Prepared for:
Tronox LLC
Henderson, Nevada

Quality Assurance Project Plan
Tronox LLC Facility
Henderson, Nevada

AECOM Incorporated
Northgate Environmental Management, Inc.
Revised June 18 2009
Document No.: 04020-023-101

AECOM

TRONOX

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June 17, 2009

Ms. Shannon Harbour, P.E.
Nevada Division of Environmental Protection
2030 East Flamingo Road, Suite 230
Las Vegas, Nevada 89119-0818

Subject: **NDEP Facility ID # H-000539 – Response to NDEP Comments on the May 26, 2009 Revised Phase B Quality Assurance Project Plan (QAPP) Tronox LLC, Henderson, Nevada**

Dear Ms. Harbour:

On May 26, 2009 Tronox LLC (Tronox) submitted a revised Quality Assurance Project Plan (QAPP), reflecting changes in the Henderson Phase B soil and groundwater sampling efforts. The Nevada Division of Environmental Protection (NDEP) provided their comments on this revised QAPP on June 1, 2009. This transmittal provides Tronox's response to those comments (RTC). Attached you will find an RTC document, errata pages for the May 26, 2009 QAPP, as well as a clean copy of the QAPP document (with the errata pages inserted) for your convenience. This QAPP document continues to reflect our transition from AECOM to Northgate Environmental Management as well as to incorporate NDEP guides received over the last 11 months.

Please contact me at (702) 592-7727 if you have any comments or questions concerning this correspondence.

Sincerely,

Susan M. Crowley, CEM 1428, exp 3-8-11

Overnight Mail

CC: Please see the attached distribution sheet

Tronox LLC (TRX)
NDEP Facility ID #H-000539
Nevada Division of Environmental Protection (NDEP) Response to:
Quality Assurance Project Plan, Tronox LLC Facility, Henderson, Nevada
Dated: May 26, 2009

Response to Comments

Comment

1. Section A.1, page 1 of 14, 2nd paragraph, the reference to the Field Sampling and Analysis Plan (FSAP) should be updated. The Basic Remediation Company (BRC) Standard Operating Procedures (SOPs) have been periodically updated since then. TRX should also include a reference to the most current SOPs in Section E.

Response

1. *The text in Section A.1, page 1 of 14 is amended to include the reference of the Revised Work Plan, December 2008, this document reference and the updated BRC SOPs dated December 2008 are added to Section E.0 Reference, page 1 of 3.*

Comment

2. Section A.7.a, page 11 of 14, 5th paragraph, TRX should consider using collision cell ICP/MS (or another suitable method) for the metal analyses that are subject to interferences.

Response

2. *We have reviewed the analytical benefits of ICP/MS collision cell technology to reduce the matrix interference during the groundwater analysis of arsenic and selenium. The text in Section A.7.3, page 11 of 14, 5th paragraph, is amended to reflect this change, along with the associated method reference note in Table B-2, the amended MDLs and PQLs in Table A-2, and the addition of Table A-2 note (No. 5).*

Comment

3. Section B.2.2, page 1 of 9, TRX states that field filtration may be required if the turbidity exceeds 10 NTU. TRX should review the BRC SOP-5: Water Sampling and Field Measurements and revise this section for consistency with this SOP.

Response

3. *The text in Section B.2.2, page 1 of 9 is amended to reflect the field filtration requirements as stated in the BRC SOP-5, as follows:*

   Soil, soil gas, and groundwater sampling procedures are discussed in Section 3.0 of the FSAP. SOPs are included as separate documents. Field filtration of water samples for metals and radiochemical analyses may be required on a work plan-specific basis; however, in general routine groundwater samples will not be filtered prior to analysis. In general, field filtration is required when turbidity exceeds 10 nepheloemetric turbidity units (NTUs) indicating the presence of suspended sediment. As indicated in the FSAP for the Source Area investigation, both filtered and non-filtered samples will be collected for the groundwater grab samples because they are expected to be cloudy. Comparison of the filtered versus non-filtered analytical results will provide data relative to the effect of field filtering.

Comment

4. Section B.4, table, page 5 or 9, PTS Laboratories are listed in this table; however, no Quality Assurance (QA) manual from this laboratory was provided in Appendix B. Please forward their QA Manual for review and inclusion in this QAPP or revise this Section accordingly.

Response

4. *Appendix B is revised to include the Quality Assurance (QA) manual for PTS Laboratories, Inc.*

Comment

5. Section E, reference NDEP 2009(e), TRX should note that this guidance has been updated with *Unification of Electronic Data Deliverables (EDD), NDEP-Required EDD Format* (NDEP guidance letter, May 20, 2009).

Response

5. *The updated NDEP Guidance document is amended to Section E, References and added to Appendix C.*

Comment

6. Figure A-1, TRX should provide an update to this organization chart Figure as follows:

a. Northgate Environmental Management, Inc. is providing project oversight for the environmental investigative activities and AECOM is no longer providing any services at the Site.
b. Susan Crowley is no longer directly employed by TRX.

Response

6. *Figure A-1 will reflect the current Tronox project organization chart. The Consultant Project Manager text in Section A.4.1 is amended to include the revised Figure A-1, Northgate Project Team Organization Chart as shown below:*

Consultant Project Manager

AECOM's consultant project team withdrew from the Tronox Henderson project affect May, 15 2009. Northgate staff has replaced AECOM for the continuation of the Phase B Investigation. Northgate is assisted by Dr. Keith Bailey as a technical resource and Program Manager. Figure A-1 presents the Northgate team organization chart.

Comment

7. Table A-1, Distribution List, NDEP has the following comments:
    a. Todd Croft, NDEP, should be removed from the distribution list.
    b. Joanna Otani-Fehling is incorrectly listed as associated with Neptune and Company.

Response

7. *The Distribution List, Table A-1, was amended by removing Todd Croft from the NDEP, amending Joanna to Joanne Otani-Fehling and removing her association with Neptune and Company.*

Comment

8. Table B-1, pages 19-22 of 37, NDEP has the following comments:
    a. General comment, this table appears to have two sections: soil sampling requirements and groundwater sampling requirements. Please revise this table to clarify this.
    b. Page 19 of 37, the number "1" is used in two separate instances to reference a footnote. The first is for the "Container" heading (this footnote reference is on all four pages on the Table) and the second is for the preservative for hexavalent chromium. There are two number 1 footnotes listed on this Table: on page 20 and on page 22. Please revise this Table for clarity.

Response

8. *Table B-1, pages 19-22 of 37 are amended as follows:*
    a. *The table is amended to show the associated matrices of aqueous or soil at the top of each page and the font size was enlarged for clarity.*
    b. *The hexavalent chromium footnote on page 19 of 37 was amended to number "4" and all footnotes are located on the last page of Table B-1.*

Comment

9. Table B-3, page 28 of 37, the Control Limits for Organic Acids - Method Blanks uses the term MRL. It is likely this should this be replace with the term is PQL. If not, please justify why MRL is being used.

Response

9. *Table B-3, page 28 of 37, the Organic Acids, method blank reference to the MRL is amended to reflect the PQL.*

northgate

environmental management, inc.

ERRATA to

Quality Assurance Project Plan
Tronox LLC Facility
Henderson, Nevada

Correction Issued
June 17, 2009

04020-023-101

Tronox LLC (TRX)
NDEP Facility ID #H-000539
Quality Assurance Project Plan, Tronox LLC Facility, Henderson, Nevada
Dated: June 2007, 2009

ERRATA

Section 1

Revisions to the QAPP in Response to Comments

1. The revised text in Section A.1, page 1 of 14 shows the addition of the Revised Work Plan, December 2008. Section E.0 References, *page 1 of 3* was amended to include the AECOM, Revised Work Plan and the BRC SOPs: *BRC Field Sampling and Standard Operating* Procedures*, BMI Common Areas, Clark County, Nevada.* Revision 3. December 2008.

2. ICP/MS Collision Cell technology
   A. *Amended text in Section A.7.3, page 11 of 14, 5th paragraph* for use of collision cell during the analysis of aqueous samples for arsenic and selenium.
   B. *Table A-2, pages 13 and 14 of 37,* amended aqueous *MDLs and PQLs* for arsenic and selenium.
   C. *Table A-2, page 18 of 37,* amended table note No. 5 for use of collision cell.
   D. *Table B-2, page 23 of 37,* amended metals method to include ICP/MS collision cell for As and Se.

3. Turbidity text amendment in Section B.2.2, *page 1 of 9,* to reflect BRC SOP-05.

4. Appendix B addition of the PTS Laboratories, Inc. Quality Assurance (QA). Appendix B PTS cover page presented.

5. Section E.0 References, *page 2 of 3* shows the addition of the: *Unification of Electronic Data Deliverables (EDD), NDEP-Required EDD Format* (NDEP guidance letter, May 20, 2009). This document will also be amended to Appendix C.

6. Revised Figure A-1 is amended to Section Figures, *page 1 of 2*. The Consultant Project Manager text in Section A.4.1, *page 2 of 14*, is amended to include the revised Figure A-1, Northgate Project Team Organization Chart.

7. The Distribution List, Table A-1, *page 1 of 37,* was amended by removing Todd Croft from the NDEP, amending Joanna to Joanne Otani-Fehling and removing her association with Neptune and Company.

8. Table B-1, *pages 19-22 of 37* amendments:
    a. The table is amended to show the associated matrices of aqueous or soil at the top of each page and the font size was enlarged for clarity.
    b. The hexavalent chromium footnote on *pages 19 of 37* was amended to number "4" and footnoted on Table B-1, *page 22 of 37.*

9. Table B-3, *page 28 of 37,* method blank reference of MRL was amended to reflect the PQL.

Section 2

Revisions to the QAPP - Additional Changes and Corrections

1. Filter Blank text was amended to Section B.2.3, QC Sample Collection, *page 1 of 9* as presented below.

    Filter blanks – Field filtration will be utilized during the collection of all aqueous hexavalent chromium samples and for dissolved metals and radiological sample fractions when field turbidity exceeds 10 NTUs. A filter blank (for each lot of filters) will be collected prior to sample collection to evaluate whether the filter is a source of potential contamination. This sample is collected in the field by passing the source water through the same filter type used during sample collection and submitted for analysis of the associated parameters.

2. **Table A-2 Analyte List, Practical Quantitation Limits, and Method Detection Limits** (May 2009) amendments.

    A. Table A-2, *pages 3,4 and 14 of 37*
        1) o-xylene CAS No. 1330-20-7 was amended to CAS No. 95-47-6.
        2) isopropyl benzene CAS No. 98-28-8 was amended to CAS No. 98-82-8.
        3) platinum CAS No. 6/4/7440 was amended to CAS No. 7440-06-04.
        4) potassium CAS No. 9/7/7440 was amended to CAS No. 7440-09-7.
        5) manganese CAS No. 7439-95-4 was amended to CAS No. 7439-96-5.
        6) nitrate CAS No. 7697-37-2 was amended to CAS No. 84145-82-4.
        7) nitrite IC Method 9056 PQL 50 ug/L was amended to 10 ug/L using colorimetric Method 353.2.
        8) m,p-xylenes CAS No. 179601-21-1 was amended to CAS No. 1330-207.
        9) nitrite IC Method 9056 PQL 5 mg/Kg was amended to 0.1 mg/Kg using colormetric Method 353.2.

10) nitrite IC Method 9056 MDL 1.08 mg/Kg was amended to 0.07 mg/Kg using colorimetric Method 353.2.
11) Oil Range Organics (ORO) TPH Method 8015 soil MDL 10 mg/Kg was amended to 30 mg/Kg.
12) Diesel Range Organics (DRO) TPH Method 8015 soil MDL 10 mg/Kg was amended to 30 mg/Kg.

B. Table A-2 Columbia Analytical Services – Kelso, Washington Annual updated MDLs/PQLs submitted 5/22/09, were amended to Table A-2, *pg. 14 of 37*, as presented below.

Updated CAS-Kelso, Washington MDLs and PQLs					
		Water		**Soil**	
Analyte	Method	PQL	MDL	PQL	MDL
Antimony	6010				0.50
Beryllium	6010	0.20			
Boron	6010	10	2.0	2	0.4
Cadimum	6010		0.30	0.1	0.03
Chromium	6010	2.0	0.6		0.03
Lead	6010			2.0	0.4
Molybdenum	6010		0.60	0.40	0.08
Nickel	6010		0.70	0.40	0.07
Silver	6010			0.5	0.2
Vanadium	6010		1.0	1.0	0.30

3. **Table B-2 Analytical Methodologies** amendments.

A. Aqueous portion of Table B-2, *pg. 23 of 37*
1) Oil Range Organics by Method EPA 8015B was added to the table.
2) Chlorate Method 300.1 was amended to Method 9056, MDL and PQL were unaffected.
3) Nitrite by Method 353.2 was added to the table.
4) PH Method 9045C was amended to Method 9040B.

B. Soil portion of Table B-2, *pg. 24 of 37*
1) Oil Range Organics by Method EPA 8015B was added to the table.
2) % Solids Method 160.1 was amended to Method 160.3.
3) Hexavalent Chromium Method 218.6 was amended to Method 7199, MDL and PQL were unaffected.
4) Alkalinity Method 310.1 was amended to Method 2320B.
5) Phosphate (total) Method 365.2 was amended to Method 365.1, MDL and PQL were unaffected.
6) Nitrite IC Method 9056 was amended to colormetric Method 353.2 to eliminate chloride interference.

Section 1

Revisions to the QAPP in Response to Comments

A.0 PROJECT MANAGEMENT

A.1 Introduction

This Quality Assurance Project Plan (QAPP) presents the organization, objectives, planned activities, and specific Quality Assurance/Quality Control (QA/QC) procedures associated with soil and groundwater sampling at the Tronox LLC (Tronox) facility, formerly Kerr-McGee Chemical LLC, located at 8000 West Lake Mead Parkway in Henderson, Nevada. The facility is owned and operated by Tronox. The work will be conducted by AECOM, Northgate Environmental Management Inc. (Northgate), Veolia and other subcontractors as needed on behalf of Tronox in response to requests by the Nevada Division of Environmental Protection (NDEP) or others. The sampling activities will support characterization, monitoring, and remediation as needed.

A Field Sampling and Analysis Plan (FSAP) and Revised Phase B Site Investigation Work Plan (AECOM, December 2008) were prepared for soil and groundwater sampling activities and is incorporated into this QAPP by reference. The FSAP includes the standard operating procedures (SOPs) to be used for sample collection and handling, field measurements and sample analysis, and is supported by specific work plans developed for characterization, monitoring, or remediation. These program-specific work plans will describe the specific objectives, sample locations and frequency, sample designations, analytical parameters, and test methods for the individual events. General SOPs are also available for use or reference under a separate cover.

This QAPP has been prepared using U.S. Environmental Protection Agency (EPA) QAPP guidance as presented in *EPA Requirements for Quality Assurance Project Plans* (EPA QA/R-5, March 2001, and EPA QA/G6, December 2002). Additional guidance used in preparing this QAPP is presented in Section E.0. In a letter dated October 11, 2006, the NDEP provided comments on the QAPP. The document was revised to address these comments as indicated in the Tronox response to comments. Copies of NDEP and Tronox correspondence are included in Appendix A. In April 2008 the QAPP was revised prior to the initiation of Phase B sampling. The QAPP has been revised again in May 2009 to accommodate changes in NDEP guidance prior to the restart of Phase B sampling. Guidance documents relevant to analytical data review, data validation, and Access database structure are included in Appendix C. Clarifications of this guidance provided to Tronox in a conference call on April 2, 2009 are included in Appendix A.

A.2 Project Schedule

The schedule for each groundwater or soil sampling program will be specified in the program-specific work plan.

A.3 Distribution List

Most of the data-intense tasks will be accomplished by Tronox and their consultants and subcontractors with oversight, review, and approval by the NDEP. Table A-1 presents a general distribution list for the project. Each document prepared will include a distribution list with an indication of how each document will be

E.0 REFERENCES

This QAPP was prepared using the following documents:

AECOM, Inc. *Revised Phase B Site Investigation Work Plan, Text, Tables and Figures.* Tronox LLC Facility. Henderson, Nevada. December 2008.

Basic Remediation Company (BRC). ERM-West (ERM) and MWH. *BRC Field Sampling and Standard Operating Procedures.* BMI Common Areas, Clark County, Nevada. Revision 3. December 2008.

Basic Remediation Company (BRC). *BRC Standard Operating Procedure (SOP) 40. Data Review Validation.* Revision 4. May 7, 2009.

Department of Energy (DOE). *EML Environmental Meassurements Laboratory Procedures Manual*, HASL-300, 28th Edition. February 1982.

Department of Energy (DOE). *Evaluation of Radiochemical Data Usability*. April 1997.

Ecology & Environment (E&E). *Summary and Interpretation of Environmental Quality Data*, BMI Industrial Complex, Henderson, Nevada. November 1982.

ENSR Corporation (ENSR). *Phase II Environmental Conditions Assessment.* Kerr-McGee Chemical Corporation, Henderson, Nevada. August 7, 1997.

ENSR Corporation (ENSR). *Supplemental Phase II Environmental Conditions Assessment*, April 2001.

ENSR Corporation (ENSR). *Conceptual Site Model*, Kerr-McGee Facility, Henderson, Nevada. February 28 2005.

ENSR Corporation (ENSR). *Upgradient Workplan Addendum*, Tronox facility, Henderson, Nevada. February 2006 **(a)**.

ENSR Corporation (ENSR). *Upgradient Investigation Results*, Tronox facility, Henderson, Nevada. October 2006 **(b).** (Revised September 2007).

ENSR Corporation (ENSR). *Quality Assurance Project Plan*, Tronox facility, Henderson, Nevada. December 2006 **(c).**

ENSR Corporation (ENSR). *Phase A Source Area Investigation Results*, Tronox facility, Henderson, Nevada. September 2007.

Kerr-McGee. *Phase II Work Plan*. May 1996 **(a)**.

Kerr-McGee. *Response to Letter of Understanding,* Henderson, Nevada. October 1996 **(b)**.

Kerr-McGee. *Response to Phase II Report Comments and Supplemental Phase II Work Plan*. November 9, 1998.

Sensitivity

Sensitivity of analytical data is demonstrated by laboratory method detection limits (MDLs) and by laboratory reporting limits (RLs) based on quantitation limits (QLs) derived from the low point of calibration, which are equivalent to the NDEP definition of (PQLs), except for dioxins and PCB congeners, which are based on Estimated Detection Limits (EDLs). The target PQLs and MDLs for the compounds to be analyzed for Source Area Phase B work after April 2009 are presented in Table A-2. The analyte list, PQLs, and MDLs are laboratory specific and may be amended, as necessary, for future programs. Note PQLs and MDLs may be updated by the laboratory on an annual basis.

Per NDEP specification in *Detection Limits and Data Reporting* (NDEP 2008), the RDL field in the EQuIS database will be populated by laboratory MDLs adjusted for sample specific factors (designated SQL by NDEP) and this numeric value will represent the detection limit associated with nondetects in all results tables.

Radionuclides are a special case in that the actual result value is reported regardless of the Minimum Detectable Activity (MDA) which is sample specific value based on aliquot size, tracer recovery, detector sensitivity, background counts, and counting duration. The MDA and PQL are functionally equivalent.

Asbestos is another special case in that, per NDEP guidance, raw fiber counts per sample are reported for the result value but the sensitivity is based on the concentration of fiber protocol structures per gram of PM10 dust produced by the elutriator.

Arsenic and selenium are subject to interferences due to high salt concentrations in groundwater. The alternative method ICP-MS collision cell technology will be employed to overcome these interferences and increase sensitivity.

The sensitivity goal for all analytical data used for human health risk assessment is 1/10 of the Basic Comparison Levels (BCLs) established by NDEP for the BMI Complex and Common Areas (NDEP 2009c).
This level of sensitivity may not be achievable for all analytes and all laboratory methods, but the laboratory should attempt to achieve it whenever possible using standardized and demonstrated procedures that provide the lowest possible detection limits.

A.8 Special Training/Certification

A.8.1 Training

The groundwater and soil investigations are not expected to include any non-routine field sampling techniques, field analyses, laboratory analyses, or data validation. Specialized training is therefore not required. In the event that non-routine procedures are needed, training requirements will be outlined in the program-specific work plan.

Table A-2 Analyte List, Practical Quantitation Limits, and Method Detection Limits (Cont'd)
(May 2009)

Parameter		CAS No.	Water		Soil	
			PQL	MDL	PQL	MDL
PCBs as congeners[1] (pg/L or ng/kg)						
2,2',3,3',4,5,5',6'-OcCB	PCB-199	52663-75-9	500	5.88	200	1.41
2,2',3,3',4,5,6,6'-OcCB	PCB-200	52663-73-7	1000	4.18	400	1.00
2,2',3,3',4,5',6,6'-OcCB	PCB-201	40186-71-8	1000	4.23	400	1.11
2,2',3,3',5,5',6,6'-OcCB	PCB-202	2136-99-4	1000	6.66	400	1.54
2,2',3,4,4',5,5',6-OcCB	PCB-203	52663-76-0	1000	6.04	400	1.47
2,2',3,4,4',5,6,6'-OcCB	PCB-204	74472-52-9	1000	4.33	400	1.00
2,3,3',4,4',5,5',6-OcCB	PCB-205	74472-53-0	1000	4.09	400	0.90
2,2',3,3',4,4',5,5',6-NoCB3	PCB-206	40186-72-9	1000	10.9	400	0.71
2,2',3,3',4,4',5,6,6'-NoCB	PCB-207	52663-79-3	1000	4.12	400	0.29
2,2',3,3',4,5,5',6,6'-NoCB	PCB-208	52663-77-1	1000	4.05	400	0.31
DeCB3	PCB-209	2051-24-3	500	4.62	200	0.49
Dioxins/Furans (ng/kg)[2]						
1,2,3,4,6,7,8,9-Ocatchlorodibenzofuran		39001-02-0	na		5	0.10
1,2,3,4,6,7,8,9-Ocatchlorodibenzodioxin		3268-87-9	na		5	0.16
1,2,3,4,6,7,8-Heptatchlorodibenzofuran		67562-39-4	na		2.5	0.064
1,2,3,4,6,7,8-Heptatchlorodibenzo-p-dioxin		35822-46-9	na		2.5	0.059
1,2,3,4,7,8,9-Heptatchlorodibenzofuran		55673-89-7	na		2.5	0.350
1,2,3,4,7,8-Hexachlorodibenzofuran		70648-26-9	na		2.5	0.090
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin		39227-28-6	na		2.5	0.049
1,2,3,6,7,8-Hexachlorodibenzofuran		57117-44-9	na		2.5	0.041
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin		57653-85-7	na		2.5	0.048
1,2,3,7,8,9-Hexachlorodibenzofuran		72918-21-9	na		2.5	0.050
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin		19408-74-3	na		2.5	0.048
1,2,3,7,8-Pentachlorodibenzofuran		57117-41-6	na		2.5	0.038
1,2,3,7,8-Pentachlorodibenzo-p-dioxin		40321-76-4	na		2.5	0.050
2,3,4,6,7,8-Hexachlorodibenzofuran		60851-34-5	na		2.5	0.044
1,2,3,6,7,8-Hexachlorodibenzofuran		57117-31-4	na		2.5	0.036
2,3,7,8-Tetrachlorodibenzofuran		51207-31-9	na		1	0.048
2,3,7,8-Tetrachlorodibenzo-p-dioxin		1746-01-6	na		1.00	0.051
Metals (µg/L or mg/kg)						
Aluminum		7429-90-5	50	4.0	3	0.8
Antimony		7440-36-0	0.05	0.03	2.0	0.40
Arsenic[5]		7440-38-2	5	0.21	0.5	0.1
Barium		7440-39-3	5	0.5	0.6	0.2
Beryllium		7440-41-7	0.30	0.09	0.02	0.02
Boron		7440-42-8	50	4	10	0.9

Table A-2 Analyte List, Practical Quantitation Limits, and Method Detection Limits (Cont'd)
(May 2009)

Parameter	CAS No.	Water		Soil	
		PQL	MDL	PQL	MDL
Metals (g/L or mg/kg)					
Cadmium	7440-43-9	0.50	0.20	0.20	0.04
Calcium	7440-70-2	50	30	20	4
Chromium (total)	7440-47-3	5.0	0.90	0.2	0.04
Chromium (hexavalent)	18540-29-9	10	0.3	0.4	0.025
Cobalt	7440-48-4	10	0.3	0.3	0.09
Copper	7440-50-8	10	0.8	0.6	0.2
Iron	7439-89-6	20	4	6	2
Lead	7439-92-1	0.02	0.01	3.0	1.0
Magnesium	7439-95-4	20	2	3	0.7
Manganese	7439-95-4	5	0.2	0.2	0.04
Mercury	7439-97-6	0.2	0.03	0.02	0.006
Molybdenum	7439-98-7	2.0	0.50	0.30	0.09
Nickel	7440-02-0	2.0	0.5	0.6	0.2
Platinum	6/4/7440	0.1	0.1	0.1	na
Potassium	9/7/7440	2000	100	200	20
Selenium[5]	7782-49-2	5	0.7	6	2
Silver	7440-22-4	2.0	0.7	0.9	0.3
Sodium	7440-23-5	100	70	20	20
Strontium	7440-24-6	10	0.4	2	0.2
Tin	7440-31-5	50	2	10	1
Titanium	7440-32-6	10	0.03	2	0.06
Thallium	7440-28-0	0.02	0.003	0.02	0.003
Tungsten	7440-33-7	0.1	0.1	0.1	0.1
Uranium	7440-61-1	0.02	0.005	0.02	0.004
Vanadium	7440-62-2	2.0	0.8	2.0	0.2
Zinc	7440-66-6	10	0.6	2	0.3
Wet Chemistry and Misc. Analytes (µg/L or mg/kg)					
Alkalinity (total, CO_3^{--},HCO_3^-)	na	2000	220	2	na
Ammonia	7664-41-7	50	4.5	5.0	0.41
Chloride	16887-00-6	200	51	30	2.3
Chlorate	7790-93-4	20	4	0.2	0.04
Cyanide (total)	57-12-5	10	4.3	1	0.42
Conductivity	na	na	na	na	na
Nitrate	7697-37-2	50	4	5	0.44
Nitrite	14797-65-0	50	7	5	1.08

Table A-2 Analyte List, Practical Quantitation Limits, and Method Detection Limits (Cont'd)
(May 2009)

Parameter	CAS No.	Air	
		PQL	MDL
Soil Gas Analytes (µg/m^3)			
trans-1,2-Dichloroethene	156-60-5	0.1	0.050
trans-1,3-Dichloropropene	10061-02-6	0.5	0.063
Trichloroethene	79-01-6	0.1	0.050
Trichlorofluoromethane	75-69-4	0.1	0.050
Trichlorotrifluoroethane (CFC 113)	76-13-1	0.1	0.056
Vinyl acetate	108-05-4	5	0.16
Vinyl Chloride	75-01-4	0.1	0.050
m,p-Xylenes	179601-23-1	0.5	0.13
o-Xylene	95-47-6	0.5	0.063

Parameter	CAS No.	RL
		Soil
Asbestos (s/gPM10)		
Total Amphibole Protocol Structures[3]	na	3000000
Long Amphibole Protocol Structures[3]	na	3000000
Total Chrysotile Protocol Structures[3]	na	3000000
Long Chrysotile Protocol Structures[3]	na	3000000
Total Asbestos Protocol Structures[3]	na	3000000
Long Asbestos Protocol Structures[3]	na	3000000

Notes:

[1] All 209 PCB congeners will be reported. CB congener MDL values are based on average blank EDLs. PQLs are based on method defined Minimum Levels.

[2] Dioxin/furan congener MDL values are based on EDLs, and the PQLs on method defined Minimum Calibration Levels.

[3] Modified structure width criterion < 0.4 micron. PQLs are based on nominal dust weight, grid opening counts and stopping rules. Actual fiber counts and calculated sensitivity are reported.

[4] Radionuclide MDLs and PQLs are based on nominal MDA values. Measured result values are reported regardless of the sample specific MDA.

[5] Groundwater samples for As and Se will be analyzed by ICP/MS collision cell to overcome matrix interferences. See options in Table B-2.

SPLP leachate analyses will be analyzed by EPA Method 1312 using two preparation methods: 1) with extraction fluid #2 (reagent water at pH 5.00±0.05), and 2) with extraction method #3 (reagent water); per NDEP. SPLP will conform to the analyte lists and water limits above if specified in the project-specific workplans.

All PQLs and MDLs may be updated, typically on an annual basis, by the laboratories.

Table B-2 Analytical Methodologies

Parameter	Methodology
Aqueous	
VOCs	EPA 5030/8260B
SVOCs	EPA 8270C
Organochlorine Pesticides	EPA 8081A
Organophosphorous Pesticides	EPA 8141A
Organic Acids	HPLC-UV per Alpha Analytical SOP E.64 Rev.5
PCBs	EPA 8082 and/or EPA 1668A
Gasoline Range Organics	EPA 8015B
Diesel Range Organics	EPA 8015B
Formaldehyde	EPA 8315A
Metals	EPA 6010B/6020 (As and Se ICP/MS collision cell)
Mercury	EPA 7470
Hexavalent chromium	EPA 218.6
Alkalinity	SM 2320B
Ammonia	EPA 350.1
Bromide	EPA 9056
Chloride	EPA 9056
Chlorate	EPA 300.1
Cyanide	EPA 9012A/9014
Nitrate	EPA 9056
Phosphate (total)	EPA 365.1
Perchlorate	EPA 314.0
pH	EPA 9045C
Sulfate	EPA 9056
Surfactants	SM 5540C
TDS	SM 2540C
TSS	SM 2540D

B.0 MEASUREMENT/DATA ACQUISITION

B.1 Sampling Process Design

The rationale for sample design will be provided in the program-specific work plans.

B.2 Sampling Methods

B.2.1 Field Measurements

Field measurements taken in conjunction with soil, soil gas, and groundwater sampling are addressed in Section 3.0 of the FSAP. SOPs are included in Attachment A of the FSAP.

B.2.2 Sampling Procedures

Soil, soil gas, and groundwater sampling procedures are discussed in Section 3.0 of the FSAP. SOPs are included as separate documents. Field filtration of water samples for metals and radiochemical analyses may be required on a work plan-specific basis; however, in general routine groundwater samples will not be filtered prior to analysis. In general, field filtration is required when turbidity exceeds 10 nephelometric turbidity units (NTUs) indicating the presence of suspended sediment. As indicated in the FSAP for the Source Area investigation, both filtered and non-filtered samples will be collected for the groundwater grab samples because they are expected to be cloudy. Comparison of the filtered versus non-filtered analytical results will provide data relative to the effect of field filtering.

B.2.3 QC Sample Collection

QC samples may include trip blanks, equipment field blanks, field duplicates, and MS/MSDs as needed for the individual sampling program. These samples will be collected as described below unless otherwise noted in the program-specific work plans. Laboratory grade water free of target analytes and suitable for the intended analyses will be supplied by the laboratory for trip, equipment, and field blanks.

Filter blanks – Field filtration will be utilized during the collection of all aqueous hexavalent chromium samples and for dissolved metals and radiological sample fractions when field turbidity is greater than 10 NTUs. A filter blank (for each lot of filters) will be collected prior to sample collection to evaluate whether the filter is a source of potential contamination. This sample is collected in the field by passing the source water through the same filter type used during sample collection and submitted for analysis of the associated parameters.

Trip blanks – Trip blanks will be included with each cooler shipment of volatile organic compound (VOC) samples. Trip blanks associated with aqueous VOC samples will originate in the laboratory and will be prepared by filling two 40-mL volatile organic analysis (VOA) vials with laboratory deionized water and sealing the vials with septum-lined caps (allowing no headspace). Trip blanks associated with solid VOC samples will be prepared in VOA vials. Trip blanks will accompany the sample bottles to the site and will

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Santa Fe Springs, CA

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U.S. Environmental Protection Agency (EPA). Quality Staff. *EPA Requirements for Quality Assurance Project Plans*, EPA QA/R-5. March 2001.

distributed. The QAPP, and any subsequent revisions, will be distributed to the personnel identified with an "X" on Table A-1.

A.4 Project/Task Organization

A project organization chart is provided on Figure A-1. The project organization defines the lines of communication and identifies key personnel assigned to various project activities. The activity-specific work plans will provide a description of the organizational structure and specific responsibilities of the individual positions for the respective project activities. The individuals participating in the project and their specific roles and responsibilities are discussed below.

A.4.1 Management Responsibilities

Tronox Program Manager

The Tronox Program Managers, Susan Crowley and Dr. Keith Bailey are primarily responsible for project direction and decisions concerning technical issues and strategies, budget and schedule. Ms. Crowley is a Nevada-Certified Environmental Manager (CEM # 1428, expiring March 8, 2011) and is the person who serves as the primary point of contact for regulatory and environmental issues pertinent to the Site. She is located at the Tronox Henderson Facility. Her telephone number is (702) 651-2234. Ms. Crowley and Dr. Bailey will be supported by Tronox technical specialist Mr. Tom Reed (hydrogeologist).

Consultant Project Manager

AECOM's consultant project team withdrew from the Tronox Henderson project affect May, 15 2009. Northgate staff has replaced AECOM for the continuation of the Phase B Site Investigation. Figure A-1 presents the Northgate project team organization chart. Project duties, as necessary, include:

- Subcontractor coordination;
- Assignment of duties to project staff and orientation of the staff to the specific needs and requirements of the project;
- Ensuring that data assessment activities are conducted in accordance with the QAPP;
- Approval of project-specific procedures and internally prepared plans, drawings, and reports;
- Serving as the focus for coordination of all field and laboratory task activities, communication, reports, and technical reviews, and other support functions, and facilitating site activities with the technical requirements of the project; and
- Maintenance of the project files.

Figure A-1 Project Organization Chart

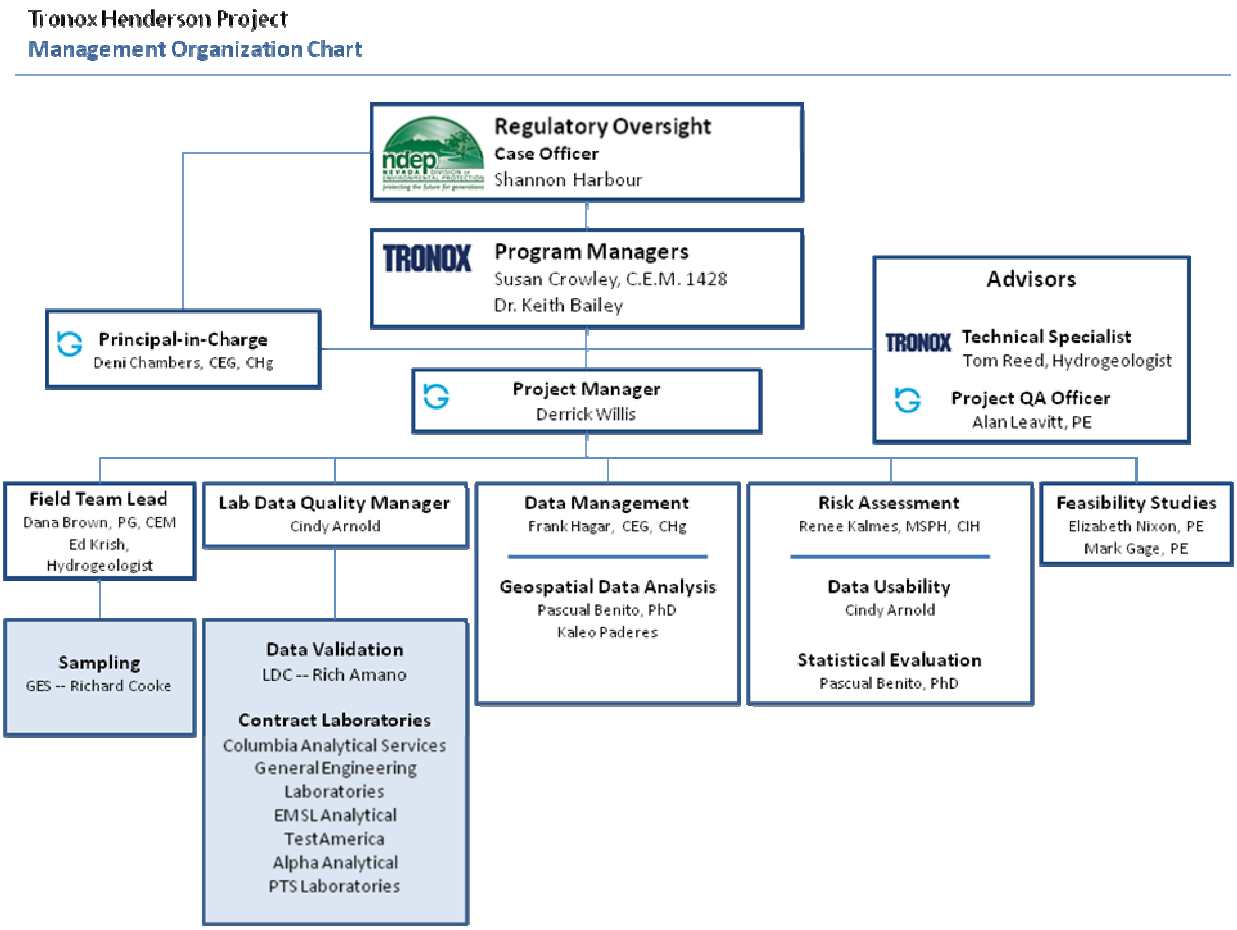

Table A-1
Distribution List

Updated 18-June-09

Document Name: **Tronox QAPP Revision 4**

Name (Last, First)		Firm	Distribution Hard	e-Copy	Cvr Only
King	Val	NDEP			
Najima	Jim	NDEP		X	
Rakvica	Brian	NDEP	X	X	
Sous	Nadir	NDEP			
Tinney	Al	NDEP			
Palm	Jon	NDEP			
Harbour	Shannon	NDEP	X	X	
Black	Paul	Neptune	X	X	
Gratson	Dave	Neptune	X	X	
Copeland	Teri		X	X	
Otani-Fehling	Joanne		X	X	
Hackenberry	Paul	Hackenberry	X	X	
Pohlmann	Brenda	COH		X	
Conaty	Barry	COH Counsel		X	
Kennedy	Robert	AECOM		X	
Mulroy	Pat	SNWA			
Goff	Mike	SNWA			
Liesing	Joe	SNWA			
Kaplan	Mitch	EPA, Reg 9		X	
Compliance Coordinator		NDEP			
Compliance Coordinator		DAQEM			
Juma	Ebrahim	CCDAQEM			
Public Repository		Library		X	
Jaeger	Janice	CAS - Roschester		X	
Wallace	Ed	CAS - Kelso		X	
Aguilera	Kate	CAS - Simi Valley		X	
Freemeyer	Jane	CAS - Houston		X	
Kent	Edith	Gen. Eng. Labs, LLC		X	
Kocher	Daniel	EMSL Analytical, Inc.		X	
Phillips	Michael	TestAmerica Denver		X	

Name (Last, First)		Firm	Distribution Hard	e-Copy	Cvr Only
Logan	Mike	Tronox		X	
Paque	Matt	Tronox Counsel		X	
Reed	Tom	Tronox	X	X	
Stater	Rick	Tronox		X	
Crowley	Susan	Crowley Environmental	2	X	
Skromyda	Mike	Tronox		X	
Bailey	Keith	Environ Answers	X	X	
Krish	Ed	Hydrogeologist	X	X	
Chambers	Deni	Northgate	X	X	
Leavitt	Alan	Northgate		X	
Donnelly	Dara	Northgate	X	X	
Willis	Derrick	Northgate	X	X	
Arnold	Cindy	Northgate	X	X	
Lambeth	Jeff	Veolia			
Baker	Ken	AIU		X	
Diebenow	Julie	AIU		X	
Giroux	Barry	GEI		X	
Stowers	Kirk	Broadbent			
Sahu	Rahnijit	BMI		X	
Crouse	George	Syngenta		X	
Erickson	Lee	Stauffer		X	
Kelly	Joe	Montrose			
Sundberg	Paul	Montrose		X	
Gibson	Jeff	AmPac			
Richards	Curt	Olin		X	
Bellotti	Michael	Olin		X	
Wilkinson	Craig	Timet		X	
Mack	Joel	Montrose Counsel			
Brady	Michelle	PTS Laboratories, Inc.		X	
Amano	Richard	LDC		X	

Table B-1 Sample Container, Preservation, and Holding Time Requirements

Aqueous			
Parameter	**Container [1, 2]**	**Preservation**	**Holding Time [3]**
VOCs	3-40 ml glass vials with Teflon-lined septum caps	HCl to pH<2; no headspace; cool 4°C	14 days
SVOCs	2-1 L amber glass with Teflon-lined lids	Cool 4°C	Extract within 7 days, analyze within 40 days
GRO	3-40 ml glass vials with Teflon-lined septum caps	HCl to pH<2; no headspace; cool 4°C	14 days
DRO/ORO	2-1 L amber glass with Teflon-lined lids	HCl to pH<2; no headspace; cool 4°C	Extract within 7 days, analyze within 40 days
Organochlorine Pesticides	2-1 L amber glass with Teflon-lined lids	Cool 4°C	Extract within 7 days, analyze within 40 days
Organophosphorous Pesticides	2-1 L amber glass with Teflon-lined lids	Cool 4°C	Extract within 7 days, analyze within 40 days
PCBs as Aroclors	2-1 L amber glass with Teflon-lined lids	Cool 4°C	Extract within 7 days, analyze within 40 days
PCBs as congeners	2-1 L amber glass with Teflon-lined lids	Cool 4°C	Extract within 1 year, analyze within 1 year
Metals	1-500 mL plastic	HNO_3 to pH <2; cool 4°C	Mercury - 28 days, other metals - 180 days
Hexavalent chromium	250 mL plastic	$(NH_4)_2SO_4$ buffer[4]; cool 4°C; field filter	28 days to analysis if filtered and preserved properly
Alkalinity	500 mL plastic	Cool 4°C	14 days
Ammonia	500 mL plastic	H2SO4 to pH <2; cool 4°C	28 days
Bromide	125 mL plastic	Cool 4°C	28 days
Chlorate	125 mL plastic	Cool 4°C	28 days
Chloride	125 mL plastic	Cool 4°C	28 days
Cyanide	500 mL plastic	NaOH to pH>12	14 days
Conductivity	125 mL plastic	Cool 4°C	28 days
Nitrate	125 mL plastic	Cool 4°C	2 days
Nitrite	125 mL plastic	Cool 4°C	2 days

Table B-1 Sample Container, Preservation, and Holding Time Requirements (Cont'd)

Aqueous			
Parameter	**Container [1, 2]**	**Preservation**	**Holding Time [3]**
Phosphate (total)	125 mL plastic	H2SO4 to pH <2; cool 4°C	28 days
Perchlorate	125 mL plastic	Cool 4°C	28 days
Sulfate	125 mL plastic	Cool 4°C	28 days
Surfactants	500 mL plastic	Cool 4°C	48 hours
TOC	1-1L glass	H2SO4 to pH <2; cool 4°C	28 days
TDS	1-1L plastic	Cool 4°C	7 days
TSS	1-1L plastic	Cool 4°C	7 days
Radium 226	1-1L plastic	HNO3 to pH <2;	6 months
Radium 228	1-1L plastic	HNO3 to pH <2;	6 months
Thorium (isotopic)	1-1L plastic	HNO3 to pH <2;	6 months
Uranium (isotopic)	1-1L plastic	HNO3 to pH <2;	6 months
Formaldehyde	2-1 L amber glass with Teflon-lined lids	Cool 4°C	3 days to extraction, 3 days to analysis
Organic Acids	125 mL plastic	Cool 4°C	28 days

Table B-1 Sample Container, Preservation, and Holding Time Requirements (Cont'd)

Soil			
Parameter	**Container [1, 2]**	**Preservation**	**Holding Time [3]**
VOCs	3 40-ml VOA vials/ 2 with DI water and 1 with MeOH	Cool 4°C	Unpreserved VOA vials must be frozen within 48 hours of collection, 14 days from field preservation to analysis
SVOCs	1-250 ml glass with Teflon-lined cap	Cool 4°C	14 days until extraction; 40 days from extraction to analysis
Dioxins/Furans	1-250 ml glass with Teflon-lined cap	Cool 4°C	30 days until extraction; 40 days from extraction to analysis
GRO	1 VOA vial with MeOH	Cool 4°C	14 days from field preservation to analysis
DRO/ORO	1-250 ml glass with Teflon-lined cap	Cool 4°C	14 days until extraction; 40 days from extraction to analysis
Fuel Alcohols and Ethylene glycol	1-250 ml glass with Teflon-lined cap	Cool 4°C	14 days
Pesticides and PCBs as Aroclors PCBs as congeners	1-250 or 500-ml glass with Teflon-lined cap 1-250 ml glass with Teflon-lined cap	Cool 4°C Cool 4°C from field, Lab storage <-10°C	14 days until extraction; 40 days from extraction to analysis Extract within 1 year, analyze within 1 year
Metals	1-250 ml glass with Teflon-lined cap	Cool 4°C	Mercury – 28 days, other metals – 180 days
Hexavalent chromium	1-250 ml glass with Teflon-lined cap	Cool 4°C	28 days to digestion, 4 days from digestion to analysis
TOC	1-250 ml glass with Teflon-lined cap	Cool 4°C	14 days
Asbestos	1-gallon plastic bag	None	None established for soil
Alkalinity	1-250 ml glass with Teflon-lined cap	Cool 4°C	None established for soil. Use water holding time for leachates
Ammonia	1-250 ml glass with Teflon-lined cap	Cool 4°C	None established for soil. Use water holding time for leachates
Anions (Br-,Cl-, ClO2-,ClO4-, , NO3-,NO2-,PO4--, SO4--, -)	1-250 ml glass with Teflon-lined cap	Cool 4°C	None established for soil. Use water holding time for leachates
Surfactants	1-250 ml glass with Teflon-lined cap	Cool 4°C	None established for soil. Use water holding time for leachates

Table B-1 Sample Container, Preservation, and Holding Time Requirements (Cont'd)

Soil			
Parameter	Container [1, 2]	Preservation	Holding Time [3]
Radiochemicals	1- 500-mL glass with Teflon lined cap	None	6 months
Formaldehyde	1-250 ml glass with Teflon-lined cap	Cool 4°C	14 days
Organic Acids	125 mL plastic	Cool 4°C	None established for soil. Use water holding time for leachates
Soil Gas			
VOCs by TO-15	SUMMA canister	None	30 days

Notes:

1 Additional volume will be collected for MS/MSD samples.

2 Laboratory may provide alternate containers as long as the containers meet the requirements of the method and allow the collection of sufficient volume to perform the analyses.

3 Holding time begins from date of sample collection. Leachate holding times must conform to water holding times or the requirements of EPA Method 1312.

4. Site specific modified buffer with 0.3 mL NaOH plus 2.5 mL $(NH_4)_2SO_4$ method defined solution

Table B-3 Internal QC Checks for Laboratory Analyses (Cont'd)

Parameter	QC Check	Frequencies	Control Limits	Laboratory Corrective Actions
PCB congeners by HRGC/ HRMS	Method blanks	One per analytical batch	No target analyte above detected above PQLs (MLs) for tetra to decaCBs or 5X PQL for mono to triCBs	Reextraction/reanalysis of samples if sample results< 10x MB results, evaluate and B flag if sample >10x MB
	LCS (OPR)	One per analytical batch –analyte list per method	50-150%	Reextraction/reanalysis of entire batch
	Internal standards (labeled toxics/ LOCs)	Every sample, blank standard prior to analysis	25-150% (15-150% for MoCBs)	Evaluate matrix effects. If called for, reextract samples using smaller sample amount.
	Mass resolution check	At beginning of each 12 hour shift	Must meet >10,000 resolving power in center ranges and >8,000 throughout	Reanalysis of entire batch
	Ion abundance and S/N ratios	At beginning of each 12 hour shift	Must meet Table 8 method limits and S/N $\geq$ 10	Cannot begin run until criteria are met
	RT and GC resolution	At beginning of each 12 hour shift	$\pm$ 15 sec. of ICAL RTs and RRTs per method	Cannot begin run until criteria are met
Organic Acids	Method Banks	One per analytical batch	No target analytes above PQL	Reextraction/reanalysis of entire batch
	LCS	One per analytical batch – full analyte list	Per current laboratory limits	Reextraction/reanalysis of entire batch
	MS/MSD samples	One pair per analytical batch – full analyte list	Per current laboratory limits	Check LCS, reanalyze, flag results if matrix effect

Section 2

Additional Changes and Corrections

B.0 MEASUREMENT/DATA ACQUISITION

B.1 Sampling Process Design

The rationale for sample design will be provided in the program-specific work plans.

B.2 Sampling Methods

B.2.1 Field Measurements

Field measurements taken in conjunction with soil, soil gas, and groundwater sampling are addressed in Section 3.0 of the FSAP. SOPs are included in Attachment A of the FSAP.

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Soil, soil gas, and groundwater sampling procedures are discussed in Section 3.0 of the FSAP. SOPs are included as separate documents. Field filtration of water samples for metals and radiochemical analyses may be required on a work plan-specific basis; however, in general routine groundwater samples will not be filtered prior to analysis. In general, field filtration is required when turbidity exceeds 10 nephelometric turbidity units (NTUs) indicating the presence of suspended sediment. As indicated in the FSAP for the Source Area investigation, both filtered and non-filtered samples will be collected for the groundwater grab samples because they are expected to be cloudy. Comparison of the filtered versus non-filtered analytical results will provide data relative to the effect of field filtering.

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QC samples may include trip blanks, equipment field blanks, field duplicates, and MS/MSDs as needed for the individual sampling program. These samples will be collected as described below unless otherwise noted in the program-specific work plans. Laboratory grade water free of target analytes and suitable for the intended analyses will be supplied by the laboratory for trip, equipment, and field blanks.

Filter blanks – Field filtration will be utilized during the collection of all aqueous hexavalent chromium samples and for dissolved metals and radiological sample fractions when field turbidity is greater than 10 NTUs. A filter blank (for each lot of filters) will be collected prior to sample collection to evaluate whether the filter is a source of potential contamination. This sample is collected in the field by passing the source water through the same filter type used during sample collection and submitted for analysis of the associated parameters.

Trip blanks – Trip blanks will be included with each cooler shipment of volatile organic compound (VOC) samples. Trip blanks associated with aqueous VOC samples will originate in the laboratory and will be prepared by filling two 40-mL volatile organic analysis (VOA) vials with laboratory deionized water and sealing the vials with septum-lined caps (allowing no headspace). Trip blanks associated with solid VOC samples will be prepared in VOA vials. Trip blanks will accompany the sample bottles to the site and will

Table A-2 Analyte List, Practical Quantitation Limits, and Method Detection Limits (Cont'd)
(May 2009)

Parameter	CAS No.	Water		Soil	
		PQL	MDL	PQL	MDL
Volatile Organic Compounds (µg/L or µg/kg)					
Carbon Tetrachloride	56-23-5	1	0.36	5	0.26
Chlorobenzene	108-90-7	1	0.26	5	0.32
Chloroethane	75-00-3	2	0.21	5	0.27
Chloroform	67-66-3	1	0.16	5	0.35
Chloromethane	74-87-3	2	0.18	5	0.54
cis-1,2-Dichloroethene	156-92-2	1	0.14	5	0.54
cis-1,3-Dichloropropene	10061-01-5	1	0.14	5	0.27
Dibromochloromethane	124-48-1	1	0.11	5	0.34
Dibromomethane	74-95-3	1	0.18	5	0.36
Dichlorodifluoromethane	75-71-8	1	0.18	5	0.45
Diisopropyl ether (DIPE)	108-20-3	1	0.09	5	0.22
Ethyl-tert-butyl ether (ETBE)	637-92-3	1	0.12	5	0.17
Hexachlorobutadiene	87-68-3	5	0.27	5	1.80
Isopropyl Benzene	98-82-8	2	0.34	5	0.82
Methylene Chloride	75-09-2	2	0.13	5	0.36
Methyl-tert-butyl ether (MTBE)	1634-04-4	1	0.13	5	0.25
Naphthalene	91-20-3	2	0.31	5	0.99
n-Butylbenzene	104-51-8	2	0.20	5	0.52
n-Propylbenzene	103-65-1	2	0.32	5	0.84
p-Isopropyltoluene	99-87-6	2	0.22	5	0.89
sec-Butylbenzene	135-98-8	2	0.23	5	0.95
Styrene	100-42-5	1	0.35	5	0.45
tert-Amyl-methyl ether (TAME)	994-05-8	1	0.13	5	0.18
tert-Butyl alcohol (TBA)	75-65-0	100	3.00	100	3.90
tert-Butylbenzene	98-06-6	2	0.28	5	0.90
Tetrachloroethene	127-18-4	1	0.42	5	0.79
Toluene	108-88-3	1	0.21	5	0.99
trans-1,2-Dichloroethene	156-60-5	1	0.16	5	0.34
trans-1,3-Dichloropropene	10061-02-6	1	0.17	5	0.25
Trichloroethene	79-01-6	1	0.13	5	0.48
Trichlorofluoromethane	75-69-4	1	0.15	5	0.33
Vinyl Chloride	75-01-4	1	0.22	5	0.54
o-Xylene	95-47-6	1	0.40	5	0.63

Table A-2 Analyte List, Practical Quantitation Limits, and Method Detection Limits (Cont'd)

Parameter	CAS No.	Water		Soil	
		RL	MDL	RL	MDL
Volatile Organic Compounds (µg/L or µg/kg)					
m,p-Xylenes	1330-20-7	1	0.81	5	0.63
Semivolatile Organic Compounds (µg/L or µg/kg)					
1,4-dioxane	123-91-1	2	0.13	6.6	0.13
2-Methylnaphthalene	91-57-6	0.2	0.04	6.6	0.05
Acenaphthene	83-32-9	0.2	0.05	6.6	0.04
Acenaphthylene	208-96-8	0.2	0.07	6.6	0.08
Anthracene	120-12-7	0.2	0.04	6.6	0.04
Benzo(a)anthracene	56-55-3	0.2	0.04	6.6	0.04
Benzo(a)pyrene	50-32-8	0.2	0.04	6.6	0.02
Benzo(b)fluoranthene	205-99-2	0.2	0.03	6.6	0.03
Benzo(g,h,i)perylene	191-24-2	0.2	0.03	6.6	0.04
Benzo(k)fluoranthene	207-08-9	0.2	0.03	6.6	0.02
Bis(2-ethylhexyl)phthalate	117-81-7	5.0	0.23	170	3.8
Butylbenzylphthalate	85-68-7	5.0	0.17	170	0.03
Chrysene	218-01-9	0.2	0.03	6.6	0.03
Dibenzo(a,h)anthracene	53-70-3	0.2	0.05	6.6	0.04
Diethylphthalate	84-66-2	5.0	0.20	170	3.5
Dimethylphthalate	131-11-3	5.0	0.04	170	0.04
Di-n-butylphthalate	84-74-2	5.0	0.76	170	0.89
Di-n-octylphthalate	117-84-0	5.0	0.03	170	0.04
Fluoranthene	206-44-0	0.2	0.04	6.6	0.02
Fluorene	86-73-7	0.2	0.04	6.6	0.06
Hexachlorobenzene	118-74-1	0.2	0.04	6.6	0.03
Indeno(1,2,3-cd)pyrene	193-39-5	0.2	0.05	6.6	0.03
Naphthalene	91-20-3	0.2	0.11	6.6	0.14
Nitrobenzene	98-95-3	0.2	0.05	6.6	0.05
Octachlorostyrene	29082-74-4	0.2	0.13	6.6	0.12
Phenanthrene	85-01-8	0.2	0.06	6.6	0.05
Pyrene	129-00-0	0.2	0.03	6.6	0.03
Pyridine	110-86-1	2	0.89	6.6	0.77

Table A-2 Analyte List, Practical Quantitation Limits, and Method Detection Limits (Cont'd).
(May 2009)

Parameter	CAS No.	Water		Soil	
		PQL	MDL	PQL	MDL
Metals (µg/L or mg/kg)					
Cadmium	7440-43-9	0.50	0.30	0.10	0.03
Calcium	7440-70-2	50	30	20	4
Chromium (total)	7440-47-3	2.0	0.60	0.2	0.03
Chromium (hexavalent)	18540-29-9	10	0.3	0.4	0.025
Cobalt	7440-48-4	10	0.3	0.3	0.09
Copper	7440-50-8	10	0.8	0.6	0.2
Iron	7439-89-6	20	4	6	2
Lead	7439-92-1	0.02	0.01	2.0	0.4
Magnesium	7439-95-4	20	2	3	0.7
Manganese	7439-96-5	5	0.2	0.2	0.04
Mercury	7439-97-6	0.2	0.03	0.02	0.006
Molybdenum	7439-98-7	2.0	0.60	0.40	0.08
Nickel	7440-02-0	2.0	0.7	0.4	0.07
Platinum	7440-06-4	0.1	0.1	0.1	na
Potassium	7440-09-7	2000	100	200	20
Selenium[5]	7782-49-2	5	0.7	6	2
Silver	7440-22-4	2.0	0.7	0.5	0.2
Sodium	7440-23-5	100	70	20	20
Strontium	7440-24-6	10	0.4	2	0.2
Tin	7440-31-5	50	2	10	1
Titanium	7440-32-6	10	0.03	2	0.06
Thallium	7440-28-0	0.02	0.003	0.02	0.003
Tungsten	7440-33-7	0.1	0.1	0.1	0.1
Uranium	7440-61-1	0.02	0.005	0.02	0.004
Vanadium	7440-62-2	2.0	1.00	1.0	0.30
Zinc	7440-66-6	10	0.6	2	0.3
Wet Chemistry and Misc. Analytes (µg/L or mg/kg)					
Alkalinity (total, CO_3^{--},HCO_3^-)	na	2000	220	2	na
Ammonia	7664-41-7	50	4.5	5.0	0.41
Chloride	16887-00-6	200	51	30	2.3
Chlorate	7790-93-4	20	4	0.2	0.04
Cyanide (total)	57-12-5	10	4.3	1	0.42
Conductivity	na	na	na	na	na
Nitrate	84145-82-4	50	4	5	0.44
Nitrite	14797-65-0	10	7	0.1	0.07

Table B-2 Analytical Methodologies

Parameter	Methodology
Aqueous	
VOCs	EPA 5030/8260B
SVOCs	EPA 8270C
Organochlorine Pesticides	EPA 8081A
Organophosphorous Pesticides	EPA 8141A
Organic Acids	HPLC-UV per Alpha Analytical SOP E.64 Rev.5
PCBs	EPA 8082 and/or EPA 1668A
Gasoline Range Organics	EPA 8015B
Diesel Range Organics	EPA 8015B
Oil Range Organics	EPA 8015B
Formaldehyde	EPA 8315A
Metals	EPA 6010B/6020 (As and Se ICP/MS collision cell)
Mercury	EPA 7470
Hexavalent chromium	EPA 218.6
Alkalinity	SM 2320B
Ammonia	EPA 350.1
Bromide	EPA 9056
Chloride	EPA 9056
Chlorate	EPA 9056
Cyanide	EPA 9012A/9014
Nitrate	EPA 9056
Nitrite	EPA 353.2
Phosphate (total)	EPA 365.1
Perchlorate	EPA 314.0
pH	EPA 9040B
Sulfate	EPA 9056
Surfactants	SM 5540C
TDS	SM 2540C
TSS	SM 2540D

Table B-2 Analytical Methodologies (Cont'd)

Parameter	Methodology
Aqueous	
Total Organic Carbon	EPA 9060
Radium 226	EPA 903.1
Radium 228	EPA 904.0 modified
Thorium (isotopic)	DOE EML HASL 300 modified (alpha spectroscopy)
Uranium (isotopic)	DOE EML HASL 300 modified (alpha spectroscopy)
Soil	
% Solids	EPA 160.3
VOCs	EPA 5035A/8260B
SVOCs	EPA 8270C
Organochlorine Pesticides	EPA 8081A
Organophosphorous Pesticides	EPA 8141A
Organic Acids	HPLC-UV per Alpha Analytical SOP E.64 Rev.5
PCBs	EPA 8082 and/or EPA 1668A
Dioxins/Furans (PCDDs/PCDFs)	EPA 8290
Gasoline Range Organics	EPA 8015B
Diesel Range Organics	EPA 8015B
Oil Range Organics	EPA 8015B
Formaldehyde	EPA 8315A
Metals	EPA 6010B/6020 (7062/7742/7740 optional)
Mercury	EPA 7471A
Hexavalent chromium	EPA 7199
Asbestos	EPA 600/R-93/116 modified per Berman & Kolk (2000)
Alkalinity	EPA 2320B
Ammonia	EPA 350.1
Bromide	EPA 9056
Chloride	EPA 9056
Chlorate	EPA 9056
Cyanide	EPA 9012
Nitrate	EPA 9056
Nitrite	EPA 353.2
Phosphate (total)	EPA 365.1
Perchlorate	EPA 314.0
pH	EPA 9045C
Sulfate	EPA 9056
Surfactants	SM 5540C modified
Total Organic Carbon	Lloyd Kahn