

Application of ITRC Product at the Hanford Federal Facility, WA

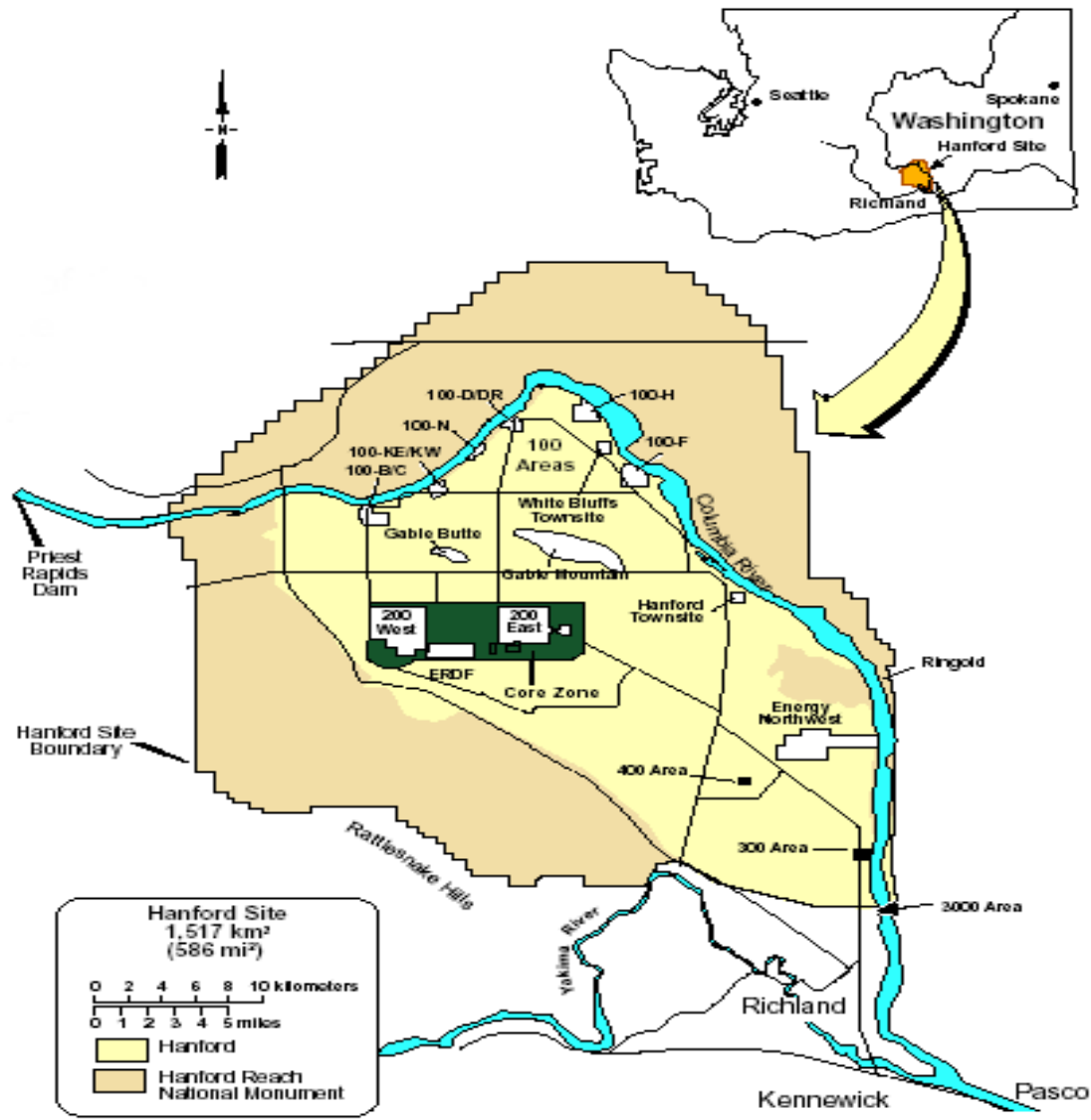
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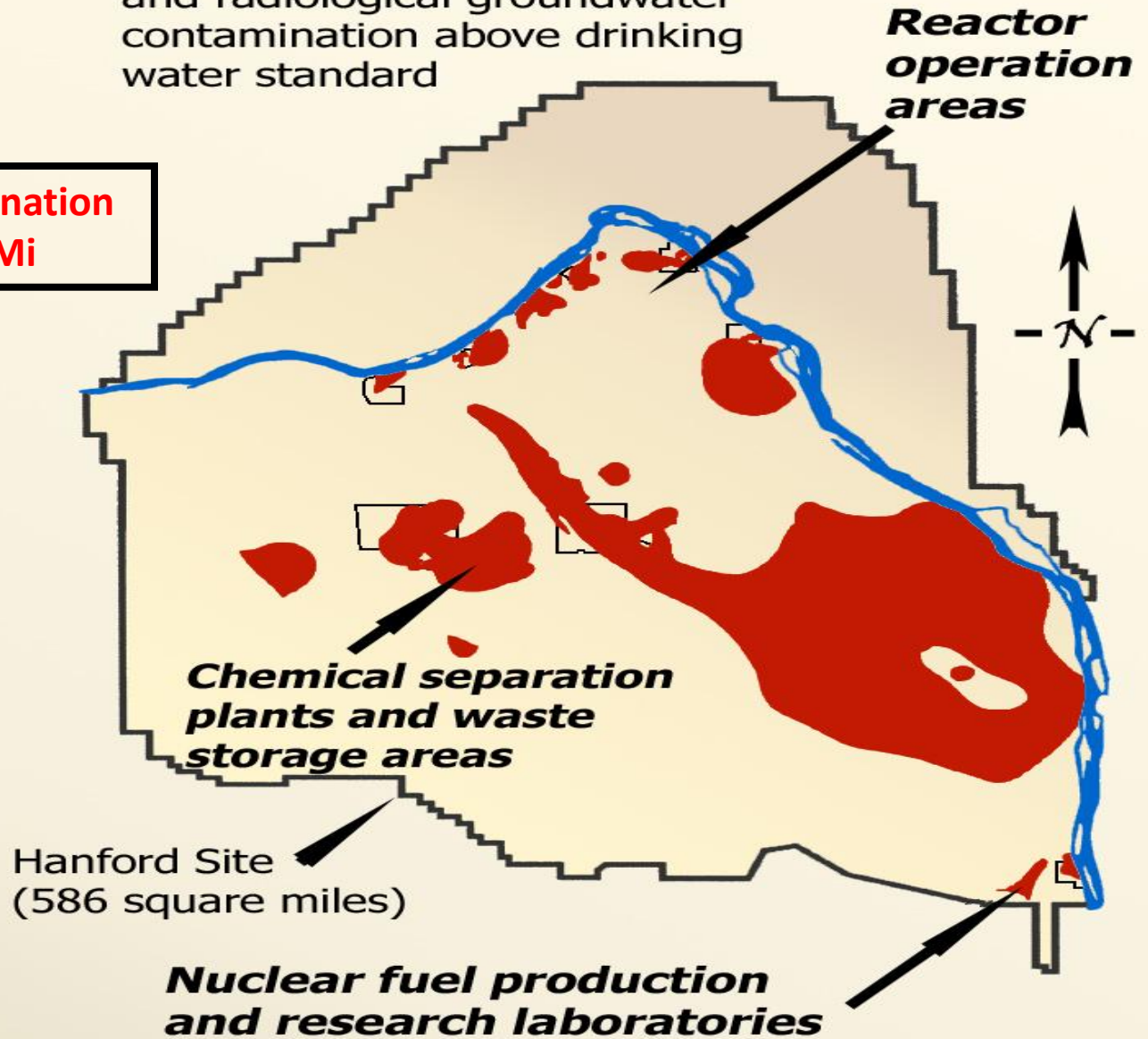
ITRC Team Leader



Location of the Hanford Site.

 Extent of combined chemical and radiological groundwater contamination above drinking water standard

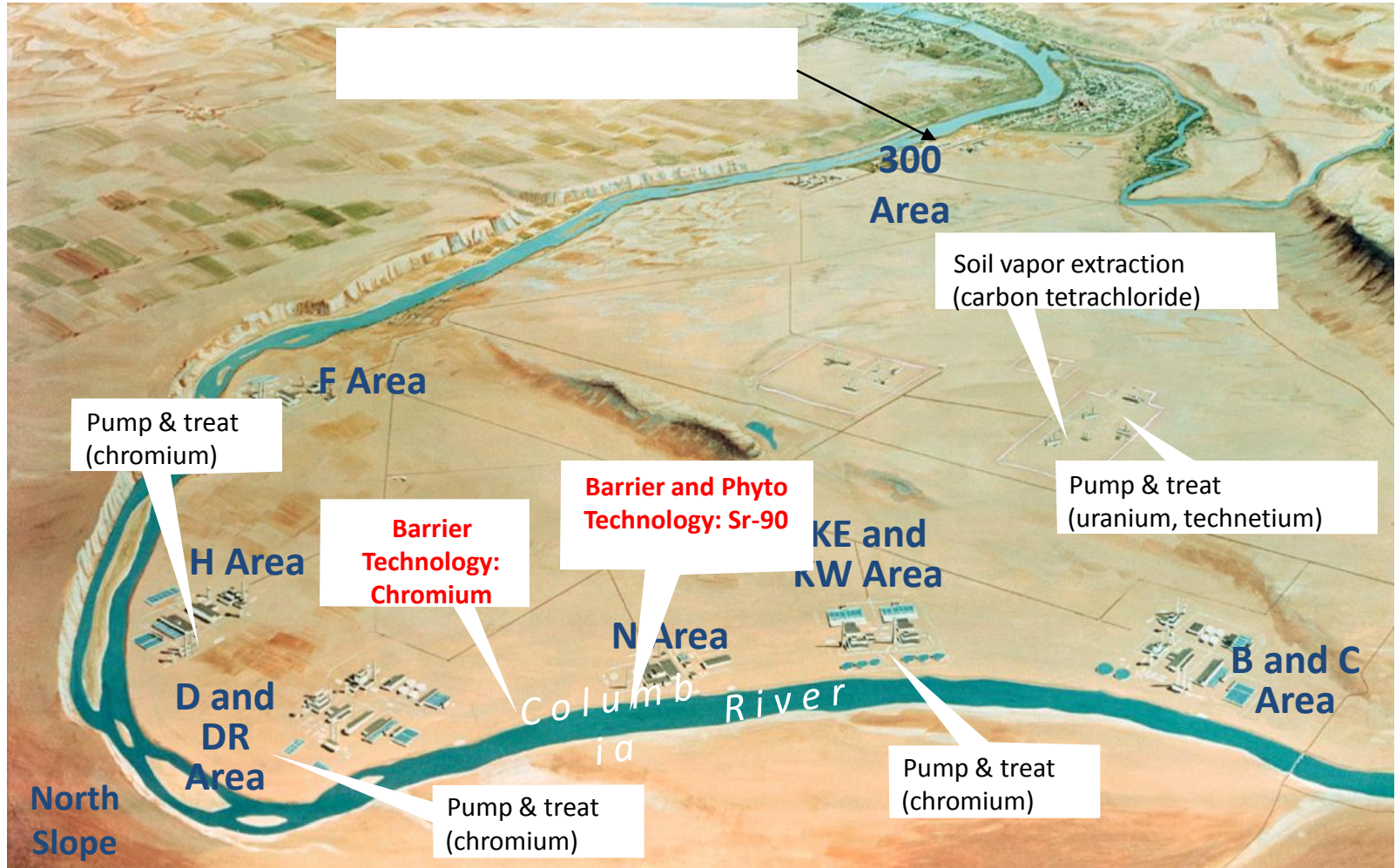
Total Area of Contamination above DWS: ~ 80 Sq. Mi



ITRC Product Use at the Hanford Site, WA

- *Technical and Regulatory Guidance Document Use:*
 1. Regulatory Guidance for Permeable Reactive Barriers (1999) and Lessons Learned/New Directions (2005)
 2. Determining Cleanup Goals at Radioactively Contaminated Sites: Case Studies (2002)
 3. Issues of Long-Term Stewardship: State Regulators' Perspectives (2004)
 4. Decontamination and Decommissioning of Radiologically Contaminated Facilities (2008)
 5. Phytotechnology Technical and Regulatory Guidance (1999, 2001, 2008)
- INTERNET TRAINING: 800+ participants from the WA State

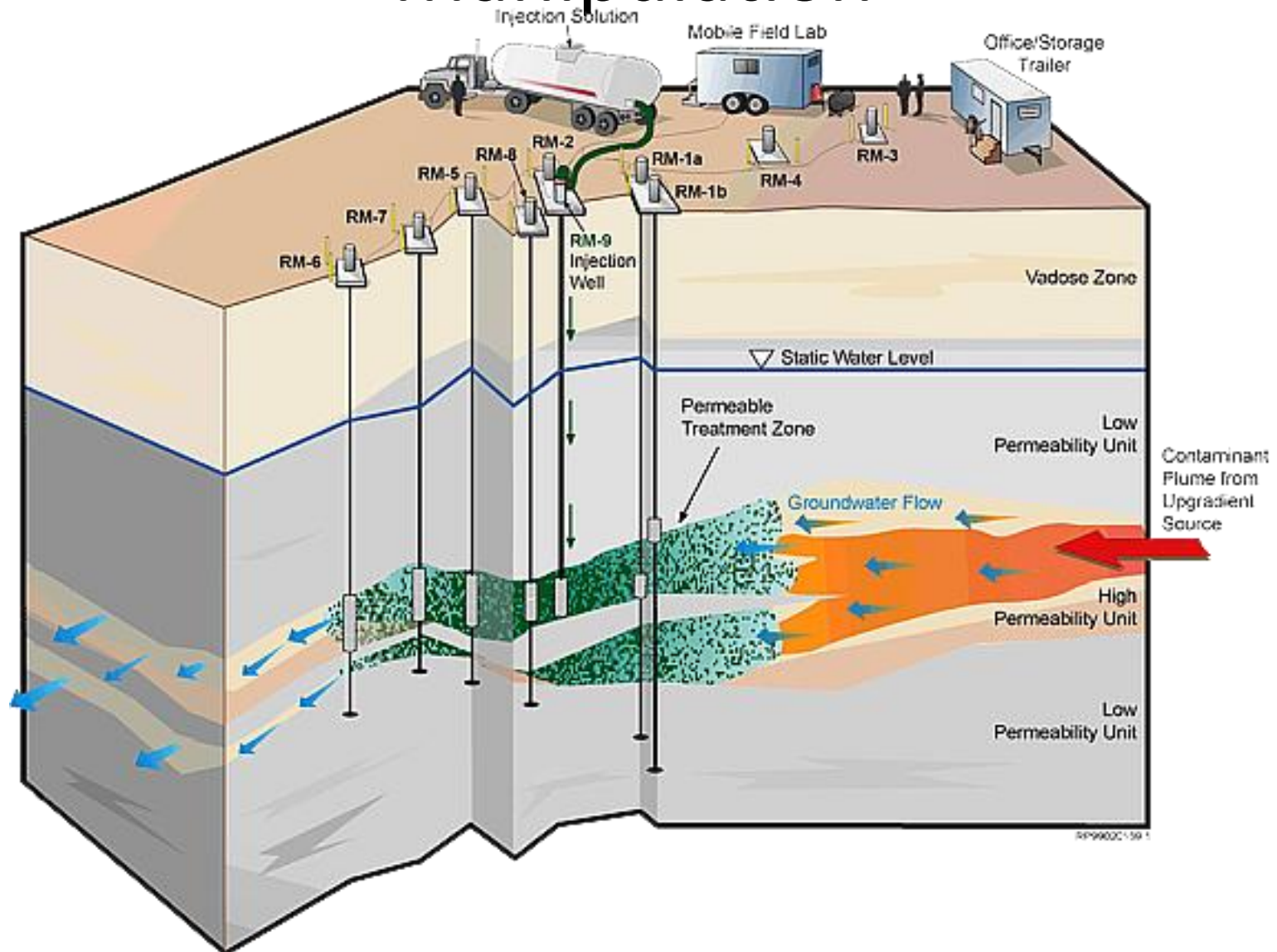
Current Remediation Systems



Specific Use of ITRC Products

- Identifying characterization needs
- Monitoring requirements (frequency, location, etc.)
- QA/QC (e.g. filtered vs. unfiltered, etc.)
- Regulatory issues/requirements (e.g. cleanup time/goal, etc.)
- **Stakeholders and Tribal Nations Issues**

Permeable Barrier Wall: In Situ Redox Manipulation



Hanford 100-D Area ISRM Site

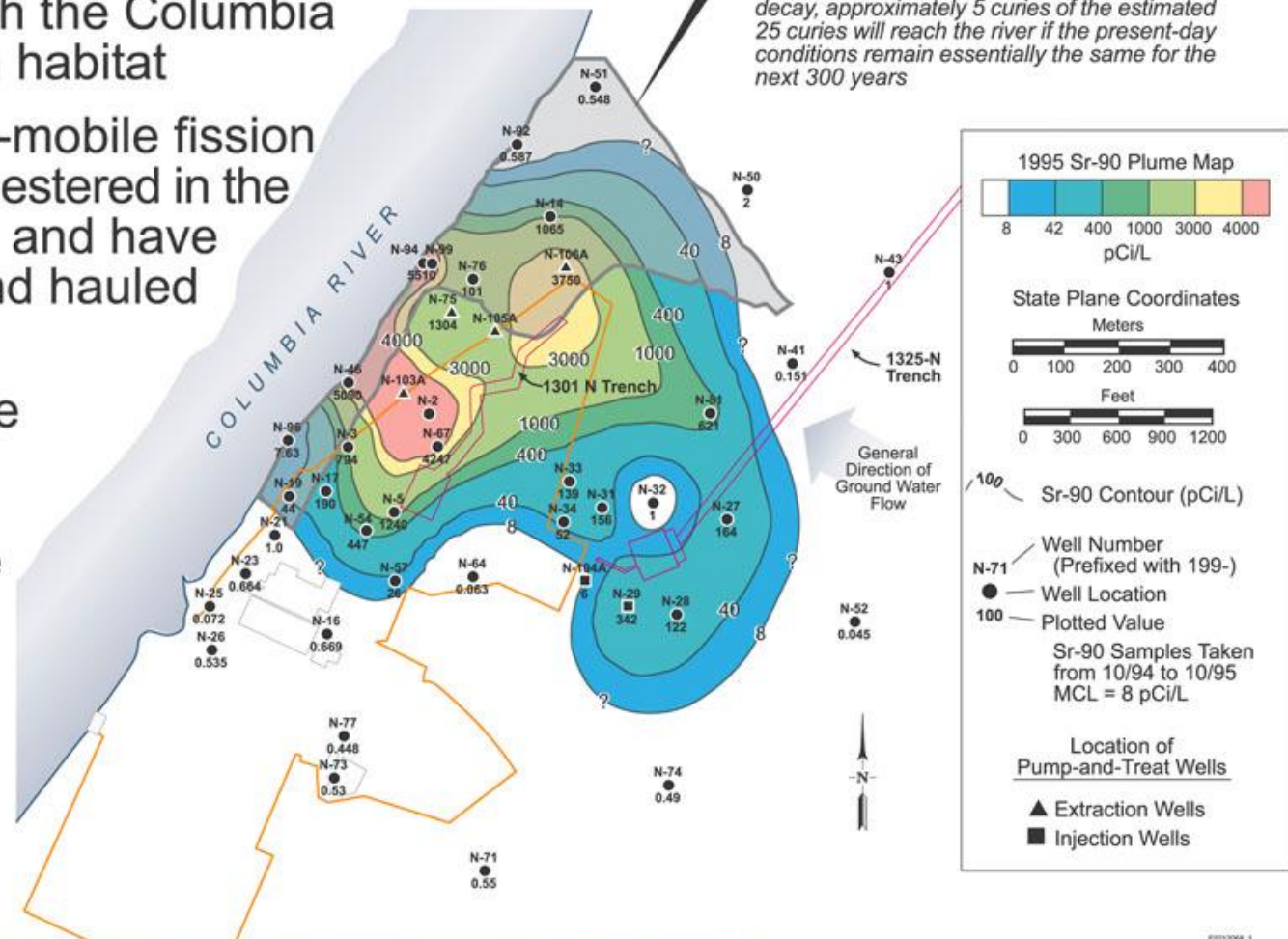


The groundwater source area for Sr-90 that is predicted to reach the Columbia River

- The 1301-N and 1325-N Liquid Waste Disposal Facilities are not a source for current or future Sr-90 that will reach the Columbia River or its riparian habitat
- Generally, the less-mobile fission products were sequestered in the first few feet of soil and have been excavated and hauled to ERDF
- Generally, the more mobile radioactive and hazardous contaminants were flushed through the soil column by the 2,000 gpm operational discharge

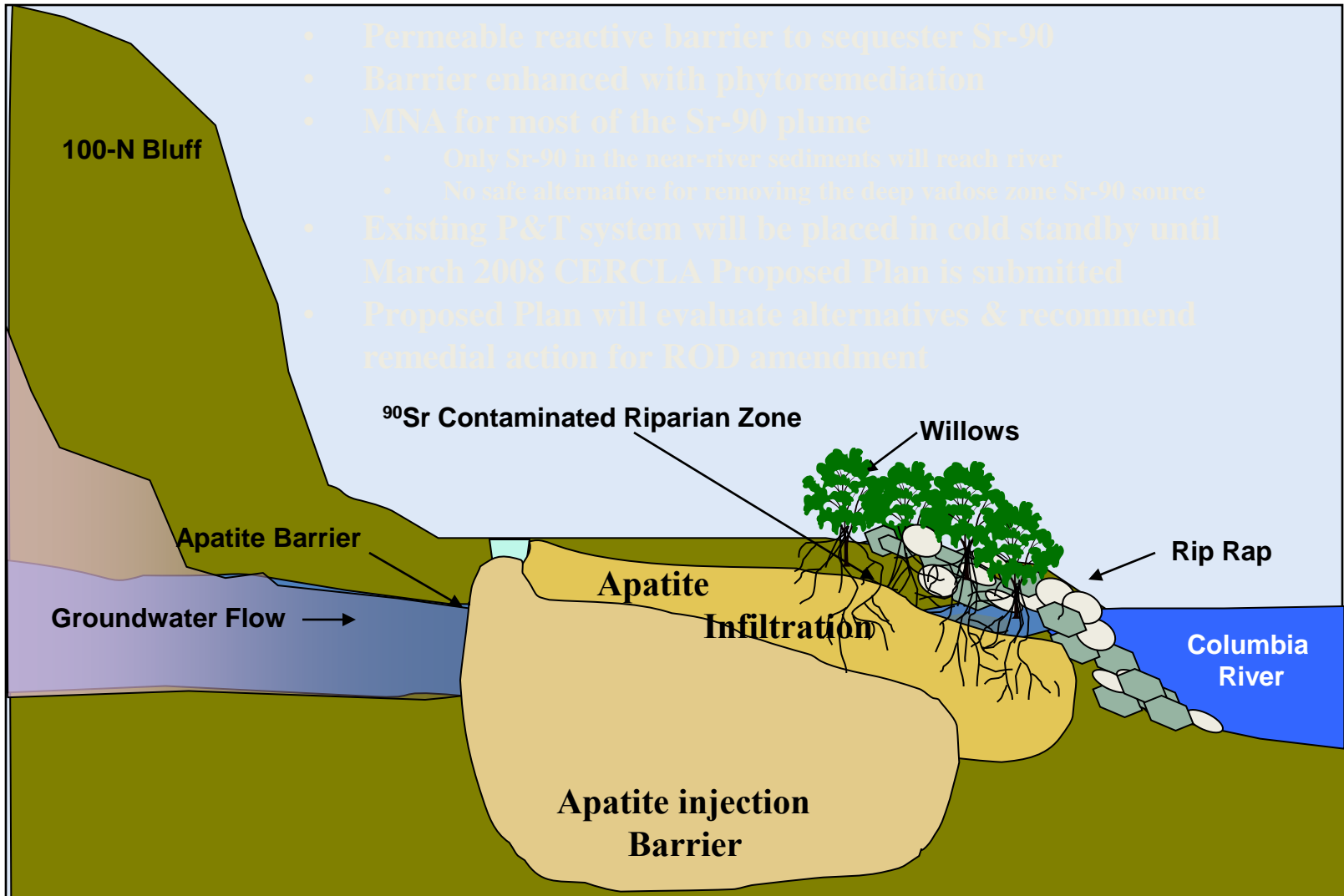
Approximate area of the Sr-90 groundwater plume that will arrive at the Columbia River over the next 300 years

Taking into account travel time and radioactive decay, approximately 5 curies of the estimated 25 curies will reach the river if the present-day conditions remain essentially the same for the next 300 years





Systems Approach to Address 100-N ⁹⁰Sr Permeable Wall (Apatite Barrier) and Phytoremediation



Salix exigua – Sandbar or Coyote Willow
for Phyto Extraction





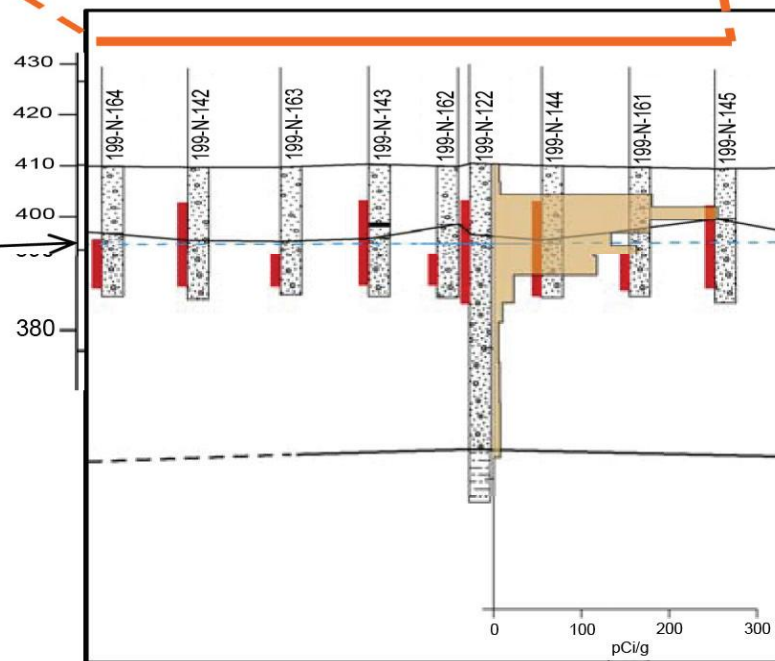
-  Hanford formation sandy gravel
-  Ringold "E" sandy gravel
-  Ringold Formation silt
-  thin silt interbed
-  water level fall 2008
-  screened interval

Mean Ground Level
410 Ft. Above Mean Sea Level
125 m Above Mean Sea Level

Water Level
Fall 2008

Sr-90 in sediments (pCi/g)

0 50 100
pCi/g



Technology Deployment: Summary

Technology	Contaminants	Investment	Success	Comment
Permeable Barrier: In-Situ Redox Barrier	Hexavalent chromium (max. conc.~45,000ppb) MCL for total Cr 100 ppb	\$ 22 Million +	>90% of the barrier is successful (Cr : <20 ppb)	Part of the treatment train for the final remediation
Permeable Barrier : Apatite sequestration (300 ft)	Strontium 90 (max Conc. ~8000 Pci/L) MCL= 8 Pci/L	~\$ 10 million	>90% reduction of Sr-90	Extension of the barrier to ~2500 ft
Phyto - technology	Sr-90 along the Shoreline of the Columbia River	~ \$3 million for the pilot scale testing	Green house and other studies are successful	Planned to go ahead with the plan

Current ITRC Products Related to Hanford Site Clean up

- Application of MNA for metals and radionuclides
- Remediation Process Optimization,
- Etc.