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Experimental Design

4.1 Project Tasks

Task descriptions are provided below. The list of tasks reflects the Sampling and Analysis Plan provided in Appendix A of the Work Plan.

4.1.1 Task 1: Preparation

Task 1 includes meetings with DOC for general project orientation and project start-up to obtain information required for the project.

This QAPP with detailed scope of work has been prepared in accordance with Ecology formatting requirements, including a detailed description of the sampling procedures. The Sampling and Analysis Plan (SAP) was prepared concurrently with this QAPP. The SAP concentrates the sampling in identified areas of concern (AOCs) based on previous investigations and historical land use.

4.1.2 Task 2: Sample Collection

The study has a non-random sampling design, and applies a concentrated laboratory analysis approach to characterize surface water, groundwater, soils, and soil gas conditions within and around the WSP. Samples will be collected at locations with potential and/or known sources of chemical contaminants. The data collection and sampling activities will be conducted in a phased approach as outlined in the SAP.

The RI will follow all internal and Ecology guidance on sampling of surface water, groundwater, soil, and soil gas. The approach to sampling detailed herein is based on previously published documents for collecting samples.

Throughout the sampling event, proper sample collection, handling, preservation, transport, and custody procedures will be followed.

4.1.3 Task 3: Laboratory Analyses

On-Site Environmental, Redmond, Washington, will perform the analyses listed in Table 3. On-Site is a Washington-State-accredited laboratory. On-Site will provide the analytical results, including summary data sheets and all raw data, electronically (in Excel and EIM formats) to Parametrix. Parametrix will coordinate analytical work with laboratories prior to the sampling events and verify sample data delivery from the laboratories after each sampling event.

4.1.4 Task 4: Reporting

Data validation and database activities:

Analytical data will be reviewed and validated to verify they meet project data quality objectives and to identify any limitations of the data, following the process outlined in Ecology QA1 review guidelines (PTI 1989), or other guidelines if specified. These data will be reviewed by comparing calibration, accuracy, and precision results to the QC criteria listed in the method, the laboratory SOP, and the QAPP. If no QA guidelines exist for specific analytes, applicable U.S. Environmental Protection Agency (EPA) National and Regional Data Review guidelines will be used. The contractor will enter data into Ecology's Environmental Information Management (EIM) database.

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Health and Safety

The field work identified in this plan requires careful consideration of health and safety, including:

- Physical hazards associated with working in the WSP Landfill and within the WSP facility,
- Site security procedures for the WSP facility,
- Tool Policy for the WSP facility,
- Chemical hazards related to sample collection and handling, and
- Safe driving.

The Health and Safety Plan is included in Appendix C of the Work Plan.

Decontamination Procedures

To the greatest extent possible, disposable and/or dedicated personal protective and sampling equipment will be used to avoid cross-contamination.

Pre-cleaned sample bottles will be provided by the laboratory. As much as possible, dedicated sampling equipment will be used. If the equipment is to be reused, it will be scrubbed and washed with non-phosphate detergent and distilled water, followed by a rinse with an appropriate solvent. A final rinse with distilled water also will be performed. If a noticeable oily sheen or petroleum odor is observed after decontamination, sampling bowls and utensils used to process those samples will not be used for subsequent sample processing.

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Measurement Procedures

The laboratory will analyze the surface water, groundwater, soil, and soil gas samples for the applicable contaminant of concern based on the sample location. For example, potential solvent AOC samples at metal plant #1 will be analyzed for VOCs and metals, and UST area samples will be analyzed for VOCs, SVOCs, and metals.

The VOCs will be analyzed using United States Environmental Protection Agency (USEPA) SW-846 Method 8260. With this method, samples are analyzed by gas chromatograph/mass spectrometer (GC/MS). Samples are purged with an inert gas and the analytes are absorbed on a trap. The trap is quickly heated to a high temperature and the analytes are desorbed into a GC equipped with a capillary column. The GC uses a temperature program to separate analytes that are then detected with an MS. Mass spectra of the sample compound and a current laboratory-generated standard must match for positive analyte identification. Analytes are quantified by comparing the response of a major ion relative to an internal standard using a calibration curve developed for each GC/MS.

The SVOCs, including PAHs, will be analyzed using USEPA SW-846 Method 8270. Samples will be analyzed by GC/MS following extraction and, if necessary, appropriate sample cleanup and derivatization procedures. With this technique, sample extracts are injected into a GC equipped with a capillary column. The GC uses a temperature program to separate analytes that are then detected with an MS. Mass spectra of the sample compound and a current laboratory-generated standard must match for positive analyte identification. Analytes are quantified by comparing the response of a major ion relative to an internal standard using a calibration curve developed for each GC/MS.

TPH-D will be analyzed using Northwest total petroleum hydrocarbons (NWTPH) Method NWTPH-Dx. Samples will be analyzed by GC/flame ionization detector (GC/FID) following extraction and, if necessary, appropriate sample cleanup procedures. Sample extracts are injected into a GC equipped with a capillary column, which uses a temperature program to separate TPH

components that are then detected with an FID. TPH-D is identified by comparing the peak patterns of diesel with retention times of known standards. Diesel is quantified by comparing the sample peak response using a calibration curve developed for each target compound.

Metals (excluding mercury) will be analyzed using USEPA 6000 series methods. Samples will be analyzed by either Inductively Coupled Plasma (ICP) or ICP-Mass Spectrometer (ICP-MS) following acid extraction. Sample extracts injected into the ICP or ICP-MS are quantified by comparing instrument response to a calibration curve developed for each analyte. Mercury will be analyzed using USEPA Method 7470 or 7471. Samples will be analyzed by cold vapor absorption spectroscopy (CVS) following acid extraction. Sample extracts injected into the CVS are quantified by comparing instrument response to a calibration curve developed for mercury. Results will be reported for total metals.

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Quality Objectives

The data quality objectives (DQOs) for this project are presented below. They identify the seven steps taken to develop this QAPP.

1. State the Problem – Previous investigations have confirmed the presence of VOCs in the groundwater upgradient of the Sudbury Road Landfill and in additional monitoring wells around the WSP landfill. All monitoring wells are considered to be downgradient of the WSP. In several monitoring wells, the concentrations of PCE and TCE have exceeded the MTCA Method A cleanup levels for groundwater. In addition, the following are contaminants of concern based on historical site use:

- SVOCs, including PAHs
- PCBs
- TPHs
- Metals

2. Identify the Principle Study Questions – The decision will answer these questions: What is the source of the contamination in found in groundwater? Are historical or present activities at the WSP facility responsible for environmental contamination? Is the WSP Landfill responsible for environmental contamination? Alternative actions include eliminating areas from further study or plan and conduct further investigation activities.

3. Identify the Inputs to the Decision – Surface water, groundwater, soils, and soil gas samples will be collected from the identified AOCs. In addition, sample locations may be chosen based on field observations or decisions. Samples will be analyzed for VOCs, SVOCs, PCBs, NWTPH as diesel, and/or total metals, depending on the confirmed or suspected COCs in each AOC.

4. Define the Boundaries of the Study – The primary AOCs are listed in Table 3 and include the WSP Landfill, the former laundry and dry cleaning services area, the former motor pool, UST areas, the former autobody shop and furniture refurbishing area, the hazardous waste accumulation area, boiler ash from the former steam plant, the sign shop, and metal plant #1. Some sampling is dependent on field confirmation of appropriate sampling locations.

5. Develop a Decision Rule – If VOCs and other contaminants of concern are above cleanup limits, then Ecology will consider remedial options.
6. Specify Tolerable Limits on Decision Errors – Sampling should be conducted following guidance appropriate for surface water, groundwater, soil, and soil gas sampling and analyses, e.g., *USEPA Test Methods for Evaluating Solid Waste, Physical Chemical Methods*, 3rd edition SW-846 (EPA 1986). Analyses should be conducted using standard methods, by Ecology-approved analytical laboratories (alternate laboratories may be used with Ecology approval). Analytical data should meet standard quality control criteria (EPA 1999, EPA 2004).
7. Optimize the Design for Obtaining Data – The Work Plan, QAPP, and SAP present the design for conducting an RI to characterize the nature and vertical and horizontal extent of soil and groundwater contamination across the site and defining the characteristics of soils and groundwater to support a future FS.

Acceptance and performance criteria are often specified in terms of precision, accuracy, representativeness, completeness, and comparability (PARCC) parameters. Numerical acceptance criteria cannot be assigned to all PARCC parameters, but general performance goals are established for most data collection activities. PARCC parameters are briefly defined below.

Precision

Precision measures the reproducibility of measurements under a given set of conditions. Specifically, it is a quantitative measure of the variability of a group of measurements compared with their average value, usually stated in terms of standard deviation or coefficient of variation. It also may be measured as the relative percent difference (RPD) between two values. Precision includes the interrelated concepts of instrument or method detection limits (MDLs) and multiple field sample variance. Sources of this variance are sample heterogeneity, sampling error, and analytical error.

Accuracy

Accuracy measures the bias of the measurement system. Sources of this error include sampling process, field contamination, preservation, handling, sample matrix, sample preparation, and analysis. Data interpretation and reporting may also be significant sources of error. Typically, analytical accuracy is assessed through the analysis of spiked samples and may be stated in terms of percent recovery or the average (arithmetic mean) of the percent recovery. Blank samples are also analyzed to assess sampling and analytical bias (e.g., sample contamination).

Representativeness

Representativeness expresses the degree to which data represent a characteristic of a population, a parameter variation at a sampling point, or an environmental condition over time. Representativeness is a qualitative parameter, which is most concerned with proper design of the measurement program. Sample/measurement locations may be biased (judgmental) or unbiased (random or systematic). For unbiased schemes, the sampling must be designed not only to collect samples that represent conditions at a sample location, but also to select sample locations that represent the total area to be sampled. Representativeness also embodies the concept of temporal (for example, seasonal) variations in parameters or conditions.

Completeness

Completeness for sample collection is defined as the percentage of specified samples listed in the QAPP that were actually collected. The completeness goal will be 90% for this project. Completeness for acceptable data is defined as the percentage of acceptable data out of the total amount of data generated. Acceptable data includes data that passes all QC criteria or data that may not pass all QC criteria but for which appropriate corrective actions are taken.

Comparability

Comparability is a qualitative parameter expressing the confidence with which one data set may be compared to another. Sample data should be comparable with other measurement data for similar samples and sample conditions. This goal is achieved through the use of standard techniques to collect and analyze samples.

Analytical quality objectives for each method are summarized in Table 4. Reporting limits are the practical quantitation limits attainable with these methods. Ranges are presented for some analyte groups due to the large number of compounds analyzed. Analyte-specific reporting limits are presented in Appendix A.

7. Quality Objectives

Table 3 Areas of Concern

1. WSP Landfill (AOC)	VOCs, metals	VOCs, TPH-D, SVOCs, PAHs (boiler ash fill at various WSP locations)
2. Former dry cleaning services (AOC)		VOCs
3. Former motor pool (potential AOC)		VOCs, TPH-D, SVOCs
4. Former UST areas (potential AOC)	TPH-D	TPH-D, SVOCs
5. Former auto body shop and furniture refurbishing facility (potential AOC)		VOCs, TPH-D, SVOCs
6. Former hazardous waste accumulation area (potential AOC)		VOCs, SVOCs, metals, PCBs and TPH
7. Steam plant boiler ash (potential AOC)		PAHs
8. Sign shop (potential AOC)		VOCs
9. Metal Plant #1 (potential AOC)		VOCs

*Analytes that have been detected in previous sampling events.

SVOCs = Semi-volatile organic compounds
TPH = Total petroleum hydrocarbons
TPH-D = Total petroleum hydrocarbons-diesel
VOCs = Volatile organic compounds
PAHs = Polycyclic aromatic hydrocarbons

Table 4. Chemical Analytical Parameters, Laboratory Methods, and Method Detection Limits

	Soil	Soil	Soil	Water	Water	Water	SPE	SPE	SPE
PAHs by Method 8270D SIM	MDL	PQL	Units	MDL	PQL	Units	MDL	PQL	Units
Naphthalene	0.000372	0.0067	ppm	0.0137	0.10	ppb	0.0154	0.10	ppb
2-Methylnaphthalene	0.000281	0.0067	ppm	0.0195	0.10	ppb	0.0141	0.10	ppb
1-Methylnaphthalene	0.000204	0.0067	ppm	0.00587	0.10	ppb	0.0142	0.10	ppb
Acenaphthylene	0.000179	0.0067	ppm	0.00438	0.10	ppb	0.0108	0.10	ppb
Acenaphthene	0.000282	0.0067	ppm	0.00617	0.10	ppb	0.0190	0.10	ppb
Fluorene	0.000176	0.0067	ppm	0.00589	0.10	ppb	0.0123	0.10	ppb
Phenanthrene	0.000186	0.0067	ppm	0.00590	0.10	ppb	0.0101	0.10	ppb
Anthracene	0.000151	0.0067	ppm	0.00494	0.10	ppb	0.00979	0.10	ppb
Fluoranthene	0.000179	0.0067	ppm	0.00431	0.10	ppb	0.00729	0.10	ppb
Pyrene	0.000125	0.0067	ppm	0.00693	0.10	ppb	0.00479	0.10	ppb
Benzo[a]anthracene	0.0000872	0.0067	ppm	0.00418	0.010	ppb	0.00585	0.010	ppb
Chrysene	0.000103	0.0067	ppm	0.00503	0.010	ppb	0.00626	0.010	ppb
Benzo[b]fluoranthene	0.000134	0.0067	ppm	0.00611	0.010	ppb	0.00618	0.010	ppb
Benzo[k]fluoranthene	0.0000966	0.0067	ppm	0.00553	0.010	ppb	0.00594	0.010	ppb
Benzo[a]pyrene	0.0000577	0.0067	ppm	0.00607	0.010	ppb	0.0143	0.010	ppb
Indeno[1,2,3-c,d]pyrene	0.0000706	0.0067	ppm	0.00391	0.010	ppb	0.00603	0.010	ppb
Dibenz[a,h]anthracene	0.0000530	0.0067	ppm	0.00353	0.010	ppb	0.00618	0.010	ppb
Benzo[g,h,i]perylene	0.0000638	0.0067	ppm	0.00412	0.010	ppb	0.00646	0.010	ppb
	Soil	Soil	Soil	Water	Water	Water			
Semivolatiles by Method 8270D	MDL	PQL	Units	MDL	PQL	Units			
N-Nitrosodimethylamine	0.0103	0.033	ppm	0.195	1.0	ppb			
Pyridine	0.245	0.33	ppm	0.144	1.0	ppb			
Phenol	0.0128	0.033	ppm	0.233	1.0	ppb			
Aniline	0.146	0.17	ppm	0.266	1.0	ppb			
bis(2-chloroethyl)ether	0.0135	0.033	ppm	0.441	1.0	ppb			
2-Chlorophenol	0.0138	0.033	ppm	0.392	1.0	ppb			
n-Decane	0.0141	0.033	ppm	0.302	1.0	ppb			
1,3-Dichlorobenzene	0.0118	0.033	ppm	0.328	1.0	ppb			
1,4-Dichlorobenzene	0.0123	0.033	ppm	0.323	1.0	ppb			
Benzyl alcohol	0.0127	0.033	ppm	0.305	1.0	ppb			
1,2-Dichlorobenzene	0.0118	0.033	ppm	0.322	1.0	ppb			
2-Methylphenol (o-Cresol)	0.0125	0.033	ppm	0.320	1.0	ppb			
bis(2-Chloroisopropyl)ether	0.0127	0.033	ppm	0.360	1.0	ppb			
(3+4)-Methylphenol (m,p-Cresol)	0.0118	0.033	ppm	0.287	1.0	ppb			
N-Nitroso-di-n-propylamine	0.0142	0.033	ppm	0.349	1.0	ppb			
Hexachloroethane	0.0142	0.033	ppm	0.393	1.0	ppb			
Nitrobenzene	0.0157	0.033	ppm	0.369	1.0	ppb			
Isophorone	0.0129	0.033	ppm	0.346	1.0	ppb			
2-Nitrophenol	0.0151	0.033	ppm	0.392	1.0	ppb			
2,4-Dimethylphenol	0.0162	0.83	ppm	0.360	1.0	ppb			
bis(2-Chloroethoxy)methane	0.0129	0.033	ppm	0.382	1.0	ppb			

Table 4. Chemical Analytical Parameters, Laboratory Methods, and Method Detection Limits

	Soil	Soil	Soil	Water	Water	Water			
Semivolatiles by Method 8270D	MDL	PQL	Units	MDL	PQL	Units			
2,4-Dichlorophenol	0.0126	0.033	ppm	0.313	1.0	ppb			
Benzoic acid	0.0175	0.17	ppm	0.0356	5.0	ppb			
1,2,4-Trichlorobenzene	0.0130	0.033	ppm	0.407	1.0	ppb			
Naphthalene	0.0147	0.033	ppm	0.429	1.0	ppb			
4-Chloroaniline	0.00586	0.033	ppm	2.68	10	ppb			
Hexachlorobutadiene	0.0131	0.033	ppm	0.354	1.0	ppb			
4-Chloro-3-methylphenol	0.0112	0.033	ppm	0.339	1.0	ppb			
2-Methylnaphthalene	0.0143	0.033	ppm	0.387	1.0	ppb			
1-Methylnaphthalene	0.0140	0.033	ppm	0.344	1.0	ppb			
Hexachlorocyclopentadiene	0.0102	0.033	ppm	0.265	1.0	ppb			
2,4,6-Trichlorophenol	0.0130	0.033	ppm	0.346	1.0	ppb			
2,3-Dichloroaniline	0.0117	0.033	ppm	0.280	1.0	ppb			
2,4,5-Trichlorophenol	0.0128	0.033	ppm	0.206	1.0	ppb			
2-Chloronaphthalene	0.0127	0.033	ppm	0.309	1.0	ppb			
2-Nitroaniline	0.00964	0.033	ppm	0.334	1.0	ppb			
1,4-Dinitrobenzene	0.0108	0.033	ppm	0.322	1.0	ppb			
Dimethylphthalate	0.0121	0.033	ppm	0.287	1.0	ppb			
1,3-Dinitrobenzene	0.00868	0.17	ppm	0.236	1.0	ppb			
2,6-Dinitrotoluene	0.00822	0.033	ppm	0.377	1.0	ppb			
1,2-Dinitrobenzene	0.0118	0.033	ppm	0.292	1.0	ppb			
Acenaphthylene	0.0119	0.033	ppm	0.293	1.0	ppb			
3-Nitroaniline	0.00612	0.033	ppm	0.249	1.0	ppb			
2,4-Dinitrophenol	0.00478	0.033	ppm	3.95	10	ppb			
Acenaphthene	0.0102	0.033	ppm	0.397	1.0	ppb			
4-Nitrophenol	0.0116	0.033	ppm	0.222	1.0	ppb			
2,4-Dinitrotoluene	0.00969	0.17	ppm	0.345	1.0	ppb			
Dibenzofuran	0.0109	0.033	ppm	0.275	1.0	ppb			
2,3,4,6-Tetrachlorophenol	0.00843	0.033	ppm	0.287	1.0	ppb			
2,3,5,6-Tetrachlorophenol	0.00954	0.033	ppm	0.235	1.0	ppb			
Diethylphthalate	0.0131	0.17	ppm	0.357	1.0	ppb			
4-Chlorophenyl-phenylether	0.0110	0.033	ppm	0.228	1.0	ppb			
4-Nitroaniline	0.0185	0.033	ppm	0.345	1.0	ppb			
Fluorene	0.00948	0.033	ppm	0.262	1.0	ppb			
4,6-Dinitro-2-methylphenol	0.00699	0.033	ppm	0.267	5.0	ppb			
n-Nitrosodiphenylamine	0.0118	0.033	ppm	2.12	10	ppb			
1,2-Diphenylhydrazine	0.0156	0.033	ppm	0.271	1.0	ppb			
4-Bromophenyl-phenylether	0.00984	0.033	ppm	0.170	1.0	ppb			
Hexachlorobenzene	0.0100	0.033	ppm	0.240	1.0	ppb			
Pentachlorophenol	0.00902	0.33	ppm	0.468	5.0	ppb			
n-Octadecane	0.0199	0.033	ppm	0.335	1.0	ppb			
Phenanthrene	0.0109	0.033	ppm	0.283	1.0	ppb			
Anthracene	0.0101	0.033	ppm	0.230	1.0	ppb			
Carbazole	0.00910	0.033	ppm	0.276	1.0	ppb			

Table 4. Chemical Analytical Parameters, Laboratory Methods, and Method Detection Limits

	Soil	Soil	Soil	Water	Water	Water			
Semivolatiles by Method 8270D	MDL	PQL	Units	MDL	PQL	Units			
Di-n-butylphthalate	0.0140	0.033	ppm	0.276	1.0	ppb			
Fluoranthene	0.00986	0.033	ppm	0.250	1.0	ppb			
Benzidine	0.00128	0.33	ppm	1.19	10	ppb			
Pyrene	0.0117	0.033	ppm	0.271	1.0	ppb			
Butylbenzylphthalate	0.0222	0.033	ppm	0.359	1.0	ppb			
bis-2-Ethylhexyladipate	0.0148	0.033	ppm	0.285	1.0	ppb			
3,3'-Dichlorobenzidine	0.115	0.33	ppm	2.13	10	ppb			
Benzo[a]anthracene	0.0125	0.033	ppm	0.309	1.0	ppb			
Chrysene	0.0126	0.033	ppm	0.321	1.0	ppb			
bis(2-Ethylhexyl)phthalate	0.0191	0.033	ppm	0.172	1.0	ppb			
Di-n-octylphthalate	0.0131	0.033	ppm	0.235	1.0	ppb			
Benzo[b]fluoranthene	0.0106	0.033	ppm	0.240	1.0	ppb			
Benzo[k]fluoranthene	0.0151	0.033	ppm	0.316	1.0	ppb			
Benzo[a]pyrene	0.00922	0.033	ppm	0.228	1.0	ppb			
Indeno[1,2,3-c,d]pyrene	0.0111	0.033	ppm	0.233	1.0	ppb			
Dibenz[a,h]anthracene	0.00938	0.033	ppm	0.257	1.0	ppb			
Benzo[g,h,i]perylene	0.00920	0.033	ppm	0.274	1.0	ppb			
	Soil	Soil	Soil	Water	Water	Water			
NWTPH-Dx	MDL	PQL	Units	MDL	PQL	Units			
Diesel	8.78	25	ppm	0.0791	0.25	ppm			
Lube Oil	14.6	50	ppm	0.138	0.40	ppm			
	Soil	Soil	Soil	Water	Water	Water			
Volatiles by Method 8260B	MDL	PQL	Units	MDL	PQL	Units			
Dichlorodifluoromethane	0.628	1.0	ppb	0.143	0.20	ppb			
Chloromethane	1.69	5.0	ppb	0.0313	1.0	ppb			
Vinyl Chloride	0.857	1.0	ppb	0.0399	0.20	ppb			
Bromomethane	0.536	1.0	ppb	0.0978	0.20	ppb			
Chloroethane	1.69	5.0	ppb	0.175	1.0	ppb			
Trichlorofluoromethane	0.647	1.0	ppb	0.0599	0.20	ppb			
1,1-Dichloroethene	0.210	1.0	ppb	0.0459	0.20	ppb			
Acetone	4.57	5.0	ppb	0.562	5.0	ppb			
Iodomethane	0.643	5.0	ppb	0.343	1.0	ppb			
Carbon Disulfide	0.281	1.0	ppb	0.0258	0.20	ppb			
Methylene Chloride	2.74	5.0	ppb	0.175	1.0	ppb			
(trans) 1,2-Dichloroethene	0.789	1.0	ppb	0.0335	0.20	ppb			
Methyl t-Butyl Ether	0.173	1.0	ppb	0.0507	0.20	ppb			
1,1-Dichloroethane	0.219	1.0	ppb	0.0426	0.20	ppb			
Vinyl Acetate	0.231	5.0	ppb	0.163	2.0	ppb			
2,2-Dichloropropane	0.253	1.0	ppb	0.0702	0.20	ppb			
(cis) 1,2-Dichloroethene	0.179	1.0	ppb	0.0380	0.20	ppb			

Table 4. Chemical Analytical Parameters, Laboratory Methods, and Method Detection Limits

Volatiles by Method 8260B	Soil MDL	Soil PQL	Soil Units	Water MDL	Water PQL	Water Units			
2-Butanone	1.23	5.0	ppb	0.523	5.0	ppb			
Bromochloromethane	0.489	1.0	ppb	0.0710	0.20	ppb			
Chloroform	0.315	1.0	ppb	0.0527	0.20	ppb			
1,1,1-Trichloroethane	0.286	1.0	ppb	0.0336	0.20	ppb			
Carbon Tetrachloride	0.366	1.0	ppb	0.0329	0.20	ppb			
1,1-Dichloropropene	0.346	1.0	ppb	0.0612	0.20	ppb			
Benzene	0.142	1.0	ppb	0.0241	0.20	ppb			
1,2-Dichloroethane	0.266	1.0	ppb	0.0359	0.20	ppb			
Trichloroethene	0.554	1.0	ppb	0.0484	0.20	ppb			
1,2-Dichloropropane	0.302	1.0	ppb	0.0542	0.20	ppb			
Dibromomethane	0.351	1.0	ppb	0.0661	0.20	ppb			
Bromodichloromethane	0.273	1.0	ppb	0.0217	0.20	ppb			
2-Chloroethyl Vinyl Ether	3.29	5.0	ppb	0.210	1.0	ppb			
(cis) 1,3-Dichloropropene	0.197	1.0	ppb	0.0613	0.20	ppb			
Methyl Isobutyl Ketone	0.518	5.0	ppb	0.141	2.0	ppb			
Toluene	0.291	5.0	ppb	0.0291	1.0	ppb			
(trans) 1,3-Dichloropropene	0.203	1.0	ppb	0.0506	0.20	ppb			
1,1,2-Trichloroethane	0.375	1.0	ppb	0.0978	0.20	ppb			
Tetrachloroethene	0.297	1.0	ppb	0.0457	0.20	ppb			
1,3-Dichloropropane	0.229	1.0	ppb	0.0660	0.20	ppb			
2-Hexanone	0.679	5.0	ppb	0.0969	2.0	ppb			
Dibromochloromethane	0.298	1.0	ppb	0.0382	0.20	ppb			
1,2-Dibromoethane	0.199	1.0	ppb	0.0952	0.20	ppb			
Chlorobenzene	0.196	1.0	ppb	0.0340	0.20	ppb			
1,1,1,2-Tetrachloroethane	0.254	1.0	ppb	0.0465	0.20	ppb			
Ethylbenzene	0.168	1.0	ppb	0.0243	0.20	ppb			
m,p-Xylene	0.401	2.0	ppb	0.0333	0.40	ppb			
o-Xylene	0.273	1.0	ppb	0.0255	0.20	ppb			
Styrene	0.178	1.0	ppb	0.0231	0.20	ppb			
Bromoform	0.538	1.0	ppb	0.0928	1.0	ppb			
Isopropylbenzene	0.162	1.0	ppb	0.0284	0.20	ppb			
Bromobenzene	0.244	1.0	ppb	0.117	0.20	ppb			
1,1,2,2-Tetrachloroethane	0.462	1.0	ppb	0.0557	0.20	ppb			
1,2,3-Trichloropropane	0.306	1.0	ppb	0.0939	0.20	ppb			
n-Propylbenzene	0.179	1.0	ppb	0.0188	0.20	ppb			
2-Chlorotoluene	0.325	1.0	ppb	0.0401	0.20	ppb			
4-Chlorotoluene	0.336	1.0	ppb	0.0402	0.20	ppb			
1,3,5-Trimethylbenzene	0.258	1.0	ppb	0.0258	0.20	ppb			
tert-Butylbenzene	0.262	1.0	ppb	0.0243	0.20	ppb			
1,2,4-Trimethylbenzene	0.209	1.0	ppb	0.0217	0.20	ppb			
sec-Butylbenzene	0.183	1.0	ppb	0.0220	0.20	ppb			
1,3-Dichlorobenzene	0.278	1.0	ppb	0.0266	0.20	ppb			
p-Isopropyltoluene	0.242	1.0	ppb	0.0257	0.20	ppb			

Table 4. Chemical Analytical Parameters, Laboratory Methods, and Method Detection Limits

	Soil	Soil	Soil	Water	Water	Water			
Volatiles by Method 8260B	MDL	PQL	Units	MDL	PQL	Units			
1,4-Dichlorobenzene	0.269	1.0	ppb	0.123	0.20	ppb			
1,2-Dichlorobenzene	0.321	1.0	ppb	0.107	0.20	ppb			
n-Butylbenzene	0.222	1.0	ppb	0.0394	0.20	ppb			
1,2-Dibromo-3-chloropropane	0.940	5.0	ppb	0.468	1.0	ppb			
1,2,4-Trichlorobenzene	0.383	1.0	ppb	0.0398	0.20	ppb			
Hexachlorobutadiene	0.503	5.0	ppb	0.0529	0.20	ppb			
Naphthalene	0.314	1.0	ppb	0.0547	1.0	ppb			
1,2,3-Trichlorobenzene	0.259	1.0	ppb	0.0586	0.20	ppb			
Volatiles by Method 8260B/SIM	Soil	Soil	Soil	Water	Water	Water			
	MDL	PQL	Units	MDL	PQL	Units			
Vinyl Chloride					0.020	ppb			
	Soil	Soil	Soil	Water	Water	Water	Dissolved	Dissolved	Dissolved
ICP Metals by Method 200.7/6010B	MDL	PQL	Units	MDL	PQL	Units	MDL	PQL	Units
Antimony	3.55	5.0	ppm	53.1	100	ppb	63.2	100	ppb
Arsenic	1.65	10	ppm	25.8	200	ppb	44.1	200	ppb
Beryllium	0.0103	0.50	ppm	0.223	10	ppb	0.466	10	ppb
Cadmium	0.0744	0.50	ppm	1.49	10	ppb	1.17	10	ppb
Chromium	0.155	0.50	ppm	4.40	10	ppb	3.26	10	ppb
Copper	0.384	0.50	ppm	5.98	10	ppb	6.42	10	ppb
Lead	1.18	5.0	ppm	35.6	100	ppb	20.9	100	ppb
Nickel	0.389	2.5	ppm	7.34	50	ppb	7.99	50	ppb
Selenium	3.37	10	ppm	52.5	200	ppb	102	200	ppb
Silver	0.201	0.50	ppm	5.54	10	ppb	5.41	10	ppb
Thallium	9.64	10	ppm	135	200	ppb	184	200	ppb
Zinc	0.361	2.5	ppm	4.95	50	ppb	5.85	50	ppb

Table 4. Chemical Analytical Parameters, Laboratory Methods, and Method Detection Limits

	Soil	Soil	Soil	Water	Water	Water	Dissolved	Dissolved	Dissolved
ICP/MS Metals by Method 200.8/6020	MDL	PQL	Units	MDL	PQL	Units	MDL	PQL	Units
Antimony	0.0180	5.0	ppm	0.160	5.5	ppb	0.0441	5.0	ppb
Arsenic	0.0104	10	ppm	0.577	3.3	ppb	0.0661	1.0	ppb
Beryllium	0.00720	0.50	ppm	0.230	11	ppb	0.0517	10	ppb
Cadmium	0.00461	0.50	ppm	0.0401	4.4	ppb	0.0154	4.0	ppb
Chromium	0.0438	0.50	ppm	0.654	11	ppb	0.109	10	ppb
Copper	0.0153	0.50	ppm	0.321	11	ppb	0.304	10	ppb
Lead	0.0353	5.0	ppm	0.218	1.1	ppb	0.0123	1.0	ppb
Nickel	0.0178	2.5	ppm	0.303	56	ppb	0.0364	40	ppb
Selenium	0.0485	10	ppm	1.06	5.6	ppb	0.127	5.0	ppb
Silver	0.0163	0.50	ppm	0.199	11	ppb	0.0609	10	ppb
Thallium	0.00547	5.0	ppm	0.0284	5.6	ppb	0.0133	5.0	ppb
Zinc	0.133	2.5	ppm	2.32	56	ppb	0.487	50	ppb
	Soil	Soil	Soil	Water	Water	Water			
Mercury by Method 7470A/7471A	MDL	PQL	Units	MDL	PQL	Units			
Mercury	0.000247	0.25	ppm	0.0126	0.50	ppb			
Mercury (low)	n/a	n/a	n/a	0.0145	0.038	ppb			

8

Quality Control Procedures

8.1 Field

Table 5 specifies the sample volumes, types of containers, preservation, and holding times for all analyses.

Field Logbooks and Data Forms

Field logbooks and data forms/sheets will be used to document daily activities and observations. Documentation will be sufficient to enable participants to accurately and objectively reconstruct events that occurred during the project at a later time. Entries will be made in waterproof ink, dated, and signed. Project-specific field data forms/sheets will be used to capture field operations and observations.

If corrections to the field logbooks are necessary, they will be made by drawing a single line through the original entry (so that the original entry is legible) and writing the corrected entry alongside. The correction will be initialed and dated. Corrected errors may require a footnote explaining the correction.

Custody Procedures

The primary objective of chain of custody procedures is to provide an accurate written or computerized record that can be used to trace the possession and handling of a sample from collection to completion of all required analyses. A sample is in custody when it is:

- In someone's physical possession
- In someone's view
- Locked up
- Kept in a secured area that is restricted to authorized personnel

8. Quality Control Procedures

Table 5 Sample Volumes, Containers, Preservation, and Holding Times for Target Analytes

VOCs	TBD	8260	Soil	3 Encore® Samplers	Cool to $\leq 6^{\circ}\text{C}$	7 days for extraction, then 14 days until analysis
VOCs	TBD	8260	Water	3 VOA vials	HCl pH < 2; Cool to $\leq 6^{\circ}\text{C}$	14 days to analysis
VOCs	Field	Modified 8260	Soil Gas	TBD	Cool to $\leq 6^{\circ}\text{C}$	14 days to analysis
SVOCs	TBD	8270	Soil	8-oz glass jar, Teflon lid	Cool to $\leq 6^{\circ}\text{C}$	14 days for extraction, then 40 days until analysis
SVOCs	TBD	8270	Water	1-liter amber glass, Teflon lid	Cool to $\leq 6^{\circ}\text{C}$	7 days for extraction, then 40 days until analysis
PAHs	TBD	8270	Soil	8-oz glass jar, Teflon lid	Cool to $\leq 6^{\circ}\text{C}$	14 days for extraction, then 40 days until analysis
PAHs	TBD	8270	Water	1-liter amber glass, Teflon lid	Cool to $\leq 6^{\circ}\text{C}$	7 days for extraction, then 40 days until analysis
TPH-D	TBD	NWTPH-Dx	Soil	8-oz glass jar, Teflon lid	HCl pH < 2; Cool to $\leq 6^{\circ}\text{C}$	14 days for extraction, then 40 days until analysis
TPH-D	TBD	NWTPH-Dx	Water	1-liter amber glass, Teflon lid	Cool to $\leq 6^{\circ}\text{C}$	14 days for extraction, then 40 days until analysis
Metals	TBD	6000/7000 series	Soil	500-ml Teflon bottle	Cool to $\leq 6^{\circ}\text{C}$	6 months to analysis, except Hg (28 days)
Metals	TBD	6000/7000 series	Water	8-oz glass jar, Teflon lid	HNO ₃ pH < 2; Cool to $\leq 6^{\circ}\text{C}$	6 months to analysis, except Hg (28 days)

Key:

HCl	=	Hydrochloric acid
Hg	=	Mercury
HNO ₃	=	Nitric acid
SVOCs	=	Semivolatile organic compounds
TBD	=	To be determined
TPHs	=	Total petroleum hydrocarbons
VOCs	=	Volatile organic compounds

Field Custody Procedures

The following guidance will be used to ensure proper control of samples while in the field:

- As few people as possible will handle the samples.
- The sample collector will be responsible for the care and custody of collected samples until they are transferred to another person or dispatched properly under chain of custody rules.
- The sample collector will record sample data in the field logbook and/or on field data forms/sheets.
- The sampling team leader will determine whether proper custody procedures were followed during the fieldwork and will decide whether additional samples are required.

When transferring custody (i.e., releasing samples to a shipping agent), the following will apply:

- The container in which the samples are packed will be sealed and accompanied by two copies of the chain of custody records. When transferring samples, the individuals relinquishing and receiving them must sign, date, and note the time on the chain of custody record. This record will document sample custody transfer.
- Samples will be dispatched to the laboratory for analysis with separate chain of custody records accompanying each shipment. Shipping containers will be sealed with custody seals for shipment to the laboratory. The chain of custody records will be signed by the relinquishing individual, and the method of shipment, name of courier, and other pertinent information will be entered on the chain of custody record before placement in the shipping container.
- All shipments will be accompanied by chain of custody records identifying their contents. The original record will accompany the shipment. The other copies will be distributed appropriately to the site team leader and site manager.
- If samples are sent by common carrier, a bill of lading will be used. Freight bills and bills of lading will be retained as part of the permanent documentation.

Laboratory Custody Procedures

A designated sample custodian at the laboratory will accept custody of the shipped samples from the carrier and enter preliminary information about the package into a package or sample receipt log, including the initials of the person delivering the package and the status of the custody seals on the coolers (i.e., broken versus unbroken). The custodian responsible for sample log-in will follow the laboratory's SOP for opening the package, checking the contents, and verifying

8. Quality Control Procedures

that the information on the chain of custody agrees with the samples received. The laboratory will follow its internal chain of custody procedures as stated in the laboratory QA manual.

Field QC Samples

Field QC samples for this project will include: field (equipment rinsate) blank and field duplicate for collection of sufficient sample volume to allow the laboratories to conduct the QC analyses identified in Table 6. The field/rinsate blank is used to evaluate potential contamination from sampling equipment. The matrix spike (MS) and matrix spike duplicate (MSD) taken from the duplicate sample are co-located samples collected concurrently with one sample; the laboratory uses the MSs/MSDs to measure analytical precision and accuracy.

Table 6 Field Quality Control Samples for Each Parameter monitored at POTWs

8260	VOCs	Soil	1 per 20 samples	1 per 20 samples	1 per 20 samples
8260	VOCs	Water	1 per 20 samples	1 per 20 samples	1 per 20 samples
8260	VOCs	Soil Gas	NA	NA	NA
8270	SVOCs	Soil	1 per 20 samples	1 per 20 samples	1 per 20 samples
8270	SVOCs	Water	1 per 20 samples	1 per 20 samples	1 per 20 samples
8270	PAHs	Soil	1 per 20 samples	1 per 20 samples	1 per 20 samples
8270	PAHs	Water	1 per 20 samples	1 per 20 samples	1 per 20 samples
8082	PCBs	Water	1 per 20 samples	1 per 20 samples	1 per 20 samples
NWTPH-Dx	TPH-D	Soil	1 per 20 samples	1 per 20 samples	1 per 20 samples
NWTPH-Dx	TPH-D	Water	1 per 20 samples	1 per 20 samples	1 per 20 samples
6000/7000 series	Metals	Soil	1 per 20 samples	1 per 20 samples	1 per 20 samples
6000/7000 series	Metals	Water	1 per 20 samples	1 per 20 samples	1 per 20 samples

a – A minimum of one rinsate blank will be collected per 20 samples of the same matrix collected using non-dedicated sampling equipment.

b – A minimum of one MS/MSD for organic analyses (MS/Duplicate for metals) will be analyzed per 20 samples of the same matrix.

Key:

MS/MSD = Matrix spike/matrix spike duplicate.

NA = Not applicable.

PAHs = Polycyclic aromatic hydrocarbons.

BNAs = Base/neutral/acid extractable compounds (semivolatiles).

NA = Not applicable.

NWTPH-Dx = Northwest total petroleum hydrocarbon – diesel.

TBD = To be determined.

SVOCs = Semivolatile organic compounds.

VOCs = Volatile organic compounds.

The time that each individual grab sample was collected will also be noted before the samples are composited on the site.

One equipment rinsate blank for every twenty samples will be collected. The blanks will be collected by filling sample bottles using the same equipment used for actual sample collection.

One field duplicate will be collected for every twenty samples for each analysis. Clean blank water field (equipment rinsate) blanks will be provided by the laboratory.

A modified one-person clean hands/dirty hands sampling technique will be used to collect the samples.

8.2 Laboratory

Laboratory QC samples are summarized in Table 7. Detailed QA procedures are documented in each subcontracted laboratory's quality assurance manual. One QC target for this project is for each lab to extract and analyze all the samples collected during each event in a single batch. By doing this, a single set of quality control parameters will be applicable to all samples collected during each sampling event.

Table 7 Analytical Laboratory Quality Control Samples

8260	VOCs	1/batch/matrix	1/batch/matrix	1/batch/matrix	1/batch/matrix
8270	SVOCs	1/batch/matrix	1/batch/matrix	1/batch/matrix	1/batch/matrix
NWTPH	TPH-D	1/batch/matrix	1/batch/matrix	1/batch/matrix	1/batch/matrix
6000/7000 series	Metals	1/batch/matrix	1/batch/matrix	1/batch/matrix	*

Key:

LCS – Laboratory control sample.

MS – Matrix spike.

MSD – Matrix spike duplicate.

NA – Not applicable.

PAHs – Polycyclic aromatic hydrocarbons.

BNAs – Base/neutral/acid extractable compounds (semivolatiles).

NWTPH-Dx – Northwest total petroleum hydrocarbons – diesel.

TBD – To be determined.

SVOCs – Semivolatile organic compounds.

VOCs – Volatile organic compounds.

*One duplicate per batch per matrix is required for metals.

The method blank is used to assess potential contamination from sample handling in the laboratory.

The laboratory control sample (LCS) is sometimes referred to as a blank spike. The LCS is used to measure the accuracy of the laboratory by determining the ability of the lab to recover known amounts of target analytes in the absence of matrix effects.

Known amounts of target analytes are added to the MS and MSD in the laboratory. The laboratories measure the percent recovery of these compounds to estimate accuracy. Analytical precision is estimated by comparing the MS and MSD recoveries. The matrix spikes allow the laboratory to assess matrix interferences. Precision is also impacted by field variability since separate samples are being collected.

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9

Data Verification, Review, and Validation

9.1 Data Verification

Field data and observations will be recorded in detailed log books. All subcontracted laboratories will provide both electronic and hard copy data packages for data. Each data package will include a case narrative discussing any problems with the analyses, alterations, if any, made to the methods, and an explanation of data qualifiers. The data package will include all relevant QC results. QC information will be used to evaluate the accuracy and precision of the data and to determine whether measurement data quality objectives were met.

A Quality Assurance level 1 (QA1) analytical data review will be conducted following the process outlined in Ecology QA1 review guidelines (PTI 1989). QA1 includes review of case narratives and laboratory data. Reviews verify that methods specified in this QAPP were followed, calibrations and QC checks are provided for all samples, and data are correct and complete. Evaluation criteria include holding times, calibrations, blanks, detection limits, control samples, spike recoveries and relative percent differences, and laboratory-applied data qualifiers.

Significant laboratory findings will be discussed with the applicable laboratory project managers. QA summary memoranda will be prepared for the record. Impacts, if any, to the data will be summarized and addressed in the final report.

Field data will also be evaluated for QA. Impacts, if any, to the data will be summarized and addressed in the final report.

All reviews will be completed by the QA lead and an experienced data validation chemist, and checked by the project manager.

9.2 Data Quality (Usability) Assessment

Once the data verification process has been completed, the project manager will determine whether the data are adequate for the calculations, determinations, and decisions for which this project was conducted. If the results are acceptable, data analysis will be completed.

Data analysis will include, but not be limited to, compiling summary statistics and constructing plots to examine the distribution of contaminant concentrations in samples spatially, temporally, and by source (e.g., industrial versus non-industrial).

9.3 Data Validation

Analytical data will be validated to verify they meet project data quality objectives and to identify any limitations of the data, following the process outlined in Ecology QA1 review guidelines (PTI 1989). These data will be validated by comparing calibration, accuracy, and precision results to the QC criteria listed in the method, the laboratory SOP, and the QAPP. If no QA guidelines exist for specific analytes, then applicable USEPA National and Regional Data Review guidelines will be used.

9.4 Data Management Procedures

Field and laboratory project data will be entered into Excel spreadsheets. Entries will be independently verified for accuracy.

All applicable data will be entered into Ecology's Environmental Information Management system (EIM). Entries will be independently verified for accuracy.

9.5 Audits and Reports

The subcontracted laboratory will conduct performance and system audits of their procedures. Ecology's Accreditation Program determines whether external laboratories may be used to analyze samples.

The contractor will prepare the following reports for this project:

- Draft Summary Technical Report
- Final Summary Technical Report

Project data will be entered into:

- Ecology's EIM
- Ecology's Phase 2 Access database

10

References

Ecology, July 2004a. Washington State Department of Ecology, Guidelines for Preparing Quality Assurance Project Plans for Environmental Studies, Publication Number 04-03-030.

EPA. 1986. USEPA Test Methods for Evaluating Solid Waste, Physical Chemical Methods, 3rd edition SW-846

_____. 1999. EPA, USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review, EPA-540/R-99-008 (PB99-963506), October 1999.

_____. 2004. Review, OSWER 9240.1-45, EPA 540-R-04-004, October 2004.

PTI. 1989. Data Validation Guidance Manual for Selected Sediment Variables. Prepared by PTI Environmental Services for Washington Department of Ecology, Olympia, Washington.

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A

Meeting Notes

This is Appendix A to the document:
Appendix B: Final Quality Assurance Project Plan

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C

Health and Safety Plan

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Project Health and Safety Plan Washington State Penitentiary Remedial Investigation/ Feasibility Study



February 2010

Parametrix

Project Health and Safety Plan Washington State Penitentiary Remedial Investigation/Feasibility Study

Prepared for

Washington State Department of Corrections

Departments of General Administration/Corrections (DGA/DOC) Team Program
Box 41112
Olympia, WA 98504

Prepared by

Parametrix

1231 Fryar Avenue
Sumner, WA 98390-1516
T. 253.863.5128 F. 253.863.0946
www.parametrix.com

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KEY TERMS

COCs	chemicals of concern
CPR	cardiopulmonary resuscitation
DOC	Department of Corrections
FS	feasibility study
HASP	Health and Safety Plan
HAZWOPER	Hazardous Waste Operation
HVOCs	halogenated volatile organic compounds
HWA	HWA Geosciences Incorporated
NIOSH	National Institute of Safety and Health
PID	photoionization detector
PPE	personal protective equipment
RI	remedial investigation
SOPs	standard operating procedures
VOCs	volatile organic compounds
WSP	Washington State Penitentiary

PROJECT HEALTH AND SAFETY INFORMATION SHEET			
Project Manager:	Mike Warfel, Parametrix	Date:	February 25, 2010
Project Name:	Washington State Penitentiary RI/FS	Project No.:	215-2662-004
Site Name and Address:	Washington State Penitentiary 1313 N. 13th Street, Walla Walla, Washington		
Client Contact:	Jack Olson	Phone:	(360) 725-8342
Site Description:	Over many years of operation, the Washington State Penitentiary used hazardous chemicals in its dry cleaning, machine repair, metalworking, and refueling activities. The purpose of the Remedial Investigation is to gather more information to determine where and how much contamination is present in soil and groundwater. The Feasibility Study will evaluate cleanup alternatives in preparation for a cleanup action.		
Estimated Date of Fieldwork:	Spring 2010	Due Date of Health & Safety Plan:	February 25, 2010
Type of Work to be Performed (check all that apply):			
<input type="checkbox"/> File Review <input type="checkbox"/> Surveying <input checked="" type="checkbox"/> Environmental Sampling <input type="checkbox"/> Engineering and/or Maintenance Work (specify below) <input type="checkbox"/> Inspection			
Notes: Parametrix will be performing a subsurface soil and groundwater investigation at the three sites involving utility location by conventional and air knife methods, direct push boring and well installation, and sampling of soil and groundwater in preparation for road improvements.			
Collection of Field Samples:			
<input checked="" type="checkbox"/> Groundwater <input checked="" type="checkbox"/> Surface Water <input checked="" type="checkbox"/> Soil <input type="checkbox"/> Air <input type="checkbox"/> Wastes (specify)			
<input type="checkbox"/> Biological <input type="checkbox"/> Entry into confined spaces (e.g., storage tank, sewer, utility vault, trenches, or other excavations) <input checked="" type="checkbox"/> Other (please specify) – Soil Gas			
Notes: Identified contaminants of concern include petroleum hydrocarbons, volatile and semivolatile organic compounds (VOCs and SVOCs), and metals in soil and groundwater water. High levels of noise and safety hazards may be present from sampling equipment.			
Role of Parametrix at site (check one):			
<input checked="" type="checkbox"/> Prime Contractor <input type="checkbox"/> Subcontractor to:			
Notes: Parametrix personnel will be conducting the remedial activities shown below. Drilling will be completed by a subcontractor.			
<input checked="" type="checkbox"/> Drilling <input type="checkbox"/> Operations and Maintenance <input type="checkbox"/> Construction <input checked="" type="checkbox"/> Field Sampling			
<input checked="" type="checkbox"/> Surveying <input type="checkbox"/> Remedial Actions			
Field Team Leader:	To Be Determined		
Health and Safety Officers:	Corporate: Sheila McConnell, CIH Site: To Be Determined		
Regulatory/Enforcement Status of Site (check all that apply):			
<input type="checkbox"/> Superfund Site			
<input checked="" type="checkbox"/> Enforcement Actions (please check all that apply and describe)			
<input type="checkbox"/> Federal			
<input checked="" type="checkbox"/> State – Department of Ecology Agreed Order			
<input type="checkbox"/> Local			
<input type="checkbox"/> Voluntary Investigations by Site Owner			
<input type="checkbox"/> On-site inspectors present? (If yes, provide names, phone numbers, and agency affiliations.)			
Notes:			

1. INTRODUCTION

The Department of Corrections (DOC) has retained Parametrix to conduct a remedial investigation (RI) and feasibility study (FS) of the Washington State Penitentiary (WSP) located at Walla Walla, Washington (Figure 1).

This Project Health and Safety Plan (HASP) presents project specific health and safety requirements for the RI. This project HASP is designed for use in conjunction with the Parametrix Health and Safety Manual (Parametrix 2003).

The health and safety requirements presented in this document are applicable to Parametrix employees and Parametrix subcontractors working on the project or persons visiting the job site during remediation activities. Any modification or additions to this project HASP will be completed as an addendum in the form of a technical memorandum.

2. SCOPE OF WORK

Parametrix's primary role is to conduct a surface and subsurface soil, soil gas, and groundwater investigation where the proposed activities include:

- Observation of utility location services provided by a subcontractor.
- Observation of drilling services to be provided by a subcontractor, using the sonic drilling method.
- Collection of surface soil samples using hand tools and test pits.
- Collection of soil gas samples.
- Collection of soil and groundwater samples during drilling.
- Collection of samples of soil cuttings from drilling.

The overall hazard level associated with the above activities is expected to be low on a scale of low, moderate, and high. An analysis of potential hazards associated with the activities is presented in Section 3.

3. HAZARD ANALYSIS

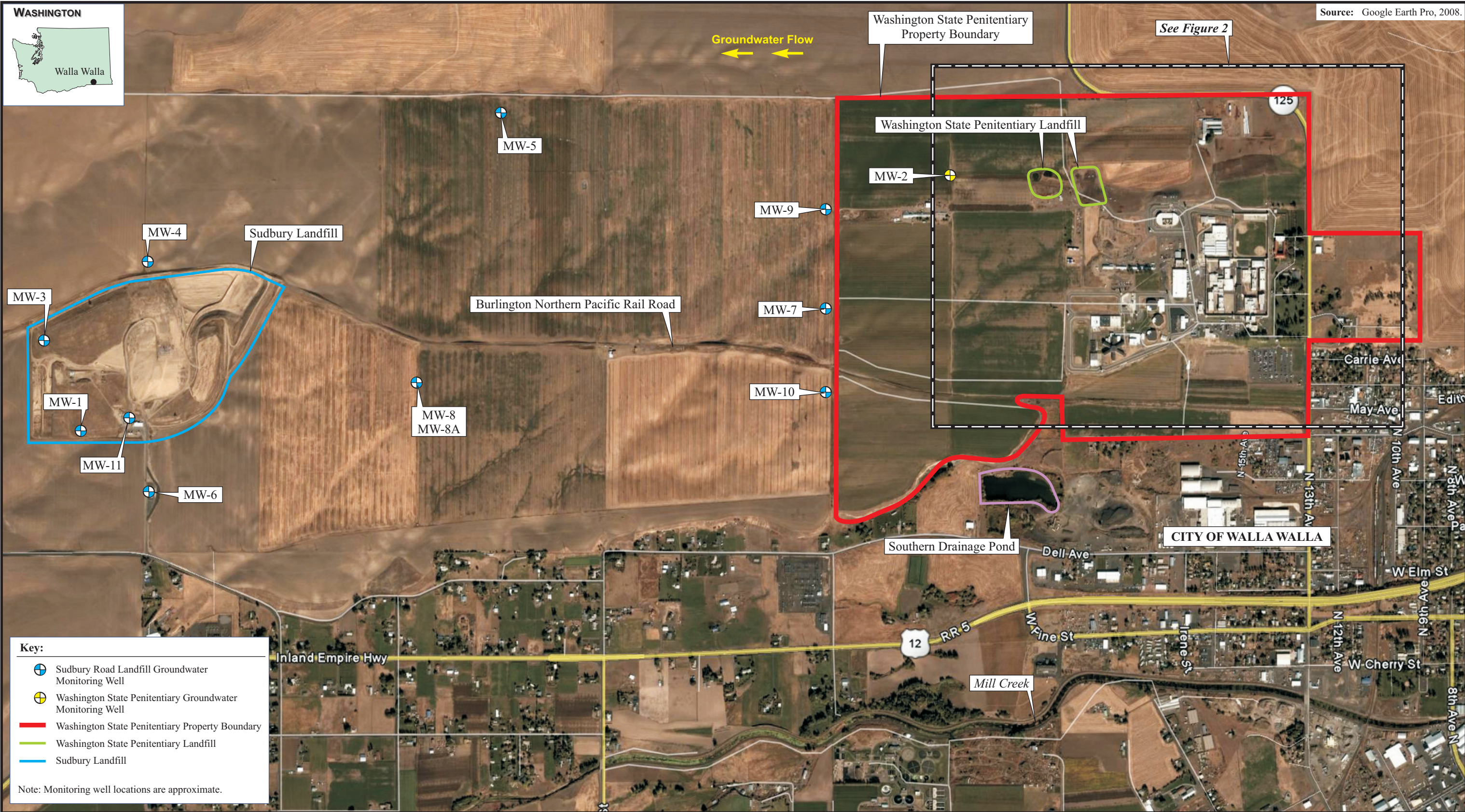
A hazard analysis was conducted for the field activities described in Section 2 to identify potential health and safety concerns. The hazard analysis will be updated if additional project-related hazards are identified.

3.1 PHYSICAL HAZARD ANALYSIS

Physical hazards that may be encountered at the site are presented below in Table 1.

Table 1. Physical Hazard Analysis for Project Activities, WSP RI/FS

Activity	Hazard	Mitigation
Drilling	Slip/Trips/Falls	<ul style="list-style-type: none"> • Keep work areas free of debris, etc. • Clean up work areas following completion of activities. • Watch for debris and other hazards that may be present from past site operations. • Follow required safety procedures. • Use proper illumination.
	Flying Debris/Soil and Splashing Liquids	<ul style="list-style-type: none"> • Wear safety glasses or other applicable eye protection.
	Drilling Rig	<ul style="list-style-type: none"> • Wear hardhat and steel-toed footwear. • Know the location of drill emergency stop switch. • Confirm the stop switch procedure with the driller • Maintain eye contact with driller. • Don't move drill rig with mast up. • Check minimum distance to power lines.
	Pinch Points	<ul style="list-style-type: none"> • Identify pinch points prior to starting equipment. • Be aware of equipment location and body placement. • Know the location of drill emergency stop switch. • Maintain eye contact with operator.
	Noise	<ul style="list-style-type: none"> • Wear earplugs while equipment is operating.
	Falling Objects	<ul style="list-style-type: none"> • Wear hardhat and steel-toed footwear.
	Utility Contact	<ul style="list-style-type: none"> • Perform a utility locate prior to drilling. • Keep at least three feet from utility markings.
	Heat or Cold Stress	<ul style="list-style-type: none"> • Wear several layers of clothing during cold weather • Dress in cotton clothing during hot weather. • Take frequent breaks to warm up in running vehicles during cold weather. • Take frequent breaks to cool down in the shade during hot weather. • Watch other workers on site for signs of heat or cold stress during the workday.
	Slip/Trips/Falls	<ul style="list-style-type: none"> • Keep work areas free of debris, etc. • Clean up work areas following completion of activities. • Watch for debris and other hazards that may be present from past site operations. • Follow required safety procedures.
	Flying Debris/Soil and Splashing Liquids	<ul style="list-style-type: none"> • Wear safety glasses or other applicable eye protection.
Environmental Sampling	Working Around Water	<ul style="list-style-type: none"> • Use buddy system. • Wear shaded safety glasses to reduce glare from water. • Do not enter or work over water unless wearing a personal floatation device.
	Contact with Contaminated Media and Preservatives	<ul style="list-style-type: none"> • Collect and handle samples wearing appropriate PPE. • Employ proper shipping and packing procedures.
	Cuts/Abrasions	<ul style="list-style-type: none"> • Use proper cutting tools. • Be careful with sharp objects. • Do not cut towards yourself. • Conduct sampling using proper operation of the sampling equipment.
	Overhead	<ul style="list-style-type: none"> • Wear hardhat and steel toed footwear. • Maintain eye contact with driller and other heavy equipment operators.
	Lifting	<ul style="list-style-type: none"> • Use proper lifting equipment and techniques when moving equipment, tools, drums, etc.
	Slip/Trips/Falls	<ul style="list-style-type: none"> • Keep work areas free of debris, etc. • Clean up work areas following completion of activities. • Watch for debris and other hazards that may be present from past site operations. • Follow required safety procedures.
	Flying Debris/Soil and Splashing Liquids	<ul style="list-style-type: none"> • Wear safety glasses or other applicable eye protection.



Key:

- Sudbury Road Landfill Groundwater Monitoring Well
- Washington State Penitentiary Groundwater Monitoring Well
- Washington State Penitentiary Property Boundary
- Washington State Penitentiary Landfill
- Sudbury Landfill

Note: Monitoring well locations are approximate.

3.2 CHEMICAL HAZARD ANALYSIS

Parametrix will be working with staff from HWA Geosciences Incorporated (HWA). HWA has conducted several investigations within the project area. Petroleum hydrocarbons, halogenated volatile organic compounds (HVOCs), and various metals have been identified as potential chemicals of concern.

Precautions will be taken by all persons conducting remedial activities at the site to minimize exposure to potential chemicals of concern. Information on reducing contact with potential chemicals of concern is presented in the following sections.

This section will be updated if additional chemicals of concern (COCs) associated with other locations within the WSP RI/FS project are identified.

4. MONITORING OF CHEMICAL HAZARDS

Air monitoring with a photoionization detector (PID) will be performed when sampling soil suspected of containing hydrocarbons or HVOCs to determine if the level of Personal Protective Equipment (Section 5) will need to be upgraded from Level D to Level C, which requires respiratory protection. Air monitoring and action levels are listed in Table 2, and exposure limits for potential contaminants of concern are shown in Table 3.

If a change in conditions (i.e., odor, etc.) indicates a need to upgrade personal protective equipment (PPE), the Parametrix Site Health and Safety Officer will upgrade the PPE to Level C, and the Corporate Health and Safety Officer and the site Task Manager will be notified immediately. Contact information is presented in Chapter 8.

All air-monitoring and instrumentation-calibration data will be recorded in the field notebook. Air monitoring instruments will be calibrated and maintained in accordance with the manufacturer's specifications.

Table 2. Air Monitoring and Action Levels

Exposure	Method	Monitoring Description	Action Level	Action
Screening for organic and inorganic vapors	PID	A PID will be used to assess potential exposures to organic vapors.	>10 ppm sustained for 5 minutes	<ul style="list-style-type: none"> • Terminate operation and move upwind • Ventilate area, as needed • Investigate cause • Upgrade to Level C Respirator with organic vapor/HEPA cartridge, if warranted • Wet area and screen with PID prior to resuming work
Metals	Visual Observation	Exposure to airborne particulates which could contain metals will be assessed using visual observation methods	Visible emissions	Control with water spray

Notes: HEPA = high efficiency particulate air
PID = Photoionization Detector.
ppm = parts per million

Table 3. Exposure Concentrations for Potential Chemicals of Concern

Analyte	Time Weighted 8-Hour, Permissible Exposure Limit	Immediately Dangerous to Life and Health
Benzene	1 ppm	500 ppm
Ethylbenzene	100 ppm	800 ppm
Toluene	100 ppm	500 ppm
Xylene	100 ppm	900 ppm
Arsenic	0.2 mg/m ³	5 mg/m ³
Cadmium	0.005 mg/m ³	9 mg/m ³
Chromium	0.5 mg/m ³	25 mg/m ³
Lead	0.050 mg/m ³	100 mg/m ³
Mercury	0.1 mg/m ³	10 mg/m ³
Naphthalene and associated compounds	10 ppm	250 ppm
Trichloroethylene	50 ppm	1,000 ppm
Tetrachloroethylene	25 ppm	150 ppm
Vinyl Chloride	1 ppm	None Determined
Gasoline	300 ppm	None Determined

Source: WAC 296-841 Table 3 (2007), NIOSH IDLH Program (1995)

Notes: mg/m³ = micrograms per cubic meter

ppm = parts per million

5. PERSONAL PROTECTIVE EQUIPMENT

Based on available chemical information for the project sites, Level D PPE will be used for conducting sampling activities. If site conditions indicate a high level of protection is required, site personnel will be prepared to use Level C PPE. This level of protection generally includes:

Level D

- Steel-toe/shank leather or rubber boots/shoes.
- Coveralls, polycoated Tyvek suit, or equivalent, as needed for working with contaminated soil and water.
- Nitrile surgical weight gloves to be used as inner gloves, as needed.
- Work gloves, nitrile gloves, or equivalent, to use as outer gloves, as needed.
- Hardhat.
- Safety glasses or goggles for general site work and with shading to control glare when working around water.
- Hearing protection for all activities in areas where it is necessary to shout to communicate, or as decided.

Level C

- Steel-toe/shank leather or rubber boots/shoes.
- Tyvek, Saranex, poly coated Tyvek, or equivalent coveralls, as needed for working with contaminated soil and water.
- Nitrile surgical weight gloves to be used as inner gloves.
- Work gloves, nitrile gloves, or equivalent, to use as outer gloves, as needed.
- Hardhat.
- Safety glasses or goggles for general site work and with shading to control glare when working around water.
- Hearing protection for all activities in areas where it is necessary to shout to communicate, or as decided.
- Full face air-purifying respirator.

Additional information on PPE is presented the Parametrix Health and Safety Manual (Parametrix 2003) and Standard Operating Procedure HS-002, Appendix C of this document.

At least one first aid kit and cellular phone will be available on-site in the company vehicle during onsite activities.

6. SITE CONTROL AND DECONTAMINATION

Work site controls will be established whenever soil disturbance may take place. Non-intrusive inspections and other similar activities do not need hazardous waste site controls; however, there may be other crews with site zones established, and these shall be respected and maintained. It is anticipated that cones with tape barriers will be set up around areas of contaminated soil prior to and during excavation activities.

The object of site control is to assure that only qualified personnel enter potentially hazardous locations and to effectively control the spread of contamination. As a minimum, a “hot” zone, extending approximately 10 feet from the work, should be established. If the sampling personnel are reasonably certain that untrained, unprotected people will not enter the “hot” zone, then demarcation may not be necessary.

Barrier tape and cones will be used to demarcate contaminated soil prior to and during excavation activities. Only personnel with a current 40-hour Hazardous Waste Operation (HAZWOPER) certification and up-to-date refresher course will be allowed inside the restricted areas.

The following items will be followed when establishing site control:

- Site control measures shall be established prior to beginning any work that disturbs potentially contaminants soils.
- Personnel will not enter vehicles with dirty boots, boot covers, or in dirty coveralls. Set the job up to keep the sediments in their original location on the site.
- The work area shall be protected from public intrusion.
- It is up to each sampling crew to establish site control based on potential hazards and on the crew’s planned activities. Make it practical and useful.
- All tools used for sampling will be properly decontaminated after each use.

Any potentially contaminated personnel will decontaminate prior to getting into vehicles, vessels, eating lunch, or leaving the site.

For all personnel working within a “hot” zone, decontamination will be conducted to remove gross contamination that may have accumulated on workers, equipment, and sampling supplies during site activities and to prevent the migration of contaminants from the site. Decontamination may consist of brushing with a stiff brush to remove dry particles and, if necessary, washing with household soap or an Alconox solution and rinsing with clean water. Additional information on decontamination procedures can be found in the Parametrix *Health and Safety Manual* (Parametrix 2003) and Standard Operating Procedure HS-007, Appendix C of this document.

All water used for decontamination by personnel will be containerized and disposed of following site waste handling procedures or as described in the Parametrix Health and Safety Manual and Standard Operating Procedure HS-006, Appendix C of this document.

7. TRAINING

All personnel conducting sampling activities on the project site must be HAZWOPER trained per the federal requirement 29 CFR 1910.120 and be current with their annual eight hour refresher course. All personnel should have proof of currency with HAZWOPER training requirements available on the project site.

All personnel working at the project site will be briefed on potential site hazards, health and safety procedures, site construction rules and requirements, and sampling procedures. Following completion of this training, all personnel will be required to sign an acknowledgement form verifying that they have completed the project-specific health and safety training. A copy of the Project-Specific Training Acknowledgement Form is included in Appendix A.

The Site Health and Safety Officer will conduct a tailgate safety meeting will be conducted each morning prior to the start of daily field activities. Each employee and, as appropriate, subcontractor personnel will attend the tailgate safety meeting and sign the daily tailgate meeting log. A Daily Tailgate Meeting Log is included in Appendix A.

8. PROJECT/EMERGENCY CONTACTS AND PROCEDURES

The project and emergency contacts are shown in Table 4. These contacts will be updated as needed.

Table 4. Project and Emergency Contacts

Name	Role	Phone Number
Jack Olson	Department of Corrections Environmental Manager	(360) 725-8342
Mike Warfel	Parametrix Project Manager	(253) 863-5128 (425) 457-0621 (cell)
Arnie Sugar	HWA Project Manager	(425) 774-0106 (ext. 227)
To Be Determined	SAR Safety Officer	
To Be Determined	Field Sampling Staff	
To Be Determined	Field Sampling Staff	
To Be Determined	Field Sampling Staff	
Sheila McConnell	Corporate Health and Safety Officer	(425) 452-8655 (425) 681-7516 (cell)
Emergency (fire, accident, etc.)	–	911
Providence St. Mary Medical Center	–	(509) 525-3320
Poison Control Center	–	(800) 222-1222

8.1 EMERGENCY ASSISTANCE

Table 4 provides a list of emergency telephone numbers. This list is to be in the possession of the Site Health and Safety Officer.

At least one cell phone will be available onsite at all times during sampling activities. In the event of an emergency, 911 will be called immediately. If a non-emergency injury occurs that requires treatment, refer to the map and directions to the nearest hospital (Providence St. Mary Medical Center) in Appendix B.

8.2 POTENTIAL INCIDENTS

Although considered unlikely, the following situations could occur and would require an emergency response action:

- Sudden release of hazardous vapors/combustible gases.
- Problems due to contacting utility lines (gas, electric, water).
- Fire.
- Medical emergency.
- Overt exposure (skin contact, inhalation, ingestion).

Release of Hazardous Vapors/Combustible Gases

In the event of a sudden release of hazardous vapors or gases constituting a potentially hazardous situation (e.g., adequate respiratory protection is unavailable, atmospheres are immediately dangerous to life or health or explosive, there is an imminent public health and safety hazard), the Site Health and Safety Officer will suspend operations and evacuate the site, and call 911. All personnel will be required to evacuate to a pre-designated safe area upwind of the release.

The Field Health and Safety Officer, in consultation with the emergency response agencies, fire department, and facility or system owner/operator, will attempt to control or secure the spread of contamination whenever possible.

Utilities

If aboveground or underground utilities are damaged or contacted, call 911 to notify the local fire department. If injury occurs, see Medical Emergency section below.

Fire

In the event of a fire, call 911.

Medical Emergency

At least one Parametrix employee or onsite worker will have current certification in first aid and cardiopulmonary resuscitation (CPR). In the event of a serious injury or illness, call 911 immediately. For non life threatening injuries that do not impair driving ability, site personnel will drive to Providence St. Mary Medical Center in Walla Walla. Appendix B illustrates the route to the hospital.

A first aid kit will be available at the site for use in case of minor injuries. First aid responders should protect themselves from contact with blood and other human body fluids by wearing latex gloves or establishing an equivalent barrier. Any contact with blood should be reported to the Site Health and Safety Officer.

Exposure

In the event of respiratory exposure, dermal or eye contact, or ingestion, the following procedures will be followed:

- Respiratory Exposure (Inhalation). Move to fresh air. Summon paramedics and notify facility or system owner/operator. Any loss of consciousness or exposure to elevated levels of known toxic contaminants, even if the individual appears to have fully recovered, will require immediate treatment and/or surveillance by a qualified physician.
- Dermal Contact. Flush area with copious amounts of soap and water. Wash/rinse affected area for at least 15 minutes. Decontaminate and provide medical attention.
- Eye Contact. Flush eye(s) for a period of 15 minutes and transport worker to the nearest emergency medical facility. Treatment and/or surveillance by a qualified physician are required.
- Ingestion. Notify the local Poison Control Center and/or emergency medical facility and immediately transport to the facility.

8.3 ADVERSE WEATHER CONDITIONS

In the event of adverse weather conditions, the Field Health and Safety Officer will determine if sampling activities can continue without endangering field personnel. Some of the conditions to be considered prior to determining if activities should continue are as follows:

- Potential for thermal stress (e.g., heat or cold stress) and related injuries.
- Dangerous weather related working conditions that would preclude working from a boat (e.g., high winds, rain, snow, fog, lightning, etc.).
- Limited visibility.
- Potential for electrical storms. No outside activities will be permitted during electrical storms.

9. STANDARD OPERATING PROCEDURES

The following project-related standard operating procedures (SOPs) are included in Appendix C:

- Personal Protective Equipment (SOP HS-002).
- Respiratory Protection (SOP HS-003).
- Handling of Investigation Derived Waste (SOP HS-006).
- Decontamination (SOP HS-007).
- Heat Stress (SOP HS-010).

10. REFERENCES

National Institute for Occupational Safety and Health (NIOSH). 1994. Documentation for immediately dangerous to life or health concentrations (IDLH): NIOSH chemical listing and documentation of revised IDLH values (as of 3/1/1995). Available at <<http://www.cdc.gov/niosh/idlh/intridl4.html>>.

National Institute of Safety and Health (NIOSH). 2005. Pocket guide to chemical hazards. September. www.cdc.gov/niosh/npg

Parametrix. 2003. Parametrix health and safety manual. Prepared for EPA Region X. March.

Washington Administrative Code 296-841. Department of Labor and Industries, Division of Occupational Safety and Health. Airborne contaminants. April 2007 Edition.

APPENDIX A

Forms

Prior to the initiation of field activities, I attended a site-specific training for the Palermo Groundwater Long-term Monitoring Project. The training included topics that are covered in the Parametrix Health and Safety Manual and the project-specific Health and Safety Plan (HASP). Additionally, I have been given an opportunity to read and questions the contents of these documents.

[illegible][illegible]

[illegible]

APPENDIX B

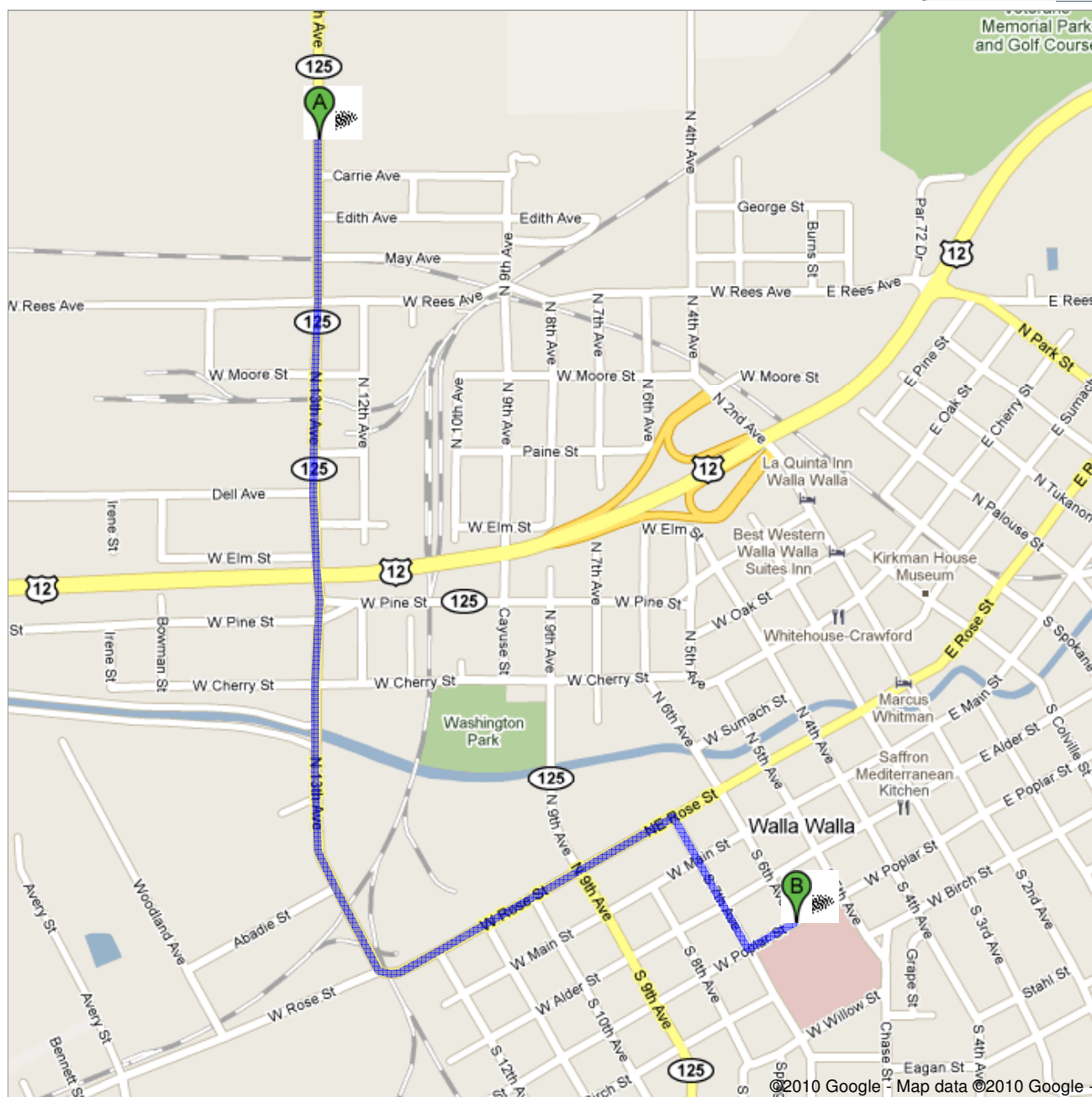
Map and Directions to Hospital




Directions to 401 W Poplar St, Walla Walla, WA 99362
1.8 mi – about 5 mins




Save trees. Go green!


Download Google Maps on your phone at google.com/gmm



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 1313 N 13th Ave, Walla Walla, WA 99362

-
- | | |
|---|---------------------------|
| 1. Head south on N 13th Ave/WA-125 S toward Carrie Ave
Continue to follow N 13th Ave
About 2 mins | go 1.1 mi
total 1.1 mi |
|  2. Turn left at W Rose St
About 2 mins | go 0.4 mi
total 1.6 mi |
|  3. Turn right at S 7th Ave
About 1 min | go 0.2 mi
total 1.8 mi |
|  4. Take the 3rd left onto W Poplar St
Destination will be on the right | go 371 ft
total 1.8 mi |

 401 W Poplar St, Walla Walla, WA 99362

These directions are for planning purposes only. You may find that construction projects, traffic, weather, or other events may cause conditions to differ from the map results, and you should plan your route accordingly. You must obey all signs or notices regarding your route.

Map data ©2010 Google

Directions weren't right? Please find your route on maps.google.com and click "Report a problem" at the bottom left.

APPENDIX C

Standard Operating Procedures

PERSONAL PROTECTIVE EQUIPMENT

Prepared By: Jung A. Bukonobi
Health and Safety Committee Chair

Date: 3-10-03

Reviewed By: SPC Conaell
Corporate Health and Safety Officer

Date: 3/11/03

Approved By: MLZ
Chief Operating Officer

Date: 3/11/03

1.0 Purpose

This Standard Operating Procedure (SOP) establishes guidelines for selection and use of Personal Protective Equipment (PPE) used to protect Parametrix employees from the risk of injury by creating a barrier against workplace hazards.

2.0 Scope

29 CFR 1910, Subpart I requires the use of PPE to reduce employees' exposures to hazards when engineering and administrative controls are not feasible or effective in reducing these exposures to acceptable levels. Employers are required to determine all exposures to hazards in their workplace and determine if PPE should be used to protect their workers. OSHA requires employers to conduct inspections of all workplaces to determine the need for PPE and to help in selecting the proper PPE for each task performed.

This SOP addresses eye, face, head, foot, hand, and body protection. Respiratory protection is discussed in SOP HS-003.

3.0 Responsibilities

There are specific responsibilities for Parametrix personnel in the care and use of PPE, depending on an individual's role within the company or on a given project. These responsibilities are outlined below:

- **Corporate Health and Safety Officer (CHSO):** The Corporate Health and Safety Officer is responsible for developing the PPE Program and updating PPE procedures, as necessary.
- **Project Manager:** The Project Manager is responsible for field implementation of the PPE Program. This includes assurance that all personnel on site comply with the policy and that all on-site personnel have had proper training in using PPE.
- **Site-specific Health and Safety Officer (SHSO):** The Site-specific Health and Safety Officer is responsible for initial on-site coordination of the cold stress. The SHSO assures that all personal potentially exposed to potential environmental hazards have proper PPE.
- **Team Member:** Each Team Member is responsible for understanding and complying with all site requirements.

Standard Operating Procedures

PERSONAL PROTECTIVE EQUIPMENT

4.0 Requirements

Eye and Face Protection

Eye and face protection shall be used when employees are exposed to potential hazards from flying particles, molten metal, acids or caustic liquids, chemicals, or gases. Eye and face protection requirements include:

- Appropriate eye and face protection devices in hazardous environments for personnel who wear contact lenses.
- Side protectors when there is a hazard from flying objects.
- Goggles and face shields when there is a hazard from chemical splash.
- Face shields worn only over primary eye protection (safety glasses or goggles).
- Eye protectors that incorporate an employee's corrective eye prescription in the design or that fit properly over the prescription lenses.

Emergency eyewash facilities meeting the requirements of ANSI Z358.1 will be provided in all areas where the eyes of any employee may be exposed to corrosive materials. All such emergency facilities will be located where they are easily accessible in an emergency.

Protective eye and face devices purchased after July 5, 1994 shall comply with ANSI Z87.1-1989, "American National Standard Practice for Occupational and Educational Eye and Face Protection."

Head Protection

Head protection (hard hat) must be worn by all employees when overhead hazards from falling or fixed objects are present. Also, when an employee is near exposed electrical conductors that could come in contact with the head, the employee must wear a protective helmet designed to reduce electrical shock hazard.

Protective headgear shall comply with ANSI Z89.1-1986, "American National Standard for Personnel Protection-Protective Headwear for Industrial Workers-Requirements."

Foot Protection

Steel-toed boots or shoes must be worn in work areas where carrying or handling materials such as packages, objects, parts, or heavy tools could be dropped or fall onto the feet. Safety shoes or boots with puncture protection are required where sharp objects such as nails, wire, tacks, screws, large staples, scrap metal, etc., could be stepped on by employees and cause foot injury.

When working with hazardous chemicals or waste, chemical-resistant, steel-toed boots may be required.

All safety footwear shall comply with ANSI Z41-1991, "American National Standard for Personal Protection – Protective Footwear."

PERSONAL PROTECTIVE EQUIPMENT**Hand Protection**

Suitable gloves shall be worn when hazards from chemicals, cuts, lacerations, abrasions, punctures, burns, and other hazards to the hands are present. Glove selection shall be based on performance characteristics of the gloves, conditions, durations of use, and hazards present.

The first consideration in the selection of gloves for use against chemicals is to determine, if possible, the nature of the substances to be encountered. Employees must read instructions and warnings on chemical container labels and MSDSs before working with any chemical.

Body Protection

Suitable body protection (torso and legs) must be worn while completing job tasks. Depending on the hazards present, body protection may include coveralls, Tyvek or Saranex suits, totally encapsulating suits, etc. The type of body protection required to perform a specific task will be determined by the Corporate or Site-specific Health and Safety Officer, as necessary.

5.0 Training

Any worker required to wear PPE shall receive training in the proper use and care of PPE. The training shall include, but not necessarily be limited to, the following subjects:

- Determining when wearing PPE is necessary.
- Determining the appropriate and necessary PPE.
- Learning how to properly wear, adjust, and remove PPE.
- Understanding the limitations of PPE.
- Understanding the proper care, maintenance, and disposal of PPE.

6.0 References

U.S. Department of Labor, OSHA Standard 29 CFR 1910, Subpart I.

RESPIRATORY PROTECTION PROGRAM

Prepared By: *Jimmy A. Bukowski*
Health and Safety Committee Chair

Date: 3-10-03

Reviewed By: *Don McConnell*
Corporate Health and Safety Officer

Date: 3/11/03

Approved By: *ML*
Chief Operating Officer

Date: 3/11/03

1.0 Purpose

To establish the minimum requirements for Parametrix, Inc. employees to use respiratory protection.

2.0 Scope

This Standard Operating Procedure (SOP) applies in its entirety to all Parametrix projects unless the Corporate Health and Safety Officer (CHSO) grants a variance.

3.0 Responsibilities

There are specific responsibilities for Parametrix personnel in complying with the Respiratory Protection Program, depending on an individual's role within the company or on a given project. These responsibilities are outlined below:

- **Project Manager:** Overall responsible for establishing and ensuring compliance with this procedure.
- **Field Health and Safety Staff:** Responsible for implementing and/or monitoring activities associated with this procedure.
- **Managers and Supervisory Personnel:** Responsible for enforcing this procedure and ensuring that each employee is properly following the procedure.

4.0 General Requirements

Respirator wearers cannot be afforded protection from hazardous airborne contaminants when conditions prevent a complete gas-tight face seal. Facial hair, head hair, and eyeglasses are among these physical obstructions. While eyeglasses are in the category of obstructions that prevent a gas-tight face seal, primarily in the case of full-face supplied-air respirators, this problem is correctable by using mounting devices to hold the eyeglass frames inside the respirator face piece. The criteria state that there can be no obstruction of contact between the wearer's skin and the mask. Beard stubble constitutes a physical obstruction. Affected employees shall be required to be clean-shaven, as a condition of employment.

Standard Operating Procedures

RESPIRATORY PROTECTION PROGRAM

Candidates for employment who object to this policy shall be made aware that their versatility on work assignments may be limited and that this factor can affect their job assignments.

Parametrix shall provide respirators whenever a qualified person determines that such equipment is necessary to protect the health of the employee from significant inhalation exposure.

Only respirator equipment that has been jointly approved by the Mine Safety and Health Administration (MSHA) and the National Institute for Occupational Safety and Health (NIOSH) shall be provided.

Employees shall be instructed and trained in the need, use, sanitary care, and limitations of such respiratory equipment prior to being assigned to activities that require respiratory protection.

Parametrix shall provide, repair, or replace respiratory protective equipment as may be required due to wear and deterioration.

Means of cleaning all respiratory protective equipment shall be provided.

Only those employees who are trained and medically qualified to wear respirators shall be assigned to work requiring use of respirators.

5.0 Implementation

Respiratory Selection

When respirator use is required, only properly cleaned and maintained NIOSH/MSHA-approved respirators shall be used. Single-use respirators (dust masks) may only be used with specific approval by the Corporate Health and Safety Officer.

Employees shall be allowed to pick the most comfortable respirator from a selection, including respirators of various sizes from different manufacturers.

Selection of respirators shall be approved by the Field Health and Safety Staff in all cases, and shall be based on the following considerations:

- Nature of the Hazard – The chemical and physical properties, toxicity, and concentration of hazardous material or mixture of materials.
- Oxygen-deficient Atmospheres – Entry into oxygen-deficient atmospheres is prohibited without prior approval of the Corporate Health and Safety Officer.
- Immediate Dangerous to Life and Health (IDLH) Atmospheres – Entry into any IDLH atmosphere is prohibited without prior approval of the Corporate Health and Safety Officer.
- Irritant or Corrosive Atmospheres – Respirators selected must provide adequate face and eye protection. The contaminant or mixture of contaminants must have adequate warning properties (odor, irritation, or taste) to indicate respirator breakthrough if an air-purifying device is used.

RESPIRATORY PROTECTION PROGRAM

- Regulated Materials – In all cases where OSHA has required that a specific respirator is used (carcinogen standards, etc.), the specified respirator, or one providing equal or better protection, shall be used.
- Air-purifying respirators shall NOT be used for protection against the materials listed below. Note that this is only a partial list; please contact the Field Health and Safety Staff for further information:

Acrolein	Methyl chloride
Aniline	Methylene chloride
Arsine	Nickel carbonyl
Bromine	Nitrobenzene
Carbon monoxide	Nitrogen oxides
Ollsocyanates	Nitroglycerine
Dimethylaniline	Nitromethane
Dimethyl sulfate	Ozone
Hydrogen cyanide	Phosgene
Hydrogen fluoride	Phosphine
Hydrogen selenide	Phosphorus trichloride
Hydrogen sulfide	Stibine
Methanol	Sulfur chloride
Methyl bromide	

Parametrix subcontracts most asbestos inspections and all asbestos abatement. Inspection personnel may use half-mask respirators in areas where asbestos is present if they are qualitatively-fit tested.

Full-facepiece, negative-pressure, air-purifying respirators are not acceptable for protection against asbestos exposure unless the wearer meets the quantitative fit testing requirement.

Use of Corrective Lens Eyewear with Respirators

The wearing of contact lenses in work environments that involve exposure to chemical fumes, vapors, splashes, intense heat, molten metals, or highly particulate-contaminated atmosphere is prohibited.

Management shall assess which employees in their operations wear eye glasses routinely, determine what respiratory protective masks (makes and models) are used, and assure that the appropriate frames or ophthalmic device hangers are obtained and provided at company expense.

RESPIRATORY PROTECTION PROGRAM**Employee Training and Instruction**

The basic respiratory training program shall include, as a minimum, the following:

- Instruction in the need for, use, sanitary care, and limitations of each respirator type.
- Opportunity for "hands-on" experience with respirators.
- Proper fitting, including demonstrations and practice in wearing, adjusting, and determining the fit of the respirator. A selection of respirators shall be available to determine the most comfortable respirator and the best fit.
- How to perform a positive and negative pressure test of the face piece to face seal.
- A familiarization period of wear in normal air.
- For negative pressure respirators, qualitative fit testing will be conducted by wearing the respirator in an irritant fume test atmosphere. A qualified person using the protocol found in Attachment A of this procedure shall perform all qualitative fit testing or other protocol, as designated by specific standards (e.g., asbestos, benzene). Powered air-purifying respirators (PAPRs) shall be worn in a test atmosphere with the power supply disconnected to evaluate fit in the negative pressure modes.
- Qualitative fit testing shall be performed annually, or more frequently as required by law. Quantitative fit testing may be required for some respirator or contaminants. The Field Health and Safety Staff will determine fit test requirements. Fit testing procedures are presented in Attachment A.
- Instruction in the nature of the respiratory hazards, whether acute, chronic, or both, and a description of potential health effects if the respirators are not used.
- Classroom and field training to recognize and cope with emergency situations (including respirator failure).

Training provided as part of this procedure shall be performed in accordance with applicable regulations.

Respirator Inspection, Cleaning, Maintenance, and Storage

General: The Field Health and Safety Staff will define and provide a program to area/facility management regarding maintenance and care of respirators, and which shall be adjusted to the type of facility, working conditions, and hazards involved. This program shall include the following basic elements:

- Inspection for defects and/or deterioration.
- Cleaning and disinfecting in accordance with manufacturers' instruction.
- Repair, as necessary.

RESPIRATORY PROTECTION PROGRAM

- Establishment and maintenance of a record-keeping system to document respiratory inspection, repair, and maintenance.
- Proper storage.

Inspection, Maintenance, and Storage

Users shall inspect all respirators routinely before, during, and after each use. Any defects shall be reported to the supervisor. No defective respirators shall be issued or worn. Defective respirators shall be tagged and returned for repair.

Respirators maintained for emergency use (such as SCBA) shall be inspected and sanitized after each use and inspected at least monthly. A record of the most recent inspection shall be maintained on the respirator or the storage container and shall include the inspector's identification, the date, and a respirator identification number.

An individual who is qualified by experience or training shall regularly clean, inspect, and sanitize routinely-used respiratory equipment.

Other types of respiratory equipment shall be maintained according to the manufacturers' instructions.

Where respirators are assigned to individual employees, area management shall ensure compliance with cleaning and maintenance requirements by periodically inspecting respiratory equipment and conducting field audits.

Respiratory equipment shall not be passed from one person to another until it has been cleaned and sanitized.

When not in use, respirators shall be stored to protect against dust, sunlight, extreme temperatures, excessive moisture, damaging chemicals, and physical damage.

Air Purifying Respirators (APR)

Fit testing shall be accomplished in accordance with Attachment A of this procedure.

When APRs are worn, employees shall change the filter-cartridge elements daily, in the case of cartridges used for non-particulate contaminants, or sooner if "breakthrough" is occurring. For other filter cartridges, the filter-cartridge should be replaced whenever an increase in breathing resistance is detected.

Powered Air Purifying Respirators (PAPR)

When PAPRs are worn, employees shall change filter/cartridge elements daily, in the case of cartridges used for non-particulate contaminants, or sooner if "breakthrough" is occurring. For other filter cartridges, the filter-cartridge should be replaced if any of the following scenarios occur:

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- Whenever an increase in breathing resistance is detected, or
- When airflow through filter elements decreases to an unacceptable level, as indicated by the manufacturer's test device.

Compressed Air Systems

- Air Quality
 - Compressed air used for respiration shall be of high purity, and shall meet, as a minimum, the requirements for the specification for Grade D or better breathing air as described in Compressed Gas Association Specification G-7.1 (ANSI Z86.1-1973). The supplier shall certify compliance with these requirements for each lot of breathing air supplied.
 - Breathing air shall be free from harmful dusts, fumes, mists, vapors, gases, or odors.
 - Oxygen shall NOT be used at any time in open-circuit SCBAs or in air-line respirators.
 - Mixed or blended air shall not be used for breathing purposes.

Compressed Air Cylinder Systems (Cascade)

Breathing air cylinders shall be legibly identified with the word AIR, by means of stenciling, stamping, or labeling as near to the valve end as practical.

Cascade systems shall be equipped with low-pressure warning bells or similar warning devices to indicate air pressure in the manifold below 500 psi.

When a cascade system is used to supply breathing air, one employee shall be assigned as a safety standby within audible range of the low-pressure alarm.

When a cascade system is used to recharge SCBA air cylinders, it shall be equipped with a high-pressure supply hose and a coupling rated at a capacity of at least 3,000 psi.

Air-line couplings shall be incompatible with outlets for other gas systems to prevent inadvertently supplying air-line respirators with non-respirable gases or oxygen.

The air pressure at the hose connection to positive pressure respiratory equipment shall be within the range specified in the approval of the equipment by the manufacturer.

Cylinders shall be stored and handled to prevent damage to the cylinder or valve. Cylinders shall be stored upright with the protective valve cover in place and, in such a way (e.g., supported with substantial rope or chain in the upper one-third of the cylinder, or in racks designed for this purpose) as to prevent the cylinder from falling. Cylinders shall not be dropped, dragged, rolled, or allowed to strike each other or to be struck violently. Cylinders shall never be exposed to temperatures exceeding 125°F. Cylinders with visible external damage, evidence of corrosion damage, or exposure to fire shall not be accepted or used.

Only cylinders within current hydrostatic test periods shall be used.

RESPIRATORY PROTECTION PROGRAM**Compressor Supplied Breathing Air**

All compressors used for supplying breathing air shall be equipped with the following safety and standby devices:

- Compressor intakes that are located to ensure that only respirable (uncontaminated) air is admitted. This requires attention to the location of the compressor intake with respect to compressor engine exhaust, chemical storage or use areas, and suitable intake screening or filtration.
- Alarms to indicate compressor failure (such as low-pressure air horns, etc.) shall be installed in the system.
- A receiver of sufficient capacity to enable the respirator wearer to exit from a contaminated atmosphere upon compressor failure shall be provided.
- Oil Lubricated Compressors – If an oil-lubricated compressor is used to supply breathing air, it shall be equipped with both of the following devices:
 - A continuous-reading carbon monoxide monitoring system that is set to alarm should the carbon monoxide concentration exceed 10 ppm.
 - A high-temperature alarm which will activate when the discharge air exceeds 110% of the normal operating temperature in degrees Fahrenheit,
- A designated employee shall be assigned as a safety standby and shall remain continuously within audible range of the alarms.
- An inline purifying filter assembly to remove oil, condensed water, particulate, odors, and organic vapors shall be used in conjunction with the air compressor.

Routine inspection and maintenance of the air compressor shall be performed in accordance with manufacturer's specifications.

Escape/Egress Units

These respirators are intended for use in areas where escape with a short-term (5-10 minute) air supply is necessary. They may be used as adjuncts to airline pressure demand respirators as a backup air supply; or as independent emergency devices in areas where respiratory protection is not normally required.

Appropriate training shall be accomplished and documented prior to assigning employees to tasks or locations subject to the use of these respirators.

Escape/egress units shall never be used as primary standby respirators for confined space entry.

RESPIRATORY PROTECTION PROGRAM**Medical Screening**

All potential candidates shall complete a medical questionnaire prior to respiratory use and once every three years. A more comprehensive medical evaluation may be required based on the results of the questionnaire.

No employee shall be assigned to a task that requires the use of a respirator unless it has been determined that the employee is physically able to perform the work while using the required respirator.

If an employee demonstrates difficulty in breathing during the fitting test or during use, the employee shall be re-examined by a physician to determine whether the employee can wear a respirator while performing the required duty.

Once a medical determination has been made to physical ability to wear a respirator, a review of the employee's health status shall be conducted annually, at a minimum.

RESPIRATORY PROTECTION PROGRAM**ATTACHMENT A****PARAMETRIX MANDATORY QUALITATIVE RESPIRATOR FIT TEST PROTOCOL**

NOTE: This protocol does not satisfy the fit test requirements for certain materials, including asbestos and benzene. Contact the Field Health and Safety Staff for assistance.

Respirator Selection

Respirators shall be selected as described in this procedure. The respirator shall be equipped with HEPA filters.

Fit Test

The test conductor shall review this protocol with the test subject before testing.

The test subject shall perform the following conventional positive and negative pressure fit checks:

- Negative Pressure Test – Cover the cartridge filter inlets with your palm and gently inhale, the face piece should collapse against the face.
- Positive Pressure Test – Cover the exhalation valve cover with your palm and gently exhale. The face piece should expand away from the face.
- If either test fails, loosen and readjust the respirator straps and check for obstructions to the sealing surface. Repeat both tests. If the test fails again, select an alternate respirator.

A test atmosphere shall be generated with irritant smoke.

The test subject shall be advised that the smoke can be irritating to the eyes and instructed to keep the eyes closed while the test is being conducted (applies to half-mask respirators).

While wearing the selected respirator, the test subject shall enter the test atmosphere and perform the following exercises:

- Breathe normally.
- Breathe deeply. Be certain breaths are deep and regular.
- Turn head all the way from one side to the other. Be certain movement is complete. Inhale on each side. Do not bump the respirator against the shoulders.
- Nod head up and down. Be certain motions are complete and made every second. Inhale on each side. Do not bump the respirator against the shoulders.
- Nod head up and down. Be certain motions are complete and made every second. Inhale when head is in the full, up position (looking toward ceiling). Do not bump the respirator against the chest.

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- Talk aloud and slowly in a fashion that will generate a wide range of facial movements.
- Breathe normally.

The test subject shall indicate to the test conductor if the irritant smoke is detected. If smoke is detected, the test conductor shall stop the test. In this case, the tested respirator is rejected and another respirator shall be selected.

Each test subject passing the smoke test (i.e., without detecting the smoke) shall be given a sensitivity check of smoke from the same tube to determine if the test subject reacts to the smoke. This may be performed by cracking the mask and gently inhaling while inside the test atmosphere. Failure to evoke a response shall void the fit test. This may trigger an asthmatic response; verify before beginning.

The test shall not be conducted if there is any hair growth between the skin and the face-piece sealing surface.

If hair growth or apparel interferes with a satisfactory fit, then the obstruction(s) shall be altered or removed to eliminate interference and allow a satisfactory fit. If a satisfactory fit is still not attained, the test subject must use a positive-pressure respirator, such as a powered, air-purifying respirator, supplied air respirator, or self-contained breathing apparatus.

If a test subject exhibits difficulty in breathing during the tests, the subject shall be referred to a physician trained in respiratory diseases or pulmonary medicine to determine whether the test subject can wear a respirator while performing required duties.

Qualitative fit testing shall be repeated at least every year, or more often, as required by law. In addition, because the sealing of the respirator may be affected, qualitative fit testing shall be repeated immediately when the last subject has experienced:

- A weight change of 20 pounds or more.
- Significant facial scarring in the area of the face-piece seal.
- Significant dental changes (i.e., multiple extractions without prosthesis, or acquisition of dentures).
- Reconstructive or cosmetic surgery.
- Any other conditions that may interfere with face-piece sealing.

RESPIRATORY PROTECTION PROGRAM**Record Keeping**

The following fit test forms shall be maintained in each office for three years. The Corporate Health and Safety Officer shall maintain permanent records. The summary shall include:

- Name of test subject.
- Date of testing.
- Name of test conductor.
- Respirator selected (indicate manufacturer, model, size, and approval number).
- Testing agent.

