

**WYOMING DEPARTMENT OF ENVIRONMENTAL QUALITY
SOLID & HAZARDOUS WASTE DIVISION (WDEQ/SHWD)
LANDFILL REMEDIATION PROGRAM (LRP)**

**REQUIREMENTS AND REQUEST FOR STATEMENT OF QUALIFICATIONS
FOR PROFESSIONAL SERVICES**

A. PURPOSE OF REQUEST

The Wyoming Department of Environmental Quality (WDEQ), Solid & Hazardous Waste Division, Landfill Remediation Program (LRP) is accepting Statements of Qualifications (SOQ) from engineering/environmental firms interested in providing professional services to the LRP. Professional services to be performed include, but are not limited to: 1) determination of nature and extent of contamination including identification of location and type of buried waste, 2) assessment of corrective measures including design and installation of monitoring systems and selected remedy(ies), 3) construction management/oversight during installation of the selected remedy(ies), 4) operation and maintenance (O&M) and monitoring of the selected remedy(ies), and 5) closeout of the selected remedy(ies) if objectives are met within the contract time frame.

SOQs will be evaluated as they apply to municipal solid waste landfills and applicable chapters of the Solid Waste Rules and Regulations. Firms meeting the minimum requirements stated herein will be added to the prequalified list of design firms for the LRP.

Attached is the template Scope of Work for landfill remediation projects. This Scope of Work may be modified during contract negotiations with the successful firm depending on site-specific needs.

B. TIME SCHEDULE. SOQs can be submitted at any time. However, firms not prequalified on the date a Statement of Interest (SOI) is advertised **will not** be eligible to submit an SOI for the advertised project. The WDEQ may take up to 60 days to review and score an SOQ.

C. INSTRUCTIONS TO INTERESTED PARTIES

- i) All SOQs shall be submitted to:

Karen L. Halvorsen, P.E., Program Manager
122 W. 25th Street, 4W
Cheyenne, WY 82002

- ii) Four copies of the SOQ shall be submitted for review and evaluation by the LRP. The SOQ must provide the information requested in Item C.vii. of this document. Include sufficient information to demonstrate the experience of the firm and the education/experience of key personnel that will actually complete the work in the areas identified in Item C.v. of this document. Firms meeting the minimum requirements stated herein will be added to the prequalified list of design firms. Qualifications should be prepared simply and economically, providing a straight forward, concise description of firm and staff capabilities to satisfy the requirements of this request. Emphasis should

be on completeness and clarity of content. To the extent practicable, submit the SOQ double sided.

iii) An authorized representative of the firm must sign at least one (1) original of its SOQ, certifying the truth of the statements and representations made in the SOQ. This can be addressed in the cover letter.

iv) Any questions regarding the SOQ shall be directed to:

Scott Forister, P.E.
NE District Engineering Supervisor, WDEQ
2100 West 5th Street
Sheridan, Wyoming 82801
307-675-5678 or email at scott.forister@wyo.gov

v) Consultants must document experience, expertise, and qualifications in the following areas:

- a. Leachate and landfill gas contaminant fate and transport analyses.
- b. Municipal solid waste landfill chemistry.
- c. Municipal solid waste landfill gas; both explosive gasses and gasses with potential for groundwater contamination.
- d. Knowledge of applicable fire protection and electrical codes.
- e. Experience in the selection, design, construction, construction quality assurance (CQA), operation & maintenance (O&M), and monitoring of a variety of remedial systems at municipal solid waste landfills that: i) limit migration of leachate to and within the water table, ii) remove pollutants dissolved in groundwater, and (iii) control/mitigate gasses.
- f. Selection, design, construction, CQA, and O&M of final cover systems at municipal solid waste landfills.
- g. Design and implementation of drilling and sampling programs to delineate the limits and types of contaminants and waste at municipal solid waste landfills.
- h. Preparation of detailed reports, geologic cross sections, and maps.
- i. Preparation of detailed engineering plans and specifications for bidding by the state. System design experience is necessary for typical solid waste municipal landfill remediation technologies, including, but not limited to, capping, landfill gas management, groundwater remediation and control, and other state-of-the-art landfill remedial systems as follows:
 1. Groundwater remediation and control systems,
 2. Landfill gas management and control systems,
 3. Landfill capping,
 4. Surface restoration,
 5. Remote measurement and control systems,
 6. Electrical systems unique to remediation system design,
 7. Wastewater treatment related to permit discharge requirements from remediation systems.

- j. Mitigation of immediate health and safety hazards, such as hazardous substance vapor exposures in enclosed spaces where people work and/or live, contaminated drinking water supplies, imminent hazardous substance release to surface water, etc.
 - k. Groundwater data statistical analysis and reporting as applicable to municipal solid waste landfill remediation.
- vi) Consultants shall provide equipment and monitor the work place to protect workers from safety and health hazards in compliance with all Wyoming Occupation Health and Safety Division (WOHS) regulations. On-site workers (consultants, sub-consultants, and sub-contractors) must submit copies of certifications demonstrating compliance with 29 CFR 1910.120 (e), including 40-hour occupational health and safety training, 8-hour supervisory course for supervisors/managers, and current 8-hour annual refresher training for all on-site workers.
- vii) Statement of Qualifications Content:
- a. Familiarity and experience of firm and personnel likely to be assigned to perform tasks as they relate to C.v. above. Include a discussion of the firm's specific experience with current state-of-the-art and innovative landfill remediation technologies. Specific project experience and years of experience performing similar work must be provided.
 - b. Education and specialized training (including health and safety) of personnel likely to be assigned to work on landfill remediation projects (for both on-site and project management personnel); copies of each employee's initial 40-hour OSHA training certificate; copy of supervisor's 8-hour OSHA training certificate(s); and a copy of each employee's current 8-hour annual refresher OSHA training certificate, as appropriate. Resumes of key personnel that will likely be performing the work and training certificates of personnel that will be on site should be included as an attachment to the SOQ. **NOTE:** Copies of OSHA training certificates **MUST BE** submitted for a consultant to be considered responsive. Consultants will **not** be listed on the pre-qualified list prior to submittal of required OSHA training certificates.
 - c. Familiarity of the firm with applicable federal and state laws, regulations, and procedures as they relate to the work (do not address State procurement or contract issues).
 - d. Include a copy of the firm's Quality Assurance/Quality Control (QA/QC) Plan relating to groundwater and soil sampling, analyses, and chain of custody procedures. The QA/QC Plan should be provided as an attachment to the SOQ. Include a copy of the consultant's general Occupational Health and Safety Plan, which could be modified to meet landfill remediation project-specific needs. The Plan should be provided as an attachment to the SOQ.
 - e. Include references (contact names, telephone numbers, e-mail addresses, etc.) and descriptions of similar projects to establish the firm's professional reputation and character and to demonstrate performance and professionalism with similar or like activities. Submit information for at least three projects, but no more than six.
 - f. Include documentation verifying the firm's compliance with applicable Wyoming Secretary of State business registration. Include documentation verifying that the firm is registered with the Wyoming State Board of Registration for Professional

- Engineers and Professional Land Surveyors. Include documentation (copies of certificates) verifying employees registered in the State of Wyoming as Professional Engineers, Professional Land Surveyors, and Professional Geologists. Copies of certificates must be submitted. **Consultants must have both a Registered Professional Engineer in the State of Wyoming and a Registered Professional Geologist in the State of Wyoming to be considered qualified.** These individuals must seal reports and plans and specifications and shall be responsible for report content and plans and specifications, certifying that the work was done under his/her supervision. Work requiring geological insight, interpretation, and application of knowledge of geologic principles that would be expected of a geologist but not readily known to the general public constitutes the practice of geology and must be sealed by a Wyoming Registered Professional Geologist. **NOTE:** Copies of certificates **MUST BE** submitted in order for a consultant to be considered responsive. Consultants will **not** be listed on the prequalified list prior to submittal of required certificates. If a firm does not have Wyoming registered professionals on staff, identify the professionals that will be contracted to oversee the work performed.
- g. The Wyoming Preference Act (W.S. § 16-6-201 through W.S. § 16-6-206) applies to drilling and construction-related work completed by the LRP. The firm will be required to sign an affidavit indicating that the firm is aware of the Act.

D. SUBCONTRACTORS AND/OR JOINT VENTURES:

Planned use of consultant/subconsultant/subcontractor joint ventures shall be clearly explained in the SOQ.

The consultant's proposed subconsultants/subcontractors will be considered under the qualifications of C.v. above. Therefore, the tasks each subconsultant/subcontractor will be completing must be stated and the qualifications for completing those tasks must be provided.

The use of subcontractors not listed in the SOQ may be allowed subject to LRP approval prior to award of a specific contract. The firm selected for a project shall be responsible for contract performance whether or not subcontractors are used.

All subconsultants/subcontractors must comply with C.vi. above

E. LRP'S RIGHT TO WAIVE INFORMALITIES:

The LRP reserves the right to waive informalities and minor irregularities when reviewing SOQs.

F. CLARIFICATION OF SOQs:

A Firm submitting an SOQ may be required, at the request of the LRP, to provide oral or written clarification of particular information within its SOQ. Such clarification shall be at the discretion of the LRP.

G. PROPRIETARY INFORMATION:

Any restrictions on the use of data contained within an SOQ must be clearly stated in the SOQ.

Proprietary information should be segregated from the remainder of the SOQ to insure proper handling, since SOQs will be available for public review after LRP review. Proprietary information submitted will be handled in accordance with Wyoming statutes and applicable WDEQ policies and/or procedures.

H. MATERIAL OWNERSHIP:

All materials submitted regarding the SOQ become the property of the LRP. The SOQ may be reviewed by any person after final evaluation has been made and a contract has been signed. The LRP has the right to use any or all environmental remediation system ideas presented in reply to this request,

subject to limitations outlined in WDEQ proprietary policies and regulations. Disqualification of a firm does not eliminate this right.

I. INCURRED COSTS:

The LRP is not liable for any costs incurred by prospective firms prior to the signing of a contract.

J. ACCEPTANCE OF SOQ CONTENT:

The SOQ contents of a successful firm may become contractual obligations if future purchasing action(s) follow. Failure of the successful firm to accept these obligations in a contractual agreement, purchase order, delivery order, or similar purchasing instrument may result in cancellation of the award, and such firm may be removed from future contract solicitations.

Future changes of personnel not included in the SOQ for prequalification may be allowed with prior approval by the LRP. A formal request and justification must be made to the LRP when personnel changes are required.

K. EQUAL EMPLOYMENT OPPORTUNITY:

Upon signing a contract, the firm will be required to comply with all applicable local, state, and federal laws, rules, and regulations involving nondiscrimination on the basis of race, color, religion, national origin, age, or sex.

L. PROCUREMENT REQUIREMENTS:

Firms that accomplish work for the LRP will be required to comply with all applicable state and federal rules, laws, or requirements.

M. LIMITATIONS ON CONCURRENT PROJECTS:

Prequalified firms may submit an SOI for *any* Request for Statements of Interest issued by the LRP. However, a firm's SOI will not be considered if the firm has **two** landfill remediation projects under design that have not received final LRP approval of plans and specifications on the date SOIs are due. The Administrator may waive this requirement if very few interested firms have the necessary experience, qualifications, and available personnel required for the specific project, or one or both of the existing design contracts are considered substantially complete by the LRP even though plans and specifications have not received final approval. Firms in doubt as to whether or not this clause applies to them may request clarification before the SOI due date.

This limitation is necessary to adhere to State procurement statutes that require equitable distribution of contracts among qualified firms.

N. SOVEREIGN IMMUNITY:

The State of Wyoming and WDEQ do not waive sovereign immunity by entering into a contract and specifically retain all immunities and defenses available to them as sovereigns pursuant to Wyo. Stat. § 1-39-104(a) and all other applicable law. Designations of venue, choice of law, enforcement actions, and similar provisions should not be construed as a waiver of sovereign immunity. The parties agree that any ambiguity in a Contract shall not be strictly construed, either against or for either party, except that any ambiguity as to sovereign immunity shall be construed in favor of sovereign immunity.

O. CONTRACT CONDITIONS:

The generic Request for Proposal (RFP) document for landfill remediation projects is available upon request, and it will be provided to prequalified firms. The RFP outlines requirements for proposals and includes required contract elements. Prospective providers should be aware of these conditions and be advised that these terms are **not** negotiable. A selected provider may be bypassed in favor of the second highest ranked firm if the selected provider fails to accept or meet the standard/generic contract conditions, as outlined in the generic RFP document. Providers that are unable or unwilling to meet these stated conditions should not submit an SOQ for review. Providers that are qualified for the LRP and on the prequalified list and unable or unwilling to accept the standard contract conditions will be removed from the prequalified list. The LRP reserves the right to modify these conditions during the procurement process, as necessary, to meet State procurement requirements.

P. INSURANCE REQUIREMENTS:

If awarded a contract, the firm shall file a Certificate of Insurance with WDEQ and A&I Procurement verifying each type of coverage required below.

i) Worker's Compensation and Employers' Liability Insurance. The firm shall provide proof of workers' compensation coverage for all its employees who are to work on the project described in this Contract. Firm's insurance shall include Employer's Liability "Stop Gap" coverage in an amount not less than Five Hundred Thousand Dollars (\$500,000.00) per employee for each accident and disease. The Firm shall also supply to A&I Procurement proof of worker's compensation and employer's liability insurance on each and every subcontractor before allowing that subcontractor on the job site. Proof of Worker's Compensation insurance may be in the form of a "Letter of Good Standing" from the Wyoming Workers' Compensation Division. Requests for Certificates of Good Standing can be made online at the website maintained by the relevant state government office. If the Firm is not a Wyoming firm, Firm shall provide proof of good standing from the Worker's Compensation Division in the state where the Firm resides.

ii) Commercial General Liability Insurance. The Firm shall provide coverage, during the entire term of the Contract, against claims arising out of bodily injury, death, damage to or destruction of the property of others, including loss of use thereof, and including underground, collapse and explosion (XCU) and products and completed operations, in an amount not less than One Million Dollars (\$1,000,000.00) per occurrence and Two Million Dollars (\$2,000,000.00) general aggregate.

iii) Business Automobile Liability. The Firm shall maintain, during the entire term of the Contract, automobile liability insurance in an amount not less than Five Hundred Thousand Dollars (\$500,000.00) per occurrence.

iv) Professional Liability or Errors and Omissions Liability Insurance. The Firm shall provide proof of professional liability insurance or errors and omissions liability insurance to protect the state and the WDEQ from any and all claims arising from the Firm's alleged or real professional errors, omissions, or mistakes in the performance of professional duties in an amount not less than Five Hundred Thousand Dollars (\$500,000.00).

v) Unemployment Insurance. The Firm shall be duly registered with the Employment Security Commission, Unemployment Compensation Division. The Firm shall provide a "Letter of Good Standing" from the Department of Employment (307-235-3200) indicating that the Firm is in compliance with the Wyoming Employment Security Law. Firm shall provide a similar "Letter of Good Standing" on each and every subcontractor before beginning work under this Contract. If the Firm is not a Wyoming firm, Firm shall provide similar proof of good standing from the state in which the Firm resides.

vi) Payment of Premiums and Notice of Revocation. All policies required under this Contract shall be in effect for the duration of this Contract and project. All policies shall be primary and not contributory. Firm shall pay the premiums on all insurance policies and all insurance certificates must include a clause stating that the insurance may not be revoked, canceled, amended, or allowed to lapse until the expiration of at least thirty (30) days advance written notice to WDEQ.

vii) WDEQ May Insure for Firm. In case of the breach of any provision of this Section, WDEQ may, at WDEQ's option, purchase and maintain, at the expense of the Firm, such insurance in the name of the Firm, or subcontractor, as WDEQ may deem proper and may deduct the cost of obtaining and maintaining such insurance from any sums that may be found to be due or become due to the Firm under this Contract.

viii) WDEQ's Right to Reject. The state reserves the right to reject a certificate of insurance, if the Firm's insurance company is widely regarded in the insurance industry as financially unstable. This includes, but is not limited to, insurance companies with an "Omit" rating in the A.M. Best insurance rating guide.

ix) WDEQ's Right to Contact Insurer. WDEQ shall have the right to consult with the Firm's insurance agent for disclosure of relevant policy information. Relevant information includes, but is not limited to:

- a. Exclusions, and
- b. Claims in progress that could significantly reduce the annual aggregate limit.

x) With the exception of Professional Liability, "Claims made" policies will not be accepted by WDEQ.

Q. REMOVAL OF FIRMS FROM THE PREQUALIFIED LISTING:

Firms that do not submit SOIs when announced by the LRP, should indicate, in writing, their continued interest in remaining on the prequalified list. A written statement is not required for every SOI

request, but one should be submitted at least annually. Submittal of an SOI shall constitute written notice of continued interest by the firm.

Firms performing work for the LRP are evaluated by the LRP Project Manager at project milestones. An unsatisfactory performance evaluation will be discussed with the firm's Project Manager. The reason for an unsatisfactory evaluation and a list of steps that should be taken by the firm to obtain a satisfactory evaluation will be discussed. If the firm does not take the necessary action(s) to resolve the problems, the firm will be removed from the prequalified list. If such action is necessary, the contract may be terminated. Firms that are in dispute with any subcontractor on any LRP project will be removed from the prequalified list until the dispute is resolved.

END OF DOCUMENT

Department of Environmental Quality - Solid & Hazardous Waste Division
 Landfill Remediation Program (LRP) Professional Services
Statement of Qualifications Rating Form

Ratings	
Clearly outstanding in this item	10
Well qualified in this item	7
Average in this item	5
Weak in this item	3
Unsatisfactory in this item	1

The average rating from the three committee members will be used to determine the firm's qualifications. To become prequalified, a firm must receive an average rating of "5" for **EACH** (1a. through 1k., 2, 3, 4, and 5) item on this rating form. Firms may submit additional information for items where an average of "5" is not obtained for further consideration by the committee. All required documentation in item 6 must be provided to become prequalified.

Firm Name: _____ **Committee Person:** _____ **Date:** _____

Rating Item	Rating
<p>1. EXPERIENCE, EXPERTISE AND QUALIFICATIONS IN THE FOLLOWING AREAS OF THE FIRM AND PERSONNEL LIKELY TO BE ASSIGNED TO LRP PROJECTS</p> <p>a. Leachate and landfill gas contaminant fate and transport analyses.</p> <p>b. Municipal solid waste landfill chemistry.</p> <p>c. Municipal solid waste landfill gas; both explosive gasses and gasses with the potential for groundwater contamination.</p> <p>d. Knowledge of applicable fire protection and electrical codes.</p> <p>e. Selection, design, construction, construction quality assurance (CQA), operation & maintenance (O&M), and monitoring of a variety of remedial systems at municipal solid waste landfills that: i) limit migration of leachate to and within the water table, ii) remove pollutants dissolved in groundwater, and (iii) control/mitigate gasses.</p> <p>f. Selection, design, construction, CQA, and O&M of final cover systems at municipal solid waste landfills.</p> <p>g. Design/implementation of drilling and sampling programs to delineate limits and types of contaminants at municipal solid waste landfills.</p> <p>h. Preparation of detailed reports, geologic cross sections, maps.</p> <p>i. Preparation of detailed engineering plans/specifications.</p> <p>j. Mitigation of immediate health and safety hazards.</p> <p>k. Groundwater data statistical analysis and reporting as applicable to municipal solid waste landfill remediation</p>	<p>a. _____</p> <p>b. _____</p> <p>c. _____</p> <p>d. _____</p> <p>e. _____</p> <p>f. _____</p> <p>g. _____</p> <p>h. _____</p> <p>i. _____</p> <p>j. _____</p> <p>k. _____</p>
<p>2. EDUCATION, EXPERIENCE, AND TRAINING OF PERSONNEL LIKELY TO BE ASSIGNED</p>	
<p>3. FIRM FAMILIARITY WITH APPLICABLE FEDERAL/STATE LAWS, REGULATIONS, & PROCEDURES, INCLUDING PERMITTING PROCEDURES FOR REMEDIATION SYSTEMS</p>	
<p>4. QA/QC FOR SAMPLING ANALYSIS, OCCUPATIONAL HEALTH AND SAFETY PLAN</p>	

<p>5. REFERENCES ON SIMILAR PROJECTS Provide no less than three and no more than 6 descriptions and references for similar projects.</p>	
<p>6. REQUIRED DOCUMENTATION (this item not rated). If items are not submitted, firm will not be qualified until items are provided.</p> <ul style="list-style-type: none"> a. The firm's current compliance with all applicable Wyoming Secretary of State business registration requirements. Submit copies of certificate of registration, or pending application, with the Secretary of State. b. The firm's current compliance with the State Board of Registration for Professional Engineers and Professional Land Surveyors. Submit copies of certificate of registration for both the firm and employees registered as Professional Engineers/Professional Geologists in the State of Wyoming. Submit only those registrations for employees that will be working on LRP projects. c. Copies of 40-hour and current 8-hour annual refresher OSHA training certificates for each employee likely to be assigned to work on LRP projects and copies of 8-hour supervisor's training certificates for key personnel who supervise work activities. 	<p>Yes/No</p> <p>Yes/No</p> <p>Yes/No</p>

PROPOSED SCOPE OF WORK
LANDFILL NAME LANDFILL REMEDIATION PROJECT

This is a tentative scope of work that is subject to change during contract negotiations with the selected firm. The final scope of work will be specific to the project. However, at a minimum, consultants must be able to provide all services indicated herein.

1. Work Objective

Soil and groundwater contamination have been identified at the **Landfill Name** landfill as a result of landfill operations. The Engineer shall complete work necessary to investigate the nature and extent of contamination, prepare an Assessment of Corrective Measures Plan (ACMP), implement the selected remedy, operate and maintain the selected remedy, and decommission the remedy when soil and groundwater standards have been met.

The Contract will be written for Phases A (Nature and Extent Study) and B (Assessment of Corrective Measures Plan only). Amendments may be issued at appropriate milestones to complete other work phases at the discretion of WDEQ.

Three hardcopies of all deliverables shall be submitted to the WDEQ Project Manager. Additionally, all deliverables shall be submitted electronically in WORD, AutoCAD, or other appropriate format approved by WDEQ.

The schedule for meeting milestones, submitting deliverables, and review will be defined during contract negotiations. The landfill operator designee will be involved in all phases of this work and may review and comment on work products submitted by the Engineer. The Engineer will meet with the landfill operator designee and the WDEQ Project Manager at specified milestones throughout the life of this project.

2. Summary Scope of Work

A. Nature and Extent Study (NES) Tasks (0907.05)

- (i) Prepare NES Work Plan
- (ii) Planning Meeting (1)
- (iii) Secure Permits and Provide Required Notifications
- (iv) Complete NES Field Work
- (v) Prepare Findings Report

B. Assessment of Corrective Measures Plan (ACMP) Tasks (0906.01)

- (i) ACM Work Plan Preparation
- (ii) Planning Meetings (2)
- (iii) Assessment of Corrective Measures

- (iv) Prepare ACM Report
- (v) Prepare Construction Plans and Specifications for Remedy Implementation

C. Remedy Implementation Tasks (0906.02, 0907.01, 0907.09, 0907.10)

- (i) Construction Bidding and Oversight
- (ii) Prepare Operation, Maintenance, and Operating Manual and Equipment Startup

D. Operation and Maintenance (O&M) and Monitoring Tasks (0907.06)

- (i) O&M Including Groundwater Monitoring
- (ii) Data Evaluation and Annual Reports
- (iii) Post-Remediation Verification Sampling and Testing
- (iv) Site Remediation Completion Reports

E. Project Closeout Tasks (0907.07)

- (i) Site Closeout Plans
- (ii) Closeout Construction
- (iii) Final Site Closeout Reports
- (iv) Public Meeting

F. Additional Work

3. Detailed Scope of Work

A. Nature and Extent Study Tasks (0907.05)

(i) **Prepare NES Work Plan.** If additional site condition information is necessary as a result of the evaluation of existing data, a Nature and Extent Study (NES) Plan shall be prepared. The NES Work Plan shall be structured to provide the nature and extent of the contamination present, identify buried waste location(s), and identify waste types. Data will be identified that are needed to support design of an appropriate remedial action program. Sampling activities will be consistent with the Engineer's Sampling and Analysis Plan (SAP). The NES Work Plan shall define how the additional information will be collected, analyzed, and incorporated into the Assessment of Corrective Measures Plan (ACMP). The NES Work Plan shall include the following elements:

(a) Project Management Plan (PMP)

(1) The PMP shall include an organizational chart and description of key personnel responsibilities. The plan shall list the project director, project manager, project engineer, project geologist, key field personnel, subcontractors, and equipment. Additionally, the plan shall address:

(A) The approach for minimizing waste generation, handling, and disposal throughout the life of the project.

(B) The approach for water, energy, and fuel conservation throughout the life of the project. Consideration for the use of renewable energy.

(C) Recycling approach.

(2) Personnel experience summaries and/or resumes shall be provided. Certificates of completion of initial OSHA Hazardous Waste Site Worker Training, annual refresher training, and supervisory training (as appropriate) shall be provided for each person proposed for work on the sites.

(b) Task Schedule and Cash Flow Projections. The Engineer shall prepare and submit for approval a graphic time schedule showing the tasks to be completed and the time in which they will be conducted and completed. This time schedule shall include provisions to graphically portray the actual time schedule of tasks completed for use in progress evaluation. The cash flow projection will indicate the tasks or subtasks to be completed under each payment request. The time schedule, task schedule, and cash flow projection shall be updated and submitted with each payment request. Anticipated budget and/or schedule overruns and a recovery plan shall be included with each payment request. The Engineer shall notify the WDEQ Project Manager when a task goes over budget and provide justification for the overage. Failure by the Engineer to submit an updated time schedule, task schedule, and cash flow projection with each payment request will result in delays in processing payments.

(c) Project Health and Safety Plan (HASP).

(1) A project HASP must be developed by the Engineer and reviewed by WDEQ before work begins. Review of the Engineer's HASP shall not imply WDEQ's acceptance or approval of the plan. The HASP must address hazards likely to be encountered at the site and establish policies and procedures to protect workers and the public from the hazards. The plan will also provide measures to minimize the possibility of accidents and injuries that may occur during normal activities or adverse weather conditions.

(2) Each on-site worker must be trained and in current compliance with health and safety provisions of 29 CFR Part 1910.120. Documentation shall be provided to verify compliance with this requirement. Workers that have not received required training or that lack training certificates will not be permitted to perform work at the site.

(d) Sampling and Analysis Plan (SAP). The SAP shall include a Quality Assurance/Quality Control (QA/QC) Plan for sample collection and analysis. It is the Engineer's responsibility to ensure adequate QA/QC procedures are utilized in sample handling and analysis so that representative analytical results are obtained.

(1) This plan shall be submitted to the WDEQ Project Manager for review and approval.

(2) The laboratory that the Engineer proposes to use for analysis of environmental samples shall be indicated.

(3) Static water level and immiscible layers shall be measured prior to well purging and sampling. A minimum of three well casing volumes must be removed from the well prior to sampling, except when free product exists. If water samples are to be collected from wells containing free product, the purging/collection procedure must be approved by WDEQ before proceeding. Low yielding wells can be evacuated to dryness. Samples are not to be taken until wells have totally recovered. Samples are not to be taken within 48 hours of well development. Samples collected from the bottom of the aquifer, if specifically requested, must be collected in a manner that will not allow the sample collected, nor the inside of the sample container, to come into contact with groundwater above the sample depth. Sample collection method shall be approved by WDEQ.

(4) Low-flow sampling may be used at wells conducive to the technique. Low-flow sampling techniques must follow ASTM D 6771-02, "Standard Practice for Low-Flow Purging and Sampling for Wells and Devices Used for Ground-Water Quality Investigations." In accordance with ASTM D6771-02, peristaltic and other suction-lift pumps may not be used for low-flow sampling. No-flow sampling, such as "Hydrasleeve," may be used upon prior approval by WDEQ provided collection protocols are described in the SAP.

(5) All handling procedures must be carefully established and followed. Samples must be cooled to 4°C for transportation to the laboratory. Proper chain-of-custody procedures must be followed. Field blanks, duplicate samples, laboratory spikes, etc. will be utilized as part of the QA/QC program. The Engineer must supply all chain-of-custody reports and lab reports, including QA/QC reports, to WDEQ in the Findings Report or applicable routine report.

(6) In addition to groundwater analyses required by the Solid Waste permit, analyses may be required to evaluate remediation system wastewater disposal options (e.g., WYPDES permit or industrial pretreatment permit). The Engineer shall determine additional water analyses required for wastewater disposal options and present those to WDEQ.

(7) Monitored Natural Attenuation Parameters.

(A) The Engineer shall collect groundwater samples and have the samples analyzed for monitored natural attenuation (MNA) parameters at all sites where MNA is one of the proposed remedy(ies). The groundwater samples are to be collected only from equally spaced groundwater monitoring wells along, or very near, the centerline of down-gradient groundwater contaminant plumes and immediately up gradient of the contaminant source in an uncontaminated groundwater monitoring well or other agreed upon location.

(B) The MNA parameters and EPA methods are specified in the following table.

**ANALYTICAL METHODS FOR MNA INDICATOR
PARAMETERS IN GROUNDWATER**

CONSTITUENT	EPA METHOD*
Dissolved Iron (Fe ⁺²)**	3020A/7381 or 6010C
Total Iron (Fe ⁺³)	3020A/7381 or 6010C
Nitrate (NO ⁻³)	353.2
Sulfate (SO ⁻⁴)	375.2
Sulfide (S ⁻² ***)	376.2
Total Manganese (Mn ⁺²)	3020A/7361 or 6010C
Methane (CH ₄)***	3810
Total Alkalinity	310
pH	On site
Dissolved Oxygen	On site

*Detection levels are EPA-method specific. Notification is required for all constituents detected above the detection level.

** **Dissolved** iron samples must be collected and shipped in an air-tight amber glass container with no head space. If the sample cannot be delivered to the laboratory within 48 hours, the sample must be filtered on site with a 45 micron filter. Add nitric acid to lower the sample pH to <2 **after** sample is filtered on site. If the sample can be delivered to the laboratory within 48 hours, there is no need to filter the sample on site. **Do not** acidify the sample during on-site collection.

*** Methane and Sulfide samples must be collected and shipped in an air-tight glass container with no head space.

(e) Field Work Plan. The NES shall identify areas where additional field work is needed to determine nature and extent of contamination. This activity may include recommendation for additional wells and soil and/or groundwater sampling. New well locations shall be identified and shown on a map to be included in the NES Work Plan. All field work needed to define the nature and extent of contamination and analyze remedial alternatives shall be identified in the work plan. An implementation schedule for completing the field work shall be provided in the NES Work Plan.

(f) Sage Grouse Coordination/Activities. If Work will be conducted outside of an obvious city/town limit and not in a previously disturbed area, the Engineer shall consult with Wyoming Game & Fish Department (WGFD) and follow all procedures required by WGFD. All protective stipulations and mitigation measures must be included in the Engineer's NES plan, construction plans, specifications, and other work products. Lead time from WGFD may be substantial. Sage grouse habitat mitigation and consultation with WGFD is an on-going activity throughout the life of this Project.

(g) Threatened and Endangered Species Survey

(1) Site Survey Report. The Engineer shall furnish services for a site-specific authoritative survey of threatened and endangered plant and animal species at or near the proposed Project. The survey shall satisfy the requirements of the Endangered Species Act (Act) and shall include those species that are federally listed in accordance with the Act, and those that are presently candidate species for listing under the Act. A one-page report shall be included in the NES Work Plan. The report, at a minimum, will include: 1) county name and legal description of properties or areas, 2) species observed, 3) a brief description of habitats, 4) a comment on the suitability of the site for the species that may reasonably be expected in the area, 5) photographs, and 6) an overview and recommendations for avoidance.

(2) Mitigation or Avoidance. The Engineer shall provide recommendations for mitigation or avoidance of adverse impacts on threatened and endangered species, per the requirements of the Act. These recommendations shall be included in the NES Work Plan.

(h) Cultural Resources Inventory

(1) Cultural Resources Inventory Report. The Engineer may be required to conduct or commission an inventory of the cultural resources that may be affected by the proposed Project. Such inventories shall be conducted by a qualified professional. The cultural resource report shall be included in the NES. The report, at a minimum, shall include: 1) an inventory of the cultural resources present on each site in the form of completed Wyoming Cultural Properties (WyCP) forms, which can be found at <http://wyoshpo.state.wy.us>, 2) a map of the project area, 3) maps of each site showing the location of all cultural features, artifact concentrations, and plan views of proposed remediation system locations, 4) photographs of all cultural features that will be affected by the Project, and 5) and overview and recommendations for avoidance.

(2) Mitigation or Avoidance. A plan to mitigate the adverse effects of the Project on any of the sites determined eligible for the National Register of Historic Places shall be submitted as part of the NES plan. This could include marking off areas to be avoided by construction activities due to the existence of cultural resources.

(ii) Planning Meeting. The Engineer shall meet with the WDEQ Project Manager to present the information in the Draft NES Work Plan. The Engineer is responsible for providing a complete analysis of available data and the need for additional information. WDEQ shall evaluate the information presented at the meeting and request changes, as necessary. WDEQ comments shall be incorporated into the NES Work Plan and three copies the Final NES Work Plan shall be submitted to WDEQ. Field work presented in the NES Work Plan shall not commence until WDEQ has approved the information presented at this meeting and requested changes have been made by the Engineer.

(iii) Secure Permits and Provide Required Notifications. The Engineer shall secure all required permits prior to initiating any site activities. All notifications required by any permitting entity shall be provided by the Engineer.

(iv) Complete NES Field Work

The Engineer shall conduct additional site assessment identified in the NES Work Plan and approved by WDEQ. The Engineer is responsible for the types, quantities, and locations of all subsurface investigation methods necessary for the Engineer to provide complete remedy designs. The results from the additional site assessment shall be presented in the Assessment of Corrective Measures Plan.

(a) Install Soil Borings

(1) Boreholes shall be drilled by the Engineer at locations and to depths agreed to during planning meetings and as described in the NES Work Plan. Any deviation from the NES Work Plan approved by WDEQ must have prior approval before beginning work. Work completed without prior WDEQ approval may not be eligible for payment.

(2) All down-hole equipment shall be decontaminated between borings to minimize the risk of cross contamination. Decontamination water must be disposed of according to applicable rules and regulations. The Engineer shall provide WDEQ with the location to be used for water disposal.

(3) All soils from the boreholes shall be disposed of by the Engineer. If the soils are not contaminated, they may be disposed of on the Project site. If the soils are contaminated, they must be disposed of at a site approved by WDEQ Solid and Hazardous Waste Division. The Engineer shall obtain all permits and pay all costs associated with soil disposal. The Engineer will notify the WDEQ Project Manager of the disposal site.

(4) The Engineer shall provide an accurate log of each borehole. This documentation shall be provided by or under the direct supervision of a Wyoming licensed Professional Geologist. Soil samples shall be described in accordance with the Unified Soil Classification System, as specified in ASTM D 2488, unless another method is approved by WDEQ. The log shall include the thickness of the contaminated zone and the distance between the bottom of the contaminated zone to the groundwater table, as applicable.

(5) Each borehole not completed as a well shall be surveyed for both horizontal location and elevation (above mean sea level). This survey information is to be plotted on the coordinate base map provided in the NES Report. The Wyoming State Plane Coordinate System (Wyo. Stat. § 34-25-101 through 108) shall be used when surveying and plotting the borehole locations. Surveys shall be conducted in accordance with Wyo. Stat. § 33-29-124 by a Wyoming Registered Professional Land Surveyor. Survey data shall be in feet.

(6) Borehole closure must be performed in accordance with Chapter 26, Wyoming Water Quality Rules and Regulations. A deviation may be permitted, however, for shallow boreholes that do not penetrate the groundwater table. These may be abandoned with the associated cuttings, if they are uncontaminated, and with a 2-foot bentonite plug on the upper 2 feet. All other boreholes must be abandoned with a bentonite slurry. Borings in paved areas or other public use areas shall be abandoned in accordance with the requirements of the jurisdiction having authority.

(7) Any redrilling of boreholes necessitated by the negligence or fault of the Engineer will be done at the Engineer's expense and will not be eligible for payment.

(8) Backhoe Excavation Test Pits. Backhoe test pits may be used in lieu of boreholes to examine the subsurface conditions and/or obtain representative samples. The location and size of the excavation shall be determined by the Engineer. The Engineer shall provide accurate documentation of the soil in the test pit. This documentation shall be provided by or under the direct supervision of a Wyoming licensed Professional Geologist. Soil samples shall be described and surveyed as described above for boreholes.

(b) Monitoring Wells

(1) Well Installation. Selected boreholes will be completed as monitoring wells at locations agreed to during planning meetings and as described in the NES Work Plan. Monitoring well permits for wells 4-inches or less in diameter are not required by the Wyoming State Engineer's Office or WDEQ.

(A) Monitoring well construction must satisfy the requirements of Chapter 2 of the Solid Waste Rules and Regulations, Chapter 26 of the Wyoming Water Quality Rules and Regulations, and Part II, Chapters III, IV, V, and VI of the Wyoming State Engineer's Office Regulations and Instructions. The borehole diameter shall be at least 4 inches larger in diameter than the well casing diameter. All wells shall be constructed using 2-inch Schedule 40 PVC, or 4-inch Schedule 40 PVC if requested by WDEQ Project Manager, unless this material is found to be incompatible with conditions in the field. In this case an alternate well material shall be chosen by the Engineer and approved by WDEQ for the well construction.

(B) The casings shall meet the conditions provided in the Wyoming Water Quality Rules and Regulations Chapter 26. All well casing sections will be flush threaded. Under no circumstances are PVC glue or plastic welding solvents to be used to join casings. The casing will be fitted with a free draining, threaded bottom cap of the same material as the casing. The top of the casing will be fitted with a locking cap.

(C) The well screen shall be commercially manufactured plastic screen or slotted casing only, unless otherwise directed by the WDEQ Project Manager. Screen slot size will be chosen to be compatible with the granular pack. The screened interval shall extend at least 2 feet above the highest expected seasonal groundwater level and at least 5 feet below the lowest expected groundwater level. Any deviations from the specified screened interval must be approved by the WDEQ Project Manager. The screened interval shall intersect the water table of the uppermost aquifer, unless the intent is to install a well below the water table surface to evaluate the vertical extent of contamination below the water table. The granular pack around the screened interval will extend to 1 foot above the screen. The granular pack will be chosen for compatibility with the screen slot size and the geologic materials encountered to minimize the entrance of fine grained material into the well. The granular pack will be placed into the annular space in such a manner that no voids or bridging will occur.

(D) A seal of bentonite pellets or chips, 2 feet in thickness, shall be placed above the granular pack. The bentonite plug shall be hydrated for 24 hours prior to placing the surface seal. The annular space above the bentonite seal to within 1 foot of the surface shall be sealed with Portland cement or a sand-cement grout. The grout shall be placed into the annular space in such a manner that no voids or bridging will occur. The sealing material shall meet the conditions provided in the Wyoming Water Quality Rules and Regulations Chapter 26.

(E) The Engineer shall determine the monitoring well surface completion to be used.

(F) Monitoring well closure must be performed in accordance with Chapter 26, Wyoming Water Quality Rules and Regulations, and Part III, Chapter VI of the Wyoming State Engineer's Office Regulations and Instructions. Wells in paved areas or other public use areas shall be abandoned in accordance with the requirements of the jurisdiction having authority. The Engineer shall obtain the WDEQ's approval prior to abandoning any monitoring well.

(G) Any redrilling of boreholes caused by failure to reach the planned total depth, by careless drilling affecting samples, or for failure in the installation of well materials will be done at the Engineer's expense.

(H) Accurate as-built documentation of the well design and construction shall be provided by the Engineer. This documentation shall be provided by or under the direct supervision of a Wyoming licensed Professional Geologist or Professional Engineer.

(I) Each well shall be surveyed for both horizontal location and elevation (above mean sea level). A referenced water level measuring point to the nearest 0.01 foot shall be established and used at each monitoring well. The reference point shall be established as the north side, top of PVC casing. This survey information is to be plotted on the coordinate base map provided in the NES Report. The Wyoming State Plane Coordinate System (Wyo. Stat. § 34-25-101 through 108) shall be used when surveying and plotting the well and borehole locations. Surveys shall be conducted in accordance with Wyo. Stat. § 33-29-124 by a Wyoming Registered Professional Land Surveyor. Survey data shall be in feet.

(2) The Engineer shall develop the well by overpumping, water surging, air surging, or jetting; method used shall be approved by WDEQ. The Engineer shall develop and sample wells within 10 days of well installation. The Engineer shall not sample wells within 48 hours of well development.

(3) Contaminated Water Disposal. Water that is collected during monitoring well development or sampling must be disposed of properly by the Engineer. The Engineer will propose a water disposal plan for approval by WDEQ.

(c) Geologic Cross-Sections

(1) Geologic cross-sections depicting lithologic relationships and lithologic continuity shall be developed. Geologic cross-sections shall include cross-section location maps.

(2) The specific plotting method shall be agreed to by WDEQ and the Engineer during the planning meeting. At least one geologic cross-section will be provided. Cross-sections shall be completed by or under the direct supervision of a Wyoming licensed Professional Geologist and must be stamped by a Wyoming P.G. A complete reproducible set of each cross-section shall be included in the NES Report.

(d) Potentiometric Surface and Iso-concentration Maps. A potentiometric surface map is required for the site. Individual iso-concentration maps shall be prepared for each chemical compound with concentrations equal to or greater than the groundwater protection standard.

Iso-concentration maps will be developed only after discussion with the WDEQ Project Manager to determine their usefulness.

(e) **Vapor Intrusion Determination.** If assessment reveals that an acute or chronic vapor intrusion exposure may be a concern (e.g., plume has migrated or is suspected to have migrated under or near buildings or along preferential pathways) at the site or adjacent properties, Engineer shall assess the possibility of vapor intrusion to buildings, sewer lines, etc. Following the construction of any active subsurface remediation system that has the potential to liberate or move petroleum vapors from source areas (e.g., air sparge), a follow up vapor intrusion evaluation will be required using the same procedures as the initial evaluation. This is intended to ensure the active system has not caused a vapor intrusion problem.

(f) Any remobilization costs, costs for additional subsurface analysis, or other costs for work needed because of incomplete field effort will be the Engineer's responsibility; no reimbursement will be made for this additional work.

(v) **Prepare NES Report.** At the conclusion of the study, results shall be presented in a Draft NES Report. The Draft NES Report shall contain all information and data necessary to move forward with the Assessment of Corrective Measures and identify a remedy for the site. WDEQ shall comment on the Draft NES Report, and the Engineer shall make requested changes to the report. Three copies of the Final NES Report shall be submitted to WDEQ. Any deficiencies in the report shall be corrected by the Engineer at the Engineer's expense. Payment will not be provided to correct report deficiencies. Work shall not begin on the Assessment of Corrective Measures until the Engineer receives approval from WDEQ.

B. Assessment of Corrective Measures (ACM) Plan Tasks (0906.01)

(i) **ACM Work Plan Preparation.** An ACM Work Plan shall be prepared by the Engineer. Based on the NES results, the Engineer shall identify the proposed remedial options for further assessment. Three copies of the Draft ACM Work Plan shall be submitted to WDEQ. WDEQ shall comment on the draft plan, the Engineer shall incorporate comments, and submit three copies of the Final ACM Work Plan. The Plan shall be approved by WDEQ before assessment activities begin.

(ii) Planning Meetings.

(a) After the Engineer has identified the remedial options for further assessment, a planning meeting with WDEQ will be scheduled with the Engineer. The purpose of the planning meeting is to determine and agree upon the proposed remedial options that will be considered for further assessment in the Assessment of Corrective Measures phase. Upon agreement between the Engineer and WDEQ, the Engineer shall assess the options agreed upon by WDEQ to determine the best remedial approach for the site.

(b) After the ACM work is complete and the report finalized, the Engineer and WDEQ shall meet to discuss the Engineer's approach to completing plans and specifications for the WDEQ-approved remedy.

(iii) Assessment of Corrective Measures

(a) In accordance with the approved Work Plan, the Engineer shall further assess the options chosen, prepare cost estimates for implementation of the options, recommend one or more alternatives for implementation, and provide an implementation schedule.

(b) The evaluation shall include, but is not limited to, remediation potential; constructability; cost; and Wyoming Solid Waste Rules and Regulations, Chapter 2, Section 8 requirements.

(c) If pilot testing is proposed, the Engineer shall prepare a Pilot Test Work Plan for WDEQ review and approval. At a minimum the plan shall include the technologies proposed for pilot testing, the location(s) selected for pilot testing, the estimated cost of conducting the pilot test(s), the data to be obtained from the pilot test(s), and how the data will be used in the final selection and design of the remedial alternative. This plan shall be approved by WDEQ prior to commencing work. The Engineer shall be responsible for proper disposal of all waste generated during pilot testing.

(iv) ACM Report

(a) Draft ACM Report. Three copies of the Draft ACM Report shall be submitted to the WDEQ Project Manager. The Draft ACM Report shall be in the format specified below. The Draft ACM Report shall be dated and clearly stamped **Draft - For Review Only**, or other similar language, so as to not construe it as a final document. Each copy of the Draft ACM Report shall bear the original seals and signatures of the Engineer and Geologist of record for the Project as having responsibility for the content of the document. At a minimum, the Draft ACM Report shall provide a summary of the NES findings, Engineer's recommendations, and the recommended final remedy or remedies proposed at the site. The Draft ACM Report shall provide sufficient detail to allow WDEQ to evaluate the proposed remedy or remedies and further understand the scope of the Project. Depending on the nature of WDEQ's comments, the Engineer may be called for an in-person meeting. This meeting may either be in person or via teleconference, depending on the nature of WDEQ's comments.

(b) Final ACM Report. The Engineer shall incorporate WDEQ requested changes to the Draft ACM Report and prepare three complete copies of the Final ACM Report, including Appendices, and submit them to the WDEQ Project Manager. The Final ACM Report shall be in final form and content and in the format specified below. The Final ACM Report shall be dated and clearly stamped **Final**, or other similar language. The Final ACM Report shall clearly define the final remedy or remedies approved by the WDEQ to be taken at the site. Each copy of the Final ACM Report shall bear the original seals and signatures of the Engineer and Geologist of record for the Project as having responsibility for the content of the document.

(c) ACM Report Requirements and Guidelines. The ACM shall meet the standards presented in Solid Waste Rules and Regulations, Chapter 2, Section 8.

(d) This section is intended to provide guidance for preparing an ACM Report for the Landfill Remediation Program (Program). The guidance describes major components and sections that shall be contained in any ACM Report submitted to the Program. To allow faster review, the ACM Report must be organized as outlined below. Obviously, each Project is unique. Site-specific conditions govern the content of an ACM Report, from the nature of the contamination present to the choice of potential technologies for reduction or removal of contaminants. However, WDEQ recommends that the components described below be used as the starting point for development of the ACM Report. The Engineer should coordinate with WDEQ if there are questions or concerns about particular site-specific elements to be included in the report.

(1) Title Page. The title page should identify the site for which the ACM Report is being prepared, the date the ACM Report was prepared or submitted, and the name of the consulting firm preparing the ACM Report.

(2) Table of Contents. The table of contents should be sufficiently detailed to facilitate rapid location of information contained in the report. In addition to identifying the major sections and subsections of text, the table of contents should include: 1) List of Appendices, 2) List of Tables, 3) List of Figures, and 4) List of Plates.

(3) Introduction. The introduction should familiarize the reader with the approaches and design criteria used in developing the ACM. At a minimum, this section should include: 1) summary of document content and layout, 2) the location of the site, 3) summary of methodology for sampling and choosing remedial technologies, and 4) description of criteria evaluated to choose appropriate remedial method(s) (e.g., technical, human health, environmental impact, institutional, and present worth cost criteria) in accordance with Solid Waste Rules and Regulations, Chapter 2, Section 8(b).

(4) Description of Subsurface Environmental Conditions. This section should describe the results of subsurface investigations undertaken to assess the nature and extent of contamination and to support selection and design of the remedial method(s). It may reference previously completed investigations, if applicable.

(5) Environmental Restoration Standards. Describe the methodology used for determining environmental restoration standards for both soil and groundwater, as applicable. Clearly identify any EPA or WDEQ criteria adopted. If the standards for a particular contaminant vary based on location (e.g., different locations in the soil column), the reasons for the variation should be explained and justified. Specify the anticipated remediation time range necessary to achieve target cleanup levels. Calculations should be provided to fully illustrate the parameters, analyses, and computations used.

(6) Description of Remediation Area Conditions. A summary description of remediation area conditions including those discussed below should be provided. This information could be displayed in table format.

(A) Risk characterization including acute hazards identified, acute hazard exposure pathways, chronic hazards identified, and chronic hazard exposure pathways.

(B) General characteristics including identified contaminants present, vertical and horizontal extent of contamination, concentrations and distribution of contaminants throughout the soil profile, preferred pathways, acreage of remediation area, offsite land uses, and site geology (evidence of sinkholes, fractures, lithologic units and/or rock types, faults, or other discontinuities).

(C) Soil characteristics including soil type and stratification; general mineral composition; texture; porosity; permeability; concentrations of contaminants; surface area of contamination; and extent of contamination under structures, in groundwater, and off site, as applicable.

(D) Groundwater characteristics including depth to uppermost groundwater table; water chemistry (hardness, total dissolved solids, total suspended solids, concentrations of total metals, nitrogen, VOCs, etc.); aquifer thickness and type; direction and velocity of groundwater flow; hydraulic conductivity; vertical and horizontal distribution of groundwater contamination; plumes; extent of contamination under structures and off site.

(7) Maps, Tables, and Appendices. Provide a visual display of the remediation area. Displays should include: 1) the location of the facility including streets, nearby structures, and other prominent features; 2) areas of impacted soils within the unsaturated and capillary fringe zones; 3) lateral extent of groundwater contaminant plumes with concentrations exceeding cleanup levels; 4) monitoring wells, including cone penetrometer groundwater sampling locations; 5) groundwater flow direction on potentiometric surface maps; 6) borehole locations and designations (e.g., Geoprobe, soil boring); 7) soil sampling depths including depth to groundwater table; and 8) concentration contour maps for detected constituents.

A brief written summary emphasizing the pertinent information given on the map should be included in the report text. To the extent that any pertinent details are not included in the text, the following types of information should be provided in tables or appendices: 1) laboratory reports, including QA/QC documentation for soil and groundwater analyses, 2) summary data tables; 3) copies of all completed well permit completion forms, as filed in the Wyoming State Engineer's Office; 4) individual well completion information, including State Plane Coordinates, latitude/longitude, and water level measuring point elevations; and 5) well borehole and/or Geoprobe survey data, including groundwater surface elevations and State Plane Coordinates.

(8) Preliminary Evaluation of Remediation Technologies and Pilot Testing. Describe the scope and evaluation of preliminary remediation technology selection to demonstrate applicability, reliability, and selection of technologies for pilot testing (if completed). Describe the proposed pilot testing program to generate site-specific data necessary to evaluate relative merits and limitations of remedial alternatives and provide data to design remediation systems.

(A) Preliminary Evaluation of Remediation Technologies Selected for Further Study. Identify the available remediation technologies that were approved for further study. Based on various screening criteria, identify a technology with potential merit for the site. The Report should provide a brief overview of each method, including a description of the processes involved, and a demonstration that the technologies are appropriate for given site conditions. Demonstration that technologies are proven to meet WDEQ restoration standards through removal or reduction of concentrations of target constituents is also required.

While monitored natural attenuation (MNA) may meet performance criteria for both soils and groundwater, it should only be proposed as the primary means to achieve restoration standards where available data clearly demonstrate that contamination is of limited degree and extent and has minimal potential for migration to points of exposure. The following conditions must exist before MNA will be considered as the primary remediation technology: 1) contamination must not be migrating or expanding in areal extent; 2) monitoring mechanism must be provided; 3) final environmental restoration standards must be reached in a WDEQ-accepted time frame; and 4) if active remediation technology is engineered into the core of the primary subsurface contamination plume, MNA may be considered for fringes of the plume.

(B) Pilot Testing Program. Describe the pilot testing program (if completed) used to assess the site-specific feasibility of the various technologies that were considered.

1) Explain why certain remediation technologies are considered appropriate, given chemical and physical characteristics of local soils and/or groundwater, including a discussion of how the scope of pilot testing was determined.

2) Describe the procedures and data collection techniques for the systems, including descriptions of the equipment used, its specifications, and schematic diagrams of the equipment and system layout.

3) Describe the sampling procedures, including shipping methods, name of laboratory, and the analytical methods used.

4) Explain why specific parameters were omitted and why such omissions do not affect the viability of the method or technology.

5) Provide tabular summaries of pilot system sampling data, estimated maximum removal rates, applied vacuum, flow rate, estimated radius of influence, constituent maximum initial concentration, pumping rate, maximum draw down, aquifer flow velocity, hydraulic conductivity, transmissivity, specific capacity, etc.

6) Define terms and parameters, methods of calculating them, and citations of prior studies or papers used.

7) Describe data collection methods and calculations, including descriptions of the equipment selected and methodologies used for data plotting and calculations (these may be located in an appendix).

8) Provide brief summaries of the results of the pilot tests, possibly in tabular form, including a brief assessment of overall viability. Full reporting of results may be reserved for an appendix.

9) Identify technologies that do not require pilot testing to accurately determine feasibility and conceptual design and a statement why pilot testing is not necessary. Identify remedial areas having similar characteristics where a given technology would produce similar results.

10) Describe any computer modeling used, including model names.

(9) Feasibility Evaluations and Conceptual Designs. Evaluate the feasibility of potential remediation options based on data generated during the preliminary evaluation and pilot testing. Present conceptual designs of remedial technologies selected. The feasibility evaluation shall include a comparison of the environmental footprint expected from each cleanup alternative, including green house gas emissions, which may require coordination with WDEQ Air Quality Division. Engineer shall consider the need for disposal of potentially hazardous non-media (filters, canisters, etc.) waste generated as a result of the remedial alternative selected. Prior approval by the WDEQ project manager must be obtained to implement a technology that generates non-media (filters, canisters, etc.) hazardous waste during remedial alternative operation.

(A) Description of Potentially Feasible Remediation Technologies. Provide a schematic diagram of a typical system or cap design for each potential technology. Provide an overview of equipment needs, operating and monitoring requirements, and discharge control. If a seemingly appropriate technology was not included in the feasibility evaluation and the reason is not immediately apparent, a brief explanation of why it was not included should be provided.

(B) Evaluation and Selection of Remediation Technologies.

Describe the criteria used in evaluating the potential remediation technologies. Compare the technical, institutional, and fiscal merits and limitations of potential remedial technologies and justify the selection of certain technologies within the context of Solid Waste Rules and Regulations, Chapter 2, Section 8. Tabular presentation of the results is appropriate.

1) Base technical evaluations on performance, reliability, implementability, and safety aspects of the technology. Factors affecting performance include effectiveness and useful life of the systems. Reliability includes consideration of operation and maintenance requirements and demonstrated reliability of the technology. Implementability is based on ease of permitting and construction. Factors affecting safety include potential threats to public health and/or the environment during implementation and measures taken to mitigate the potential for adverse effects. Describe the general applicability of each system to hydrogeologic conditions and existing contamination.

2) Institutional considerations include compliance with federal, state, and/or local regulations and ordinances; environmental and public health standards; landfill owner/operator concerns; and community relations. General institutional considerations pertinent to remediation technologies include coordination with: 1) WDEQ, Air Quality Division, for air emissions; 2) municipalities for discharge of water to the sanitary sewer system and/or storm drain system, building permits, fire codes, noise ordinances, electrical codes, roadway crossings, manholes, etc.; 3) WDEQ, Water Quality Division, WYPDES Section, for storm sewer discharges; 4) WDEQ, site owners, and the public where odors and noise nuisances may be problematic; and 5) companies supplying electrical, gas, and telephone service, or other utilities required to operate systems.

3) Analysis of present worth associated with the remedial technologies including capital, operation and maintenance, and shutdown/removal. Capital costs include two categories; direct and indirect. Direct capital costs are those associated with construction of the remedial alternative and include labor, equipment, and materials. Construction and equipment costs shall be presented as separate line items. Indirect capital costs are those associated with engineering, permitting, and construction management for the remedial alternative. Operation and maintenance costs include costs to operate and maintain the systems or caps and monitoring. Shutdown and removal costs include system decommission, system removal, well abandonment, site restoration, and salvage.

A present worth analysis shall be computed for the remediation options. This analysis should also clearly explain why the chosen technologies are best suited to achieve restoration standards. Appendices may be used to provide further justification.

(C) Conceptual Designs. Display schematically how the selected technologies will be configured and designed to attain optimal results within fiscal and institutional constraints. Site plans should include the general layout of the remedial option including well locations, piping networks, equipment enclosures, and/or a cap. Include process flow diagrams showing extraction/treatment trains. Provide a thorough description of proposed equipment including types, capacities (e.g., horsepower, air volumes), efficiencies, locations, and numbers/densities. Provide a thorough description of the cap system. Describe groundwater monitoring and all types of remediation wells including horizontal and vertical placement, placement criteria, and pump and flow test results. Provide system operation summaries (e.g., where the treated groundwater will be discharged/re-injected), special design requirements to ensure that a locality's infrastructure will not be overwhelmed by proposed discharge, operation to remain within noise limits or permit limits. Include a site-specific project schedule that tracks the work from construction and start-up through operation and closure. Provide

typical construction details including well completion, wellhead assemblies, equipment enclosure layouts, trench cross-sections, and typical sewer connections.

(D) Design and Cost Parameters. Specify the design parameters for the remedy. Include effective and maximum radii of influence (ROIs) achievable with various flow rates and vacuums applied. Precisely describe the equipment that will be used and separate costs by component in a summary cost table. This table should include direct capital costs, indirect capital costs, annual O&M costs, and shutdown/removal costs.

(10) Progress Monitoring. Describe how remedial progress will be monitored, including: 1) sampling methods, 2) sampling density, 3) sampling frequency (e.g., at start-up, during operations, and after asymptotic conditions have been reached), 4) analyses to be conducted (e.g., contaminants or other constituents, temperature, pH, etc.), and 5) analytical methods to be used.

(11) System Monitoring and Controls. Describe methods of controlling plume and gas migration and soil erosion. Propose a rate of contaminant recovery, identify system controls (e.g., overload detectors, alarms, shutoff systems), and describe off-gas recovery and groundwater treatment. Outline a program for system monitoring including identification of monitoring points and inspection frequencies.

(12) Permits and Health and Safety Plan for Operation. Identify the permits needed to implement the remedial actions, describe existing municipal noise restrictions and limits, and provide a health and safety plan for remedial action personnel.

(13) Maps. Provide site maps that are sufficiently detailed to identify all components of the remedial alternative and site-specific information for the surrounding area. Area maps included with the document should show, to the extent possible, the locations of: 1) groundwater monitoring wells, 2) soil boring and sampling locations, 3) areas of impacted soils in the unsaturated zone and capillary fringe, 4) lateral extent of the groundwater plumes, 5) total groundwater contamination plume, 6) total soils contamination plume, as applicable, 7) groundwater flow direction, 8) groundwater injection wells, 9) remediation wells and radii of influence, 10) remediation system piping, 11) manholes, 12) roadways and alleys, 13) utilities or other buried features, 14) signs, 15) surface materials (vegetation, curb, gutter, sidewalk, etc.), 16) light and power poles, 17) drinking water wells, 18) surface water bodies, 19) playgrounds, 20) parking lots, and 21) buildings (note basements within close proximity to the Project).

(14) References. Clearly identify documents, studies, reports, and other resources referenced in or relied upon to assemble the report.

(15) Appendices. As indicated throughout this guidance, any information that is too voluminous or technical to include in the major sections outlined above may be assembled into appendices. For example, while the report may summarize sampling results, the actual data may be assembled in an appendix. If there is lengthy background material available summarizing a remedial alternative's specifications and capabilities, this information may be included as an appendix. While site-specific drawings are crucial for displaying the extent of contamination and demonstrating the conceptual design of a remedial approach, a map showing the site's relation to structures in the area should be included as an appendix.

(v) Prepare Construction Plans and Specifications for Remedy Implementation.
After the Engineer has received authorization from WDEQ to proceed with design of the ACMP

recommended remedial approach. Three copies of all submittals shall be provided to WDEQ. The Engineer shall:

(a) Prepare Engineering Design Report. The Engineering Design Report shall address the following (as applicable to the remedial alternative(s) selected): 1) remediation system operation theory and/or cap implementation and objectives; 2) remediation system hydraulics and treatment processes; 3) summary of the anticipated flows, influent characteristics, and effluent requirements; 4) proposed equipment sizing, safety factors, and design calculations; 5) system interlocks, alarms, and responses; 6) construction/equipment itemized cost estimate(s); 7) value engineering and cost savings; and 8) permits required.

(1) Active Remediation Systems. The Engineering Design Report shall include data and information used to specify the chosen equipment including, but not limited to, product efficiency, reliability, fuel and energy consumption, air emissions, and water consumption for pieces of equipment that require electricity or gas for operation. A comparison shall be made between various pieces of equipment to meet the Project needs and conserve energy. A list of components, materials, supplies, etc. that are made from recycled materials or that can be recycled after their intended use shall also be included. Use of renewable resources shall be discussed and any other green remediation technology that was considered during design. A comparison of costs associated with the use of green remediation technologies versus traditional technologies shall be presented for consideration by the WDEQ. The Department of Energy estimates that 1.37 pounds of CO₂ are emitted for each kilowatt hour of electricity generated in the U.S. Green remediation technologies that minimize electricity must be considered during design of remediation systems. Technologies that might be considered include:

A. Using smaller equipment to reduce energy requirements and green house gas emissions. The additional cost and environmental impacts to operate the equipment over a longer time frame to reach cleanup objectives should be evaluated.

B. Using a smaller equipment and cycling through different legs of the system to reduce energy requirements and green house gas emissions. Again, the additional cost to operate the equipment over a longer time frame must be evaluated.

C. Operating pulsed pumping during off-peak hours of electrical demand, if possible, to reduce costs.

D. Enclosure heat recirculation during winter months, insulating structural housing and equipment, installing energy recovery ventilators to maintain air quality without heat or cooling loss in treatment buildings, weather-proofing system components that are exposed to outside elements, etc.

E. Use of passive and renewable energy sources.

F. Use of variable frequency drives to operate equipment.

(2) Cap. Caps must meet the minimum specifications provided in Solid Waste Rules and Regulations, Chapter 2, Section 7(d). The Engineering Design Report shall include a description of the cap to be used, data and information used to design the cap, stability calculations, differential settlement calculations, CQA Plan, etc.

(3) Plans and Specifications Proposal. The Engineer shall propose a method for preparing the plans and specifications. If both a remediation system and a cap are proposed, it

may be necessary to bid the cap installation separate from the system installation. If a system is proposed, the equipment supply (remediation building and contents) shall be bid separately from the construction.

(b) Prepare Preliminary and Final Construction Plans and Specifications. Plans and specifications shall be prepared that are adequate for bidding Project construction.

(1) Preliminary Design Documents. The Engineer shall prepare Preliminary Design documents consisting of preliminary drawings including site plans, system layouts, process flow diagrams, remediation wells, piping, and/or a cap. Preliminary Design documents shall include an outline of the construction and equipment supply specifications. If the Engineer specifies brand-name equipment, the Engineer must also specify "or equivalent in quality and performance." It is important to incorporate an appropriate level of quality into brand name and model because performance alone is not sufficient. If the design specifies a specific piece of equipment, and no other manufacturer makes that specific piece of equipment, the Engineer must document and justify that brand named item.

Non-proprietary program logic controls must be provided for all equipment shipped to the project site. If programmable logic or controls are provided rather than standard relay and timer control logic, the equipment supplier must supply all the software, equipment, access codes, etc. necessary to interface with the control equipment such that the Engineer can operate and maintain the equipment, including making adjustments to operation, without input or assistance from the equipment supplier. The Engineer shall be responsible for insuring that control logic is provided that meets this requirement.

(A) Based on the information contained in the Preliminary Design documents, Engineer shall submit an engineer's estimate of construction and equipment costs.

(B) Engineer shall furnish two copies of each set of the Preliminary Design Documents after the Final ACMP has been approved by the WDEQ Project Manager. The Preliminary Design documents must be presented and reviewed in person with the WDEQ Project Manager. The Preliminary Design Documents shall be dated and stamped, **Preliminary - Not for Bidding**, or similar language so as not to construe these as final documents. WDEQ may request a meeting or teleconference to discuss the design.

(2) Final Design Documents. After authorization to proceed with the final design, the Engineer shall prepare final construction and equipment design drawings, details, and specifications. Specifications shall comply, in general and only as necessary to provide a concise bidding document, with the 16 division format of the Construction Specifications Institute. Drawings shall contain all known information concerning horizontal and vertical locations of existing underground utilities and any surface structures that may interfere with the work.

(A) Engineer shall advise WDEQ of any adjustments to the engineer's cost estimate caused by changes in general scope, extent, character, or design requirements of the project or construction costs.

(B) The Engineer shall submit 90% plans and specifications to WDEQ for review. The Engineer shall meet with WDEQ to review and finalize the plans and specifications, if necessary. Three copies of the Final Plans and Specifications shall be submitted to WDEQ. Each copy of the Final Plans and Specifications shall have an original stamp and seal by the Engineer(s) of record as having responsibility for the design. Prior to distribution, each copy of the individual major sections of the Plans and Specifications (e.g., Civil, Mechanical, Electrical) shall also be signed and sealed by a Wyoming Registered Professional Engineer as having responsibility for the

content of the individual sections. All documents offered to the public and prepared or issued under the supervision of a Wyoming licensed Professional Geologist shall include the full name, date, license number, and original seal and signature of the licensee.

(c) Obtain Necessary Permits. The Engineer shall provide WDEQ with a summary of the permits necessary to complete the work. A schedule indicating when each permit must be obtained to keep the project on schedule shall be submitted.

The Engineer shall obtain all necessary permits for the proposed Project. These permits or authorizations may include a Wyoming Pollutant Discharge Elimination System (WYPDES) permit for wastewater discharge to surface waters, Industrial Pretreatment Permit for sanitary sewer discharges, WDEQ Air Quality Division permit for air emissions, amendments to the landfill permit application, State Fire Marshall's Office for electrical system review, and any other permits from state or local government agencies necessary for the Project.

The Engineer shall obtain well permits from the State Engineer's Office for all remediation wells that extract groundwater. Permits are not required for 4-inch diameter or less monitoring wells.

The Engineer shall obtain a license from the Wyoming Department of Transportation (WYDOT) to perform work within WYDOT right-of-way. The Engineer shall be responsible for coordination with WYDOT.

If wastewater disposal involves re-injection of the wastewater into a groundwater aquifer, detailed project information and coordination with WDEQ Underground Injection Control Section is required. A public notice, and possible public hearing, may also be necessary based on input received by WDEQ. Wastewater requiring transportation to a commercial disposal facility requires prior WDEQ approval.

(d) Solid Waste Permit Amendments. The solid waste permit shall be amended per the Solid Waste Rules and Regulations.

C. Remedy Implementation. Construction tasks include construction bidding and oversight (Task 0906.02), construction (0907.01), equipment supply (0907.09), and injection work (0907.10).

(i) Construction Bidding and Oversight.

(a) If necessary to reflect current project status, the Engineer shall update the Project Management Plan, task schedule, cash flow projections, project Health and Safety Plan, and the Sample Collection and Analysis Plan. The time schedule, task schedule, and cash flow projections will be submitted with each reimbursement request.

(b) All injection wells including, but not limited to, air sparge and chemical oxidation, shall be permitted through DEQ Water Quality Division Underground Injection Control (UIC) program. A UIC permit shall be obtained by the Engineer for each injection well.

(c) As used in this section, the term Contractor, shall include the construction contractor(s), equipment supplier, and injection contractor (as applicable to the Project).

(d) WDEQ shall bid the construction, equipment supply, and injection programs (as applicable) through the State's procurement process. Procurement for these services will be completed by WDEQ. The Engineer shall:

(1) Conduct a pre-bid conference for on-site construction work. WDEQ shall be notified as to the date and time for this conference and will attend the conference.

(2) Issue addenda as appropriate to interpret, clarify, or modify the bid documents. All addenda issued by the Engineer shall be signed and sealed by the Engineer of record as having responsibility for the Project. Copies of addenda shall be provided to WDEQ.

(3) Determine the acceptability of subcontractors, suppliers, and other persons and organizations proposed by the contractors for those portions of the work requiring subcontractor acceptability by the bid documents.

(4) Determine the acceptability of equivalent substitute materials and equipment proposed by the contractors when substitutions prior to award of the contracts are allowed by the bid documents.

(5) Assist WDEQ in evaluating bids.

(e) Construction Oversight. The Engineer shall perform the following tasks:

(1) Preconstruction Meeting. The Engineer shall meet with representatives of the contractors and their subcontractors, utility firms, telephone company, City or Town officials, other affected parties, and WDEQ at a preconstruction meeting. The purpose of the meeting is to allow representatives to meet and inform all interested and affected parties of planned activities and schedule. Engineer will make arrangements for the meeting.

(2) Construction Inspection and Oversight. The Engineer shall make site visits to observe the work of the contractors while the work is in progress. The Engineer is responsible for ensuring the work is completed in accordance with the plans and specifications and that the integrity of the design concept has been implemented and preserved by the contractors. The Engineer shall keep WDEQ informed of the progress of the work. The Engineer shall:

(A) Maintain at the job site orderly files for correspondence; reports of job conferences; shop drawings and samples; reproductions of original Contract Documents including all Site Work Orders, Field Orders, Amendments, Addenda, and additional drawings issued subsequent to the execution of the Contract; the Engineer's clarifications and interpretations of the Contract Documents; progress reports; and other project related documents. Record names, addresses, and telephone numbers of all contractors, subcontractors, and major suppliers of materials and equipment.

(B) Keep a diary or log book and record daily: contractor's hours on the job site; weather conditions; data relative to questions of Site Work Orders, Field Orders, Amendments, or changed conditions; lists of job site visitors; activities; meetings; decisions; contractor's equipment on site; work force on site, observations in general; and specific observations in more detail as in the case of observing test procedures.

(C) Review applications for payment with contractors for compliance with the established procedure for submission, and noting particularly the relationship of the

payment requested to the schedule of values, work completed, and materials and equipment delivered at the site but not incorporated in the work.

(D) The Engineer shall issue necessary interpretations and clarifications of the Contract Documents and in connection therewith prepare Field Orders and Site Work Orders. The Engineer shall be responsible for providing a complete package for WDEQ approval including budget and/or schedule revisions, scope changes, and results of negotiations. All changes or clarifications issued by the Engineer to the contractors shall be signed and sealed by the Engineer of record as having responsibility for the Project.

(E) The Engineer is responsible for ensuring that proposed substitute materials and/or equipment maintain the same performance as the originally specified materials and/or equipment.

(F) The Engineer shall assign technically qualified personnel to inspect enclosures and equipment and witness the wet test of each different type of integrated unit at the contractor's assembly location.

1) The Engineer shall verify that each type of unit is functioning at design specifications including, but not limited to, noise, capacity, pressure, vacuum, and temperature. Prior to shipment to the project site, the Engineer shall ensure that components of each type of enclosure/equipment unit is functioning properly, both individually and as a unit. The Engineer shall be responsible for evaluating the acceptability of each type of unit.

2) The Engineer shall verify that electrical wiring is correctly sized and installed.

3) The Engineer shall verify that the components meet the specifications and plans.

4) The Engineer shall require a signed certification from the Equipment Supplier stating that all units satisfactorily passed the factory wet test. The certification will be provided to the Engineer and WDEQ before the units are shipped by the Equipment Supplier to the project site.

(G) The Engineer shall review the amounts owed to the contractors. Such review will constitute a representation to WDEQ that the work has progressed to the point indicated. Further, that to the best of the Engineer's knowledge, information, and belief, the quality of such work is generally in accordance with the Contract Documents (subject to an evaluation of such work as a functioning whole prior to or upon Substantial Completion, to the results of any subsequent tests called for in the Contract Documents, and to any other qualifications stated). In the case of unit price work, the contractor's request for payment will include final determinations of quantities and classifications of such work (subject to any subsequent adjustments allowed by the Contract Documents).

(H) The Engineer shall receive and review owner's manuals, schedules, guarantees, bonds, certificates of inspection, tests, and approvals that are to be assembled by the contractors in accordance with the Contract Documents. Such review will also be to determine that the content complies with the test and approval requirements needed for certificates of inspection and for compliance with the Contract Documents. The Engineer shall use this information in preparation of the operation and maintenance manual.

(I) The Engineer shall conduct an inspection to determine if the work is substantially complete and conduct a final inspection to determine if the completed work is acceptable so that the Engineer can recommend, in writing, that final payment be made. Note that the Project is not considered substantially complete until all remediation equipment (if installed) has been successfully started up and meets the preliminary run times specified in the specifications. WDEQ shall be notified as to the date and time for this job walk and shall attend the job walk.

(J) The Engineer shall observe, verify, and document that each component of the remedy has operated satisfactorily, as designed, for a continuous period of time to be specified by the Engineer in the technical specifications before the system can be accepted as substantially complete. If a system does not meet these requirements, the Engineer will submit to the contractor(s) a list of items requiring change, modification, correction, or completion. Changes must be made by the contractor(s) and a new operating period initiated. After all systems have met the completion requirement and/or the cap is completed, the Engineer will issue a Certificate of Substantial Completion to the contractor(s). A joint final inspection by the Engineer, WDEQ, and the contractor(s) will follow issuance of the Certificate, and a final list of items that must be completed or corrected will be prepared by the Engineer and submitted to the contractors. After the Engineer has determined that the listed items have been satisfactorily completed, the Engineer will submit the final request for payment for construction.

(ii) Prepare Operation, Maintenance, and Monitoring Manual and Equipment Startup

(a) Prepare Operation and Maintenance Manual. An Operation and Maintenance (O&M) manual shall be developed to describe detailed operational and maintenance practices and provide schematics, diagrams, and as-built drawings. This information shall be provided in enough detail to allow each system to be operated as designed and shall be provided in sufficient time to allow startup and operation of the system.

(1) Included in the manual shall be maintenance requirements and schedules, replacement requirements and schedules, and the location of spare parts. A spare parts list, the locations and phone numbers of each manufacturer's representative and service location, a troubleshooting guide, a description of health and safety risks related to operation and care of the equipment, and a health and safety plan for the operator shall be included in the O&M Manual. The final O&M Manual shall include all the original owners' manuals provided by the equipment manufacturers or other sources and a list of those manuals.

(2) The O&M Manual shall include a schedule for collecting water and vapor samples from remediation equipment and a list of methods to be used for sample analyses. The sampling schedule and methods shall meet the requirements of local and state agencies having jurisdiction. The schedule shall include collection and analyses of groundwater samples from monitoring wells. All monitoring schedules will be reviewed and approved by WDEQ prior to implementation.

(3) The O&M Manual shall include a section on Remedial System Evaluations. The Remedial System Evaluation schedule shall be determined to evaluate:

(A) Is the plume still being captured?

(B) Are new wells needed to capture the plume?

(C) Is energy-intensive equipment oversized or set at rates/temperatures higher than needed?

(D) Are wells that are no longer contributing to the cleanup effort taken off line timely?

(E) Consider alternate technologies (e.g., low-power or passive equipment, passive bioventing) with lower cost and energy after the bulk of the contamination has been removed.

(4) The Engineer shall submit a draft O&M Manual to WDEQ for approval no later than 75 percent completion of Project construction. The date when 75 percent of the construction contract time has elapsed, calculated using the Notice to Proceed date and the date of substantial completion, will be defined as the 75 percent completion date. All draft copies of the O&M Manual shall be dated and marked **“Draft - For Review Only.”** Submittal and review times shall be in accordance with Attachment C.

(b) Prepare As-Built Drawings. A complete set of Drawings and Specifications incorporating all Site Work Orders, Field Orders, Amendments, Addenda, and any other revisions shall be supplied to WDEQ at the conclusion of construction. The as-built drawings shall be signed and sealed by the Engineer of record as having responsibility for the project certifying that the drawings are complete and accurate reflecting installed conditions.

(c) Equipment Startup

(1) The Engineer shall develop a plan and schedule for equipment startup. The Engineer shall describe the plan for staffing and accomplishing startup of the equipment. The plan shall be submitted to WDEQ no later than 30 calendar days prior to startup of the systems.

(2) The Engineer shall coordinate with the local power company and other utility companies, as necessary, to insure power and other utilities are available and connections are made such that startup is not delayed.

(3) Startup of the systems shall be completed by the Engineer and the contractor(s). WDEQ may be present to witness startup. The Engineer shall take measurements and conduct sampling, including sampling and analysis of discharges necessary to make adjustments to the systems so they will operate most effectively and within permit limits. The Engineer is responsible for sampling and analyses in accordance with the O&M Manual to determine if the systems are meeting performance and discharge requirements. Note that substantial completion cannot be issued until the systems have been successfully started and preliminary run times specified in the specifications have been met.

(4) Following the construction of any active subsurface remediation system that has the potential to liberate or move vapors from source areas, a follow up vapor intrusion evaluation will be required. This is intended to ensure the active system has not caused a vapor intrusion problem.

(d) Update O&M Manual. Following system startup, the O&M manual shall be updated to take into account any changes made during startup. The final O&M manual shall be signed and sealed by the Engineer of record as having responsibility for the project.

D. Operation and Maintenance (O&M) and Monitoring Tasks (0907.06)

(i) O&M Including Groundwater Monitoring.

(a) If necessary to reflect current project status, the Engineer shall update the Project Management Plan, task schedule, cash flow projections, project Health and Safety Plan, and the Sample Collection and Analysis Plan. The time schedule, task schedule, and cash flow projections will be submitted with each reimbursement request. During O&M, if the O&M Manual requires modifications, the Engineer shall make the necessary changes.

(b) The Engineer shall prepare an O&M Plan and Schedule that corresponds to O&M detailed in the O&M Manual. The Engineer shall operate and maintain the remedy beginning immediately after startup or substantial completion.

(c) If injection wells are installed as part of O&M, all such wells including, but not limited to, air sparge and chemical oxidation, shall be permitted through DEQ Water Quality Division Underground Injection Control (UIC) program. A UIC permit shall be obtained by the Engineer for each injection well.

(d) Following is a list of general tasks the Engineer will be responsible to complete. The list may not be inclusive. Specific tasks will be identified and agreed upon by the Engineer and WDEQ after the remedy has been designed and the O&M Manual written. The Engineer shall conduct routine O&M activities as outlined in the WDEQ-approved O&M Manual and Plan. Regardless of the specific equipment used, the Engineer is responsible for keeping the systems operating and performing all maintenance, as necessary. General responsibilities include:

(1) Complete and submit O&M data in accordance with the facility permit.

(2) Provide utility locating services as needed, including joining the applicable One-Call registration service(s).

(3) Ensure environmental protection and prevention of human health risks through the safe and proper operation and maintenance of the remedy.

(4) Maintain operating equipment in working condition and ensure continuous operation of the remediation systems.

(5) Develop and update a maintenance management system and maintain adequate operation and maintenance records.

(6) Monitor, inspect, record, and report conditions of operation of each system and general observations about each system.

(7) Complete O&M procedures outlined in the O&M Manual. Corrective maintenance activities shall be scheduled with no interference to the routine preventative and monitoring activities described in the O&M Manual.

(8) Collect water and vapor samples from remediation equipment and submit the samples for analyses according to the schedule in the O&M Manual.

(9) Collect groundwater samples from monitoring wells and submit the samples for analyses according to the schedule in the O&M Manual.

(10) Dispose of any treatment residuals in an environmentally safe manner and in accordance with all applicable local, state, and federal regulations.

(11) Adjust the operating conditions of the systems, as necessary, so the systems operate in the most efficient manner possible and within permit limits.

(12) Measurements and checks the Engineer believes are important for effective system operation (i.e., vacuum pressures, fluid levels, temperatures, etc.) shall be recorded, as often as necessary. Adjustments to valves, well pump levels, floats, etc. shall be made, as necessary, to keep the systems operating in the most optimum manner possible and within permit limits.

(13) Provide building and equipment repairs, such as but not limited to, repairs of wells, piping, electrical wiring, and utility boxes. Arrange for repair of equipment by licensed specialists (e.g., electrician, plumber), where applicable.

(14) Obtain local discharge permit, if necessary.

(15) Sampling collection and analyses may be completed over the course of the project to determine remediation effectiveness.

(16) O&M may include redesigning or modifying remediation systems, conducting small-scale excavations, in-situ remediation efforts, etc. in an effort to expedite the cleanup effort at recalcitrant sites.

(17) Maintain and repair caps as necessary.

(ii) Data Evaluation and Reports

An O&M report will be prepared and submitted to WDEQ according to the time frame specified in the facility's permit. Each report shall contain all monitoring, sampling, and analyses data obtained during each reporting period and an ongoing compilation of the data available up to the time of the report. The report shall contain a discussion and analysis of the rate of cleanup and percent of cleanup that has been attained during the reporting period for each of the major contaminants and a summary of the cleanup progress attained to date. Each report shall indicate all problems and concerns for the reporting period, the solutions, and continuing problems. The Engineer shall make an analysis of progress of the operation and recommend improvements. Each report shall be signed and sealed by the Engineer of record as having responsibility for the project.

(iii) Post-Remediation Verification Sampling and Testing

(a) The Engineer will advise WDEQ when contaminant levels in soil and groundwater are at or near remediation cleanup standards or when remediation efforts are nearing the limit of their effectiveness. The Engineer and WDEQ will jointly review data and discuss the need and extent of verification sampling and testing to be performed.

(b) The Engineer shall prepare a plan for verification sampling and analyses to document site clean-up or the need for additional remediation. The Engineer shall collect and submit soil samples and groundwater samples for verification analyses according to the WDEQ-approved

Verification Sampling Plan. The Engineer shall evaluate the data relative to WDEQ remediation standards or risk-based clean-up standards.

(c) A vapor intrusion evaluation shall be completed by the Engineer at all sites where vapor intrusion was an issue during the life of the project.

(iv) Site Remediation Completion Reports

(a) When the Engineer determines that a remediation system is no longer operating effectively or efficiently or that required clean-up levels have been satisfied, a recommendation shall be made to close out the system. A summary report shall be prepared supporting the recommendation for system closeout or for alternative action in accordance with Solid Waste Rules and Regulations, Chapter 2, Section 8. The report shall contain a discussion on the success of the system including:

- (1) Were the cleanup goals attained?
- (2) Is additional remediation effort required?
- (3) Proposed future action(s), if any.

(b) The report shall be signed and sealed by the Engineer of record as having responsibility for the Project.

E. Project Closeout Tasks (0907.07)

If cleanup objectives are met within the contract term, remediation systems and wells designated for abandonment shall be closed.

(i) Site Closeout Plans.

(a) If necessary to reflect current project status, the Engineer shall update the Project Management Plan, task schedule, cash flow projections, project Health and Safety Plan, and the Sample Collection and Analysis Plan. The time schedule, task schedule, and cash flow projections will be submitted with each pay request. After authorization to proceed with Project Closeout is received from WDEQ, the Engineer shall complete the tasks discussed below.

(b) Within 60 days following authorization to begin site closeout, the Engineer shall submit a Site Closeout Plan. The plan shall include an assessment of the usability of the equipment, management of the equipment, and site restoration.

(c) The Engineer shall assess the condition of equipment and enclosures and determine which individual pieces of equipment and enclosures may be effectively reused, as is, as a unit. Provide estimates of equipment and enclosure unit values for reusable units. Determine which individual pieces of equipment and which individual enclosures may be cost-effectively reconditioned for immediate reuse at another landfill site and provide an estimated reconditioning cost for each item worthy of reconditioning. Provide a reconditioned value for each item. Determine which pieces of equipment and enclosures are subject to sale for scrap and estimate their salvage value. Determine which items may have no value and estimate the cost of their disposal.

(d) The Engineer shall recommend management of each piece of equipment and each enclosure. The Engineer shall recommend which monitoring and remediation wells should remain for future sampling.

(e) The Engineer shall propose methods for closing pipelines and wells, removing enclosure foundations, and site restoration.

(ii) Closeout Construction

(a) In consultation with WDEQ and on the basis of the Site Closeout Plan(s), determine the general scope, extent, and character of the project.

(b) Prepare a preliminary Scope of Work detailing equipment and enclosure reuse, reconditioning, salvage, and disposal information and criteria. Include a description of reclamation and restoration work to be performed to complete project closeout that includes, but is not limited to, damage created during removal of remediation equipment and structures, resurfacing, and well abandonment.

(c) Based on the information contained in the Site Closeout Plan(s), submit an engineer's estimate for decommissioning that includes estimated reclamation and restoration costs.

(d) Present two copies of the preliminary Scope of Work and engineer's estimate to WDEQ and review them in person with WDEQ. The preliminary Scope of Work shall be dated and stamped, "**Preliminary - Not for Bidding**," or similar language, so as not to construe it as a final document.

(e) Prepare a Final Scope of Work based on review with WDEQ for inclusion in the bidding documents.

(f) The Engineer shall advertise and obtain bids for the closeout of the remediation systems. The Engineer shall conduct a mandatory prebid conference at the project site. The Engineer shall provide WDEQ with three complete copies of the final bid documents. Engineer shall attempt to obtain a minimum of three bids.

(g) Issue addenda as appropriate to interpret, clarify, or expand the bid documents. All addenda issued by the Engineer shall be signed and sealed by the Engineer of record as having responsibility for the project.

(h) Determine acceptability of subcontractors, suppliers, and other persons and organizations proposed by the prime contractor for those portions of the work requiring subcontractor acceptability by the bid documents.

(i) Determine acceptability of equivalent substitute materials and equipment proposed by the closeout contractor when substitution prior to award of the contract is allowed by the bid documents.

(j) Evaluate bids. If the lowest bid is determined to be non-responsive or unqualified and not accepted by the Engineer, the Engineer shall notify WDEQ.

(k) Enter into contract(s) with contractors to complete the closeout work (as applicable to the Project).

(l) The Engineer shall make visits to the project sites at intervals appropriate to the various stages of closeout as the Engineer deems necessary in order to observe and evaluate the progress and quality of the various aspects of the closeout contractor's work. Based on information obtained during such visits and on such observations, the Engineer shall ensure that the work is being accomplished in accordance with the Contract Documents. The Engineer shall keep WDEQ informed of the progress of the work. The Engineer shall issue necessary interpretations and clarifications to the Contract Documents and in connection therewith prepare Field Orders and Site Work Orders. The Engineer shall be responsible for providing a complete package to the WDEQ for approval, including budget and/or schedule revisions, scope changes, and results of negotiations. All changes or clarifications issued by the Engineer to the closeout contractor shall be signed and sealed by the Engineer of record as having responsibility for the project.

(m) **Applications for Payment.** The Engineer shall review the amounts owed to the closeout contractor and recommend, in writing, payments to the closeout contractor in such amounts. Such recommendations of payment will constitute a representation to WDEQ, based on such observations and review, that the work has progressed to the point indicated. Further, to the best of the Engineer's knowledge, information, and belief, the quality of such work is generally in accordance with the Contract Documents. In the case of unit price work, the Engineer's recommendations of payment will include final determinations of quantities and classifications of such work.

(n) **Inspections.** The Engineer shall conduct an inspection to determine if the work is substantially complete and conduct a final inspection to determine if the completed work is acceptable so that the Engineer may recommend to WDEQ, in writing, that final reimbursement be made.

(o) **Periodic Reports.** A monthly report shall be prepared, unless another time frame is requested by the WDEQ Project Manager. Each report shall contain a discussion and analysis of tasks performed during the reporting period, and the percent of completion that has been attained by the close of the reporting period.

(iii) Final Site Closeout Report. Upon completion of the Project through system removal, well abandonment, and site restoration, the Engineer shall prepare a Final Site Closeout Report. The report shall include an executive summary of the initial and supplementary site investigations and a complete report on remedial action taken, including but not limited to, remedy installation, operation, and removal, and final site condition. The Final Report shall also include discussion of the final conditions in the subsurface. If required cleanup levels have not been met, the Final Report shall include an assessment in accordance with Solid Waste Rules and Regulations, Chapter 2, Section 8. The Final Report must include a list of equipment affected by the closure and the final disposition of each piece of equipment. The Final Report shall be signed and sealed by the Engineer of record as having responsibility for the Project.

(iv) Public Meeting. A public meeting may be scheduled to present the results of the environmental remediation project to the general public and interested parties. This public meeting shall be scheduled by WDEQ after completion of the Engineer's review of the periodic monitoring reports and presentation of a project closure recommendation to WDEQ. The Engineer shall attend the public meeting with WDEQ to present the project conclusions and answer technical questions.

F. Additional Work. The Program understands that due to the nature of the work involved at all phases, unknown conditions may arise for which additional work is necessary. This work includes, but is not limited to, additional sampling or well installation, well repair/replacement; in-situ remediation (e.g., injection programs); minor construction for repair, replacement, or abandonment of portions of a

system, cap, etc. When additional work is identified, the Engineer shall notify the WDEQ project manager and provide a proposed scope of work, costs to complete the work, a time frame to complete the work, and the impact to the schedule caused by the additional work. No additional work for payment shall be completed without prior approval of the WDEQ.

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