shall develop and initiate a Data Management Plan to document and track investigation data and results. This plan shall identify and set up data documentation materials and procedures, project file requirements, and project-related progress reporting procedures and documents. The plan shall also provide the format to be used to present the raw data and conclusions of the investigation, such as:

1. Data Record;

2. Tabular Displays; and

3. Graphical Displays.

C. HEALTH AND SAFETY PLAN

The Permittee shall prepare a facility Health and Safety Plan.

1. Major elements of the Health and Safety Plan shall include:

a. facility description including availability of resources such as roads, water supply, electricity and telephone service;

b. a description of the known hazards and evaluation of the risks associated with the incident and with each activity conducted;

c. list of key personnel and alternatives responsible for site safety, responses operations, and for protection of public health;

d. delineation of work areas;

e. description of levels of protection to be worn by personnel in each work area;

f. establishment of procedures to control site access;

g. description of decontamination procedures for personnel and equipment;

h. establishment of site emergency procedures;

i. plan of emergency medical care for injuries and toxicological problems;

j. description of requirements for an environmental field monitoring program;

k. specification for any routine and special training required for responders;

l. establishment of procedures for protecting workers from weather-related problems;

m. Description of emission control equipment; and

n. Description of air monitoring during activities which may expose workers to air contaminants.

2. The Facility Health and Safety Plan shall be consistent with:

a. NIOSH Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities (1985);

b. EPA Order 1440.1 - Respiratory Protection;

c. EPA Order 1440.3 - Health and Safety Requirements for Employees engaged in Field Activities;

d. approved Hazardous Waste Facility Contingency Plan;

e. EPA Operating Safety Guide (1984);

f. OSHA Regulations particularly in 29 CFR 1910 and 1926;

g. State and local regulations; and

h. other EPA guidance as provided.

D. COMMUNITY RELATIONS PLAN

The Permittee shall prepare a plan for the dissemination of information to the public regarding investigation activities and results.

E. PROJECT MANAGEMENT PLAN

The Permittee shall prepare a Project Management Plan which will include a discussion of the technical approach, schedules, budget, and key project personnel. The project management plan will also include a description of qualifications of key project personnel performing or directing the RFI, including contractor personnel. This plan shall also document the overall management approach to the RFI.

TASK III: FACILITY INVESTIGATION

The Permittee shall conduct investigations of all SWMUs in accordance with the approved RFI Workplan. The investigations shall be conducted in a manner protective of human health and the environment, and shall: characterize the facility (Environmental Setting); define the source (Source Characterization); define the degree and extent of contamination (Contamination Characterization); and identify actual or potential receptors.

Investigations should result in data of adequate technical quality to support the development and evaluation of the corrective measure alternative or alternatives during the Corrective Measures Study, when necessary.

Any facility investigation activities shall follow the plans set forth in Task II. All sampling and analyses shall be conducted in accordance with the Data Collection Quality Assurance Plan. All sampling locations shall be documented in a log and identified on a detailed site map.

A. ENVIRONMENTAL SETTING

The Permittee shall collect information to supplement and verify existing information on the environmental setting at the facility. The Permittee shall characterize the following:

1. Hydrogeology

The Permittee shall conduct a program to evaluate hydrogeologic conditions at the facility. This program shall provide the following information:

a. a description of the regional and SWMU specific geologic and hydrogeologic characteristics affecting ground water flow beneath the facility;

b. an analysis of any topographic features that might influence the ground water flow system (Note: Stereographic analysis of aerial photographs may aid in this analysis);

c. based on field data, tests, (e.g., gamma and neutron logging of existing and new wells, piezometers and borings) and cores, a representative and accurate classification and description of the hydrogeologic units which may be part of the migration pathways at the facility (i.e., the aquifers and any intervening saturated and unsaturated units);

d. based on field studies and cores, structural geology and hydrogeologic cross sections showing the extent (depth, thickness, lateral extent) of hydrogeologic units which may be part of the migration pathways identifying:

i. unconsolidated sand and gravel deposits;

ii. zones of fracturing or channeling in consolidated or unconsolidated deposits; and

iii. zones of high permeability or low permeability that might direct and restrict the flow of contaminants.

e. based on data obtained from ground water monitoring wells and piezometers installed upgradient and downgradient of the potential contaminant source, a representative description of water level or fluid pressure monitoring; and

f. a description of man-made influences that may affect the hydrogeology of the site.

2. Soils

The Permittee shall conduct a program to characterize the soil and rock units above the water table in the vicinity of the contaminant release(s). Such characterization shall include, but not be limited to, the following information:

a. surface soil distribution;

b. soil profile, including ASTM classification of soils;

c. transects of soil stratigraphy;

d. saturated hydraulic conductivity;

e. porosity;

f. cation exchange capacity (CEC);

g. soil pH;

h. particle size distribution;

i. depth of water table;

j. moisture content;

k. effect of stratification on unsaturated flow;

l. infiltration;

m. evapotranspiration;

n. residual concentration of contaminants in soil; and

o. mineral and metal content.

B. SOURCE CHARACTERIZATION

The Permittee shall collect analytical data to completely characterize the wastes and the areas where wastes have been placed, including: type, quantity, physical form, disposition (containment or nature of deposits), and the facility characteristics affecting release (e.g., facility security, and engineered barriers). This shall include quantification of the following specific characteristics, at each source area:

1. Unit/Disposal Area Characteristics:

   a. location of unit/disposal area;

   b. type of unit/disposal area;

   c. design features;

   d. operating practices (past and present);

   e. period of operation;

   f. age of unit/disposal area;

   g. general physical conditions;

   h. method used to close the unit/disposal area;

2. Waste Characteristics:

   a. type of waste placed in unit;

   b. physical and chemical characteristics; and

   c. migration and dispersal characteristics of the waste.

The Permittee shall document the procedures used in making the above determinations.

C. CONTAMINATION CHARACTERISTICS

The Permittee shall collect analytical data on ground water, soils, surface water, sediment, and subsurface gas contamination when necessary to characterize contamination from a SWMU. This data shall be sufficient to define the extent, origin, direction, and rate of movement of contaminant plumes. Data shall include time and location of sampling, media sampled, concentrations found, conditions during sampling, and the identity of the individual(s) performing the sampling and analysis. Each media (ground water, surface water, soil, air, and gas) must be investigated. If the Permittee believes certain media could not be affected by a release from a specific unit, a detailed justification for not investigating that media must be provided. The Permittee shall address the following types of contamination at the facility:

1. Ground Water Contamination

The Permittee shall conduct a Ground Water Investigation to characterize any plumes of contamination at the facility. This investigation shall at a minimum provide the following information:

a. a description of the horizontal and vertical extent of any immiscible or dissolved plume(s) originating from the facility;

b. the horizontal and vertical direction of contamination movement;

c. the velocity of contaminant movement;

d. the horizontal and vertical concentration profiles of any Appendix IX constituents;

e. an evaluation of factors influencing the plume movement; and

f. an extrapolation of future contaminant movement.

The Permittee shall document the procedures used in making the above determinations (e.g., well design, well construction, geophysics, modeling, etc.).

2. Soil Contamination

The Permittee shall conduct an investigation to characterize the contamination of the soil and rock units above the water table in the vicinity of the contaminant release. The investigation shall include the following information:

a. a description of the vertical and horizontal extent of contamination;

b. a description of contaminant and soil chemical properties within the contaminant source area and plume migration and transformation;

c. specific contaminant concentrations;

d. the velocity and direction of contaminant movement; and

e. an extrapolation of future contaminant movement.

The Permittee shall document the procedures used in making the above determinations.

3. Surface Water Contamination

The Permittee shall conduct a surface water investigation to characterize contamination in surface water bodies resulting from contaminant releases at the facility. The investigation shall include the following:

a. a description of the horizontal and vertical extent of any immiscible or dissolved plumes originating from the facility, and the extent of contamination in the underlying sediments;

b. the horizontal and vertical direction and velocity of contaminant

movement;

c. an evaluation of the physical, biological, chemical, and radiochemical factors influencing contaminant movement;

d. an extrapolation of future contaminant movement; and

e. a description of the chemistry and radiochemistry of the contaminated surface waters and sediments. This includes determining the pH, total dissolved solids, specific contaminant concentrations, etc.

The Permittee shall document the procedures used in making the above determinations.

4. Air Contamination

The Permittee shall conduct an investigation to characterize the particulate and gaseous contaminants released into the atmosphere.

This investigation shall provide the following information:

a. a description of the horizontal and vertical direction and velocity of contaminant movement;

b. the rate and amount of the release; and

c. the chemical, radiochemical, and physical composition of the contaminants released, including horizontal and vertical concentration profiles.

5. Subsurface Gas

The Permittee shall provide information characterizing the nature, rate, and extent of releases of reactive gases from the units. Such information shall include, but not be limited to: provisions for monitoring subsurface gases released from the unit; and an assessment of the potential for these releases to have a threat to human health and/or the environment.

The Permittee shall document the procedures used in making the above determination.

D. POTENTIAL RECEPTORS

The Permittee shall collect data describing the human populations and environmental systems that are susceptible to contaminant exposure from the facility. Chemical and radiochemical analysis of biological samples may be needed. Data on observable effects in ecosystems may also be obtained.

TASK IV: INVESTIGATIVE ANALYSIS

The Permittee shall prepare an analysis and summary of all facility investigations and their results. The objective of this task shall be to ensure that the investigation data are sufficient in quality (e.g., quality assurance procedures have been followed) and quantity to describe the nature and extent of contamination, potential threat to human health and/or the environment, and to support the CMS, if one is required.

The Permittee shall analyze all facility investigation data outlined in Task III and prepare a report on the type and extent of contamination at the facility including sources and migration pathways. The report shall describe the extent of contamination (qualitative/quantitative) in relation to the background levels indicative for the area.

The Permittee shall identify all relevant, applicable, and appropriate standards for the protection of human health and the environment (e.g., National Ambient Air Quality Standards, Federally-approved State water quality standards, ground water protection standards, etc.).

TASK V: REPORTS

A. PRELIMINARY AND WORKPLAN

The Permittee shall submit to the Director or designee the DOCC (Task I) and the RFI Workplan (Task II) as described in the Permit.

B. PROGRESS

The Permittee shall at a minimum provide the Director or designee with signed, semi-annual progress reports containing:

1. A description and estimate of the percentage of the RFI completed;
2. Summaries of all findings to date;
3. Summaries of all changes made in the RFI during the reporting period;
4. Summaries of all contacts relevant to corrective action with representatives of the local community, public interest groups or State government during the reporting period;
5. Summaries of all problems or potential problems relevant to corrective action encountered during the reporting period;
6. Actions being taken to rectify problems;
7. Changes in key project personnel during the reporting period; and
8. Projected work for the next reporting period.

C. RFI REPORT

The Permittee shall submit one (1) hardcopy and one (1) electronic copy of the RFI Report for the Director or designee's review. The Director or designee will either approve or disapprove the RFI Report in writing. In the event of disapproval (in whole or in part) of the plan, the Director or designee will specify any deficiencies in writing. The Permittee shall incorporate the comments in a revised RFI Report within thirty (30) days of receipt of the disapproval by the Director or designee. Should the Permittee take exception to all or part of the disapproval, the Permittee may invoke dispute resolution as outlined by Permit Module XII(b), Condition B.5., Standard Conditions, above. If necessary to accomplish matters of noted deficiencies of dispute resolution, the Director or designee will make further modifications as required. If the Director or designee modifies the RFI Report, this modified report becomes the approved RFI Report subject to the Permittee's rights to dispute resolution outlined by Permit Module XII(b), Condition B.5., Standard Conditions.

R. **SCOPE OF WORK FOR A CORRECTIVE MEASURE STUDY (CMS)**

[FINAL RADD APPROVED OCTOBER 23, 2012]

PURPOSE

The purpose of this CMS is to develop and evaluate the corrective action alternative or alternatives and to recommend the corrective measure or measures to be taken by the Permittee.

The Permittee shall furnish the personnel, materials, and services necessary to prepare the CMS, except as otherwise specified.

If the Permittee believes that certain requirements of the scope of work are not applicable, the specific requirements shall be identified and a detailed rationale for inapplicability shall be provided.

PLAN

The Permittee shall submit a CMS Plan to accomplish all pertinent work of this Condition, Tasks VI-IX, and as outlined in Permit Module XII(b), Condition K., CMS Plan.

SCOPE

The CMS consists of four tasks:

Task VI: Identification and Development of the Corrective Measure Alternative or Alternatives

A. Description of Current Situation

B. Establishment of Corrective Action Objectives

C. Laboratory, Bench-Scale, and/or Pilot Study

D. Screening of Corrective Measures Technologies

E. Identification of the Corrective Measure Alternative or Alternatives

Task VII: Evaluation of the Corrective Measure Alternative(s)

A. Technical/Environmental/Human Health/Institutional

B. Cost Estimate

Task VIII: Justification and Recommendation of the Corrective Measure(s)

A. Technical

B. Human Health

C. Environmental

Task IX: Reports

A. Progress

B. CMS Report

The required information shall include each item specified under Permit Module XII(b), Condition R., Scope of Work for a CMS, Tasks VI-IX. It is mandatory that the work of the Tasks VI-IX be sufficient to allow for immediate design implementation without requiring further study and/or for analysis. Since these required items are essential elements of this Permit, failure to submit any of these elements or submission of inadequate or insufficient information may subject the Permittee to enforcement action under the Arkansas Hazardous Waste Management Act which may include fines, suspension, or revocation of the Permit.

TASK VI: IDENTIFICATION AND DEVELOPMENT OF THE CORRECTIVE ACTION ALTERNATIVE OR ALTERNATIVES

Based on the results of the RFI, the Permittee shall identify, screen, and develop the alternative(s) for removal, containment, treatment and/or other remediation of the contamination based on the objectives established for the corrective action.

A. DESCRIPTION OF CURRENT SITUATION

The Permittee shall submit an update to the information describing the current situation at the facility and the known nature and extent of the contamination as documented by the RFI report. The Permittee shall provide an update to information presented in Task I of the RFI to the Director or designee regarding previous response activities and any interim measures which have or are being implemented at the facility. The Permittee shall also make a facility-specific statement of the purpose for the response, based on the results of the RFI. The statement of purpose should identify the actual or potential exposure

pathways that should be addressed by corrective measures.

B. ESTABLISHMENT OF CORRECTIVE ACTION OBJECTIVES

The Permittee, in conjunction with the Director or designee, shall establish site specific objectives for the corrective action. These objectives shall be based on public health and environmental criteria, information gathered during the RCRA Facility Investigation, EPA guidance and the requirements of any applicable State and Federal statutes. At a minimum, all corrective actions concerning ground water releases from solid waste management units must be consistent with, and as stringent as, those required under APC&EC Regulation No. 23 §264.101.

C. LABORATORY, BENCH-SCALE, AND/OR PILOT-SCALE STUDY

When a new technology is being proposed or similar waste streams have not routinely been treated or disposed using the technology the Permittee shall conduct laboratory, bench-scale, and/or pilot-scale studies to determine the applicability of a corrective measure technology or technologies to the facility conditions. The Permittee shall analyze the technologies, based on literature review, vendor contracts, and past experience to determine the testing requirements.

The Permittee shall develop a testing plan identifying the type(s) and goal(s) of the study(ies), the level of effort needed, and the procedures to be used for data management and interpretation. The plan goals shall be sufficiently broad to allow the Permittee to prepare corrective measures alternative(s) which can be implemented in the CMI Work [Permit Module XII(b), Condition S., Scope of Work for the CMI] without further study in the CMI phase.

Upon completion of testing, the Permittee shall evaluate the testing results to assess the technology or technologies with respect to the site-specific questions identified in the test plan. The Permittee shall prepare a report summarizing the testing program and its results, both positive and negative.

D. SCREENING OF CORRECTIVE MEASURE TECHNOLOGIES

The Permittee shall review the results of the RFI and assess the technologies which are applicable to the facility. The Permittee shall screen the preliminary corrective measure technologies to eliminate those that may prove infeasible to implement, that rely on technologies unlikely to perform satisfactorily or reliably, or that do not achieve the corrective measure objective within a reasonable time period. This screening process focuses on eliminating those technologies which have severe limitations for a given set of waste and site-specific conditions. The screening step may also eliminate technologies based on inherent technology limitations.

Site, waste, and technology characteristics which are used to screen inapplicable technologies are described in more detail below:

1. Site Characteristics

Site data should be reviewed to identify conditions that may limit or promote the use of certain technologies. Technologies whose use is clearly precluded by site characteristics should be eliminated from further consideration;

2. Waste Characteristics

Identification of waste characteristics that limit the effectiveness or feasibility of technologies is an important part of the screening process. Technologies clearly limited by these waste characteristics should be eliminated from consideration. Waste characteristics particularly affect the feasibility of in-situ methods, direct treatment methods, and land disposal (on/off-site); and

3. Technology Limitations

The level of technology development, performance record, and inherent construction, operation and maintenance problems shall be identified for each technology considered. Technologies that are unreliable, perform poorly, or are not fully demonstrated may be eliminated in the screening process. For example, certain treatment methods that have been developed to a point where they can be implemented in the field without extensive technology transfer or development are suitable, but are not suitable if the opposite is true. Technologies which cannot be implemented under the CMI work phase without additional study in the CMI phase must be eliminated.

E. IDENTIFICATION OF THE CORRECTIVE MEASURE ALTERNATIVES

The Permittee shall develop the corrective measure alternatives based on the corrective measure objectives and analysis included herein (Task VI). The Permittee shall rely on engineering practice to determine which of the previously identified technologies appear most suitable for the site.

Technologies can be combined to form the overall corrective action alternatives. The alternatives developed should represent a workable number of options that each appear to adequately address all site problems and corrective action objectives. Each alternative may consist of an individual technology or a combination of technologies. The Permittee shall document the reasons for excluding technologies, identified herein (Task VI), as supplemented in the development of the alternative.

TASK VII: EVALUATION OF THE CORRECTIVE MEASURE ALTERNATIVE OR ALTERNATIVES

The Permittee shall describe each corrective measure alternative that passed the Initial Screening in Task VI and evaluate each corrective measure alternative and its components. The evaluation shall be based on technical, environmental, human health and institutional concerns. The Permittee shall also develop cost estimates for each corrective measure.

A. TECHNICAL/ENVIRONMENTAL/HUMAN HEALTH/INSTITUTIONAL

The Permittee shall provide a description of each corrective measure alternative which includes but is not limited to the following: preliminary process flow sheets, preliminary sizing and type of construction for buildings and structures, and rough quantities of utilities required. The Permittee shall evaluate each alternative in the four following areas:

1. Technical

The Permittee shall evaluate each corrective measure alternative based on performance, reliability, implementability, and safety.

a. The Permittee shall evaluate performance based on the effectiveness and useful life of the corrective measure.

i. Effectiveness shall be evaluated in terms of the ability to perform intended functions such as containment, diversion, removal, destruction, or treatment. The effectiveness of each corrective measure shall be determined either through design specifications or by performance evaluation. Any specific waste or site characteristics which could potentially impede effectiveness shall be considered. The evaluation should also consider the effectiveness of combinations of technologies.

ii) Useful life is defined as the length of time the level of effectiveness can be maintained. Most corrective measure technologies, with the exception of destruction, deteriorate with time. Often, deterioration can be slowed through proper system operation and maintenance, but the technology eventually may require replacement. Each corrective measure shall be evaluated in terms of the projected service lives of its component technologies. Resource availability in the future life of the technology, as well as appropriateness of the technologies, must be considered in estimating the useful life of the project.

b. The Permittee shall provide information on the reliability of each corrective measure including their operation and maintenance requirements and their demonstrated reliability:

i. Operation and maintenance requirements include the frequency and complexity of necessary operation and maintenance. Technologies requiring frequent or complex operation and maintenance activities should be regarded as less reliable than technologies requiring little or straightforward operation and

maintenance. The availability of labor and materials to meet these requirements shall also be considered; and

ii. Demonstrated and expected reliability is a way of measuring the risk and effect of failure. The Permittee should evaluate whether the technologies have been used effectively under analogous conditions, whether the combination of technologies have been used together effectively, whether failure of any one technology has an immediate impact on receptors, and whether the corrective measure has the flexibility to deal with uncontrollable changes at the site.

c. The Permittee shall describe the implementability of each corrective measure including the relative ease of installation (constructability) and the total time required to achieve a given level of response:

i. Constructability is determined by conditions both internal and external to the facility conditions and includes such items as location of underground utilities, depth to water table, heterogeneity of subsurface materials, and location of the facility (i.e., remote location vs. a congested urban area). The Permittee shall evaluate what measures can be taken to facilitate construction under these conditions. External factors which affect implementation include the need for special permits or agreements, equipment availability, and the location of suitable off-site treatment or disposal facilities;

ii. Two components of time shall be addressed: the time it takes to implement a corrective measure and the time it takes to actually see beneficial results. Beneficial results are defined as the reduction of contamination to some acceptable, pre-established level.

d. The Permittee shall evaluate each corrective measure alternative with regard to safety. This evaluation shall include threats to the safety of nearby communities and environments as well as those to workers during implementation. Factors to consider include fire, explosion, and exposure to hazardous substances.

2. Environmental

The Permittee shall perform an Environmental Assessment for each alternative. The Environmental Assessment shall focus on facility conditions and pathways of contamination actually addressed by each alternative. The Environmental Assessment for each alternative will include, at a minimum, an evaluation of: the short- and long-

term beneficial and adverse effects of the response alternative, any adverse effects on environmentally sensitive areas, and an analysis of measures to mitigate adverse impacts.

3. Human Health

The Permittee shall assess each alternative in terms of the extent which it mitigates short- and long-term potential exposure to any residual contamination and protects human health both during and after implementation of the corrective measure. The assessment shall describe the levels and characterizations of contaminants on-site, potential exposure routes, and potentially affected populations. Each alternative shall be evaluated to determine the level of exposure to contaminants and the reduction over time. For management of mitigation measures, the relative reduction of impact shall be determined by comparing residual levels of each alternative with existing criteria, standards, or regulations acceptable to the Director or designee.

4. Institutional

The Permittee shall assess relevant institutional needs for each alternative. Specifically, the effects of Federal, State, and local environmental and public health standards, regulations, guidance, advisories, ordinances, or community relations on the design, operation, and timing of each alternative.

B. COST ESTIMATE

The Permittee shall develop an estimate of the cost of each corrective measure alternative (and for each phase or segment of the alternative). The cost estimate shall include capital and operation and maintenance costs.

1. Capital costs consist of direct (construction) and indirect (non-construction and overhead) costs.

   a. Direct capital costs include:

      i. Construction costs: Cost of materials, labor (including fringe benefits and worker's compensation), and equipment required to install the corrective measure alternative.

      ii. Equipment costs: Costs of treatment, containment, disposal, and/or service equipment necessary to implement the action; these materials remain until the corrective action is completed;

      iii. Land and site development costs: Expenses associated with purchase of land and development of existing property; and

      iv. Building and services costs: Costs of process and nonprocess buildings, utility connections, purchased services, and disposal costs.

   b. Indirect capital costs include:

i. Engineering expenses: Costs of administration, design, construction supervision, drafting, and testing of corrective measure alternatives;

ii. Legal fees and license or permit costs: Administrative and technical costs necessary to obtain licenses and permits for installation and operation;

iii. Start-up and shakedown costs: Costs incurred during corrective measure start-up; and

iv. Contingency allowances: Funds to cover costs resulting from unforeseen circumstances, such as adverse weather conditions, strikes, and inadequate facility characterization.

2. Operation and maintenance costs are post-construction costs necessary to ensure continued effectiveness of a corrective measure. The Permittee shall consider the following operation and maintenance cost components:

a. Operating labor costs: Wages, salaries, training, overhead, and fringe benefits associated with the labor needed for post-construction operation;

b. Maintenance materials and labor costs: Costs for labor, parts, and other resources required for routine maintenance of facilities and equipment;

c. Auxiliary materials and energy: Costs of such items as chemicals and electricity for treatment plant operations, water and sewer service, and fuel;

d. Purchased services: Sampling costs, laboratory fees, and professional fees for which the need can be predicted;

e. Disposal and treatment: Costs of transporting, treating, and disposing of waste materials, such as treatment plant residues generated during operation;

f. Administrative costs: Costs associated with administration of corrective measure operation and maintenance not included under other categories;

g. Insurance, taxes, and licensing costs: Costs of such items as liability and sudden accidental occurrence insurance; real estate taxes on purchased land or rights-of-way; licensing fees for certain technologies; and permit renewal and reporting costs;

h. Maintenance reserve and contingency funds: Annual payments into escrow funds to cover (1) costs of anticipated replacement or rebuilding of equipment and (2) any large unanticipated operation and maintenance

costs; and

i. Other costs: Items that do not fit any of the above categories.

TASK VIII: JUSTIFICATION AND RECOMMENDATION OF THE CORRECTIVE MEASURE OR MEASURES

The Permittee shall justify and recommend a corrective measure alternative using technical, human health, and environmental criteria. This recommendation shall include summary tables which allow the alternative or alternatives to be understood easily. Tradeoffs among health risks, environmental effects, and other pertinent factors shall be highlighted, and the corrective measure alternative or alternatives to be implemented based on the results of Tasks VI and VII must be approved by the Director or designee before implementation. The Director or designee may also choose a different remedy or modify the recommended remedy in responding to and approving the Corrective Measures Report, Task IX, or in response to public comments on the Draft RADD [Permit Module XII(b), Condition R., Scope of Work for a CMS, Task IX.C]. At a minimum, the following criteria will be used to justify the final corrective measure or measures:

A. TECHNICAL

1. Performance - corrective measure or measures which are most effective at performing their intended functions and maintaining the performance over extended periods of time will be given preference;

2. Reliability - corrective measure or measures which do not require frequent or complex operation and maintenance activities and have proven effective under waste and facility conditions similar to those anticipated will be given preference;

3. Implementability - corrective measure or measures which can be designed immediately upon approval and can be constructed and operated to reduce levels of contamination to attain or exceed applicable standards in the shortest period of time will be preferred; and

4. Safety - corrective measure or measures which pose the least threat to the safety of nearby residents and environments as well as workers during implementation will be preferred.

B. HUMAN HEALTH

The corrective measure or measures must comply with existing U.S. EPA criteria, standards, or regulations for the protection of human health. Corrective measures which provide the minimum level of exposure to contaminants and the maximum reduction in exposure with time are preferred.

C. ENVIRONMENTAL

The corrective measure(s) posing the least adverse impact (or greatest improvement) on the environment over the shortest period of time will be favored.

TASK IX: REPORTS

The Permittee shall prepare a CMS Report presenting the results of Tasks VII and VIII recommending a corrective measure alternative. One (1) hardcopy and one (1) electronic copy of the CMS Report shall be provided to the Director or designee by the Permittee.

A. PROGRESS

The Permittee shall at a minimum provide the Director or designee with signed semiannual progress reports containing:

1. A description and estimate of the percentage of the CMS completed;
2. Summaries of all findings;
3. Summaries of all changes made in the CMS during the reporting period;
4. Summaries of all contacts related to corrective action with representatives of the local community, public interest groups, or State government during the reporting period;
5. Summaries of all problems or potential problems encountered during the reporting period;
6. Actions being taken to rectify problems;
7. Changes in personnel during the reporting period;
8. Projected work for the next reporting period; and
9. Copies of daily reports, inspection reports, laboratory/monitoring data, etc.

B. CONTENT OF CMS REPORT

The Report shall at a minimum include:

1. A Summary of the Corrective Measure or Measures and Rationale:
    a. Description of the corrective measure or measures and rationale for selection;
    b. Performance expectations;
    c. Preliminary design criteria and rationale;
    d. General operation and maintenance requirements;
    e. Long-term monitoring requirements
2. Design and Implementation Precautions:

a. Special technical problems;

b. Additional engineering data required;

c. Permits and regulatory requirements;

d. Access, easements, right-of-way;

e. Health and safety requirements; and

f. Community relations activities.

3. Cost Estimates and Schedules:

a. Capital cost estimate;

b. Operation and maintenance cost estimate; and

c. Project schedule (design, construction, operation).

C. CMS REPORT AND RADD

The Director or designee will either tentatively approve or disapprove the CMS Report in writing along with his development of a Draft RADD conforming to the process of the ADEQ Guidance Document titled Checklist - Remedial Action Decision Document, Outline for a Proposed Plan of Action. The purpose of the Draft RADD is to choose the corrective action remedy for each unit or group of units. In the event of disapproval (in whole or in part) of the Report prior to public notice of the Draft RADD, the Director or designee will specify any deficiencies in writing. The Permittee shall incorporate the comments in a revised CMS Report within thirty (30) days of receipt of the disapproval by the Director or designee. However, in most cases it will be appropriate for the Director or designee to develop a Draft RADD, public notice the Draft RADD, and require modifications to the CMS Report to conform to the Draft RADD and/or to address public comments to the Draft RADD.

The Director or designee shall prepare a Public Notice for the CMS Report and Draft RADD. The Permittee shall bear the cost of the Public Notice. The Director or designee will consider comments from the public prior to the approval of the CMS Report and in preparation of the Final RADD. Should the Permittee take exception to all or part of the disapproval or modified approval through the RADD of the CMS Report, the Permittee may invoke dispute resolution as outlined by Permit Module XII(b), Condition B.5., Standard Conditions, above after the public comment period. If necessary to accomplish matters of noted deficiencies or of dispute resolution, the Director or designee will make further modifications as required. If the Director or designee modifies the CMS Report, this modified report becomes the approved CMS Report. It may be necessary for the Director or designee to develop a modified Draft RADD and submit it a second time for public review and comment followed by the CMS Report approval as outlined above.

The CMS Report must include a schedule for implementing all corrective measure

designs and construction as applicable. This schedule is subject to approval and modification through the RADD.

S. SCOPE OF WORK FOR THE CORRECTIVE MEASURE IMPLEMENTATION (CMI)

[FINAL RADD APPROVED OCTOBER 23, 2012]

PURPOSE

The purpose of this CMI program is to design, construct, operate, maintain, and monitor the performance of the corrective measures selected through the Final RADD to protect human health and the environment. The Permittee shall furnish all personnel, materials, and services necessary for the implementation of the corrective measure or measures.

SCOPE

The CMI program consists of four tasks:

Task X: CMI Program Plan

- A. Program Management Plan
- B. Community Relations Plan

Task XI: Corrective Measure Design

- A. Construction Drawings and Specifications
- B. Operation and Maintenance Plan
- C. Monitoring and Effectiveness Evaluation
- D. Cost Estimate
- E. Project Schedule
- F. Construction Quality Assurance Objectives
- G. Health and Safety Plan
- H. Design Phases

Task XII: Corrective Measure Construction

- A. Responsibility and Authority
- B. Construction Quality Assurance Personnel Qualifications
- C. Inspection Activities
- D. Sampling Requirements
- E. Documentation

Task XIII: Reports

A. Progress

B. CMI Program Plan

C. CMI Reports

TASK X: CMI PROGRAM PLAN

The Permittee shall prepare a CMI Program Plan. This program shall include the development and implementation of several documents, which require concurrent preparation. The Permittee shall implement this Task X as well as Task XI work concurrently. It may be necessary to revise plans as the work is performed to focus efforts on a particular problem. The Program Plan shall include the following:

A. PROGRAM MANAGEMENT PLAN

The Permittee shall prepare a Program Management Plan which will document the overall management strategy for performing the design, construction, operation, maintenance and monitoring of corrective measures(s). All corrective measure designs shall be scheduled and implemented simultaneously, unless otherwise approved in the Final RADD, and the plan shall reflect this provision. The plan shall document the responsibility and authority of all organizations and key personnel involved with the implementation. The Program Management Plan shall also include a description of qualifications of key personnel directing the CMI Program, including contractor personnel. The plan shall include but not be limited to the following:

1. Discussion of the design strategy and the design basis, including:
    a. Compliance with all applicable or relevant environmental and public health standards; and
    b. Minimization of environmental and public interests.
2. Discussion of the technical factors of importance including:
    a. Use of currently accepted environmental control measures and technology;
    b. The constructability of the design;
    c. Use of currently acceptable construction practices and techniques;
    d. Use of facilities and designs which will provide highly reliable, easily maintained, and where possible, visual inspection of critical, but hard to access, facilities such as leak collection pipes; and
    e. Overview description of how the design operates (as applicable) and includes this on construction drawings.
3. Description of assumptions made and detailed justification of these assumptions.

4. Discussion of the possible sources of error and references to possible operation and maintenance problems.

5. Appendices including:

   a. Sample calculations (one example presented and explained clearly for significant or unique design calculations);

   b. Derivation of equations essential to understanding the report; and

   c. Results of laboratory and/or field tests.

B. COMMUNITY RELATIONS PLAN

The plan shall include but not be limited to the following:

1. Specific activities which shall be conducted during the design stage are as follows:

   a. Revise the facility Community Relations Plan to reflect knowledge of citizen concerns and involvement at this stage of the process; and

   b. Prepare and distribute a public notice and an updated fact sheet at the completion of engineering design.

2. Specific activities to be conducted during the construction stage could be the following: Depending on citizen interest at a facility at this point in the corrective action process, community relations activities could range from group meetings to fact sheets on the technical status.

The Permittee shall revise the Community Relations Plan to include any changes in the level of concern of information needs to the community during design and construction activities.

TASK XI: CORRECTIVE MEASURE DESIGN

[CORRECTIVE MEASURES DESIGN APPROVED JULY 31, 2013]

The Permittee shall prepare design documents (Design Document submission) to implement the corrective measures(s) at any site that requires corrective measures. All individual designs shall be implemented simultaneously immediately upon final approval of the selected corrective measure in the Final RADD and shall include the following:

A. CONSTRUCTION DRAWINGS AND SPECIFICATIONS

The Permittee shall develop clear and comprehensive construction drawings and specifications. The specifications shall follow the principles established in the Manual of Practice published by the Construction Specifications Institute (CSI) and shall be organized in the CSI 16-division, three-part section format with five digit section numbers. These design documents shall include but not be limited to the following:

1. Detailed drawings of the proposed design including:
    a. Plans, profiles, cross sections, details, etc;
    b. Quantitative flow sheets;
    c. Piping and instrument diagrams;
    d. Plans for borrow areas (as applicable);
2. Detailed specifications including:
    a. All items of design including quality of materials and workmanship;
    b. Schedule of quality control certification and testing for all items of construction;
    c. Investigative results for borrow areas (as applicable);

These construction drawings and specifications shall be submitted simultaneously with the Design Document submission.

B. OPERATION AND MAINTENANCE (O & M) PLAN

The Permittee shall prepare an O & M Plan to cover both implementation and long term maintenance of the corrective measure. The plan shall be composed of the following elements:

1. Description of normal O&M:
    a. Description of tasks for operation;
    b. Description of tasks for maintenance;
    c. Description of prescribed treatment or operation conditions; and
    d. Schedule showing frequency of each O&M task.
2. Description of potential operating problems:
    a. Description and analysis of potential operation problems;
    b. Description of quantitative measurements of downtime or non-operational time for each facility and/or unit thereof;
    c. Sources of information regarding problems; and
    d. Common and/or anticipated remedies.
3. Description of routine monitoring and laboratory testing:
    a. Description of monitoring tasks;
    b. Description of method to measure leachate collection and visually inspect (TV camera or otherwise) leak detection pipes if a leak develops;

c. Description of required laboratory tests and their interpretation;

d. Required QA/QC; and

e. Schedule of monitoring frequency and date, if appropriate, when monitoring may cease.

4. Description of alternate O&M:

a. Should system fail, alternate procedures to prevent undue hazard; and

b. Analysis of vulnerability, additional resource requirements, and additional corrective action facilities needed should a failure occur.

5. Safety plan:

a. Description of precautions, of necessary equipment, etc., for site personnel; and

b. Safety tasks required in event of system failure.

6. Description of equipment and:

a. Equipment identification;

b. Installation of monitoring components;

c. Maintenance of site equipment;

d. Replacement schedule for equipment and installed components; and

e. List of spare parts maintained on site with an inventory checklist updated monthly for the spare parts.

7. Records and reporting mechanisms required:

a. Daily operating logs;

b. Laboratory records;

c. Records for operating costs;

d. Mechanism for reporting emergencies;

e. Personnel and maintenance records;

f. Downtime for each applicable facility or unit; and

g. Monthly reports to the Director or designee which shall especially identify problems, failures, and corrective actions taken for such failures.

An O&M Plan shall be submitted simultaneously with the Design Document submission.

C. MONITORING AND EFFECTIVENESS EVALUATION

The Permittee shall develop a system for monitoring and evaluating each corrective measure for each unit or units as necessary to show that the intended remedy and its environmental protection have been and continue to be met. This proposal by the Permittee shall include a sampling and analysis and quality assurance plan (compliant with RFI standards), monitoring and reporting requirements, and the basis for determining the success or failure of the remedy for the particular systems as well as a proposal for initiating additional corrective measures compliant with the CMI Standards of this permit. This document shall be submitted simultaneously with the Design Document submission.

D. COST ESTIMATE

The Permittee shall develop cost estimates for the purpose of assuring that the facility has the financial resources necessary to construct and implement the corrective measure. The cost estimate developed in the Corrective Measure Study shall be refined to reflect the more detailed/accurate construction drawings and specifications being developed. The cost estimate shall include both capital and operation and maintenance costs and must contain contingency costs. The Cost Estimate shall be submitted simultaneously with the Design Document submission. The Cost Estimate must be updated for contract award costs provided to the Director or designee and, once approved by the Director or designee, shall be the basis for updating the Corrective Action Financial Assurance required under this permit.

E. PROJECT SCHEDULE

The Permittee shall develop a detailed Project Schedule for construction and implementation of the corrective measure(s) which identifies timing for initiation and completion of all critical path tasks. This shall reflect simultaneous and coordinated implementation of individual designs. The Permittee shall specifically identify dates for completion of the project(s) and major interim milestones which shall be enforceable terms of this permit. A Project Schedule shall be submitted simultaneously with the Design Document submission.

F. CONSTRUCTION QUALITY ASSURANCE OBJECTIVES

The Permittee shall identify and document the objective and framework for the development of a construction quality assurance program including, but not limited to the following: responsibility and authority, personnel qualifications, inspection activities, sampling requirements, and documentation. A detailed Construction Quality Assurance Plan (CQAP) shall be developed for each corrective measure design. The CQAP shall include a detailed list and frequency of quality control tests to be performed for all items of construction and shall include sampling and analysis procedures for this work. Remediation contractor quality control and quality assurance are not acceptable for certification of this work to the Director or designee. This work must be accomplished

by a party independent of the remediation contractor and by a third party directly responsible to the Permittee. Task XII gives further details for the provisions of the CQAP which shall be submitted simultaneously with the Design Document submission.

G. HEALTH AND SAFETY PLAN

The Permittee shall modify the Health and Safety Plan developed for the RFI to address the activities to be performed at the facility to implement the corrective measure(s). This document shall be submitted simultaneously with the Design Document submission.

H. DESIGN PHASES

The design (Design Document submission) of major and/or complicated corrective measure(s) should include the applicable phases outlined below. The preliminary and intermediate designs will not be required by the Director or designee for noncomplex projects, and the Permittee must request approval from the Director or designee for any projects for which these design phases will be used.

1. Preliminary Design

The Permittee shall submit the Preliminary design when the design effort is approximately 30 percent complete. At this stage the Permittee shall have field verified the existing conditions of the facility. The preliminary design shall reflect a level of effort such that the technical requirements of the project have been addressed and outlined so that they may be reviewed to determine if the final design will provide an operable and usable corrective measure. Supporting data and documentation defining the functional aspects of the program shall be provided with the design documents. The preliminary construction drawings by the Permittee shall reflect organization and clarity. The scope of the specifications shall be outlined in a manner reflecting the final specifications. The Permittee shall include with the preliminary submission design calculations reflecting the same percentage of completion as the designs they support.

2. Intermediate Design

Complex project design may necessitate review of the design documents between the preliminary and the prefinal/final design. At the discretion of the ADEQ, a design review may be required at 60 percent completion of the project. The intermediate design submittal should include the same elements as the prefinal design, but developed to further detail.

3. Prefinal and Final Design

The Permittee shall submit the prefinal/final design documents in two parts. The first submission shall be at 95 percent completion of design (i.e., prefinal). After approval of the prefinal submission, the Permittee shall execute the required revisions and submit the final documents 100 percent complete with reproducible drawings and specifications.

The prefinal design submittal shall consist of the Design Drawings and Specifications, CQAP, O & M Plan, Monitoring and Effectiveness Plan, Capital Costs for Final Design and for O & M Plan, Final Quality Assurance Plan, and Health and Safety Plan. The quality of the design documents should be such that the Permittee would be able to include them in a bid package and invite contractors to submit bids for the construction project.

4. Correlating Drawings and Specifications

General correlation between construction drawings and specifications is a basic requirement of any set of working construction drawings and specifications. Before submitting the project specifications, the Permittee shall:

a. Coordinate and cross-check the specifications, drawings, and CQAP; and

b. Complete the proofing of the edited specifications and required cross-checking of all drawings and specifications and CQAP.

These activities shall be completed prior to the 95 percent prefinal submittal to the Director or designee.

5. Equipment Start-up and Operator Training

The Permittee shall prepare, and include in the specifications governing treatment systems, contractor requirements for providing: appropriate service visits by experienced personnel to supervise the installation, adjustment, start-up, and operation of the treatment systems; and training covering appropriate operational procedures once the start-up has been successfully accomplished.

6. Additional Studies

CMI may require additional studies to address unknown or unforeseen problems which were not addressed in the CMS work phase, but this condition is not intended to allow inadequate CMS work requiring later supplementation (the CMS work must be sufficiently complete to allow CMI designs). At the direction of the Director or designee for any such studies required, the Permittee shall furnish all services, including field work as required, materials, supplies, plant, labor, equipment, investigations, studies, and superintendence. Sufficient sampling, testing and analysis shall be performed to optimize the required treatment and/or disposal operations and systems. There shall be an initial meeting of all principal personnel involved in the development of the program. The purpose will be to discuss objectives, resources, communication channels, roles of personnel involved, and orientation of the site, etc. The interim report shall present the results of the testing with the recommended treatment or disposal system (including options). A review conference shall be scheduled after the interim report has been reviewed by all interested parties. The final report of the testing shall include all data

taken during the testing and a summary of the results of the studies.

TASK XII: CORRECTIVE MEASURE CONSTRUCTION

Following Director or designee approval of the final design, the Permittee shall immediately implement construction of the corrective measure and the CQAP to ensure, with a reasonable degree of certainty, that a completed corrective measure(s) meets or exceeds all design criteria, drawings, and specifications. The CQAP is a facility specific document which must be submitted to the Director or designee with design submittals. At a minimum, the CQAP should include the elements which are summarized below and as necessary to fulfill the requirements of Permit Module XII(b), Condition S., Scope of Work for the CMI, Task XI.F. Upon Director or designee approval, the Permittee shall construct and implement the corrective measures in accordance with the approved design, schedule in the Design Document submission or in accordance with Permit Module XII(b), Condition T., Facility Submission, and the CQAP. The Permittee shall also carry out all elements of the approved Operation and Maintenance Plan as and when applicable to construction facilities.

A. RESPONSIBILITY AND AUTHORITY

The responsibility and authority of all organizations (i.e., technical consultants, construction firms, etc.) and key personnel involved in the construction of the corrective measure shall be described fully in the CQAP. The Permittee shall identify a CQA officer and the necessary supporting inspection staff.

B. CONSTRUCTION QUALITY ASSURANCE PERSONNEL QUALIFICATIONS

The qualifications of the CQA officer and supporting inspection personnel shall be presented in the CQAP to demonstrate that they possess the training and experience necessary to fulfill their identified responsibilities.

C. C. INSPECTION ACTIVITIES

The observations and tests that will be used to monitor the construction and/or installation of the components of the corrective measure(s) shall be summarized in the CQAP. The plan shall include the scope and frequency of each type of inspection. Inspections shall verify compliance with all environmental and engineering requirements and include, but not be limited to air quality and emissions monitoring records, waste disposal records (e.g., RCRA transportation manifests), specifications, designs, etc. The inspection should also ensure compliance with all health and safety procedures. In addition to oversight inspections, the Permittee shall conduct the following activities:

1. Preconstruction Inspection and Meeting

The Permittee shall conduct a preconstruction inspection and meeting with ADEQ to:

a. Review methods for documenting and reporting inspection data;

b. Review methods for distributing and storing documents and reports;

c. Review work area security and safety protocol;

d. Discuss any appropriate modifications of the CQAP to ensure that site-specific considerations are addressed; and

e. Conduct a site walk-around to verify that the design criteria, drawings, and specifications are understood and to review material and equipment storage locations.

f. To bring attention to all problems, discrepancies, etc., which are known to date to allow their resolution prior to begin of construction.

The preconstruction inspection and meeting shall be documented by a designated person, and minutes should be transmitted to all parties.

2. Prefinal Inspection

Upon preliminary project completion the Permittee shall notify the Director or designee for the purposes of conducting a prefinal inspection. The prefinal inspection will consist of a walk-through inspection of the entire project site. The inspection is to determine whether the project is complete and consistent with the contract documents and the Director or designee approved corrective measure. Any outstanding construction items discovered during the inspection will be identified and noted. Additionally, treatment equipment shall be operationally tested by the Permittee. The Permittee shall certify that the equipment has performed to meet the purpose and intent of the specifications. Retesting shall be completed where deficiencies are revealed. The prefinal inspection report should outline the outstanding construction items, actions required to resolve items, completion date for these items, and date for final inspection.

3. Final Inspection

Upon completion of any outstanding construction items, the Permittee shall notify the Director or designee for the purposes of conducting a final inspection. The final inspection will consist of a walk-through inspection of the project site. The prefinal inspection report will be used as a checklist with the final inspection focusing on the outstanding construction items identified in the prefinal inspection. Confirmation shall be made that outstanding items have been resolved.

D. SAMPLING REQUIREMENTS

The sampling activities, sample size, sample locations, frequency of testing, acceptance and rejection criteria, and plans for correcting problems as addressed in the project specifications should be presented in the CQAP.

E. DOCUMENTATION

Reporting requirements for CQA activities shall be described in detail in the CQAP. This

should include such items as daily summary reports, inspections data sheet, problem identification and corrective measures reports, design acceptance reports, and final documentation. Provisions for the final storage of all records should be presented in the CQAP. The documentation must be adequate to show that all verification tests of the CQAP and as necessary to verify the certification of corrective measure(s) called for by the CQAP.

TASK XIII: REPORTS

The Permittee shall prepare reports for the progress of development of the drawings, specifications, CQAP, etc., as set forth in Task XI and Task XII and to document the design, construction, operation, maintenance, and monitoring of the corrective measure(s). The documentation shall include but not be limited to the following:

A. PROGRESS

The Permittee shall at a minimum provide the Director or designee with signed, monthly progress reports containing:

1. A description and estimate of the percentage of the CMI completed (designs and/or construction);
2. Summaries of all findings, CQAP test results, and data;
3. Summaries of all changes made in the CMI during the reporting period;
4. Summaries of all contacts with representative of the local community, public interest groups or State government during the reporting period;
5. Summaries of all problems or potential problems encountered during the reporting period;
6. Actions being taken to rectify problems;
7. Changes in personnel associated with corrective measures during the reporting period;
8. Projected work for the next reporting period; and
9. Copies of daily reports, inspection reports, laboratory/monitoring data, etc.

B. CORRECTIVE MEASURE IMPLEMENTATION PROGRAM PLAN

1. The Permittee shall submit a Corrective Measure Implementation Program Plan as outlined in Task X;
2. The Permittee shall submit the Construction Drawings and Specifications, CQAP, Monitoring and Effectiveness Plan, Design Reports, Cost Estimate, Project Schedule, O & M Plan, and Health and Safety Plan as outlined in Task XI;
3. At the "completion" of the construction of the project, the Permittee shall submit a

Corrective Measure Implementation Report to the Director or designee. The Report shall document that the project is consistent with the design specifications and the CQAP, and that the corrective measure is performing adequately. The Report shall include, but not be limited to, the following elements:

a. Synopsis of the corrective measure and certification of the design and construction;

b. Explanation of any modifications to the drawings and why these were necessary for the project;

c. Listing of the criteria, established before the corrective measure was initiated, for judging the functioning of the corrective measure and also explaining any modification to these criteria;

d. Results of facility monitoring, indicating that the corrective measure will meet or exceed the performance criteria for effectiveness; and

e. Explanation of the operation and maintenance (including monitoring) to be undertaken at the facility.

This report shall include all of the daily inspection summary reports, inspection data sheets, problem identification and corrective measure reports, block evaluation reports, photographic reporting data sheets, design engineers' acceptance reports, all construction quality assurance results, analysis and certifications, deviations from designated material specifications (with justifying documentation), certification of the constructed corrective measure(s), and as-built drawings.

C. CMI REPORT

The Director or designee will either approve or disapprove the CMI Report in writing. In the event of disapproval (in whole or in part) of the Report, the Director or designee will specify any deficiencies in writing. The Permittee shall incorporate the comments in a revised CMI Report within thirty (30) days of receipt of the disapproval by the Director or designee. Should the Permittee take exception to all or part of the disapproval, the Permittee may invoke dispute resolution as outlined by Permit Module XII(b), Condition B.5., Standard Conditions, above. If necessary to accomplish matters of additional corrective action or of dispute resolution, the Director or designee will make further modifications as required and may require further corrective measures implementation. If the Director or designee modifies the CMI Report, this modified report becomes the approved CMI Report.

If the CMI Report (or the modified report) show that the intended remedy, and desired results, were not attained, the Director or designee can require additional corrective measures implementation to be developed and pursued under the appropriation conditions and tasks of this permit. In addition, if the monitoring and effectiveness system at

anytime show that the intended remedy has not been accomplished, the Director or designee can require additional corrective measures.

T. FACILITY SUBMISSIONS

Schedule for Corrective Measure Implementation (CMI):

SUBMISSION FOR CMI**		DUE DATE
Program Management Plan (Task X)		Concurrent with CMI Designs
Design Documents:		
CQAP		With prefinal Design **[COMPLETE]**
Design Phases (Task XI)*		
- Prefinal Design (95%)		120 days after approval of Corrective Measure Study and Final RADD **[COMPLETE]**
- Final Design (100%)		30 Days After Approval of Prefinal Design **[COMPLETE]**
Construction of Corrective Measures		As approved in submittals and in the CMS Report and Final RADD or as approved in schedules in CMI Designs.
CMI Report (Task XIII)		March 31, 2016

* For noncomplex projects, 95 percent complete submittals shall be made by the Permittee without going through the 30 percent and 60 percent submittal process. Design submittal time frames may be varied slightly to allow for submittal of 30 percent and 60 percent designs but only for complex projects, and such a provision must be approved by the Director or designee before developing such submittals.

** Unless otherwise stipulated and approved in the CMS Report and Final RADD.

Summary of Project Milestones – Completion of the CMI

Project Milestone	Due Date
Complete Soil Excavation and Disposal	January 31, 2016
Complete CMI Construction Activities	January 31, 2016
Conduct Prefinal Inspection	February 10, 2016
Conduct Final Inspection	March 11, 2016
Submit CMI Report	March 31, 2016
Issue Public Notice and Fact Sheet	June 29, 2016

END OF MODULE XII(b)

MODULE XII(B) APPENDIX INDEX

APPENDIX A

INTERIM MEASURES WORKPLAN

The Permittee shall submit to the Director or designee for review and approval an Interim Measures Workplan. The Workplan shall include the development of several plans which shall be prepared concurrently.

A. INTERIM MEASURES OBJECTIVES

The Workplan shall specify the objectives or the interim measures, demonstrate how the interim measures will abate releases, and, to the extent possible, be consistent and integrated with any long term solution at the facility. The Interim Measures Workplan shall include a discussion of the technical approach, engineering design, engineering plans, schedules, budget, and personnel. The Workplan shall also include a description of qualifications of personnel performing or directing the interim measures, including contractor personnel. This plan shall also document the overall management approach to the interim measures.

B. HEALTH AND SAFETY PLAN

The Permittee shall submit to the Director or designee for review and approval a facility Health and Safety plan.

1. Major elements of the Health and Safety Plan shall include:

    a. Facility description including availability of resources such as roads, water supply, electricity and telephone service;

    b. Description of the known hazards and evaluate the risks associated with the incident and with each activity conducted, including, but not limited to on and off-site exposure to contaminants during the implementation of interim measures at the facility.

    c. List of key personnel and alternates responsible for site safety, responses operations, and for protection of public health;

    d. Delineation of the work area;

    e. Description of the levels of protection to be worn by personnel in work area;

    f. Establishment of procedures to control site access;

    g. Description of decontamination procedures for personnel and equipment;

    h. Establishment of site emergency procedures;

    i. Plan for addressing emergency medical care for injuries and

toxicological problems;

j. Description of requirements for an environmental surveillance program;

k. Specification for routine and special training required for responders;

l. Establishment of procedures for protecting workers from weather-related problems;

m. Description of emission control equipment; and

n. Description of air monitoring during activities which may expose workers to air contaminants.

2. The Facility Health and Safety Plan shall be consistent with:

a. NIOSH Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities (1985)

b. EPA Order 1440.1 - Respiratory Protection;

c. EPA Order 1440.3 - Health and Safety Requirements for Employees engaged in Field Activities;

d. Facility Contingency Plan;

e. EPA Standard Operating Safety Guide (1984)

f. OSHA regulations particularly in 29 CFR 1910 and 1926;

g. State and local regulations; and

h. Other EPA guidance as provided.

3. The Health and Safety Plan shall be revised to address the activities to be performed at the facility to implement the interim measures.

C. COMMUNITY RELATIONS PLAN

The Permittee shall submit to the Director or designee for review and approval a plan for the dissemination of information to the public regarding interim measure activities and results. These activities shall include the preparation and distribution of fact sheets and participation in public meetings.

END OF APPENDIX A

APPENDIX B

INTERIM MEASURES INVESTIGATION PROGRAM

A. DATA COLLECTION QUALITY ASSURANCE PLAN

The Permittee shall submit to the Director or designee for review and approval a plan to document all monitoring procedures: sampling, field measurements and sample analysis performed during the investigations to characterize the source and contamination, so as to ensure that all information, data, and resulting decisions are technically sound and properly documented.

1. Data Collection Strategy

The strategy section of the Data Collection Quality Assurance Plan shall include but not be limited to the following:

a. Description of the intended uses for the data, and the necessary level of precision and accuracy for these intended uses;

b. Description of methods and procedures to be used to assess the precision, accuracy, and completeness of the measurement data;

c. Description of the rationale used to assure that the data accurately and precisely represent parameter variations at a sampling point, a process condition, or an environmental condition. Examples of factors which shall be considered and discussed include:

i. Environmental conditions at the time of sampling;

ii. Number of sampling points;

iii. Representativeness of selected analytical parameters.

2. Sampling and Field Measurements

The Sampling and Field Measurements section of the Data Collection Quality Assurance Plan shall discuss:

a. Selecting appropriate sampling and field measurement locations, depths, etc.;

b. Providing a sufficient number of sampling and field measurement sites;

c. Measuring all necessary ancillary data;

d. Determining which media are to be sampled (e.g., ground water, air, soil, sediment, etc.);

e. Determining which parameters are to be measured and where;

f. Selecting the frequency of sampling and field measurement and length of sampling period;

g. Selecting the types of sample (e.g., composites vs. grabs) and number of samples to be collected;

h. Documenting field sampling and field measurement operations and procedures, including:

i. Documentation of procedures for preparation of reagents or supplies which become a integral part of the sample (e.g., filters, and absorbing reagents);

ii. Procedures and forms for recording the exact location and specific considerations associated with sample and field measurement data acquisitions;

iii. Documentation of specific sample preservation method;

iv. Calibration of field devices;

v. Collection of replicate samples;

vi. Submission of field-biased blanks where appropriate;

vii. Potential interferences present at the facility;

viii. Construction materials and techniques associated with monitoring wells and piezometers;

ix. Field equipment listing and sample containers;

x. Sampling and field measurement order; and

xi. Decontamination procedures.

i. Selecting appropriate sample containers;

j. Sample preservation; and

k. Chain-of-custody, including:

i. Standardized field tracking reporting forms to establish sample custody in the field prior to shipment; and

ii. Pre-prepared sample labels containing all information necessary for effective sample tracking.

3. Sample Analysis

The Sample Analysis section of the Data collection Quality Assurance Plan shall specify the following:

a. Chain-of-custody procedures, including:
    i. Identification of a responsible party to act as sample custodian at the laboratory facility authorized to sign for incoming field samples, obtain documents of shipment, and verify the data entered onto the sample custody records;
    ii. Specification of laboratory sample custody log consisting of serially numbered standard lab-tracking report sheets; and
    iii. Specification of laboratory sample custody procedures for sample handling, storage, and dispersion for analysis.
b. Sample storage and holding times;
c. Sample preparation methods;
d. Analytical procedures, including:
    i. Scope and application of the procedure;
    ii. Sample matrix;
    iii. Potential interferences;
    iv. Precision and accuracy of the methodology; and
    v. Method detection limits.
e. Calibration procedures and frequency;
f. Data reduction, validation and reporting;
g. Internal quality control checks, laboratory performance and systems audits and frequency, including:
    i. Method blank(s);
    ii. Laboratory control sample(s);
    iii. Calibration check samples;
    iv. Replicate sample(s);
    v. Matrix-spiked sample(s);
    vi. "Blind" quality control sample(s);
    vii. Control charts;
    viii. Surrogate sample(s);

ix. Zero and span gases; and

x. Reagent quality control checks.

h. Preventative maintenance procedures and schedules;

i. Corrective action (for laboratory problems); and

j. Turnaround time.

B. DATA MANAGEMENT PLAN

The Permittee shall submit to the Director or designee for review and approval a Data Management Plan to document and track investigation data and results. This plan shall identify and set up data documentation materials and procedures, project file requirements, and project-related progress reporting procedures and documents. The plan shall also provide the format to be used to present the raw data and conclusions of the investigation.

1. Data Record

The data record shall include the following:

a. Unique sample or field measurement code;

b. Sampling or field measurement location and sample or measurement type;

c. Sampling or field measurement raw data;

d. Laboratory analysis ID number;

e. Property or component measured; and

f. Result of analysis (e.g., concentration).

2. Tabular Displays

The tabular displays shall include the following:

a. Unsorted (raw) data;

b. Results for each medium or for each constituent monitored;

c. Data reduction for numerical analysis;

d. Summary data.

3. Graphical Displays

The following data shall be presented in graphical formats (e.g., bar graphs, line graphs, area or plain maps, isopleth plots, cross-sectional plots or transects, three dimensional graphs, etc.):

a. Sampling location and sampling grid;

b. Boundaries of sampling area and areas where more data are required;

c. Levels of contamination at each sampling location;

d. Geographical extent of contamination;

e. Contamination levels, averages, and maxima;

f. Changes in concentration in relation to distance from the source, time, depth or other parameter; and

g. Features affecting intramedia transport; and

h. Potential receptors.

END OF APPENDIX B

APPENDIX C

INTERIM MEASURES DESIGN PROGRAM

A. DESIGN DRAWINGS AND SPECIFICATIONS

The Permittee shall submit to the Director or designee for review and approval clear and comprehensive design construction drawings and specifications which include but are not limited to the following:

1. Discussion of the design strategy and the design basis, including:
    a. Compliance with all applicable or relevant environmental and public health standards; and
    b. Minimization of environmental and public impacts.
2. Discussion of the technical factors of importance including:
    a. Use of currently accepted environmental control measures and technology;
    b. The constructability of the design; and
    c. Use of currently acceptable construction practices and techniques.
3. Description of assumptions made and detailed justification of these assumptions;
4. Discussion of the possible sources of error and references to possible operation and maintenance problems;
5. Detailed drawing of the proposed design including:
    a. Qualitative flow sheets;
    b. Quantitative flow sheets;
    c. Facility layout;
    d. Utility locations; and
    e. Piping and instrument diagrams.
6. Tables listing materials, equipment and specifications;
7. Tables giving material balances;
8. Appendices including:
    a. Sample calculations (one example presented and explained clearly for significant or unique design calculations);
    b. Derivation of equations essential to understanding the report; and

c. Results of laboratory or field tests.

General correlation between drawings and technical specifications is a basic requirement of any set of working construction drawings and specifications. Before submitting the project specifications, the Permittee shall coordinate and cross-check the specifications and drawings and complete the proofing of the edited specifications and required cross-checking of all drawings and specifications.

B. O & M PLAN

1. Equipment start-up and operator training

The Permittee shall prepare, and include in the technical specifications governing treatment systems, contractor requirements for providing: appropriate service visits by experienced personnel to supervise the installation, adjustment, start up and operation of the treatment systems, and training covering appropriate operational procedures once the start up has been successfully accomplished.

2. Description of normal O&M:

   a. Description of tasks for operation;

   b. Description of tasks for maintenance;

   c. Description of prescribed treatment or operation conditions;

   d. Schedule showing frequency of each O&M task; and

   e. Common and/or anticipated remedies.

3. Description of monitoring tasks:

   a. Description of monitoring tasks;

   b. Description of required laboratory tests and their interpretation;

   c. Required QA/QC; and

   d. Schedule of monitoring frequency and date, if appropriate, when monitoring may cease.

4. Description of equipment:

   a. Equipment identification;

   b. Installation of monitoring components;

   c. Maintenance of site equipment; and

   d. Replacement schedule for equipment and installed components.

5. Records and reporting mechanisms required:

   a. Daily operating logs;

b. Laboratory records;

c. Mechanism for reporting emergencies;

d. Personnel and maintenance records; and

e. Monthly/annual reports for Federal/State agencies.

The O & M Plan shall be submitted with the Final Design Documents.

C. PROJECT SCHEDULE

The Permittee shall submit to the Director or designee for review and approval a detailed Project Schedule for construction and implementation of the interim measure(s) which identifies timing for initiation and completion of all critical path tasks. The Permittee shall specifically identify dates for completion of the project and major interim milestones which are enforceable terms of this order. A Project Schedule shall be submitted simultaneously with the Final Design Documents.

D. FINAL DESIGN DOCUMENTS

The Final Design Documents shall consist of the Final Design Construction Drawings and Specifications (100 percent complete), the Final Draft O & M Plan, and the Project Schedule. The Permittee shall submit the final documents 100 percent complete with reproducible drawings and specifications. The quality of the design documents should be such that the Permittee would be able to include them in a bid package and invite contractors to submit bids for the construction project.

END OF APPENDIX C

APPENDIX D

INTERIM MEASURES CONSTRUCTION QUALITY ASSURANCE PLAN (CQAP)

A. CONSTRUCTION QUALITY ASSURANCE OBJECTIVES

In the CQA plan, the Permittee shall identify and document the objectives framework for the development of a construction quality assurance program including, but not limited to the following: responsibility and authority; personnel qualifications; inspection activities; sampling requirements; and documentation. The responsibility and authority of all organizations (i.e., technical consultants, construction firms, etc.) and key personnel involved in the construction of the interim measure shall be described fully in the CQAP. The Permittee must identify a CQA officer and the necessary supporting inspection staff.

B. INSPECTION ACTIVITIES

The observations and tests that will be used to monitor the construction and/or installation of the components of the interim measure(s) shall be summarized in the CQA plan. The plan shall include the scope and frequency of each type of inspection. Inspections shall verify compliance with all environmental requirements and include, but not be limited to air quality and emissions monitoring records, waste disposal records (e.g., RCRA transportation manifests), etc. The inspection should also ensure compliance with all health and safety procedures. In addition to oversight inspections, the Permittee shall conduct the following activities.

1. Preconstruction inspection and meeting:

The Permittee shall conduct a preconstruction inspection and meeting to:

a. Review methods for documenting and reporting inspection data;

b. Review methods for distributing and storing documents and reports;

c. Review work area security and safety protocol;

d. Discuss any appropriate modifications of the CQAP to ensure that site-specific considerations are addressed; and

e. Conduct a site walk-around to verify that the design criteria, plans, and specifications are understood and to review material and equipment storage locations.

The preconstruction inspection and meeting shall be documented by a designated person and minutes should be transmitted to all parties.

2. Prefinal inspection:

Upon preliminary project construction completion, the Permittee shall notify the Director or designee for the purposes of conducting a prefinal inspection. The prefinal inspection of the entire project may consist of a walk-through inspection of the entire project site. The inspection is to determine whether the project is complete and consistent with the contract documents and the Director or designee approved interim measure. Any outstanding construction items discovered during the inspection shall be identified and noted. Additionally, treatment equipment shall be operationally tested by the Permittee. The Permittee shall certify that the equipment has performed to meet the purpose of and intent of the specifications. Retesting will be completed where deficiencies are revealed. The prefinal inspection report should outline the outstanding construction items, completion date for these items, and date for final inspection.

3. Final inspection:

Upon completion of any outstanding construction items, the Permittee shall notify the Director or designee for the purposes of conducting a final inspection. The final inspection may consist of a walk-through inspection of the project site. The prefinal inspection report will be used as a checklist with the final inspection focusing on the outstanding construction items identified in the prefinal inspection. Confirmation shall be made that outstanding items have been resolved.

C. SAMPLING REQUIREMENTS

The sampling and testing activities, sample size, sample and test locations, frequency of testing, acceptance and rejection criteria, and plans for correcting problems should be presented in the CQAP.

D. DOCUMENTATION

Reporting requirements for CQA activities shall be described in the CQAP. This plan shall include such items as daily summary reports, inspection data sheets, problem identification and interim measures reports, design acceptance reports, and final documentation. Provisions for final storage of all records shall be presented in the CQAP.

END OF APPENDIX D

APPENDIX E

REPORTS

A. PROGRESS

The Permittee shall at a minimum provide the Director or designee with signed, monthly interim measures progress reports containing:

1. A description and estimate of the percentage of interim measures completed;
2. Summaries of all findings;
3. Summaries of all changes made in the interim measures during the reporting period;
4. Summaries of all contacts with representatives of the local community, public interest groups or State government during the reporting period;
5. Summaries of all problems or potential problems encountered during the reporting period;
6. Actions being taken to rectify problems;
7. Changes in personnel during the reporting period; and
8. Projected work for the next reporting inspection reports, laboratory/monitoring data, etc.

B. INTERIM MEASURES WORKPLAN

The Permittee shall submit the Interim Measures Workplan as described in Appendices A, B, C, and D.

C. FINAL DESIGN DOCUMENTS

The Permittee shall submit the Final Design Documents as described in Appendix C.

D. INTERIM MEASURES REPORT

At the "completion" of the construction of the project (except for long term operation, maintenance and monitoring), the Permittee shall submit an Interim Measures Implementation Report to the Director or designee. The Report shall document that the project is consistent with the design specification, and that the interim measures are performing adequately. The Report shall include, but not be limited to the following elements:

1. Synopsis of the interim measures and certification of the design and construction;
2. Explanation of any modification to the plans and why these were necessary for

the project;

3. Listing of the criteria, established before the interim measures were initiated, for judging the functioning of the interim measures and also explaining any modifications to these criteria;

4. Results of facility monitoring, indicating that the interim measures will meet or exceed the performance criteria; and

5. Explanation of the operation and maintenance (including monitoring) to be undertaken at the facility.

This report shall include the inspection summary reports, inspection data sheets, problem identification and corrective measure reports, block evaluation reports, photographic reporting data sheets, design engineer's acceptance reports, deviations from design and material specifications (with justifying documentation) and as-built drawings.

END OF APPENDIX E

APPENDIX F - REMEDIAL ACTION DECISION DOCUMENT (RADD)

STATE OF ARKANSAS

ARKANSAS DEPARTMENT OF ENVIRONMENTAL QUALITY

Remedial Action Decision Document (RADD) for Corrective Action

Aerojet Rocketdyne, Inc.

Calhoun County, Arkansas

October 2017

Arkansas Department of Environmental Quality (ADEQ)

REMEDIAL ACTION DECISION DOCUMENT
(RADD)

Aerojet Rocketdyne, Inc.

1. INTRODUCTION

The Aerojet Rocketdyne facility is located in Calhoun County in the Highland Industrial Park (HIP), approximately three (3) miles east of the community of East Camden, Arkansas. The 1,400-acre leased area is located in Section 1, T13S, and R16W of the USGS East Camden 7.5 minute quadrangle and also lies within portions of the Eagle Mills and Bearden 7.5 minute quadrangles. The leased area is surrounded by rural land consisting of timberland and sparse pastureland. The ground surface elevation at the facility ranges from one hundred forty-five (145) feet to one hundred sixty feet (160) above Mean Sea Level (ft MSL). Dogwood Creek separates the northern and southern leased areas of the facility. In addition, there is a separate remote leased Explosives Testing Facility (EXTEF) located within HIP which is located 4.4 miles southeast of the main facility. The EXTEF is located in an area approximately 770 feet in diameter enclosed within a fence. An additional 620 feet diameter open area surrounds the exterior of the fence. (Refer to Attachment A - General Location Map, for facility locations)

This RADD contains ADEQ's final decisions for all applicable Corrective Measures Implementation (CMI) activities at the facility, including all the remedies considered and the justifications for the remedies selected.

This RADD includes the opportunity for the public to comment on the selected corrective action remedies, and serves as a companion to the administrative record. Public involvement is an important process for ultimately selecting the final remedies to be employed at the site for remediating hazardous substances into the environment. Since this RADD is an important decision document, the RADD is subject to public notice and comment to allow the public and all interested parties to raise all ascertainable issues concerning the remedies proposed at the

facility, including options not addressed.

2. SITE BACKGROUND

Before RCRA permitted operations began at the site, the site was part of the Shumaker Naval Ammunition Depot (NAD). The Shumaker NAD was constructed in 1944 to manufacture and test munitions for the U.S. Navy in World War II. The Shumaker NAD was temporarily closed immediately after World War II but reopened again during the Korean conflict. The Shumaker NAD was permanently shut down by the US government in 1957. Brown Engineering Corporation (the predecessor of HIP) purchased a large portion of the former Shumaker NAD in 1961.

Aerojet Rocketdyne manufactures solid propellants and rocket motors for the U.S. Department of Defense on land leased from HIP. The rocket motors vary in size from small Javelin missiles to large Patriot Advanced Capability (PAC-3) missiles. Aerojet Rocketdyne also historically manufactured devices utilized in airbag deployment for the civilian market. The site consists of several storage and production buildings formerly used by the U.S. Department of Defense (as part of the former Shumaker NAD) to manufacture products, store raw materials and manufactured products, and for office housing.

Original RCRA operating Permit (RCRA Permit 8H) was issued to Atlantic Research Corporation (ARC) and HIP (co-Permittees) by ADEQ on August 26, 1984. Aerojet Rocketdyne subsequently purchased ARC's rocket motor production and research facility and ARC's portion of RCRA Permit 8H was officially transferred to Aerojet Rocketdyne by ADEQ on August 28, 2003. On May 4, 2005, RCRA Permit 8H was renewed by ADEQ with RCRA (Renewal) Permit No. 8H-RN1. All applicable corrective action requirements required by the 1984 Hazardous and Solid Waste Amendments (HSWA) were incorporated into the original and RCRA Renewal Permits. These HSWA obligations consist of four (4) phases: 1) a Description of Current Conditions (DOCC) phase; 2) a RCRA Facility Investigation (RFI) phase; 3) a Corrective Measures Study (CMS) phase, and; 4) a Corrective Measures Implementation (CMI) phase.

In 2009, Aerojet Rocketdyne constructed a new RCRA-permitted Open Burn (OB) unit referred as the "Thermal Treatment Facility (TTF)" to OB off-specification rocket fuel and other off-specification products. The newly constructed TTF replaced the former onsite RCRA permitted OB unit, referred as the "Open Burn Unit (OBU)", originally permitted under (expired) RCRA Permit 8H. The inactive OBU is currently undergoing RCRA closure activities, consisting of ex-situ biological soil treatment to remediate perchlorate impacts.

RCRA Facility Assessment (RFA):

An RFA was completed by EPA Region 6 on July 9, 1991. A total of thirteen (13) Solid Waste Management Units (SWMUs) and three (3) Areas of Concern (AOCs) were identified by EPA at the facility. These specific SWMU/AOCs are detailed below:

Table 1: RFA Original Listing of Identified SWMUs and AOCs

SWMU #	RFA SWMU Description
1	Navy Landfill
2	Four (4) Reactive Waste Open Burn Pits
3	Burn Cage
4	Thirty-one (31) Reactive Waste Satellite Accumulation Points
5	Eleven (11) Wastewater Sumps
6	Bldg. A12 Main Container Storage Area
7	Thirteen (13) Chemical Waste Satellite Accumulation Points
8	Bldg. B28 Wastewater Neutralization Sump
9	Bldg. 2SH2 MLRS Used Oil Collection Pan and Satellite Accumulation Point
10	Bldg. M8 Casting Tooling Wastewater Tank
11	Two (2) Solvent Reclamation Units
12	Washout Building

Table 1 continued

13	Bldg. B30 Wastewater Sump
AOC #	**RFA AOC Description**

1	Empty Drum Storage Area (Barrel Pen)
2	Underground Storage Tank
3	Bldg. M8 Drainage Ditch

The conclusions of the RFA recommended only four (4) SWMUs to be retained for further investigation (Note: No identified AOCs were recommended to be retained). These specific SWMUs are depicted below:

Table 2: SWMUs/AOCs Retained for Further Investigation by RFA

SWMU#	RFA SWMU Description
1	Navy Landfill
2	Four (4) Reactive Waste Open Burn Pits
3	Burn Cage
6	Bldg. A12 Main Container Storage Area

At the time of the RFA, RFA-SWMU #2 and RFA-SWMU #3 were *active* RCRA units all located within one (1) RCRA Open Burn Unit (OBU). All of the OBU Fixture Units (including RFA-SWMU #3 - Burn Cage) have been previously RCRA clean-closed (ADEQ approval dated February 25, 2011). As stated above, the OBU is currently undergoing RCRA closure activities, consisting of ex-situ biological soil treatment to remediate perchlorate impacts.

Description of Current Conditions (DOCC):

Pursuant to Module XII(b) of the RCRA Permit, a DOCC Report was submitted to ADEQ on August 16, 2004. The facility's DOCC Report incorporated several additional SWMUs and AOCs not identified in the previous RFA. In addition, the DOCC *reintroduced* several SWMUs/AOCs for further investigation - not originally recommended in the RFA. The DOCC Report also incorporated a renumbering system of various onsite SWMUs/AOCs. The DOCC Report was approved by ADEQ on October 1, 2004.

The following Table depicts the DOCC's SWMUs/AOCs with its distinct SWMU/AOC numbering system:

Table 3: SWMUs/AOCs Identified by DOCC

SWMU #	DOCC-SWMU Description
1	Forty-seven (47) Hot Trash Cages (HTCs) - Energetic Waste Accumulation Points
2	Sixteen (16) Propellant Wastewater Sumps
3	Bldg. A12 Main Container Storage Area (RFA SWMU #6)
4	Thirty-one (31) Chemical Waste Storage Sites
5	Bldg. B28 Wastewater Neutralization Sump
6	Bldg. 2SH2 MLRS Used Oil Collection Pan and Satellite Accumulation Point

Table 3 continued

7	Bldg. M8 Casting Tooling Wastewater Tank
8	Bldg.'s M85C and 2SH4 two (2) Solvent Reclamation Units
9	Building C52
AOC #	**DOCC AOC Description**
1	Empty Drum Storage Area (Barrel Pen)
2	Bldg. M84E Historic Underground Storage Tank
3	Bldg. M8 Drainage Ditch
4	Bldg. C52 Drainage Area
5 [1]	Area Adjacent to Navy landfill – located on land leased by Permittee

6	Potential Total Petroleum Hydrocarbon (TPH) Impacts; Eight (8) Locations
7	Potential Perchlorate Impacts; twenty-six (26) Locations
8	Scrapyard (Boneyard)
9	Potential Solvent Impacts; Two (2) Locations
10	Onsite above-ground Storage Tanks

[1] The Navy Landfill (RFA-SWMU #1) identified in the RFA is not within the leased area of the facility; however, AOC # 5 is applicable to the leased area adjacent to the Navy Landfill

Based on the findings of "no documented, reported or discovered releases" in the approved DOCC, several SWMUs/AOCs were eliminated for further investigation. The following SWMUs/AOCs were *retained* for further investigation in the approved DOCC:

Table 4: SWMUs/AOCs Retained per approved DOCC

SWMU #	**Unit Description**
1	Forty-seven (47) Hot Trash Cages (HTCs) - Energetic Waste Accumulation Points
2	Sixteen (16) Propellant Wastewater Sumps
3	Bldg. A12 Main Container Storage Area (RFA SWMU #6)
5	Bldg. B28 Wastewater Neutralization Sump
7	Bldg. M8 Casting Tooling Wastewater Tank
9	Building C52
AOC #	**Unit Description**
1	Empty Drum Storage Area (Barrel Pen)
3	Bldg. M8 Drainage Ditch

4	Bldg. C52 Drainage Area
5 [1]	Area Adjacent to Navy landfill located on land leased by respondent
6	Potential Total Petroleum Hydrocarbon (TPH) Impacts; Eight (8) Locations
7	Potential Perchlorate Impacts; Twenty-six (26) Locations
8	Scrapyard (Boneyard)
9	Potential Solvent Impacts; Two (2) Locations

[1] The Navy Landfill (RFA-SWMU #1) identified in the RFA is not within the leased area of the facility; however, AOC # 5 is applicable to the leased area adjacent to the Navy Landfill

In addition, at the time of the DOCC, the OBU unit and its fixtures were active RCRA-permitted units. Therefore, these RFA-identified units were also forwarded, as recommended by the original RFA Report.

Table 5: Additional SWMUs forwarded by RFA Report

DOCC SWMU #	RFA SWMU #	RFA SWMU Description
n/a	2[1]	Four (4) Reactive Waste Open Burn Pits [1]
n/a	3[2]	Burn Cage [2]

[1] All units applicable to the RCRA permitted OBU Area are currently undergoing RCRA closure

[2] Burn Cage previously RCRA clean-closed

RCRA Facility Investigation (RFI):

After the approval of the DOCC, a RFI Work Plan was submitted to ADEQ, dated December 1, 2004, (revised March 11, 2005). The revised RFI Work Plan was approved

by ADEQ on March 24, 2005. The approved RFI Work Plan was implemented and the facility submitted an "RFI Intermediate Report" to ADEQ on March 29, 2007. A final RFI Report was submitted to ADEQ on March 27, 2009 (revised on June 18, 2009). ADEQ approved the final RFI Report on June 24, 2009. Based on the findings of the approved RFI Report, the only Constituent of Concern (COC) present onsite was determined to be perchlorate.

Pursuant to the specific site investigation, many SWMUs/AOCs were eliminated from the next Corrective Measure Study (CMS) phase due to the findings of the investigation, i.e., no impacts. The specific SWMUs/AOCs retained for further corrective measures, based on confirmed media impacts, are depicted below:

Table 6: SWMUs/AOCs Retained by final RFI Report for Corrective Measures

SWMU #	**Unit Description**
1	Twenty-nine (29) Energetic Waste Accumulation Points ("Hot Trash Cages") *[Note: Reduction from 47]*
2	Eleven (11) Propellant Wastewater Sumps *[note: reduction from a total of 16]*
3	Bldg. A12 Main Container Storage Area (RFA SWMU #6)
9	Building C52
AOC #	**Unit Description**
1	Empty Drum Storage Area (Barrel Pen)
4	Bldg. C52 Drainage Area
7	Potential Perchlorate Impacts; Seventeen (17) Locations *[Note: Reduction from 26 locations]* *[Note 2: The new 17 total also incorporates DOCC-AOC #5 (Area Adjacent to the Navy Landfill) & DOCC-AOC #8 (Scrapyard)]*

Note: The individual twenty-nine (29) Hot Trash Cages (HTCs) within SWMU #1 forwarded pursuant to the approved RFI Report apply to the following onsite buildings:

A2, A4, A5, A6, A8, A9, A11, A90, B20, B21, B22, B23, B24, B25, B27, B30, B32- (two HTCs), C38, C39, C51, C52, E47, M2 (North), M8 (South), M125- (two HTCs), RT-45, and 41

Note 2: The individual eleven (11) Propellant Wastewater Sumps within SWMU #2 forwarded pursuant to the approved RFI Report apply to the following onsite buildings:

B20, B21, B22, B23, B24, B25, B27, B30, C35, C51, and C52

Note 3: The individual seventeen (17) Potential Perchlorate Impacts within AOC #7 apply to the following onsite Buildings and Areas:

Buildings A8, B21, B24, B30, B34, C39, C52, M122, M125, RT-45, 2SH12, 41; RT-15; Rocket Test Firebreak Area; Remote Explosives Testing Area (EXTEF), the area adjacent to the Navy Landfill - located on land leased by respondent (AOC #5); and the Scrapyard (AOC #8)

The OBU unit and its fixtures were replaced by the newly constructed TTF and were subsequently undergoing RCRA closure activities. Therefore, these RFA-identified units are also forwarded, as recommended by the original RFA Report.

Table 7: Additional SWMUs forwarded by RFA Report

DOCC SWMU #	**RFA SWMU #**	**RFA SWMU Description**
n/a	2[1]	Four (4) Reactive Waste Open Burn Pits [1]
n/a	3[2]	Burn Cage [2]

[1] All units applicable to the RCRA permitted OBU Area are currently undergoing RCRA closure

[2] Burn Cage previously RCRA clean-closed

Refer to Attachment B - Site Map of the Specific Investigation Areas for the specific

locations of the above units.

Corrective Measure Study (CMS):

Aerojet Rocketdyne submitted a CMS Plan (Task VI) on August 27, 2009, as revised on 11/23/09, 01/13/10 and 03/09/10. The Final revised CMS Plan (Task VI) was approved by ADEQ on April 9, 2010.

The CMS Report (Tasks VII & VIII) was received on April 26, 2011, as revised 07/01/11, 10/06/11, 02/16/12, 06/12/12, and 06/21/12. The final CMS Report (Tasks VII & VIII) was approved by ADEQ on July 3, 2012. The final approved CMS Report is the basis for the corrective action decisions imposed by ADEQ, as detailed in this RADD.

3. SUMMARY OF SITE RISKS

A. HUMAN HEALTH RISKS

The 2010 Human Health Risk Assessment was conducted to determine potential risks related to current and future human exposure to constituents detected in soil, groundwater, and surface water. The only Constituent of Concern (COC) retained for evaluation in these media was perchlorate. Receptors assumed to be exposed to perchlorate include 1) on-site industrial workers (adult); 2) trespassers (adult and child); 3) on-site construction workers (adult); 4) offsite hunters (adult and child); 5) offsite recreational user (adult and child); and 6) an off-site fisher (adult).

Perchlorate is not considered a human carcinogen; therefore, only non-cancer risks were calculated. The results of the Human Health Risk Assessment indicate there are no unacceptable non-cancer human health risks due to exposure from perchlorate at the facility. Any soil that was identified and scheduled to be excavated or remediated by the time of the risk assessment completion was not evaluated in the risk assessment. All remaining perchlorate impacts in soils will be remediated to levels developed to be protective of human health and also protective of potential groundwater usage at the property boundary.

Impacted groundwater at the facility was quantitatively evaluated for a construction

worker via incidental contact. Groundwater as an actual potable water supply was not quantitatively evaluated on-site since the facility is on public water supply. Therefore, on-site groundwater is not used as a potable source of water and is not expected to in the future. Additionally, downgradient land use from the site is classified as "industrial" out to approximately three (3) kilometers from the leased property boundary. However, groundwater was considered a potential exposure pathway as a potable water source from future migration of impacted onsite groundwater to offsite downgradient potable wells. Therefore, drinking water standards at the leased property boundary (see Section 9.B.2) must be met through corrective actions.

B. ECOLOGICAL RISKS

The 2010 Ecological Risk Assessment was conducted to determine potential risks related to a wide range of plant and animal species in terrestrial and aquatic habitats. Benzo(b)fluoranthene and perchlorate were the only chemicals retained for an ecological evaluation. The results of the Ecological Risk Assessment indicated there were no unacceptable risks to ecological receptors.

4. SUMMARY OF REMEDIAL APPROACH

As stated above in Section 3.A, the only human health Constituent of Concern (COC) at the facility is perchlorate. Perchlorate impacts have occurred in soils, subsoils, shallow groundwater, and surface water at the facility due to past production and waste treatment operations of solid rocket propellant. Perchlorate impacts are generally found onsite in various distinct contaminate source areas which in some instances, overlap each other. Aerojet Rocketdyne has completed several surveys to identify these various production and treatment area locations for all contamination plumes - in both soil and groundwater.

Therefore, to *fully* remediate all perchlorate impacts, all perchlorate source areas (i.e., soils) must be remediated. Once all source areas are fully remediated, other media can then be *fully* remediated (i.e., shallow groundwater and surface water). Shallow groundwater must also be addressed immediately to prevent the expansion of existing perchlorate shallow groundwater plumes. Once area soils have been fully remediated, the perchlorate source to surface water should be eliminated. Surface water will undergo continual monitoring to ensure the perchlorate concentrations continues to be reduced and to ensure surface water exiting the facility is meeting the specific surface water Remedial Action Limit.

5. INSTALLED ONSITE INTERIM MEASURES

In 1993, extensive environmental testing was conducted around the onsite RCRA-permitted Open Burn Unit (OBU). Perchlorate was identified in the soils, sediments, shallow groundwater, and in surface water, in and around the four (4) Thermal Treatment Units (TTUs), i.e., Burn Pans, associated with the OBU. A subsequent detailed investigation conducted in March 2005 indicated that one of the four TTUs, (specifically TTU-1), was contributing to perchlorate surface water releases. In September 2005, ADEQ approved an Interim Measure (IM) Work Plan which utilized a corrugated steel pipe to direct surface water drainage from TTU-1 to an adjacent Fire Water Pond.

In 2003, an IM Work Plan was approved by ADEQ for the area surrounding Building C52. This IM was designed to mitigate perchlorate impacts to shallow groundwater and surface water impacts discovered in the drainage area. The approved IM Work Plan included installing an encircling upgradient Trench (to Building C52) and utilizing a downgradient pond for containment and treatment of: 1) the perchlorate impacted surfacing shallow groundwater, and; 2) the area's surface water. In addition, the IM Work Plan included installing a downgradient subsurface Permeable Reactive Bio-barrier (PRB) consisting of an array of individual groundwater injection points. The PRB was installed downgradient of the pond utilizing direct push methods. Organic substrates were added to the shallow groundwater utilizing the upgradient trench and other upgradient injection points. Organic substrates were also added to the pond's surface water. These organic substrates were used to facilitate anaerobic biodegradation of perchlorate.

In 2005, groundwater sampling in the A Building Area indicated shallow groundwater perchlorate impacts. This investigation led to an additional IM being designed and submitted to ADEQ in January 2006. After ADEQ approval, construction of this IM was commenced and was completed in December 2006. The IM consisted of a 25-foot deep Permeable Reactive Bio-barrier Trench (PRBT) installed perpendicular to the area's shallow groundwater flow. A total of four (4) PRBTs were built to ensure the full capture of shallow groundwater flow.

In 2007, perchlorate was detected off-site of HIP in Dogwood Creek. Subsequent upgradient investigations revealed the source of the perchlorate release was a sewer line leak from a basement sump, located in Building M125, collecting shallow groundwater. Environmental testing also confirmed perchlorate impacts in soil, subsoil, and shallow groundwater in the area around Building M125. The approved IM consisted of the installation of Groundwater Infiltration Trenches on the upgradient side of the building, and the installation of injection

points located downgradient of the Groundwater Infiltration Trenches. After ADEQ approval, construction of this IM began in November 2007 and was completed in January 2008. Building M125 sump's former sewer line was disconnected and the sump's discharge was redirected back into the upgradient Groundwater Infiltration Trenches for treatment, resulting in a non-discharge shallow groundwater circular flow. Downgradient groundwater monitoring wells were installed to monitor the effectiveness of the shallow groundwater treatment within these trenches. In addition, impacted soil was excavated and removed as an IM in September 2008 near the Hot Trash Cages (HTCs) as part of the IM at Building M-125.

Table 8: Past Interim Measures Employed Onsite

SWMU #	AOC #	Description	Interim Measure(s)
n/a [1]	*n/a* [1]	*Not included* [1]	Surface Drainage Diversion from TTU-1 (1 of 4) to existing adjacent Fire Water Pond [1]
1		Bldg. C52 HTC	Subsurface Permeable Reactive Barrier; Anaerobic Surface Pond; Upgradient Injection Trench
2 [2]		Bldg. C52 Sump [2]	
9		Bldg. C52	
	4	Bldg. C52 Drainage Area	
	7	Bldg. C52 Potential Soil Perchlorate Impact	
	7	Scrapyard Potential Soil Perchlorate Impact	Permeable Reactive Bio-barrier Trench (PRBT)
1		Bldg. A2 HTC	
1		Bldg. A4 HTC	
1		Bldg. A5 HTC	
1		Bldg. A6 HTC	
1		Bldg. A8 HTC	
	7	Bldg. A8 Potential Soil	

		Perchlorate Impact	
1		Bldg. A9 HTC	
1		Bldg. A11 HTC	
3		Bldg. A12 Main Container Storage Area	
1		Bldg. A90 HTC	
2 [2]		Bldg. M125 Propellant Waste Water Sump [2]	Upgradient Groundwater Infiltration Trenches; Soil Excavation

[1] This IM is specific to a former Burn Pan (TTU-1) located within the OBU (RFA-SWMU -2) when it was active. All former OB Fixtures are RCRA clean-closed. The OBU is currently undergoing RCRA closure activity.

[2] The Bldg. C52 & M125 sumps are two of the total 11 sumps defined under SWMU #2 of the DOCC

6. SUMMARY OF ALTERNATIVES CONSIDERED IN CORRECTIVE MEASURES STUDY (CMS)

A. SURFACE SOILS & SUBSOILS

The following alternatives were considered in the CMS phase for surface and subsurface soils:

1) Soil Excavation and Off-Site Disposal: This remedy is simply the excavation and transportation of contaminated soil to an off-site permitted disposal facility. The soil would be excavated if the concentrations of perchlorate exceeded the Remedial Action Levels (RALs) (refer to Section 9) based on pre-excavation sampling. In addition, post-excavation confirmation sampling will be performed to ensure all impacted soil has been totally removed. During excavation, this remedy will require dust control and erosion control. In addition, stabilization may be required in potential excavation areas located near a building.

2) In-situ Soil Treatment: This remedy involves treating contaminated in-place soil via injection points (infiltration) introducing a carbon donor source substrate to reduce the perchlorate concentrations in the soil by biological treatment. This carbon donor must allow the development of anaerobic conditions that will reduce perchlorate concentrations. However, this method is highly dependent on existing soil conditions and may not be applicable in some areas of the facility. In areas where applicable, pre-soil conditioning may be required.

3) Ex-situ Soil Treatment: This remedy involves the excavation of impacted soil and its placement into constructed biocells for biological treatment of perchlorate. This technology is currently being utilized onsite to treat impacted soil from the OBU, as well as impacted soil from the Thermal Treatment Area (TTA). Excavated soils may need to be "conditioned" to adequately break up the clay portions. In addition, carbon donor substrates may also have to be added to the excavated soils. In areas where this technology has been used, perchlorate concentrations have successfully been reduced to values below the established Remedial Action Limits (refer to Section 9). During excavation, this remedy will require dust control and erosion control. In addition, stabilization may be required in potential excavation areas located near a building.

4) Monitored Natural Attenuation (MNA): This remedy involves the monitoring of the impacted soil to measure the natural degradation of perchlorate being accomplished by existing bacteria in the soil. Effectiveness Monitoring (refer to Section 12) would

be required to gather the necessary field data to monitor soil natural attenuation - and/or to confirm if MNA is indeed occurring.

5) No Further Action (NFA): The NFA alternative is applicable for areas that do not exceed the established Remedial Action Levels for the site. The Remedial Action Level for soil source areas (defined as areas where the groundwater perchlorate concentration exceeds 0.10 mg/L and the soil concentration exceeds 1.04 mg/kg), the soil Remedial Action Level is 1.04mg/kg. For soil non-source areas, the soil Remedial Action Level equals 0.27 mg/kg. This level applies to the western facility boundary (defined as a line 350 feet east of and parallel to the western facility boundary). Refer to Section 9.

B. GROUNDWATER

The following alternatives were considered in the CMS phase for groundwater:

1) Pump and Treat: Shallow impacted groundwater would be recovered from groundwater recovery wells and/or recovery trenches (extraction). The recovered groundwater would then be treated and discharged (via an appropriate water discharge Permit). Alternatively, the recovered groundwater could be injected into separately constructed upgradient Treatment Trenches for groundwater recirculation.

2) In-situ Anaerobic Remediation: This will be accomplished by injecting carbon donor substances to facilitate indigenous bacteria to degrade perchlorate into inert daughter products. Anaerobic treatment can occur in constructed Bio-barriers which treat shallow groundwater. In addition, this technology can be flexible and can be modified to meet new conditions to accelerate the degradation of perchlorate.

3) Monitored Natural Attenuation (MNA): Involves monitoring the existing shallow groundwater plume to ensure the plume is not expanding and that it is degrading over time. Effectiveness Monitoring (refer to Section 12) would be required to ensure natural attenuation is indeed occurring. In addition, this may require the installation of additional shallow groundwater monitoring wells for adequate monitoring.

4) No Further Action (NFA): The NFA alternative is applicable for areas that do not exceed the established Remedial Action Levels for the site. The Remedial Action Levels for groundwater at the facility boundary is 0.026 mg/L and for groundwater in the source area is 0.100 mg/L (refer to Section 9).

C. SURFACE WATER

The following alternatives were considered in the CMS phase for surface water:

1) Constructed Wetlands: A constructed wetland is an artificially (manmade) constructed aquatic environment engineered to contain plants that can degrade perchlorate into inert daughter products by phytoremediation and/or anaerobic degradation. The manmade wetland would need to be constructed in either natural or manmade onsite drainage pathways.

2) Source Area (Soil Impacts) Removal and Monitored Natural Attenuation (MNA): By removing perchlorate impacted soils, the facility will have removed the source of the perchlorate to surface waters. By monitoring the surface water, the facility will be able to demonstrate that perchlorate is no longer impacting surface waters. Effectiveness Monitoring (refer to Section 12) would be required to ensure natural attenuation is indeed occurring.

3) No Further Action (NFA): The NFA alternative is applicable for surface water that does not exceed the established Remedial Action Level of 0.026 mg/L (refer to Section 9).

7. PROPOSED/RECOMMENDED REMEDIES

A. SURFACE SOILS & SUBSOILS

Remediation selections for soils and subsoils are varied. Please refer to Figures 1 and 9 in Attachment B for each specific area's selected technology. The proposed/recommended remedies for surface and subsoils at the facility are the following:

In-situ Treatment:

This technology will be utilized for the individual SWMUs and AOCs specifically associated with Building C52. These specific SWMUs/AOCs are the following:

Table 9: In-situ Treatment Selection for Soils

Unit	SWMU #	AOC #	Description
Bldg. C52	1		Bldg. C52 Hot Trash Cage
	2		Bldg. C52 Sump
	9		Bldg. C52
		4	Bldg. C52 Drainage Area
		7	Bldg. C52 Potential Soil Perchlorate impact

Excavation and Offsite Disposal:

This technology is retained as *a contingency* if "Excavation and Onsite Ex-situ Anaerobic Treatment" (see below) is determined not to be successful.

Excavation and Onsite Ex-situ Anaerobic Treatment:

This technology will be utilized for the SWMUs/AOCs at the following locations.

Table 10: Excavation & Onsite Ex-situ Selection for Soils

Unit	SWMU #	AOC #	Description
Bldg. B20	2		Bldg. B20 Sump
Bldg. B27	1		Bldg. B27 Hot Trash Cage
Bldg. B30	1		Bldg. B30 Hot Trash Cage
	2		Bldg. B30 Sump
Bldg. C38	1		Bldg. C38 Hot Trash Cage

Bldg. M125	1		Bldg. M125 two (2) Hot Trash Cages

Table 10 continued

EXTEF		7	EXTEF Potential Perchlorate Impact
OBU Area [1]	*n/a* [1]	*n/a* [1]	(RFA-SWMU #2) Four Reactive Waste Open Burn Pits [1]

[1] RCRA permitted OBU (RFA SWMU #2) currently undergoing remediation under RCRA closure via excavation & ex-situ remediation

Monitored Natural Attenuation (MNA):

This technology will be utilized for the SWMUs/AOCs at the following Buildings:

Table 11: MNA Selection for Soils

Unit	SWMU #	AOC #	Description
Bldg. A2	1		Bldg. A2 Hot Trash Cage
Bldg. A4	1		Bldg. A4 Hot Trash Cage
Bldg. A5	1		Bldg. A5 Hot Trash Cage
Bldg. A8		7	Bldg. A8 Potential Perchlorate Impacts
Bldg. A9	1		Bldg. A9 Hot Trash Cage
Bldg. A11	1		Bldg. A11 Hot Trash Cage
Bldg. A90	1		Bldg. A90 Hot Trash Cage
Bldg. B22	1		Bldg. B22 Hot Trash Cage
Bldg. B23	1		Bldg. B23 Hot Trash Cage
	2		Bldg. B23 Sump

Bldg. B24	1		Bldg. B24 Hot Trash Cage
Bldg. B27	2		Bldg. B27 Sump
Bldg. B32	1		Bldg. B32 two (2) Hot Trash Cages
Bldg. B34		7	Bldg. B34 Potential Perchlorate Impacts
Bldg. C35	2		Bldg. C35 Sump
Bldg. C39		7	Bldg. C39 Potential Perchlorate Impacts
Bldg. C51	2		Bldg. C51 Sump
Bldg. RT-45		7	Bldg. RT-45 Hot Trash Cage

No Further Action (NFA):

The NFA alternative is applicable for areas that do not exceed the established Remedial Action Levels for the site (refer to Section 9).

Table 12: NFA Selection for Soils

Unit	SWMU #	AOC #	Description
Bldg. A6	1		Bldg. A6 Hot Trash Cage
Bldg. A8	1		Bldg. A8 Hot Trash Cage

Table 12 continued

Bldg. A12	3		Bldg. A12 (main container storage building)
Bldg. B20	1		Bldg. B20 Hot Trash Cage

Bldg. B21	1		Bldg. B21 Hot Trash Cage
	2		Bldg. B21 Sump
		7	Bldg. B21 Potential Perchlorate Impacts
Bldg. B22	2		Bldg. B22 Sump
Bldg. B24	2		Bldg. B24 Sump
		7	Bldg. B24 Potential Perchlorate Impacts
Bldg. B25	1		Bldg. B25 Hot Trash Cage
	2		Bldg. B25 Sump
Bldg. B30		7	Bldg. B30 Potential Perchlorate Impacts
Bldg. C39	1		Bldg. C39 Hot Trash Cage
Bldg. C51	1		Bldg. C51 Hot Trash Cage
Bldg. E47	1		Bldg. E47 Hot Trash Cage
Bldg. M2 (North)	1		Bldg. M2 (North) Hot Trash Cage
Bldg. M8 (South)	1		Bldg. M8 (South) Hot Trash Cage
Bldg. M122		7	Bldg. M122 Potential Perchlorate Impacts
Bldg. M125		7	Bldg. M125 Potential Perchlorate Impacts
Bldg. RT-45	1		Bldg. RT-45 Hot Trash Cage
Bldg. 2SH12		7	Bldg. 2SH12 Potential Perchlorate Impacts
Bldg. 41	1		Bldg. 41 Hot Trash Cage

(Washout)		7	Bldg. 41 Potential Perchlorate Impacts
Rocket Test Firebreak Area		7	Rocket Test Firebreak Area Potential Perchlorate Impacts
Empty Drum Storage Area (Barrel Pen)		1	Empty Drum Storage Area Potential Perchlorate Impacts (Barrel Pen)
Scrapyard		7	Scrapyard Potential Perchlorate Impacts
Area Adjacent to Navy Landfill		7	Area Adjacent to Navy Landfill Potential Perchlorate Impacts

B. GROUND WATER

The remediation selections for groundwater are varied. Please refer to Figures 8 and 10 in Attachment B for each specific area's selected technology. The proposed and recommended remedies for shallow groundwater impacted with perchlorate are the following:

In-Situ Remediation:

This technology is specific to the larger areas of the site where groundwater exceeds the established Remedial Action Levels (refer to Section 9). Specifically these areas include: 1) Building B30 Area - including the area defined by Building B30/B20/MW-48 cluster/and MW-47 cluster; 2) OBU Area; 3) Building C52 Area, and; 4) Building M125 Area.

This technology targets groundwater perchlorate concentrations exceeding the Remedial Action Level by several orders of magnitude. The groundwater fate and transport model presented by the RCRA Facility Investigation (RFI) indicated that reducing groundwater perchlorate concentrations to 0.100 mg/L or below would prevent migration of

perchlorate across the downgradient facility property boundary at concentrations above the Remedial Action Level of 0.026 mg/L.

In-Situ Remediation addresses the impacted groundwater through the creation of conditions that promote the biological destruction of perchlorate. This process is typically referred to as bioremediation.

In order to create suitable conditions for stimulating perchlorate reduction, subsurface conditions need to be slightly reducing with a low oxygen content and an available electron donor source. Competing ions such as iron and nitrate should either be absent or at low concentrations. Suitable conditions for in-situ remediation can be created in the subsurface soils.

In-Situ Remediation will involve the use of: 1) Injection Points; 2) Infiltration Trenches (with pumping wells); 3) Anaerobic Recharge Bio-basins (ARB), and; 4) Recirculation Well Couples (with extraction and injection wells).

- **Injections Points:** These are designed to allow the addition of a carbon donor source to the subsurface to facilitate the degradation of perchlorate in groundwater. The placement of well screens for injection points is determined based on the specific area and groundwater zone (depth) to be treated. The delivery of substrate facilitates the development of an anaerobic reducing environment capable of degrading perchlorate. This technology was pilot tested onsite as part of the Interim Measure (IM) at Building C52. Final design may include single or multi-level Injection Points.

- **Infiltration Trenches:** These are designed to allow the addition of a carbon donor source to the subsurface to facilitate the degradation of perchlorate in groundwater. An electron donor substrate (such as mulch) is incorporated into the backfill material for the creation of a long-lasting anaerobic reducing zone around and downgradient of the constructed Infiltration Trench. The initial substrate can be supplemented as needed during the operational time of the remedial system to maintain adequate biological conditions. Infiltration trenches can create a passive biological barrier for treatment of perchlorate migration along the natural groundwater flow lines or can be supplemented with extraction wells to enhance control and treatment of the target zone.

- Infiltration Trenches can also be supplemented with injection points to allow introduction of additional substrate at various depths to maintain the anaerobic reducing zone in the targeted treatment area.

- Groundwater may be continually or pulse-pumped into the Infiltration Trenches to improve flow rates and distribution of the biologically active waters throughout the treatment zone. The location and need for a pumping well along with the length, depth, and placement of Injection Points and Infiltration Trenches are determined based on the specific area and groundwater zone (depth) to be treated. The delivery of substrate is intended to facilitate the development of an anaerobic reducing environment capable of degrading perchlorate.

- **Anaerobic Recharge Basins ("ARBs" or "Ponds"):** These are a variation of an infiltration trench in which the natural flow rate of surface precipitation is utilized in place of a pumping well to facilitate water flow into the subsurface treatment zone. The ARB is designed to channel surface water into a basin, the bottom of which is filled with mulch, to create anaerobic water that infiltrates into the groundwater, thereby creating a treatment zone below and downgradient of the ARB. The base of the ARB is excavated to intersect the top of the alluvial gravel aquifer, thereby creating a recharge "window" into the aquifer to allow anaerobic water from the basin to enter the shallow groundwater.

    - The delivery of anaerobic water into the groundwater is intended to facilitate the development of an anaerobic reducing environment capable of degrading perchlorate within the shallow aquifer.

    - The ARB may be designed as a shallow pond or may be backfilled with permeable gravel to allow use of the land above the ARB. In cases of backfilled ARBs, surface drainage outlets would be the entrance point for surface water collection.

    - Liquid substrates can be added to the ARB as needed to maintain or enhance treatment conditions.

    - Long-term maintenance issues such as periodic clean out of debris or potential siltation issues would be considered during design.

- ♦ ARBs may incorporate elements of Constructed Wetlands to enhance the treatment of standing water at the margins of the basins and to serve as buffer zones for sedimentation, with concurrent perchlorate uptake into the wetland vegetation.

- **Recirculation Well Couples:** These would be designed to distribute substrate vertically across the saturated thickness of the aquifer, creating a treatment zone that extends horizontally and downgradient of the recirculation well. Each Recirculation Well Couple consists of a deep extraction point screened typically toward the base of the shallow aquifer and a shallow or intermediate-depth injection point with the screen depth determined by specific geology of the site area (estimated at 25 to 35 feet bgs for a general facility application). The Extraction Point would contain a submersible pump to extract groundwater from the base of the aquifer for re-injection into the intermediate-depth Injection Point thereby creating a continuous loop for shallow groundwater recirculation. At the surface, a substrate Feed Tank and metering pump with discharge piping tapped into the Injection Point influent would feed electron donor substrate into the Injection Point. This continuous loop recirculation distributes substrate and in turn creates an anaerobic reducing environment vertically across the saturated thickness of the aquifer. The created anaerobic reducing zone will migrate downgradient via natural groundwater flow (advection) and spread through dispersion to provide a groundwater treatment zone. The distribution of substrate both vertically and horizontally throughout the targeted treatment zone will facilitate the development of an anaerobic reducing environment capable of degrading perchlorate.

  This technology will be utilized for the following individual SWMUs/AOCs:

Table 13: In-situ Selection for Groundwater

Unit	SWMU #	AOC #	Description
Bldg. B20	2		Bldg. B20 Sump
Bldg. B30	1		Bldg. B30 Hot Trash Cage
	2		Bldg. B30 Sump

Table 13 continued

Bldg. C52	1		Bldg. C52 Hot Trash Cage
	2		Bldg. C52 Sump
	9		Bldg. C52 Washout
		4	Bldg. C52 Drainage Area
		7	Bldg. C52 Potential Perchlorate Impacts
Rocket Test Firebreak Area		7	Rocket Test Fire Break Area Potential Perchlorate Impacts
Area adjacent to Navy Landfill		7	Area Adjacent to Navy Landfill Potential Perchlorate Impacts
RT-15		7	Bldg. RT-15 Potential Perchlorate Impacts
OBU Area [1]	*n/a*	*n/a*	(RFA-SWMU #2) Four Reactive Waste Open Burn Pits [1]

[1] RCRA permitted OBU (RFA SWMU #2) is currently undergoing remediation under RCRA closure.

Pump and Treat:

The Pump and Treat technology consists of groundwater being extracted from the subsurface via appropriately screened extraction wells and passed through a treatment process (above ground or below ground) to reduce perchlorate concentrations to below established Remedial Action Levels (refer to Section 9). Under appropriate Permits, the treated groundwater can be discharged to surface water. Groundwater extraction is being considered as part of in-situ remediation for groundwater (e.g.,

Recirculation Well Couples and optional enhancements to ARBs), but the extracted groundwater will be recirculated back into the groundwater via an Injection Point, Infiltration Trench, or ARB for treatment. The extracted groundwater is not being discharged to surface water.

As stated above, Pump and Treat technology is being utilized as part of the *In-Situ Remediation* alternative (see above). Therefore, refer to Table 13 (above) for the specific SWMUs/AOCs associated with Pump and Treat.

Monitored Natural Attenuation (MNA):

MNA will also be utilized in select areas of groundwater that exceed the Remedial Action Levels (refer to Section 9) for perchlorate to monitor and evaluate residual perchlorate concentrations. MNA will be performed to document the continued reduction of perchlorate concentrations and to confirm that perchlorate is not migrating beyond the facility property boundary at a concentration greater than the established Remedial Action Levels for the western property boundary.

In select areas, the use of the MNA corrective measure alternative may be applied to determine the effect of Soil Excavation and In-Situ Treatment on the residual perchlorate concentrations in groundwater. MNA is the use of natural chemical or biological processes to reduce contaminant concentrations in soil and/or groundwater without human intervention. The chemical processes may include but are not limited to biodegradation, dispersion, dilution, sorption, volatilization, and chemical or biological stabilization, transformation, and/or destruction of containments (EPA, 1998). A MNA remediation program will consist of Effectiveness Monitoring (refer to Section 12) designed to evaluate the rate at which the natural processes reduce contamination concentrations to ensure that the established Remedial Action Levels for the facility will be accomplished within a reasonable period of time. For areas designated for the MNA alternative for groundwater, the following processes are anticipated.

- Conduct groundwater sampling of locations and intervals as specified in individual area plans. The current estimate is to conduct annual

groundwater sampling for perchlorate in each location. In conjunction with annual groundwater sampling, monitor groundwater annually for natural attenuation parameters (dissolved oxygen, oxidation-reduction potential, temperature, and pH).

- Analyze groundwater samples for perchlorate utilizing EPA Method 314.

- Upon groundwater sample results attaining levels below Remedial Action Levels, conduct confirmatory (closure) sampling of the area monitoring well network. Conceptually, confirmatory sampling will occur one year following achievement of Remedial Action Levels to verify groundwater perchlorate concentrations and achievement of Remedial Action Levels.

- Report collected data to ADEQ and if results are below Remedial Action Levels, request "No Further Action (NFA)" for area. If sample results are above Remedial Action Levels, continue annual groundwater sampling of area monitoring well network until achieving Remedial Action Levels or evaluate alternative recommendation for ADEQ consideration.

This technology will be utilized for the individual SWMUs/AOCs:

Table 14: MNA Selection for Groundwater

Unit	SWMU #	AOC #	Description
Bldg. A5	1		Bldg. A5 Hot Trash Cage
Bldg. A6	1		Bldg. A6 Hot Trash Cage
Bldg. A8	1		Bldg. A8 Hot Trash Cage
		7	Bldg. A8 Potential Perchlorate Impacts
Bldg. A9	1		Bldg. A9 Hot Trash Cage
Bldg. B21	1		Bldg. B21 Hot Trash Cage

	2		Bldg. B21 Sump
		7	Bldg. B21 Potential Perchlorate Impacts
Bldg. B22	1		Bldg. B22 Hot Trash Cage
	2		Bldg. B22 Sump
Bldg. B23	1		Bldg. B23 Hot Trash Cage
	2		Bldg. B23 Sump
Bldg. B24	1		Bldg. B24 Hot Trash Cage
	2		Bldg. B24 Sump
Bldg. B25	1		Bldg. B25 Hot Trash Cage
	2		Bldg. B25 Sump
Bldg. B27	1		Bldg. B27 Hot Trash Cage
	2		Bldg. B27 Sump
Bldg. B34		7	Bldg. B34 Potential Perchlorate Impacts
Bldg. C39	1		Bldg. C39 Hot Trash Cage
		7	Bldg. C39 Potential Perchlorate Impacts
Bldg. C51	2		Bldg. C51 Sump
Bldg. M2 (North)	1		Bldg. M2 North Hot Trash Cage
EXTEF		7	EXTEF Potential Perchlorate Impacts

No Further Action (NFA):

The NFA alternative is applicable for areas that do not exceed the established Remedial Action Levels for the site (refer to Section 9).

NFA was selected for the following individual SWMUs/AOCs:

Table 15: NFA Selection for Groundwater

Unit	SWMU #	AOC #	Description
Bldg. A2	1		Bldg. A2 Hot Trash Cage
Bldg. A4	1		Bldg. A4 Hot Trash Cage
Bldg. A11	1		Bldg. A11 Hot Trash Cage
Bldg. A12	3		Bldg. A12 Main Container Storage Building
Bldg. A90	1		Bldg. A90 Hot Trash Cage
Bldg. B20	1		Bldg. B20 Hot Trash Cage

Table 15 continued

Bldg. B24		7	Bldg. B24 Potential Perchlorate Impacts
Bldg. B30		7	Bldg. B30 Potential Perchlorate Impacts
Bldg. B32	1		Bldg. B32 Two (2) Hot Trash Cage
Bldg. C35	2		Bldg. C35 Sump
Bldg. C38	1		Bldg. C38 Hot Trash Cage
Bldg. C51	1		Bldg. C51 Hot Trash Cage
Bldg. E47	1		Bldg. E47 Hot Trash Cage
Bldg. M8 (South)	1		Bldg. M8(South) Hot Trash Cage
Bldg. M122		7	Bldg. M122 Potential Perchlorate

			Impacts
Bldg. M125	1		Bldg. M125 Two (2) Hot Trash Cages
Bldg. RT-45	1		Bldg. RT-45 Hot Trash Cage
		7	Bldg. RT-45 Potential Perchlorate Impacts
Bldg. 2SH12		7	Bldg. 2SH12 Potential Perchlorate Impacts
Bldg. 41 (Washout)	1		Bldg. 41 (Washout) Hot Trash Cage
		7	Bldg. 41 (Washout) Potential Perchlorate Impacts
Empty Drum Storage Area (Barrel Pen)		1	Empty Drum Storage Area (Barrel Pen)
Scrapyard		7	Scrapyard Potential Perchlorate Impacts

C. Surface Water

The proposed and recommended remedies for surface water are the following:

Monitored Natural Attenuation (MNA):

MNA will be utilized at the following SWMUs/AOCs:

Table 16: MNA Selection for Surface Water

Unit	SWMU #	AOC #	Description
Bldg. B24		7	Potential Perchlorate Impact
Bldg. C52	1		Bldg. C52 Hot Trash Cages

	2		Bldg. C52 Sump
	9		Bldg. C52 Area
		4	Bldg. C52 Drainage Area
		7	Bldg. C52 Potential Soil Perchlorate impact

Table 16 continued

EXTEF		7	Potential Perchlorate Impact
OBU Area [1]	*n/a* [1]	*n/a* [1]	(RFA-SWMU #2) Four Reactive Waste Open Burn Pits [1]

[1] RCRA permitted OBU (RFA SWMU #2) is currently undergoing remediation under RCRA closure.

No Further Action (NFA):

NFA was selected for the following SWMUs/AOCs based on established Remedial Action Levels (refer to Section 9):

Table 17: NFA Selection for Surface Water

Unit	SWMU #	AOC #	Description
Bldg. A2	1		Bldg. A2 Hot Trash Cage
Bldg. A4	1		Bldg. A4 Hot Trash Cage
Bldg. A5	1		Bldg. A5 Hot Trash Cage
Bldg.A6	1		Bldg. A6 Hot Trash Cage
Bldg. A8	1		Bldg. A8 Hot Trash Cage
		7	Bldg. A8 Potential Perchlorate

			Impact
Bldg. A9	1		Bldg. A9 Hot Trash Cage
Bldg. A11	1		Bldg. A11 Hot Trash Cage
Bldg. A12	3		Building A12 (main container storage building)
Bldg. A90	1		Bldg. A90 Hot Trash Cage
Bldg. B20	1		Bldg. B20 Hot Trash Cage
	2		Bldg. B20 Sump
Bldg. B21	1		Bldg. B21 Hot Trash Cage,
	2		Bldg. B21 Sump
		7	Bldg. B21 Potential Perchlorate Impacts
Bldg. B22	1		Bldg. B22 Hot Trash Cage
	2		Bldg. B22 Sump
Bldg. B23	1		Bldg. B23 Hot Trash Cage
	2		Bldg. B23 Sump
Bldg. B24	1		Bldg. B24 Hot Trash Cage
	2		Bldg. B24 Sump
Bldg. B25	1		Bldg. B25 Hot Trash Cage
	2		Bldg. B25 Sump
Bldg. B27	1		Bldg. B27 Hot Trash Cage
	2		Bldg. B27 Sump
Bldg. B30	1		Bldg. B30 Hot Trash Cage
	2		Bldg. B30 Sump

		7	Bldg. B30 Potential Perchlorate Impacts

Table 17 continued

Bldg. B32	1		Bldg. B32 Two (2) Hot Trash Cages
Bldg. B34		7	Bldg. B34 Potential Perchlorate Impacts
Bldg. C35	2		Bldg. C35 Sump
Bldg. C38	1		Bldg. C38 Hot Trash Cage
Bldg. C39	1		Bldg. C39 Hot Trash Cage
		7	Bldg. C39 Potential Perchlorate Impacts
Bldg. C51	1		Bldg. C51 Hot Trash Cage
	2		Bldg. C51 Sump
Bldg. E47	1		Bldg. E47 Hot Trash Cage
Bldg. M2 (North)	1		Bldg. M2 (North) Hot Trash Cage
Bldg. M8 (South)	1		Bldg. M8 (South) Hot Trash Cage
Bldg. M122		7	Bldg. M122 Potential Perchlorate Impact
Bldg. M125	1		Bldg. M125 two (2) Hot Trash Cages
		7	Bldg. M125 Potential Perchlorate Impacts
Bldg. RT-45	1		Bldg. RT-45 Hot Trash Cage

		7	Bldg. RT45 Potential Perchlorate Impacts
Bldg. 2SH12		7	Bldg. 2SH12 Potential Perchlorate Impacts
Bldg. 41 (Washout)	1		Bldg. 41 (Washout) Hot Trash Cage
		7	Bldg. 41 (Washout) Potential Perchlorate Impacts
Bldg. RT-15		7	Bldg. RT-15 Potential Perchlorate Impacts
Rocket Test Firebreak Area		7	Rocket Test Firebreak Area Potential Perchlorate Impacts
Empty Drum Storage Area (Barrel Pen)		1	Empty Drum Storage Area (Barrel Pen)
Scrapyard		7	Scrapyard Potential Perchlorate Impacts
Area adjacent to Navy Landfill		7	Area Adjacent to Navy Landfill Potential Perchlorate Impacts

8. EVALUATION OF THE PROPOSED REMEDY AND ALTERNATIVES

All proposed remedies were evaluated prior to determining if the proposed remedy would be an effective remedy. To perform an adequate evaluation, all applicable pros and cons for each technology were independently analyzed. The specific pros and cons considered in the evaluation process for each technology analyzed are detailed below:

A. SURFACE SOILS & SUBSOILS

1) Excavation and Off-Site Disposal:

Pros:

a) Proven technology
b) Eliminates future soil exposure risk to onsite workers
c) Can be performed in a relatively short time period
d) After confirmation sampling, eliminates the need for future soil testing
e) Eliminates source pathway to surface water or groundwater
f) Eliminates future liabilities

Cons:

a) Requires clean fill after excavation
b) Requires dust and erosion controls during excavation
c) Stabilization needs in excavation areas next to structures or buildings
d) Restricted soil excavation depth due to high groundwater table
e) Soil excavation is dependent on dry weather conditions.
f) Liability concerns with disposal contractors
g) Disposal and transportation costs expensive

2) In-situ Treatment:

Pros:

a) Proven technology
b) After treatment, eliminates the need for future soil testing
c) Requires no clean fill
d) No disposal or transportation costs
e) Eliminates source pathway to surface water or groundwater
f) Eliminates future liabilities

Cons:

a) Requires carbon donor source
b) Effective treatability highly dependent on soil conditions
c) May require considerable time to reach established remedial levels
d) Generally restricted to only subsurface soils (subsoils)

3) Excavation and On-site Ex-situ Anaerobic Treatment:

Pros:

a) Proven technology
b) Eliminates future soil exposure risk to onsite workers
c) Treated clean soil can be reused (as clean fill) at the facility.
d) After confirmation sampling, eliminates the need for future soil testing
e) Eliminates source pathway to surface water or groundwater
f) Eliminates future liabilities

Cons:

a) Requires excavation and the construction of biocells
b) Requires dust and erosion controls during excavation
c) Stabilization needs in excavation areas next to structures or buildings
d) The site has a high groundwater table, restricting soil depth excavations.
e) Soil excavation is dependent on dry weather conditions.
f) Prior soil conditioning (prior to ex-situ bioremediation) may be required

B. GROUNDWATER

1) Pump and Treat:

Pros:

a) Proven technology
b) Directly removes perchlorate source from media
c) Prevents potential expansion of groundwater plume

Cons:

a) Requires the construction of a Groundwater Treatment Facility (GWTF)
b) Requires environmental water discharge Permit(s)
c) Requires a network of groundwater recovery wells
d) Maintenance intensive
e) Expensive, both in construction and maintenance
f) May require considerable time to reach established remedial levels

2) In-situ Anaerobic Remediation:

Pros:

a) Proven technology
b) Directly removes perchlorate source from media

Cons:

a) Requires carbon donor source
b) Requires method(s) to inject carbon donor source
c) Does not address point source(s) of contamination

3) Monitored Natural Attenuation:

Pros:

a) Relatively inexpensive
b) Relies exclusively on natural biodegradation activity

Cons:

a) Requires pre-approved Groundwater Monitoring & Sampling Plan

b) May require additional groundwater monitoring wells

c) Only applicable to low-level groundwater impacts

d) May require other additional institutional controls

C. SURFACE WATER

Source Soil Removal and Monitored Natural Attenuation (MNA)

Pros:

a) Relatively inexpensive

b) Easy to implement

c) Minimal impact to environment

Cons:

a) Results and time dependent on rate of source removal

b) Dependent on facility boundary surface water concentrations

9. REMEDIAL ACTION LEVELS

A. SURFACE SOILS & SUBSOILS

Based on the approved Human Health and Ecological Risk Assessment, two (2) separate soil Remedial Action Levels were generated for both surface soils and subsoils:

1) For soil source areas (defined as areas where the groundwater perchlorate concentration exceeds 0.10 mg/L), as shown on Figure 3 in Attachment B of this RADD, the soil Remedial Action Level is 1.04 mg/kg.

2) For soil non-source areas, the soil Remedial Action Level equals 0.27 mg/kg.

B. GROUNDWATER

Based on the approved Human Health and Ecological Risk Assessment, two (2) separate groundwater Remedial Action Levels were generated:

1) For source areas (defined as areas where the groundwater perchlorate concentration exceeds 0.10 mg/L) as shown on Figure 3 in Attachment B of this RADD, the Remedial Action Level is 0.10 mg/L.

2) For groundwater non-source areas, the Remedial Action Level equals 0.026 mg/L. Corrective Measures will initially focus on achieving the Remedial Action Level of 0.10 mg/L in Source Areas. After this Source Area Remedial Action Level is achieved, additional corrective measure technologies may be required to achieve the Remedial Action Level of 0.026 mg/L in the groundwater non-source areas. Additional corrective measure technologies not specifically detailed in this RADD would require a prior modification of the RADD prior to implementation.

C. SURFACE WATER

Based on the approved Human Health and Ecological Risk Assessment, the goal of 0.026 mg/L is the Remedial Action Level for Surface Water at the Facility Boundary. The Remedial Action Level for Surface Water within the Facility Boundary is 0.795 mg/L.

10. JUSTIFICATION FOR SELECTIONS

A. SURFACE SOILS & SUBSOILS

No Further Action (NFA) was selected for those units that were below the established soil Remedial Action Levels (refer to Section 9 and Table 12).

For all units not selected for NFA, four (4) separate technologies were selected (for various units) consisting of: 1) In-situ Treatment; 2) Excavation and Ex-situ Treatment; 3) Monitored Natural Attenuation (MNA), and; 4) Excavation and Offsite Disposal.

In-situ Treatment: In areas where excavation may not be feasible due to the presence of buildings or other structures, soils can be remediated in-place with In-situ Treatment with the utilization of Injection Points or Trenches to inject electron donors to aid in the degradation of perchlorate. Although In-situ Treatment is very dependent on soil characteristics, this technology has been demonstrated to be effective in substantially reducing perchlorate impacts in onsite soil under previously approved "Interim Measures (IMs)" at the following locations: 1) the A-designated Building Area; 2) Building C52 Area, and; 3) Building M125 (refer to Section 5).

Excavation and Ex-situ Treatment: For areas were soils can be safely excavated, excavated soils will be placed in engineered constructed biocells for Ex-situ Treatment in controlled conditions. This technology has been employed onsite at the Open Burn Unit (OBU) to treat perchlorate impacted soils. Results have shown that this technology is effective in substantially reducing perchlorate impacts in soil.

Monitored Natural Attenuation (MNA): This technology was retained for units having minor perchlorate impacts in soil. Soil monitoring will ensure the reduction of perchlorate impacts by natural processes. Effectiveness Monitoring will be employed to ensure natural attenuation is indeed occurring (refer to Section 12). If MNA is determined to be ineffective, other technologies may need to be employed. Refer to Section 12 for monitoring time lines.

Excavation and Offsite Disposal: This technology is retained as a *contingent* remediation alternative if onsite Ex-situ Treatment is determined not to be successful. Excavation and Offsite Disposal is a proven reliable technology that can be easily and quickly implemented to achieve the Remedial Action Levels at various locations at the facility.

B. GROUNDWATER

No Further Action (NFA) was selected for those units that were below the established groundwater Remedial Action Levels (refer to Section 9 and Table 15).

For all units not selected for NFA, two (2) technologies were selected for various units consisting of: 1) In-situ Remediation (*Note: Includes Pump and Treat technology*), and; 2) Monitored Natural Attenuation (MNA). The combination of these technologies provides a wide range of groundwater remediation options for the facility.

In-Situ Remediation: Three (3) types of In-situ remediation delivery technologies have successfully been implemented at the site as part of the facility's ongoing Interim Measures (refer to Section 5). These technologies include in-situ Passive Permeable Reactive Bio-barriers (A-Area); in-situ Semi-Passive Permeable Reactive Bio-barriers (Building C52 Surface Water), and; in-situ Active Permeable Reactive Bio-barriers (Building M125). This corrective measure alternative is often coupled with groundwater pumping allowing for containment and recirculation of groundwater within a defined treatment zone. Each of the above active Interim Measures (as approved) has successfully demonstrated that groundwater perchlorate impacts can be substantially reduced.

Pump and Treat (Note: Associated with In-Situ Remediation Treatment): The reinjection of treated groundwater which has been removed by pumping is the desired option as it preserves the groundwater as a natural resource. Above ground treatment (ion exchange and/or biological treatment) vessels are being retained as alternatives. 'Pump and Treat' has been selected since it will be a cost effective technology that can be easily applied to the facility's shallow groundwater impacts. The facility is currently utilizing 'Pump and Treat' technology under Interim Measures employed at Building M125, utilizing a sump to capture and recirculate shallow groundwater back into upgradient installed treatment trenches. These treatment trenches contain carbon donor materials to biodegrade the entrained perchlorate from shallow groundwater. Interim Measure results have shown that this technology is effective in substantially reducing perchlorate impacts in groundwater.

Monitored Natural Attenuation (MNA): The natural chemical process may include but are not limited to biodegradation, dispersion, dilution, sorption, volatilization, and chemical or biological stabilization, transformation, or destruction of contaminations, (EPA, 1998). A MNA remediation program will consist of Effectiveness Monitoring (refer to Section 12) designed to evaluate the rate at which the natural process can reduce perchlorate concentrations and determination of an end point for groundwater remediation. If MNA is determined to be ineffective, other technologies may need to be employed. Refer to Section 12 for monitoring time lines.

C. SURFACE WATER

No Further Action (NFA) was selected for those units that were below the established surface water Remedial Action Levels (refer to Section 9 and Table 17).

For all units not selected for NFA, two (2) technologies were evaluated consisting of: 1) Source Removal and Monitored Natural Attenuation, and; 2) Constructed Wetlands.

Source Removal and Monitored Natural Attenuation (MNA): This technology was selected for potential surface water perchlorate impacts. By removing the impacted surface soil (source removal), the perchlorate source is immediately eliminated from potentially impacting surface water. Refer to Section 12 for monitoring time lines.

Constructed Wetlands: This technology was not retained as a remediation technology due to limited application areas, cost effectiveness, and concerns with the potential accumulation of perchlorate in established vegetation.

11. SELECTED REMEDY SITE PLAN

The facility is required to maintain and properly operate all required corrective action remediation systems specified below:

The Permittees must submit plans and specification, subject to ADEQ approval, prior to construction activities associated with new onsite corrective action units.

A. SURFACE SOILS & SUBSOILS

Remediation selections for soils and subsoils are varied. Please refer to Figures 1 and 9 in Attachment B for each specific area's selected technology. The proposed/recommended remedies for surface and subsoils at the facility are the following:

In-situ Treatment:

This technology will be utilized for the individual SWMUs and AOCs specifically associated with Building C52 and the OBU. These specific SWMUs/AOCs are the following:

Table 18: *In-situ* Treatment Selection for Soils

Unit	SWMU #	AOC #	Description
Bldg. C52	1		Bldg. C52 Hot Trash Cage
	2		Bldg. C52 Sump
	9		Bldg. C52
		4	Bldg. C52 Drainage Area
		7	Bldg. C52 Potential Soil Perchlorate impact
OBU Area	11		Drainage Areas at OBU Area

Excavation and Offsite Disposal:

This technology is retained as an alternative to "Excavation and Onsite Ex-situ Anaerobic Treatment" (see below).

Use of Pavement as Engineered Cap

This technology will be utilized on a case-by-case basis for perchlorate-impacted soils which are located under asphalt pavement in close proximity to the foundations of buildings and other structures. Currently only Bldg. B30 (SWMU #10) is approved for this technology.

Excavation and Onsite Ex-situ Anaerobic Treatment:

This technology will be utilized for the SWMUs/AOCs at the following locations.

Table 19: Excavation & Onsite Ex-situ Treatment or Offsite Disposal Selection for Soils

Unit	SWMU #	AOC #	Description
Bldg. B20	2		Bldg. B20 Sump
Bldg. B27	1		Bldg. B27 Hot Trash Cage
Bldg. B30	1		Bldg. B30 Hot Trash Cage
	2		Bldg. B30 Sump
EXTEF		7	EXTEF Potential Perchlorate Impact
OBU Area [1]	*n/a* [1]	*n/a* [1]	(RFA-SWMU #2) Four Reactive Waste Open Burn Pits [1]

[1] RCRA permitted OBU (RFA SWMU #2) is currently undergoing remediation under RCRA closure via soil excavation & off-site disposal.

Monitored Natural Attenuation (MNA):

This technology will be utilized for the SWMUs/AOCs at the following Buildings:

Table 20: MNA Selection for Soils

Unit	SWMU #	AOC #	Description
Bldg. A2	1		Bldg. A2 Hot Trash Cage

Bldg. A4	1		Bldg. A4 Hot Trash Cage
Bldg. A5	1		Bldg. A5 Hot Trash Cage
Bldg. A8		7	Bldg. A8 Potential Perchlorate Impacts
Bldg. A9	1		Bldg. A9 Hot Trash Cage
Bldg. A11	1		Bldg. A11 Hot Trash Cage
Bldg. A90	1		Bldg. A90 Hot Trash Cage
Bldg. B22	1		Bldg. B22 Hot Trash Cage
Bldg. B23	1		Bldg. B23 Hot Trash Cage
	2		Bldg. B23 Sump
Bldg. B24	1		Bldg. B24 Hot Trash Cage
Bldg. B27	2		Bldg. B27 Sump
Bldg. B32	1		Bldg. B32 two (2) Hot Trash Cages
Bldg. B34		7	Bldg. B34 Potential Perchlorate Impacts
Bldg. C35	2		Bldg. C35 Sump
Bldg. C39		7	Bldg. C39 Potential Perchlorate Impacts
Bldg. C51	2		Bldg. C51 Sump
Bldg. RT-45		7	Bldg. RT-45 Potential Perchlorate Impacts
OBU Area	11		Drainage Areas at OBU Area
OBU Area	RFA 2		OBU 4

No Further Action (NFA):

The NFA alternative is applicable for areas that do not exceed the established Remedial Action Levels for the site (refer to Section 9).

Table 21: NFA Selection for Soils

Unit	SWMU #	AOC #	Description
Bldg. A6	1		Bldg. A6 Hot Trash Cage
Bldg. A8	1		Bldg. A8 Hot Trash Cage
Bldg. A12	3		Bldg. A12 (main container storage building)
Bldg. B20	1		Bldg. B20 Hot Trash Cage
Bldg. B21	1		Bldg. B21 Hot Trash Cage
	2		Bldg. B21 Sump
		7	Bldg. B21 Potential Perchlorate Impacts

Table 21 continued

Bldg. B22	2		Bldg. B22 Sump
Bldg. B24	2		Bldg. B24 Sump
		7	Bldg. B24 Potential Perchlorate Impacts
Bldg. B25	1		Bldg. B25 Hot Trash Cage
	2		Bldg. B25 Sump
Bldg. B30		7	Bldg. B30 Potential Perchlorate Impacts
Bldg. C38	1		Bldg. C38 Hot Trash Cage
Bldg. C39	1		Bldg. C39 Hot Trash Cage

Bldg. C51	1		Bldg. C51 Hot Trash Cage
Bldg. E47	1		Bldg. E47 Hot Trash Cage
Bldg. M2 (North)	1		Bldg. M2 (North) Hot Trash Cage
Bldg. M8 (South)	1		Bldg. M8 (South) Hot Trash Cage
Bldg. M122		7	Bldg. M122 Potential Perchlorate Impacts
Bldg. M125	1		Bldg. M125 Two (2) Hot Trash Cages
Bldg. M125		7	Bldg. M125 Potential Perchlorate Impacts
Bldg. RT-15		7	Bldg. RT-15 Potential Perchlorate Impacts
Bldg. RT-45	1		Bldg. RT-45 Hot Trash Cage
Bldg. 2SH12		7	Bldg. 2SH12 Potential Perchlorate Impacts
Bldg. 41 (Washout)	1		Bldg. 41 Hot Trash Cage
		7	Bldg. 41 Potential Perchlorate Impacts
Rocket Test Firebreak Area		7	Rocket Test Firebreak Area Potential Perchlorate Impacts
Empty Drum Storage Area (Barrel Pen)		1	Empty Drum Storage Area Potential Perchlorate Impacts (Barrel Pen)
Scrapyard		7	Scrapyard Potential Perchlorate Impacts
Area Adjacent to Navy Landfill		7	Area Adjacent to Navy Landfill Potential Perchlorate Impacts

B. GROUNDWATER

The remediation selections for groundwater are varied. Please refer to Figures 8 and 10 in Attachment B for each specific area's selected technology. The proposed and recommended remedies for shallow groundwater impacted with perchlorate are the following:

In-Situ Remediation:

This technology is specific to the larger areas of the site where groundwater exceeds the established Remedial Action Levels (refer to Section 9). Specifically these areas include: 1) Building B30 Area - including the area defined by Building B30/B20/MW-48 cluster/and MW-47 cluster; 2) OBU Area; 3) Building C52 Area, and; 4) Building M125 Area.

This technology targets groundwater perchlorate concentrations exceeding the Remedial Action Level by several orders of magnitude. The groundwater fate and transport model presented by the RCRA Facility Investigation (RFI) indicated that reducing groundwater perchlorate concentrations to 0.100 mg/L or below would prevent migration of perchlorate across the downgradient facility property boundary at concentrations above the Remedial Action Level of 0.026 mg/L.

In-Situ Remediation addresses the impacted groundwater through the creation of conditions that promote the biological destruction of perchlorate. This process is typically referred to as bioremediation.

In order to create suitable conditions for stimulating perchlorate reduction, subsurface conditions need to be slightly reducing with a low oxygen content and an available electron donor source. Competing ions such as iron and nitrate should either be absent or at low concentrations. Suitable conditions for in-situ remediation can be created in the subsurface soils.

In-Situ Remediation will involve the use of: 1) Injection Points; 2)

Infiltration Trenches (with pumping wells); 3) Anaerobic Recharge Bio-basins (ARB), and; 4) Recirculation Well Couples (with extraction and injection wells).

- **Injections Points:** These are designed to allow the addition of a carbon donor source to the subsurface to facilitate the degradation of perchlorate in groundwater. The placement of well screens for injection points is determined based on the specific area and groundwater zone (depth) to be treated. The delivery of substrate facilitates the development of an anaerobic reducing environment capable of degrading perchlorate. This technology was pilot tested onsite as part of the Interim Measure (IM) at Building C52. Final design may include single or multi-level Injection Points.

- **Infiltration Trenches:** These are designed to allow the addition of a carbon donor source to the subsurface to facilitate the degradation of perchlorate in groundwater. An electron donor substrate (such as mulch) is incorporated into the backfill material for the creation of a long-lasting anaerobic reducing zone around and downgradient of the constructed Infiltration Trench. The initial substrate can be supplemented as needed during the operational time of the remedial system to maintain adequate biological conditions. Infiltration trenches can create a passive biological barrier for treatment of perchlorate migration along the natural groundwater flow lines or can be supplemented with extraction wells to enhance control and treatment of the target zone.

    - ♦ Infiltration Trenches can also be supplemented with injection points to allow introduction of additional substrate at various depths to maintain the anaerobic reducing zone in the targeted treatment area.

    - ♦ Groundwater may be continually or pulse-pumped into the Infiltration Trenches to improve flow rates and distribution of the biologically active waters throughout the treatment zone. The location and need for a pumping well along with the length, depth, and placement of Injection Points and Infiltration Trenches are determined based on the specific area and groundwater zone (depth) to be treated. The delivery of substrate is intended to facilitate the development of an anaerobic reducing environment capable of degrading perchlorate.

- **Anaerobic Recharge Basins ("ARBs" or "Ponds"):** These are a variation of an infiltration trench in which the natural flow rate of

surface precipitation is utilized in place of a pumping well to facilitate water flow into the subsurface treatment zone. The ARB is designed to channel surface water into a basin, the bottom of which is filled with mulch, to create anaerobic water that infiltrates into the groundwater, thereby creating a treatment zone below and downgradient of the ARB. The base of the ARB is excavated to intersect the top of the alluvial gravel aquifer, thereby creating a recharge "window" into the aquifer to allow anaerobic water from the basin to enter the shallow groundwater.

- ♦ The delivery of anaerobic water into the groundwater is intended to facilitate the development of an anaerobic reducing environment capable of degrading perchlorate within the shallow aquifer.

- ♦ The ARB may be designed as a shallow pond or may be backfilled with permeable gravel to allow use of the land above the ARB. In cases of backfilled ARBs, surface drainage outlets would be the entrance point for surface water collection.

- ♦ Liquid substrates can be added to the ARB as needed to maintain or enhance treatment conditions.

- ♦ Long-term maintenance issues such as periodic clean out of debris or potential siltation issues would be considered during design.

- ♦ ARBs may incorporate elements of Constructed Wetlands to enhance the treatment of standing water at the margins of the basins and to serve as buffer zones for sedimentation, with concurrent perchlorate uptake into the wetland vegetation.

- **Recirculation Well Couples:** These would be designed to distribute substrate vertically across the saturated thickness of the aquifer, creating a treatment zone that extends horizontally and downgradient of the recirculation well. Each Recirculation Well Couple consists of a deep extraction point screened typically toward the base of the shallow aquifer and a shallow or intermediate-depth injection point with the screen depth determined by specific geology of the site area (estimated at 25 to 35 feet bgs for a general facility application). The Extraction Point would contain a submersible pump to extract groundwater from the base of the aquifer for re-injection into the intermediate-depth Injection Point thereby creating a continuous loop for shallow groundwater recirculation. At the surface, a substrate Feed Tank and metering pump with discharge piping tapped into the Injection Point influent would feed electron donor substrate into the Injection Point.

This continuous loop recirculation distributes substrate and in turn creates an anaerobic reducing environment vertically across the saturated thickness of the aquifer. The created anaerobic reducing zone will migrate downgradient via natural groundwater flow (advection) and spread through dispersion to provide a groundwater treatment zone. The distribution of substrate both vertically and horizontally throughout the targeted treatment zone will facilitate the development of an anaerobic reducing environment capable of degrading perchlorate.

This technology will be utilized for the following individual SWMUs/AOCs:

Table 22: In-situ Selection for Groundwater

Unit	SWMU #	AOC #	Description
Bldg. B20	2		Bldg. B20 Sump
Bldg. B30	1		Bldg. B30 Hot Trash Cage
	2		Bldg. B30 Sump
	10		Bldg. B30 Floor Drains

Table 22 continued

Bldg. C52	1		Bldg. C52 Hot Trash Cage
	2		Bldg. C52 Sump
	9		Bldg. C52 Washout
		4	Bldg. C52 Drainage Area
		7	Bldg. C52 Potential Perchlorate Impacts
Bldg. M125		7	Bldg. M125

			Potential Perchlorate Impacts
Rocket Test Firebreak Area		7	Rocket Test Fire Break Area Potential Perchlorate Impacts
Area adjacent to Navy Landfill		7	Area Adjacent to Navy Landfill Potential Perchlorate Impacts
RT-15		7	Bldg. RT-15 Potential Perchlorate Impacts
OBU Area [1]	*n/a*	*n/a*	(RFA-SWMU #2) Four Reactive Waste Open Burn Pits [1]

[1] RCRA permitted OBU (RFA SWMU #2) is currently undergoing remediation under RCRA closure.

Pump and Treat:

The Pump and Treat technology consists of groundwater being extracted from the subsurface via appropriately screened extraction wells and passed through a treatment process (above ground or below ground) to reduce perchlorate concentrations to below established Remedial Action Levels (refer to Section 9). Under appropriate discharge Permits, the treated groundwater can be discharged to surface water. Groundwater extraction is also selected as a viable part of in-situ remediation for groundwater (e.g., Recirculation Well Couples and optional enhancements to ARBs), but, in this case, the extracted groundwater will be recirculated back into the groundwater via an Injection Point, Infiltration Trench, or ARB for treatment.

As stated above, Pump and Treat technology is being utilized as part of the *In-Situ Remediation* alternative (see above). Therefore, refer to Table 22 (above) for the specific SWMUs/AOCs associated with Pump and Treat.

Monitored Natural Attenuation (MNA):

MNA will also be utilized in select areas of groundwater that exceed the Remedial Action Levels (refer to Section 9) for perchlorate to monitor and evaluate residual perchlorate concentrations. MNA will be performed to document the continued reduction of perchlorate concentrations and to confirm that perchlorate is not migrating beyond the facility property boundary at a concentration greater than the established Remedial Action Levels for the western property boundary.

In select areas, the use of the MNA corrective measure alternative may be applied to determine the effect of Soil Excavation and In-Situ Treatment on the residual perchlorate concentrations in groundwater. MNA is the use of natural chemical or biological processes to reduce contaminant concentrations in soil and/or groundwater without human intervention. The chemical processes may include but are not limited to biodegradation, dispersion, dilution, sorption, volatilization, and chemical or biological stabilization, transformation, and/or destruction of containments (EPA, 1998). A MNA remediation program will consist of Effectiveness Monitoring (refer to Section 12) designed to evaluate the rate at which the natural processes reduce contamination concentrations to ensure that the established Remedial Action Levels for the facility will be accomplished within a reasonable period of time. For areas designated for the MNA alternative for groundwater, the following processes are anticipated.

- Conduct groundwater sampling of locations and intervals as specified in individual area plans. The current estimate is to conduct annual groundwater sampling for perchlorate in each location. In conjunction with annual groundwater sampling, monitor groundwater annually for natural attenuation parameters (dissolved oxygen, oxidation-reduction potential, temperature, and pH).

- Analyze groundwater samples for perchlorate utilizing EPA Method 314.

- Upon groundwater sample results attaining levels below Remedial Action Levels, conduct confirmatory (closure) sampling of the area monitoring well network. Conceptually, confirmatory sampling will occur one year following achievement of Remedial Action Levels to verify groundwater perchlorate concentrations and achievement of Remedial Action Levels.

- Report collected data to ADEQ and if results are below Remedial Action Levels, request "No Further Action (NFA)" for area. If sample results are above Remedial Action Levels, continue annual groundwater sampling of area monitoring well network until achieving Remedial Action Levels or evaluate alternative recommendation for ADEQ consideration.

This technology will be utilized for the individual SWMUs/AOCs:

Table 23: MNA Selection for Groundwater

Unit	SWMU #	AOC #	Description
Bldg. A5	1		Bldg. A5 Hot Trash Cage
Bldg. A6	1		Bldg. A6 Hot Trash Cage
Bldg. A8	1		Bldg. A8 Hot Trash Cage
		7	Bldg. A8 Potential Perchlorate Impacts
Bldg. A9	1		Bldg. A9 Hot Trash Cage
Bldg. B21	1		Bldg. B21 Hot Trash Cage
	2		Bldg. B21 Sump
		7	Bldg. B21 Potential Perchlorate Impacts
Bldg. B22	1		Bldg. B22 Hot Trash Cage
	2		Bldg. B22 Sump
Bldg. B23	1		Bldg. B23 Hot Trash Cage
	2		Bldg. B23 Sump

Bldg. B24	1		Bldg. B24 Hot Trash Cage
	2		Bldg. B24 Sump
Bldg. B25	1		Bldg. B25 Hot Trash Cage
	2		Bldg. B25 Sump
Bldg. B27	1		Bldg. B27 Hot Trash Cage
	2		Bldg. B27 Sump
Bldg. B34		7	Bldg. B34 Potential Perchlorate Impacts
Bldg. C39	1		Bldg. C39 Hot Trash Cage
		7	Bldg. C39 Potential Perchlorate Impacts
Bldg. C51	2		Bldg. C51 Sump
Bldg. M2 (North)	1		Bldg. M2 North Hot Trash Cage
EXTEF		7	EXTEF Potential Perchlorate Impacts

No Further Action (NFA):

The NFA alternative is applicable for areas that do not exceed the established Remedial Action Levels for the site (refer to Section 9).

NFA was selected for the following individual SWMUs/AOCs:

Table 24: NFA Selection for Groundwater

Unit	SWMU #	AOC #	Description
Bldg. A2	1		Bldg. A2 Hot Trash Cage
Bldg. A4	1		Bldg. A4 Hot Trash Cage

Bldg. A11	1		Bldg. A11 Hot Trash Cage
Bldg. A12	3		Bldg. A12 Main Container Storage Building

Table 24 continued

Bldg. A90	1		Bldg. A90 Hot Trash Cage
Bldg. B20	1		Bldg. B20 Hot Trash Cage
Bldg. B24		7	Bldg. B24 Potential Perchlorate Impacts
Bldg. B30		7	Bldg. B30 Potential Perchlorate Impacts
Bldg. B32	1		Bldg. B32 Two (2) Hot Trash Cage
Bldg. C35	2		Bldg. C35 Sump
Bldg. C38	1		Bldg. C38 Hot Trash Cage
Bldg. C51	1		Bldg. C51 Hot Trash Cage
Bldg. E47	1		Bldg. E47 Hot Trash Cage
Bldg. M8 (South)	1		Bldg. M8(South) Hot Trash Cage
Bldg. M122		7	Bldg. M122 Potential Perchlorate Impacts
Bldg. M125	1		Bldg. M125 Two (2) Hot Trash Cages
Bldg. RT-45	1		Bldg. RT-45 Hot Trash Cage
		7	Bldg. RT-45 Potential Perchlorate Impacts
Bldg. 2SH12		7	Bldg. 2SH12 Potential Perchlorate Impacts

Bldg. 41 (Washout)	1		Bldg. 41 (Washout) Hot Trash Cage
		7	Bldg. 41 (Washout) Potential Perchlorate Impacts
Empty Drum Storage Area (Barrel Pen)		1	Empty Drum Storage Area (Barrel Pen)
Scrapyard		7	Scrapyard Potential Perchlorate Impacts

D. Surface Water

The proposed and recommended remedies for surface water are the following:

Monitored Natural Attenuation (MNA):

MNA will be utilized at the following SWMUs/AOCs:

Table 25: MNA Selection for Surface Water

Unit	SWMU #	AOC #	Description
Bldg. B24		7	Potential Perchlorate Impact

Table 25 continued

Bldg. C52	1		Bldg. C52 Hot Trash Cages
	2		Bldg. C52 Sump

	9		Bldg. C52 Area
		4	Bldg. C52 Drainage Area
		7	Bldg. C52 Potential Soil Perchlorate impact
EXTEF		7	Potential Perchlorate Impact
OBU Area [1]	*n/a* [1]	*n/a* [1]	(RFA-SWMU #2) Four Reactive Waste Open Burn Pits [1]

[1] RCRA permitted OBU (RFA SWMU #2) is currently undergoing remediation under RCRA closure.

No Further Action (NFA):

NFA was selected for the following SWMUs/AOCs based on established Remedial Action Levels (refer to Section 9):

Table 26: NFA Selection for Surface Water

Unit	SWMU #	AOC #	Description
Bldg. A2	1		Bldg. A2 Hot Trash Cage
Bldg. A4	1		Bldg. A4 Hot Trash Cage
Bldg. A5	1		Bldg. A5 Hot Trash Cage
Bldg.A6	1		Bldg. A6 Hot Trash Cage
Bldg. A8	1		Bldg. A8 Hot Trash Cage
		7	Bldg. A8 Potential Perchlorate Impact
Bldg. A9	1		Bldg. A9 Hot Trash Cage
Bldg. A11	1		Bldg. A11 Hot Trash Cage

Bldg. A12	3		Building A12 (main container storage building)
Bldg. A90	1		Bldg. A90 Hot Trash Cage
Bldg. B20	1		Bldg. B20 Hot Trash Cage
	2		Bldg. B20 Sump
Bldg. B21	1		Bldg. B21 Hot Trash Cage,
	2		Bldg. B21 Sump
		7	Bldg. B21 Potential Perchlorate Impacts
Bldg. B22	1		Bldg. B22 Hot Trash Cage
	2		Bldg. B22 Sump
Bldg. B23	1		Bldg. B23 Hot Trash Cage
	2		Bldg. B23 Sump
Bldg. B24	1		Bldg. B24 Hot Trash Cage
	2		Bldg. B24 Sump
Bldg. B25	1		Bldg. B25 Hot Trash Cage
	2		Bldg. B25 Sump

Table 26 continued

Bldg. B27	1		Bldg. B27 Hot Trash Cage
	2		Bldg. B27 Sump
Bldg. B30	1		Bldg. B30 Hot Trash Cage
	2		Bldg. B30 Sump
		7	Bldg. B30 Potential Perchlorate Impacts

Bldg. B32	1		Bldg. B32 Two (2) Hot Trash Cages
Bldg. B34		7	Bldg. B34 Potential Perchlorate Impacts
Bldg. C35	2		Bldg. C35 Sump
Bldg. C38	1		Bldg. C38 Hot Trash Cage
Bldg. C39	1		Bldg. C39 Hot Trash Cage
		7	Bldg. C39 Potential Perchlorate Impacts
Bldg. C51	1		Bldg. C51 Hot Trash Cage
	2		Bldg. C51 Sump
Bldg. E47	1		Bldg. E47 Hot Trash Cage
Bldg. M2 (North)	1		Bldg. M2 (North) Hot Trash Cage
Bldg. M8 (South)	1		Bldg. M8 (South) Hot Trash Cage
Bldg. M122		7	Bldg. M122 Potential Perchlorate Impact
Bldg. M125	1		Bldg. M125 two (2) Hot Trash Cages
		7	Bldg. M125 Potential Perchlorate Impacts
Bldg. RT-45	1		Bldg. RT-45 Hot Trash Cage
		7	Bldg. RT45 Potential Perchlorate Impacts
Bldg. 2SH12		7	Bldg. 2SH12 Potential Perchlorate Impacts

Bldg. 41 (Washout)	1		Bldg. 41 (Washout) Hot Trash Cage
		7	Bldg. 41 (Washout) Potential Perchlorate Impacts
Bldg. RT-15		7	Bldg. RT-15 Potential Perchlorate Impacts
Rocket Test Firebreak Area		7	Rocket Test Firebreak Area Potential Perchlorate Impacts
Empty Drum Storage Area (Barrel Pen)		1	Empty Drum Storage Area (Barrel Pen)

Table 26 continued

Scrapyard		7	Scrapyard Potential Perchlorate Impacts
Area adjacent to Navy Landfill		7	Area Adjacent to Navy Landfill Potential Perchlorate Impacts

12. EFFECTIVENESS MONITORING PROGRAM

A. SURFACE SOILS & SUBSOILS

Excavation and Ex-situ Anaerobic Treatment: Once soil has been completely excavated, confirmation soil samples will be taken to ensure all perchlorate impacted soils have been removed – prior to clean fill being placed.

Monitored Natural Attenuation: In areas with minor perchlorate impacts, the facility will conduct annual soil sampling at multiple locations to access natural attenuation in soils. This soil sampling will continue for a period of five (5) years. At the end of this five (5)

year period, the facility can request to discontinue soil sampling in those areas where perchlorate impacts are no longer present. If MNA is determined to be ineffective, other technologies may need to be employed. After five (5) years, ADEQ will make a determination if MNA is ineffective and requires an alternate technology. Any changes to selected technologies would require a revision to this RADD.

Asphalt Cap: A maintenance plan for the asphalt cap which contains an inspection schedule, details how repairs will be made, etc. must be submitted no later than thirty (30) days from the effective date of RCRA Permit 8H-RN2-M007.

MNA Soil Sampling for OBU Area: In 2017, separate MNA sampling programs were established for the perchlorate-impacted soils located within the OBU drainage areas (SWMU #11) and OBU 4 (RFA-SWMU #2). The program specific sampling requirements are described in the following documents: the Class 3 permit application dated May 1, 2017; the addendum to the application dated July 21, 2017; and, the underlying CM 100% Final Design Report as amended in May and July 2017.

B. GROUNDWATER

Effectiveness Monitoring for facility groundwater perchlorate impacts consists of water quality monitoring of several existing onsite groundwater monitoring wells, injection points, and recharge basins. Additional groundwater monitoring wells are also required to be installed under this program. The locations of future groundwater monitoring effectiveness wells must be prior approved by ADEQ. Note: Groundwater monitoring wells and Injection Points (specified below), sampling frequency and parameters, may be modified at any stage, with prior ADEQ approval, to achieve more efficient Effectiveness Monitoring. As noted in the "Term (Years)" column of Table 27 below, at the end of specified term, ADEQ will make a determination if additional steps or alternate technologies need to be employed.

Details of the Effectiveness Monitoring Program are detailed below:

Table 27: Effectiveness Monitoring for Groundwater

Unit	# Wells	Description	Frequency	Term (Years)
Bldg. M125	10	MW-43S, MW-43I, MW-51S, MW-51I, MW-52S, MW-52I,	Annually	15

		MW-53S, MW-53I, MW-54S, MW-54I		
EXTEF	3	MWX-2S, MWX-3S, MWX-4S	Annually	5
Bldg. B22	1	MW-23S	Annually	5
Bldg. B23	1	Planned Shallow Well	Annually	5
Bldg. B34	1	MW-46S	Annually	5
Bldg. C39	4	MW-17S, MW-17I, MW-31S, MW-31I	Annually	5
Bldg. C51	1	Planned Shallow Well	Annually	5
Bldg. M2 (North)	1	Planned Shallow Well	Annually	5
A-Area	10	MW-8S, MW-8I, MW-44S, MW-44I, MW-45S, MW-45I, BTW-16, BTW-18	Annually	5
		MW-8D, MW-45D	Annually/ Quarterly	15/5
Bldg. B30 Area	31	MW-47S, MW-47I, MW-15S, MW-15I, MW-22S, MW-22I, MW-22D, MW-22DD, MW48S, MW-48I, MW-48D, MW-7S, MW-7I 4 - Planned SI Well Pairs 2 - Planned Shallow Wells 4 - Recirculation Well Couples *Non-wells:* 2 - Anaerobic Recharge Basins 2 - ARB Semi-Passive Injec.+Pts.	Annually/ Quarterly	15/5

Bldg. C52 Area	38	MW-1A, MW-9S, MW-9I, MW-9D, MW-25S, MW-25I, MW-25D, MW-34S,MW-34I, MW-34D, MW-37S, MW-37I, PM-2S, PM-2V, PM-7S, PM-7D, EW-1, EW-1A, IGMP-1, IGMP-2, IGMP-3, IM-1, IM-2, IM-3, PM-1S, PM-1V, PM-3AS, PM-3AV, PM-3S, PM-3V, PM-4S, PM-4V, PM-6S, PM-6I, PM-16S, PZ-1, RB-1, RB-2 *Non-wells: 27 Injection Points*: IP-01, IP-02, IP-03, IP-05, IP-06, IP-07, IP-08, IP-09, IP-10, IP-11, IP-12, IP-13, IP-14, IP-15, IP-16, IP-17, IP-18, IP-19, IP-21, IP-22, IP-23, IP-24,IP-25, IP-26, IP-27, IP-28, IP-29	Annually/ Quarterly	15
OBU Area[1]	22	MW-2, MW-5, MW-6, MW-19S, MW-19I, MW-24I, MW-24D, W-4, MW-62S, MW-63S, MW-64S, MW-65S, MW-66S,MW-66I, MW-67S, MW-69S, MW-70S OBU-EW1, OBU-EW2, OBU-EW3, OBU-EW4, AND OBU-GBR Discharge	Annually/ Quarterly	15/5
OBU Area	19	MW-2, MW-5, MW-6, MW-24I, MW-24D, W-4, MW-62S, MW-63S, MW-64S, MW-65S,	Annually	5 (2029-2033)

		MW-66S, MW-66I, MW-67S, OBU-EW1, OBU-EW2, OBU-EW3, OBU-EW4, OBU-GBR Influent, and OBR-GBR Discharge		
OBU Area	1	MW-79I	Quarterly/ Annually	5 (2018-2022)

[1] OBU Area (RFA SWMU #2) is currently undergoing remediation under RCRA closure activities.

C. SURFACE WATER

The facility will implement a Surface Water Monitoring Program to document the natural perchlorate reduction in onsite surface water at various locations on the facility. These surface water sampling points are located near perchlorate impacted surface soils. Surface water monitoring will be conducted annually and last for five (5) years. After five (5) years, ADEQ will make a determination if MNA is ineffective and requires an alternate technology. Any changes to selected technologies would require a revision to this RADD. The specific surface monitoring locations are detailed below:

Table 28: Effectiveness Monitoring for Surface Water

Area	SWMU #	AOC #	Sampling Location(s)
Bldg. B24	1 & 2	7	Bldg. B24 Drainage Area
Bldg. C52	1 & 2	4 & 7	Bldg. C52 Drainage Area
Bldg. M125	1 & 2	7	M125-Pond; M125 Pond-East; M125 Pond-Outfall
EXTEF		7	EXTEF Fire Water Pond
OBU Area	*n/a* [1]	*n/a* [1]	OBU Fire Water Pond
Onsite Surface Water	*n/a*	*n/a*	N1; OU1; OU2

Off-Site Surface Water	*n/a*	*n/a*	N2; N3; S1; S2; S2A, S3; S5

[1] RCRA permitted OBU (RFA SWMU-2) is currently undergoing remediation under RCRA closure.

13. COMMUNITY PARTICIPATION

Public involvement is an important process for ultimately selecting the final remedies to be employed at the site for remediating releases to the environment of hazardous constituents. Since this RADD is an important decision document, the RADD was subject to public notice and comment to allow the public and interested parties to raise all ascertainable issues concerning the remedies proposed at the facility, including options not potentially addressed.

The Notice of the RADD was published in the *South Arkansas Sun.* Individuals were afforded the opportunity to review the RADD and the administrative record in the ADEQ Records Management Section, Arkansas Department of Environmental Quality; 5301 Northshore Drive; North Little Rock, Arkansas.

Documents comprising the administrative record include:

1. Remedial Action Decision Document (RADD)
2. Public Notice
3. Facility Investigation (FI) Report, Phase I, II, and III
4. Corrective Measures Study (CMS) - Task VI
5. CMS Evaluation, Justification, and Recommendations - Tasks VII and VIII
6. Health Human Ecological Risk Assessment

In addition, the RADD and the administrative record were reviewable at Calhoun County Public Library, located at 109 2nd Street, Hampton, Arkansas.

The Department has now made a final decision on the RADD after the public comment period. ADEQ would have, in response to written requests, held a public hearing to clarify issues concerning the RADD. Any request for a hearing was to include the requestor's name and address and state the nature of the issues to be raised in a hearing. ADEQ would have issued a public notice of a hearing at least 30 days prior to the scheduled hearing.

Any individuals, including the Applicant, who wished to comment, request a public hearing or add their names to the mailing list concerning ADEQ decisions relating to the RADD, were to do so by hand delivering or mailing written comments, along with their name and mailing address to:

Regulated Waste Operations Senior Manager

Office of Land Resources

Arkansas Department of Environmental Quality

5301 Northshore Drive

North Little Rock, AR 72118-5317

Web site: http://www.adeq.state.ar.us

All comments and request for a public hearing were to be received by 4:30 p.m. on September 10, 2012. Only comments regarding the RADD were to be considered. The only comments received during the public comment period were from the facility.

Submitting written comments to ADEQ or making oral statements on the record at a public hearing on the RADD decision provides individuals with legal standing to appeal a final Department decision. Comments supporting or opposing the tentative decision will provide legal standing. Only parties with legal standing may appeal the decision.

14. COORDINATION WITH OTHER DIVISIONS/AGENCIES

It is important to involve/inform other divisions of ADEQ and other agencies in the development of a RADD, as applicable. To keep EPA informed of all corrective action work, EPA Region 6 was provided a copy of the Public Notice and RADD for review and comment.

INTERNAL COORDINATION

ADEQ Divisions	Consulted or Informed	Sent Notice of Decision
Water	Yes	Yes
NPDES	Yes	Yes
Air	Yes	Yes
Solid Waste	Yes	Yes
Regulated Storage Tanks	No	No

Technical Services and Environmental Preservation	Yes	Yes
Mining	No	No

EXTERNAL COORDINATION

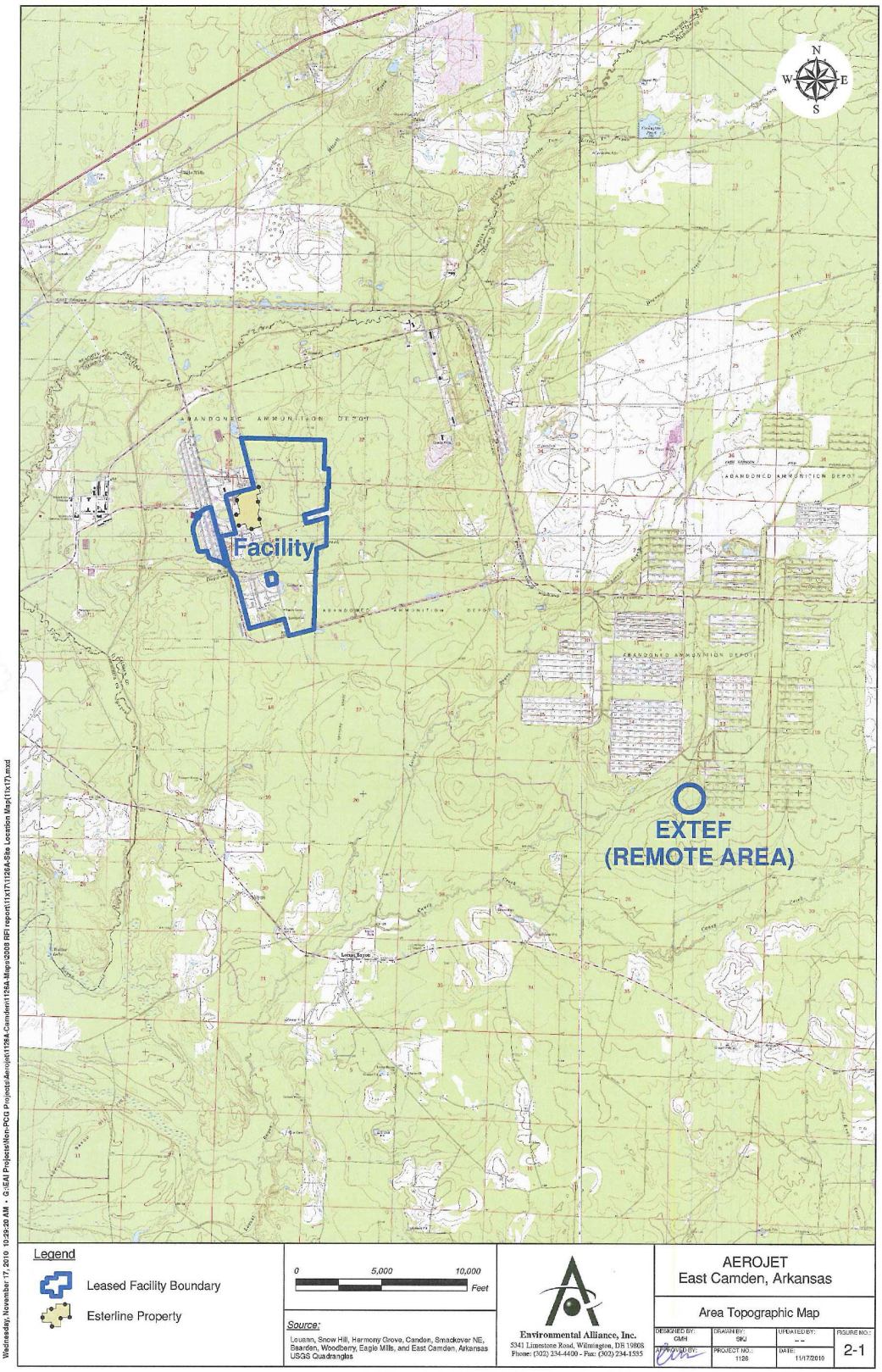
Other State and Federal Organizations	Consulted or Informed	Sent Notice of Decision
EPA, Region 6	Yes	Yes
Office of Emergency Services	No	No
AR Dept. of Health	Yes	Yes
AR State Clearinghouse	No	No
AR State Historic Preservation	No	No
AR Natural Heritage Commission	No	No
AR Game & Fish Commission	No	No
U.S. Army Corps of Engineers	No	No
AR Soil and Water Conservation	No	No
AR Geological Commission	No	No

The final RADD was sent to all applicable branches of the Hazardous Waste Division, and to all ADEQ Divisions and Agencies listed above.

END OF RADD

Attachment A

General Facility Map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ABANDONED AMMUNITION DEPOT
Facility
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Legend
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5,000
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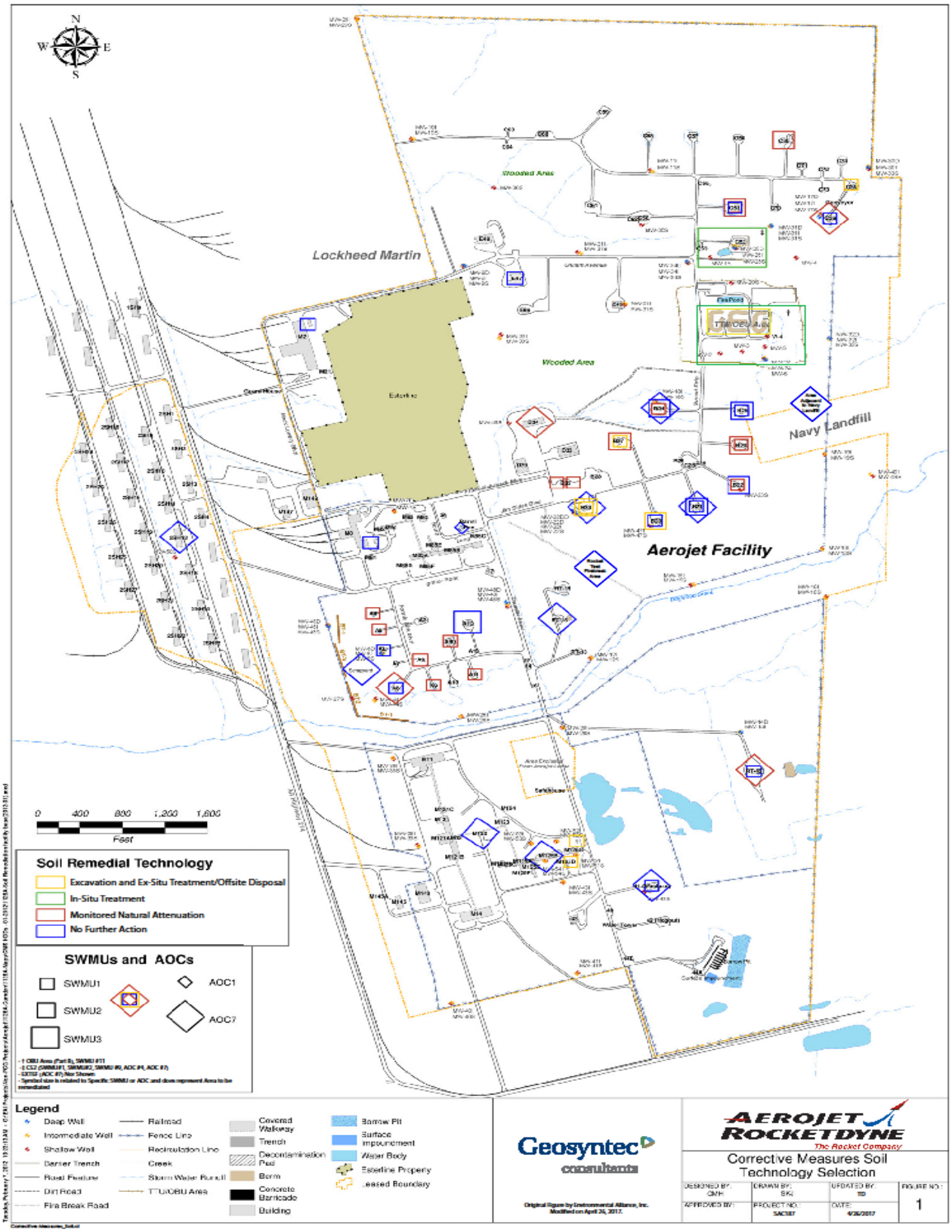
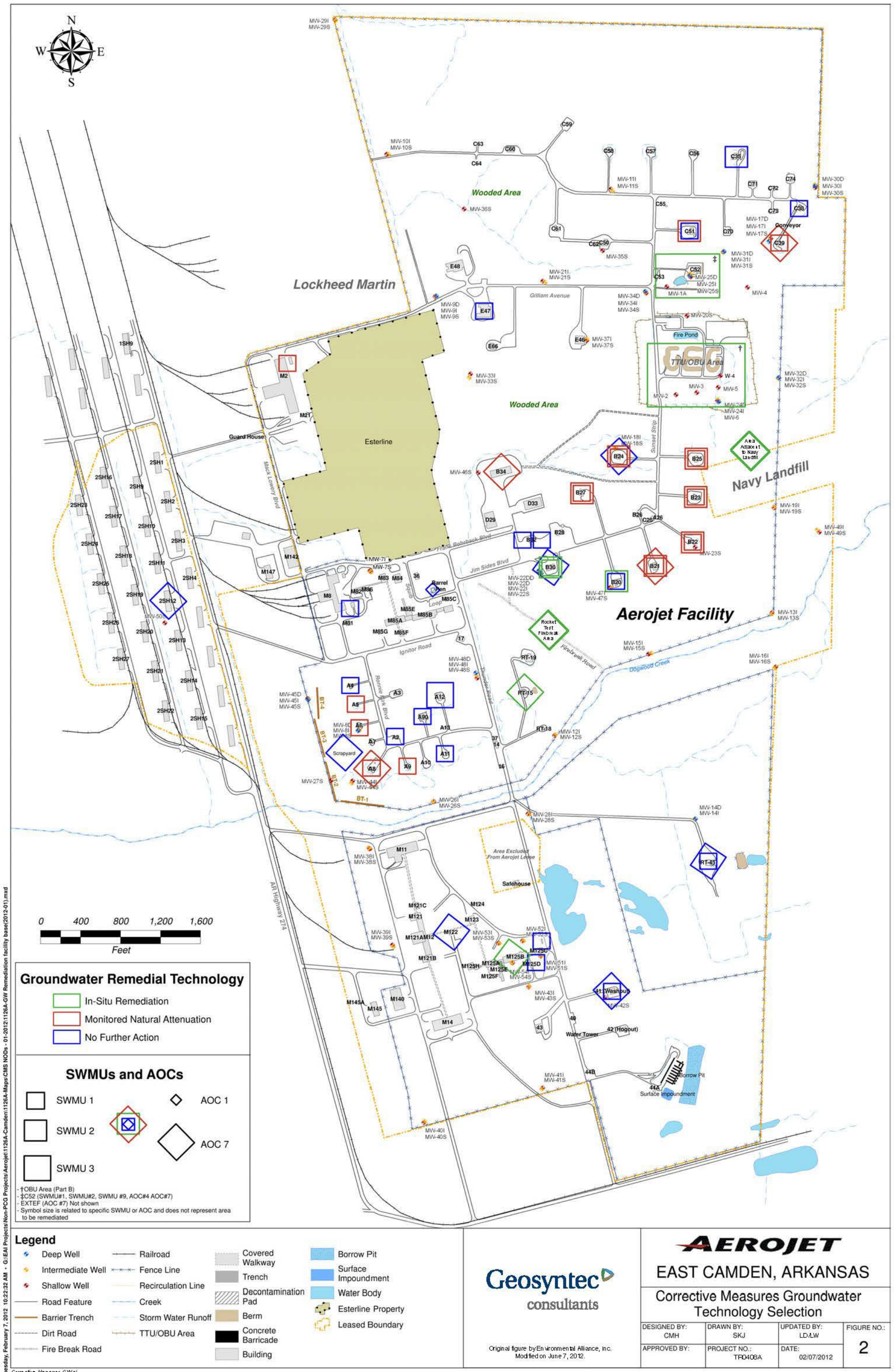
Source:
Louann, Snow Hill, Harmony Grove, Camden, Smackover NE, Baarden, Woodberry, Eagle Mills, and East Camden, Arkansas USGS Quadrangles
Environmental Alliance, Inc.
5341 Limestone Road, Wilmington, DE 19808
Phone: (302) 234-4400 - Fax: (302) 234-1535
AEROJET
East Camden, Arkansas
Area Topographic Map
DESIGNED BY: GMH
DRAWN BY: SKJ
UPDATED BY: --
FIGURE NO.: 2-1
APPROVED BY:
PROJECT NO.: 1126
DATE: 11/17/2010
Wednesday, November 17, 2010 10:29:20 AM - G:\EA\Projects\Non-PCG Projects\Aerojet\1126A-Camden\1126A-Maps\2008 RFI report\11x17\1126A-Site Location Map(11x17).mxd

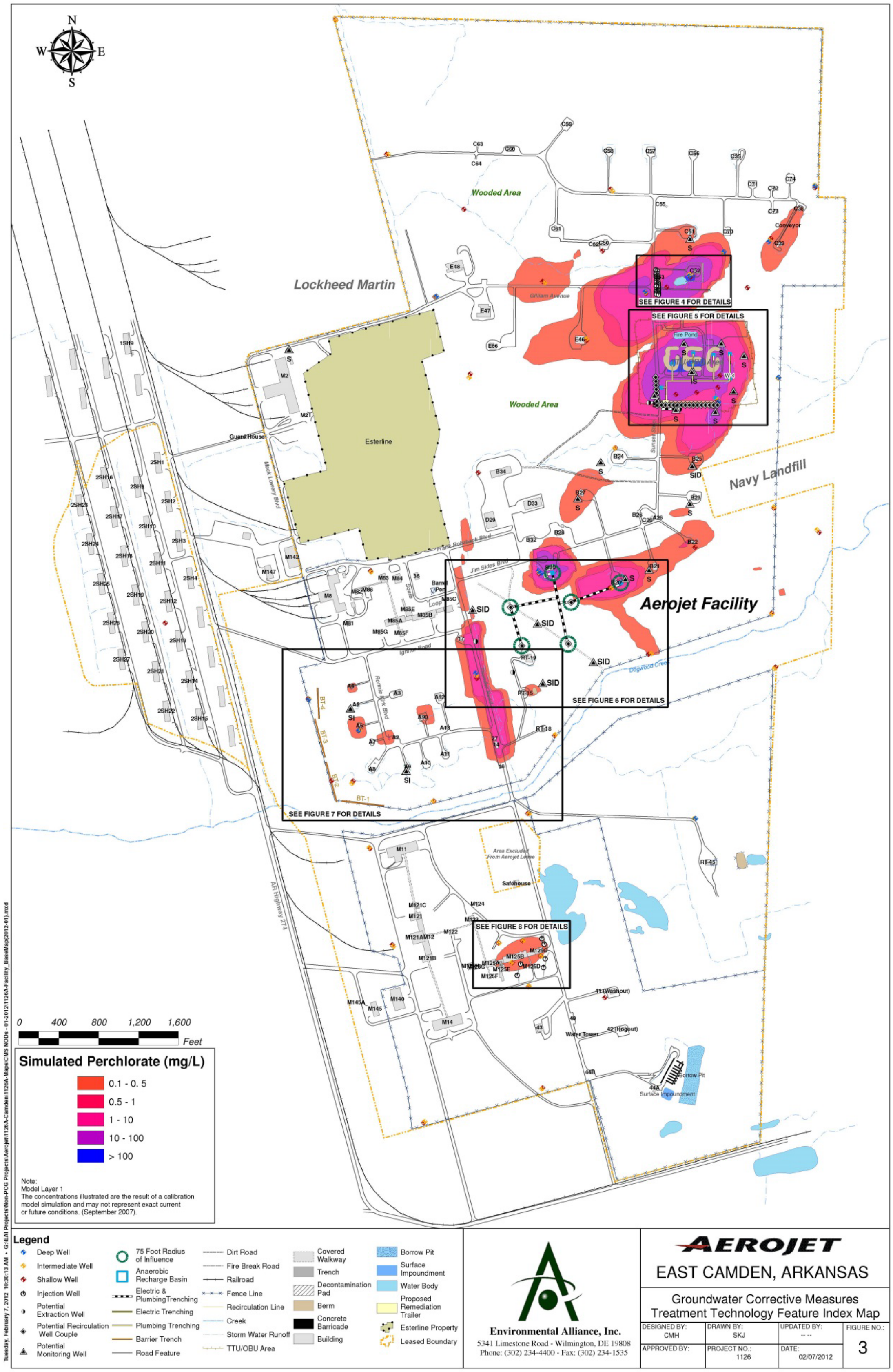
Attachment B

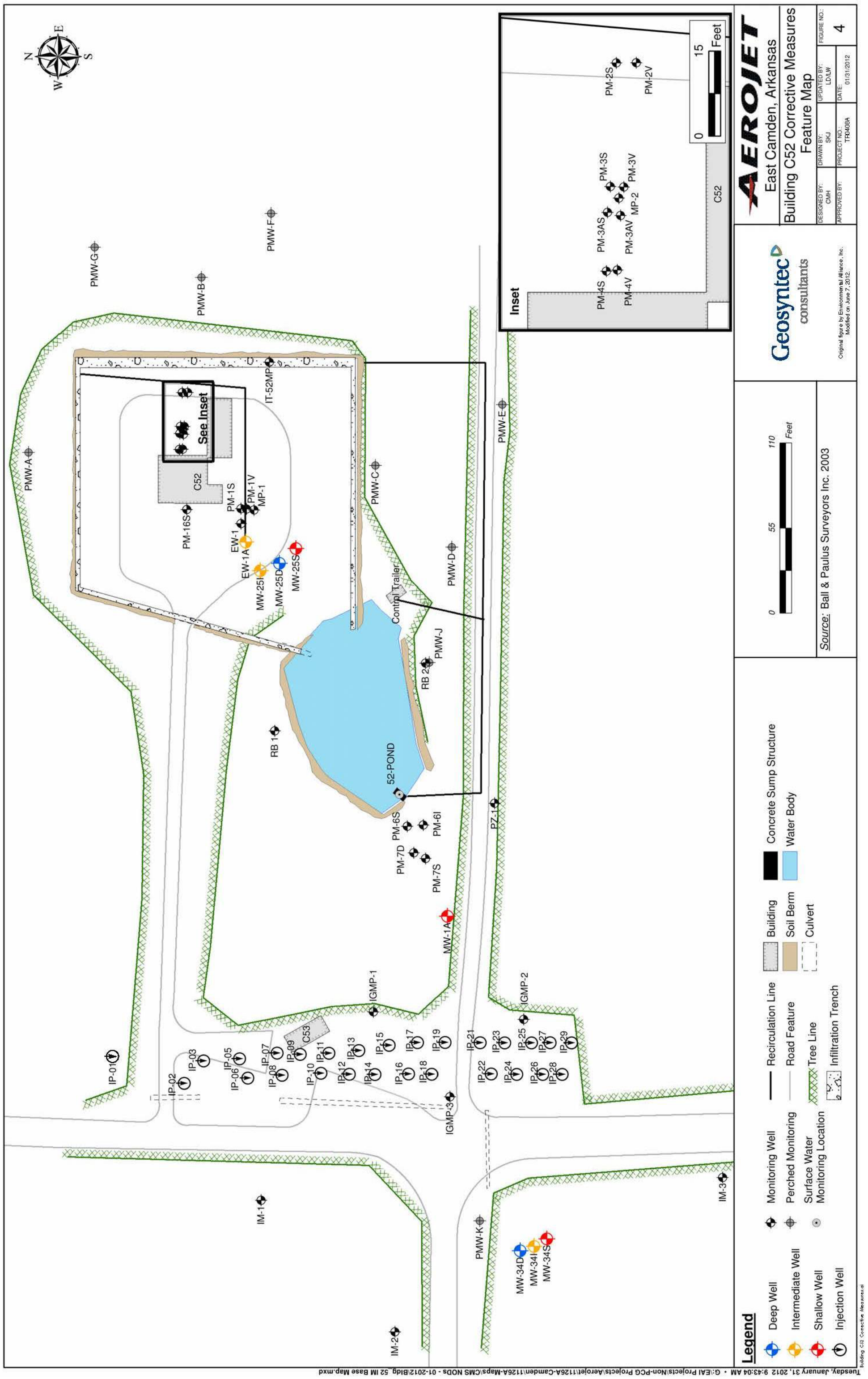
Site Specific SWMU Maps

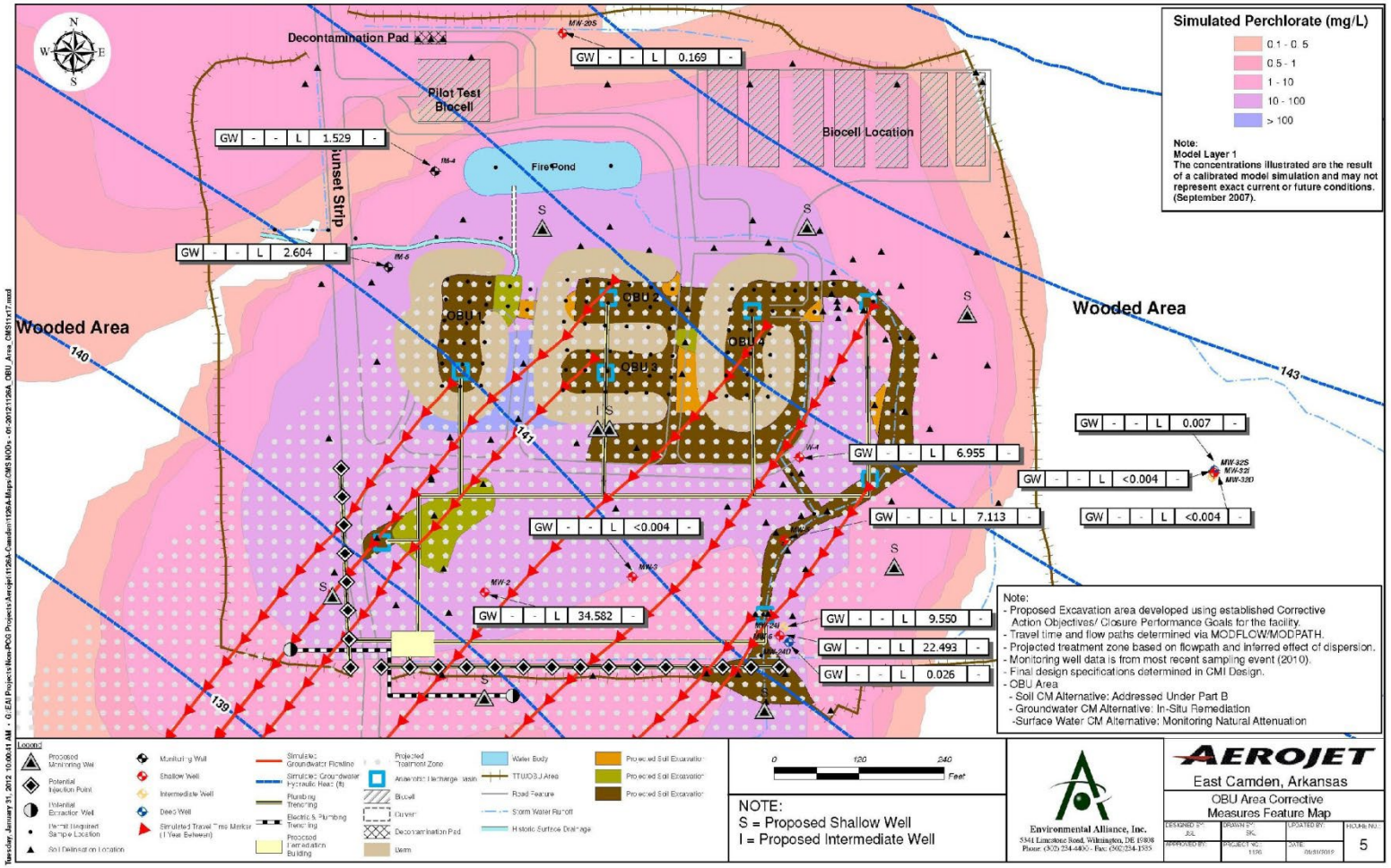
Figures 1-10

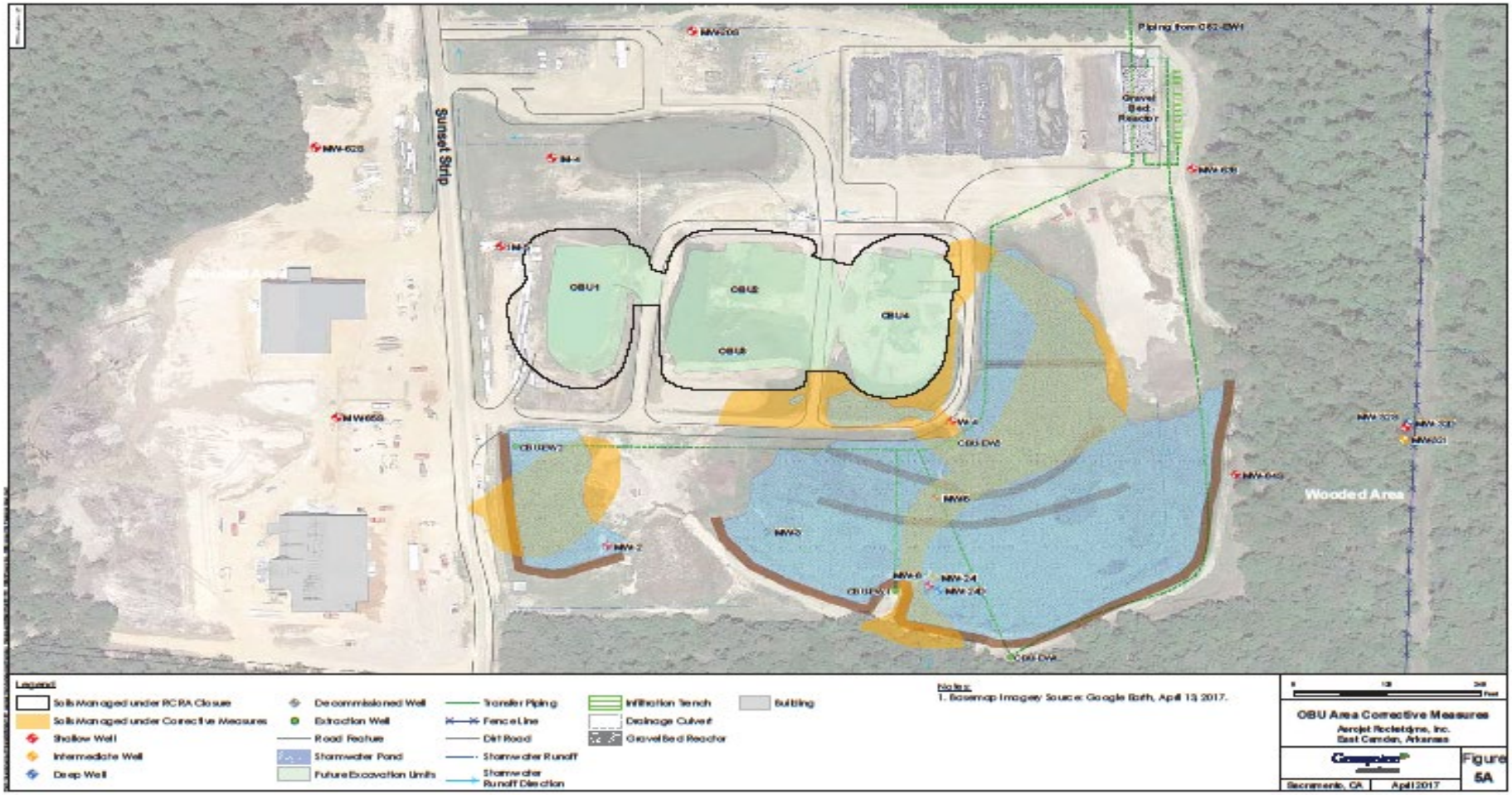

N
W
E
S
Lockheed Martin
Wooded Area
Wooded Area
Navy Landfill
Aerojet Facility
0 400 800 1,200 1,600
Feet
Soil Remedial Technology
Excavation and Ex-Situ Treatment/Offsite Disposal
In-Situ Treatment
Monitored Natural Attenuation
No Further Action
SWMUs and AOCs
SWMU1
SWMU2
SWMU3
AOC1
AOC7
Legend
Deep Well
Intermediate Well
Shallow Well
Barrier Trench
Road Feature
Dirt Road
Fire Break Road
Railroad
Fence Line
Recirculation Line
Creek
Storm Water Runoff
TTU/OBU Area
Covered Walkway
Trench
Decontamination Pad
Berm
Concrete Barricade
Building
Borrow Pit
Surface Impoundment
Water Body
Baseline Property
Leased Boundary
Geosyntec consultants
AEROJET ROCKETDYNE
The Rocket Company
Corrective Measures Soil Technology Selection
FIGURE NO.: 1

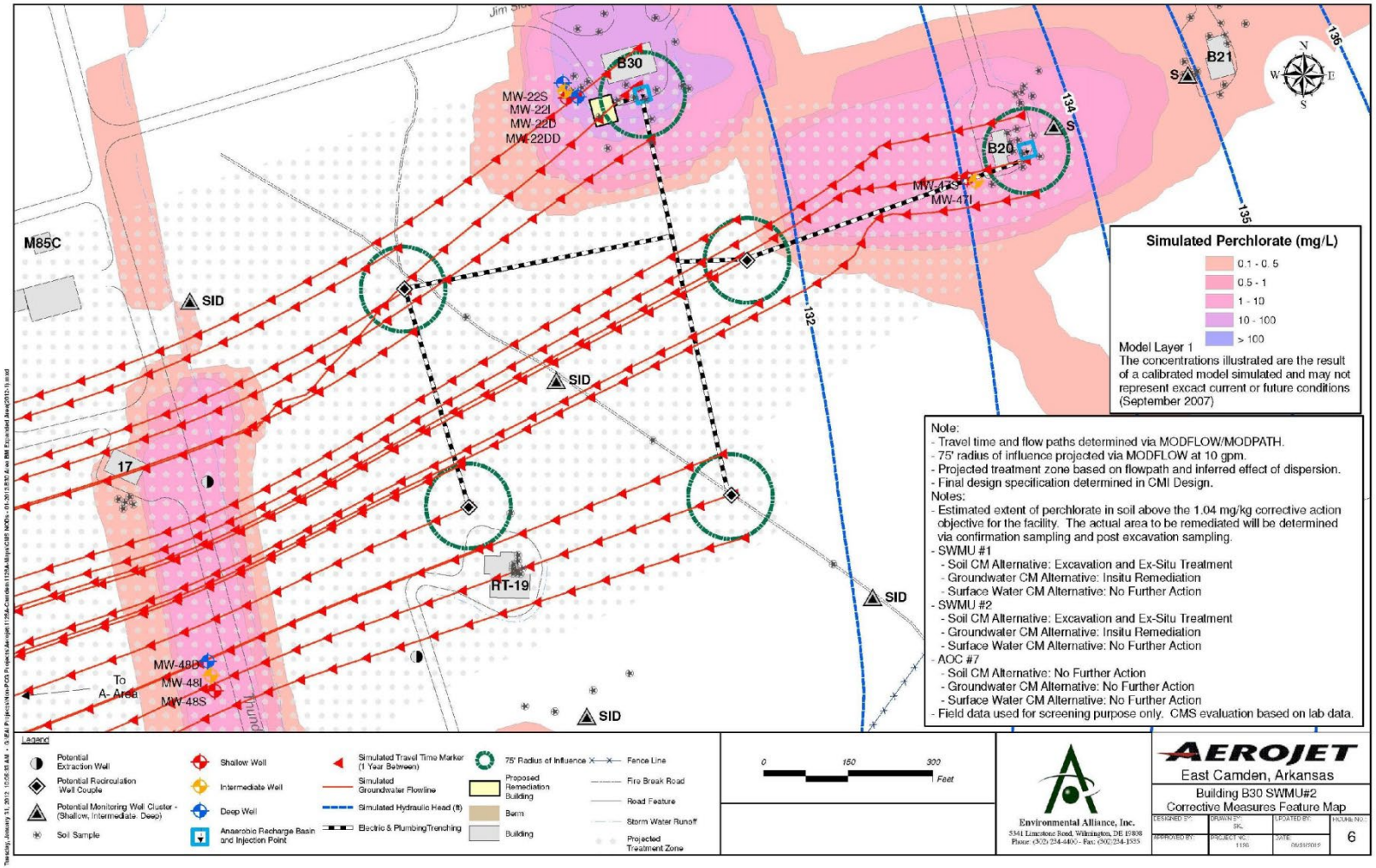

Lockheed Martin
Esterline
Wooded Area
Navy Landfill
Aerojet Facility
0 400 800 1,200 1,600
Feet
Groundwater Remedial Technology
In-Situ Remediation
Monitored Natural Attenuation
No Further Action
SWMUs and AOCs
SWMU 1
SWMU 2
SWMU 3
AOC 1
AOC 7
Legend
Deep Well
Intermediate Well
Shallow Well
Road Feature
Barrier Trench
Dirt Road
Fire Break Road
Railroad
Fence Line
Recirculation Line
Creek
Storm Water Runoff
TTU/OBU Area
Covered Walkway
Trench
Decontamination Pad
Berm
Concrete Barricade
Building
Borrow Pit
Surface Impoundment
Water Body
Esterline Property
Leased Boundary
Geosyntec consultants
Original figure by Environmental Alliance, Inc. Modified on June 7, 2012.
AEROJET
EAST CAMDEN, ARKANSAS
Corrective Measures Groundwater Technology Selection
DESIGNED BY: CMH
DRAWN BY: SKJ
UPDATED BY: LD/LW
FIGURE NO.: 2
APPROVED BY:
PROJECT NO.: TR0408A
DATE: 02/07/2012

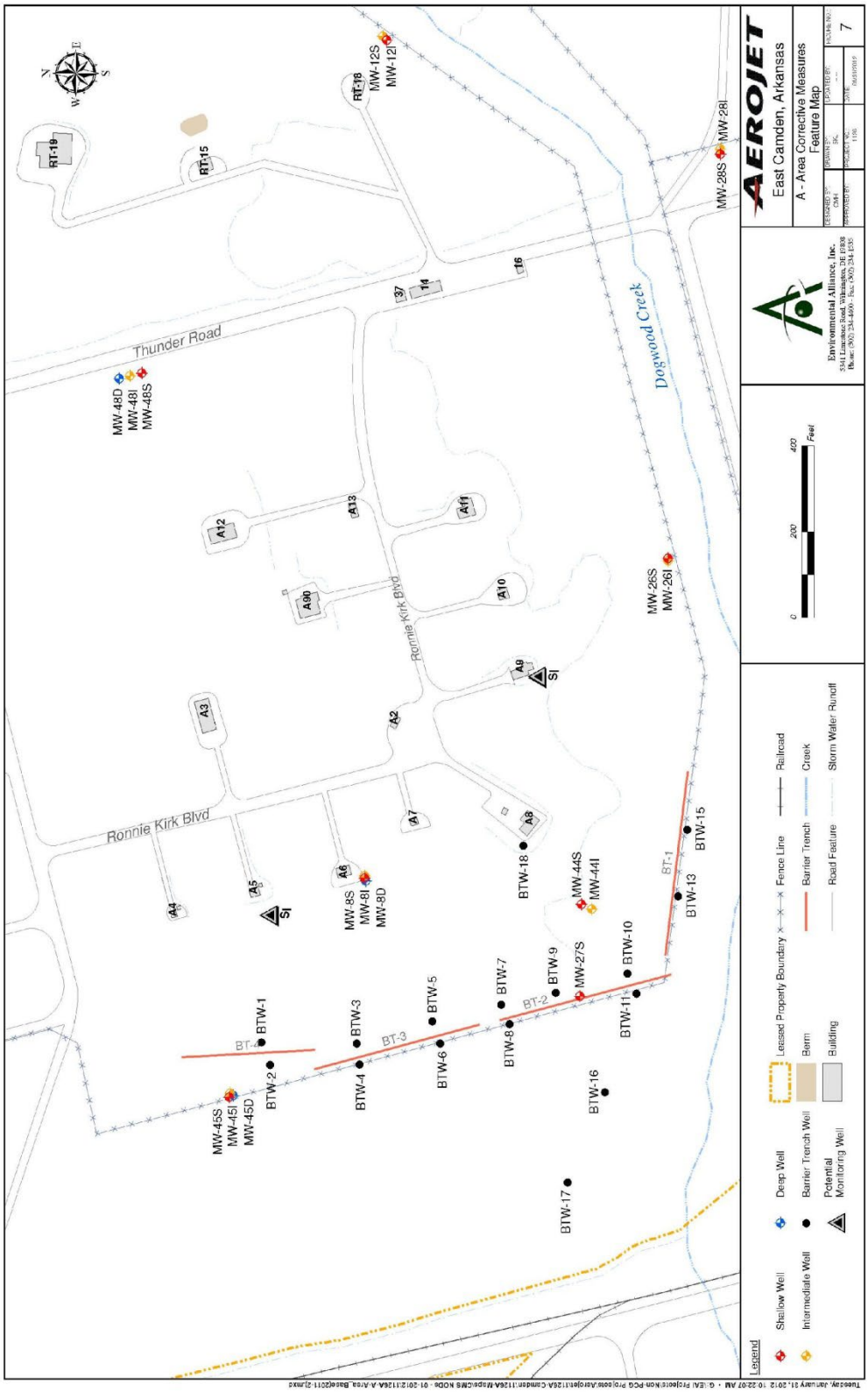

N
S
E
W
Lockheed Martin
Esterline
Wooded Area
Wooded Area
Navy Landfill
Aerojet Facility
Guard House
SEE FIGURE 4 FOR DETAILS
SEE FIGURE 5 FOR DETAILS
SEE FIGURE 6 FOR DETAILS
SEE FIGURE 7 FOR DETAILS
SEE FIGURE 8 FOR DETAILS
Area Excluded From Aerojet Lease
Safehouse
AR Highway 274
41 (Washout)
42 (Hogout)
Water Tower
Borrow Pit
44A Surface Impoundment
0 400 800 1,200 1,600
Feet
Simulated Perchlorate (mg/L)
0.1 - 0. 5
0.5 - 1
1 - 10
10 - 100
> 100
Note:
Model Layer 1
The concentrations illustrated are the result of a calibration model simulation and may not represent exact current or future conditions. (September 2007).
Legend
Deep Well
Intermediate Well
Shallow Well
Injection Well
Potential Extraction Well
Potential Recirculation Well Couple
Potential Monitoring Well
75 Foot Radius of Influence
Anaerobic Recharge Basin
Electric & Plumbing Trenching
Electric Trenching
Plumbing Trenching
Barrier Trench
Road Feature
Dirt Road
Fire Break Road
Railroad
Fence Line
Recirculation Line
Creek
Storm Water Runoff
TTU/OBU Area
Covered Walkway
Trench
Decontamination Pad
Berm
Concrete Barricade
Building
Borrow Pit
Surface Impoundment
Water Body
Proposed Remediation Trailer
Esterline Property
Leased Boundary
Environmental Alliance, Inc.
5341 Limestone Road - Wilmington, DE 19808
Phone: (302) 234-4400 - Fax: (302) 234-1535
AEROJET
EAST CAMDEN, ARKANSAS
Groundwater Corrective Measures
Treatment Technology Feature Index Map
DESIGNED BY: CMH
DRAWN BY: SKJ
UPDATED BY: -- --
FIGURE NO.: 3
APPROVED BY:
PROJECT NO.: 1126
DATE: 02/07/2012

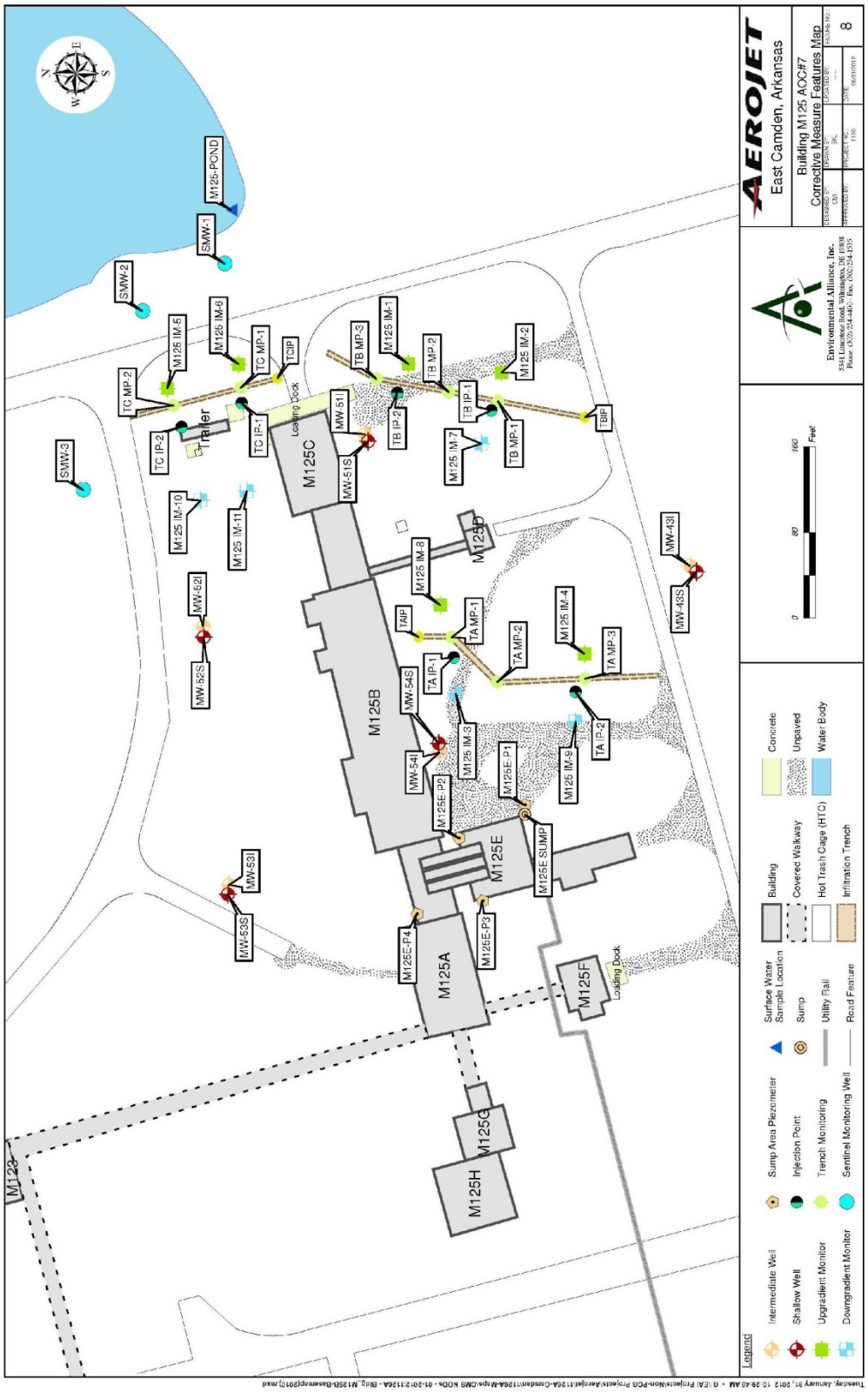

AEROJET
East Camden, Arkansas
Building C52 Corrective Measures
Feature Map
Geosyntec consultants
Source: Ball & Paulus Surveyors Inc. 2003
Legend
Deep Well
Intermediate Well
Shallow Well
Injection Well
Monitoring Well
Perched Monitoring
Surface Water Monitoring Location
Recirculation Line
Road Feature
Tree Line
Infiltration Trench
Building
Soil Berm
Culvert
Concrete Sump Structure
Water Body
Inset
See Inset
52-POND
Control Trailer
C52
C53
Feet
4

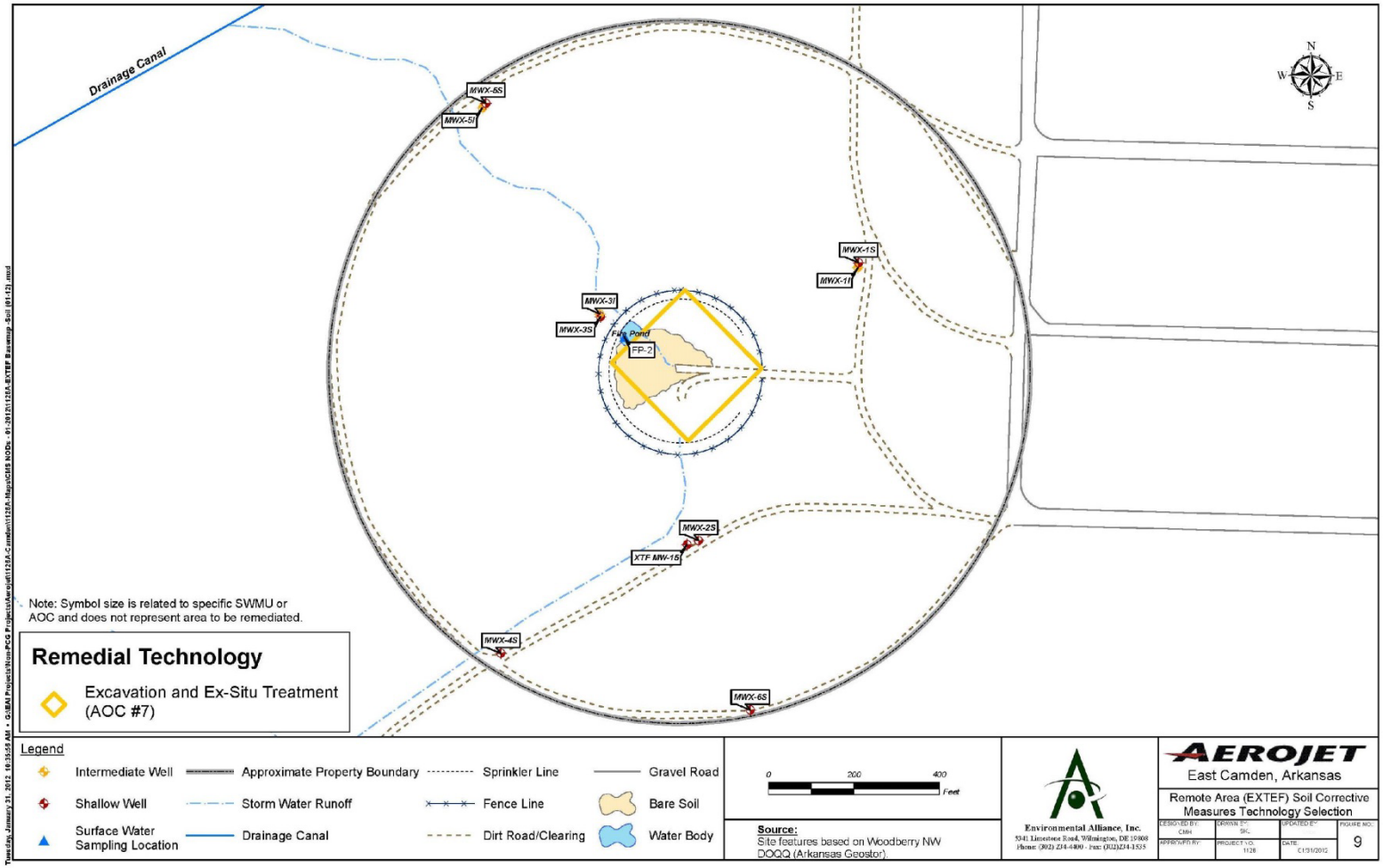

Simulated Perchlorate (mg/L)
0.1 - 0.5
0.5 - 1
1 - 10
10 - 100
> 100
Note:
Model Layer 1
The concentrations illustrated are the result of a calibrated model simulation and may not represent exact current or future conditions. (September 2007).
Decontamination Pad
Pilot Test Biocell
Biocell Location
Fire Pond
Sunset Strip
Wooded Area
Wooded Area
OBU 1
OBU 2
OBU 3
OBU 4
GW - - L 0.169 -
GW - - L 1.529 -
GW - - L 2.604 -
GW - - L 6.955 -
GW - - L 0.007 -
GW - - L <0.004 -
GW - - L 7.113 -
GW - - L <0.004 -
GW - - L <0.004 -
GW - - L 34.582 -
GW - - L 9.550 -
GW - - L 22.493 -
GW - - L 0.026 -
Note:
- Proposed Excavation area developed using established Corrective Action Objectives/ Closure Performance Goals for the facility.
- Travel time and flow paths determined via MODFLOW/MODPATH.
- Projected treatment zone based on flowpath and inferred effect of dispersion.
- Monitoring well data is from most recent sampling event (2010).
- Final design specifications determined in CMI Design.
- OBU Area
- Soil CM Alternative: Addressed Under Part B
- Groundwater CM Alternative: In-Situ Remediation
-Surface Water CM Alternative: Monitoring Natural Attenuation
NOTE:
S = Proposed Shallow Well
I = Proposed Intermediate Well
0 120 240 Feet
Environmental Alliance, Inc.
5341 Limestone Road, Wilmington, DE 19808
Phone: (302) 234-4400 - Fax: (302) 234-1535
AEROJET
East Camden, Arkansas
OBU Area Corrective Measures Feature Map
5

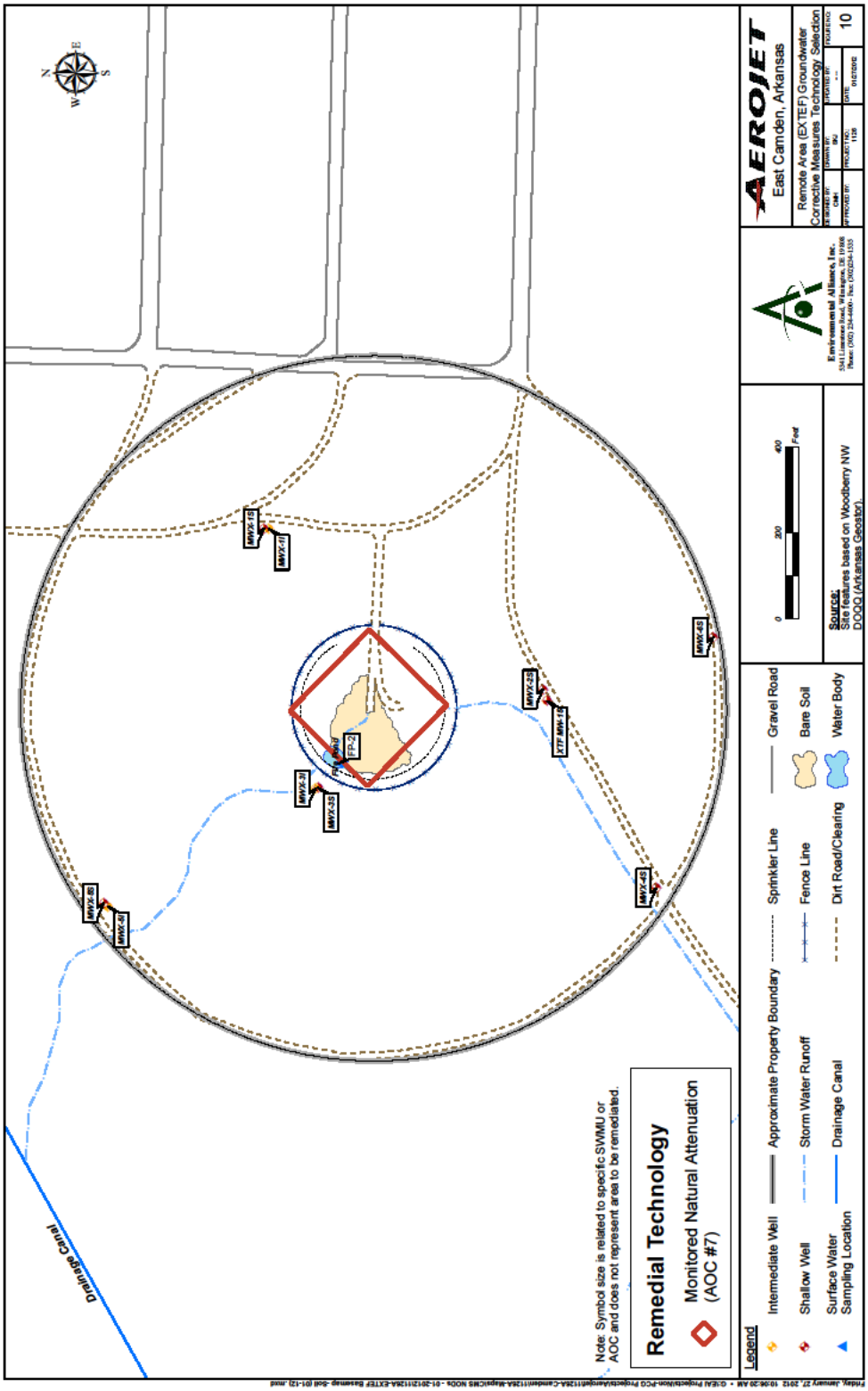

Piping from CB2-EW1
Gravel Bed Reactor
Sunset Strip
OBU1
OBU2
OBU3
OBU4
CB1-EW2
CB2-EW3
Wooded Area
CB3-EW4
Legend
Soils Managed under RCRA Closure
Soils Managed under Corrective Measures
Shallow Well
Intermediate Well
Deep Well
Decommissioned Well
Extraction Well
Road Reshue
Stormwater Pond
Future Excavation Limits
Transfer Piping
Fence Line
Dirt Road
Stormwater Runoff
Stormwater Runoff Direction
Infiltration Trench
Drainage Culvert
Gravel Bed Reactor
Building
Notes:
1. Basemap Imagery Source: Google Earth, April 13, 2017.
OBU Area Corrective Measures
Aerojet Rocketdyne, Inc.
East Camden, Arkansas
Sacramento, CA
April 2017
Figure
5A


B30
MW-22S
MW-22I
MW-22D
MW-22DD
B21
B20
MW-47S
MW-47I
M85C
SID
SID
SID
SID
17
RT-19
MW-48D
MW-48I
MW-48S
To
A- Area
132
134
135
136
Simulated Perchlorate (mg/L)
0.1 - 0.5
0.5 - 1
1 - 10
10 - 100
> 100
Model Layer 1
The concentrations illustrated are the result of a calibrated model simulated and may not represent exact current or future conditions (September 2007)
Note:
- Travel time and flow paths determined via MODFLOW/MODPATH.
- 75' radius of influence projected via MODFLOW at 10 gpm.
- Projected treatment zone based on flowpath and inferred effect of dispersion.
- Final design specification determined in CMI Design.
Notes:
- Estimated extent of perchlorate in soil above the 1.04 mg/kg corrective action objective for the facility. The actual area to be remediated will be determined via confirmation sampling and post excavation sampling.
- SWMU #1
- Soil CM Alternative: Excavation and Ex-Situ Treatment
- Groundwater CM Alternative: Insitu Remediation
- Surface Water CM Alternative: No Further Action
- SWMU #2
- Soil CM Alternative: Excavation and Ex-Situ Treatment
- Groundwater CM Alternative: Insitu Remediation
- Surface Water CM Alternative: No Further Action
- AOC #7
- Soil CM Alternative: No Further Action
- Groundwater CM Alternative: No Further Action
- Surface Water CM Alternative: No Further Action
- Field data used for screening purpose only. CMS evaluation based on lab data.
Legend
Potential Extraction Well
Potential Recirculation Well Couple
Potential Monitoring Well Cluster - (Shallow, Intermediate, Deep)
Soil Sample
Shallow Well
Intermediate Well
Deep Well
Anaerobic Recharge Basin and Injection Point
Simulated Travel Time Marker (1 Year Between)
Simulated Groundwater Flowline
Simulated Hydraulic Head (ft)
Electric & PlumbingTrenching
75' Radius of Influence
Proposed Remediation Building
Berm
Building
Fence Line
Fire Break Road
Road Feature
Storm Water Runoff
Projected Treatment Zone
0
150
300
Feet
Environmental Alliance, Inc.
5341 Limestone Road, Wilmington, DE 19808
Phone: (302) 234-4400 - Fax: (302)234-1535
AEROJET
East Camden, Arkansas
Building B30 SWMU#2
Corrective Measures Feature Map
DESIGNED BY:
DRAWN BY: SK
LOCATED BY:
APPROVED BY:
PROJECT NO.: 1156
DATE: 01/31/2013
FIGURE NO.: 6


AEROJET
East Camden, Arkansas
A - Area Corrective Measures
Feature Map
Environmental Alliance, Inc.
5341 Limestone Road, Wilmington, DE 19808
Phone: (302) 234-4400 - Fax: (302) 234-4535
Thunder Road
Ronnie Kirk Blvd
Dogwood Creek
RT-19
RT-15
RT-16
MW-12S
MW-12I
MW-28S
MW-28I
MW-48D
MW-48I
MW-48S
MW-26S
MW-26I
MW-8S
MW-8I
MW-8D
MW-44S
MW-44I
MW-27S
MW-45S
MW-45I
MW-45D
BTW-1
BTW-2
BTW-3
BTW-4
BTW-5
BTW-6
BTW-7
BTW-8
BTW-9
BTW-10
BTW-11
BTW-13
BTW-15
BTW-16
BTW-17
BTW-18
BT-1
BT-2
BT-3
BT-4
A2
A3
A4
A5
A6
A7
A8
A9
A10
A11
A12
A13
A00
14
16
37
SI
0
200
400
Feet
Legend
Shallow Well
Intermediate Well
Deep Well
Barrier Trench Well
Potential Monitoring Well
Leased Property Boundary
Berm
Building
Fence Line
Barrier Trench
Road Feature
Railroad
Creek
Storm Water Runoff


AEROJET
East Camden, Arkansas
Building M125 AOC#7
Corrective Measure Features Map
Environmental Alliance, Inc.
M125B
M125C
M125D
M125E
M125A
M125F
M125G
M125H
M123
Trailer
Loading Dock
M126-POND
SMW-1
SMW-2
SMW-3
TC MP-2
TC IP-2
M125 IM-5
M125 IM-6
TC MP-1
TC IP-1
TCIP
MW-51I
MW-51S
TB MP-3
TB IP-2
M125 IM-7
TB MP-2
M125 IM-2
TB IP-1
TB MP-1
TBIP
M125 IM-10
M125 IM-11
MW-52I
MW-52S
M125 IM-8
TAIP
TA MP-1
TA MP-2
TA IP-1
MW-54S
MW-54I
M125 IM-3
M125E-P2
M125E-P1
M125 IM-4
TA MP-3
TA IP-2
M125 IM-9
MW-43I
MW-43S
MW-53I
MW-53S
M125E-P4
M125E-P3
M125E SUMP
Legend
Intermediate Well
Shallow Well
Upgradient Monitor
Downgradient Monitor
Sump Area Piezometer
Injection Point
Trench Monitoring
Semivel Monitoring Well
Surface Water Sample Location
Sump
Utility Rail
Road Feature
Building
Covered Walkway
Hot Trash Cage (HTC)
Infiltration Trench
Concrete
Unpaved
Water Body
0
80
160
Feet


Drainage Canal
MWX-6S
MWX-5I
MWX-1S
MWX-1I
MWX-3I
MWX-3S
Fire Pond
FP-2
MWX-2S
XTF MW-1S
MWX-4S
MWX-6S
N
W
E
S
Note: Symbol size is related to specific SWMU or AOC and does not represent area to be remediated.
Remedial Technology
Excavation and Ex-Situ Treatment (AOC #7)
Legend
Intermediate Well
Shallow Well
Surface Water Sampling Location
Approximate Property Boundary
Storm Water Runoff
Drainage Canal
Sprinkler Line
Fence Line
Dirt Road/Clearing
Gravel Road
Bare Soil
Water Body
0
200
400
Feet
Source:
Site features based on Woodberry NW DOQQ (Arkansas Geostor).
Environmental Alliance, Inc.
5341 Limestone Road, Wilmington, DE 19808
Phone: (302) 234-4400 - Fax: (302)234-4525
AEROJET
East Camden, Arkansas
Remote Area (EXTEF) Soil Corrective Measures Technology Selection
DESIGNED BY: CMH
DRAWN BY: SK
UPDATED BY:
FIGURE NO: 9
APPROVED BY:
PROJECT NO: 1128
DATE: 01/31/2012



END OF APPENDIX F

MODULE XIV - TREATMENT OF ENERGETIC WASTES

A. MODULE HIGHLIGHTS

Aerojet Rocketdyne, Inc. operates a manufacturing facility located in the Highland Industrial Park. The park is owned by Highland Industrial Park, Inc. a division of Highland Resources, Inc., located in East Camden (Calhoun County), Arkansas. The company produces solid rocket propellants and motors, related components for rocket and missile systems, warheads and other ordnance, and the propellants for automobile air bag systems.

Off-specification rocket motors, solid rocket fuels, air bag propellants and propellant-contaminated materials which exhibit the characteristic of ignitability or reactivity (D001 or D003) as well as certain propellants that contain barium, cadmium, chromium, lead and/or silver at characteristic hazardous levels (waste codes D005, D006, D007, D008, and D011), and reactive wastewater sludge (K044) are thermally treated by Open Burning (OB) in the Thermal Treatment Area (TTA).

The TTA consists of twenty-four individual burn pans which shall treat no more than 500 pounds of waste each, two burn cages which shall treat no more than 500 pounds of waste each, one static rocket motor firing fixture which will treat up to 1,000 pounds of waste per day, one motor case firing block which will treat a maximum of one pound of waste per firing, and one ignitor firing device which will treat a maximum of one pound of waste per firing. The burn pans, cages, and static rocket firing fixture are situated above native soils by means of a curbed concrete containment pad which is itself placed over a synthetic liner designed to prevent migration of hazardous constituents to soil and groundwater. Also, the burn pans, cages, and static rocket firing fixture are separated by steel and concrete barricades designed to prevent low angle fragmentation hazards should a detonation occur.

B. GENERAL

1. All plans and schedules required by this Permit are, upon approval by the Director or designee, incorporated into Permit Module XIV, Condition B., General. Since required items are essential elements of this Permit, failure to submit any of the required items or submission of inadequate or insufficient information may subject the Permittee to enforcement action under the Arkansas Hazardous Waste Management Act (A.C.A. §8-7-201 et seq.) which may include fines, suspension, or revocation of this Permit. The Permittee may submit written requests for extensions of due dates for submittals to the Director or designee for review, but such requests must be submitted to ADEQ at least thirty (30) calendar days prior to the expiration of the stipulated submittal date.

2. The Permittee originally submitted on August 25, 2003 and re-submitted on November 4, 2014, to the Director or designee a report which contained the following:

   a. A statement of certification that for each waste specified in Permit Module XIV, Condition C., Permitted and Prohibited Waste Identification, open burning is the only practical and generally approved treatment method available and that these wastes cannot be practically treated or incinerated in any other manner which would provide better control of emissions to the environment;

   b. Documentation from sources including, but not limited to, commercial hazardous waste incinerator operators, explosive and chemical manufacturing industry representatives, academic sources, etc., that open burning is the only reasonable approved method of treatment for each hazardous waste specified in Permit Module XIV, Condition C; and

   c. Reserved

3. The list of wastes specified in Permit Module XIV, Condition C., shall be certified annually as described above and the report shall be submitted to ADEQ for approval no later than the effective date of this Permit every year.

4. Criteria for a modification of the *List of Wastes That May Be Treated* include but are not limited to the following:

   a. If there is a determination that open burning of any of the wastes threatens human health and the environment such wastes shall be removed from the List of Wastes That May Be Treated; or

   b. If other practical and generally approved method of treatment can be used which are more protective of human health and the environment such waste shall be removed from the List of Wastes That May Be Treated.

5. All open detonation activities to treat hazardous wastes are prohibited by this Permit. Any unplanned open detonation of hazardous waste shall be reported to ADEQ within twenty-four (24) hours in accordance with the requirements of Module I, Condition E.14 of this Permit.

6. The facility must ensure it follows APC&EC Regulation No. 23 Section 262.34 to avoid storing hazardous waste in excess of the generator requirement.

7. Engineering reports.

   a. The Permittee shall within thirty (30) calendar days of the effective date of this Permit submit to the ADEQ for approval a report certified by an

Arkansas registered engineer that all equipment and structures in the OB unit are in compliance with this Permit.

b. The engineering report in the condition above shall also be submitted annually no later than the effective date of this Permit every year.

C. **PERMITTED AND PROHIBITED WASTE IDENTIFICATION**

1. The Permittee may open burn the following wastes subject to the terms of this permit and as described below:

Type of Unit	Description of Unit	Description of Hazardous Wastes	Hazardous waste No.	Allowed Quantity per unit	Allowed Quantity per event	Allowed Quantity per day
Open Burning Unit (01-24)	13' by 5' pan on concrete pad (4 pans per pad)	Reactive Waste Propellant, Explosive Pyrotechnic (PEP) waste, and reactive wastewater sludge	D003 containing off specification AP (D003 and/or D001), D005, D006, D007, D008, and/or D011, and K044; and/or D018, D019, D022, D028, D029; D035; D038, F001, F002, F003 and/or F005	500 lbs	1000 lbs	6000 lbs
"	"	High explosives	D003, D005, D006, D007, D008, and/or D011; and/or D018, D019, D022, D028, D029; D035; D038, F001, F002, F003 and/or F005	125 lbs	500 lbs	
Open burning cages (1-2)	3 ½' by 6' cage on concrete pad	Off-specification Propellant, Explosive and Pyrotechnic (PEP) waste	D003 containing D005, D006, D007, D008, and/or D011; and/or D018, D019, D022, D028, D029; D035; D038, F001, F002, F003 and/or F005	500 lbs	1000 lbs	1000 lbs

Static firing fixture	Underground Silo	Off-specification rocket motors	D003 containing D005, D006, D007, D008, and/or D011	1000 lbs	1000 lbs	1000 lbs[(A)]
Motor Case Firing Block	Pipe clamps affixed to concrete block	Off-specification rocket motors	D003 containing D005, D006, D007, D008, and/or D011	50 lbs	50 lbs	
Igniter Firing Device	Cut-down motor case with igniter mount	Off-specification igniter units	D003 containing D005, D006, D007, D008, and/or D011	1 lb	1 lb	

(A). Daily waste throughput limit for rocket motor static firing fixture, motor case firing block, and igniter firing device combined.

The following table details the specific amounts of D008, D011, and Ammonium Perchlorate (AP) that may be treated as part of the totals in the table above.

Type of Unit	Description of Unit	Description of Hazardous Wastes	Hazardous waste No.	Allowed Quantity per unit	Allowed Quantity per event	Allowed Quantity per day
Open Burning Unit (01-24)	13' by 5' pan on concrete pad (4 pans per pad)	Reactive and/or ignitable waste (off specification AP)	D003 and/or D001 (off specification AP)	25 lbs	100 lbs	150 lbs

“	“	Reactive waste containing lead	D003 containing D008	250 lbs	1000 lbs	1000 lbs
“	“	Reactive waste containing silver	D003 containing D011	100 lbs	100 lbs	100 lbs

The following shall also apply to the treatment units mentioned above: 19.3 tons of K044 and 475 tons of D003 (as described below) may be treated in a year (as a 12-month rolling total).

The 475 tons of D003 may only contain 182.5 tons of D003 containing D008, and may only contain 18.2 tons of D003 containing D011.

Only 8000 lbs of hazardous waste may be treated per day.

The Permittee may treat up to 23.75 tons per year (5% of total annual capacity) of D003 waste generated off-site at other Aerojet Rocketdyne, Inc.-owned facilities.

2. The Permittee is prohibited from treating hazardous waste that is not identified in Permit Module XIV, Condition C.1., Permitted and Prohibited Waste Identification.

3. Open burning of all non-reactive hazardous and non-hazardous waste is prohibited with the exception of scrap cardboard and wood pallets used as a supplemental fuel to aid in the treatment of certain propellant wastes.

D. DESIGN, CONSTRUCTION, AND OPERATING REQUIREMENTS

The following requirements are applicable to all units operating at the TTA.

1. Open Burning in a Containment Device

   a. The Permittee has designed and constructed waste treatment units in accordance with the design drawings and specifications contained in Section H of the Renewal Permit Part B Application.

   b. The Permittee shall operate and maintain the TTA in accordance with the operating procedures contained in Section C of the Renewal Permit Part B Application. The application includes detailed standard operating procedures (SOP) that specify how the wastes are to be treated. The SOP discusses loading/unloading procedures, how waste is to be placed in the unit, the amount to be burned per event, how the waste will be ignited, duration between burns including a minimum cool-down period, number of burns per day, ash/residue management, misfire procedures, and any other relevant information on procedures that could affect the quantity, quality, duration, or frequency of releases to the environment.

   c. Reserved.

   d. The Permittee shall operate and maintain a precipitation cover in accordance with the design drawings, specifications, and operating practices contained in Section H of the Renewal Permit Part B Application.

   e. The Permittee shall manage accumulated precipitation in accordance with Section H of the Renewal Permit Part B Application. The application discusses how precipitation will be collected, how it will be sampled and analyzed, how it is managed/treated, or other information that could affect infiltration during nonoperational periods or the quantity, quality, duration, or frequency of releases to the environment. If the Permittee discharges any accumulated water to surface, the Permittee shall comply with the requirements of APC&EC Regulation No. 6, APC&EC Regulation No.2, and Stormwater Permit ARR00A521.

   f. The Permittee shall operate and maintain the TTA in order to minimize

air emissions or exposure of people (onsite or offsite) to toxic or hazardous emissions in accordance with Section H-2(d) of the Renewal Permit Part B Application.

g. The Permittee shall operate and maintain the TTA burning unit in order to minimize noise and concussions.

h. Ash/residues from the containment device shall be managed in accordance with Section H of the Renewal Permit Part B Application and the following permit conditions:

i. All ashes or waste remaining in the pans shall be removed within five (5) calendar days of the last burn series; and

ii. The ashes and waste removed shall be stored in roll-off boxes which must be kept covered at all times to prevent infiltration of precipitation or dispersal of contents except for adding or removing material with a dated label stating the contents and in accordance with the following conditions:

(1) Tarps used to cover roll-off boxes must be impermeable to precipitation and secured to the roll-off box in such a manner as to prevent infiltration of precipitation during storm events. Please note that positioning the roll-off box under a free standing cover does not satisfy this requirement.

(2) Tarps shall be inspected at least weekly for punctures, cuts, tears, or any other damage or wear and tear which reduces the effectiveness of the tarp to prevent infiltration of precipitation.

(3) Equivalent containers may be used instead of roll-off boxes; however these containers are required to be closed at all times except for adding or removing material in accordance with manufacturer's intended design.

iii. All ash and residual materials must be protected from surface water at all times as well as run-on and run-off.

2. Operation of the Containment Pad

a. The Permittee has designed and constructed a containment pad in accordance with the design drawings and specifications contained in Section H of the Renewal Permit Part B Application.

b. The Permittee shall operate and maintain the containment pad in accordance with the operating procedures contained in Section H of the Renewal Permit Part B Application. The application includes detailed standard operating procedures (SOP) that specify how the wastes are to be handled. The SOP discusses loading/unloading procedures, how waste is to be placed in the containment devices above the containment pad, the amount to be burned per event, how the waste will be ignited, duration between burns including a minimum cool-down period, number of burns per day, ash/residue management, misfire procedures, and any other relevant information on procedures that could affect the quantity, quality, duration, or frequency of releases to the environment.

c. RESERVED

d. The Permittee shall manage accumulated precipitation in accordance with Section H of the Renewal Permit Part B Application. The application discusses how precipitation will be collected, how it will be sampled and analyzed, how it is managed/treated, or other information that could affect infiltration during nonoperational periods or the quantity, quality, duration, or frequency of releases to the environment. If the Permittee discharges any accumulated water to surface, the Permittee shall comply with the requirements of APC&EC Regulation No. 6, APC&EC Regulation No.2, and Stormwater Permit ARR00A521.

e. The Permittee shall operate and maintain the containment pad in order to minimize air emissions or exposure of people (onsite or offsite) to toxic or hazardous emissions in accordance with Section H-2(d) of the Renewal Permit Part B Application.

f. RESERVED

g. The Permittee shall operate and maintain the containment pad in order to minimize impacts upon soil and surface water in areas contiguous to the unit. In addition, the containment pad shall be maintained free of cracks and gaps which in the case of a concrete pad will require an impermeable coating resistant to heat, chemical and physical deterioration as a result of waste material and by conducting visual inspections and performing proper maintenance of the concrete in accordance with APC&EC Regulation No. 23 §264.15 and as detailed in

Sections C and H of the Part B Permit Application. Furthermore, the containment pad is underlain with a synthetic liner and leak detection system. This system shall be maintained so as to detect contamination that has penetrated the pad. Within sixty (60) calendar days of the date this Permit is issued, the permittee shall submit to ADEQ for review and approval a permit modification which includes either a workplan detailing the design and installation of an impermeable coating or a modified Closure Plan which addresses concerns raised by ADEQ about the potential for impacts to human health and the environment by the practice of leaving the containment pad and liner in-place during post closure. [Permit condition fulfilled in August 2015]

h. Ash or residue material spilled or released onto the containment pad shall **IMMEDIATELY** be remediated and managed in accordance with Section H of the Renewal Permit Part B Application and Module XIV, Condition D.1.h.

3. Operating Conditions

a. Thermal treatment operations shall not be initiated or conducted during periods when atmospheric wind speeds equal or exceed fifteen (15) miles per hour.

b. Thermal treatment operations shall not be initiated or conducted when electrical storms are present within a ten (10) mile radius of the facility.

c. Thermal treatment operations shall be limited to daylight hours only which include physical preparation, transportation of explosives to the thermal units, and treatment and inspection after the cool-down period. For the purposes of enforcing this permit condition, daylight hours are defined as the time between sunrise and sunset as determined by the Astronomical Applications Department of the U.S. Naval Observatory.

d. The Permittee shall observe a minimum of at least a forty-five (45) minute cool-down period following each burn.

e. Ash/residues from the thermal treatment units shall be managed in accordance with Permit Module II, Condition C., General Waste Analysis, and shall be removed at least within five (5) days of the last burn series.

f. The Permittee shall record the date and time of all explosive detonations before, during, and after the thermal treatment process including unexpected explosions. The operating record shall include the waste treatment unit where the explosion occurred, a detailed description of the

wastes, the amount that exploded, and the reason for the explosion. ADEQ shall receive this notification of the incident within 24 hours.

g. Highly volatile and flammable liquids shall not be used to facilitate burning. Number 2 diesel fuel oil is acceptable.

h. The Permittee shall not treat high explosives containing initiators of any description. The Permittee may use initiators to safely ignite energetic wastes, which are not considered high explosives.

i. The Permittee shall not mix incompatible energetic wastes for treatment.

j. A warning signal shall be operated prior to treatment operations. Access to the TTA shall be controlled during the treatment events.

E. HANDLING AND STORAGE REQUIREMENTS

1. The Permittee shall handle/manage energetic waste in accordance with Section C of the Renewal Permit Part B Application.

F. INSPECTION SCHEDULES AND PROCEDURES

1. The Permittee shall inspect the TTA in accordance with the Inspection Schedule, Section C-2 of the Renewal Permit Part B Application and shall complete the following as part of those inspections.

2. The Permittee shall thoroughly inspect the TTA and associated equipment/structures for leaks and spills. The leaks/spills shall be cleaned up immediately upon discovery.

3. The Permittee shall inspect the TTA concrete pad on a weekly schedule and shall repair any cracks or deteriorations in accordance with Section C-2 of the Renewal Permit Part B Application.

4. All defects, deteriorations, or other malfunctions of the waste treatment units and associated structures (e.g., precipitation covers or roofs, and TTA concrete pads and curbs) discovered during the required inspections shall be repaired before additional treatment can occur in those units. Materials in units that are damaged and must be replaced shall be decontaminated prior to disposal.

5. The inspection and maintenance schedules, results, and repair records shall become part of the operating record and shall be made available to the Director or designee at all reasonable times.

G. PREVENTION OF UNINTENDED IGNITION OR REACTION OF WASTES

The Permittee shall follow the procedures contained in Section C-5 of the Renewal Permit Part B Application designed to prevent unintended ignition or reaction of wastes.

H. MONITORING REQUIREMENTS

1. Ground Water Monitoring

The Permittee shall conduct ground water monitoring if required during implementation of Permit Module XIV, Condition K., Soil and Surface Water Sampling With Contingency for Ground Water Investigation, included herein.

2. Air Monitoring

The Permittee shall conduct air monitoring in accordance with Permit Module XIV, Condition J., Ambient Air Monitoring Program, and Section H of the Renewal Permit Part B Application.

3. Surface Water Monitoring

The Permittee shall conduct surface water monitoring in accordance with Permit Module XIV, Condition K., and Section H of the Renewal Permit Part B Application.

4. Soil Monitoring

The Permittee shall conduct soil monitoring in accordance with Permit Module XIV, Condition K., and Section H of the Renewal Permit Part B Application.

I. ENVIRONMENTAL ASSESSMENTS

An initial Environmental Assessment (EA) was completed and approved June 28, 2007, prior to operation of the new thermal treatment unit. If new treatment units are added to the permit, or if the hourly waste throughput rates increase, or if operation of the Thermal Treatment Area is determined to adversely impact the site environmental media, then within one hundred eighty (180) calendar days of the effective date of this Renewal Permit, the Permittee must demonstrate to the satisfaction of the Director or designee that releases having adverse effects on human health or the environment because of migration of hazardous wastes or hazardous waste constituents into the ground water or subsurface environment and into the surface waters, wetlands, or the soil surface will be prevented. These demonstrations shall be achieved through the environmental assessment process described in the Subpart X guidance manual developed by EPA's Office of Solid Waste, Permits, and State Programs Division, and the Permit Writer's Workgroup (RCRA; APC&EC Regulation No. 23, Section 264, Subsection X; Draft Permit Writers Guidance; April 1992).

An Environmental Assessment Workplan detailing the activities necessary to demonstrate compliance with the Environmental Performance Standards of APC&EC Regulation No. 23 §264.601(a) and (b) shall be submitted to the Director or designee within thirty (30) calendar days notification that a second EA is required. After the Permittee submits the workplan, the Director or designee will approve, disapprove, or modify

the workplan in writing. If the Director or designee approves the workplan, the Permittee shall implement the plan according to the schedule contained in the plan.

In the event of disapproval (in whole or in part) of the workplan, the Director or designee will specify deficiencies in writing. The Permittee shall modify the plan to correct these deficiencies within thirty (30) calendar days of the receipt of notification of disapproval from the Director or designee and shall submit a modified workplan to the Director or designee for review. Upon receipt of written approval from the Director or designee for the workplan, the Permittee shall implement the plan according to the schedule contained in the approved workplan

An Environmental Assessment Report shall be submitted to the Director or designee according to a schedule proposed in the workplan. After the Permittee submits the report, the Director or designee will either approve or disapprove the report in writing. If the Director or designee approves the report, the Permittee shall be notified of this determination in writing. The Permittee shall obtain written notification from the Director or designee that the information presented in this and/or subsequent reports demonstrates compliance with the Environmental Performance Standards codified at APC&EC Regulation No. 23 §264.601(a) and (b) prior to commencing thermal treatment operations in the new units or increasing the waste hourly throughput rate(s). The Permittee shall be allowed to continue to operate the existing treatment units until such time when the updated Environmental Assessment is approved by ADEQ; however in the event that the Director or designee has determined that the TTA has had an adverse impact on site media, operation of the TTA will be suspended until a new Environmental Assessment has been approved by ADEQ.

If the Director or designee determines that these demonstrations do not comply with these regulatory requirements, the Director or designee will disapprove the report in writing. Within thirty (30) calendar days of receiving such notification, the Permittee shall submit to the Director or designee a Facility Modification Workplan, along with a schedule for submission of a final report, detailing plans to modify the construction details of the thermal treatment units, restrict certain wastes determined to be adversely affecting human health and the environment from thermal treatment, and/or to implement any measures necessary to comply with the Environmental Performance Standards codified at APC&EC Regulation No. 23 §264.601(a) and (b). Upon receipt of written approval from the Director or designee for the workplan, the Permittee shall implement the plan according to the schedule contained in the approved workplan.

In the event of disapproval (in whole or in part) of this workplan, the Director or designee will specify deficiencies in writing. The Permittee shall modify the plan to correct these deficiencies within thirty (30) days of the receipt of notification of disapproval from the Director or designee and shall submit a modified workplan to the Director or designee for review. Upon receipt of written approval from the Director or designee for the workplan,

the Permittee shall implement the plan according to the schedule contained in the approved workplan.

A Final Environmental Assessment Report shall be submitted to the Director or designee according to a schedule proposed in the approved workplan. If the Director or designee approves the report, the Permittee will be notified of this determination in writing. The Permittee shall obtain written notification from the Director or designee that the information presented in this report demonstrates compliance with the Environmental Performance Standards codified at APC&EC Regulation No. 23 §264.601(a) and (b) prior to commencing thermal treatment operations in the new units or increasing the waste hourly throughput rate(s) ; however in the event that the Director or designee has determined that the TTA has had an adverse impact on site media, operation of the TTA will be suspended until a new Environmental Assessment has been approved by ADEQ.

If the Director or designee determines that these demonstrations do not comply with these regulatory requirements and that the permitted activity endangers human health and the environment and can only be regulated to acceptable levels by termination of this Permit, the Director or designee will disapprove the final report in writing. The Director or designee will follow the applicable procedures contained in 40 CFR 124 in terminating this Permit pursuant to APC&EC Regulation No. 23 §270.43(a)(3).

The environmental assessment process shall involve evaluations of the basic types of characterization data specified in Permit Module XIV, Condition I.1., relative to each of the media referenced in Permit Module XIV, Condition I., Environmental Assessments, the performance of screening and/or detailed assessments described in Permit Module XIV, Conditions I.2. and I.3., and if necessary shall include the performance of human health and environmental risk assessments described in Permit Module XIV, Conditions I.4 through I.6. If data necessary to comply with this permit condition is not available, the Permittee shall perform the activities required to obtain this data.

1. Characterization Data

   a. Unit Characterization

      The Permittee shall consider the design and operating parameters of each unit and shall discuss how direct contact with untreated wastes or treated residues and dry deposition of particulates from air emissions could serve as a pathway to ground water and the subsurface environment, surface water (including wetlands), and soils.

   b. Waste Characterization

      The Permittee shall consider the volume and physical/chemical characteristics (i.e., volatility, mobility in soils/ground water, ignitability, and toxicity) of the waste to be treated in each unit. [APC&EC Regulation

No. 23 §264.601(a)(1), §264.601(b)(1), and §264.601(c)(1)]

c. Site Characterization

The Permittee shall consider the meteorological, climatological, geological, and hydrogeological characteristics of the site.

The site characterization requirements concerning ground water assessments [APC&EC Regulation No. 23 §264.601(a)(2), (4), and (5)] shall take into consideration the hydrologic/geologic characteristics of the site. The Permittee shall describe soil types, depth to ground water, direction of ground water flow, net recharge, and characteristics of the aquifer system (i.e., permeability) including current and potential uses.

The site characteristic requirements concerning surface waters [APC&EC Regulation No. 23 §264.601(b)(3)] shall take into consideration hydrologic and topographic characteristics such as distance to surface waters, stream flow data relative to potential discharges, patterns of precipitation, and the general likelihood of releases to surface waters. Surface water uses in the area shall be identified.

The site characterization requirements concerning soils [APC&EC Regulation No. 23 §264.601(b)(3)] shall take into consideration soil characteristics (i.e., permeability) and land uses in the area.

An analysis of pre-existing site conditions [APC&EC Regulation No. 23 §264.601(a)(3), §264.601(b)(8), and §264.601(c)(5)] shall consider the possibility of contamination from past operations of previous units on or near the site, active sources offsite, and natural background levels (e.g., natural levels of metals in soils).

The Permittee shall consider human and environmental population distributions in complying with the requirements of this permit condition. In addition, the Permittee shall provide existing air quality, ground water, surface water, and hydrogeologic data obtained from federal, state, or local sources.

2. Screening Assessments

The Permittee shall perform screening assessments for each of the media referenced in Permit Module XIV, Condition I., Environmental Assessments. These screening assessments shall incorporate, but not be limited to, the information specified in Permit Module XIV, Condition I.1.a. through I.1.c. These screening assessments shall describe worst-case analyses for each of the following media and shall use a conservative approach for evaluating releases by incorporating worst-case assumptions into a model:

a. A ground water screening assessment shall cover the possibility of

contaminants leaching through the thermal treatment area concrete pad and/or through the soil into the underlying ground water. This assessment shall determine worst-case ground water release scenarios (including characterization of the possible sources and the environmental setting of the release), determine worst-case dispersion scenarios for the transport of contaminants in the ground water, and allow for a qualitative analysis of local ground water quality.

b. A surface water screening assessment shall cover the possibility of hazardous wastes/hazardous waste constituents or residues impacting surface waters located at or adjacent to the facility. In conducting the assessment, the Permittee shall consider the possible adverse effects on wildlife, aquatic life, and human health.

c. A soil screening assessment shall cover the possibility of hazardous wastes/hazardous constituents or residues impacting area soils. This assessment shall require multiple levels of pathway analyses and shall consider, but not be limited to, the following applicable scenarios:

i. Fugitive dust emissions from vehicular traffic;

ii. wind-blown fugitive dust emissions;

iii. surface runoff of particulates; and

iv. percolation of particulates to ground water.

d. An air screening assessment shall cover the possibility of hazardous wastes/hazardous waste constituents or residues impacting air located at or adjacent to the facility. In conducting the assessment, the Permittee shall consider the possible adverse effects on wildlife, aquatic life, and human health.

If the operation of the thermal treatment units can be shown to be protective of human health and the environment even when worst-case assumptions are used detailed assessments, described in Permit Module XIV, Condition I.3, may not be required. These determinations will be at the discretion of the Director or designee.

3. Detailed Assessments

The objective of detailed assessments, if required, shall be to determine contaminant concentrations, in each of the media of Permit Module XIV, Conditions I.1.a. through I.1.c., using methods more detailed than those used during the screening assessment. These methods shall incorporate monitoring and modeling to determine emission/release rates and concentrations. The Permittee shall perform the required activities to obtain data not already available. Actual site-specific monitoring data

shall be used when performing modeling activities.

A detailed assessment for ground water shall include the use of adequate models that account for transmissive and dispersive soil and ground water properties. A detailed assessment for surface waters shall utilize the most current methodologies for performing detailed modeling of water quality impacts.

4. Health and Environmental Assessments

Baseline human health and environmental risk assessments shall be performed as necessary to evaluate the potential threat to human health and the environment as a result of the conditions at the site. The baseline risk assessment shall identify and characterize the following:

a. toxicity and levels of hazardous substances in each media determined to be impacting human health and/or the environment;

b. such environmental fate and transport mechanisms as physical, chemical, and biological degradation processes and hydrogeologic conditions;

c. potential human and environmental receptors;

d. the extent of the expected impact or threat and the likelihood of such impact or threat occurring; and

e. uncertainty levels associated with the assessment.

5. Human Health Risk Assessment

The baseline human health risk assessment shall be divided into the following four components:

a. Data collection and evaluation shall involve screening the information that is available on the hazardous substances or wastes present at the site and identifying contaminants of concern for which subsequent efforts will be focused in the risk assessment process.

b. Exposure assessments shall include an estimate of the magnitude of actual and/or potential human exposures, in addition to the frequency and duration of the exposures, and the pathways by which humans potentially are exposed. The exposure assessment shall incorporate an analysis of contaminant releases, identification of exposed pathways and all potential pathways of exposure, estimates of exposure point concentrations for specific pathways (based on environmental monitoring data as well as predictive chemical modeling results), and estimates of contaminant intakes for specific pathways.

c. Toxicity assessments shall consider the types of adverse health or

environmental effects associated with individual and multiple exposures, the relationship between the magnitude of the exposures and adverse effects, and such related uncertainties as the weight-of-evidence for the potential carcinogenicity of a chemical to humans. The toxicity assessment shall incorporate hazard identification and a dose-response evaluation. Reference doses, used to evaluate non-carcinogenic effects of exposure to contaminants, and cancer slope factors and the accompanying weight-of-evidence determination, used to evaluate potential human carcinogenic risks, shall be used to estimate the incidence of adverse effects occurring in humans at the different exposure levels.

d. Risk characterization shall characterize and summarize the potential risks of adverse health effects for each of the exposure scenarios derived in the exposure assessment. Estimates of risk shall involve the integration of information developed during the exposure and toxicity assessments to characterize the potential or actual risks, including carcinogenic and non-carcinogenic risks. The final analysis shall include a summary of the risks associated with the site, including each projected exposure route for contaminants of concern and the distribution of risk across various sectors of the population. Such factors as the weight-of-evidence associated with toxicity information and any uncertainties associated with toxicity information and any uncertainties associated with exposure assessment also shall be discussed.

6. Environmental Risk Assessment

Characterization of the environmental risks shall involve the identification of potential exposure to the surrounding ecological receptors and evaluation of the potential effects associated with the exposures. The Permittee shall consider disruptive effects to plant and animal populations and the extent of perturbations to the ecological community. The environmental assessment shall consist of the following components:

a. The definition of the scope of the investigation shall describe the kind and type of information that was collected in the study in terms of the physical, biological, and chemical parameters measured, estimated, or calculated in the assessment; over what time periods and what season(s) were the data collected; at what time intervals were the samples collected; and if the data were used to assess current effects of past damage or used to predict future scenarios.

b. The description of the site and study area shall provide a physical description of the site at a level of detail that is appropriate to the scope

of the assessment. The physical boundaries for the assessment and the size of physical features such as stream reaches, roads, wetlands, or forested areas shall be described. An overall map of the area, with a minimum resolution equivalent to a 7.5' USGS quadrangle map, shall include all potentially affected areas linked to the contaminated zone by pathways of concern through any media, sampling location, and any references selected for the investigation. In addition, maps including the same information shown on the 7.5' USGS maps but of 1" = 200' scale and 2-foot contour intervals shall be prepared.

A narrative description of each habitat, accompanied by lists or tables of species collected or observed, shall be included to provide a full accounting of the ecosystems and populations potentially exposed to contamination in the vicinity of the site. The study shall consider resident, breeding, or rare species, including species of natural resource trustee concern; narrative characterization of the likely or presumed exposure pathways; and any readily observed effects potentially attributable to the site.

c. A description of the contaminants of concern from an ecological perspective shall be included.

d. The characterization of risk or threat shall address the following:

(1) probability that an adverse effect will occur;

(2) the magnitude of such an effect;

(3) the temporal character of each transient, reversible, or permanent effect; and,

(4) the affected receptor populations or habitats.

e. The Permittee shall include a summary of the risk-related data with regard to the site including environmental contaminant concentrations in biota, toxicity test results, literature values of toxicity, field surveys of receptor populations, and measures of community structure and ecosystem function.

f. A narrative describing the nature and probability of adverse effects shall consider the following:

(1) lasting effects upon removal of contaminants, length of recovery time for the receptor populations from the effects of the contaminants, intergenerational effects;

(2) movement of contaminants beyond the current study area via biotic

transport and the effects of remediation on this movement;

(3) community and ecosystem effects of contamination and if removal of the contaminants is sufficient to restore community structure and ecosystem function;

(4) data on the exposure and observed or predicted effects relative to the rapidity of required response, which responses are required immediately, and which can be undertaken later; and

(5) the limits that proposed remediation or mitigation actions place on future options for further remediation, follow-up assessment, and resource use.

g. A description of the derivation of remediation criteria or other uses of quantitative risk information shall be included. If other data are available for comparison to observed concentrations of contaminants, the risk assessment shall make the exceedences apparent by presenting the data along with the applicable criteria. Full reference citations for the source of reference doses, standards, or risk assessments used in calculating the criteria shall be provided. In addition, an explanation of and reference for the calculation method used to develop the criteria, as well as equations and parameters used in the calculations shall be provided.

h. The conclusions and limitations component of the environmental risk assessment shall address the degree of success in meeting the assessment objectives. Each conclusion shall be presented along with the items of evidence that support and fail to support the conclusion, and the uncertainty accompanying the conclusion. Any factors that limited or prevented development of definitive conclusions also shall be described. Information that indicates the degree of confidence in the data used to assess the site and its contaminants shall also be provided.

J. AMBIENT AIR MONITORING PROGRAM

1. Reporting Requirements

a. An initial Ambient Air Monitoring Workplan has been completed. A modified Air Monitoring Workplan that established a continual Air Monitoring Program has been submitted and approved by ADEQ. The Air Monitoring Program has been incorporated into this Permit. This monitoring program shall continue until the Director or designee determines, through direct sampling of the air media, that the permitted activity will not affect human health and the environment. The workplan

followed the requirements specified in Permit Module XII(b), Condition Q., Tasks I, II, and V, except the workplan shall be modified to accomplish air monitoring and reporting rather than investigation.

b. This workplan shall be sufficient in quantity and quality to detect concentrations of hazardous wastes or hazardous waste constituents in the air that could have an adverse effect on human health and the environment. This workplan shall include a proposal to submit regularly scheduled reports describing the data generated during the monitoring program. After the Permittee submits the workplan, the Director or designee will either approve, disapprove, or modify the workplan in writing. If the Director or designee approves the workplan, the Permittee shall implement the plan according to the schedule contained in the plan.

c. In the event of disapproval (in whole or in part) of the workplan, the Director or designee will specify deficiencies in writing. The Permittee shall modify the plan to correct these deficiencies within thirty (30) days of the receipt of notification of disapproval from the Director or designee and shall submit a modified workplan to the Director or designee for review. Upon receipt of written approval from the Director or designee for the workplan, the Permittee shall implement the plan according to the schedule contained in the approved workplan. In the event that the Director or designee disapproves the modified workplan, the Director or designee will modify this workplan as necessary accomplish the required work. This modified workplan shall become the approved workplan.

d. The submittal of the workplan specified in Permit XIV, Condition J.1.a., and implementation of the Ambient Air Monitoring Program shall consider EPA's guidance provided in "Interim Final, RCRA Facility Investigation (RFI) Guidance" (Volume I-IV, EPA 530/SW-89-031, May 1989), and specified in Permit Module XII(b), Condition Q., Tasks I, II, and V.

e. An initial Ambient Air Monitoring Report has been submitted to the Director or designee according to a schedule proposed in the workplan. This report shall describe the actions taken by the Permittee, in accordance with the approved workplan, to implement the air monitoring program. The Director or designee may perform an inspection of the facility to ensure compliance with this Permit. An updated Ambient Air Monitoring Report shall be submitted to ADEQ for review and approval if new treatment units are added to the facility.

The Permittee shall obtain written notification from the Director or designee that the information presented in this report demonstrates compliance with the Environmental Standards codified at APC&EC Regulation No. 23 §264.601(c), §264.602, and this Permit prior to commencing thermal treatment operations in new units. The Permittee shall be allowed to continue to operate the existing treatment provided that new units remain out of service until the updated Ambient Air Monitoring Report is approved by ADEQ.

f. In compliance with the approved Air Monitoring Program, the Permittee shall notify the Director or designee in writing within fifteen (15) days of the detection of hazardous wastes or hazardous waste constituents at concentrations above human health-based air quality standards for the target compounds at any of the monitoring stations. Within thirty (30) days of detection, the Permittee shall submit to the Director or designee for approval a Facility Modification Workplan which details the activities necessary to comply with the Environmental Performance Standards codified at APC&EC Regulation No. 23 §264.601(c).

g. In the event of disapproval (in whole or in part) of the workplan, the Director or designee will specify deficiencies in writing. The Permittee shall modify the plan to correct these deficiencies within thirty (30) days of the receipt of notification of disapproval from the Director or designee and shall submit a modified workplan to the Director or designee for review. Upon receipt of written approval from the Director or designee for the workplan, the Permittee shall implement the plan according to the schedule contained in the approved workplan.

h. A final Environmental Assessment Report shall be submitted to the Director or designee according to a schedule proposed in the approved workplan. This report shall describe the corrective actions taken by the Permittee to comply with the Environmental Performance Standards codified at APC&EC Regulation No. 23 §264.601(c). The Permittee shall continue to monitor the ambient air at the facility according to the approved air monitoring plan and shall take corrective actions as necessary to ensure compliance with these environmental performance standards.

i. If the Director or designee determines, through reviews of the regularly scheduled reports and/or the reports required by Permit Module XIV, Condition J.1.e., that the permitted activity does not comply with the Environmental Performance Standards codified at APC&EC Regulation No. 23 §264.601(c), endangers human health and the environment, and

can only be regulated to acceptable levels by termination of this Permit, the Director or designee will follow the applicable procedures contained in APC&EC Regulation Nos. 8 and 23 in terminating this Permit pursuant to APC&EC Regulation No. 23 §270.43(a)(3).

2. The Permittee shall maintain, calibrate, and operate monitoring equipment and record data while thermally treating hazardous waste as specified below:

   a. Wind speed and direction are to be continuously monitored and recorded during treatment operations. This data has be kept in the operating record until approved closure of the facility; and

   b. The permittee shall record in the operating record for this Permit the date and time of all failures of monitoring equipment and the length of non-operational status.

K. SOIL AND SURFACE WATER SAMPLING WITH CONTINGENCY FOR GROUND WATER INVESTIGATION

1. Reporting Requirements

   a. An initial Soil and Surface Water Sampling Workplan has been completed. The soil and surface water sampling program shall continue and be sufficient in quantity and quality to detect concentrations of hazardous wastes or hazardous waste constituents in the surface water or soil that could have adverse effects on human health and the environment and could potentially affect the underlying ground water. This workplan shall follow the requirements specified in Permit Module XII(b), Condition Q., Scope of Work for a RFI, Tasks I, II, and V. This workplan shall include a proposal to submit regularly scheduled reports describing the data generated during the monitoring program. After the Permittee submits the workplan, the Director or designee will either approve, disapprove, or modify the workplan in writing. If the Director or designee approves the workplan, the Permittee shall implement the plan according to the schedule contained in the plan.

   b. In the event of disapproval (in whole or in part) of the workplan, the Director or designee shall specify deficiencies in writing. The Permittee shall modify the plan to correct these deficiencies within thirty (30) days of the receipt of notification of disapproval from the Director or designee and shall submit a modified workplan to the Director or designee for review. Upon receipt of written approval from the Director or designee for the workplan, the Permittee shall implement the plan according to the schedule contained in the approved workplan.

c. The submittal of this workplan, the workplan specified in Permit Module XIV, Condition K.1.d., and implementation of the Soil and Surface Water Monitoring and Water Program shall consider EPA's guidance provided in "Interim Final, RCRA Facility Investigation (RFI) Guidance" (Volume I-IV, EPA 530/SW-89-031, May 1989), and specified in Permit Module XII(b), Condition Q., Tasks I, II, and V.

d. The Permittee shall notify the Director or designee in writing, within fifteen (15) calendar days of the detection of hazardous wastes or hazardous waste constituents in the soil or in surface water at concentrations that exceed the approved Corrective Action Objectives for perchlorate and the established Regional Screening Levels for the other target constituents. Within thirty (30) calendar days, the Permittee shall submit to the Director or designee for approval a Phase II Facility Investigation Workplan which details the activities necessary to define the full vertical and horizontal extent of soil and surface water contamination and the activities necessary to comply with the Environmental Performance Standards codified at APC&EC Regulation No. 23 §264.601(a) and (b). The expanded workplan and all investigation and remediation work that may result under that workplan must follow the RFI/CMS/CMI process of Module XII(b), Conditions Q., R., and S., and for the items presented in Table IV. These activities may include, but not be limited to, plans to modify the construction details of the thermal treatment units, reduction of the maximum permitted treatment capacity of the units, restriction of certain wastes determined to be adversely affecting human health and the environment from thermal treatment, assessment of human health and environmental risks posed by the contaminants, excavation and disposal of the contaminated surface water and soils, and/or implementation of measures necessary to comply with the Environmental Performance Standards codified at APC&EC Regulation No. 23 §264.601(a) and (b).

e. In the event of disapproval (in whole or in part) of this expanded workplan (hereafter referred to as workplan), the Director or designee will specify deficiencies in writing. The Permittee shall modify the plan to correct these deficiencies within thirty (30) days of the receipt of notification of disapproval from the Director or designee and shall submit a modified workplan to the Director or designee for review. Upon receipt of written approval from the Director or designee for the workplan, the Permittee shall implement the plan according to the schedule contained in the approved plan. In the event that the Director or designee disapproves the modified workplan, the Director or designee

will again modify this workplan as necessary to accomplish the desired work. This modified workplan shall become the approved workplan.

f. A Facility Investigation Report shall be submitted to the Director or designee according to a schedule proposed in the approved workplan. This report shall describe the corrective actions taken by the Permittee to comply with the Environmental Performance Standards codified at APC&EC Regulation No. 23 §264.601(a) and (b). The Permittee shall continue to monitor the soil and surface water media according to the approved Soil and Surface Water Monitoring Program and shall take corrective actions as necessary to ensure compliance with these environmental performance standards.

g. If the Director or designee determines, through reviews of the regularly scheduled reports and/or the reports required by Permit Module XIV, Condition K, that the permitted activity does not comply with the Environmental Performance Standards codified at APC&EC Regulation No. 23 §264.601(a) and (b), endangers human health and the environment, and can only be regulated to acceptable levels by termination of this Permit, the Director or designee will follow the applicable procedures contained in APC&EC Regulation Nos. 8 and 23 in terminating this Permit pursuant to APC&EC Regulation No. 23 §270.43(a)(3).

TABLE IV - SUMMARY OF MODULE XIV REPORTING REQUIREMENTS

Submission	**Due Time (Calendar Days)**
Environmental Assessment Workplan	30 days from ADEQ notification
Environmental Assessment Workplan (Amended)	30 days from receipt of NOD
Environmental Assessment Report Received 1/26/2007 Dated 1/23/2007 Approved 6/28/2007	**COMPLETED**

Facility Modification Workplan	30 days from receipt of determination of noncompliance from Director or designee
Facility Modification Workplan (Amended)	30 days from receipt of NOD
Final Environmental Assessment Report	As determined by Director or designee
Ambient Air Monitoring Workplan Received 9/01/2005 Dated 8/30/2005 Approved 6/2/2006 Note: found as Sec 4 Air Dispersion and Modeling (part of EA Report)	**COMPLETED**
Ambient Air Monitoring Workplan (Amended)	30 days from receipt of NOD
Ambient Air Sampling Reports	As determined by Director or designee
Ambient Air Monitoring Report Received 5/20/2009 Dated 5/19/2009 Approved 6/04/2009	**COMPLETED**
Two-Year Summary Report (Air, Soil, and Surface Water) Received 12/16/2011 Dated 12/16/2011 Approved 1/11/2012	**COMPLETED**
Notification of Detection of Hazardous Wastes/Constituents	15 days from date of detection

TABLE IV - SUMMARY OF MODULE XIV REPORTING REQUIREMENTS	
Submission	**Due Time (Calendar Days)**
Facility Investigation Workplan Received 3/16/2005 Dated 3/11/2005 Approved 3/25/2005	**COMPLETED**
Facility Investigation Workplan (Amended)	30 days from receipt of NOD
Facility Investigation Report	As determined by Director or designee
Soil and Surface Water Monitoring Plan Received 7/01/2005 Dated 6/23/2005 Approved 8/6/2007	**COMPLETED**
Soil and Surface Water Monitoring Workplan (Amended)	30 days from receipt of NOD
Soil and Surface Water Sampling Reports	As determined by Director or designee
Expanded Workplan for Ground Water Investigation and Protection (Reserved)	60 days from Permittee's submittal of soil & surface water monitoring report showing potential surface water & ground water impacts or upon Director or designee's determination of such impact
Environmental Monitoring Work Plan Received 2/15/2012 Dated 2/15/2012	**COMPLETED**

Revised 4/13/2012 Approved 5/2/2012 (Work Plan covers both current semi-annual Ambient Air Monitoring Program and semi-annual Soil and Surface Water Monitoring Program)	
Ground Water Investigation Report (Reserved)*	To be determined by Director or designee
Surface Water and Ground Water Corrective Measures Study* Received 08/27/2009	**COMPLETED**
Surface Water and Ground Water Corrective Measures Implementation (Reserved)*	To be determined by Director or designee

* It is the intent of the conditions of this Permit that the surface water and soil sampling would detect contamination early so that these tasks would not be needed except to the extent necessary to protect ground water.

L. CLOSURE

1. At final closure of the TTA, the Permittee shall follow the procedures in the Closure Plan, Section F of the most recent Part B Permit Application. The former Open Burn Unit Area is undergoing closure. The Permittee shall follow the procedures in the Closure Plan, Section G of the Part B Permit Application.

2. RESERVED

3. SUMMARY OF PROJECT MILESTONES – FINAL CLOSURE OF OBU AREA

Project Milestone	Approved Deadline
Start of Closure	September 14, 2009
Completion of Soil Excavation in OBUs and Off-Site Disposal	December 31, 2017
Completion of Final Site Work for OBUs	January 11, 2018
Submission of Closure Certification	March 12, 2018

M. RECORDKEEPING

The Permittee shall develop and maintain all records required to comply with APC&EC Regulation No. 23 §264.73, §264.602, and Section C and D of the Renewal Permit Part B Application.

N. COMPLIANCE SCHEDULE

The Permittee shall provide the following information to the Director or designee:

Item		Date Due to the Director or designee
Certification of closure and receipt of closure report		Sixty (60) calendar days after completion of closure

END OF MODULE XIV

MODULE XV - SPECIAL CONDITIONS

Based on the results of the air dispersion and gravitational deposition modeling results, surface soil samples were collected prior to startup of the new Thermal Treatment Area (TTA) (using an EPA recommended statistically valid sampling method to determine the sampling grid) at the predicted location of the greatest annual lead deposition rate to establish a downwind baseline soil concentration for lead. The same sampling procedure will be repeated at the time of closure of the TTA to evaluate the effects, if any, of operation of the TTA. Soil samples will be collected to a maximum of 3 inches in depth.

End of Module XV