

300-FF-5 Hydrogeology

March 2007

1. Summary of LFI Investigation
2. Updated Hydrogeology Based on LFI Findings
3. Location of Proposed IFC Site

Introduction

- ▶ Why doing additional work at 300-FF-5?
 - Selected remedy not working as expected
 - Determine cause of persistent U plume
 - Select and apply a remedy that returns 300 Area groundwater to maximum beneficial use = reduce U plume to <30 ug/L

300 Area Limited Field Investigation

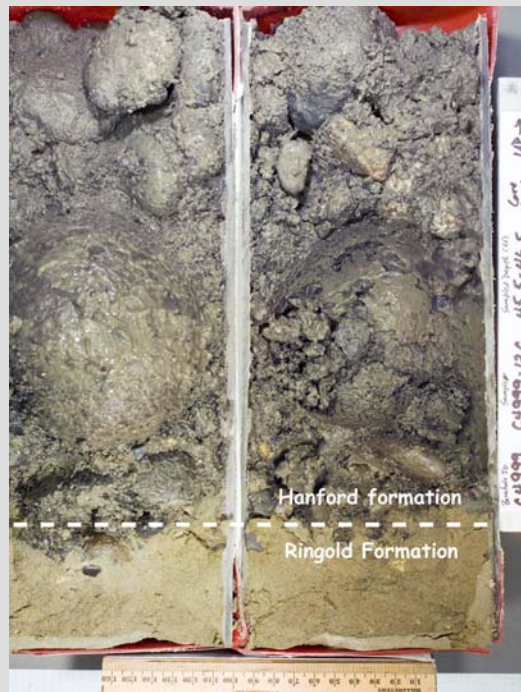
► Objectives of LFI

- Investigate nature and source of uranium in unconfined aquifer and capillary fringe (lower vadose)
- Conduct hydrogeologic characterization of the entire unconfined aquifer with emphasis on defining the relief on the Hanford – Ringold contact

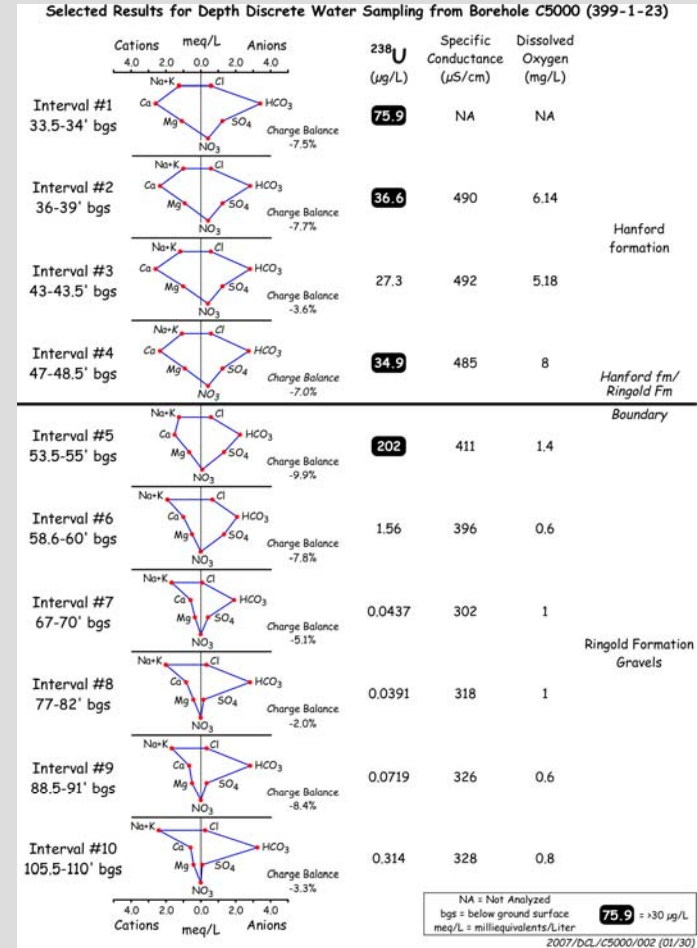
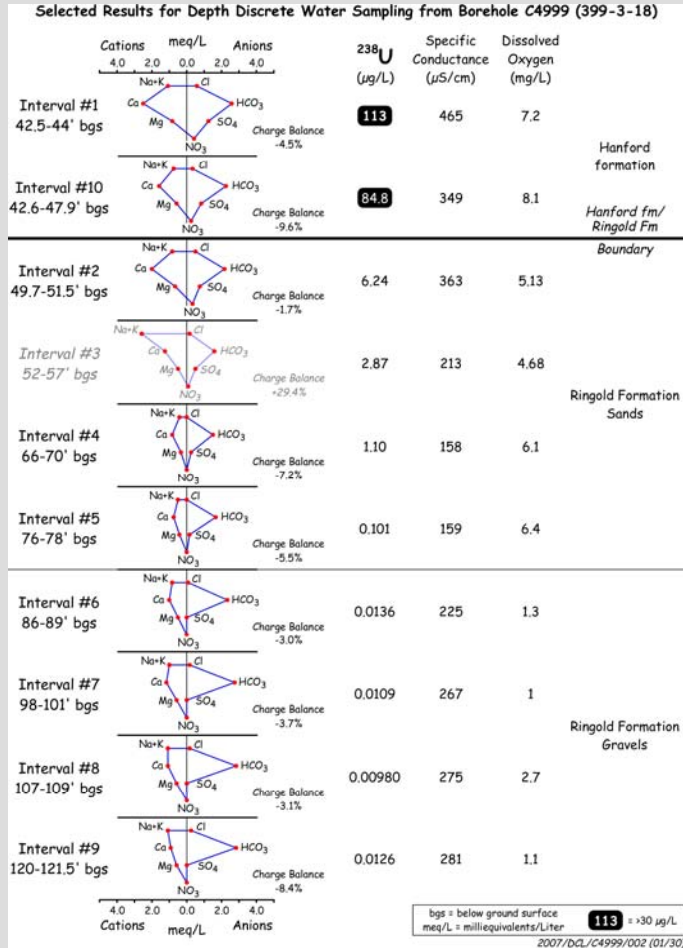
► Completed four Sonic drilled boreholes

- Continuous large diameter core
- Depth discrete aquifer sampling
- Depth discrete aquifer testing
- High resolution borehole geophysical logging

Select Core Samples Showing Variations in Lithology and Contact Boundaries

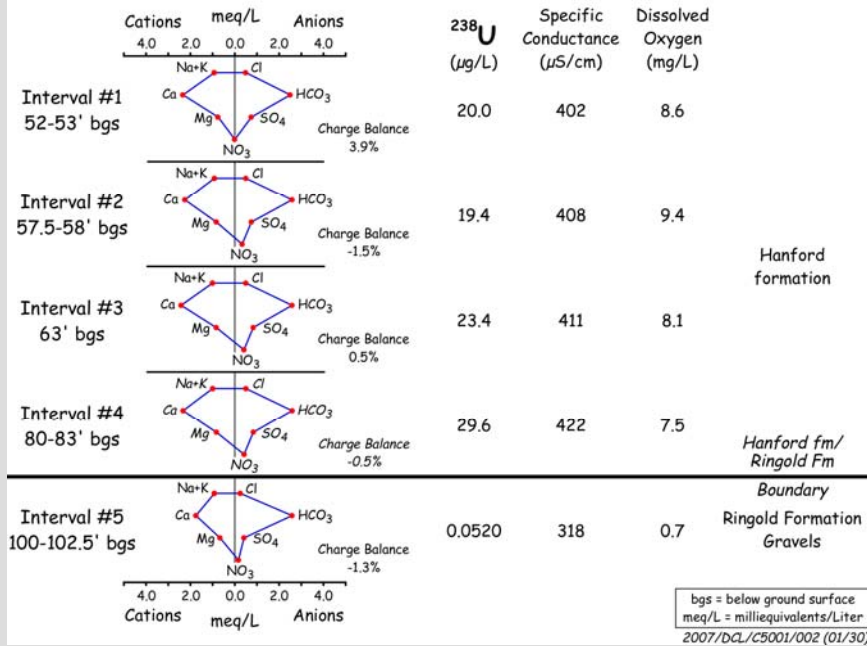


Depth specific STIFF diagrams showing groundwater chemistry variations in the unconfined aquifer, C4999 and C5000

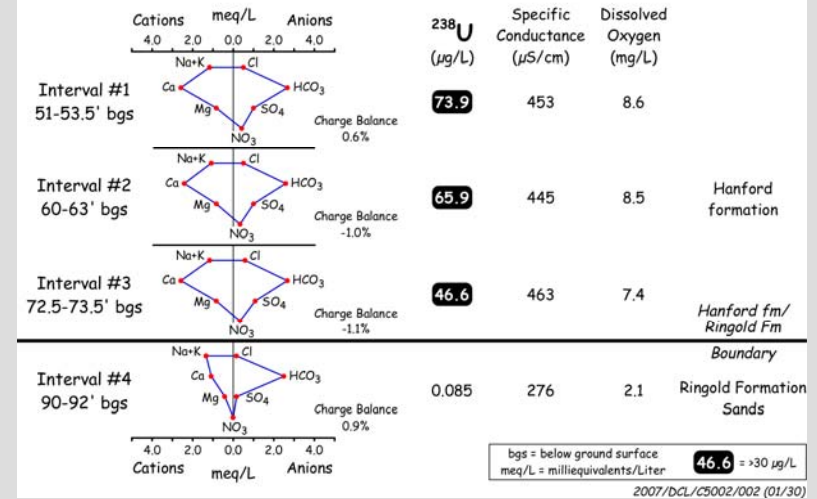


Depth specific STIFF diagrams showing groundwater chemistry variations in the unconfined aquifer, C5001 and C5002

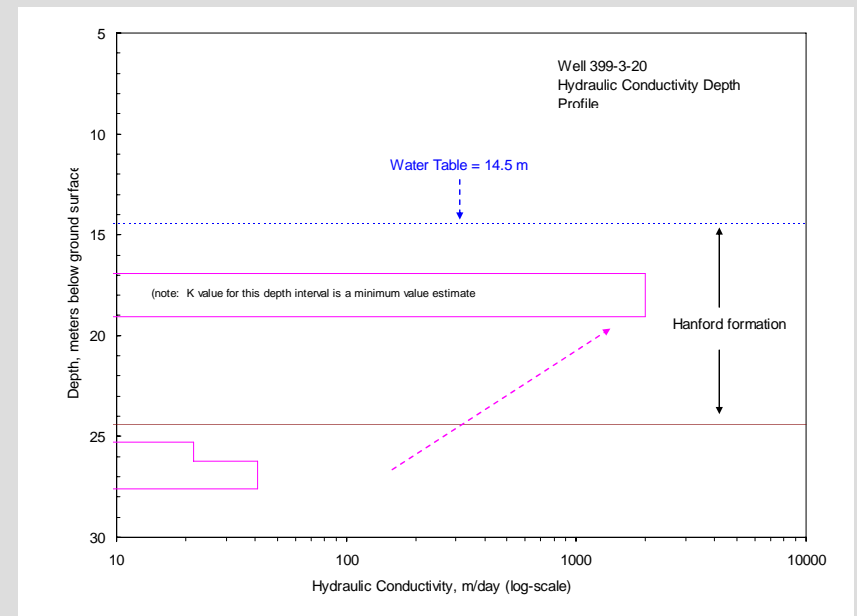
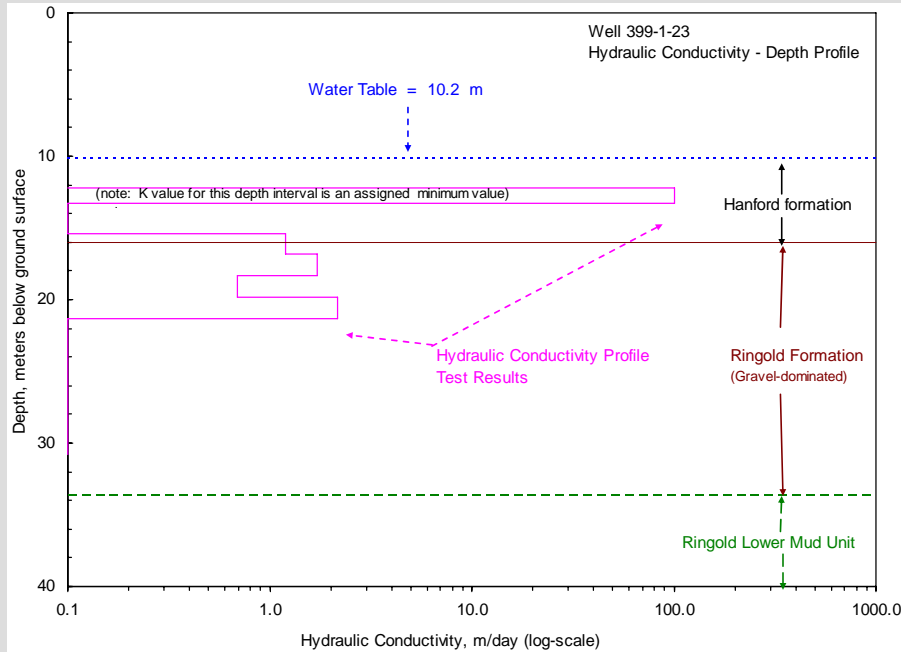
Selected Results for Depth Discrete Water Sampling from Borehole C5001 (399-3-19)



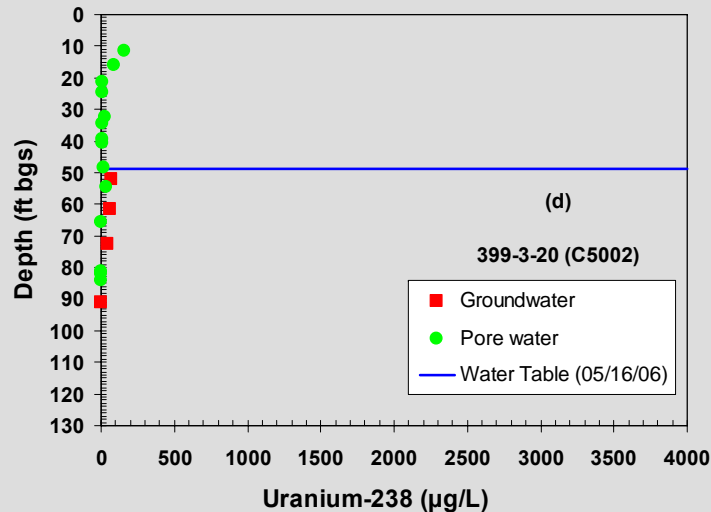
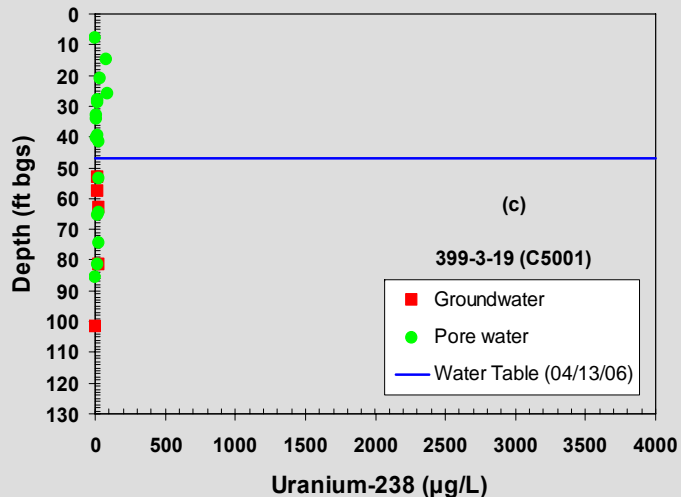
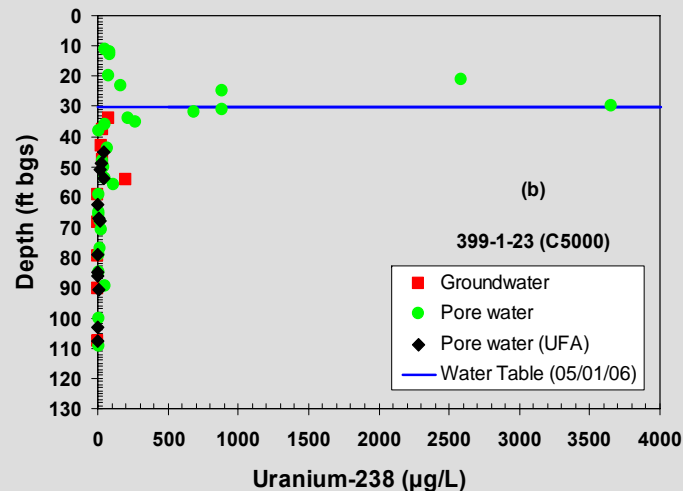
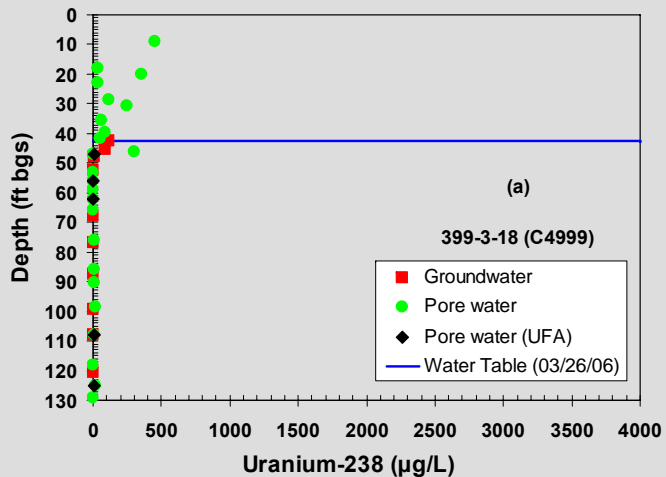
Selected Results for Depth Discrete Water Sampling from Borehole C5002 (399-3-20)



Hydraulic conductivity contrast across the Hanford – Ringold Contact

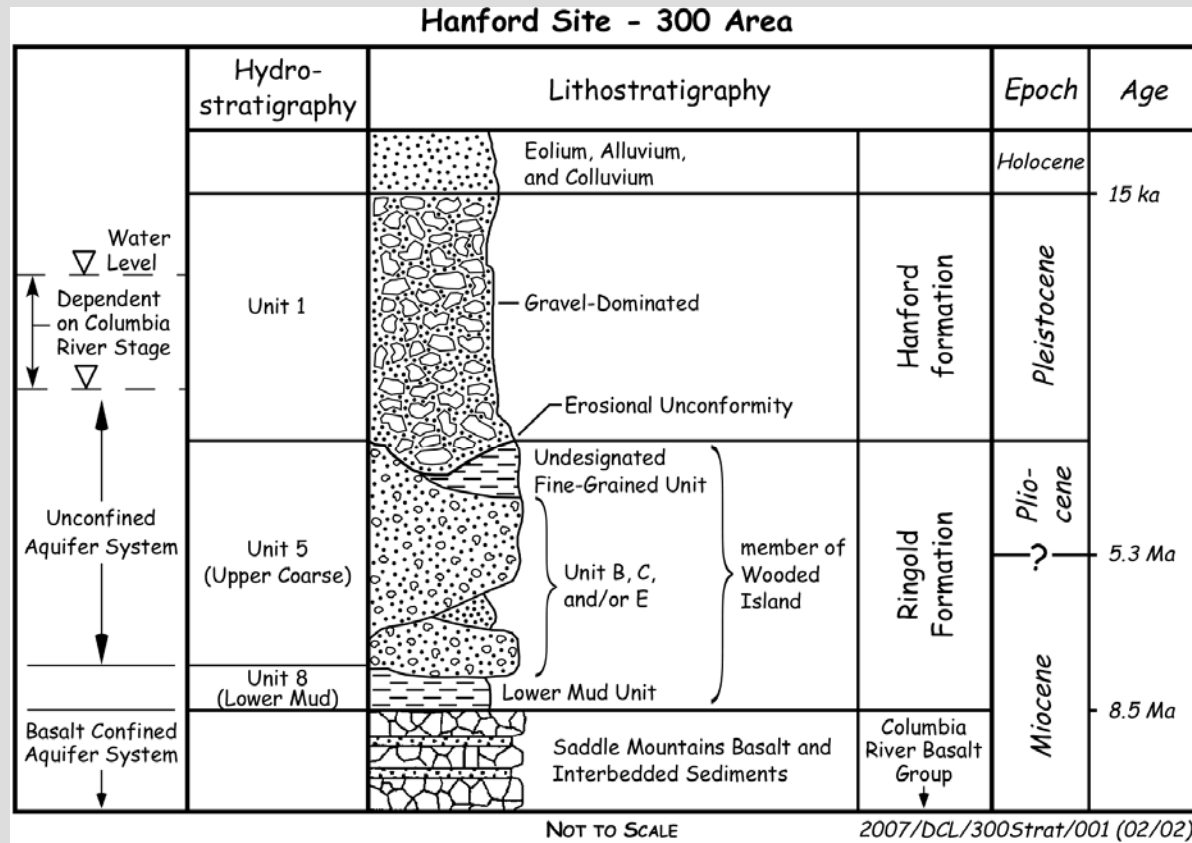


Soluble Uranium Concentrations in the Depth-Discrete Groundwater, Pore Water After Ultracentrifugation, and Calculated Pore Water Uranium Concentrations in the Sediments from Boreholes (a) 399-3-18 (C4999), (b) 399-1-23 (C5000), (c) 399-3-19 (C5001), and (d) 399-3-20 (C5002)



3. 300 Area Hydrogeology

300-FF-5 Hydrogeologic Column



Modified for 300 Area after Reidel et. al. (1992), Thorne et al. (1993), Lindsey (1995), Williams et. al. (2000), DOE (2002)

300 Area Hydrogeology

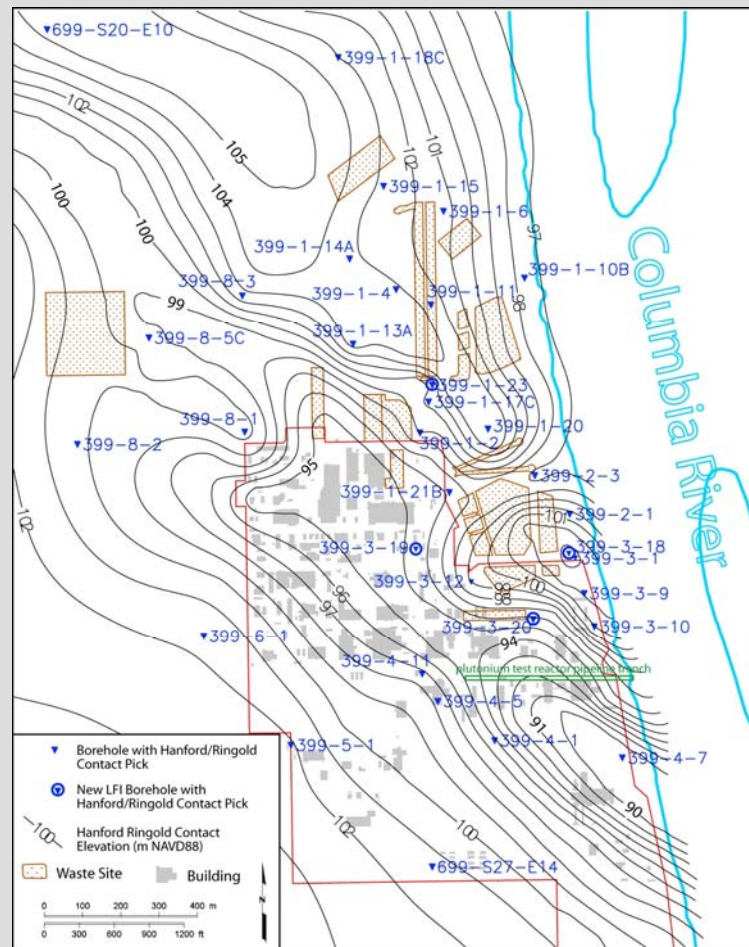
▶ Three primary geologic units form framework of the unconfined aquifer system:

- 1) Hanford fm. Unit 1 - Unconsolidated silty sandy gravel to open framework gravel. Ten to > 21 m [saturated interval 1 to >12 m] thick, , $K_h = >1000$ m/d

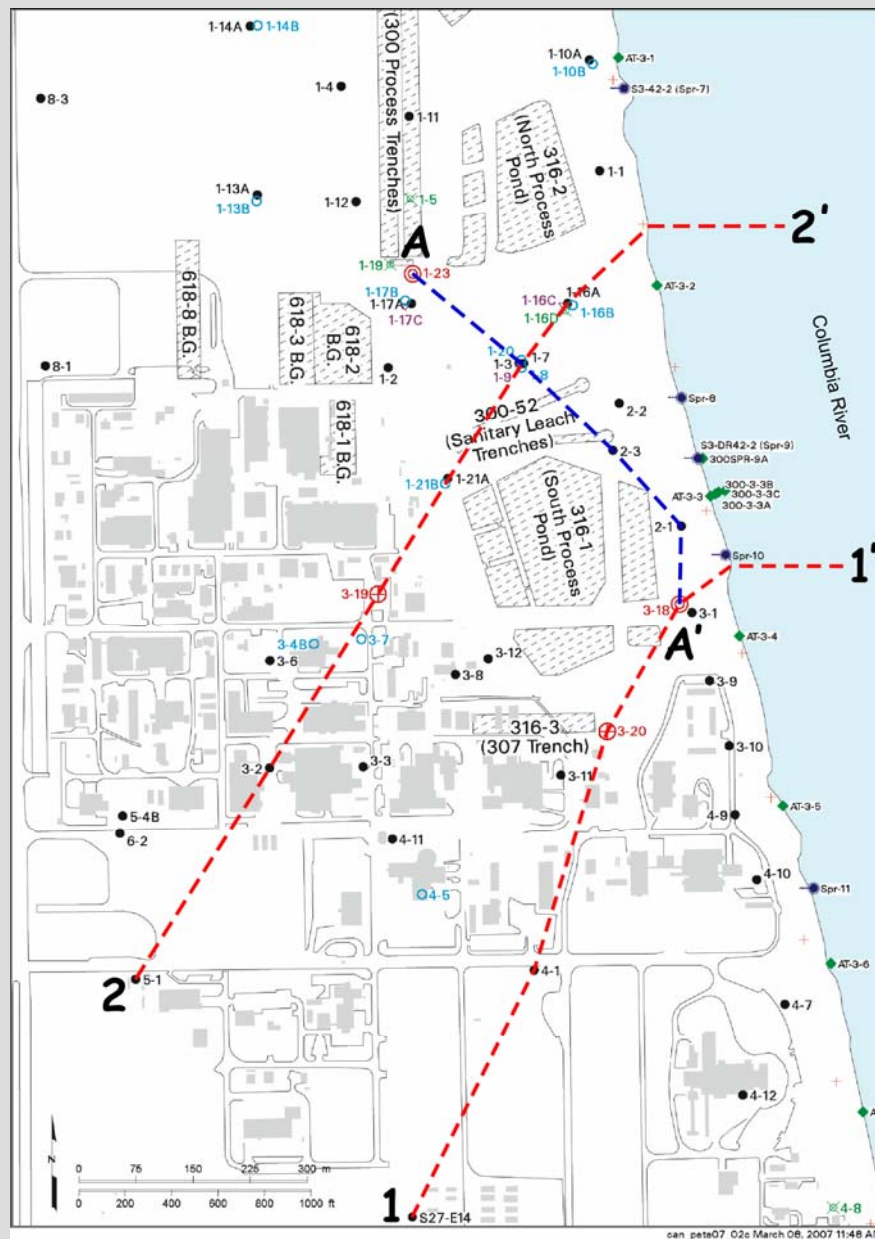
- 1) Ringold Fm. Unit 5 – Composed of two hydrogeologic units
 - a) Undifferentiated fine-grained unit, 0 to >10 m, $K_h <42$ m/d
 - b) Silty sandy gravel unit, up to 17.5 m, $K_h = <100$ m/d

- 2) Ringold Formation Unit 8 - Silty sand to clay, forms confining base of unconfined aquifer system, isolates the Basalt confined aquifer system, ~12 m, $K_h <.1$ m/d

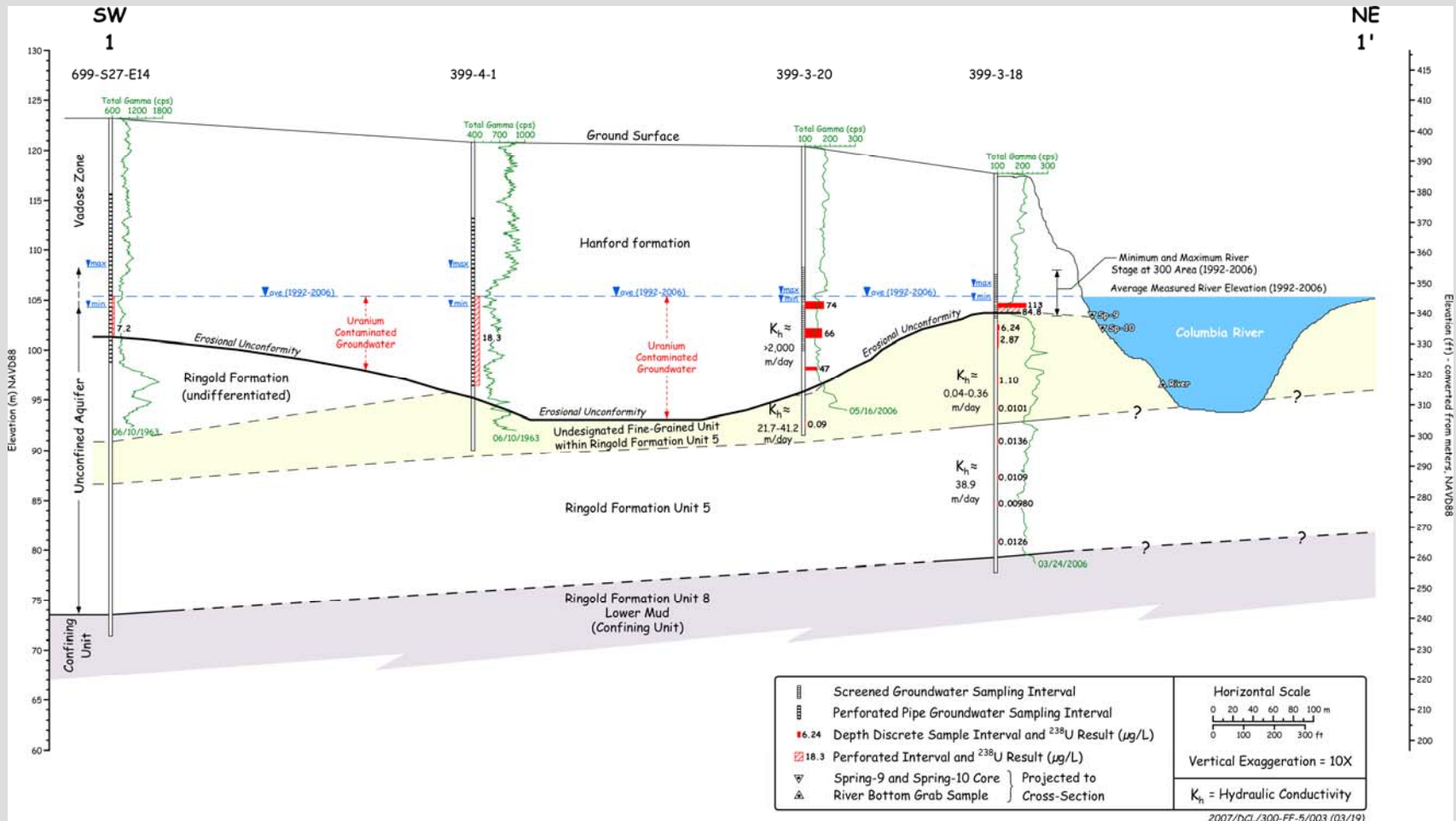
Subsurface relief map of the Ringold Fm. (aka the Hanford – Ringold contact)

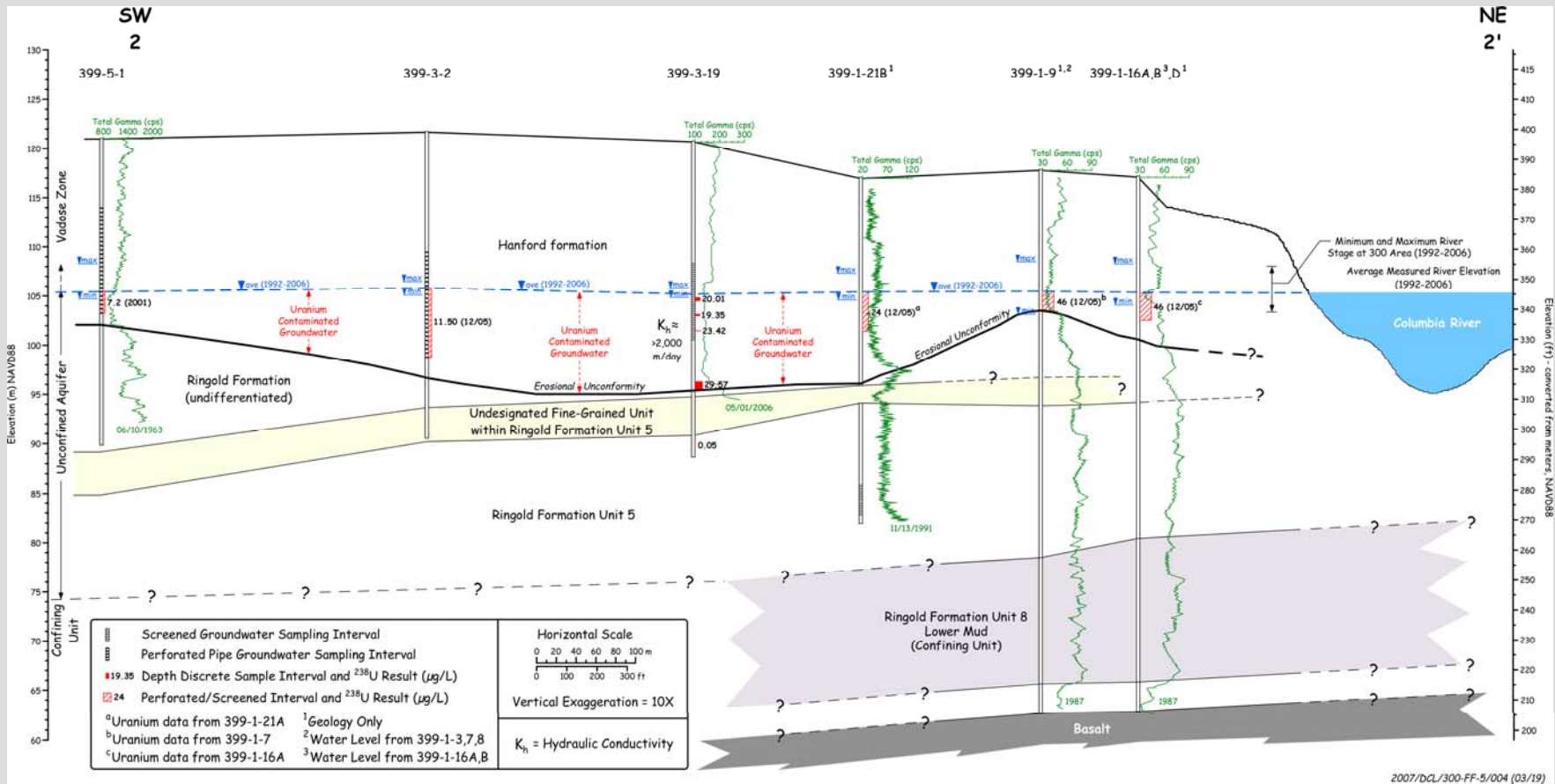


Location Map Showing Orientation of Hydrogeologic Cross Sections

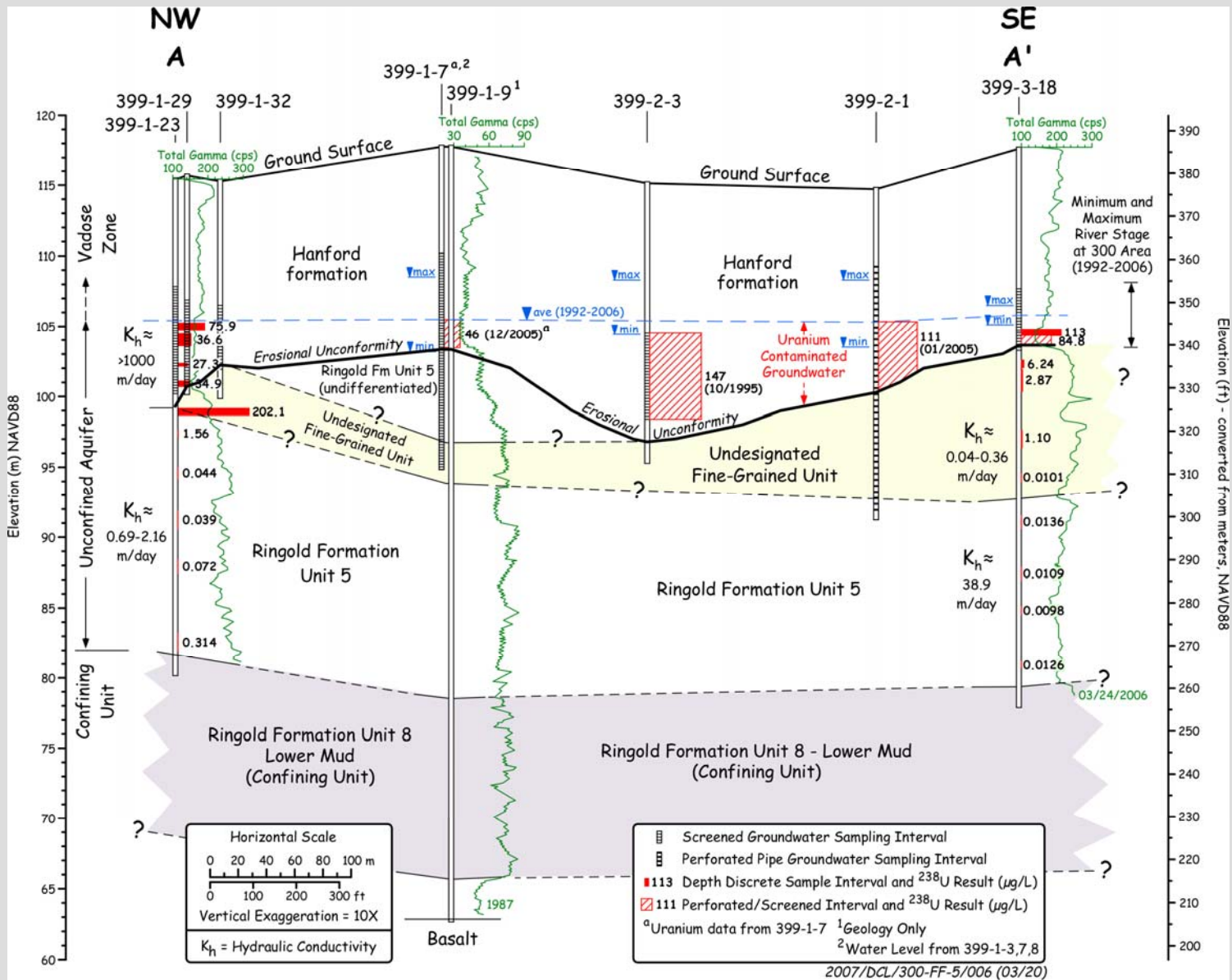


Hydrogeologic Cross Section 1 -1' Perpendicular to Ringold Fm. erosional channel showing unconfined aquifer hydrogeology

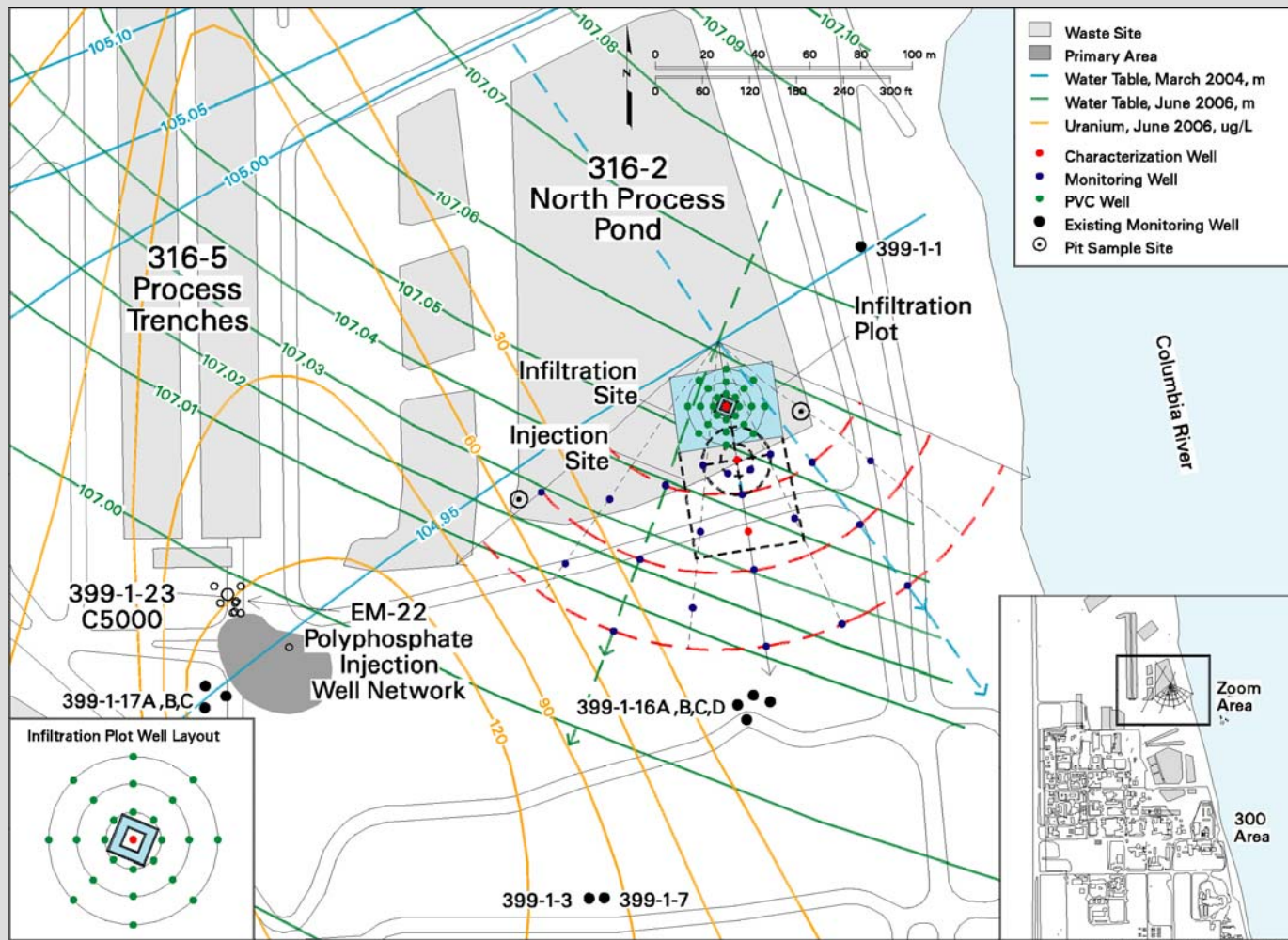




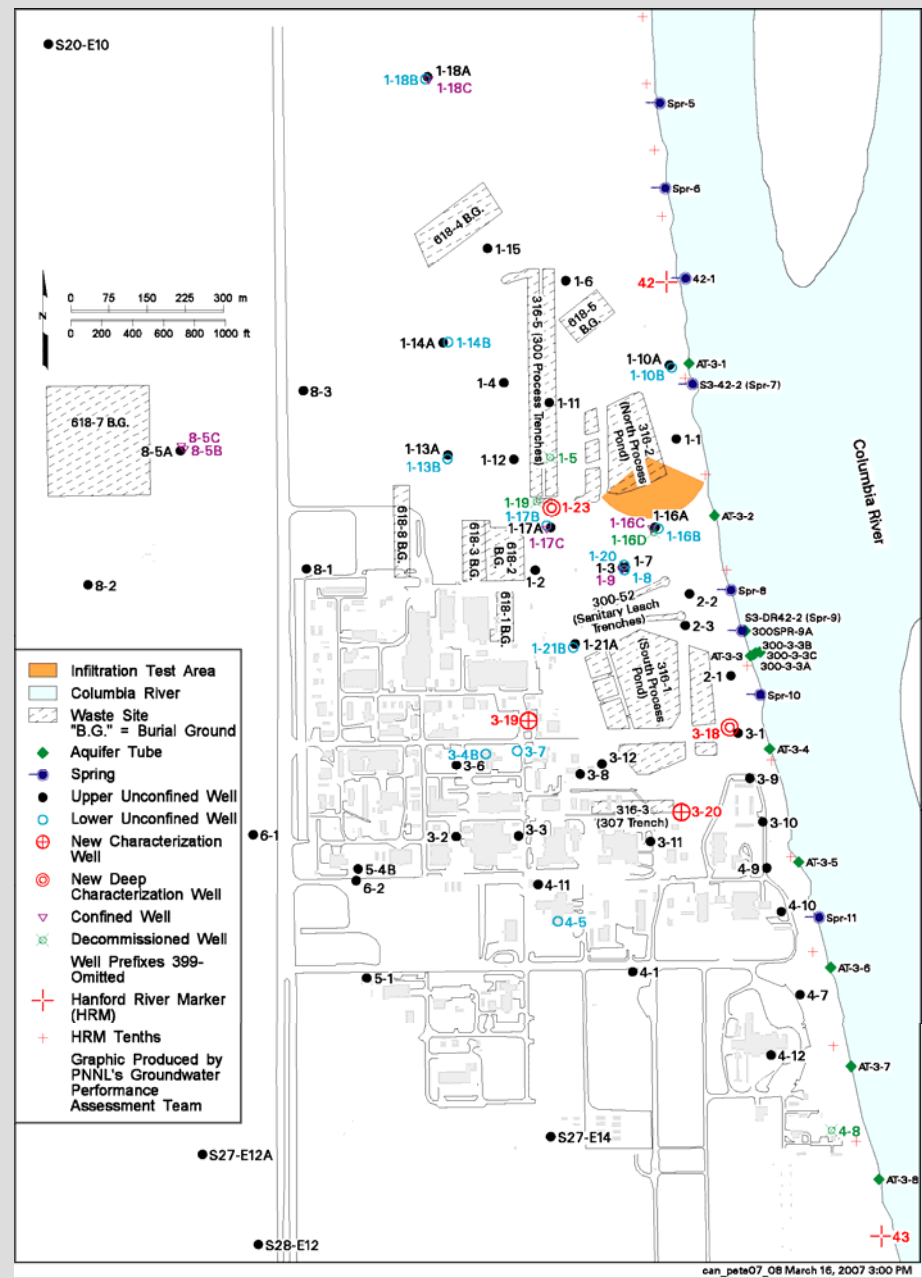
2007/DCL/300-FF-5/004 (03/19)



Proposed 300 Area IFC Site Injection and Infiltration Well Arrays



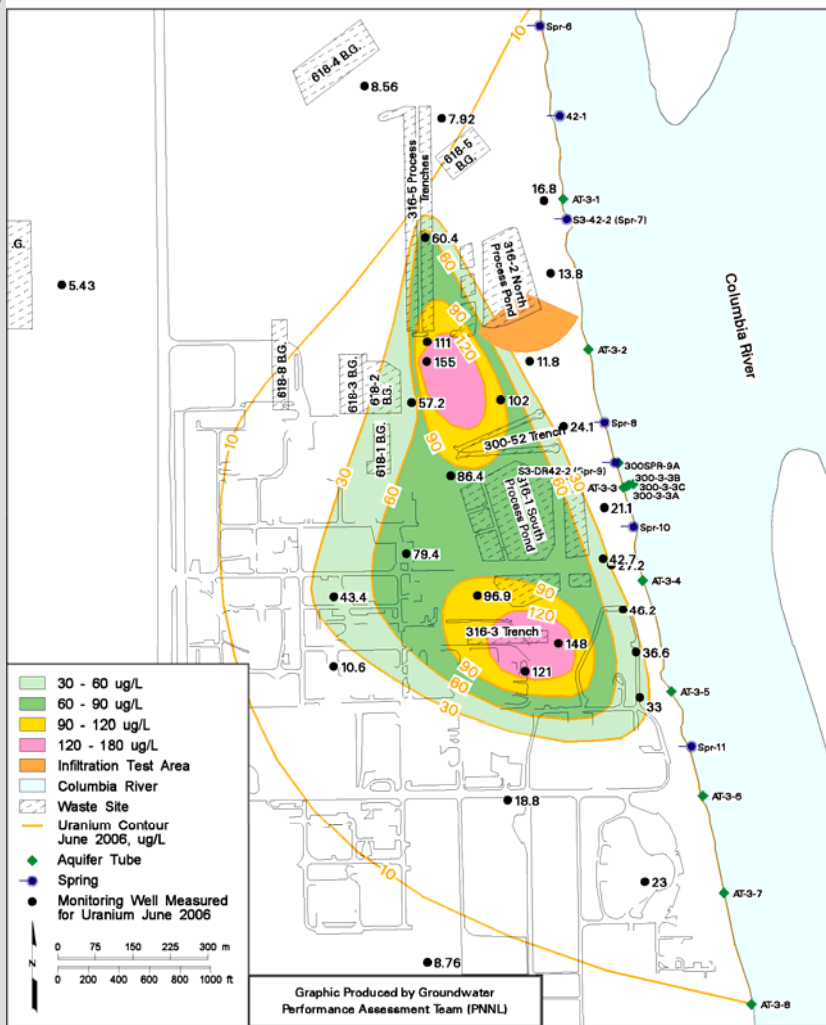
300-FF-5 OU Showing Proposed IFC Site



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Location of Proposed IFC Site and Uranium Plumes, Winter and Spring

300 Area Uranium, June 2006



300 Area Uranium, December 2005

