



Janice K. Brewer
Governor

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

1110 West Washington Street • Phoenix, Arizona 85007
(602) 771-2300 • www.azdeq.gov



Henry R. Darwin
Director

Via U.S. Mail and E-Mail

October 24, 2014
RPU 15-060

Donovan L. Neese
Superintendent
Roosevelt Irrigation District
103 West Baseline Road
Buckeye, Arizona 85326

RE: **“Administrative Completeness” Review of draft Feasibility Study Report**
West Van Buren WQARF Registry Site
Phoenix, Arizona

Dear Mr. Neese:

The Arizona Department of Environmental Quality (ADEQ) has performed an “administrative completeness” review of the draft *Feasibility Study Report* (FS Report), dated July 2014 and received on July 15, 2014. The FS Report was prepared by Synergy Environmental, LLC and Montgomery & Associates on behalf of Roosevelt Irrigation District (RID) for the West Van Buren (WVB) Water Quality Assurance Revolving Fund (WQARF) site. ADEQ has reviewed the FS Report under an executed working agreement dated October 8, 2009, amended on February 27, 2014, between RID and ADEQ.

While there is no statutory/code definition in the WQARF program for what constitutes an “administrative completeness review”, ADEQ developed a “Feasibility Study Report ‘Administratively Complete’ Checklist” (checklist) to facilitate initial review of the required elements for an FS Report. The checklist incorporates Arizona Revised Statutes (A.R.S.) §§ 49-282, 49-283, 49-285, 49-287, and Arizona Administrative Code (A.A.C.) R18-16-407 and A.A.C. R18-16-413. Portions of the code that were deemed technical in nature were not included in the checklist, e.g., A.A.C. R18-16-407(E)(2), A.A.C. R18-16-407(I)(3), and specific portions of A.A.C. R18-16-407(G).

In order for an FS Report to be considered “administratively complete”, all applicable questions on the checklist must be marked “YES”. If any applicable questions were marked “NO”, the FS Report was determined to be missing required element(s).

ADEQ has enclosed a copy of the checklist that was completed during the review of RID’s FS Report.

Southern Regional Office
400 West Congress Street • Suite 433 • Tucson, AZ 85701
(520) 628-6733

Printed on recycled paper

ADEQ has determined that the FS Report submitted by RID is **not administratively complete** based on:

Required Information

1. In accordance with A.A.C. R18-16-407(H), an FS Report shall include an evaluation of several topics regarding each alternative remedy. ADEQ was unable to locate the evaluation of:
 - a. A.A.C. R18-16-407(H)(3)(b)(iii): Exposure pathways, duration of exposure, and changes in risk over the life of the remediation;
 - b. A.A.C. R18-16-407(H)(3)(b)(iv): Protection of public health and aquatic and terrestrial biota while implementing the remedial action and after the remedial action;
 - c. A.A.C. R18-16-407(H)(3)(b)(v): Residual risk in the aquifer at the end of remediation, and;
 - d. A.A.C. R18-16-407(H)(3)(c): "...Transactional costs necessary to implement the remedial alternative, including the transactional costs of establishing long-term financial mechanisms, such as trust funds, for funding of an alternative remedy...".

Recommendations

The recommendation below is not required by State law and there are no legal consequences should RID choose to disregard it; however, ADEQ asks RID to consider the following:

1. Although the United States Environmental Protection Agency has employed an informal policy of capping Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) remedial action costs at 30 or 50 years, ADEQ strongly recommends that RID perform a cost evaluation that is based upon the amount of time needed to reach numeric water quality standards as opposed to the subjective 30 or 50 years timeframe.

Next Steps

Following the process created by ADEQ for the review of the two FS Reports developed for the WVB WQARF site, these subsequent steps will occur:

- ◆ Once RID has submitted *at least* the "Required Information" described in this letter, ADEQ will deem the FS Report "administratively complete".
- ◆ Although a public notice and comment period is not required by statute/code for FS reports; ADEQ will hold a Community Advisory Board (CAB) meeting once both FS Reports have been deemed "administratively complete" and open a 30 day public comment period the day following the CAB meeting.
- ◆ ADEQ is in the process of scheduling the CAB meeting for mid November.

- ◆ RID will have the opportunity to present their FS findings at the CAB meeting.
- ◆ Public comments received by the deadline will be reviewed by ADEQ and our contractor; however, ADEQ will not prepare a responsiveness summary.
- ◆ At the close of the public comment period, ADEQ's contractor will finalize the technical review of RID's FS Report.
- ◆ If at any time prior to the completion of the technical review of the FS Reports, either the West Van Buren Working Group or RID feel that a third party review (outside of ADEQ's contractor) is necessary, ADEQ will work out the specifics to get this review accomplished.
- ◆ ADEQ will prepare the Proposed Remedial Action Plan (PRAP). The selection of the remedy will be at the sole discretion of ADEQ.
- ◆ The PRAP will be submitted for public comment in accordance with A.A.C. R18-16-404(C)(1)(e), at which time all parties can provide comments on the selected remedy.

How to Submit

ADEQ requests that RID submit a response to this letter within **20 calendar days** of the date of this letter. After which, ADEQ will deem the FS Report "administratively complete" and will arrange to hold a CAB meeting shortly thereafter (target is mid November).

In accordance with the executed working agreement dated October 8, 2009, amended on February 27, 2014, between RID and ADEQ, please submit documents sent in response to this letter using one of the following methods:

1. Hard copy to:

ADEQ
Attention: Scott Green, R.G., Remedial Projects Unit Manager
1110 West Washington Street
Phoenix, AZ 85007

2. E-mail to srg@azdeq.gov

In general, RPU requests two hard copies and one electronic copy of submitted documents.

Additional Information

Information pertaining to the WQARF program can be obtained by accessing ADEQ's web page at www.azdeq.gov, or by visiting ADEQ's office at 1110 West Washington Street, Phoenix, Arizona. Information pertaining to Arizona Revised Statutes Title 49 can be obtained by accessing the Arizona State Legislature web page at www.azleg.gov. Information pertaining to Arizona Administrative Code rule citations may be found at www.azsos.gov.

You may contact the ADEQ Records Management Center staff about reviewing or copying file information at 602-771-4380.

Mr. Donovan Neese
October 24, 2014

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If you have any questions or need additional information, please contact me at (602) 771-4293 or by email at lepage.tina@azdeq.gov.

Sincerely,



Tina LePage, Manager
Remedial Projects Section, Waste Programs Division

Enclosures:

Feasibility Study Report "Administratively Complete" Checklist

cc: Laura Malone, ADEQ
Scott Green, ADEQ
Danielle Taber, ADEQ
Dennis Shirley, Synergy Environmental, LLC
Julie Carver, Matrix Design Group, Inc.



WEST VAN BUREN WATER QUALITY ASSURANCE REVOLVING FUND (WQARF) FEASIBILITY STUDY REPORT "ADMINISTRATIVELY COMPLETE" CHECKLIST	AUTHOR:	RID
	SUBMITTAL DATE:	July 15, 2014
	REVIEW DATE:	Sept. 20, 2014
	REVIEWED BY:	ADEQ

MATERIALS NEEDED:	Working agreement, if applicable; final feasibility study work plan; draft feasibility study report; groundwater modeling report, if applicable; list or knowledge of persons sent 287.03 letters ¹
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ANSWER THE FOLLOWING QUESTIONS BASED UPON THE FS REPORT AND OTHER KNOWN INFORMATION:

1. If the author is not ADEQ and 287.03 notice letters have been issued by ADEQ, was the Feasibility Study (FS) work plan and FS report developed under a written agreement with ADEQ? <i>[A.R.S. § 49-287.03(C), A.A.C. R18-16-407(B)]</i>	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
2. Was notification ² of the availability of FS work plan provided to interested persons? <i>[A.A.C. R18-16-404(C)(1)(d)]</i>	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
3. Was the FS work plan reviewed and approved by ADEQ? <i>[A.A.C. R18-16-402(7)(B), R18-16-413]</i>	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
4. Has the FS provided one (1) reference remedy and, at a minimum, at least two (2) alternative remedies? <i>[A.A.C. R18-16-407(E)(3)]</i>	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
<i>Title of Reference Remedy:</i> Page 129 Section 7.3; Reference Remedy		
<i>Title of Alternate Remedy 1:</i> Less Aggressive; Page 136 Section 7.4		
<i>Title of Alternate Remedy 2:</i> More Aggressive; Page 143 Section 7.5		
<i>Title of Alternate Remedy 3:</i> Most Aggressive; Page 151 Section 7.6		
5. Will the reference remedy and each alternative remedy achieve all of the site's remedial objectives? <i>[A.A.C. R18-16-407(E)(1)]</i>	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO

¹ If ADEQ is not the author of the feasibility study.

² The CIP may specify additional community involvement activities such as opportunities for comment, responsiveness summary, etc.

<p>6. Do the reference remedy and each alternative remedy include a remedial strategy listed under A.A.C. R18-16-407(F)? [A.A.C. R18-16-407(E)(1), R18-407(F)(1-6)] Check the appropriate boxes:</p> <p>Reference remedy remedial strategy(ies): <input checked="" type="checkbox"/> 1; <input checked="" type="checkbox"/> 2; <input checked="" type="checkbox"/> 3; <input type="checkbox"/> 4; <input type="checkbox"/> 5; <input type="checkbox"/> 6</p> <p>Alternative remedy 1 remedial strategy(ies): <input checked="" type="checkbox"/> 1; <input checked="" type="checkbox"/> 2; <input checked="" type="checkbox"/> 3; <input type="checkbox"/> 4; <input type="checkbox"/> 5; <input type="checkbox"/> 6</p> <p>Alternative remedy 2 remedial strategy(ies): <input checked="" type="checkbox"/> 1; <input checked="" type="checkbox"/> 2; <input checked="" type="checkbox"/> 3; <input type="checkbox"/> 4; <input type="checkbox"/> 5; <input type="checkbox"/> 6</p> <p>Alternative remedy 3 remedial strategy(ies): <input checked="" type="checkbox"/> 1; <input checked="" type="checkbox"/> 2; <input checked="" type="checkbox"/> 3; <input type="checkbox"/> 4; <input type="checkbox"/> 5; <input type="checkbox"/> 6</p> <p>1: Plume Remediation to achieve water quality standards 2: Physical containment within definite boundaries 3: Controlled migration to control the direction or rate of migration 4: Source control to eliminate or mitigate a continuing source 5: Monitoring to observe and evaluate the contamination 6: No action</p>	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
<p>7. Are the reference remedy and the alternative remedies described in sufficient detail to allow evaluation using the comparison criteria³? [A.A.C. R18-16-407(E)(1)]; Note: respond on a broader scale regarding sufficient detail.</p>	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
<p>8. Has the reference remedy been developed based upon best engineering, geological, or hydrogeological judgment following engineering, geological, or hydrogeological standards of practice, considering the following? [A.A.C. R18-16-407(E)(2)]; Note: Requirements within this rule are considered technical in nature and are not reviewed to determine "administrative completeness".</p>		
<p>9. Is at least one of the alternative remedies more aggressive⁴ than the reference remedy? [A.A.C. R18-16-407(E)(3)]</p>	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
<p>Title of "more aggressive" alternative remedy(ies): Most and MORE Aggressive</p>		
<p>10. Is at least one of the alternative remedies less aggressive than the reference remedy? [A.A.C. R18-16-407(E)(3)]</p>	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
<p>Title of "less aggressive" alternative remedy: Less Aggressive</p>		

³ Comparison Criteria: practicability, risk, cost, benefit/value.

⁴ Requires fewer remedial measures to achieve the remedial objectives and/or achieves remedial objectives in a shorter period of time, or is more certain in the long term and requires fewer contingencies.

<p>11. Were remedial measures developed that would achieve remedial objectives or to satisfy the requirements of A.R.S. § 49-282.06(B)(4)(b)⁵? [A.A.C. R18-16-407(G)]; Note: Remedial Measures may include well replacement, well modification, water treatment, provision of replacement water supplies, and engineering controls. They must remain in affect as long as required to ensure the continued achievement of remedial objectives.</p>	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
<p>Remedial Measures for Reference Remedy: <i>Well Replacement</i> <i>Water Treatment</i> <i>Well Modification</i> <i>Engineering Controls</i></p>		
<p>Remedial Measures for Alternative Remedy 1: <i>Well Replacement</i> <i>Water Treatment</i> <i>Well Modification</i> <i>Engineering Controls</i></p>		
<p>Remedial Measures for Alternative Remedy 2: <i>Well Replacement</i> <i>Water Treatment</i> <i>Well Modification</i> <i>Engineering Controls</i></p>		
<p>Remedial Measures for Alternative Remedy 3: <i>Well Replacement</i> <i>Water Treatment</i> <i>Well Modification</i> <i>Engineering Controls</i></p>		
<p>12. Were the remedial measures identified in consultation with water providers or known well owners whose water supplies are affected by the release, or threatened release, of a hazardous substance? [A.A.C. R18-16-407(G)]; Note: Additional requirements within this rule are considered technical in nature and are not reviewed to determine "administrative completeness".</p>	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
<p>13. Was a comparative evaluation of the reference remedy and the alternative remedies conducted? [A.A.C. R18-16-407(H)]</p>	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
<p>14. For the evaluation of each alternative remedy, was the following included? [A.A.C. R18-16-407(H)]</p>		
<p>A demonstration that the remedial alternative will achieve the remedial objectives.</p>	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
<p>An evaluation of consistency with the water management plans of affected water providers and the general land use plans of local governments with land use jurisdiction.</p>	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
<p>An evaluation of the comparison criteria⁶, including:</p>		
<p>Evaluation of the practicability of the alternative, including its feasibility, short and long-term effectiveness, and reliability, considering site-specific conditions, characteristics of the contamination resulting from the release, performance capabilities of available technologies, and institutional considerations.</p>	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
<p>Evaluation of risk, including the overall protectiveness of public health and aquatic and terrestrial biota under reasonably foreseeable use scenarios and end uses of water. Does the evaluation address?:</p>		
<p>Fate and transport of contaminants and concentrations and toxicity over the life of the remediation;</p>	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
<p>Current and future land and resource use;</p>	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO

⁵ For remediation of waters of the state, does the remedial action address, at a minimum, any well that at the time of remedial action selection either supplies water for municipal, domestic, industrial, irrigation or agricultural uses, or is part of a public water system if the well would now, or in the reasonably foreseeable future produce water that would not be fit for its current or reasonably foreseeable end uses, without treatment due to release of hazardous substances?

⁶ Appendix A. Standard Measurements for Comparison of Remedial Alternatives is attached.

Exposure pathways, duration of exposure, and changes in risk over the life of the remediation;	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
Protection of public health and aquatic and terrestrial biota while implementing the remedial action and after the remedial action; and	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
Residual risk in the aquifer at the end of remediation.	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
Evaluation of the cost of the remedial alternative, including:		
Expenses and losses including capital;	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
Operation and maintenance;	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
Life cycle costs; and	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
Transactional costs necessary to implement the remedial alternative ⁷ .	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
Evaluation of the benefit, or value, of the remediation that includes factors such as: Lowered risk to human and aquatic and terrestrial biota; Reduced concentration and reduced volume of contaminated water; Decreased liability; acceptance by the public; Aesthetics; preservation of existing uses; Enhancement of future uses; and Improvements to local economies.	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
A discussion of the comparison criteria, as evaluated in relation to each other.	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
15. Was a proposed remedy developed and described in the FS report? [A.A.C. R18-16-407(I)]	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
16. Did the FS report describe the reasons for selecting the proposed remedy? [A.A.C. R18-16-407(I)]	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
17. Did the descriptions include all of the following?: [A.A.C. R18-16-407(I)(1-3)]		
How the proposed remedy will achieve the remedial objectives?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
How the comparison criteria were considered?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
How the proposed remedy meets the requirements of A.R.S. § 49-282.06 (Remedial action criteria, rules)? [A.A.C. R18-16-407(I)(3)]; Note: Requirements within A.R.S. § 49-282.06 are considered technical in nature and are not reviewed to determine "administrative completeness".	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
18. Was the FS report sealed by a professional registered in the State of Arizona? [A.A.C. R4-30-304]; Note: If applicable	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO

⁷ Should include the transactional costs of establishing long-term financial mechanisms, such as trust funds, for funding of an alternative remedy. The cost analysis may include the analysis of uncertainties that may impact the cost of a remedial alternative, analysis of projected water uses and costs associated with use-based treatment, other use impairment costs of water not remediated to water quality standards, and the cost of measures such as alternative water supply or treatment.

<p>19. If the author is not ADEQ, is the author proposing to perform work under A.R.S. § 49-287.03(C)? [A.A.C. R18-16-407(J)] If yes, complete questions 22 and 23. If no, complete questions 20, 21, 21, 23, and, if applicable, question 24.</p>	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO <input type="checkbox"/> NA
<p>20. If the author is not ADEQ, is approval for the FS report being sought pursuant to A.A.C. R18-16-413 (Approval of Remedial Actions under A.R.S. § 49-285(B))? [A.A.C. R18-16-407(J)]; Note: "Any person... ..may submit a request in compliance with A.A.C. R18-16-413..." If yes, complete questions 21, 22, 23, and 24. If no, skip question 24.</p>	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO <input type="checkbox"/> NA
<p>21. If the author is not ADEQ and questions 19 and 20 were marked "NO", was a written explanation provided as to the intent of the author?</p>	<input type="checkbox"/> YES	<input type="checkbox"/> NO <input checked="" type="checkbox"/> NA
<p>22. Does the FS report comply with the administrative components of A.A.C. R18-16-407? [A.A.C. R18-16-407(J)]</p>	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
<p>23. Does the FS report comply with the community involvement activities outlined in A.A.C. R18-16-404? [A.A.C. R18-16-407(J)]</p>	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
<p>24. Did the author seeking approval of a remedial action at a site or portion of a site under A.R.S. § 49-285(B) submit a written request that contains all of the following?: [A.A.C. R18-16-413(A)(1) through (9)]</p>		
<p>Name and address of the person submitting the request and the nature of the relationship of the person to the site, if any. [A.A.C. R18-16-413(A)(1)]</p>	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
<p>Location and boundaries of the site or portion of the site addressed by the remedial action. [A.A.C. R18-16-413(A)(2)]</p>	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
<p>Nature, degree, and extent of the hazardous substance contamination, if known. [A.A.C. R18-16-413(A)(3)]</p>	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
<p>A description of any remedial action performed before the request was submitted. [A.A.C. R18-16-413(A)(4)]; Note: as it pertains to the action being sought for approval.</p>	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
<p>A work plan for any remedial action to be performed after the request is submitted. [A.A.C. R18-16-413(A)(5)]</p>	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
<p>Demonstration of how the remedial action complied, or will comply, with this Article (Remedy Selection). [A.A.C. R18-16-413(A)(6)]</p>	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
<p>A <i>proposal</i> for public notice and an opportunity for public comment on the application for approval under this Section (Approval of Remedial Actions under A.R.S § 49-285(B)) and does the <i>proposal</i> include a list of the names and addresses of persons whom the applicant believes to be responsible parties under A.R.S. § 49-283 (Responsible party liability exemptions)? [A.A.C. R18-16-413(A)(7)]; Note: Not Applicable for FS Report</p>	<input type="checkbox"/> YES	<input type="checkbox"/> NO <input checked="" type="checkbox"/> NA
<p>An agreement in which the person requesting approval agrees to: [A.A.C. R18-16-413(A)(8)]</p>		



Grant access to ADEQ as necessary to evaluate the request for approval.	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
Reimburse ADEQ for ADEQ's costs under subsection G.	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
An original seal imprint and signature of a registered professional. [A.A.C. R18-16-413(A)(9)]; Note: if not covered by No. 18.	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO

IS THE FS REPORT ADMINISTRATIVELY COMPLETE?

IF **ALL APPLICABLE** QUESTIONS⁸ HAVE BEEN ANSWERED WITH "YES":
 THE NECESSARY CRITERIA FOR A FS REPORT TO BE "ADMINISTRATIVELY COMPLETE" HAVE BEEN MET:
 NOTIFY AUTHOR OF ADMINISTRATIVE COMPLETENESS IN WRITING

IF **ANY APPLICABLE** QUESTIONS⁸ HAVE BEEN ANSWERED WITH "NO":
 THE NECESSARY CRITERIA FOR A FS REPORT TO BE "ADMINISTRATIVELY COMPLETE" HAVE NOT BEEN MET:
 NOTIFY AUTHOR OF ADMINISTRATIVE DEFICIENCIES IN WRITING

REVIEW TEAM NAMES AND AFFILIATION:

Danielle Taber, Scott Eireen, Tina LePage, Ana Vargas, Laura Malone - ADEQ
 Tony Young, Jordie Fuentes - AGO

NOTIFICATIONS:

<input type="checkbox"/>	Author Notified of Completeness?	Date:
<input checked="" type="checkbox"/>	Author Notified of Submittal Deficiencies?	Date: 10/24/14

⁸ "Applicable questions" does not include question #21.

APPENDIX A. STANDARD MEASUREMENTS FOR COMPARISON OF REMEDIAL ALTERNATIVES

Plume Characterization	Typical Units
Length	feet
Width	feet
Depth (thickness)	feet
Areal extent	acres
Volume	acre-feet
Plume leading edge advancement rate	feet/year
Plume volume expansion rate	acre-feet/year

Contaminant and Source Characterization	
Probable contributing sources	(number)
Number of contaminants	(number)
Maximum concentration of each contaminant	µg/l
Contaminant concentration vs. MCL	ratio
Contaminant mass in plume	pounds
Weighted average contaminant concentration in plume	µg/l
If present, estimated mass of LNAPL	pounds
If present, estimated mass of DNAPL	pounds
Sorbed contaminant mass in plume	pounds
Rate of downgradient contaminant mass transport	pounds/year

Remedial Efficiency	
Contaminant mass naturally degraded	pounds/year
Contaminant mass removed through remediation	pounds/year
Groundwater removed through remediation	acre-feet/year
Groundwater added (injected) by remediation	acre-feet/year
Net groundwater removed/added	acre-feet/year
Groundwater removed per year vs. plume volume expansion per year	percentage
Contaminant mass removed per year vs. pre-remedial contaminant mass transported downgradient per year	percentage
Time per first log cycle decline in average concentration	years per log cycle decline

Cost Efficiency	
Contaminant mass removal	\$ per pound
Groundwater removal	\$ per acre-foot
Cost per first cycle decline in average concentration	\$ per log cycle decline