Grade Level Slab & UCRS Sampling
Sector 1B

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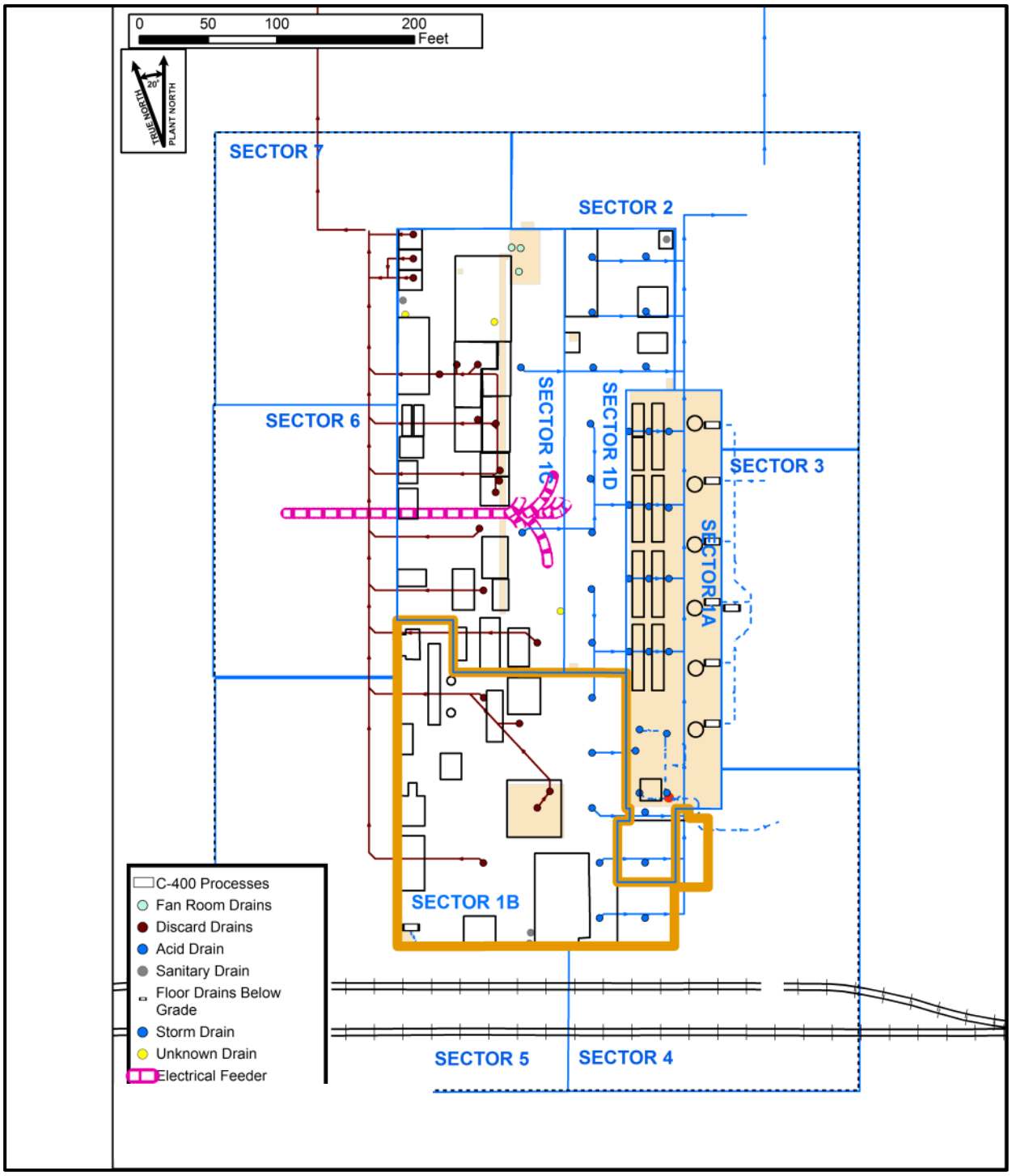
Location of Sector 1B



Sector 1B Background

Site Description

- Area of ~37,000 ft^2
- Concrete slab covers entire area
- Area contains Blakesly degreaser, compressor disassembly pit, cylinder cleaning and testing area, hand table, and spray booth

Key context based on Process Knowledge and Structure Review

- Metals and radionuclides are primary contaminants of concern based on main processes
- Acids used
- Trichloroethane used in Blakesly degreaser

Other context

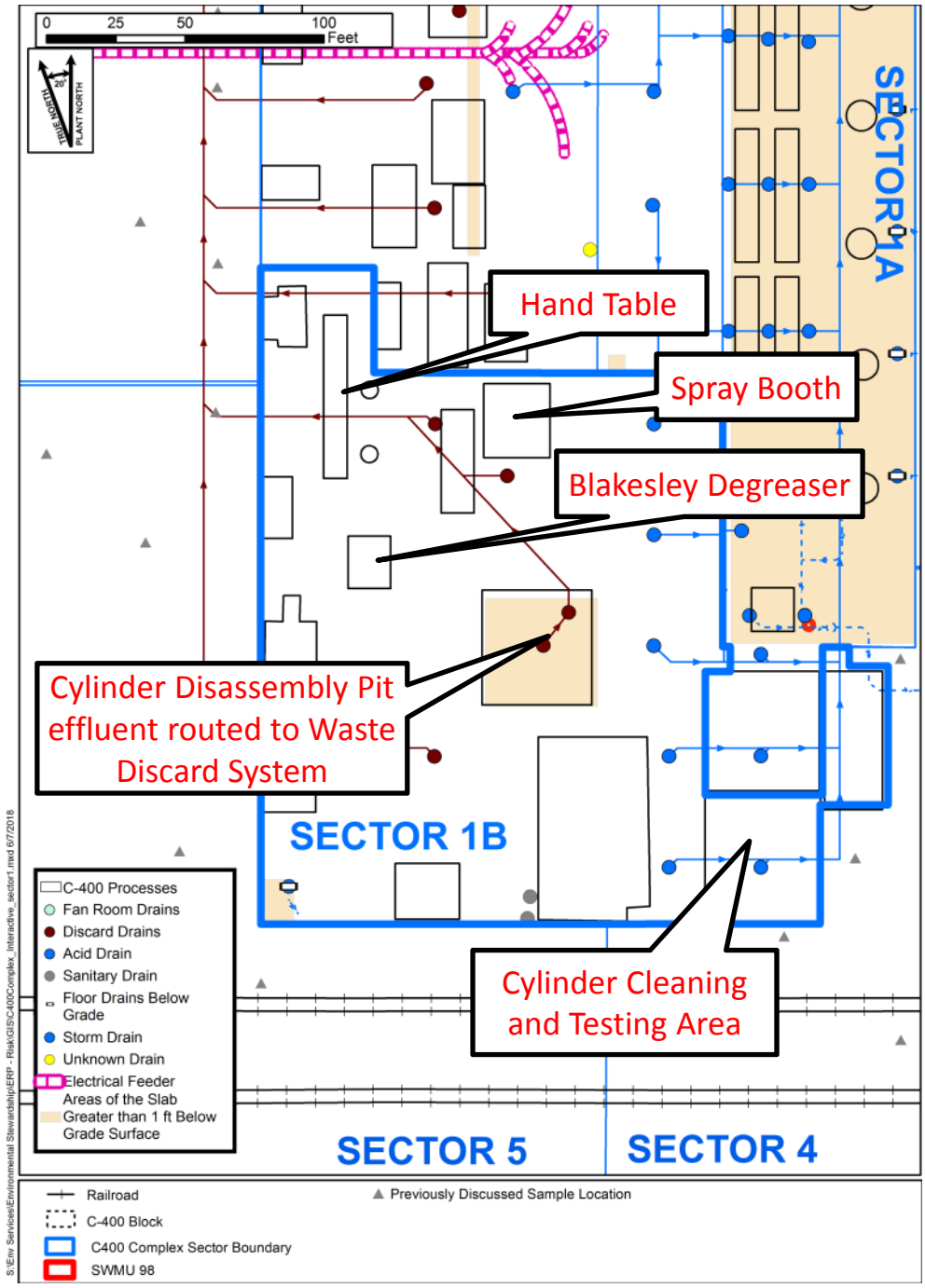
- High levels of dissolved TCE in RGA
- Possible presence of TCE DNAPL

Sector 1B Background (cont.)

- One UCRS soil boring: 400-020
    - 10 soil samples at depths 8 and 49 ft. bgs.
    - Analyzed for VOCs, SVOCs, radionuclides, and metals
    - VOCs and radionuclides were detected
        - Max TCE detected: 2,900 µg/kg
        - Radionuclides detected were ^{137}Cs and ^{237}Np
    - SVOCs at concentrations above the SQL were not found in the subsurface

- One RGA boring (angled): 400-041 – sampled for groundwater
    - 7 grab groundwater samples collected from the RGA and McNairy
        - Max TCE detected was 126,012 µg/L at 90 ft depth
        - Max Tc-99 detected was 44.2 pCi/L at 84 ft depth

Sector 1B -
Potential Areas of Contamination



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Sector 1B - Sampling Strategy: Targeted

Anticipated remedial action(s)

- TBD

Primary recognized uncertainties

- Nature and extent of subsurface soil contamination
- Nature and extent slab at grade level contamination

Sample strategy

- Sample 3 subsoil horizons
  - HU1: ~ 10 ft depth
  - HU2A: ~ 20 ft depth
  - HU3: ~ 35 ft depth

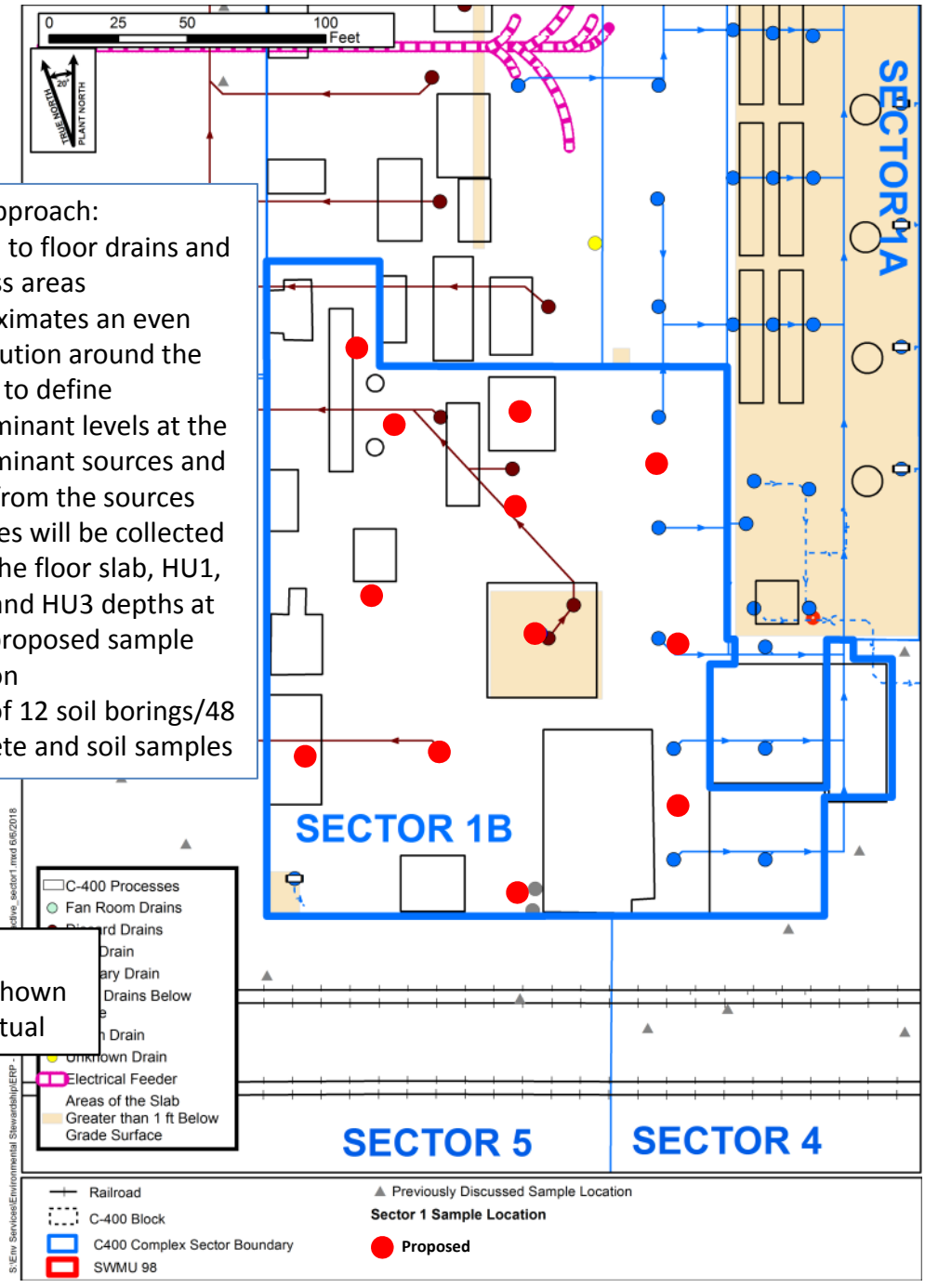
- Contaminant sources and COCs from WAG 6 RI Baseline Risk Assessment
  - Sampling to update extent of contaminants

Sector 1B - Targeted Sampling Approach

Targeted approach:

- Biased to floor drains and process areas
- Approximates an even distribution around the sector to define contaminant levels at the contaminant sources and away from the sources
- Samples will be collected from the floor slab, HU1, HU2, and HU3 depths at each proposed sample location
- Total of 12 soil borings/48 concrete and soil samples

Note:
Locations shown are conceptual



Sector 1B Analyses

Targeted Sampling Approach (based on WAG 6 RI Baseline Risk Assessment)

- Metals (chromium as total chromium)
- PCBs
- Radionuclides
- SVOCs
- VOCs (includes toluene)

Adaptation of Table 2.1 Significant Chemicals and Radionuclides of Potential Concern at PGDP

from *Methods for Conducting Risk Assessments and Risk Evaluations at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*

DOE/LX/07-0107&D2/R8/V1

Inorganic Chemicals		Organic Compounds				Radionuclides	
Analyte	CAS Number	Analyte	CAS Number	Analyte	CAS Number	Analyte	CAS Number
Aluminum	7429-90-5	Acenaphthene	83-32-9	~~Total Dioxins/Furans~~	~~1746-01-6~~	Americium-241	14596-10-2
Antimony	7440-36-0	Acenaphthylene	208-96-8	~~2,3,7,8-HpCDD~~	~~37871-00-4~~	Cesium-137+D	10045-97-3
Arsenic	7440-38-2	Acrylonitrile	107-13-1	~~2,3,7,8-HpCDF~~	~~38998-75-3~~	Neptunium-237+D	13994-20-2
Barium	7440-39-3	Anthracene	120-12-7	~~2,3,7,8-HxCDD~~	~~34465-46-8~~	Plutonium-238	13981-16-3
Beryllium	7440-41-7	Benzene	71-43-2	~~2,3,7,8-HxCDF~~	~~55684-94-1~~	Plutonium-239	15117-48-3
Boron	7440-42-8	Bromodichloromethane	75-27-4	~~OCDD~~	~~3268-87-9~~	Plutonium-240	14119-33-6
Cadmium	7440-43-9	Carbazole	86-74-8	~~OCDF~~	~~39001-02-0~~	Technetium-99	14133-76-7
~~Chromium III~~	~~16065-83-1~~	Carbon tetrachloride	56-23-5	~~2,3,7,8-PeCDD~~	~~36088-22-9~~	Thorium-230	14269-63-7
~~Chromium VI~~	~~18540-29-9~~	Chloroform	67-66-3	~~1,2,3,7,8-PeCDF~~	~~57117-41-6~~	Uranium-234	13966-29-5
Total Chromium	7440-47-3	1,1-Dichloroethene	75-35-4	~~2,3,4,7,8-PeCDF~~	~~57117-31-4~~	Uranium-235+D	15117-96-1
Cobalt	7440-48-4	1,2-Dichloroethane	107-06-2	~~2,3,7,8-TCDD~~	~~1746-01-6~~	Uranium-238+D	7440-61-1
Copper	7440-50-8	1,2-Dichloroethene (mixed)	540-59-0	~~2,3,7,8-TCDF~~	~~5127-31-9~~		
Fluoride	16984-48-8	trans-1,2-Dichloroethene	156-60-5	Total Carcinogenic PAHs	50-32-8		
Iron	7439-89-6	cis-1,2-Dichloroethene	156-59-2	Benz(a)anthracene	56-55-3		
Lead	7439-92-1	Dieldrin	60-57-1	Benzo(a)pyrene	50-32-8		
Manganese	7439-96-5	Ethylbenzene	100-41-4	Benzo(b)fluoranthene	205-99-2		
Mercury	7439-97-6	Fluoranthene	206-44-0	Benzo(k)fluoranthene	207-08-9		
Molybdenum	7439-98-7	Fluorene	86-73-7	Chrysene	218-01-9		
Nickel	7440-02-0	Hexachlorobenzene	118-74-1	Dibenz(a,h)anthracene	53-70-3		
Selenium	7782-49-2	Naphthalene	91-20-3	Indeno(1,2,3-cd)pyrene	193-39-5		
Silver	7440-22-4	2-Nitroaniline	88-74-4	Total PCBs	1336-36-3		
Thallium	7440-28-0	N-Nitroso-di-n-propylamine	621-64-7	Aroclor 1016	12674-11-2		
Uranium	NA	~~Pentachlorophenol~~	~~87-86-5~~	Aroclor 1221	11104-28-2		
Vanadium	7440-62-2	Phenanthrene	85-01-8	Aroclor 1232	11141-16-5		
Zinc	7440-66-6	Pyrene	129-00-0	Aroclor 1242	53469-21-9		
		Tetrachloroethene	127-18-4	Aroclor 1248	12672-29-6		
		Toluene	108-88-3	Aroclor 1254	11097-69-1		
		1,1,1-Trichloroethane	71-55-6	Aroclor 1260	11096-82-5		
		1,1,2-Trichloroethane	79-00-5	Vinyl chloride	75-01-4		
		Trichloroethene	79-01-6	Xylenes (Mixture)	1330-20-7		
				p-Xylene	106-42-3		
				m-Xylene	108-38-3		
				o-Xylene	95-47-6		

[1] This list of chemicals, compounds, and radionuclides was compiled from COPCs retained as COCs in baseline risk assessments performed at PGDP between 1990 and 2013 (i.e., DOE 1996a; DOE 1996b; DOE 1999a; DOE 1999b; DOE 2000a; DOE 2001; DOE 2005; DOE 2008; DOE 2010; DOE 2013).

[2] List may be added to during project scoping based on additional information.

Yellow cells with ~~strikethrough text~~ indicate COPCs that will not be analyzed for C-400 RI/FS.

Green cells indicate additional analytes, not identified as COPCs, that will be analyzed for C-400 RI/FS.

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Sector 1B - Possible Response Actions

Surface Soil

- N/A

Concrete Slab

- **TBD**

Subsurface Soil

- Above Water Table
  - Thermal – VOCs/SVOCs
  - Soil Vapor Extraction – VOC/SVOCs
  - Solidification/Stabilization - Inorganics/Radionuclides
  - Enhanced Bioremediation - VOCs/SVOCs/Inorganics (contaminant dependent)
  - Excavation and treatment/disposition – (Treatment - contaminant dependent)
  - Chemical Oxidation - VOCs/SVOCs/Inorganics (contaminant dependent)
  - Barrier/Slurry Wall – VOC/SVOCs/Inorganics
  - Combination of Technologies

- Below UCRS Water Table (above HU4) (~30 ft bgs)
  - Thermal – VOCs / SVOCs
  - Dual Phase Extraction – VOC / SVOCs
  - Soil Flushing – VOCs / Inorganics
  - Solidification/Stabilization - Inorganics / Radionuclides
  - Enhanced Bioremediation - VOCs/SVOCs/Inorganics (contaminant dependent)
  - Excavation and treatment/disposition – (Treatment-contaminant dependent)
  - Chemical Oxidation - VOCs/SVOCs/Inorganics (contaminant dependent)
  - Barrier/Slurry Wall – VOC/SVOCs/Inorganics
  - Pump and Treat – Contaminants dependent on treatment system
  - Combination of Technologies

Sector 1B - Possible Response Actions to Infrastructure

All surface and subsurface infrastructure (including utilities, auxiliary systems, site infrastructure such as railroads, etc.) inside the C-400 Complex remaining following demolition will be evaluated on a case by case basis to determine an appropriate response action, if required. The evaluation may consider if an action level [i.e., the lesser of the hazard-based value calculated using target hazard index of 3 and the cancer-based value calculated using target excess lifetime cancer risk of 1E-04 when both are calculated (DOE 2018)] is exceeded in any sample based on a realistic exposure scenario. In addition to the risk-based values above, the evaluation would consider a combination of additional factors including, but not limited to, response to an immediate site threat to human health and the environment, rapidly achieving risk reduction, extent of contamination, accessibility, efficiency, cost effectiveness, building/site specific conditions at the end of demolition and beyond, and forecasted timeline for final remedy decision and implementation. Surface and subsurface infrastructure traveling through the complex (i.e., supplying multiple facilities or not associated with the C-400 Building at all) may remain in place or be rerouted, as appropriate. Surface and subsurface infrastructure designated to be left in place will be characterized based on sample analyses, evaluation of existing data, and/or process knowledge to ensure risks are properly mitigated. Surface and subsurface infrastructure supplying only the C-400 building and/or support structures inside the C-400 Complex may undergo one or more of the following actions:

- air-gapped
- sealed (e.g., grouted)
- excavated
- addressed by other appropriate means

The purpose of these actions would be to mitigate potential impacts to the RI/FS, remedial action, etc. One example of a potential impact would be void spaces beneath grade. The RI/FS Work Plan will include a listing of these surface and subsurface infrastructure components and include additional details to support further evaluation.

Sector 1B – Geotechnical Samples

Geotechnical samples (in general):

- Engineering properties, transport properties, and risk assessment
- Geotechnical properties likely consistent across C-400 OU Complex
    - 1 boring [3 samples (HU1, HU2, and HU3)] per sector to define characteristic value and variability for C-400 OU Complex
    - Samples from minimally affected soil
- Examples of data needs for potential remedial actions
    - Geochemical and biological parameters that could affect chemical degradation and transformation
    - Modeling[3] parameters including chemical parameters, mineralogy, reduction-oxidation potential, porosity, permeability, and stratigraphy
    - Potentiometric surfaces (groundwater flow direction—from regional MWs, not from these soil borings)
    - Physical parameters including compaction, grain size, cation exchange, chemical oxygen demand, pH, permeability, genetic profiling, microbial community, NOD, moisture content of soils, and K_d (for selected chemicals)

[3]Modeling from the Risk Methods Document, Table 3.2. "Modeling Matrix for Groundwater, Surface Water, and Biota"