Sampling Plan Strategy
Sector 6

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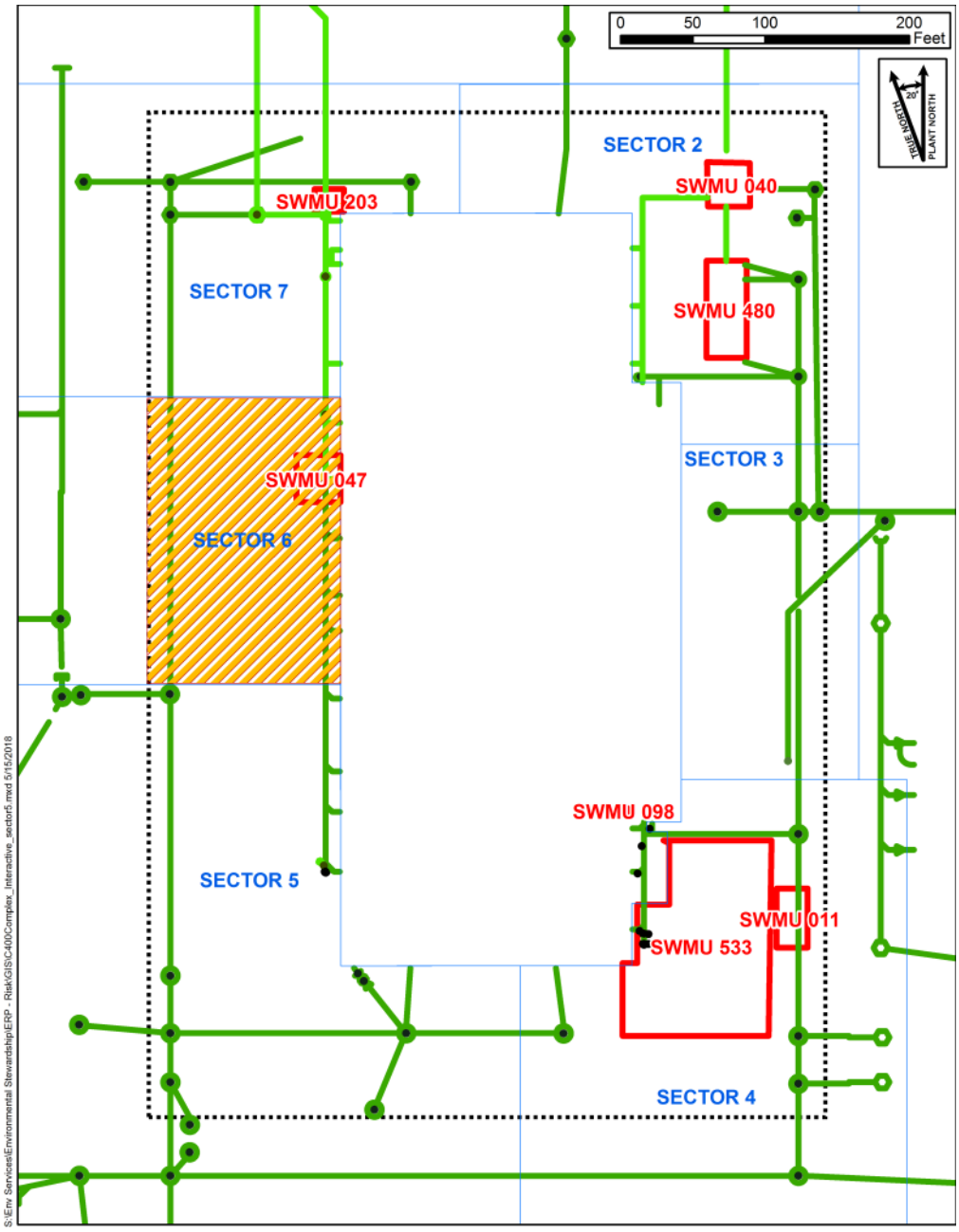
Location of Sector 6



Sector 6 Background

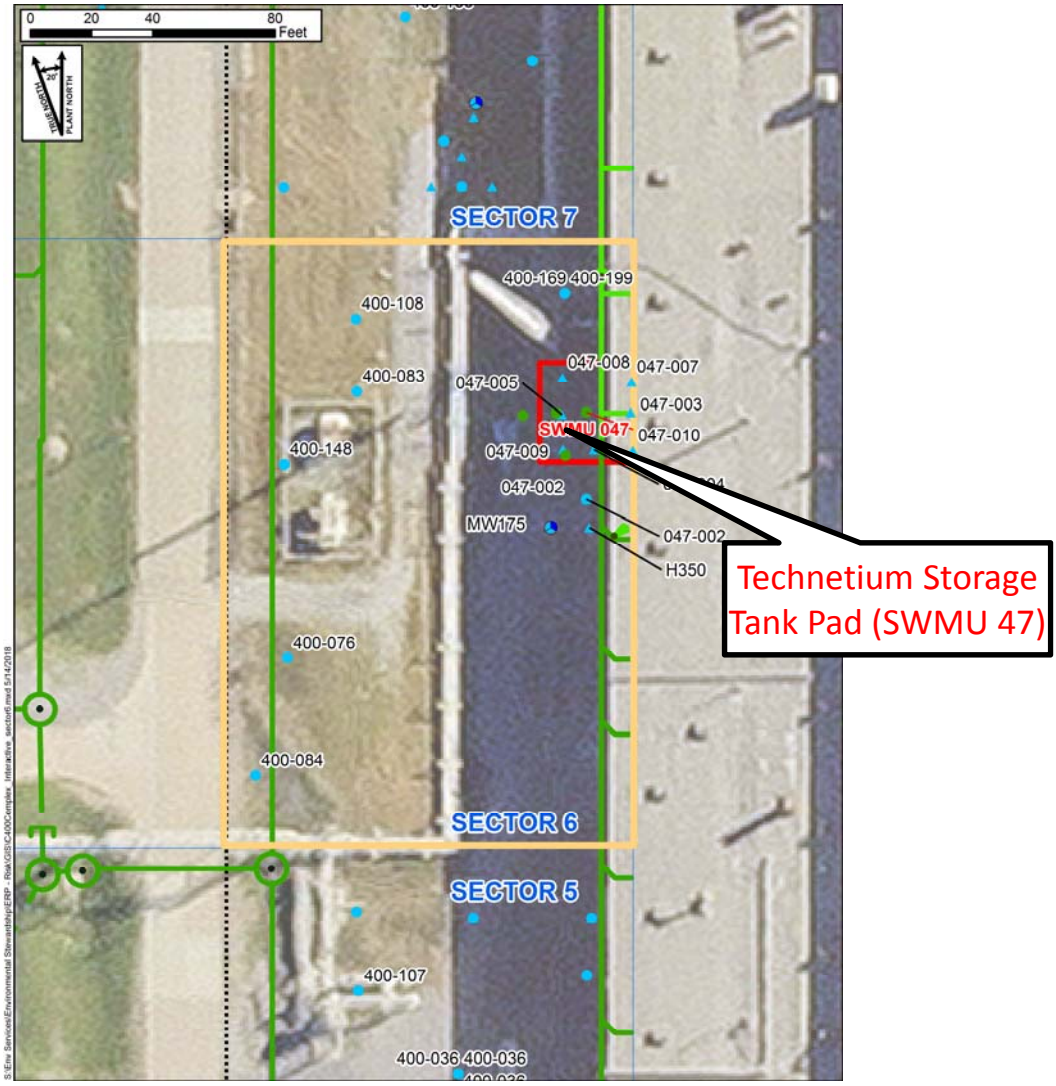
Sector 6 area is primarily covered in grassy soils with gravel roadways and concrete pads.

- Area of ~26,000 ft^2
- Area of concern - former Technetium Storage Tank (SWMU 47) and associated bermed area

Key context from WAG 6 RI

- 21 surface and subsurface soil samples collected primarily around SWMU 47 pad
  - Five VOCs were detected in the subsurface soil samples collected between 1 and 29.5 ft bgs.
  - Numerous SVOCs were reported from the soil samples submitted for analysis from Sector 6.
    - Of the SVOAs detected above the SQL (15 PAHs and one phenol), all are closely related spatially with the bermed area around the former Technetium Storage Tank site.
  - Two surface soil samples collected exhibited PCBs above the SQL . No PCBs were detected in the subsurface soil samples.
  - Numerous metals were detected at concentrations above the PGDP background screening levels. Most of the metal concentrations were only slightly above background levels. However, one surface soil sample from Boring 047-002 contained cadmium at 4.25 mg/kg, which is approximately 20 times the PGDP background level.
  - Nine radionuclides, ^{241}Am,^{137}Cs, ^{230}Th, ^{237}Np, ^{239}Pu, ^{99}Tc, ^{234}U, ^{235}U, and ^{238}U, exceeded PGDP background screening levels. The maximum activities of seven of the nine isotopes were found in the surface soil sample from Boring 047-002, adjacent to the bermed area.

WAG 6 RI
Identified Areas of Contamination
SECTOR 6



SECTOR 6
Sampling Strategies:
Targeted Sampling Approach

Anticipated remedial action(s)

- Remove SWMU 47 pad (likely action)
- Excavate surface soils under SWMU 47 pad and associated bermed areas (likely action)

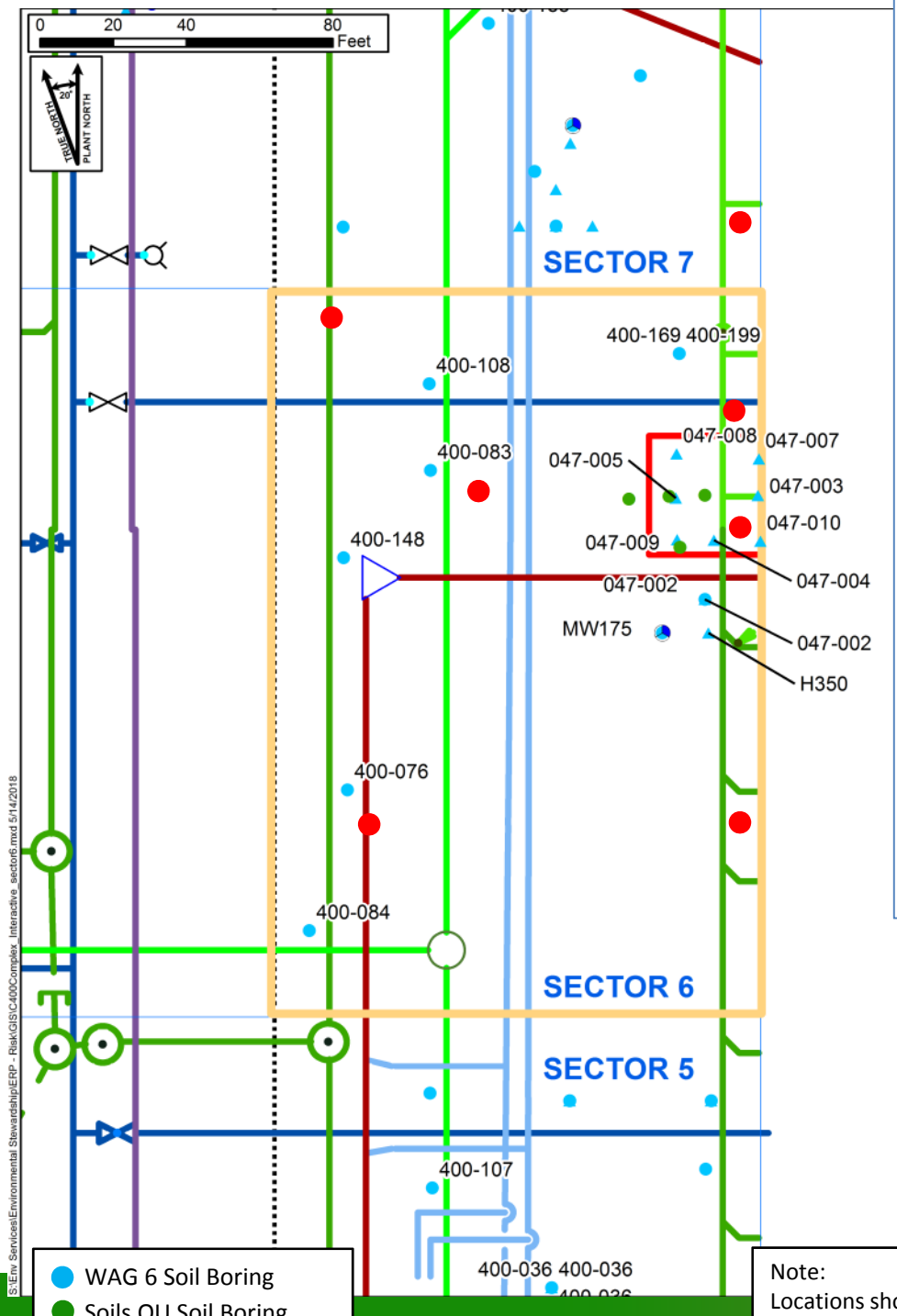
Primary recognized uncertainties

- Nature and extent of surface soil contamination (addressed by surface soil removal)
- Near-field extent (lateral and vertical) of COPC associated with identified areas of contamination

Sample strategies

- Two confirmatory surface soil samples planned
- Sample three subsoil horizons
  - HU1: ~ 10 ft depth
  - HU2A: ~ 20 ft depth
  - HU3: ~ 35 ft depth
- Targeted – contaminant sources and COCs from WAG 6 RI Baseline Risk Assessment
  - Sampling to update extent of contaminants

SECTOR 6
Targeted Sampling Approach



Targeted approach:

- Assumes removal of SWMU 47 pad
- Assumes excavation of surface soils under SWMU 47 pad and associated bermed areas
- Approximates an even distribution around the remaining contaminant sources to define contaminant levels at the contaminant sources and away from the sources
- Samples will be collected from HU1, HU2, and HU3 depths at each proposed sample location
- Total of 7 soil borings/21 soil samples
- Total of two confirmatory surface soil samples planned

WAG 6 Soil Boring
Soils OU Soil Boring
Proposed Soil Boring

Note:
Locations shown are conceptual

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Sector 6 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 6 - Possible Response Actions

Surface Soil

- Excavation, if required

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 Water Table
  - 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 6 – 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) 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 parameters including chemical parameters, mineralogy, reduction-oxidation potential, porosity, permeability, and stratigraphy
    - Potentiometric surfaces (groundwater flow direction)
    - Physical parameters including compaction, grain size, cation exchange, chemical oxygen demand, pH, permeability, genetic profiling, microbial community, NOD, and moisture content of soils