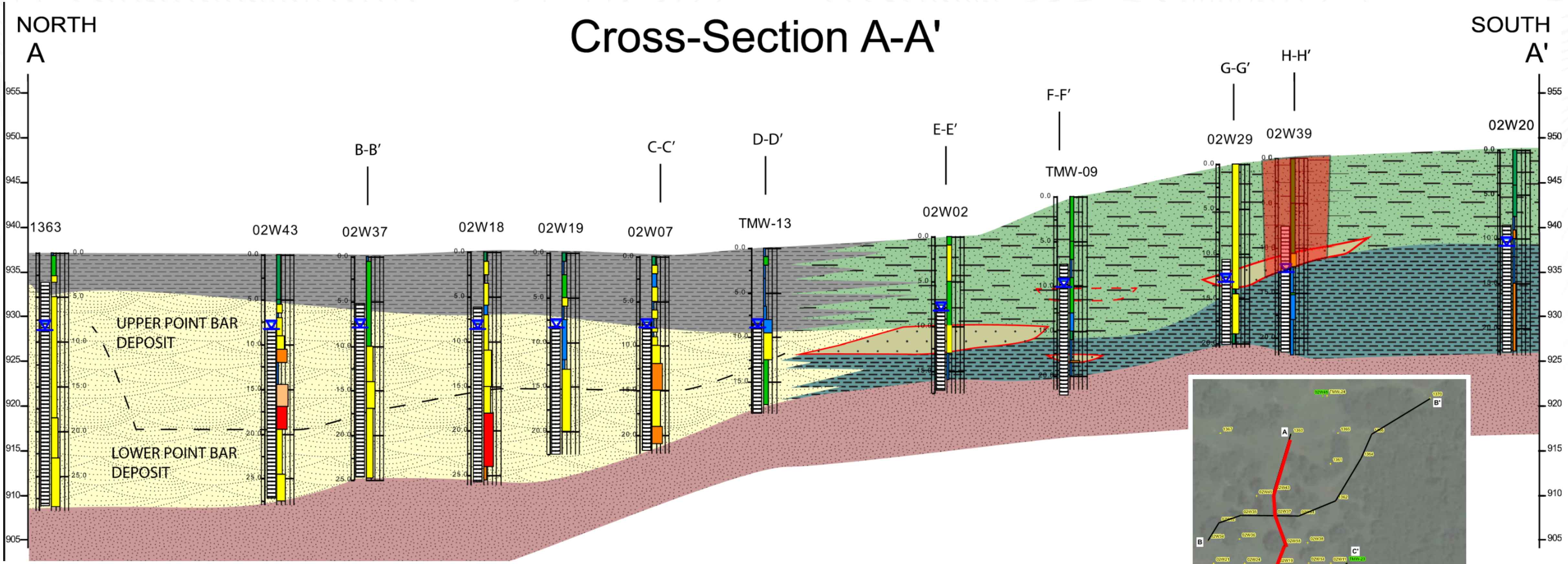
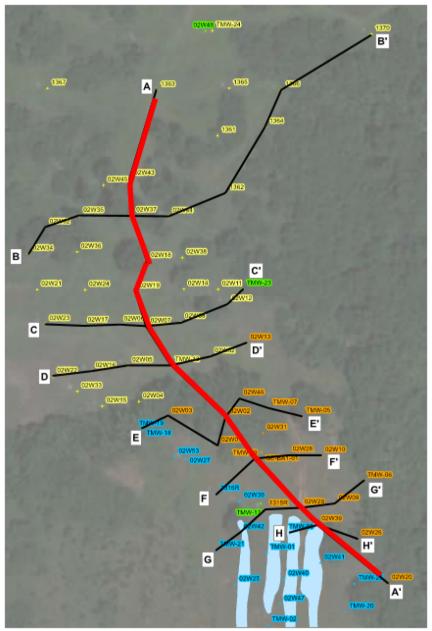
Revised Conceptual Site Model



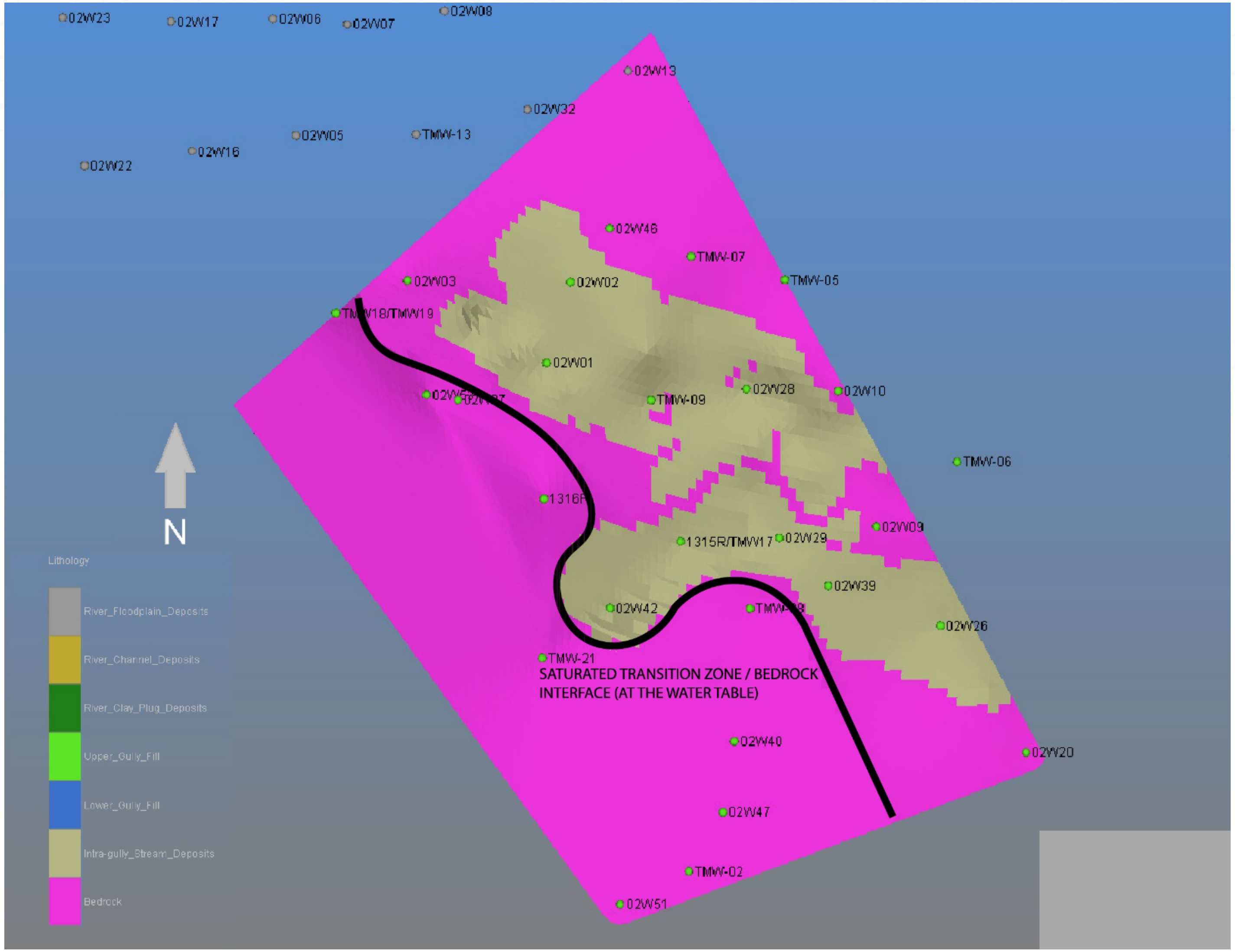


Cross section lines from 2006 Revised Conceptual Site Model. Section Line A-A' is along the approximate centerline of the uranium plume.

Source: Figure 2A, Environmental Sequence Stratigraphy (ESS) and Porosity Analysis, Burial Area 1, ML18100A297.

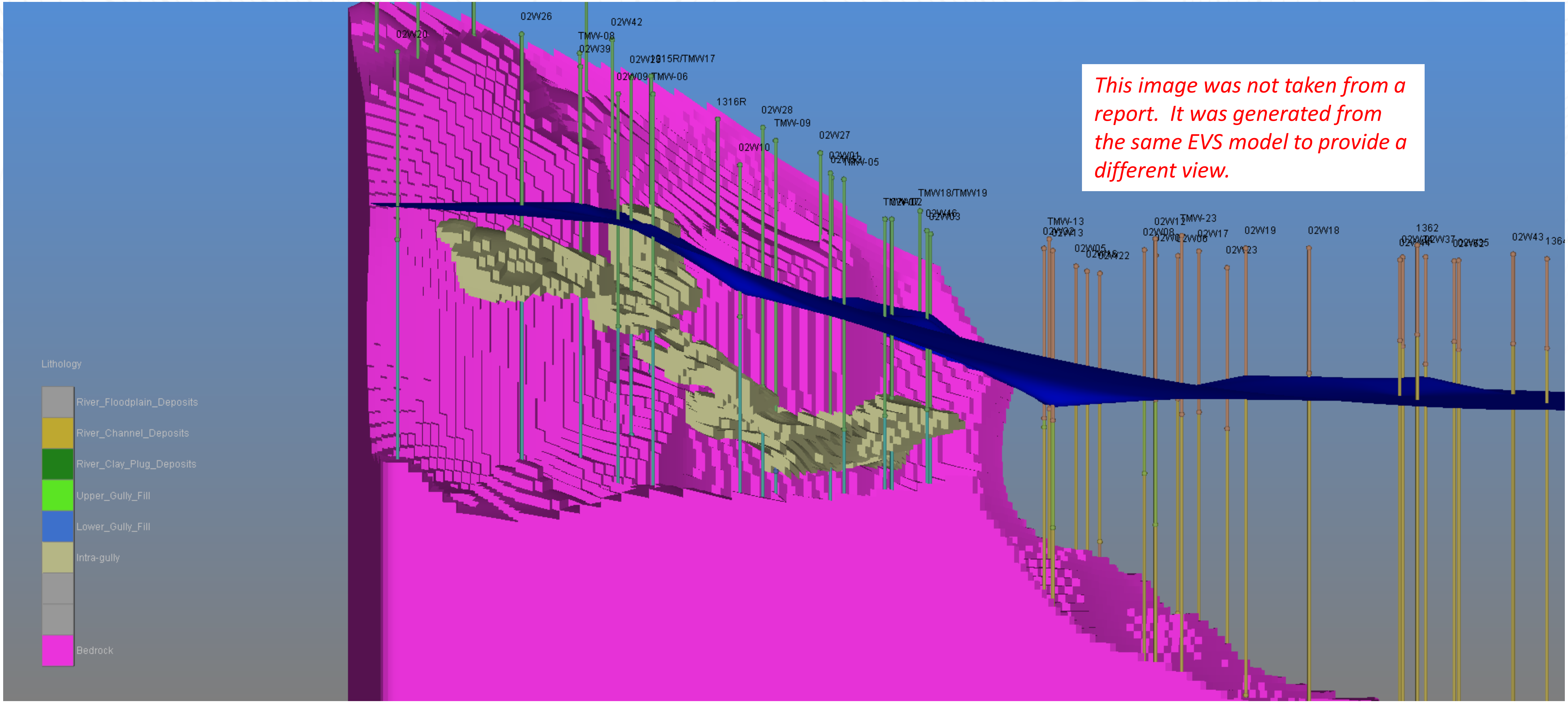
Revised Conceptual Site Model

- Black line – escarpment at groundwater surface
- Magenta – SSB surface
- Tan – interconnected, permeable sand channel deposits



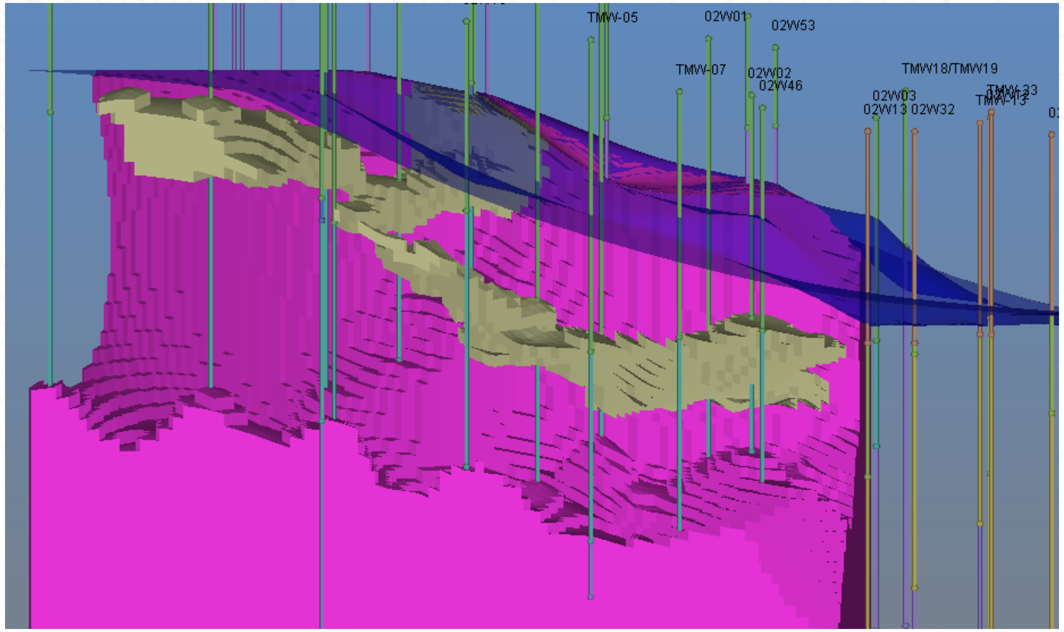
Source: Figure 4, Environmental Sequence Stratigraphy (ESS) and Porosity Analysis, Burial Area 1, ML18100A297.

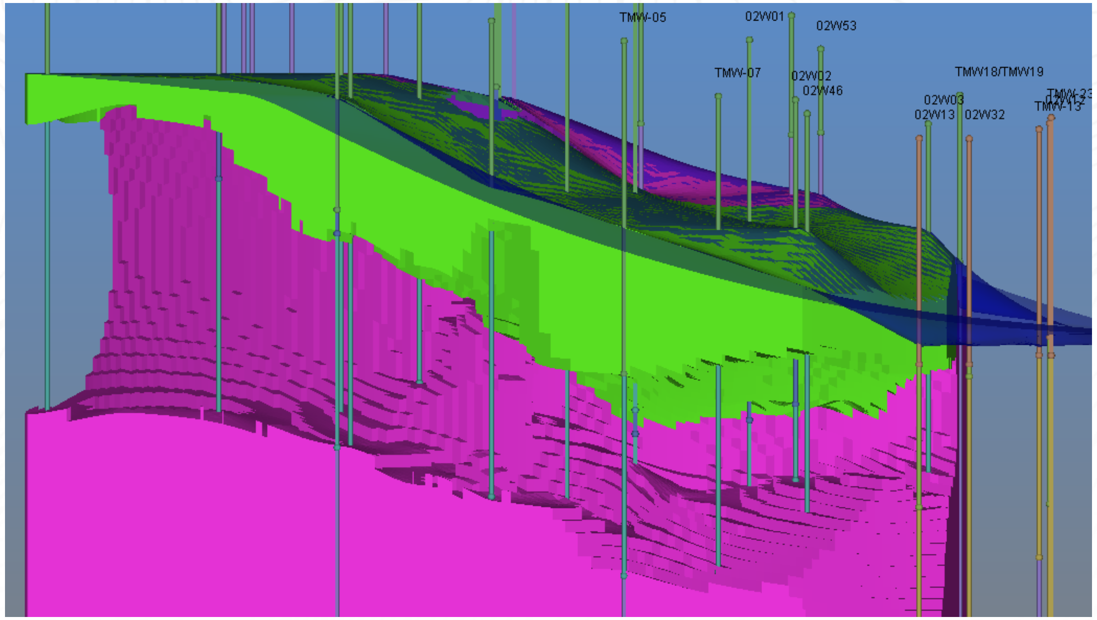
Revised Conceptual Site Model

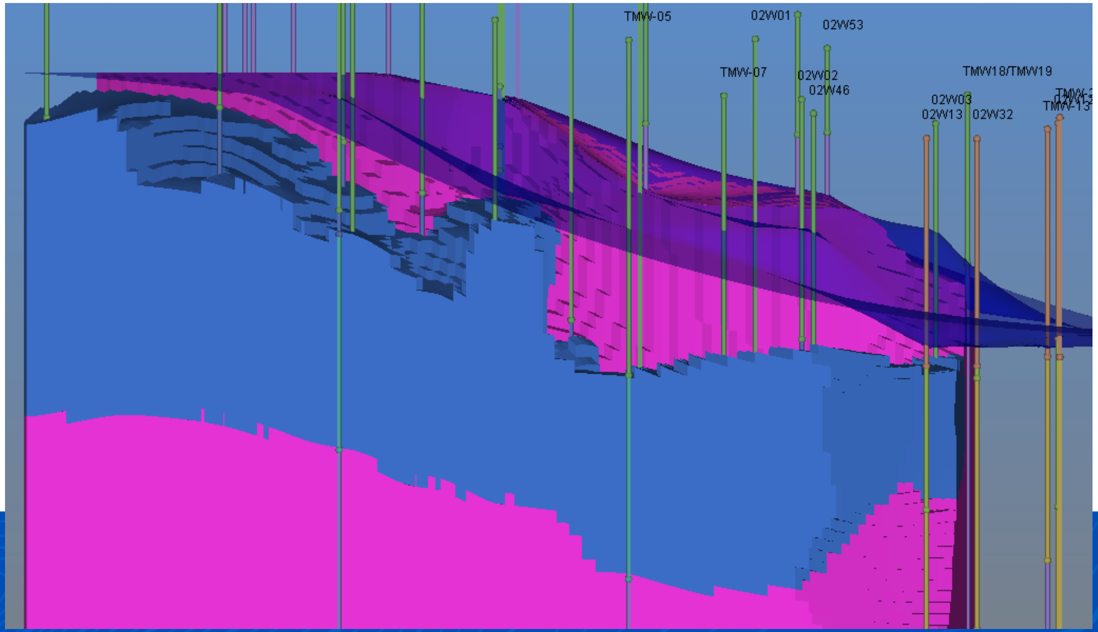


This image was not taken from a report. It was generated from the same EVS model to provide a different view.

Revised Conceptual Site Model







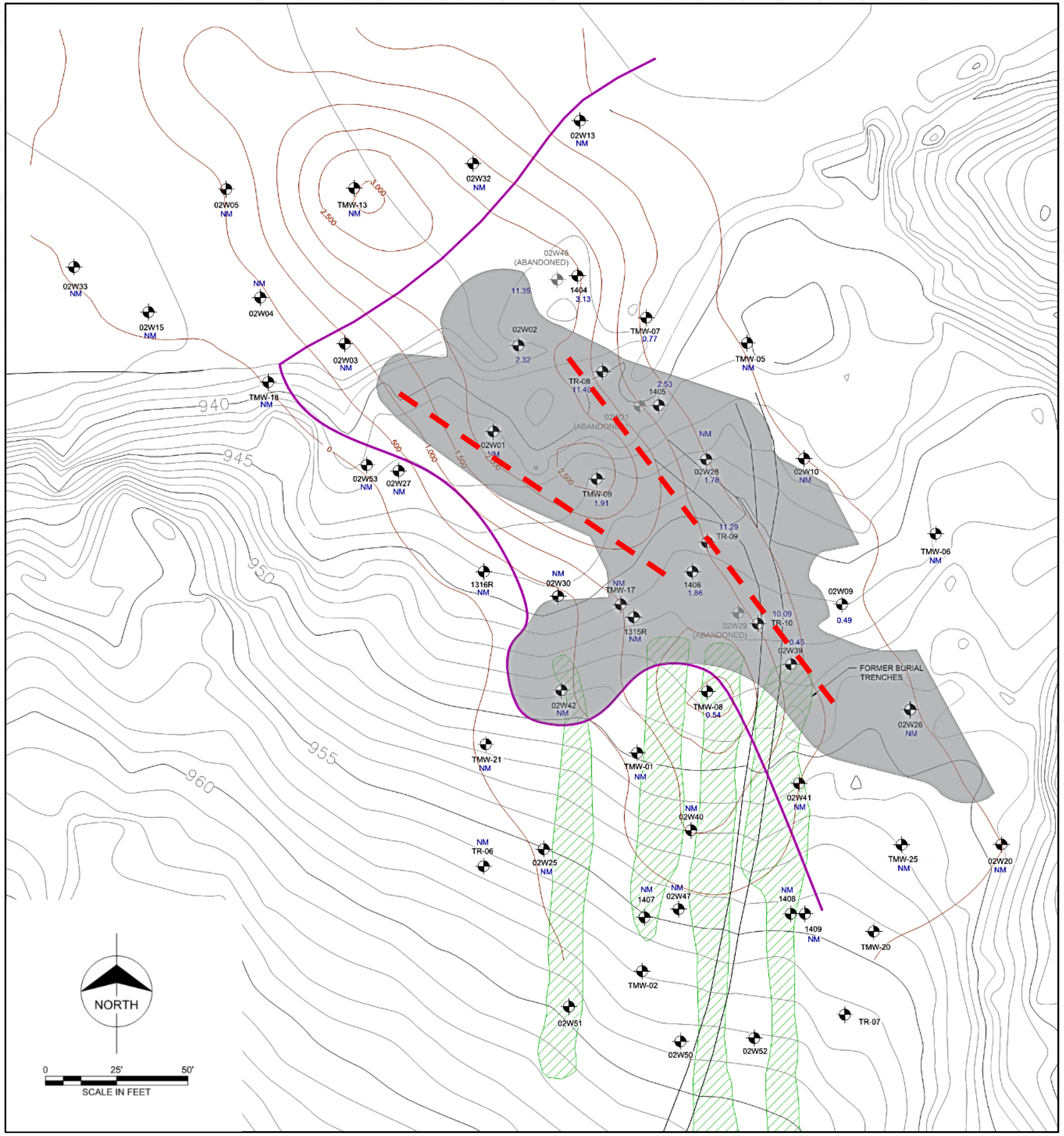
- Tan – interconnected, permeable sand channel deposits
- Green – Upper Gully Fill deposits
- Blue – Lower Gully Fill deposits

Source: Figures 5, 6, and 7, Environmental Sequence Stratigraphy (ESS) and Porosity Analysis, Burial Area 1, ML18100A297.

Remediation Design

- Gray – extent of interconnected, permeable sand channel deposits
- Red dashed lines – groundwater extraction trenches

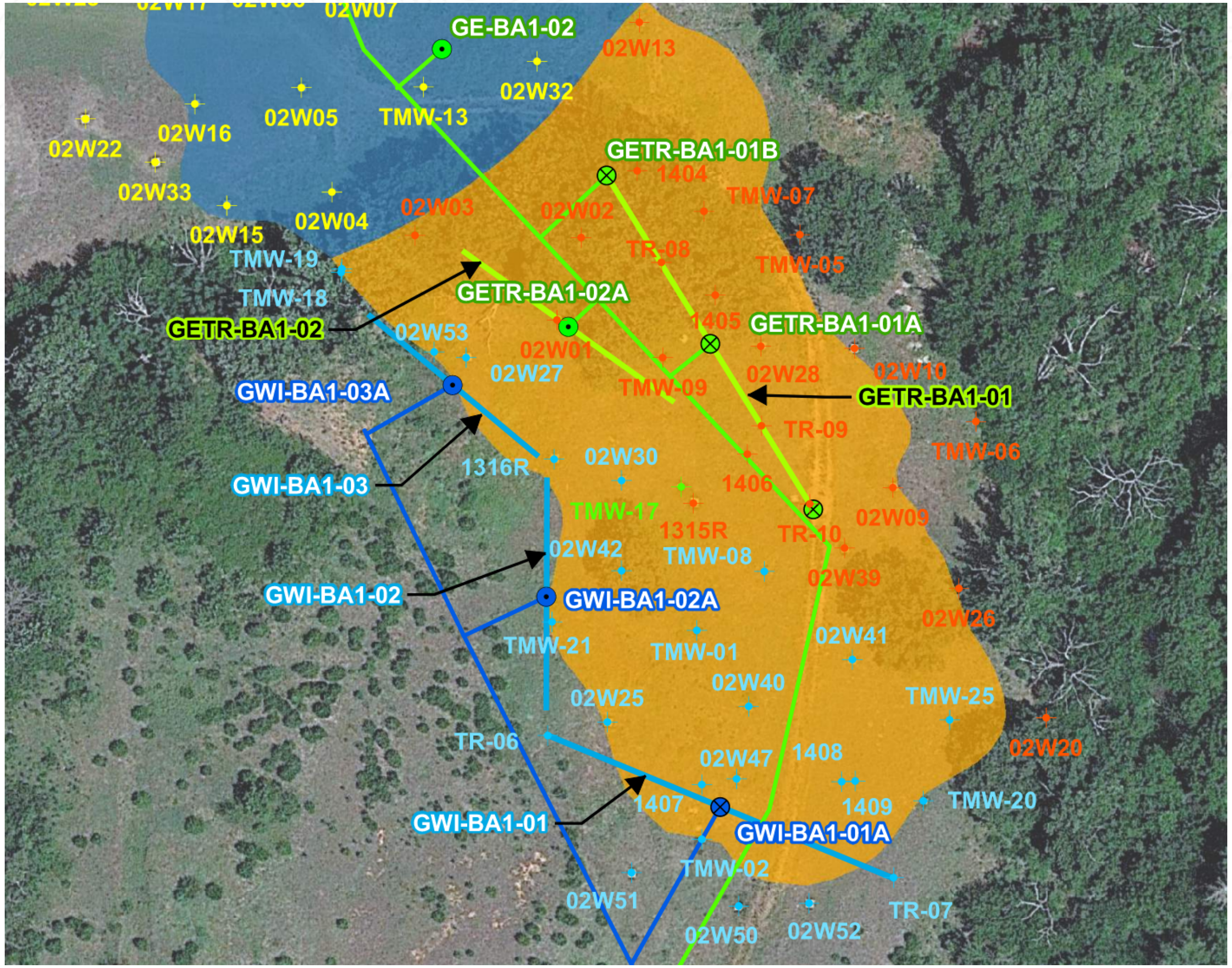
This figure was generated for internal use only and was not incorporated into a report.



BA1 Transition Zone Remediation Plan

- Light green – groundwater extraction trenches
- Light blue – treated water injection trenches

Source: Figure 8-2(b), Facility Decommissioning Plan – Rev 2, ML21076A479



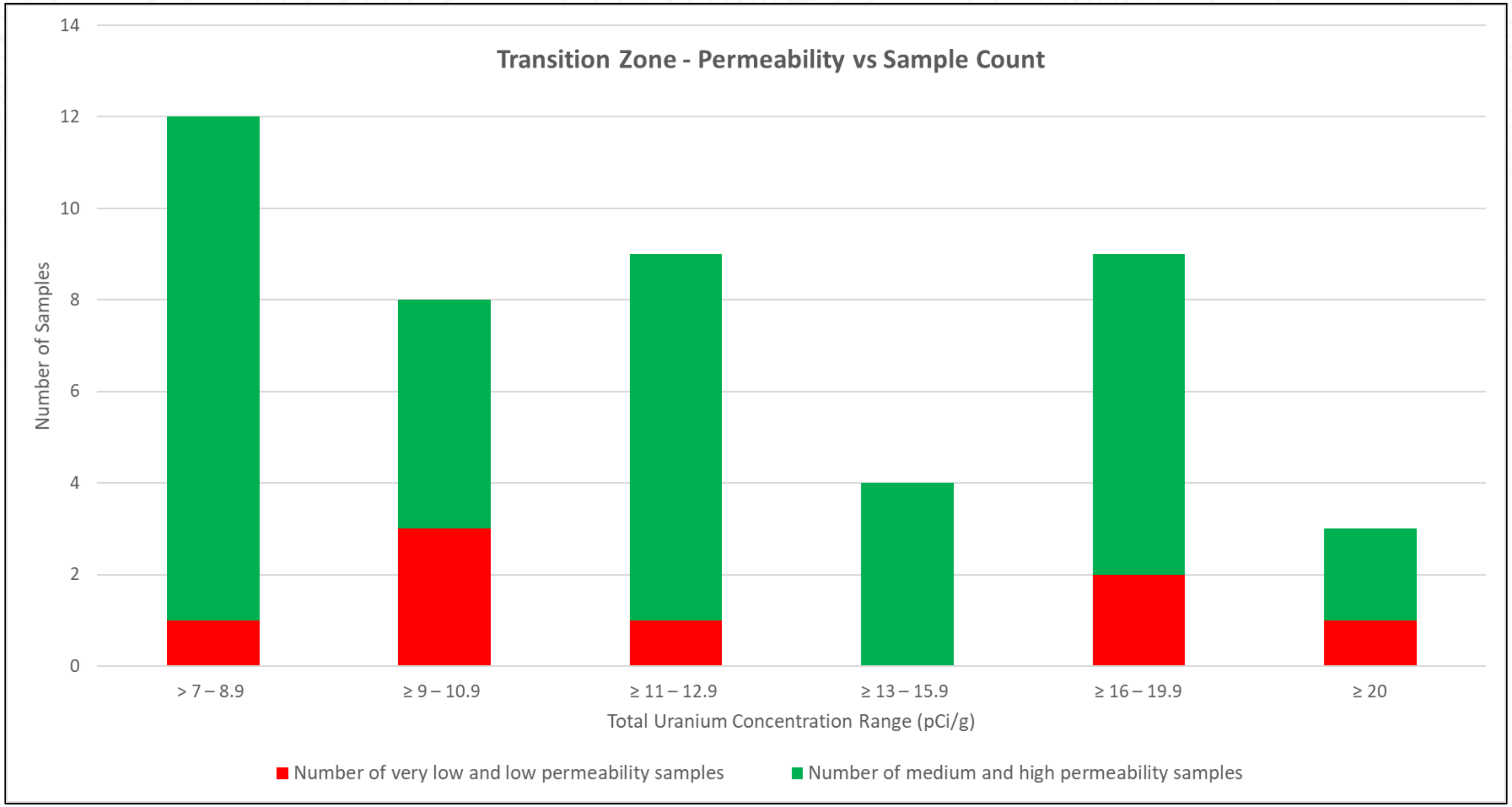
Distribution of Uranium in BA1

- Uranium is not evenly distributed within BA1 aquifer sediments
- Based on results for 204 soil samples collected from 21 borings completed in the BA1 Transition Zone, uranium in BA1 primarily resides within permeable sand channel deposits
  - 45 samples collected from 10 borings exhibited U > 7 pCi/g (background)
  - Of those 45, only 8 were collected from low permeability material

Distribution of Uranium in BA1

- Maximum background = 7 pCi/g uranium
- 159 samples < 7 pCi/g uranium

This chart was generated for internal use only and was not incorporated into a report.



Note: two of the three samples in the two highest concentration categories were collected from mixed sand/clay zones and the third sample was collected at the base of a sand zone in "shale".

Distribution of Uranium in BA1

- The BA1 permeable sand channel deposits represent approx. 16% of the total transmissive pore volume; however, 100% of the saturated pore volume was used to estimated the remediation time requirement.

Source: Environmental Sequence Stratigraphy (ESS) and Porosity Analysis, Burial Area 1, ML18100A297.

Table 1
Transmissive Porosity Calculation for Saturated and Contaminated Burial Area #1 Transition Zone
Cimarron Environmental Response Trust

Aquifer Zone	Aquifer Material	Bulk Aquifer Volume $(ft^3)^1$	Assumed Effective Porosity[2]	Transmissive Pore Volume (ft^3)	Total Bulk Aquifer Volume $(ft^3)^1$	Total Transmissive Pore Volume (ft^3)	Calculated Effective Porosity
Impacted TZ UGF Deposits	silt and silty sand with interbedded clayey sand and silty sand	189,137	10%	18,914	511,425	55,588	11%
Impacted TZ Sand Channel Deposits	sand and silty-sand streamflow deposits	44,458	20%	8,892			
Impacted TZ LGF Deposits	clay-rich channel wall failure deposits	277,830	10%	27,783			

Notes:
TZ - Transition Zone
UGF -Upper Gully Fill
LGF - Lower Gully Fill

Note: Sand channel deposits represent 9% of the bulk aquifer volume and 16% of the transmissive pore volume.

BA1 Remediation Duration Projection

- The linear sorption model* used to estimate timeframe
- Key inputs:
  - Retardation parameters (density, porosity, K_d)
  - Saturated pore volume (3D TZ/SSB "body" bounded by MCL, capture zone, TZ/Alluvium interface)
  - C_o – highest U conc. in any well
  - C_f – DCGL
  - Projected extraction rate (derived from GETR-BA1-01 pump test)

*Other than determining the injection/extraction capture zone, the numerical groundwater model was not used in estimating remediation timeframe.

Remediation and Water Treatment Duration Estimate Calculations

BA1-A ("U>DCGL" Transition Zone / Sandstone B)

$$R = 1 + \frac{\rho_b}{n} K_d$$

Table 1: Retardation Calculation

Bulk Density (g/ml)	Porosity [n][1]	Uranium K_d (ml/g)[2]		Retardation [R]
1.81	0.11	3		50.36

Table 2: Remediation Pore Volume Calculation

Bulk Saturated Plume Volume [V][3] (ft^3)	Porosity [n][1]	Pore Volume (ft^3) [PV = V*n]	Pore Volume [PV] (gallons)
818,370	0.11	90,021	673,355

Table 3: Estimated Initial Aqueous-Phase Contaminant Concentration

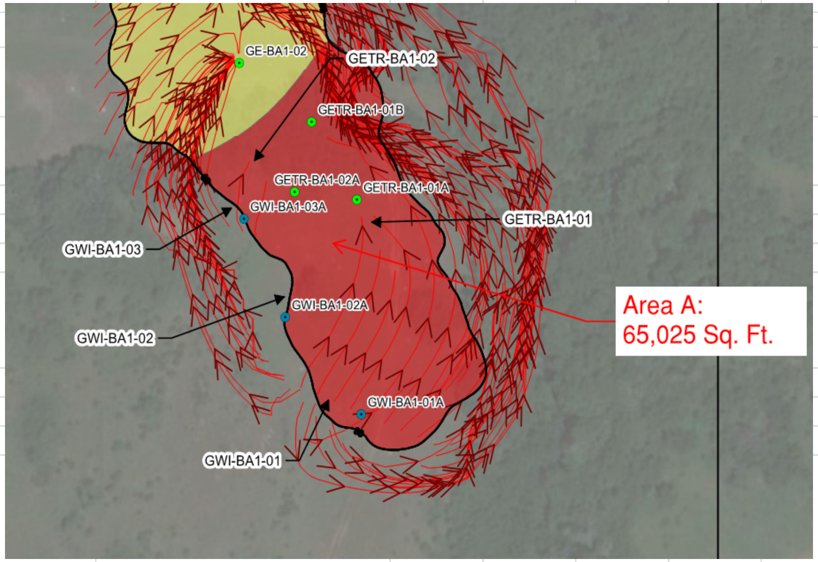
Concentration Basis	Initial Aqueous-Phase Contaminant Concentration (µg/L)	Remarks
Incremental Averaging of Concentrations within Remediation Area	823.62	Average uranium concentration in Area A
Maximum Representative Concentration within Remediation Area	2,975	Representative uranium concentration for TMW-09

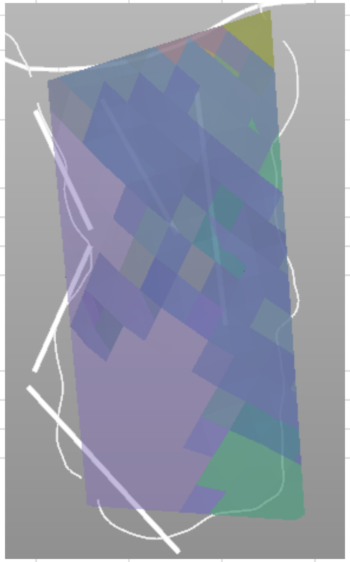
Table 4: Estimated Number of Pore Volumes to Achieve Remediation Goal (180 pCi/L)

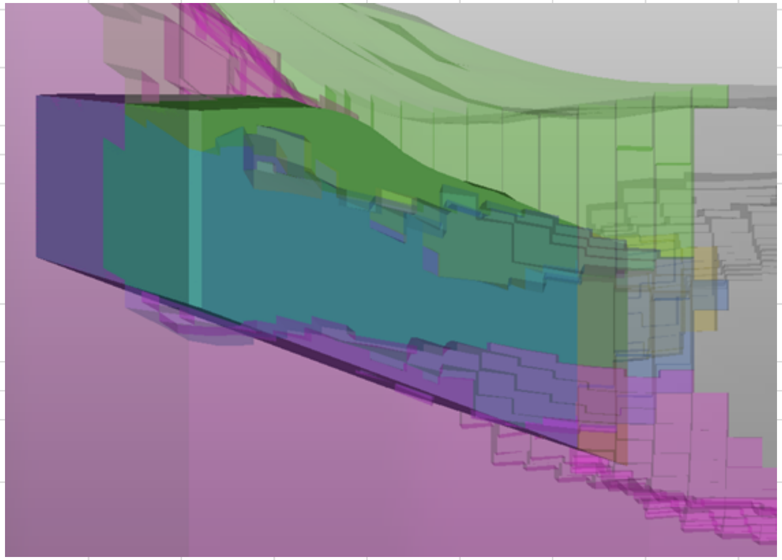
R	Uranium Cleanup Concentration (µg/L)[4]	Initial Aqueous-Phase Contaminant Concentration (µg/L)[5]	No. of Pore Volumes[6] [#PV = -R ln(Cleanup/Initial)]	Remarks
50.36	201	2,975	135.7	Pore volumes required to achieve cleanup goal (DCGL) and discontinue remediation

Table 5: Estimated Time to Achieve Remediation Goal (180 pCi/L)

No. of Pore Volumes	Pore Volume (gallons)	Flow Rate (gpm)[7]	Flow Rate (gpd)	Duration Estimate (days)	Duration Estimate (months)	Remarks
135.7	673,355	14	20,160	4,533	149.1	Time to achieve cleanup goal (DCGL) and discontinue remediation.







Source: Attachment 9.1, Basis of Design for Groundwater Remediation, Appendix K to Facility Decommissioning Plan – Rev 2, ML21076A479.

BA1 Remediation Duration Projection

- Assumptions & Limitations
  - The estimated number of pore volume (PV) exchanges required to achieve 180 pCi/L assumes linear, reversible and instantaneous desorption.
  - Each PV was assumed to be replaced with water containing no uranium.
  - Treated water will be injected during full-scale remediation; injection-enhanced conditions are not reflected in the extraction rate used in timeframe calculations.
  - Uranium is believed to present in only 16% of the PV; however, 100% of the PV was used in the timeframe calculation. The PV containing the uranium is the PV that will yield groundwater to extraction and transmit injected water.