

“Hanford Nuclear Reservation Post ‘Clean-Up’”



Yakama Nation Environmental
Restoration Waste Management
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Dave Rowland

Post Cleanup End-States

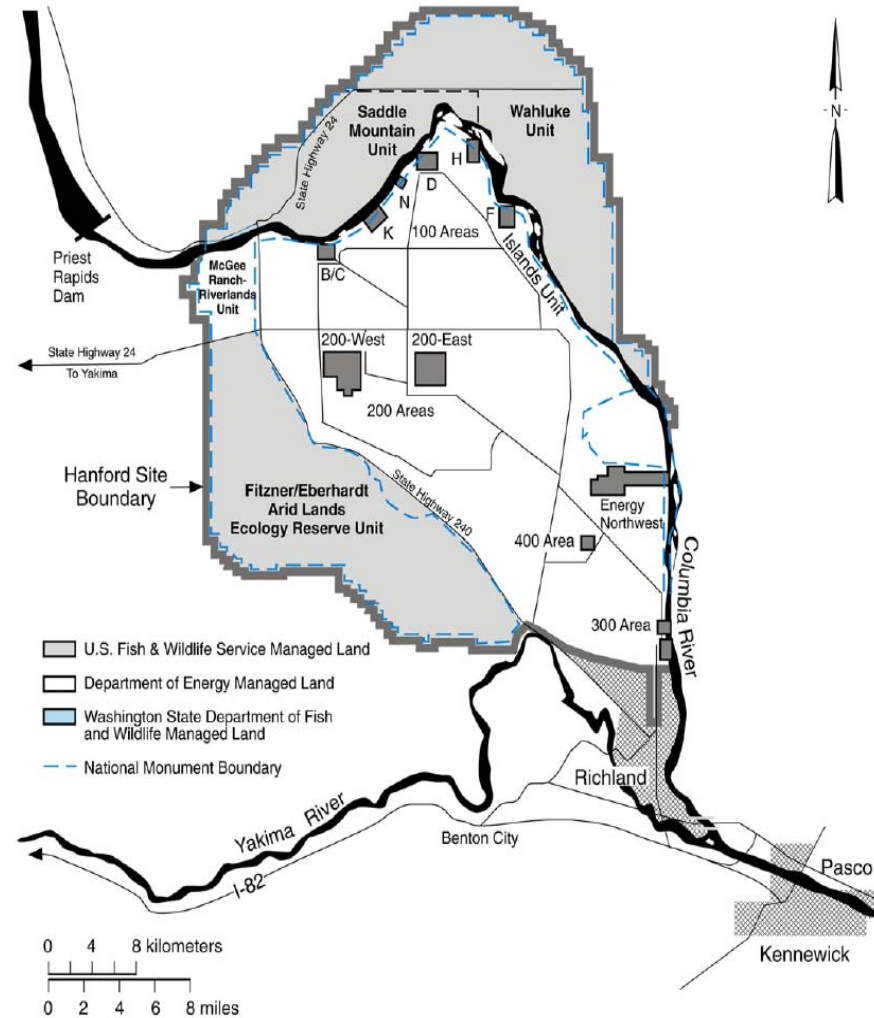
- Post cleanup decision made by DOE are documented in the Hanford Site Environmental Impact Statement (EIS) - Comprehensive Land-Use Plan (CLUP), amended in 1992.
- DOE has stayed the course with the land-use decisions.
- River Corridor 2015 Vision and Central Plateau Cleanup Principles only provide details.

Introduction

- Cleanup decisions by DOE, EPA, and Washington State Department of Ecology have not been the most protective, leaving vast amounts of radioactive and dangerous chemicals in the soils and groundwater.
- Recently proposed Tri-Party guidelines for the cleanup of the central areas of the Hanford site will leave more source wastes un-remediated and result in what's been commonly identified as a 10 square mile "sacrifice zone" unfit for YN treaty-right usage.
- YN believes cleanup of the Hanford site is a multi-generational challenge and it is necessary to have as clear an understanding as possible the overall risks that remain in order to base our decisions on priorities going forward.

Hanford Reach:

The Hanford Reach with cool water and relatively undisturbed environment provides exceptional salmon habitat, yet radioactive and chemical plumes threaten the runs. The Hanford Reach of the Columbia flows about 50 miles freely through the Hanford nuclear site. The Hanford Reach is particularly significant because it is the largest remaining spawning grounds for fall Chinook salmon on the main-stem of the Columbia River.



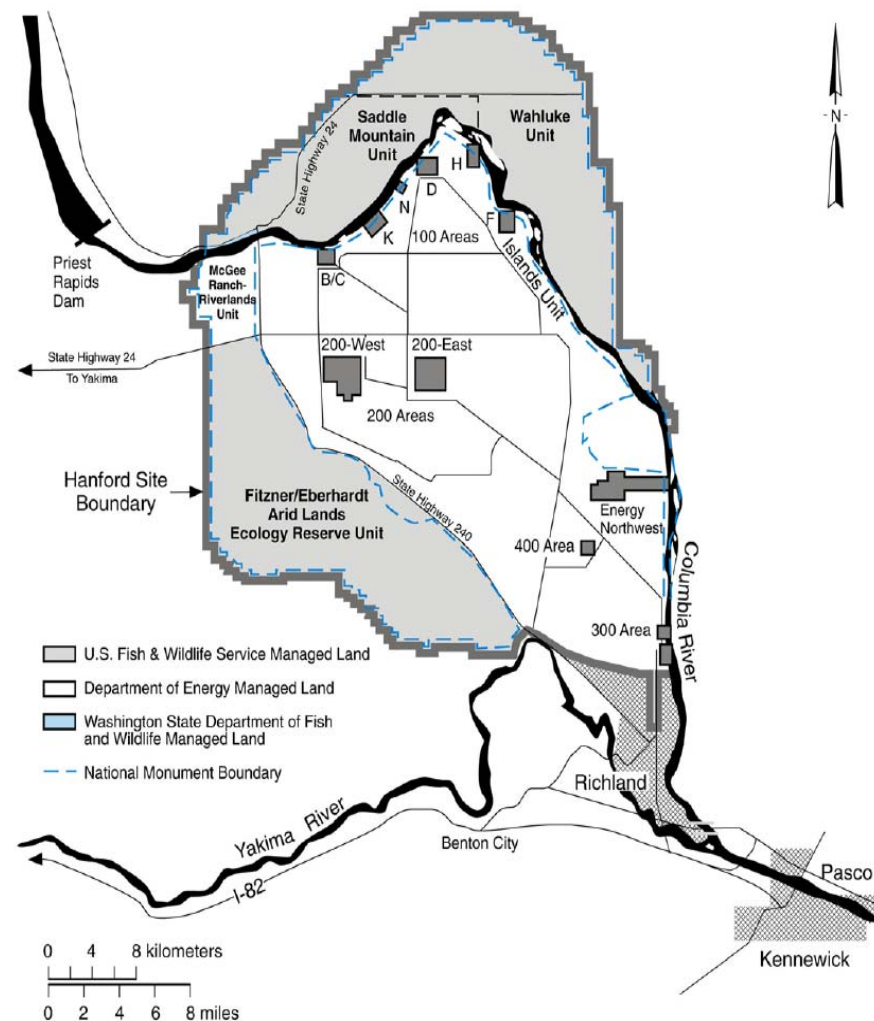
Fall Chinook Salmon Spawning Areas



History

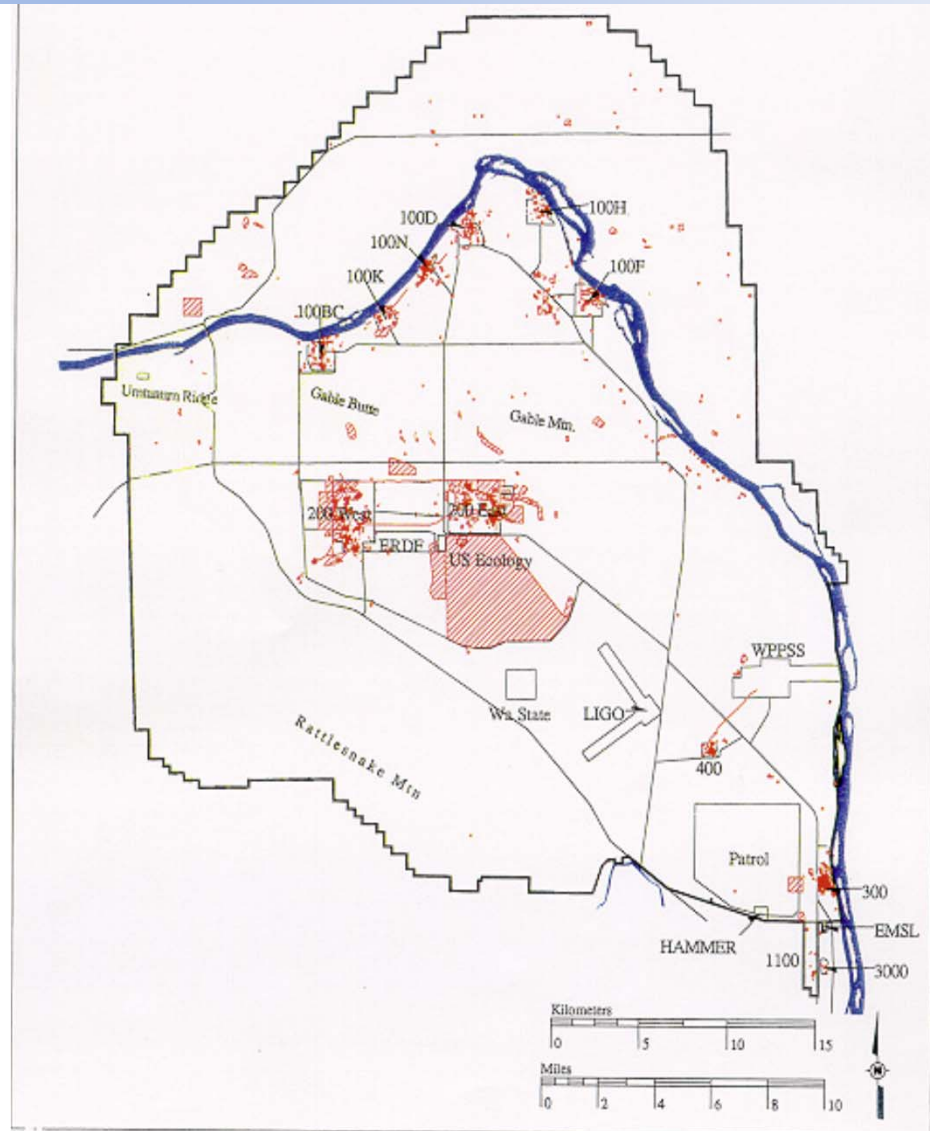
In 1943, the federal government Selected Hanford as a top-secret site for the Manhattan Project, which called for enriching plutonium for nuclear weapons.

The U.S. Government eventually built nuclear fuel fabrication facilities (300 Area), nine nuclear plutonium production reactors (100 Areas), and nuclear fuel processing and plutonium production (200 Areas).



Contamination Begins

- Radionuclides released to river from single-pass cooling reactors.
- Radionuclides released to the environment from exhaust stacks.
- Radionuclides and chemicals discharged directly into the soils and groundwater.



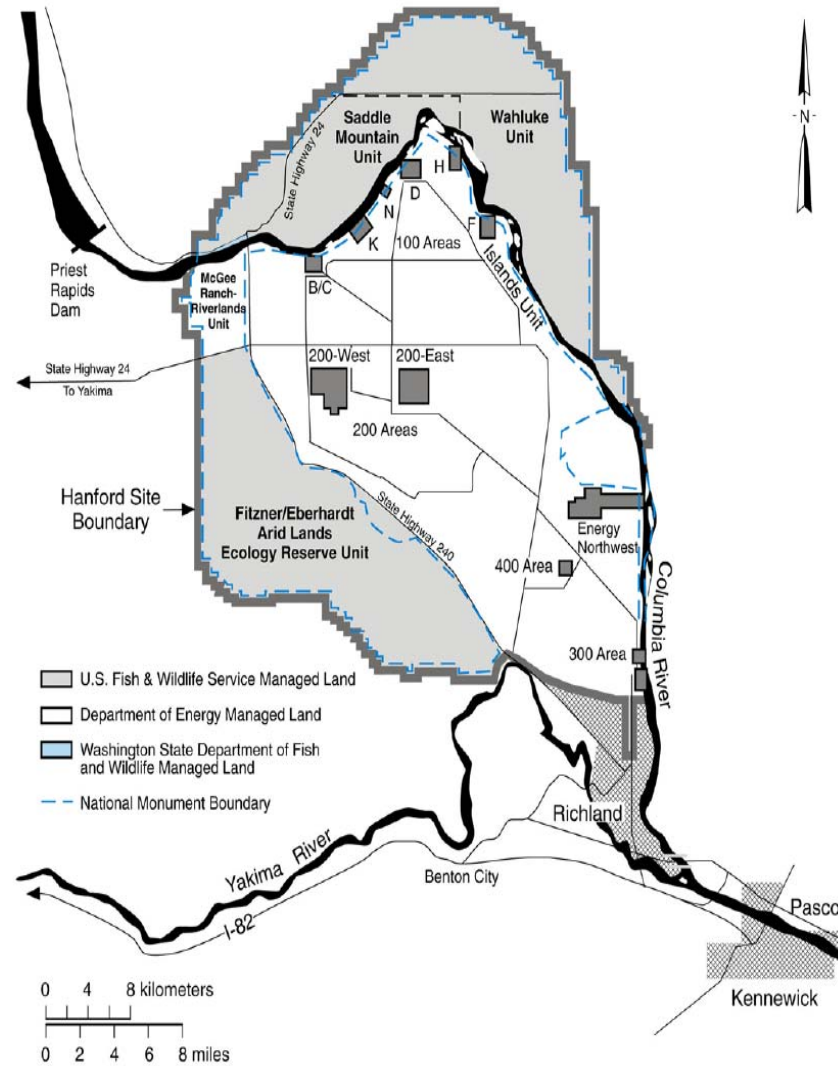
Hanford Cleanup

Since cleanup started decades ago millions of tons of contaminated soil have been removed, millions of gallons of GW has been treated, 6 reactors cocooned, hundreds of buildings demolished, and two old test reactors removed.

But there is more to do, such as HLW treatment and disposal, demolition of canyon facilities, cocooning K reactors, cleaning up GW and treating the vadose zone.

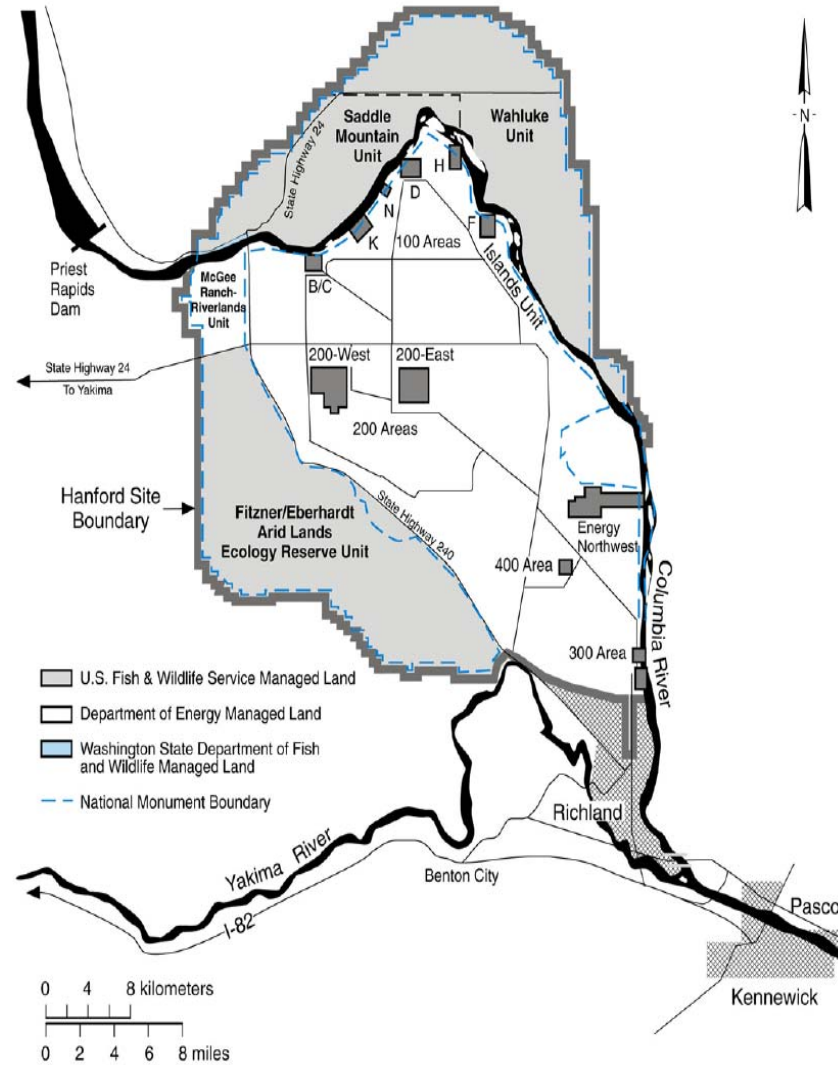
100 (Reactor) Areas

- Final cleanup not complete. 100-F Area only Record of Decision.
- DOE has identified the following contaminants:
 - Chromium, Sr-90, nitrates – All 100 Areas
 - Tritium – 100-B/C, 100-KE/KW, 100-F
 - TCE and Petroleum Products – 100-KE/KW, 100-N
 - Uranium – 100-D and 100-H
 - Carbon – 14 – 100-KE/KW
- Orchard Lands – Arsenic



300 & 400 Areas

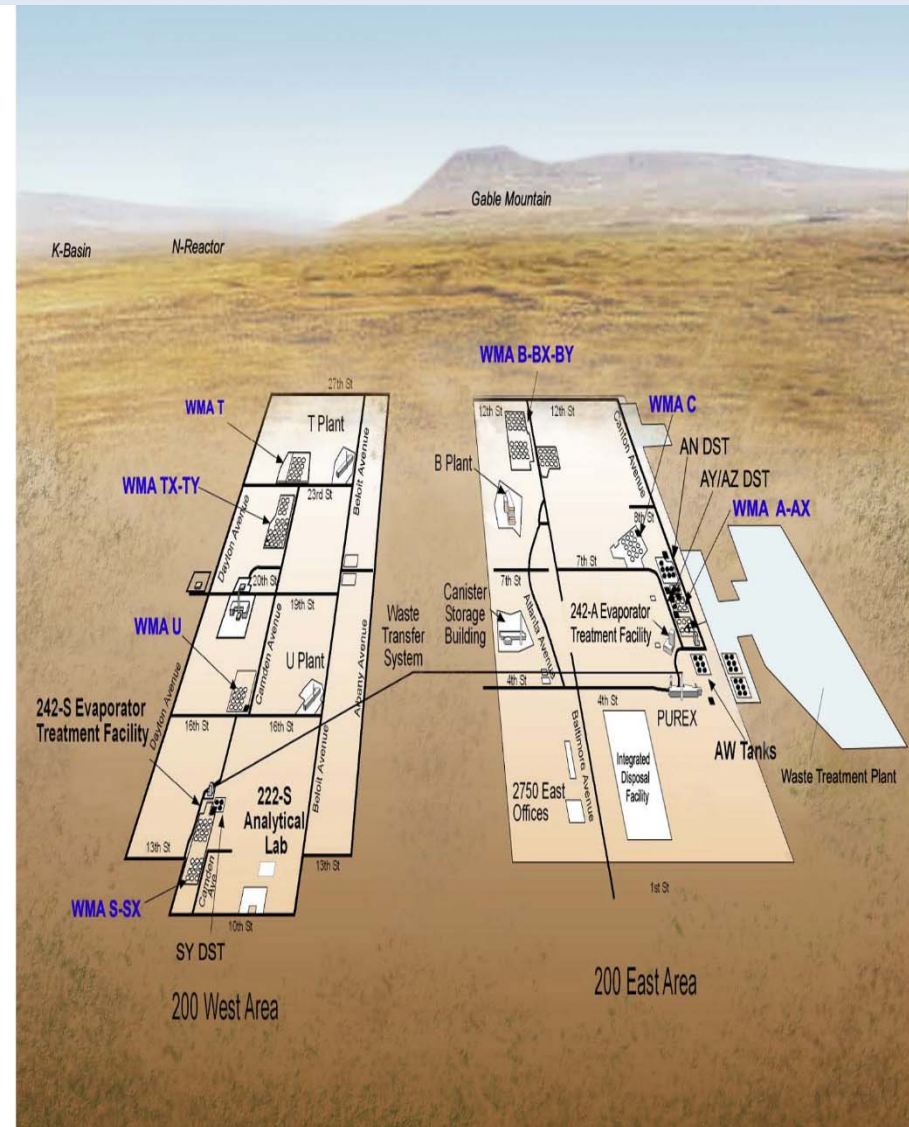
- DOE identified contaminants in the 300 Area: uranium, cesium-137, tritium, nitrate, tri-butyl phosphate.
- ROD Remedy Failure.
- 400 Area (FFTF) under surveillance status, GW contaminated with tritium from the Central Plateau



Central Plateau Areas

200 Area makes up about 75 square miles of the total Hanford site and is 7-11 miles from the Columbia River. Areas includes: Processing canyons, waste tanks, SNF storage, burial grounds/landfills, cribs, trenches, and ponds.

Waste treatment includes: Waste Treatment Plant, LLW water treatment plant, pump-and-treat systems, Class C LLW/Mixed LLW landfills (ERDF/IDF).



Central Plateau Contaminants

- Soil/groundwater contamination from liquid discharges and waste tank/systems leaks include radionuclides and chemicals, such as:

Cesium-137

Strontium-90

Uranium-235/238

Plutonium-239

Iodine-129

Technetium-99

Chromium

Carbon Tetrachloride

Nitrates

Groundwater

- Groundwater across Site contaminated with radionuclides and chemicals including:

Tritium

Iodine-129

Technetium-99

Uranium

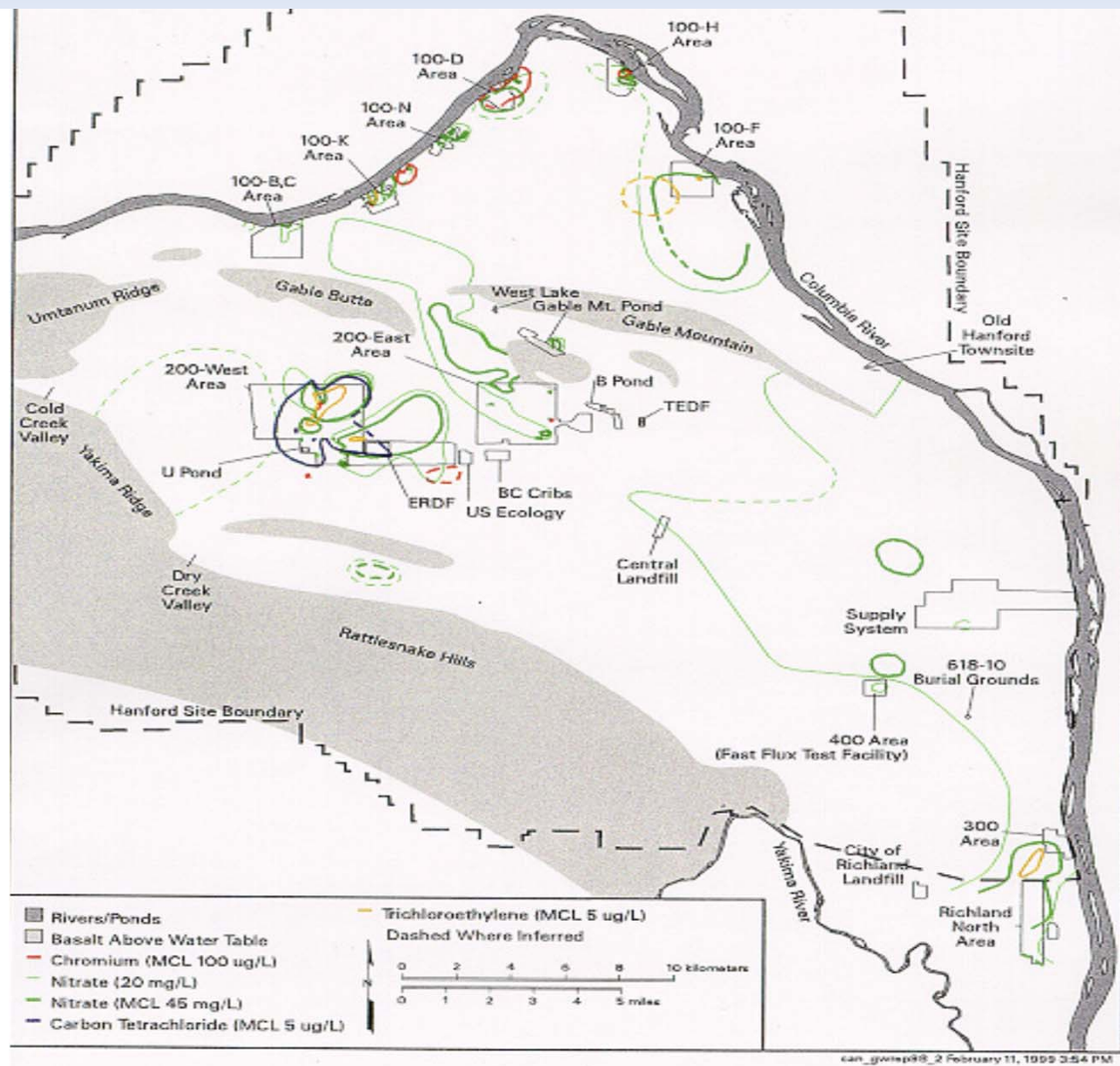
Strontium-90

Chromium

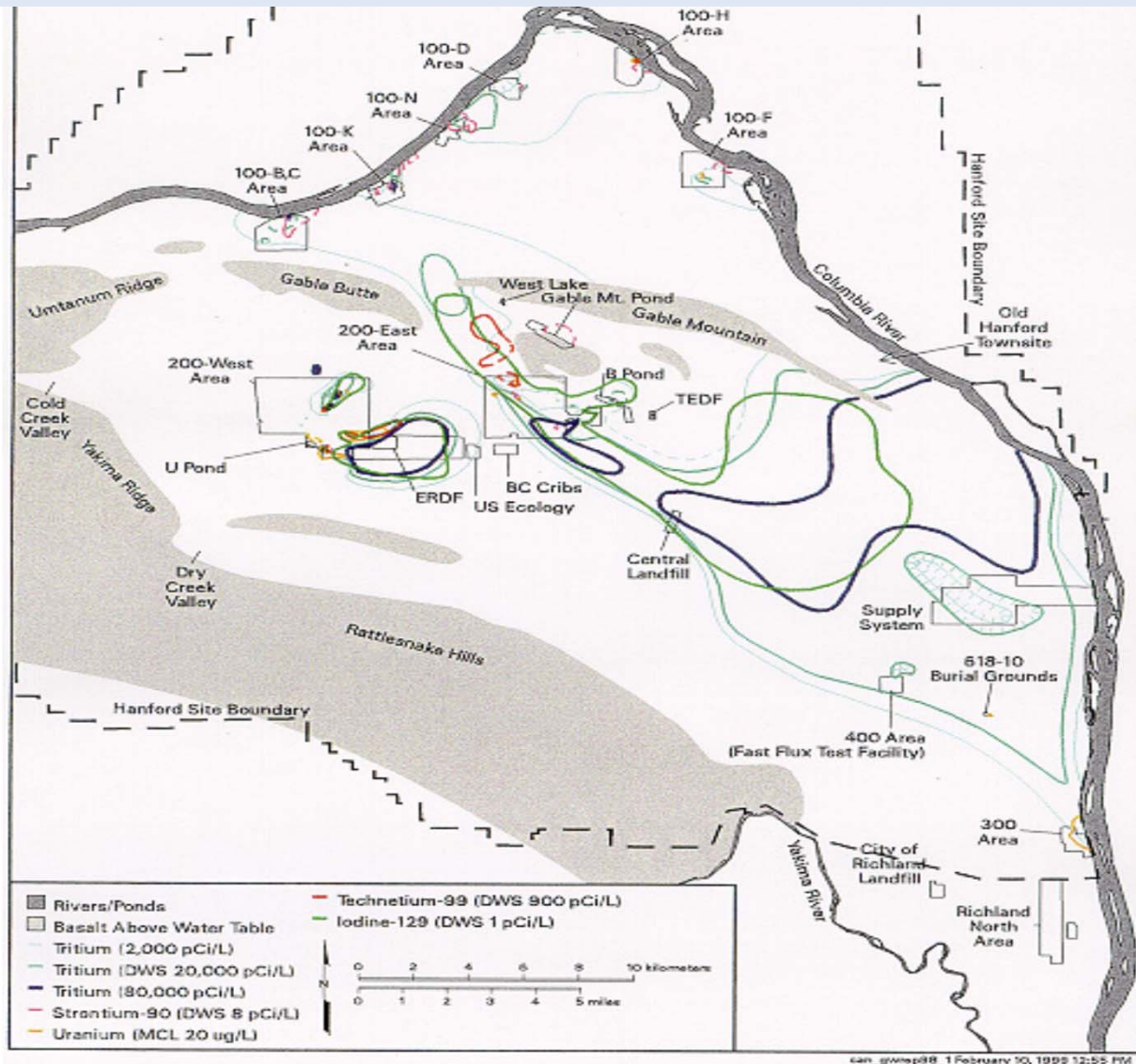
Nitrates

- GW Treatment for Chromium, Carbon Tec, Uranium and Sr-90

Hazardous Chemicals in Groundwater



Radionuclides in Groundwater



Radiological Half-Lives

- Radiological half-lives is how decay is measured.
- Full decay in 10 half-lives.
- Example of radiological half-lives:
 - Tritium – 12.26 years (123 years)
 - Cesium-137 – 30 years (300 years)
 - Strontium-90 – 29 years (290 years)
 - Plutonium-239 – 24,110 years (241,100 years)
 - Technetium-99 – 213,000 years (2,130,000 years)
 - Uranium-235 – 710,000,000 years (7,100,000,000 years)

Hanford Site End-States

Project End-States – Final Decision (RODs) need to be completed and approved.

Following information based on:

Hanford Site EIS/CLUP

Interim/Final RODs

DOE visions documents

Current cleanup actions.



Land-Use Designations

Preservation	An area managed for the preservation of archeological, cultural, ecological and natural resources. Limited public access controls.
Conservation (Mining)	An area reserved for the management and protection of archeological, cultural, ecological, and natural resources. Limited public access. Mining allowed (mineral rights).
Low-Intensity Recreation	An area allowed for low-intensity, visitor-serving activities and facilities, such as improved recreational trails, primitive boat ramps, and permitted campgrounds.
High-Intensity Recreation	An area allocated for high-intensity, visitor-serving activities, such as golf courses, recreational vehicle parks, boat launches, tribal fishing facilities, destination resorts, cultural centers and museums.
Industrial	An area suitable and desirable for activities, such as reactor operations, rail, barge transport facilities, mining, manufacturing, and food processing.
Industrial – Exclusive	An area suitable and desirable for treatment, storage, and disposal of hazardous, dangerous, radioactive, and nonradioactive wastes.

100 Areas End-States

- Cocooned reactor (75 years).
- Restricted land – contaminated soil sites.
- Institutional Controls (ICs) – Fences, signs, land/deed restrictions, GW restrictions, no irrigation/farming, environmental monitoring.
- GW treatment - chromium (50-100 years).
- Land-use restrictions for 250-300 years.



300 and 400 End-States

- Industrial Use with land-use restrictions (radiological contamination).
- No excavation (>15 ft.), no GW use, no irrigation/farming.
- ICs include land/deed restrictions and environmental monitoring.
- Radon concern.

Central Plateau End-States

- **Tank Farms – Landfill Closure**

Empty tanks and ancillary equipment fill with grout.

Leave contaminated soil – no removal.

Cover entire farm with a barrier.

ICs – land-use restrictions, fences, signs, etc. for 250 to 250,000 years.

- ✓ **LAW disposal in the near-surface IDF.**
- ✓ **HLW temporary storage awaiting final disposition.**

Central Plateau End-States

- **Canyon Facilities (including WTP)**

 - Decontaminated – (TRU removal).

 - Equipment placed in lower levels – filled with grout.

 - Wall collapsed on lower level.

 - Covered with environmental barrier

 - ICs – land-use restrictions, fences, signs, etc.,

- **Ponds, trenches, landfills (including ERDF/IDF) covered with a barrier.**

- **ICs – land-use restrictions, fences, signs, etc. for 250 to 250,000 years.**

Groundwater End-States

- Treatment for Sr-90, Tc-99, Chromium, Carbon Tetrachloride, uranium.
- Pump-and-treat systems for 50-150 years.
- Sr-90 barrier for 250-300 years.
- Monitoring wells throughout site.
- River seep monitoring.

End-States Concerns

- Soil contamination under reactors and waste sites reaching the river – especially TRU elements.
- Central Plateau soil contamination in GW and river.
- Untreated contaminated GW.
- Ability to maintain ICs for 300 years or as long as the contaminants pose a threat to human health and the environment.
- Safe use of natural and cultural resources.
- Residual contamination in river sediments behind dams.