



# SUMMARY OF RESULTS FOR THE SOUTHWEST PLUME SITE INVESTIGATION

DOE/OR/07-2180&D2

Site Investigation Report for the  
Southwest Groundwater Plume at the  
Paducah Gaseous Diffusion Plant,  
Paducah, Kentucky



SLIDE 1

 **PADUCAH**  
Remediation Services  
*A Portage Shaw Joint Venture Company*

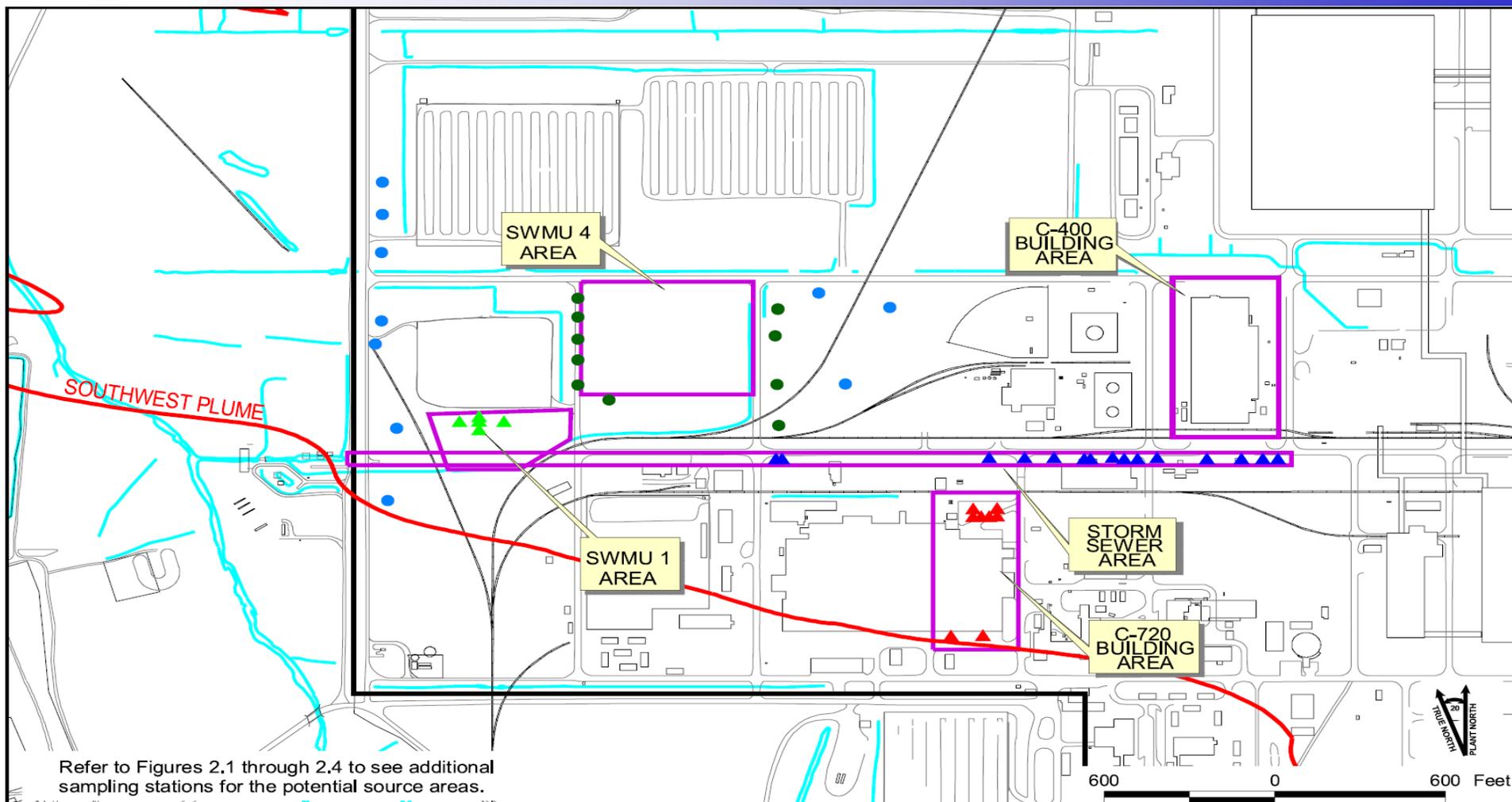


# Site Investigation Focus

- The focus of the Site Investigation was to collect sufficient data to resolve data gaps associated with 4 potential source units and collect additional data on the SW Plume.



# Site Investigation Areas



Refer to Figures 2.1 through 2.4 to see additional sampling stations for the potential source areas.

**LEGEND:**

- SOUTHWEST PLUME
- POTENTIAL SOURCE AREA

**SOUTHWEST PLUME SITE INVESTIGATION SAMPLING LOCATIONS**

SOIL SAMPLING - DPT/MIP

- ▲ SWMU 1 AREA
- ▲ STORM SEWER (SWMU 102)
- ▲ C-720 BUILDING AREA

GROUNDWATER SAMPLING - DWRC

- SWMU 4 AREA
- SOUTHWEST PLUME (SWMU 210)

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Fig. 1.6. Southwest Plume potential source areas.



# Southwest Plume Project Study Questions

- **SWMU 1**
  - What is the magnitude and extent of the high concentration zone of TCE, its degradation products, and other VOCs at SWMU 1?
- **C-720**
  - What is the magnitude and extent of the areas of VOCs, metals and radionuclide contamination near the east end of the C-720 Building?
- **Storm Sewer**
  - What is the current structural integrity of the storm sewer?
  - Are there contaminants in the backfill material of the storm sewer and the adjacent soils that may act as sources of contamination for the Southwest Plume?

SLIDE 4



## Southwest Plume Project Study Questions (Continued)

- **SWMU 4**
  - What is the level VOC and  $^{99}\text{Tc}$  contamination both upgradient and downgradient of SWMU 4 in the RGA.
- **SW Plume**
  - What is the level of VOC and  $^{99}\text{Tc}$  in the RGA groundwater passes along the west plant security fence?
  - Is the C-400 Building contributing VOCs or  $^{99}\text{Tc}$  to the RGA groundwater in the Southwest Plume?



# Groundwater Modeling Results: Expected Migration Pathways for SW Plume

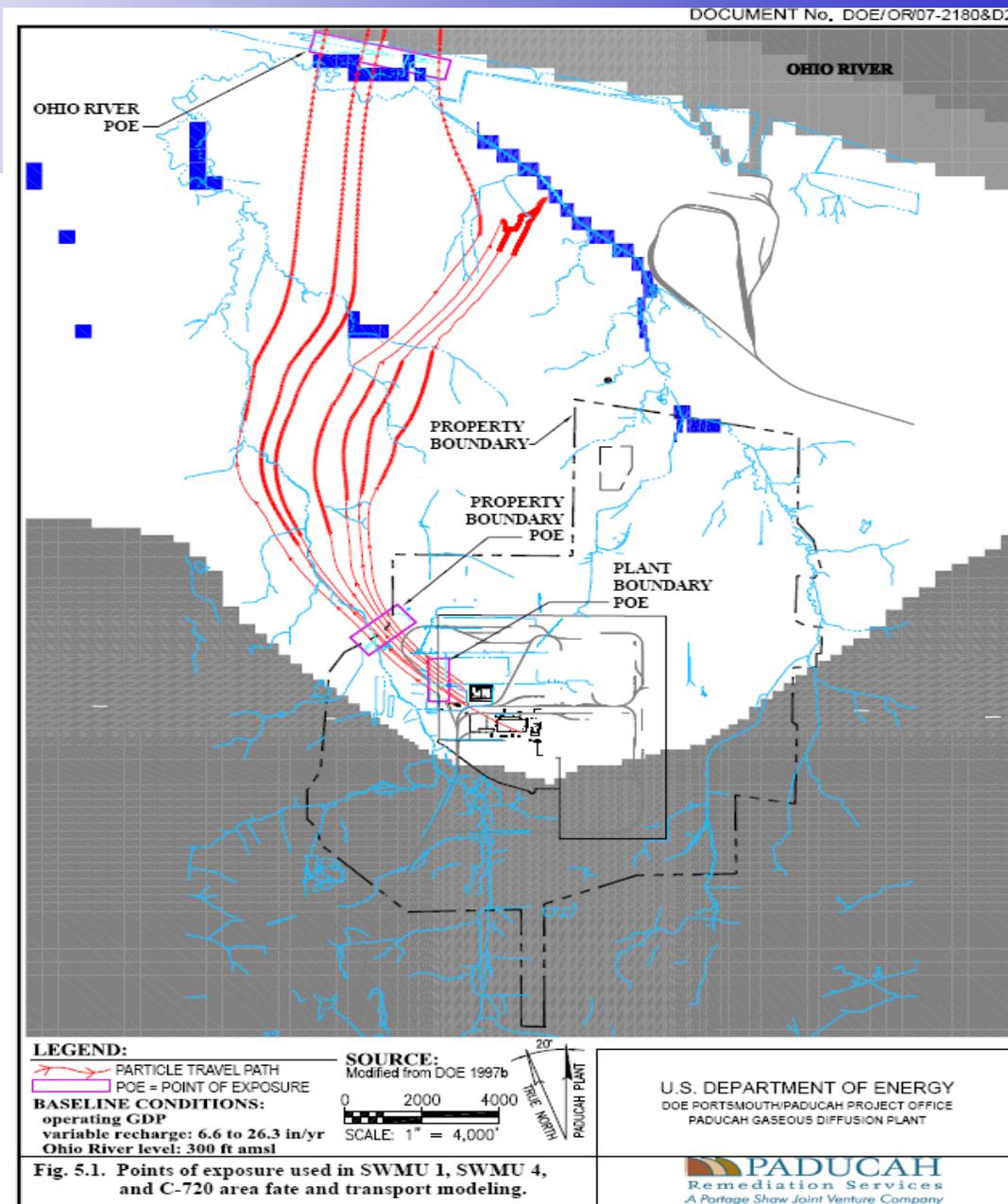
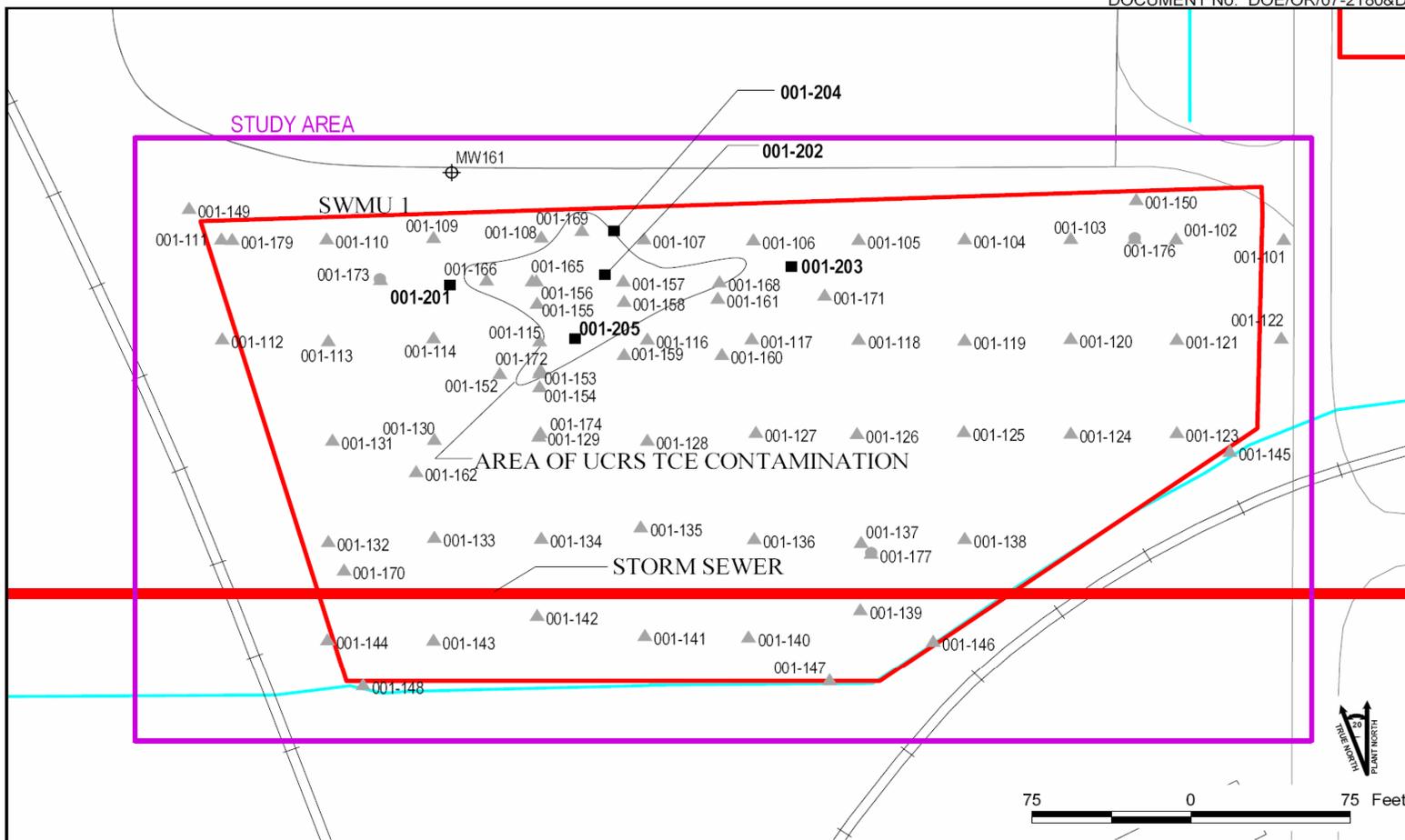


FIGURE No. /04040/DWGS/U96PRT-1mod  
DATE 12-16-04



# SWMU 1

DOCUMENT No. DOE/OR/07-2180&D2



<p><b>LEGEND:</b></p> <ul style="list-style-type: none"> <li><span style="color: red; font-weight: bold;">▭</span> SWMU</li> <li><span style="color: purple; font-weight: bold;">▭</span> STUDY AREA WITH HISTORICAL DATA</li> </ul>	<ul style="list-style-type: none"> <li>▲ SOIL BORING</li> <li>● GROUNDWATER SAMPLE FROM SOIL BORING</li> <li>⊕ MONITORING WELL</li> <li>■ SOIL SAMPLE COLLECTED FROM DPT</li> </ul>	<p>U. S. DEPARTMENT OF ENERGY DOE PORTSMOUTH/PADUCAH PROJECT OFFICE PADUCAH GASEOUS DIFFUSION PLANT</p>
<p>Fig. 2.1. SWMU 1 sample locations.</p>		 <p><b>PADUCAH</b> Remediation Services <i>A Portage Shaw Joint Venture Company</i></p>



# SWMU 1 – TCE Source

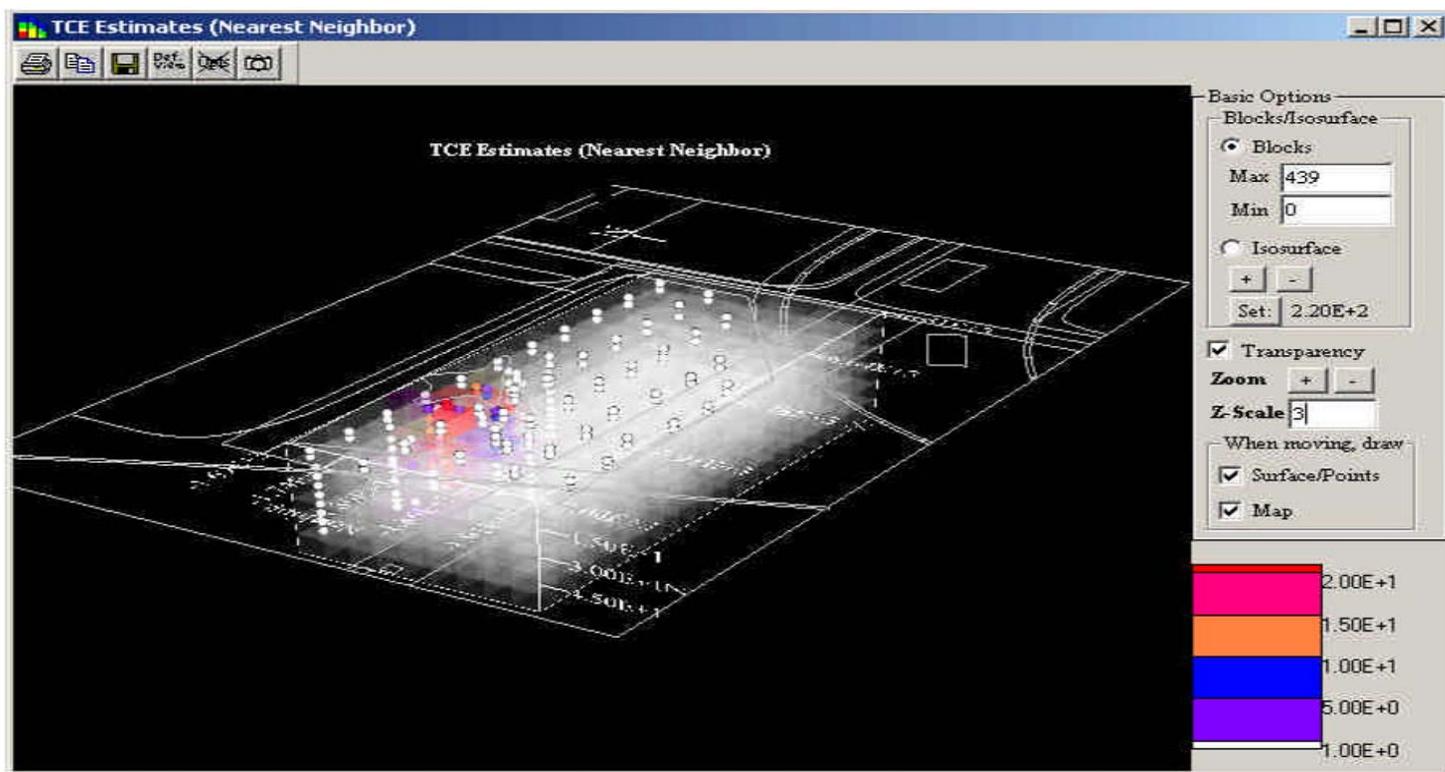


Fig. F.11. Block diagram of TCE soil contamination in the UCRS at SWMU 1 (all values in mg/kg).

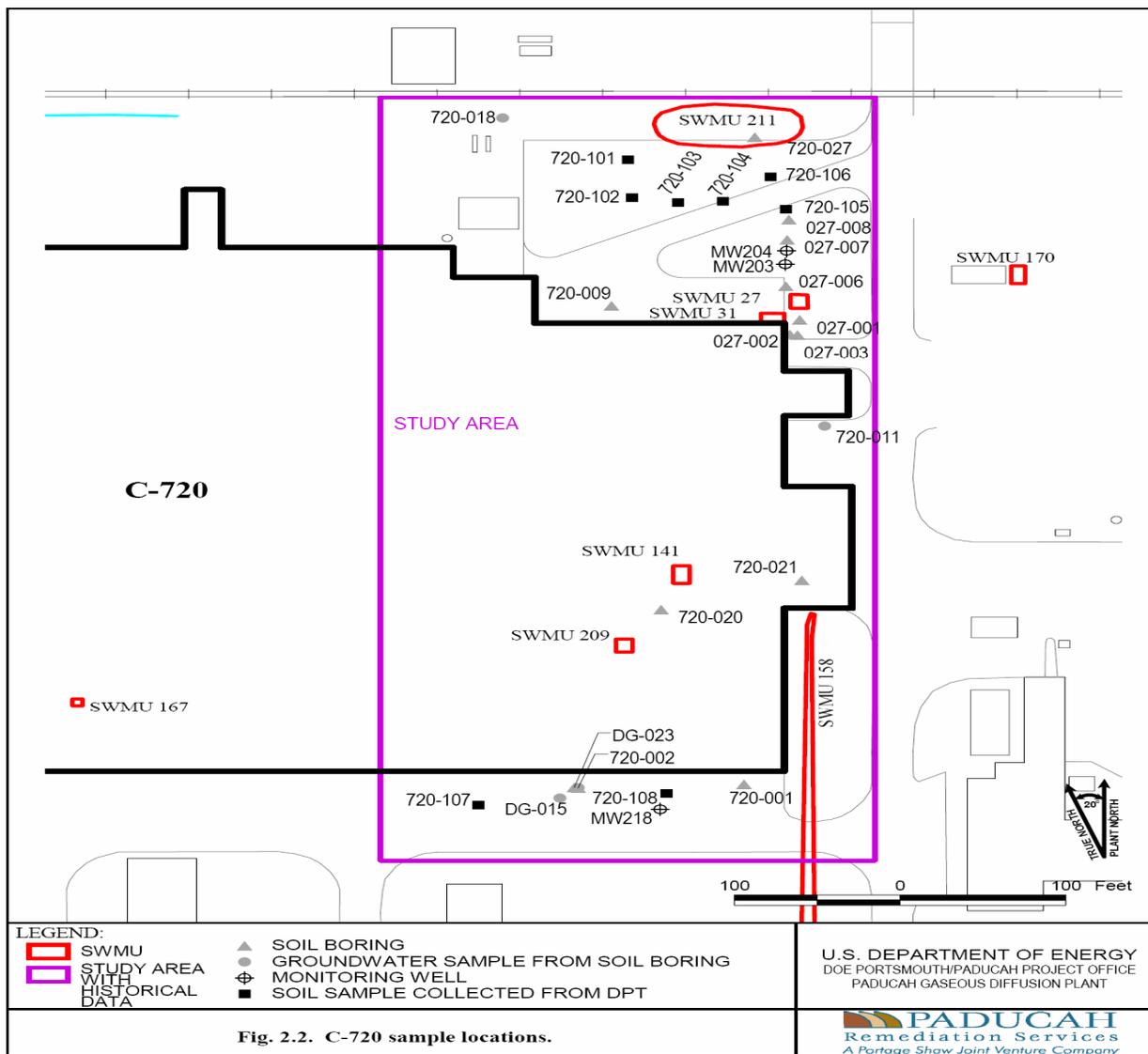


# Results and Conclusions for SWMU 1

- Area of TCE contamination is about 0.2 acre to a depth of 55 ft. Average concentrations in the source range up to 111 mg/kg (10 to 20 ft bgs).
- Predicted TCE concentration at property boundary from source is 1.3  $\mu\text{g/L}$  (less than the TCE MCL of 5  $\mu\text{g/L}$ ).
- SWMU 1 is not expected to be a source of metals or radionuclides contamination greater than the MCLs at property boundary.
- SWMU 1 is not a source of  $^{99}\text{Tc}$  contamination to RGA water.



# C-720 Building





# C-720 Building – TCE Source

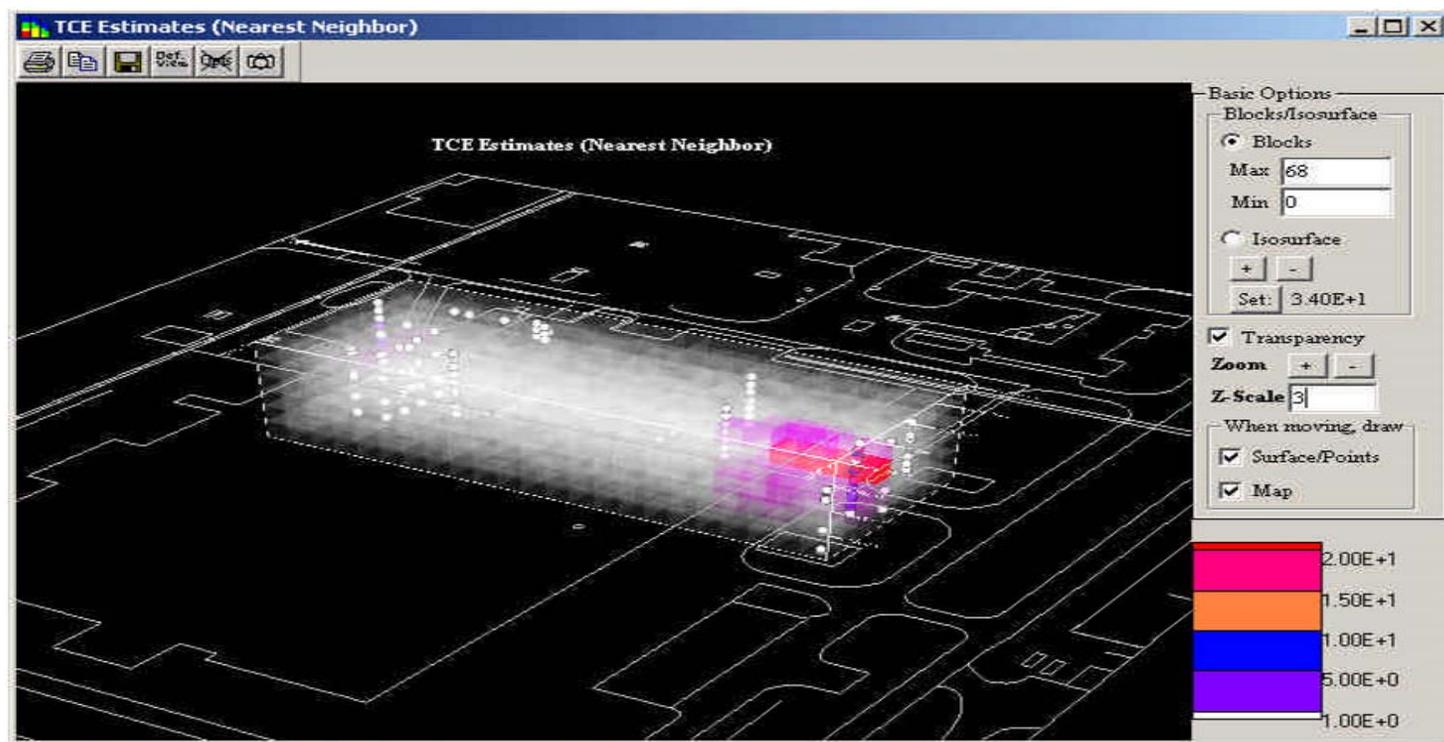


Fig. F.12. Block diagram of TCE soil contamination in the UCRS at C-720 Building area (all values in mg/kg.)

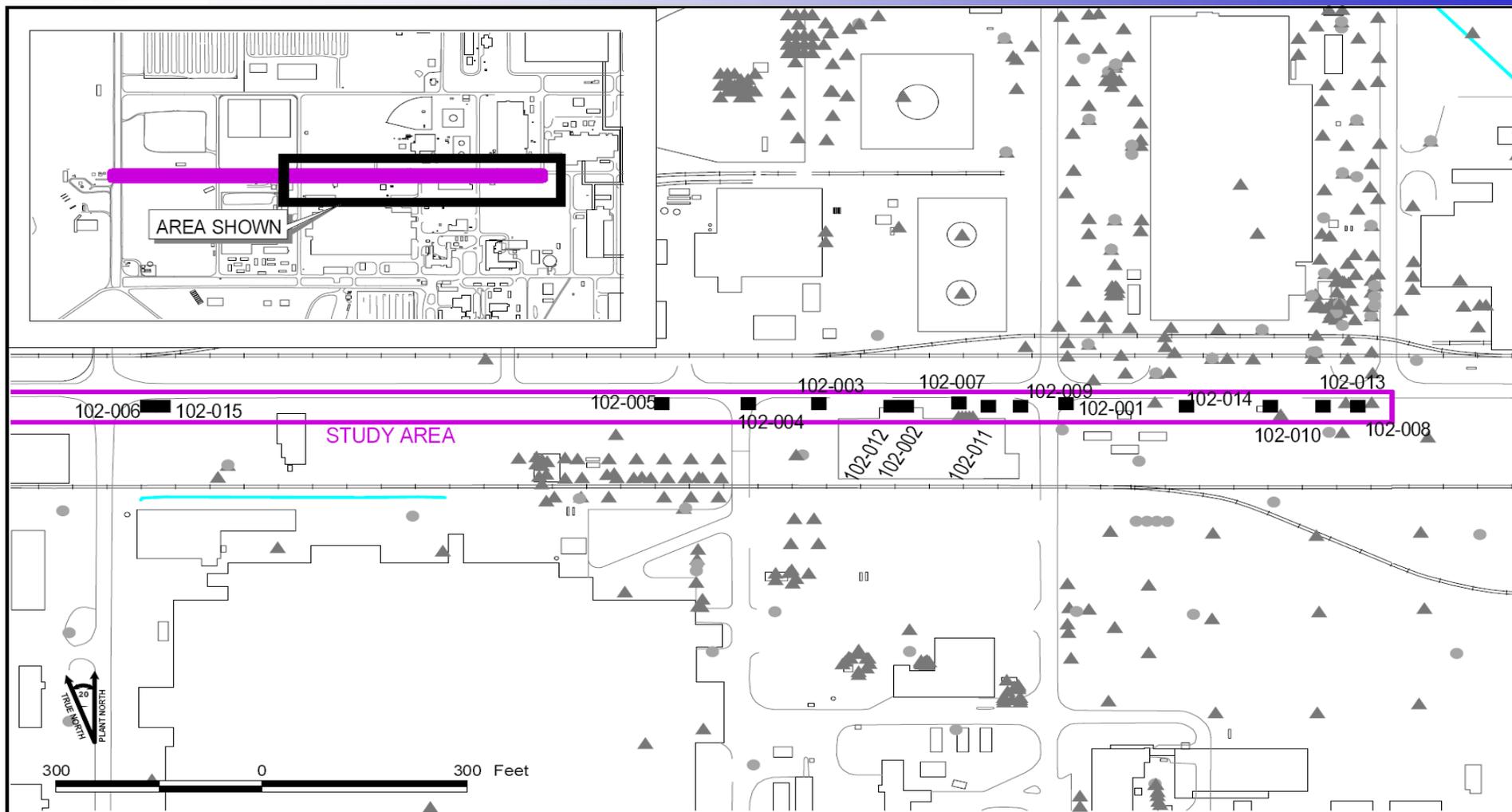


# Results and Conclusions for C-720 Building

- Largest area of TCE contamination is about 0.3 acre to a depth of 60 ft. Average concentrations in the source range up to 12 mg/kg (20 to 30 ft bgs).
- Predicted TCE concentration at property boundary from source is 0.1  $\mu\text{g/L}$  (less than the TCE MCL of 5  $\mu\text{g/L}$ ).
- C-720 is not expected to be a source of metals or radionuclides (including  $^{99}\text{Tc}$ ) contamination greater than the MCLs at property boundary.
- C-720 is not a source of  $^{99}\text{Tc}$  contamination to RGA water.



# Storm Sewer



**LEGEND:**

-  SWMU
-  STUDY AREA WITH HISTORICAL DATA
-  SOIL BORING
-  GROUNDWATER SAMPLE FROM SOIL BORING
-  MONITORING WELL
-  SOIL SAMPLE COLLECTED FROM DPT

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Fig. 2.3. SWMU 102 sample locations.

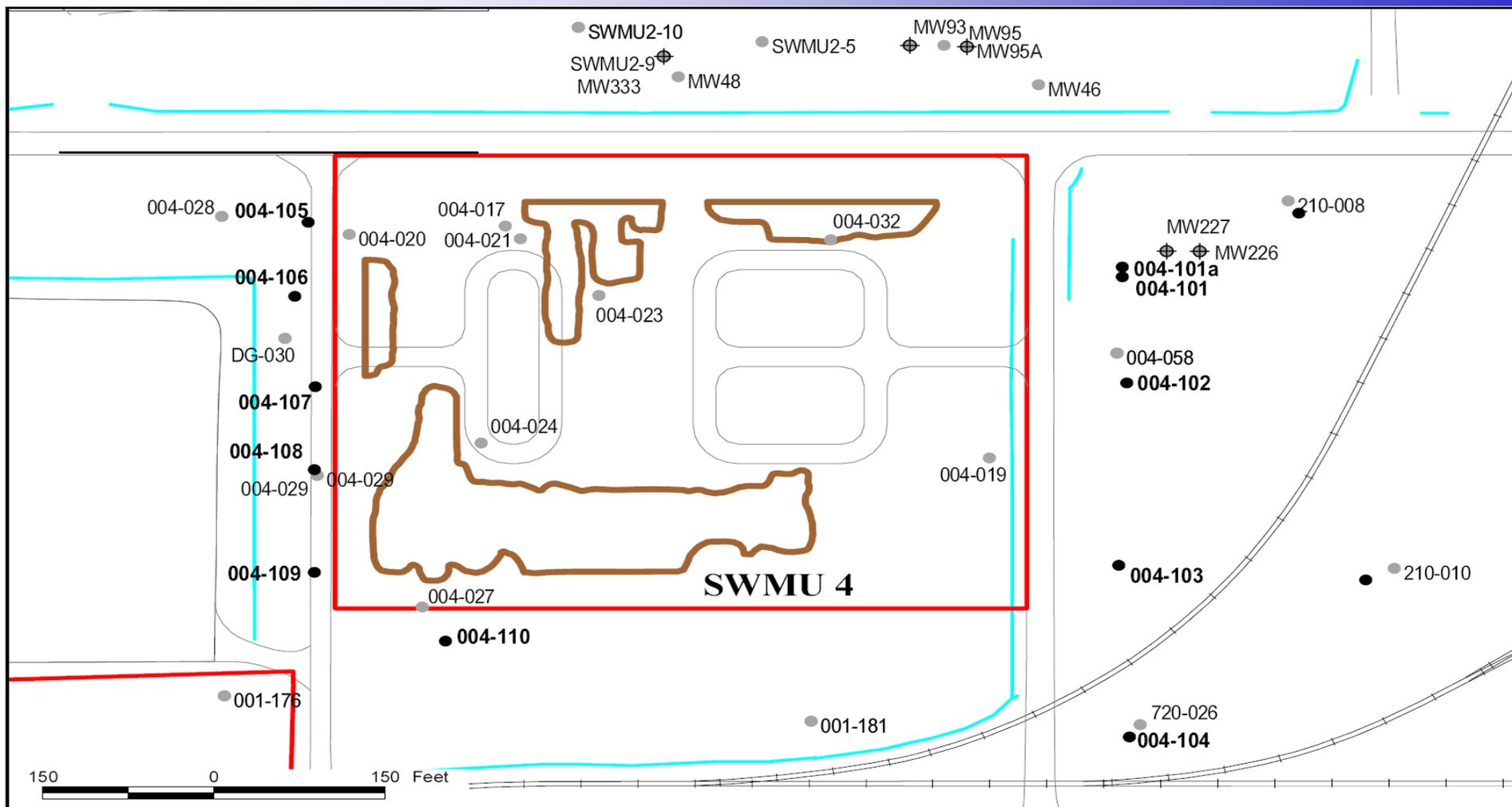


# Results and Conclusions for Storm Sewer

- Storm sewer structural integrity is good.
- Not a source of TCE contamination to the RGA.



# SWMU 4



**LEGEND:**

-  SWMU
-  WASTE PIT (as defined during WAG 3)
-  GROUNDWATER SAMPLE FROM SOIL BORING
-  MONITORING WELL
-  SI GROUNDWATER SAMPLE COLLECTED FROM DWRC



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Fig. 2.4. SWMU 4 sample locations.



# SWMU 4 – UCRS TCE Source

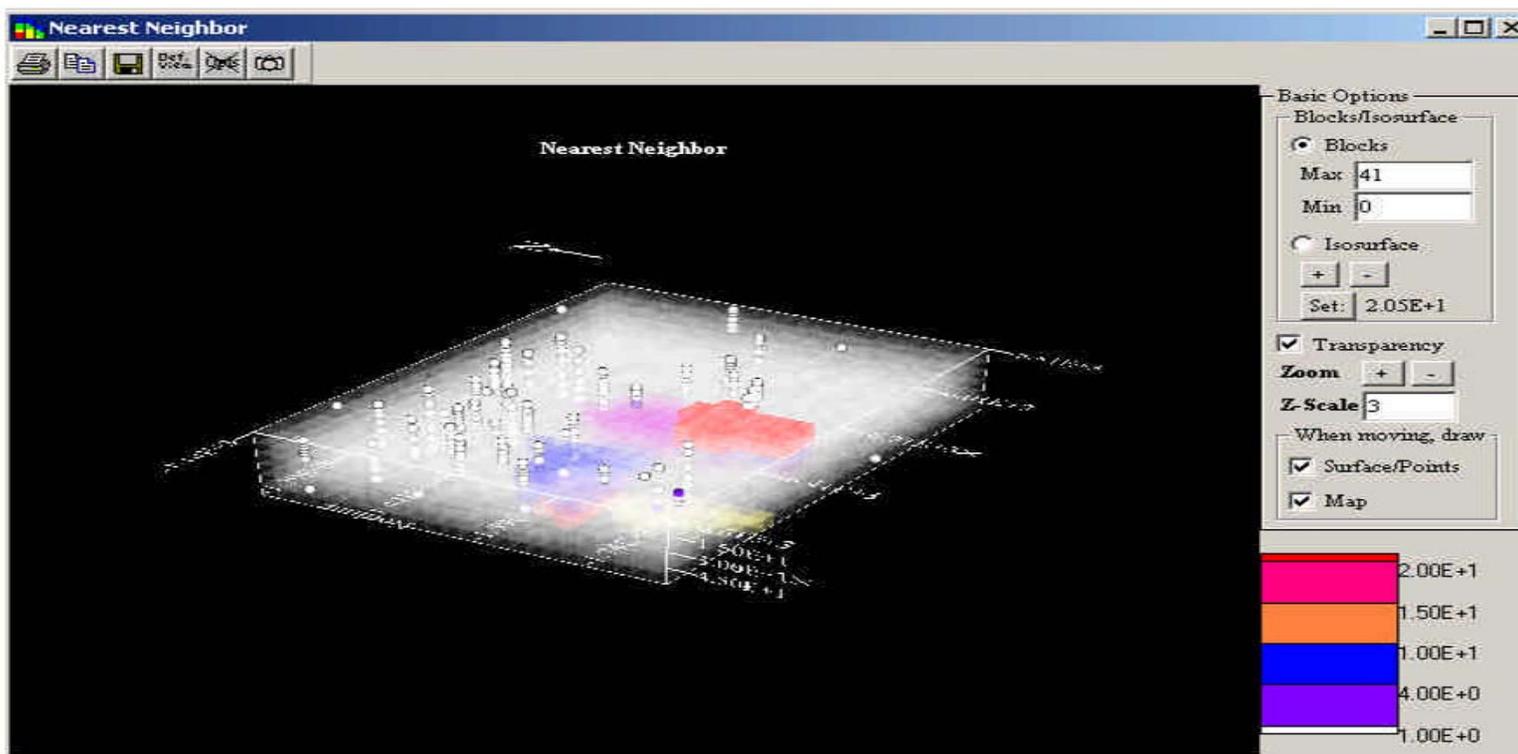


Fig. F.27. Block diagram of TCE soil contamination in the UCRS at SWMU 4 (all values in ppm).

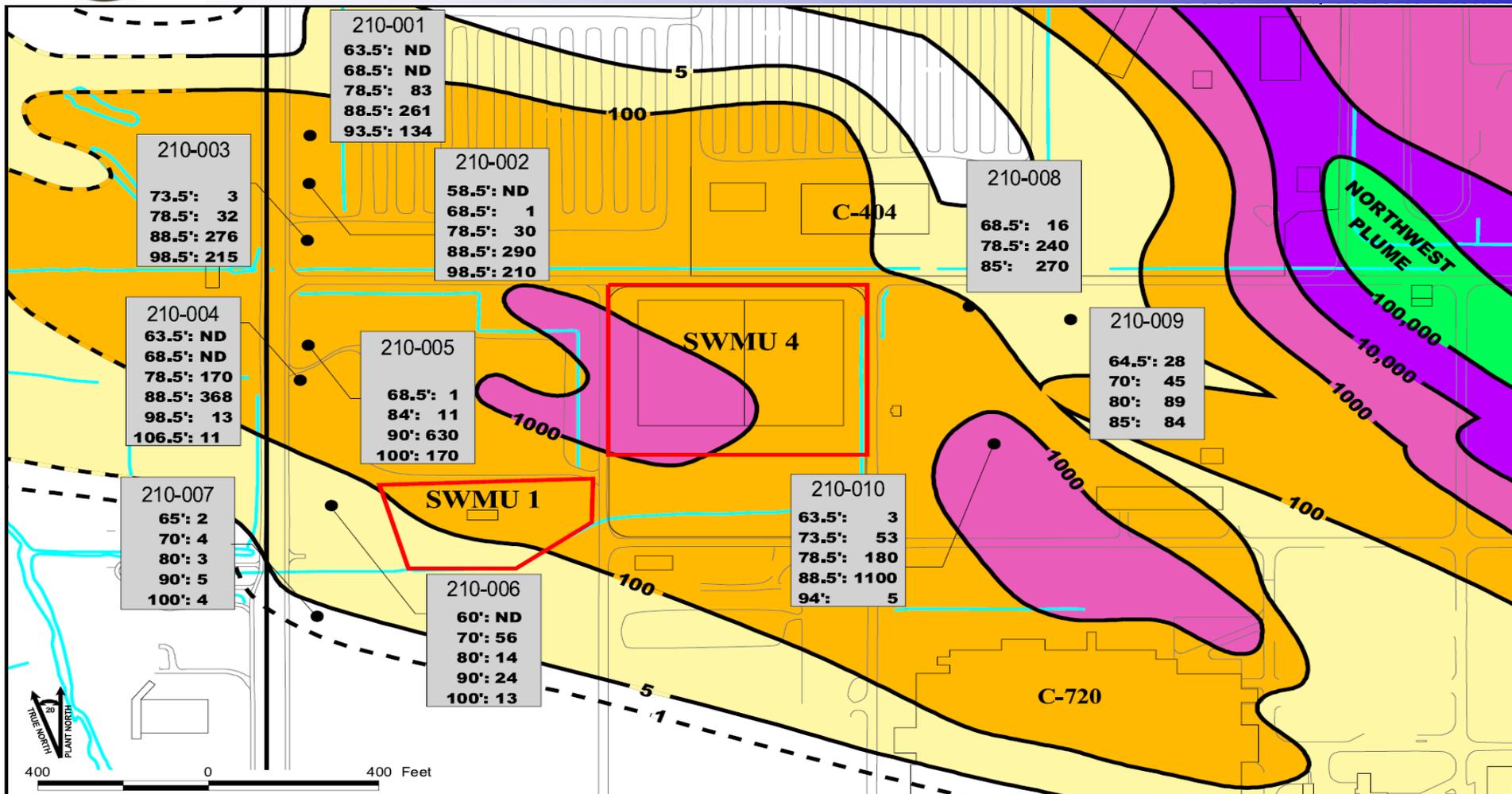


# Results and Conclusions for SWMU 4

- Largest area of TCE contamination is about 1.8 acres to a depth of 60 ft. Average concentrations in source range up to 20 mg/kg (30 to 40 ft bgs).
- Suspected secondary source of TCE (DNAPL) in the RGA below unit.
- Predicted TCE concentration at property boundary from both sources is 4.7  $\mu\text{g/L}$  (less than the TCE MCL of 5  $\mu\text{g/L}$ ).
- SWMU 4 may be a source of metals or radionuclide contamination greater than the MCLs at property boundary.
- SWMU 4 is part of the BGOU Remedial Investigation/ Feasibility Study.



# SW Plume - TCE



**LEGEND**

TCE Plume Boundary  
(ug/L):  
(modified from BJC 2004)

	>100,000
	10,000-100,000
	1000- 10,000
	100- 1000
	5- 100
	1- 5

Sample Depth & TCE :  
Result\*\* (ug/L)  
\*\*maximum result of regular  
and headspace sampling  
**ND=non-detect**

<b>60': 20</b>
<b>70': 22</b>
<b>80': 15</b>
<b>90': 18</b>
<b>100': 18</b>

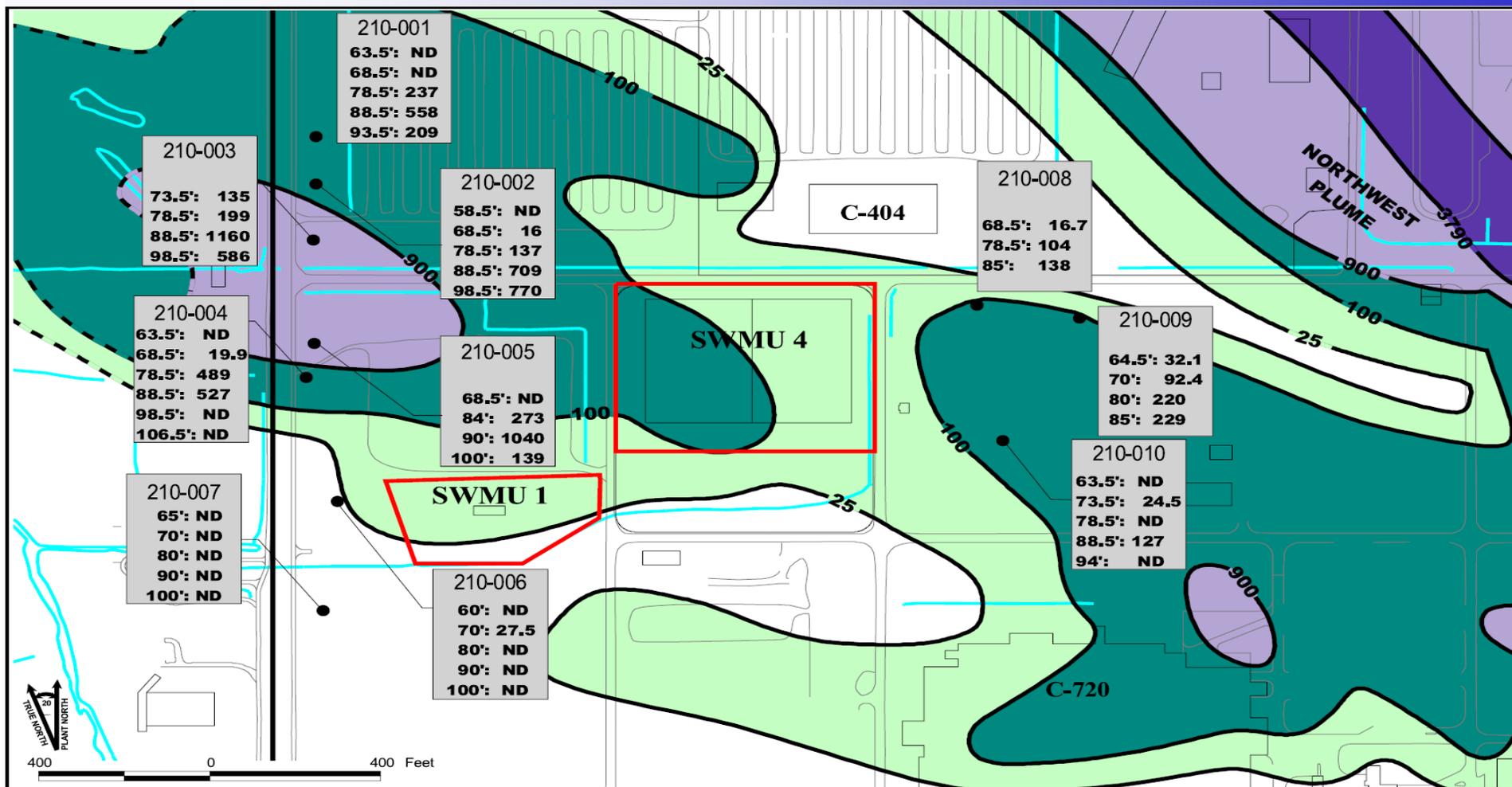
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Slide 18 Fig. 4.15. TCE results from dissolved-phase SI sampling.

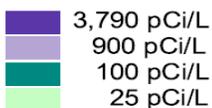


# SW Plume – <sup>99</sup>Tc



**LEGEND:**

Tc-99 Plume Boundary :  
(modified from BJC 2004)



Sample Depth & <sup>99</sup>Tc :  
Result (pCi/L)

60':	20
70':	22
80':	15
90':	18
100':	18

ND=non-detect

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# Results and Conclusions for SW Plume

- TCE concentrations at the fence range up from non-detect to 630  $\mu\text{g/L}$ .  $^{99}\text{Tc}$  concentration at the fence range from non-detect to 1,160 pCi/L. Concentrations increase with depth.



# Results and Conclusions for Site Investigation of SW Plume

- Primary contaminants defining the plume are TCE with lesser amounts of other VOCs and  $^{99}\text{Tc}$ .
- SWMU 4 is the most important contributor of TCE and  $^{99}\text{Tc}$  to the plume; SWMU 4 is being evaluated as part of BGOU.
- C-400, located upgradient of SWMU 4, may be a contributor to the plume.
- Modeling indicates that no exceedances of the TCE MCL are expected at the DOE property boundary.