

4.0 SAMPLING PROCEDURES

4.1 SAMPLE COLLECTION PROCEDURES

4.1.0.1. Sample collection and sample identification procedures shall be selected to meet the project-specific DQOs and shall be conducted as described in the field SOPs included in Appendix I of this QAPP, which are based on the following guidance:

- RCRA Ground-Water Monitoring Draft Technical Guidance (U.S. EPA, 1992a)
- RCRA Facility Investigation Guidance (U.S. EPA, 1989b)
- RCRA Ground-Water Monitoring Technical Enforcement Guidance Document (U.S. EPA, 1986b OSWER-9950)
- American Society of Testing and Materials Methods
- Suggested Practices for the Design and Installation of Ground-Water Monitoring Wells (EPA/600/4-89/034, March 1991b)
- Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA (U.S. EPA, Office of Emergency and Remedial Response EPA 500/540/G-89/004 1988a)
- Guidance for Conducting Treatability Studies under CERCLA, Final (U.S. EPA EPA/540/R-92/071A November 1992b)
- Soil Sampling Quality Assurance User's Guide (Environmental Monitoring Systems Laboratory. Las Vegas, NV EPA/600/8-89/046 1989a)

- Representative Sampling Guidance Vol. 1, Soil. (U.S. EPA, 1991 OSWER Directive 9360.4-10 1991c).

4.0.0.1. The field SOPs may be included by reference or as attachments to the project-specific work plan. Any deviation to the field procedure SOPs as presented in this QAPP shall be described in the project-specific work plans.

4.1.1. Sample Collection Order, Containers, Preservation, and Holding Time

4.1.1.1. Sample containers shall be filled in order of compound volatility or stability as described in the field SOPs included in Appendix I. All samples shall be placed in contaminant-free containers as specified in the *U.S. EPA Specifications and Guidance for Obtaining Contaminant-Free Sample Containers* (U.S. EPA, 1992c). Containers shall be stored in clean areas to prevent exposure to fuels, solvents, and other contaminants. The containers that are recommended for sample collection, the required preservatives (if applicable), and sample holding times are listed Table 4-1 and in the Appendix I SOPs.

TABLE 4-1

**ANALYTICAL METHOD, SAMPLE CONTAINER, PRESERVATIVE, UNIT OF MEASURE,
AND HOLDING TIME CRITERIA**

| Analytical Method | Sample Container | Preservative | Unit of Measure | Holding Time |
|---|--|-----------------------------|-----------------|--|
| Water | | | | |
| VOCs (SW-846 8021B, 8015B pursuable 8260B, EPA 601, 602, 624) | 2 40-ml amber glass bottles with a Teflon™ septum cap; No head space | HCL; pH < 2 Chill to 4°C | µg/l | 14 days from sample collection to analysis |
| Petroleum Hydrocarbon (SW-846 8015B, extractable) | 1-liter amber glass bottle with a Teflon™ lined cap | Chill to 4°C | µg/l | 14 days from sample collection to extraction 40 days from sample extraction to analysis |
| SVOCs (SW-846 8270C, EPA 625) | 1-liter amber glass bottle with a Teflon™ lined cap | Chill to 4°C | µg/l | 7 days from sample collection to extraction 40 days from sample extraction to analysis |
| Herbicides and Pentachlorophenol (SW-846 8151A) | 1-liter amber glass bottle with a Teflon™ lined cap | Chill to 4°C | µg/l | 7 days from sample collection to extraction 40 days from sample extraction to analysis |
| Pesticides/PCBs (SW-846 8081A, EPA 608) | 1-liter amber glass bottle with a Teflon™ lined cap | Chill to 4°C | µg/l | 7 days from sample collection to extraction 40 days from sample extraction to analysis |
| PCBs (SW-846 8082) | 1-liter amber glass bottle with a Teflon™ lined cap | Chill to 4°C | µg/l | 7 days from sample collection to extraction 40 days from sample extraction to analysis |
| Polynuclear Aromatic Hydrocarbons (SW-846 8310) | 1-liter amber glass bottle with a Teflon™ lined cap | Chill to 4°C | µg/l | 7 days from sample collection to extraction 40 days from sample extraction to analysis |
| Explosives (SW-846 8330) | 1-liter amber glass bottle with a Teflon™ lined cap | Chill to 4°C | µg/l | 7 days from sample collection to extraction 40 days from sample extraction to analysis |
| Dioxins and Furans (SW-846 8280A, 8290) | 1-liter amber glass bottle with a Teflon™ lined cap | Chill to 4°C | ng/l | 30 days from sample collection to extraction 45 days from sample extraction to analysis |

TABLE 4-1

**ANALYTICAL METHOD, SAMPLE CONTAINER, PRESERVATIVE, UNIT OF MEASURE,
AND HOLDING TIME CRITERIA
(CONTINUED)**

| Analytical Method | Sample Container | Preservative | Unit of Measure | Holding Time |
|--|---|---|-----------------|---|
| Water (con't) | | | | |
| Total Organic Carbon (SW-846 9060, EPA 415.1/.2) | 100-ml polyethylene bottle or glass bottle with a Teflon™ septum cap | HCl or H ₂ SO ₄ ; pH<2 Chill to 4°C | µg/l | 28 days from sample collection to analysis |
| Metals (except mercury) (SW-846 6010A, 6010B Trace, 6020, 7000 Series, EPA 200.7, 200.8, 200.9) | 1-liter polyethylene bottle with a Teflon™ lined cap | HNO ₃ ; pH < 2 Chill to 4°C | µg/l | 180 days from sample collection to analysis |
| Mercury (SW-846 7470A, EPA 245.1) | 1-liter polyethylene bottle with Teflon™ lined cap | HNO ₃ ; pH < 2 | µg/l | 28 days from sample collection to analysis |
| Hexavalent-Chromium (SW-846 7196A) | 100-ml polyethylene bottle with Teflon™ lined cap | Chill to 4°C | µg/l | 24 hours from sample collection to analysis |
| Chloride (EPA 300.0) | 250-ml polyethylene bottle with a Teflon™ lined cap | Chill to 4°C | mg/l | 28 days from sample collection to analysis |
| Fluoride (EPA 300.0) | 250-ml polyethylene bottle with a Teflon™ lined cap | Chill to 4°C | mg/l | 28 days from sample collection to analysis |
| Sulfate (EPA 300.0) | 100-ml polyethylene bottle with a Teflon™ lined cap | Chill to 4°C | mg/l | 28 days from sample collection to analysis |
| Perchlorate (EPA 300.0 MOD) | 100-ml polyethylene bottle with a Teflon™ lined cap | Chill to 4°C | mg/l | 28 days from sample collection to analysis |

TABLE 4-1
ANALYTICAL METHOD, SAMPLE CONTAINER, PRESERVATIVE, UNIT OF MEASURE,
AND HOLDING TIME CRITERIA
(CONTINUED)

| Analytical Method | Sample Container | Preservative | Unit of Measure | Holding Time |
|---------------------------------------|---|---|------------------------|---|
| Water (con't) | | | | |
| Nitrite/Nitrate (EPA 300.0) | 250-ml polyethylene bottle with a Teflon™ lined cap | Chill to 4°C | mg/l | 48 hours from sample collection to analysis |
| Nitrite/Nitrate (EPA 353.2) | 250-ml polyethylene bottle with a Teflon™ lined cap | H ₂ SO ₄ ; pH < 2 Chill to 4°C | mg/l | 28 days from sample collection to analysis |
| Fluoride (EPA 340.2) | 500-ml polyethylene bottle with a Teflon™ lined cap | Chill to 4°C | mg/l | 28 days from sample collection to analysis |
| Sulfide (EPA 376.2) | 500-ml polyethylene bottle with a Teflon™ lined cap | ZnAc+NaOH; pH >9 Chill to 4°C | mg/l | 28 days from sample collection to analysis |
| Alkalinity (EPA 310.1) | 250-ml polyethylene bottle with a Teflon™ lined cap | Chill to 4°C | mg/l | 14 days from sample collection to analysis |
| Total Dissolved Solids (EPA 160.1) | 250-ml polyethylene bottle with a Teflon™ lined cap | Chill to 4°C | mg/l | 7 days from sample collection to analysis |
| Total Suspended Solids (EPA 160.2) | 1 liter polyethylene bottle with a Teflon™ lined cap | Chill to 4°C | mg/l | 7 days from sample collection to analysis |

Acronyms defined on last page of this table.

TABLE 4-1

**ANALYTICAL METHOD, SAMPLE CONTAINER, PRESERVATIVE, UNIT OF MEASURE,
AND HOLDING TIME CRITERIA
(CONTINUED)**

| Analytical Method | Sample Container | Preservative | Unit of Measure | Holding Time |
|---|---|--------------|-----------------|---|
| Soil | | | | |
| VOCs (SW-846, 8260B, EPA 8021B) | 2-40 ml vial with Teflon™ lined cap containing 10 ml of methanol or 3 EnCore™ samplers. 1-4-oz glass wide-mouth bottle with Teflon™ lined cap for moisture analysis. | Chill to 4°C | µg/kg | 14 days from sample collection to analysis. Samples for EnCore™ sampler must be transferred within 48 hours then above applies |
| Petroleum Hydrocarbon (SW-846 8015B Modified) | 4- or 8-oz glass wide-mouth with a Teflon™ lined cap | Chill to 4°C | mg/kg | 14 days from sample collection to extraction 40 days from sample extraction to analysis |
| SVOCs (SW-846 8270C) | 4- or 8-oz glass wide-mouth with a Teflon™ lined cap | Chill to 4°C | µg/kg | 14 days from sample collection to extraction 40 days from sample extraction to analysis |
| Herbicides and Pentachlorophenol (SW-846 8151A) | 4- or 8-oz glass wide-mouth with a Teflon™ lined cap | Chill to 4°C | µg/kg | 14 days from sample collection to extraction 40 days from sample extraction to analysis |
| Pesticides (SW-846 8081A) | 4- or 8-oz glass wide-mouth with a Teflon™ lined cap | Chill to 4°C | µg/kg | 14 days from sample collection to extraction 40 days from sample extraction to analysis |
| PCBs (SW-846 8082) | 4- or 8-oz glass wide-mouth with a Teflon™ lined cap | Chill to 4°C | µg/kg or mg/kg | 14 days from sample collection to extraction 40 days from sample extraction to analysis |
| Polynuclear Aromatic Hydrocarbons (SW-846 8310) | 4- or 8-oz glass wide-mouth with a Teflon™ lined cap | Chill to 4°C | µg/kg | 14 days from sample collection to extraction 40 days from sample extraction to analysis |
| Explosives (SW-846 8330) | 4- or 8-oz glass wide-mouth with a Teflon™ lined cap | Chill to 4°C | mg/kg | 14 days from sample collection to extraction 40 days from sample extraction to analysis |

TABLE 4-1

**ANALYTICAL METHOD, SAMPLE CONTAINER, PRESERVATIVE, UNIT OF MEASURE,
AND HOLDING TIME CRITERIA
(CONTINUED)**

| Analytical Method | Sample Container | Preservative | Unit of Measure | Holding Time |
|--|---|--------------|-----------------|---|
| Soil (con't) | | | | |
| Dioxin and Furan (SW-846 8280A, 8290) | 4- or 8-oz glass wide-mouth with a Teflon™ lined cap | Chill to 4°C | pg/kg | 30 days from sample collection to extraction 45 days from sample extraction to analysis |
| Metals (except mercury) (SW-846 6010B, 6010B Trace, 6020, 7000 Series, EPA 200.7, 200.8, 200.9) | 4- or 8-oz glass wide-mouth with a Teflon™ lined cap | Chill to 4°C | mg/kg | 180 days from sample collection to analysis all metals except mercury |
| Mercury (SW-846 7471A, EPA 245.5) | 4- or 8-oz glass wide-mouth with a Teflon™ lined cap | Chill to 4°C | mg/kg | 28 days from sample collection to analysis for mercury |
| Air | | | | |
| TO-13 SVOCs | PUF/XAD-2 Cartridge | Chill to 4°C | µg/sample | 7 days from sample collection to analysis and 30 days from extraction to analysis |
| TO-14 VOCs | Tedlar™ Bag or Summa Canister | None | ppbv | 3 days from sample collection to analysis (Tedlar Bag) 14 days from sample collection to analysis (Summa Canister) |
| TO-3 Ethane and Methane | Tedlar™ Bag or Summa Canister | None | ppbv | 3 days from sample collection to analysis (Tedlar Bag) 14 days from sample collection to analysis (Summa Canister) |

TABLE 4-1

**ANALYTICAL METHOD, SAMPLE CONTAINER, PRESERVATIVE, UNIT OF MEASURE,
AND HOLDING TIME CRITERIA
(CONTINUED)**

EPA Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW846, (EPA Third edition, September 1986; Final Update I, July 1992; Final Update IIA, August 1993; Final Update II, September 1994; Final Update IIB, January 1995); Final Update III, December 1996.

EPA 100-400 Series Methods for the Determination of Inorganic Substances in Environmental Samples, (EPA/600R-93/100. August 1993).

EPA 200 Series Methods for the Determination Metals in Environmental Samples, (EPA/600/4-91-010, June 1991; Supplement I, EPA/600R/94-111. May 1994).

EPA 600 Series Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater (U.S. EPA, CFR Title 40, Part 136, Appendix A, July 1996).

Compendium of Methods for Determination of Toxic Organic Compounds in Ambient Air (EPA/600/4-89/017, June 1988)

State of California Department of Health Services Determination of Perchlorate by Ion Chromatography (Rev., No.0, June 1997).

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|-------|---------------------------|------|----------------------------|-------|---------------------------------|
| µg/l | Microgram per liter | ppbv | Part per billion by volume | SVOCs | Semi-volatile organic compounds |
| mg/kg | Milligram per kilogram | mg/l | Milligram per liter | oz | Ounce |
| PCBs | Polychlorinated biphenyls | VOCs | Volatile organic compounds | µg/kg | Micrograms per kilogram |
| pg/kg | Picograms per kilograms | | | | |
| ng/l | Nanograms per liter | | | | |