

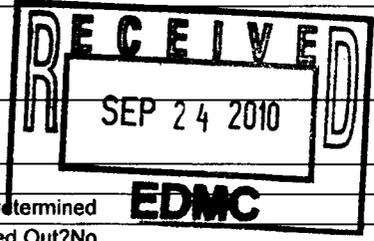
Date Received for Clearance Process (MM/DD/YYYY) 09/16/2010

## INFORMATION CLEARANCE FORM

<p><b>A. Information Category</b></p> <p><input type="checkbox"/> Abstract    <input type="checkbox"/> Journal Article</p> <p><input type="checkbox"/> Summary    <input type="checkbox"/> Internet</p> <p><input checked="" type="checkbox"/> Visual Aid    <input type="checkbox"/> Software</p> <p><input type="checkbox"/> Full Paper    <input type="checkbox"/> Report</p> <p><input type="checkbox"/> Other _____</p>	<p><b>B. Document Number</b> <b>SGW-47729-VA Revision 0</b></p> <p><b>C. Title</b> <b>Low-Level Burial Ground 3 Trenches 31 and 34 DQO Process</b></p> <p><b>D. Internet Address</b></p>
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<p><b>E. Required Information (MANDATORY)</b></p> <p>1. Is document potentially Classified? No</p> <p><b>S. P. Luttrell</b> </p> <p>Manager Required (Print and Sign)</p> <p>If Yes _____</p> <p>ADC Required (Print and Sign)</p> <table style="width: 100%;"> <tr> <td>2. Official Use Only</td> <td>No</td> <td>Exemption No.</td> </tr> <tr> <td>3. Export controlled Information</td> <td>No</td> <td>OUO Exemption No. 3</td> </tr> <tr> <td>4. UCNI</td> <td>No</td> <td></td> </tr> <tr> <td>5. Applied Technology</td> <td>No</td> <td></td> </tr> <tr> <td>6. Other (Specify)</td> <td></td> <td></td> </tr> </table>	2. Official Use Only	No	Exemption No.	3. Export controlled Information	No	OUO Exemption No. 3	4. UCNI	No		5. Applied Technology	No		6. Other (Specify)			<p>7. Does Information Contain the Following:</p> <p>a. New or Novel FH (Patentable) Subject Matter ? No If "Yes", OUO Exemption No. 3 If "Yes", Disclosure No.:</p> <p>b. Commercial Proprietary Information Received in Confidence, Such as Proprietary and/or Inventions? No</p> <p>c. Corporate Privileged Information? No If "Yes", OUO Exemption No. 4</p> <p>d. Government Privileged Information? No If "Yes", Exemption NO. 5</p> <p>e. Copyrights? No</p> <p>f. Trademarks? No</p> <p>8. Is Information Requiring submission to OSTI? No</p> <p>9. Release Level? Public</p>
2. Official Use Only	No	Exemption No.														
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5. Applied Technology	No															
6. Other (Specify)																

<p><b>F. Complete for a Journal Article</b></p> <p>1. Title of Journal _____</p>	<p><b>G. Complete for a Presentation</b></p> <p>1. Title for Conference or Meeting <u>To Be Determined</u></p> <p>2. Group Sponsoring <u>DOE</u></p> <p>3. Date of Conference <u>To Be Determined</u></p> <p>4. City/State <u>To Be Determined</u></p> <p>5. Will Information be Published in Proceedings? No</p> <p>6. Will material be Handed Out? No</p>
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<p><b>H. Information Owner/Author/Requestor</b></p> <p><b>D. A. Gamon</b> </p> <p>(Print and Sign)</p>	<p><b>Responsible Manager</b></p> <p><b>S. P. Luttrell</b> </p> <p>(Print and Sign)</p>
<p>Approval by Direct Report to FH President (Speech/Articles Only)</p> <p>_____ (Print and Sign)</p>	

I. Reviewers	Print	Signature	Public Y/N (If N, complete J)
General Counsel	<u>R. T. Swenson</u>	<u>per email 9/13/10</u>	<input checked="" type="radio"/> Y <input type="radio"/> N
Office of External Affairs	<u>L. E. Bennett</u>	<u>per email 9/13/10</u>	<input checked="" type="radio"/> Y <input type="radio"/> N
DOE	<u>R. D. Hildebrand</u>	<u>per email 9/13/10</u>	<input checked="" type="radio"/> Y <input type="radio"/> N
OUO-SME	<u>M. L. Spracklen</u>	<u>per email 9/14/10</u>	<input checked="" type="radio"/> Y <input type="radio"/> N
Clearance	<u>G. E. Bratton</u>	<u>G. E. Bratton 9/15/2010</u>	<input checked="" type="radio"/> Y <input type="radio"/> N
Other	<u>R. L. Nelson</u>	<u>per email 9/13/10</u>	<input checked="" type="radio"/> Y <input type="radio"/> N
Other	<u>D. J. Wiatrak</u>	<u>per email 9/13/10</u>	<input checked="" type="radio"/> Y <input type="radio"/> N

<p><b>J. Comments</b></p> <p> </p>	<p>Information Clearance Approval</p>
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## **Fleshman, Rachel L**

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**From:** Gamon, Daniel A  
**Sent:** Tuesday, September 14, 2010 10:20 AM  
**To:** Fleshman, Rachel L  
**Subject:** Email Approvals  
**Attachments:** image005.jpg; image006.jpg

### **1. Stuart (Manager)**

**From:** Luttrell, Stuart P  
**Sent:** Monday, September 13, 2010 11:48 AM  
**To:** Gamon, Daniel A  
**Subject:** RE: CHPRC1009-11 LLBG\_Trench31\_34Rev0.pptx

OK with me. Rachel will need to send it for approvals using the voting buttons.

*Stuart Luttrell*  
Manager, RCRA Monitoring and Reporting  
Soil and Groundwater Remediation Project  
CH2M Hill Plateau Remediation Company  
(509) 376-4531  
(509) 438-0775 (cell)

### **2. Lynette Bennett (CHPRC External Affairs)**

**From:** Bennett, Lynette E  
**Sent:** Monday, September 13, 2010 5:47 PM  
**To:** Gamon, Daniel A  
**Subject:** RE: CHPRC1009-11 LLBG\_Trench31\_34Rev0.pptx

Please delete the CH2M HILL logo on the front page in the white text box.

Approved.

Communications, Lynette Bennett

### **3. Ray Swenson (CHPRC General Counsel)**

**From:** Swenson, Raymond T  
**Sent:** Monday, September 13, 2010 3:42 PM  
**To:** Gamon, Daniel A; Luttrell, Stuart P; Hildebrand, Doug D; Bennett, Lynette E; Nelson, Ronald L; Maloney, Ryan P; Witherspoon, Wiley V III; Zimmerman, R O (Rick)  
**Cc:** Swenson, Raymond T  
**Subject:** RE: CHPRC1009-11 LLBG\_Trench31\_34Rev0.pptx

Slide 3: I believe the first line of text should NOT be demarcated by different typeface, underlining, and colon (":") from the rest of the text. It is simply part of a phrase in the first sentence. It SHOULD read:

"In order to comply with RCRA Dangerous Waste TSD requirements, monitoring wells need to be located for Trenches 31 and 34 in the 218-W-5 Low Level Burial Ground."

Slide 14: Note the use of nested parentheses and brackets in the first bullet:

- Because the trenches are considered dry waste disposal areas and waste is disposed in containers, unexpected leaks or releases probably would have small volumes (Less than 500 gallons [assuming ten 50 gallon drums leak at once and are full of liquid waste])

The brackets are redundant and should be deleted, with a simple comma inserted to demarcate the boundary between the estimate and the assumptions underlying the estimate, e.g.:

- Because the trenches are considered dry waste disposal areas and waste is disposed in containers, unexpected leaks or releases probably would have small volumes (Less than 500 gallons, assuming ten 50 gallon drums leak at once and are full of liquid waste)

These are the only comments I have after reviewing the document.

**Raymond Takashi Swenson**  
Senior Counsel

**CH2M Hill Plateau Remediation Company**  
Richland, Washington  
509-376-3511 Office  
509-308-7456 BlackBerry  
509-376-0334 Fax  
[Raymond.T.Swenson@rl.gov](mailto:Raymond.T.Swenson@rl.gov)

**4. Ron Nelson (CHPRC CIO's Office)**

**From:** Nelson, Ronald L  
**Sent:** Monday, September 13, 2010 1:00 PM  
**To:** Gamon, Daniel A  
**Subject:** RE: CHPRC1009-11 LLBG\_Trench31\_34Rev0.pptx

Approved. No comments.  
Ron Nelson  
CHPRC CIO

**5. Michael Spracklen (MSA Information Security Officer)**

**From:** Spracklen, Michael L  
**Sent:** Tuesday, September 14, 2010 9:00 AM  
**To:** Ruane, Thomas J  
**Cc:** Witherspoon, Wiley V III; Gamon, Daniel A  
**Subject:** RE: CHPRC1009-11 LLBG\_Trench31\_34Rev0.pptx

Tom/Dan,

No information security concerns. Should be OK for public posting.

*Mike Spracklen*  
MSC Classification Officer  
(509) 376-3730

**6. Dennis Wiatrak (CHPRC Safety)**

**From:** Wiatrak, Dennis J  
**Sent:** Monday, September 13, 2010 1:05 PM

**To:** Gamon, Daniel A  
**Subject:** RE: CHPRC1009-11 LLBG\_Trench31\_34Rev0.pptx

Approved for adequacy of OS&IH-related subject matter.

*dj wiatrak*

7. **DOE/RL – Doug Hildebrand**

**From:** Hildebrand, Doug [mailto:Doug.Hildebrand@rl.doe.gov]

**Sent:** Monday, September 13, 2010 11:42 AM

**To:** Gamon, Daniel A; Luttrell, Stuart P; Bennett, Lynette E; Swenson, Raymond T; Nelson, Ronald L; Maloney, Ryan P; Witherspoon, Wiley V III; Zimmerman, R O (Rick)

**Subject:** RE: CHPRC1009-11 LLBG\_Trench31\_34Rev0.pptx

I am ok with this presentation.

Doug

*Dan Gamon, PG, LG*



*soil and groundwater remediation project*

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*page 4 of 4*

# Low-Level Burial Ground 3 Trenches 31 and 34 DQO Process

**Presented to: Washington State  
Department of Ecology**

Prepared for the U.S. Department of Energy  
Assistant Secretary for Environmental Management

Contractor for the U.S. Department of Energy  
under Contract DE-AC06-08RL14788



**CH2MHILL**  
Plateau Remediation Company

**P.O. Box 1600  
Richland, Washington 99352**

Approved for Public Release;  
Further Dissemination Unlimited

# Low-Level Burial Ground 3 Trenches 31 and 34 DQO Process

**Presented to: Washington State Department of Ecology**

D. A. Gamon  
CH2M HILL Plateau Remediation Company

Date Published  
September 2010

To Be Presented at  
To Be Determined

DOE  
To Be Determined

To Be Determined

Prepared for the U.S. Department of Energy  
Assistant Secretary for Environmental Management

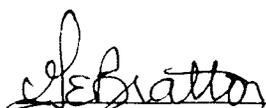
Contractor for the U.S. Department of Energy  
under Contract DE-AC06-08RL14788



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Richland, Washington**

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# Low-Level Burial Ground 3 Trenches 31 and 34 DQO Process

Presented to: Washington State  
Department of Ecology

Presented by: Daniel Gamon



U.S. DEPARTMENT OF  
**ENERGY**

CHPRC1009-11



**CH2MHILL**  
Plateau Remediation Company

# Low-Level Burial Ground-3 Trenches 31 and 34 DQO Process for New Well Locations

## **Contributors:**

**Scot Adams (CHPRC DQO Facilitator)**

**Daniel Gamon**

**Stuart Luttrell (CHPRC RCRA Reporting Manager)**

**ZP-1 Modeling Data and Support by:**

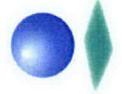
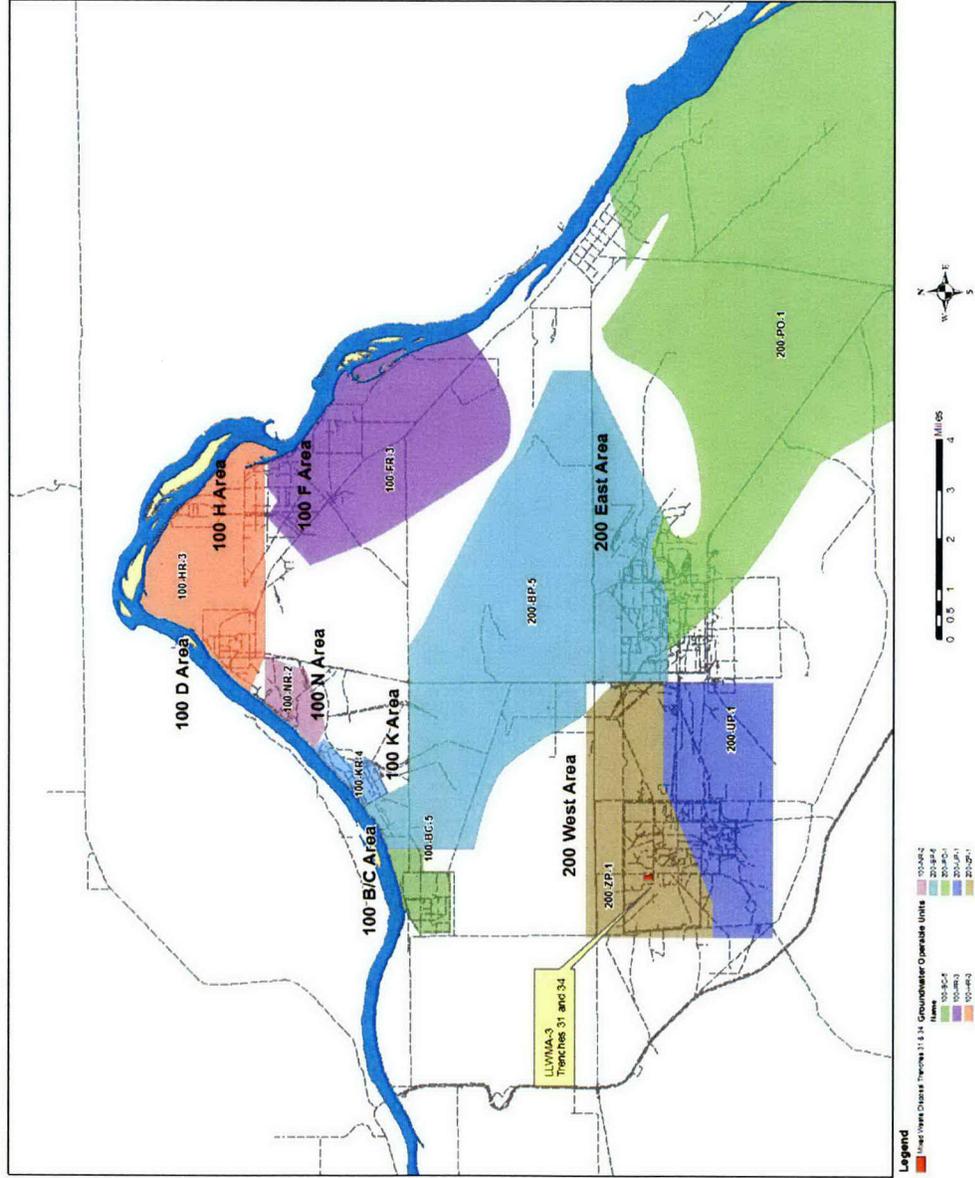
**S. S. Papadopoulos & Associates, Inc.**



# Key Element of DQO Process

*In order to comply with RCRA Dangerous Waste TSD requirements, monitoring wells need to be located for Trenches 31 and 34 in the 218-W-5 Low Level Burial Ground. The locations need to consider planned hydrologic impacts from CERCLA injection wells with respect to water elevations, flow directions, and water chemistry.*

# Location Map of Study Area



# Conceptual Site Model – Well Location Variables

- Local hydrogeology under the TSD Unit
- Flow path of conceptual dangerous waste to water table from a release from the TSD Unit
- Define “up-gradient” in relation to LLWMA-3 Trenches 31 & 34
- Define “down-gradient” in relation to Trenches 31 & 34
- Present time series of estimated ZP-1 Pump and Treat operations hydrologic effects relative to the possible new monitoring well locations
- Discuss relevant timing of monitoring well construction and ZP-1 Pump and Treat operations

# Trench 31 and 34 Details

- The double lined trenches were constructed in 2000 and are 36 m (118.1 ft) wide at the bottom, 9.1 m (29.9 ft) deep, and 230 m (754.6 ft) long.
  - Adjacent to the double lined mixed waste trenches are leachate collection tanks.
- The two 218-W-5 Burial Ground double-lined mixed waste trenches are the only trenches that continue to receive mixed waste.
  - The 218-W-5 Burial Ground received packaged waste materials from 200 West Area operations, as well as other wastes from the Hanford Site and offsite.
  - Examples of waste disposed to this burial ground include rags, paper, rubber gloves, disposable supplies, and broken tools.



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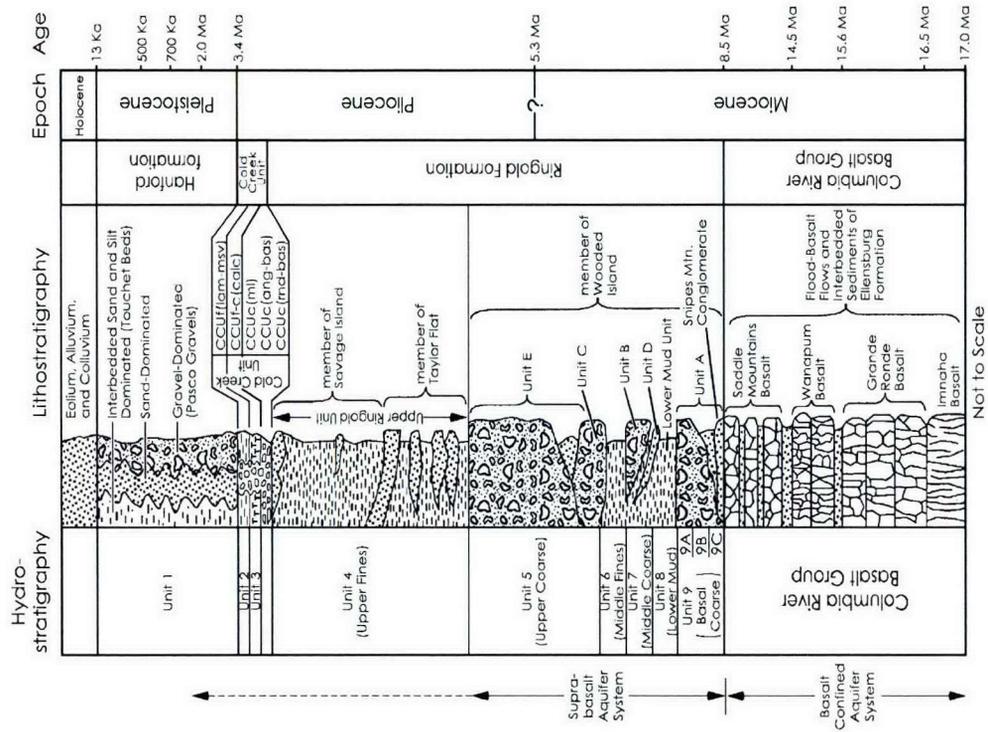
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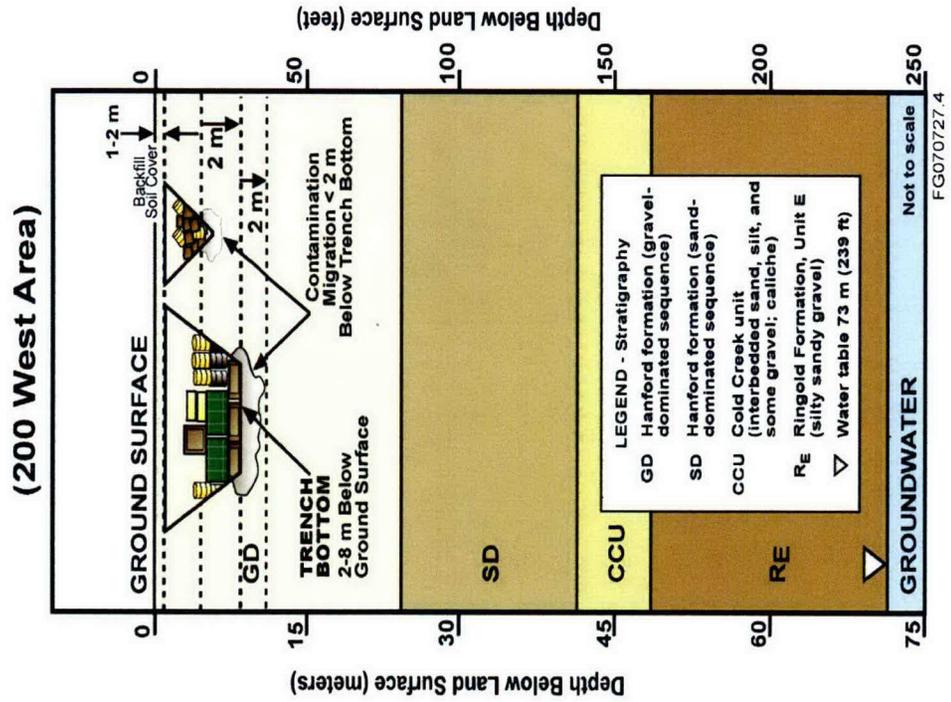
# 200-West Area Stratigraphy

**Figure 2-1. Generalized Stratigraphic Column for the Hanford Site (modified from Lindsey 1996).**

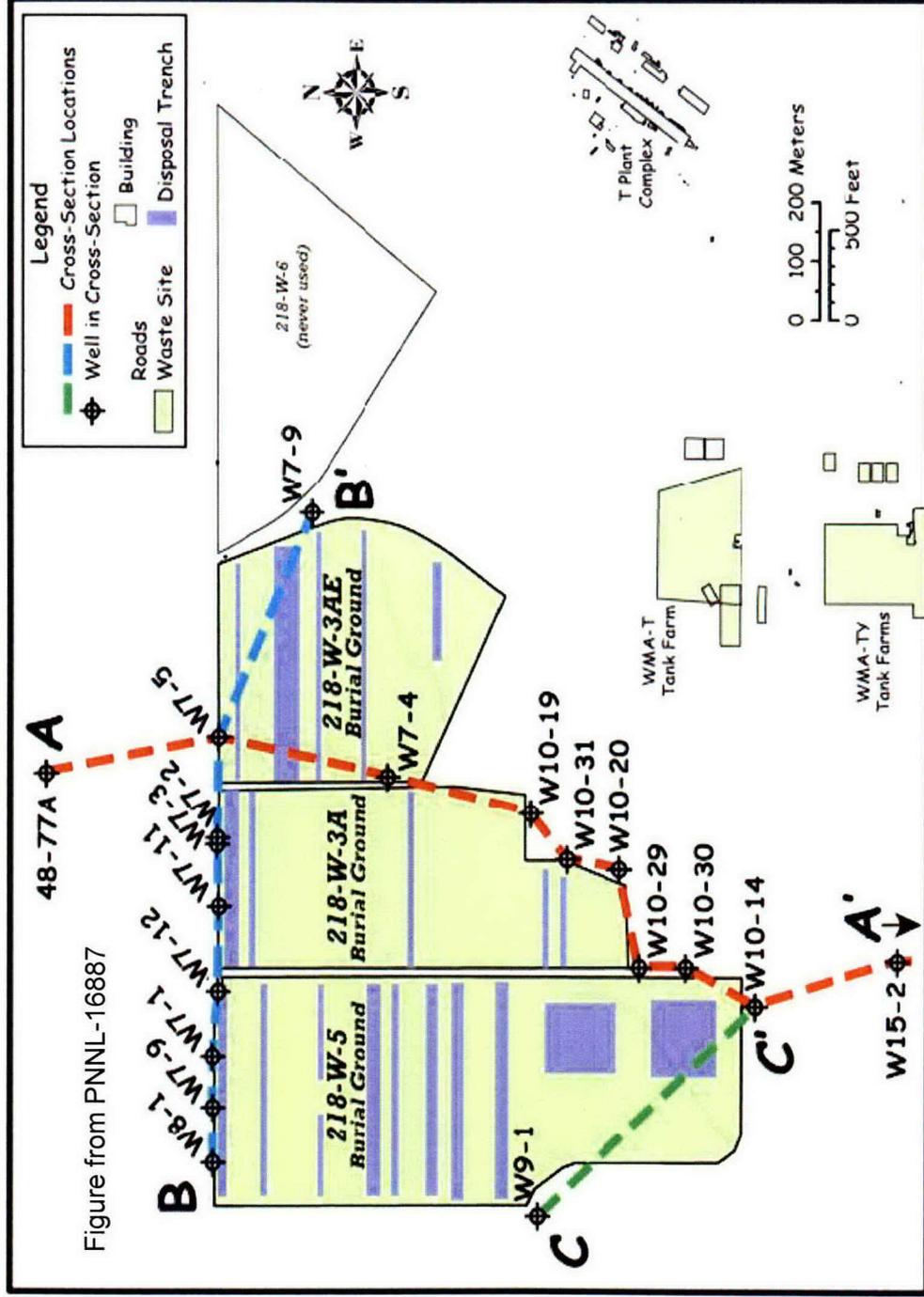
**Note: The member of Savage Island, the member of Wooded Island units C, B, and D, and the Snipes Mountain Conglomerate are not present at Waste Management Area TX-TY (southeast and adjacent to LLWMA-3).**



# Generalized Profile

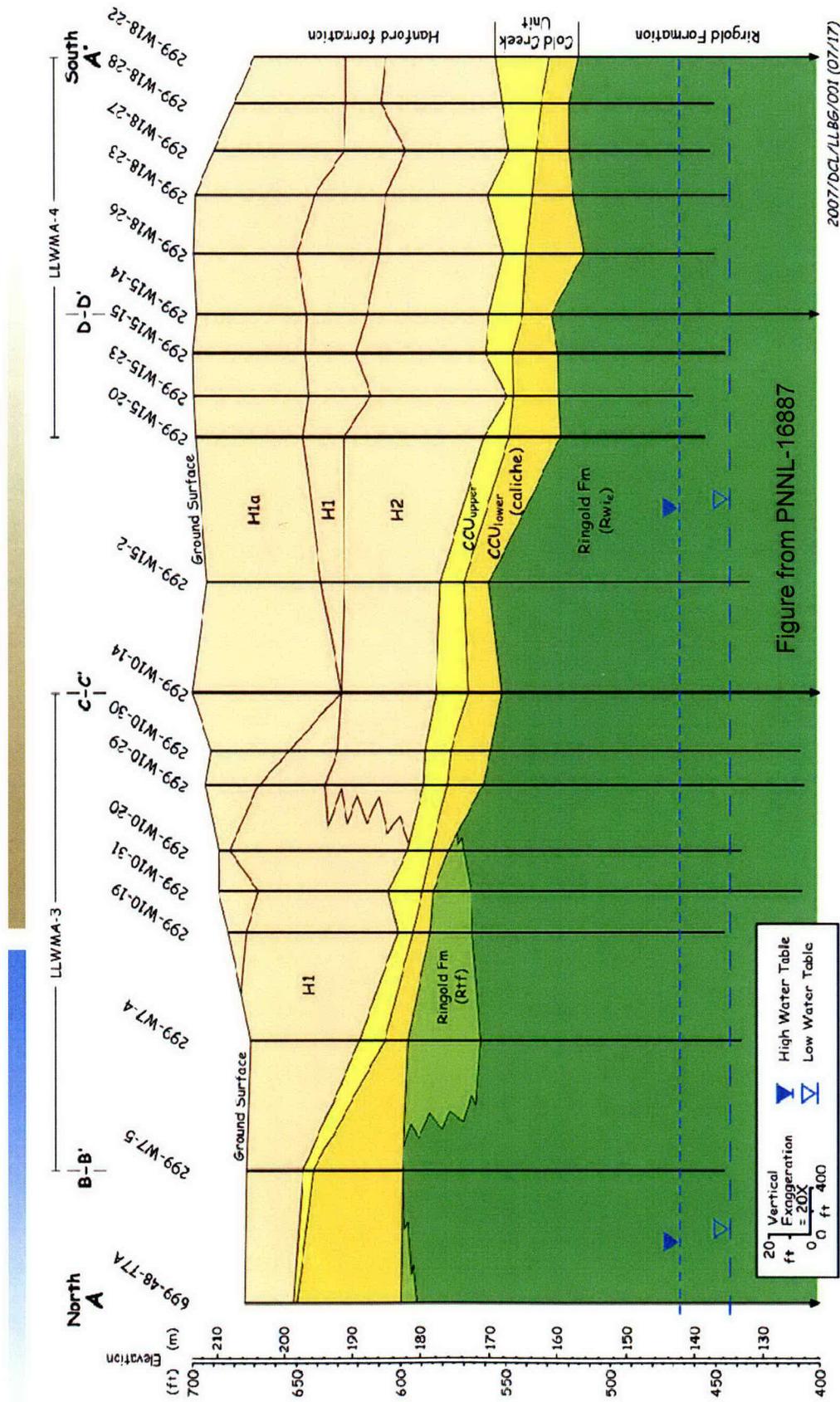


# Study Area Stratigraphy



2007/DCL/LLBG/010 (07/23)

# Study Area Stratigraphy continued..



# Study Area Stratigraphy continued..

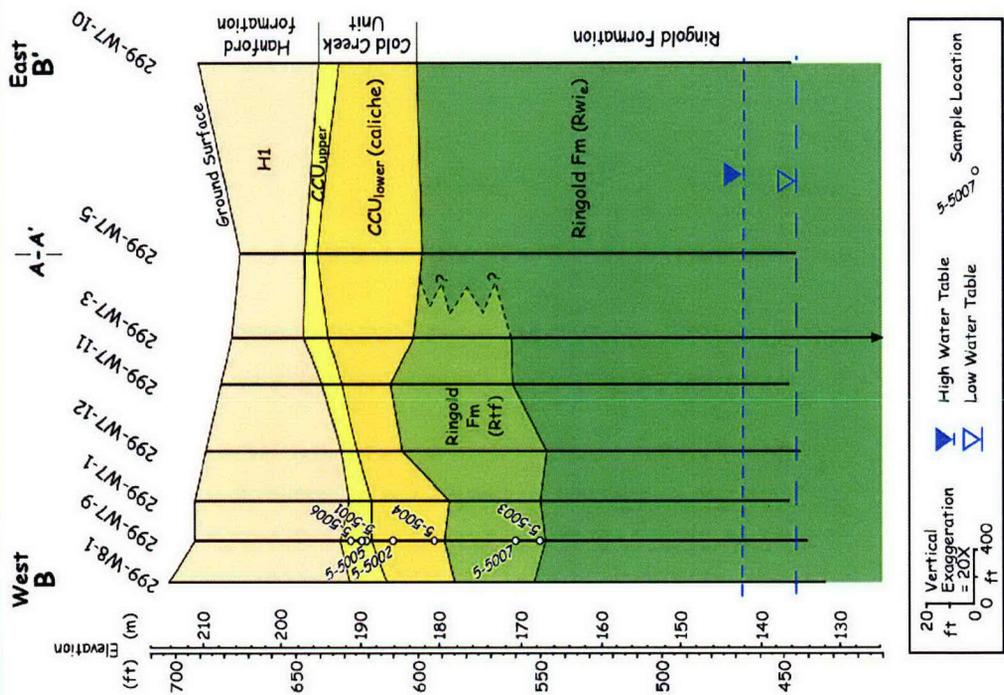


Figure from PNNL-16887



2007/DCL/LLB6/002 (07/13)



# Study Area Stratigraphy continued..

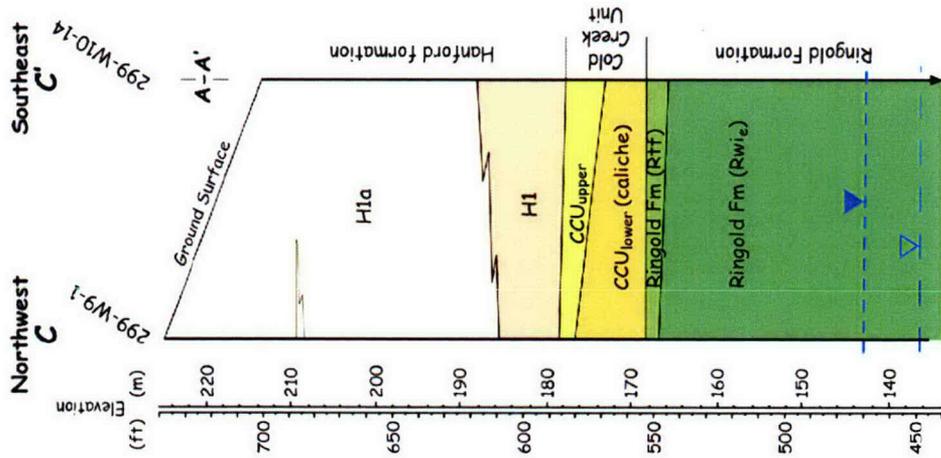


Figure from PNNL-16887



201 Vertical Exaggeration = 20X  
 ft 0 0 ft 400  
 High Water Table  
 Low Water Table  
 2007/DCL/LLBG/003 (07/13)



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# Conceptual Site Model – Hydrogeologic Considerations

- The Cold Creek unit ranges from approximately 95 to 130 feet below ground surface in the area under the trenches.
- The Cold Creek unit may retard downward movement of moisture and contaminants because of the finer textured sediment and calcium carbonate cementing that characterize this stratigraphic feature in the vadose zone.
- The Cold Creek unit dips at a low angle from north to south beneath the LLWMA, so any lateral spreading on top of the Cold Creek unit will be toward the south-southwest.
- If contaminants do break through to groundwater beneath LLWMA-3, the contaminants would move toward the east-northeast.



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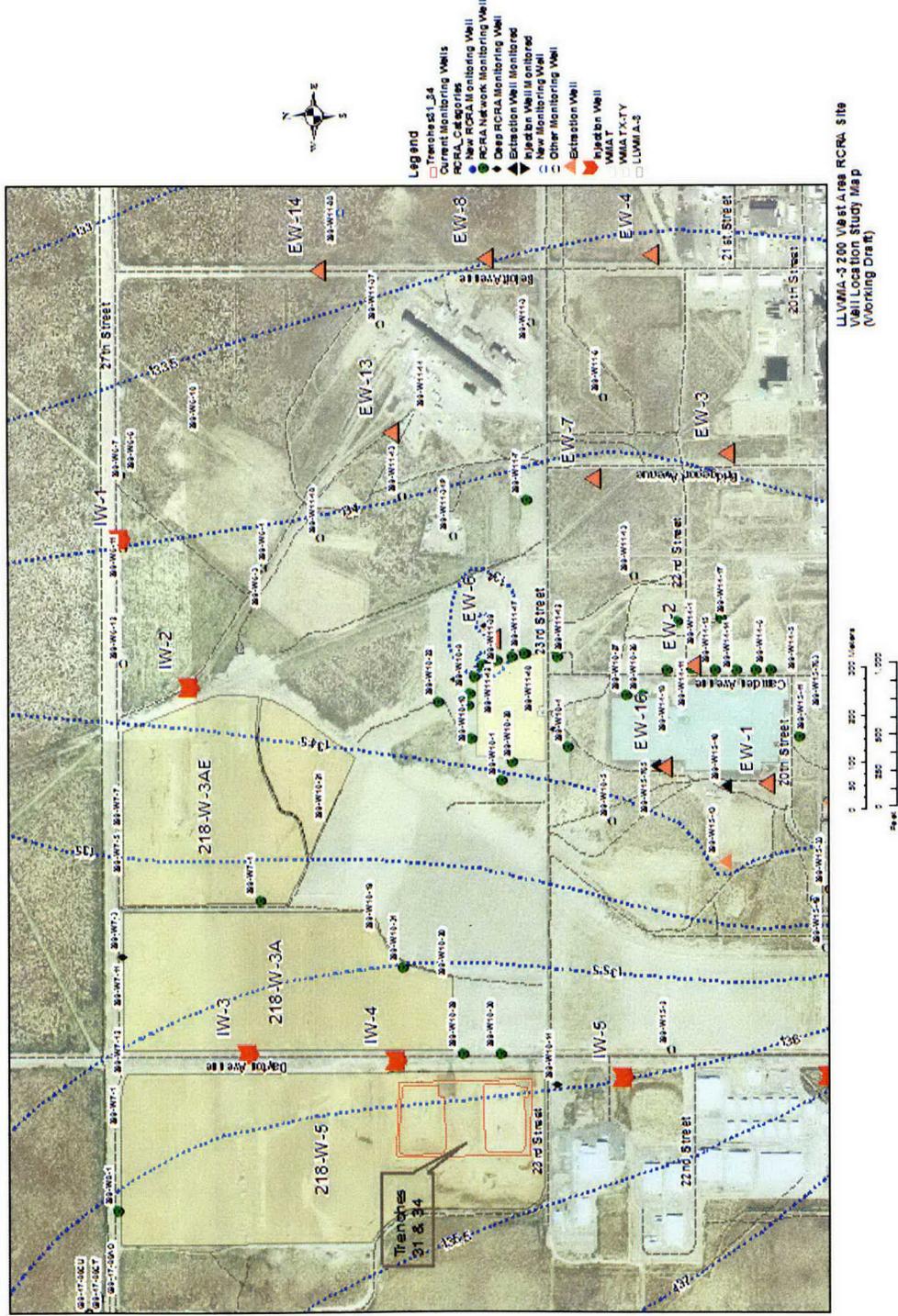
# Conceptual Site Model – Hydrogeologic Considerations

- Because the trenches are considered dry waste disposal areas and waste is disposed in containers, un-expected leaks or releases probably would have small volumes (Less than 500 gallons, assuming ten 50 gallon drums leak at once and are full of liquid waste)
- Moisture retention properties for certain lithologies, such as the Cold Creek Unit and the Taylor Flat member of the Ringold Formation, within the vadose zone have high capacity to absorb and retain contaminant moisture.
- If contaminants do break through to groundwater beneath LLWMA-3, the contaminants would move toward the east-northeast.

# Conceptual Site Model – Hydrogeologic Considerations

- The flow direction has shifted from nearly north to northeast and is slowly changing eastward as the influence of the groundwater mound subsides.
- The hydraulic conductivity values derived from aquifer testing in wells completed in the upper portion of the unconfined aquifer at LLWMA-3 varied from 0.02 to 9.8 m/day (0.07 to 32.2 ft/day).
  - Assuming an average effective porosity of aquifer materials between 0.1 and 0.3, and a hydraulic gradient of 0.0014, the average flow rate is calculated at 0.0001 to 0.14 m/day (0.000328 to 0.459 ft/day).

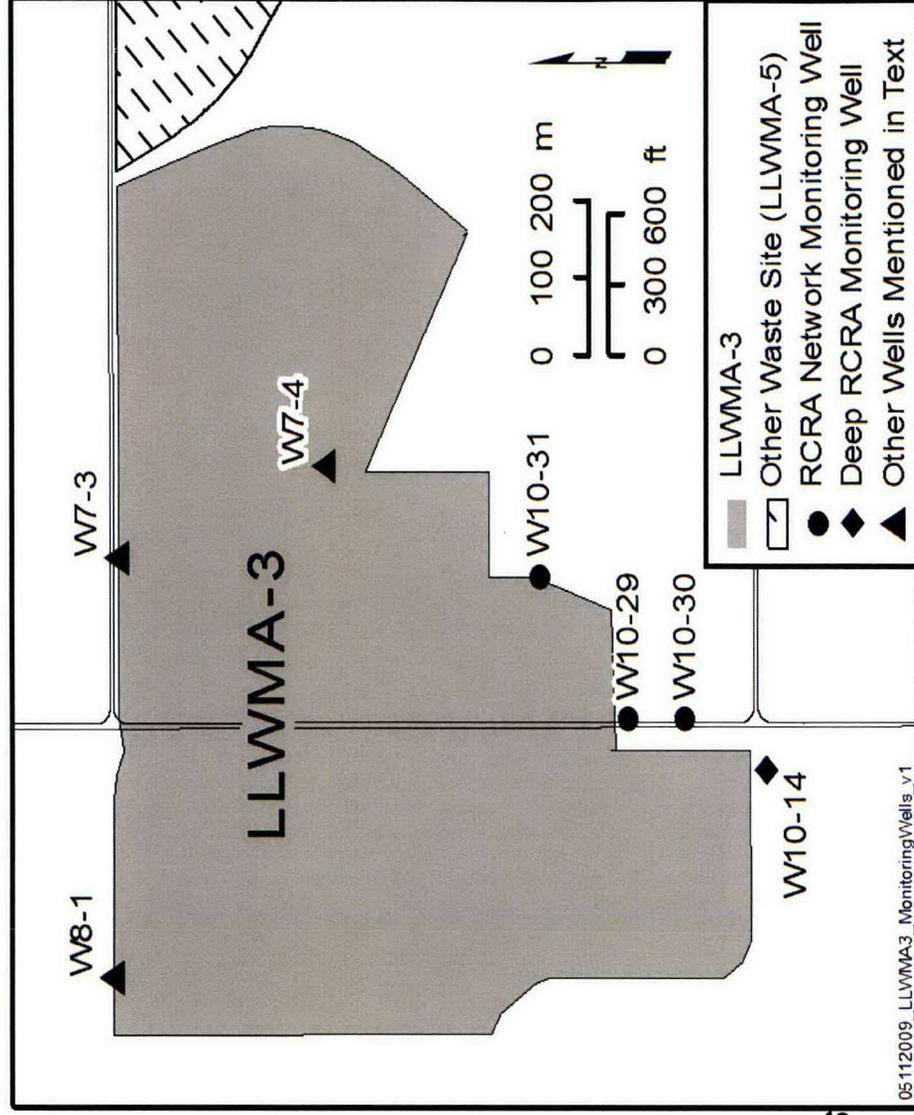
# Current Water Table Elevations at Burial Ground LLWMA-3



LLWMA-3 200 West Area RCRA Site Well Location Study Map (Working Draft)

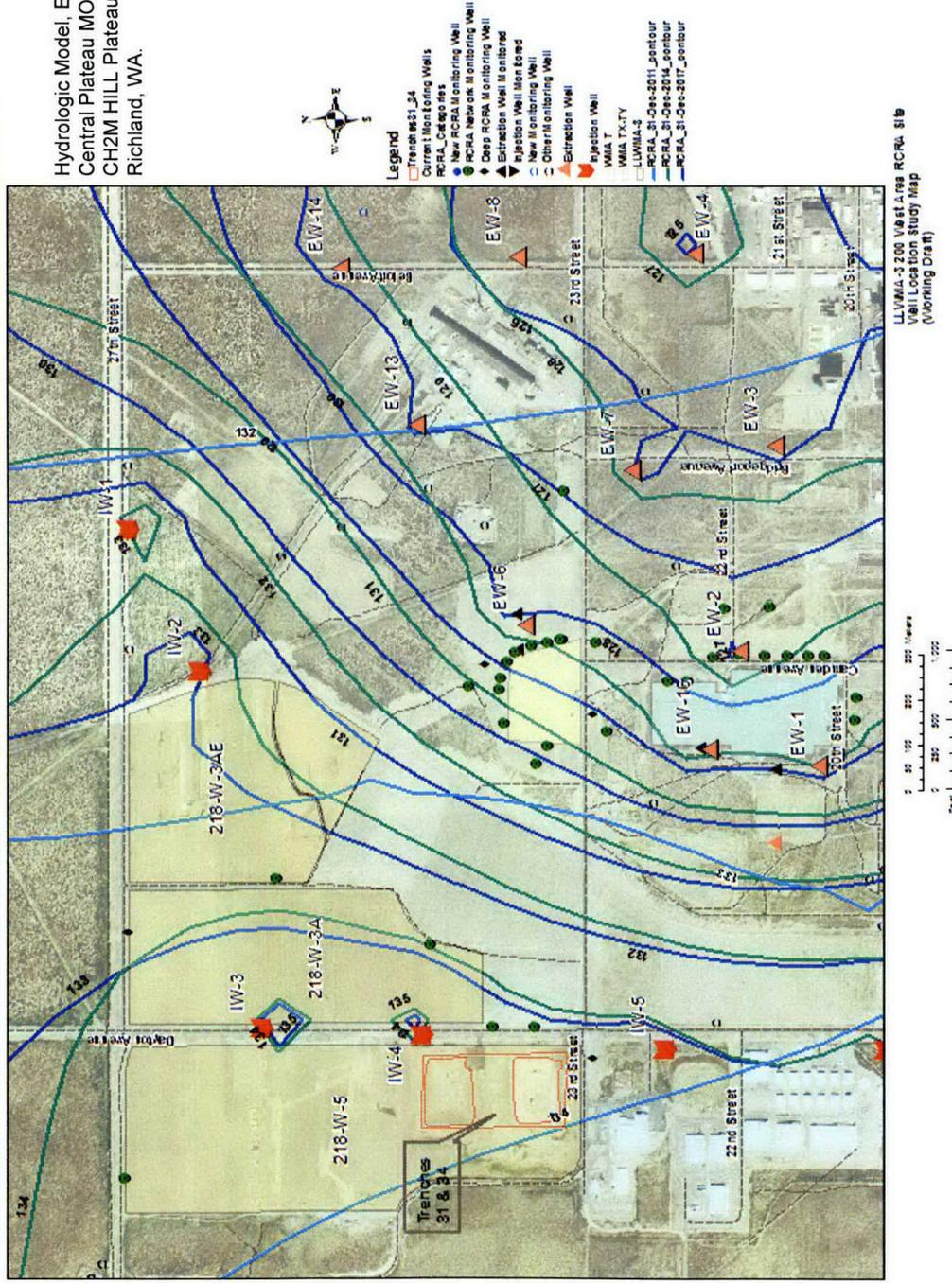
# Current (2010) LLWMA-3 Monitoring Network

- Groundwater monitoring sampling frequency is semi-annual.
- Four active monitoring wells:
  - 299-W7-3 (removed)
  - 299-W7-4 (back in network)
  - 299-W8-1 (removed)
  - 299-W10-14 (removed/deep well)
  - 299-W10-29
  - 299-W10-30
  - 299-W10-31
- No upgradient wells
- Note: Figure from DOE/RL-2009-68, Rev. 0 (*Interim Status Groundwater Monitoring Plan for the LBG WMA-3*)

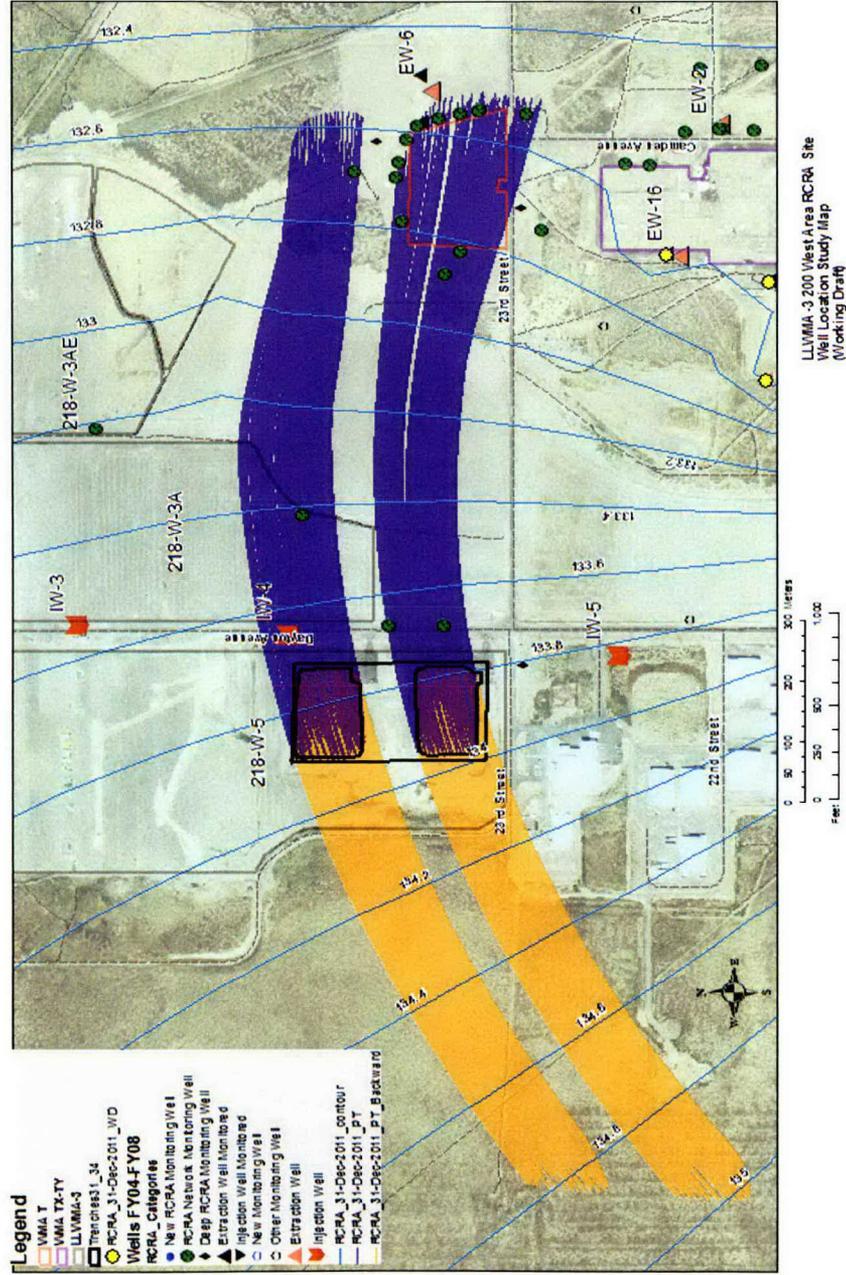


# Hydrologic Model Showing P&T Effects on Water Table (2011 - 2017)

Hydrologic Model, ECF-HANFORD-10-0371,  
 Central Plateau MODFLOW Model Version 3,  
 CH2M HILL Plateau Remediation Company,  
 Richland, WA.

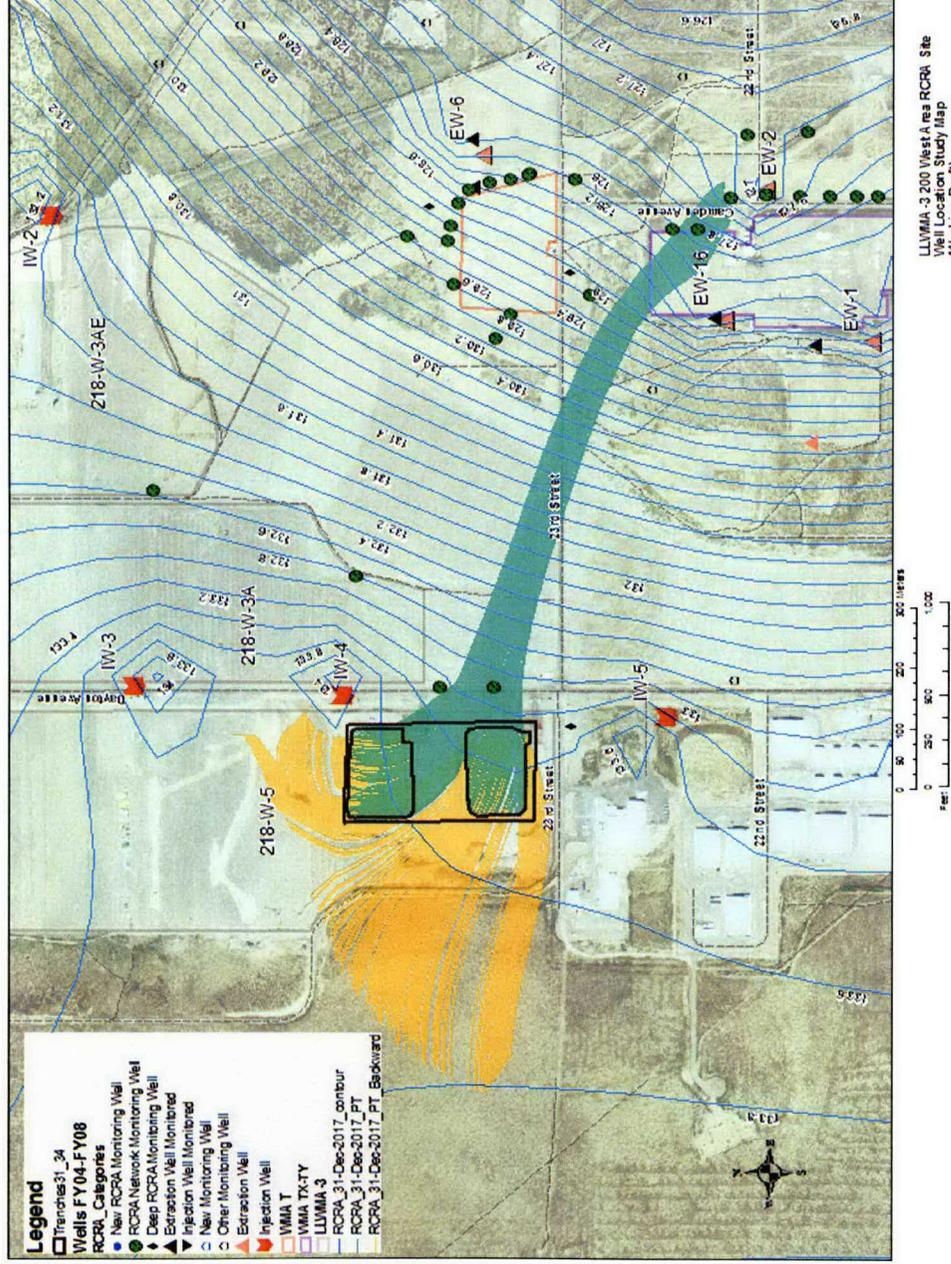


# Hydrologic Model Showing Current P&T Effects – 2010 - 2011



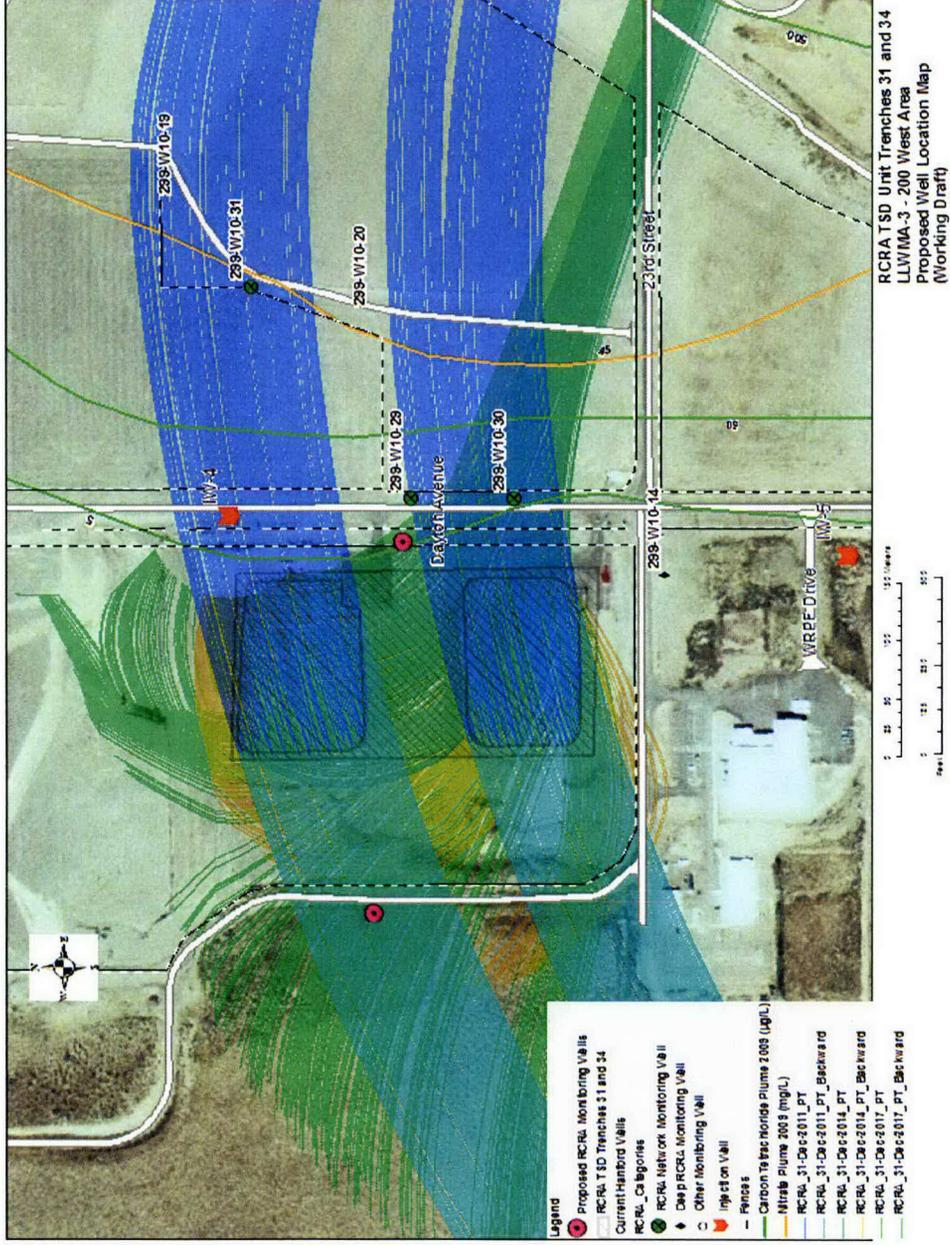


# Hydrologic Model Showing New P&T Effects - 2014 - 2017



# Well Location Site Proposals

- Using the superimposed particle tracking potential monitoring well locations were plotted.
- Upgradient well could be installed as soon as possible.
- Three downgradient wells exist under current hydrologic gradient (299-W10-29, 299-W10-30 and 299-W10-31)
- IW-4 may be considered a temporary downgradient well. (Proposal was dismissed by group consensus)



# Well Location Site Proposals

- One upgradient well west of the Trenches
- One new downgradient well east of the Trenches

