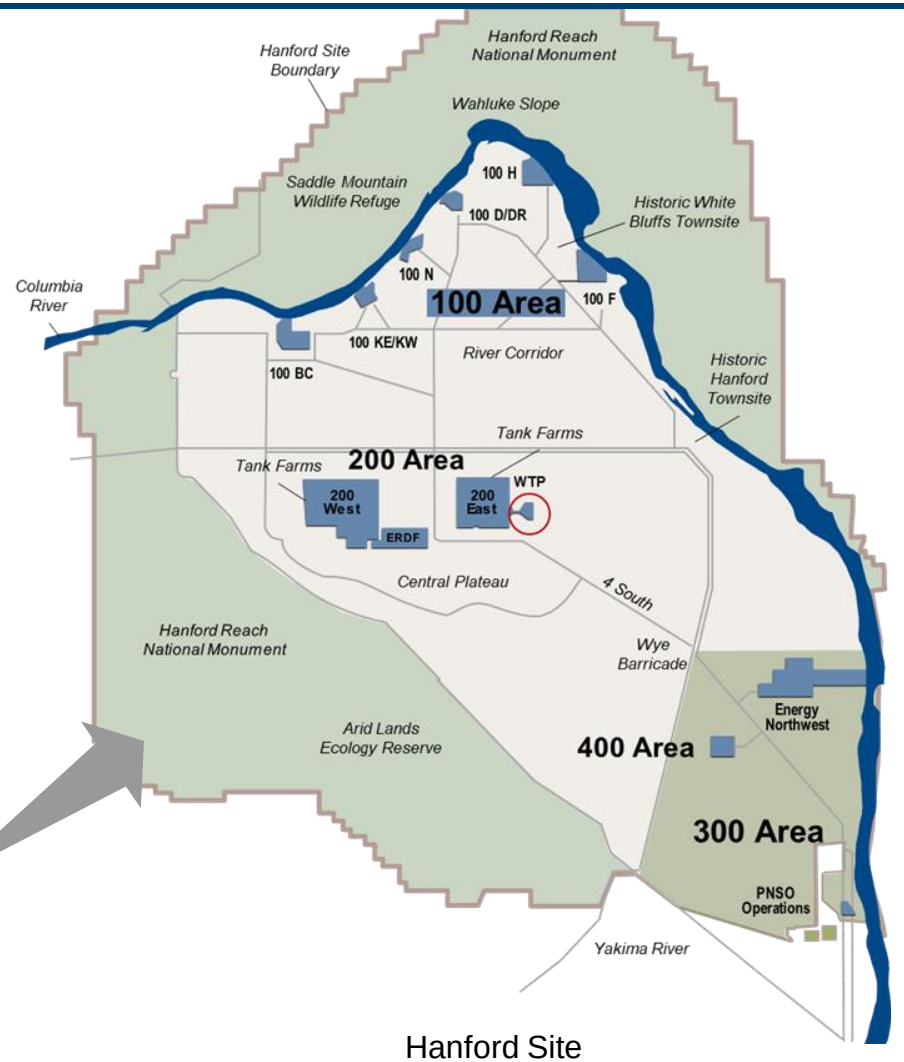
Holistic Agreement on Cleanup of Hanford Site Tank Waste

Brian Stickney, Delmar Noyes, and Mark Silberstein, U.S. DOE, Hanford
Stephanie Schleif and Kelly Wood, Washington State Dept. of Ecology/AGO
Michelle Mullin, U.S. Environmental Protection Agency

May 2024

Holistic Agreement

The agencies have reached an agreement that proposes a **safe**, **realistic, achievable** course for **cleanup** of millions of gallons of radioactive and chemical tank waste at the Hanford Site



Hanford Site

Background

- Since June 2020, the Tri-Party agencies have been engaged in federally mediated negotiations to identify an agreeable path forward for the Hanford tank waste retrieval and treatment mission
- The agencies announced a conceptual agreement in May 2023
- Negotiations were informed by key documents (including public input), such as:
  - High-level waste analysis of alternatives
  - River Protection Project system plans
  - Test Bed Initiative environmental assessment and EPA variance

What is the “Holistic Agreement”?

- The holistic agreement is comprised of three parts
  - Amendments to the Washington v. Energy consent decree via a joint motion filed with the court by the state and DOE
  - Change control forms to amend the Hanford Tri-Party Agreement
  - A settlement agreement document to capture other related provisions and commitments
- The agreement proposes a course for the tank waste retrieval and treatment mission through 2040.

Agreement Highlights

- Maintaining existing timeframes for starting treatment of both low-activity and high-level waste by immobilizing it in glass via vitrification
- Using a direct-feed approach for immobilizing high-level waste in glass, similar to the Direct-Feed Low-Activity Waste Program
- Building a waste transfer vault and second effluent management facility to support treating high-level waste

Agreement Highlights

- Removing waste from 22 tanks in Hanford's 200 West Area by 2040
  - Includes grouting low-activity waste portion for offsite disposal
  - Consistent with recommendations provided to the agencies
- Designing and constructing 1-million gallons of capacity for multi-purpose storage of tank waste
- Evaluating and developing new technologies for retrieving waste from tanks
- High-level waste interpretation forbearance

Consent Decree — Low-Activity Waste Facility

- Low-activity waste vitrification milestones unchanged (with COVID force majeure adjustment)
- Milestone for achieving Low-Activity Waste Facility “initial operations” moved up from 2036 to 3 years after facility hot commissioning

Consent Decree — High-Level Waste Facility

- Will be converted to a direct feed configuration with two new facilities
  - High-level waste effluent management facility
  - Waste transfer vault
- Current commissioning dates remain the same but may be adjusted after critical path schedule developed

Consent Decree — Pretreatment Capabilities

- In 2029, DOE selects additional pretreatment capabilities to be implemented after hot commissioning of direct feed high-level waste (e.g., sludge washing)
- Full Waste Treatment and Immobilization Plant startup and initial operations dates will also be re-set at that time

Consent Decree — Single-Shell Tank Retrievals

- No change to current dates for completing retrieval of waste from most single-shell tanks in the A/AX tank farms
- Date for completing retrieval of challenging tanks A-104 and A-105 extended to allow for development of new retrieval technology, or complete retrieval of up to two substitute tanks.

Tri-Party Agreement — “End Dates”

- No change to current dates for retrieving all single-shell tanks (2040), closing the single-shell tank system (2043) and treating all tank waste (2047)
- Asterisks added to all three “end dates” acknowledging that dates must be revised (without excusing USDOE from obligation to satisfy milestones as expeditiously as possible)
- Dates will be revised in a “one-time” System Plan negotiation to occur after direct feed high-level waste hot commissioning (based on better information at that time) (negotiation aligned with re-setting consent decree pretreatment and full Waste Treatment and Immobilization Plant milestones)

Tri-Party Agreement — “System Plan” Negotiations

- Negotiation frequency changed
- Every 3 years
  - Single-shell tanks retrieval sequencing (looking ahead next 8 years)
  - Contingency actions (including need for new tank capacity)
- Every 6 years
  - All topics

Tri-Party Agreement — Single-Shell Tank Retrievals

- 22 additional single-shell tank retrievals by 2040*
  - All from S/SX/U Farms
  - Low-activity waste portion of waste will go through alternative treatment (i.e., grouting) and be disposed of off-site
  - Allows 200 West Area tank retrievals to proceed independent of Waste Treatment and Immobilization Plant
- Tank A-103 completion date adjusted from 2022 to 2028

*Total of 29 retrievals by 2040 (including remaining consent decree tanks plus A-103)

Tri-Party Agreement—"Alternative Treatment"

- By the end of 2024 Energy will select alternatives and apprise Ecology of those selections. Additional milestones were developed to create a critical path schedule and incorporate decisions into the permit.
- Offsite disposal conditions:
  - Grouted waste to be disposed of at facilities outside Hanford's contiguous borders
  - "Just in time" production: —Energy cannot treat/store more waste than it can reasonably ship
- Conditions remain in place at least through 2040; Ecology and Energy to meet no later than 2038 to discuss future conditions (if any)

Tri-Party Agreement—New Tank Capacity

- One million gallons of new multi-purpose storage capacity ready to operate by 2040
  - To be built in 200 West Area
  - Subject to process to evaluate alternatives (analysis of alternatives)

Tri-Party Agreement — Retrieval Technology

- New Retrieval Technology Evaluation and Development
  - DOE will prepare a technology evaluation document to assess new or refined technologies to address retrieval challenges and tank condition issues
  - An expert advisory panel will be tasked with providing analysis, recommendations
  - DOE must carry forward at least two technologies into development
  - Expert panel will also analyze saltwell pumping for potential use in actively leaking single-shell tanks

Tri-Party Agreement — Other

- Cross-Site Transfer Line
  - Two new interim milestones to activate cross-site transfer lines
- Immobilized high-level waste
  - Adds permit modification and construction substantially complete requirements for immobilized high-level waste facility
- Interim Waste Management Areas Closure Milestones
  - To support Closure Plan submissions for Waste Management Areas A-AX, B-BX-BY, C, S-SX, T, TX-TY, and U

Settlement Agreement

- Not subject to public comment; mostly addresses processes for rollout and potential finalization
- Includes statement that DOE intends to forbear from applying high-level waste interpretation at Hanford
- Includes commitment for DOE and Ecology to discuss off-site grout disposal conditions, if any, after expiration of current proposed conditions

Settlement Agreement (Cont'd)

- DOE commits to involve Ecology in certain internal processes
- Parties agree to have follow-on separate, mediated negotiation to discuss possible updates to Tri-Party Agreement Appendices H (retrievals) and I (closure)
- Conditional language associated with completion of required regulatory processes (e.g., *National Environmental Policy Act* [NEPA], *National Historic Preservation Act*).

Next Steps

- May 30: 60-day public comment period on proposed changes to consent decree and Tri-Party Agreement begins
- Agencies will hold regional public meetings in Washington and Oregon (to be announced)

Next Steps (cont.)

- Discussions with Tribes seeking to consult
- Complete public comment period
- Issue response to comments
- Complete applicable regulatory processes (e.g., National Environmental Policy Act)
- Execute proposed amendments to consent decree in federal district court
- Agencies sign and implement proposed Tri-Party Agreement revisions

Questions?


The Hanford Reach
White Bluffs Overlooking the Columbia River

15 Minute Break Presentation by Mason Murphy of CTUIR to Follow

Confederated Tribes of the Umatilla Indian Reservation

Department of Natural Resources

ENERGY AND ENVIRONMENTAL SCIENCES PROGRAM

Environmental Stewardship of the Hanford Site

Background

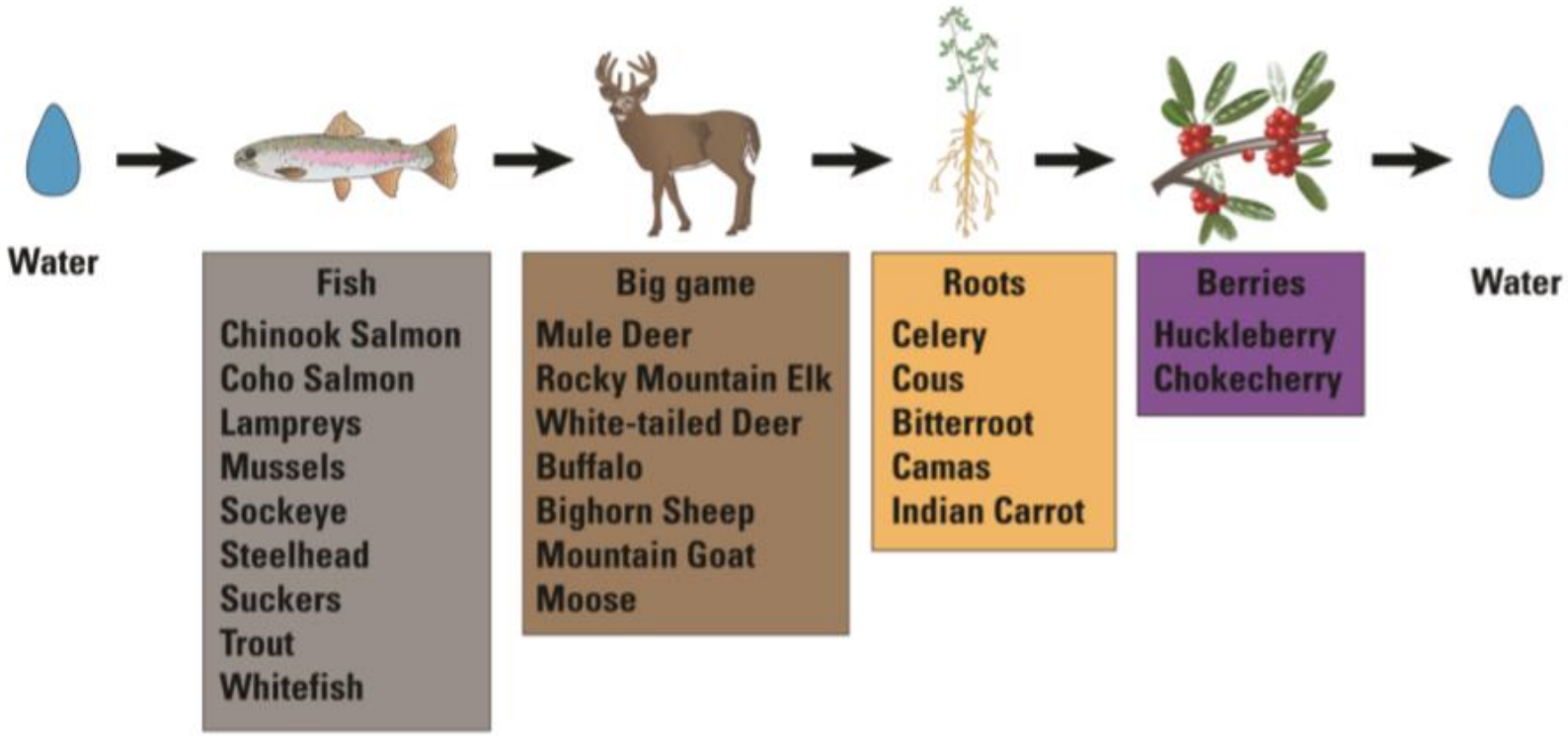
In the beginning the creator asked of the creatures of the earth, 'who will take care of the people?' and it was Salmon who said first, "I will".

The Tribes were spiritually and economically connected to the River

- **Subsistence Use**
  - The river provided plentiful clean water for drinking and bathing
  - The river nourished and sustained plentiful ***First Foods***
- **Cultural Use**
  - Religious gatherings, ceremonies, and burials
  - Crafting and building culturally important items
- **Economic Use**
  - Gathering place for trading and economic diversification

The First Foods and Their Promise

- From the CTUIR creation belief is born Tamánwit and the importance of taking care of the land to ensure the first foods will continue to take care of the tribal people
- **Reciprocity** between humans and the other biotic life forms arises from the creation belief
- A moral and practical obligation for humans and biota to care for each other
- **Ecosystem Resilience**
- Spatial distribution of serving order
- Clean water required for First Foods
- Clean Foods ~ Healthy People



First Foods Cultural Expressions- Community Feasts

Celery Feast: February

Salmon Feasts: April, Celilo, Columbia River

Root Feasts: April – May

Huckleberry Feasts: July - August

First Foods Cultural Expressions- Community Celebrations

Celebrations/War Dances
New Years Celebration
Root Feast Pow-Wow
Treaty Day Celebration
4th of July
Round Up

Men's Round Bustle
Sometimes First Kill Ceremony Requirement

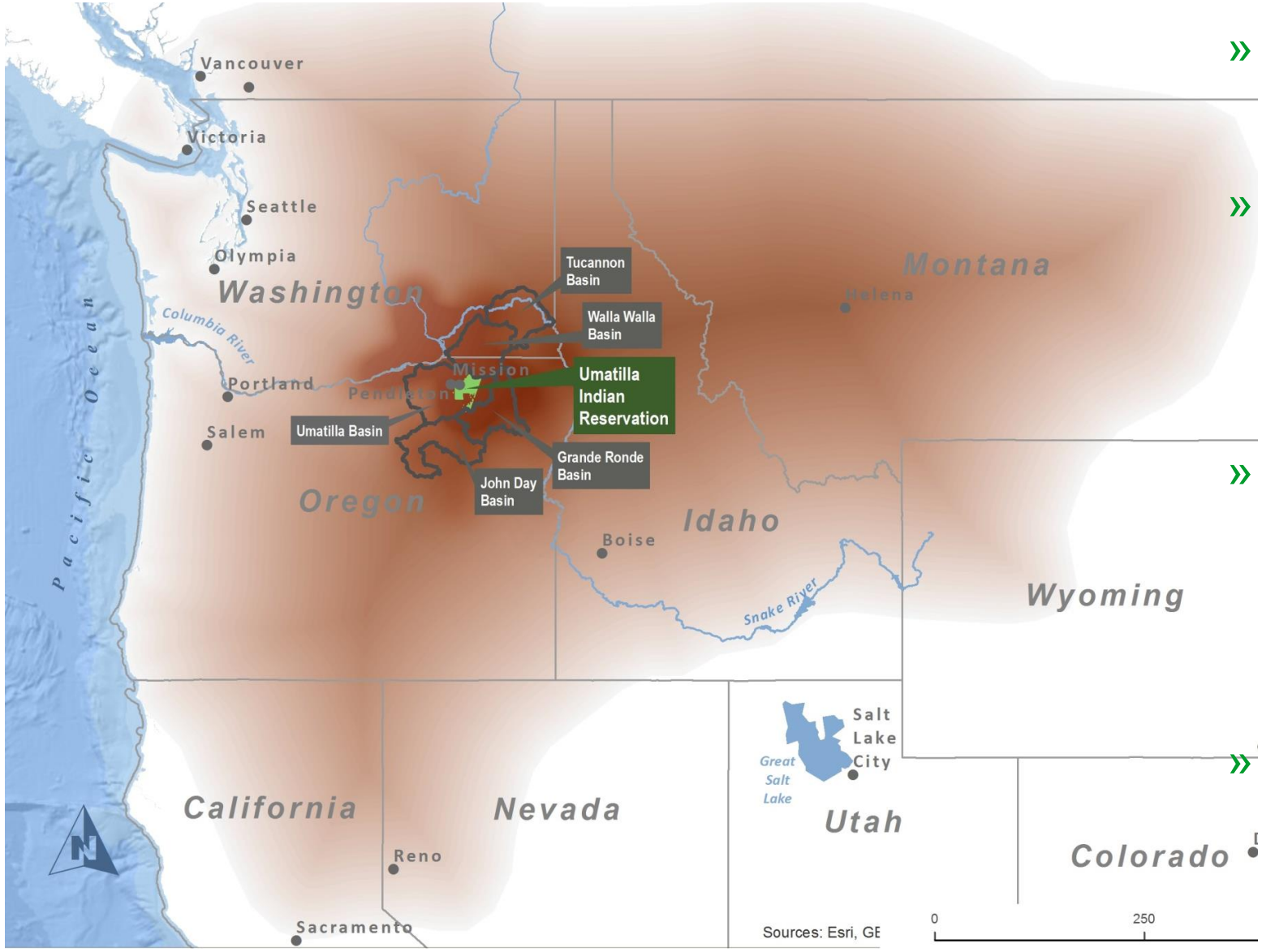
Women's Basket Hat
(Buckskin Dresses)
Sometimes First Digging/Picking Requirement

First Foods Cultural Expressions- Individual Ceremonies

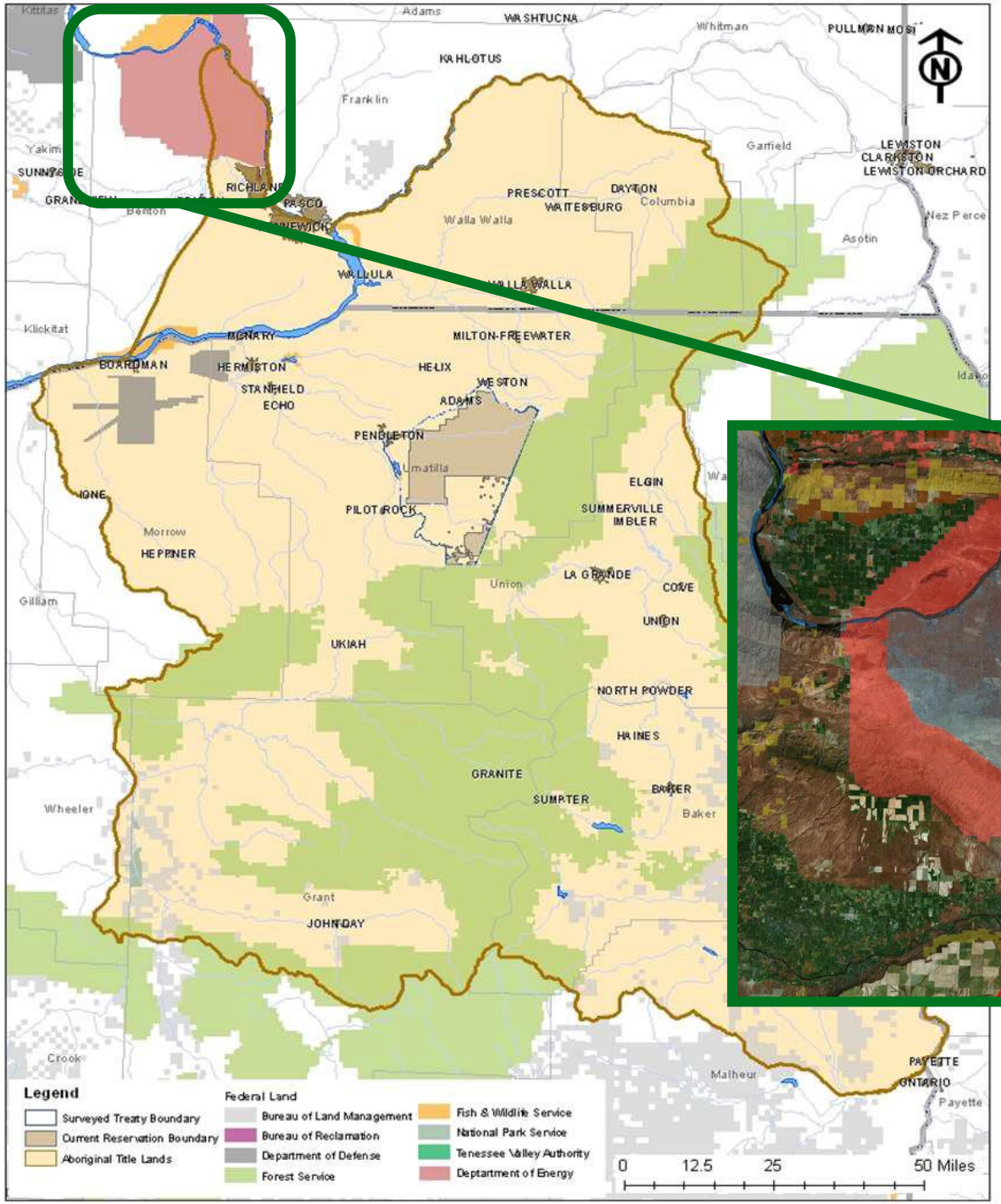
Men's Foods
First Salmon
First Kill

Women's Foods
First Digging
First Picking

CTUIR Traditional Use Areas and Usual and Accustomed Areas (U&A's)



- Historical Use by CTUIR
  - Darker-> Lighter
- Usual and Accustomed Areas
  - Treaty Resource locations of documented use through Traditional Use Studies
- Treaty Impacts
  - 'treaty rights…within all usual and accustomed areas'
  - Montana Buffalo Hunt
- Case Law
  - US v Washington
  - US v Oregon



Treaty of 1855

Basis of government-to-government relationship between the United States and the Cayuse, Walla Walla, and Umatilla people (Confederated Tribes)

Ceded 6.4 million acres and retained 250K acres for the Reservation

- Tribes were in a difficult place to accept the conditions of a treaty
- Reserved the right to hunt, fish, gather foods and medicines, and pasture animals on ceded lands and in U&A's
- Treaty of 1855 remains in effect and is very recent history to the Confederated Tribes
- Reservation land reduced from 250K to 172K acres

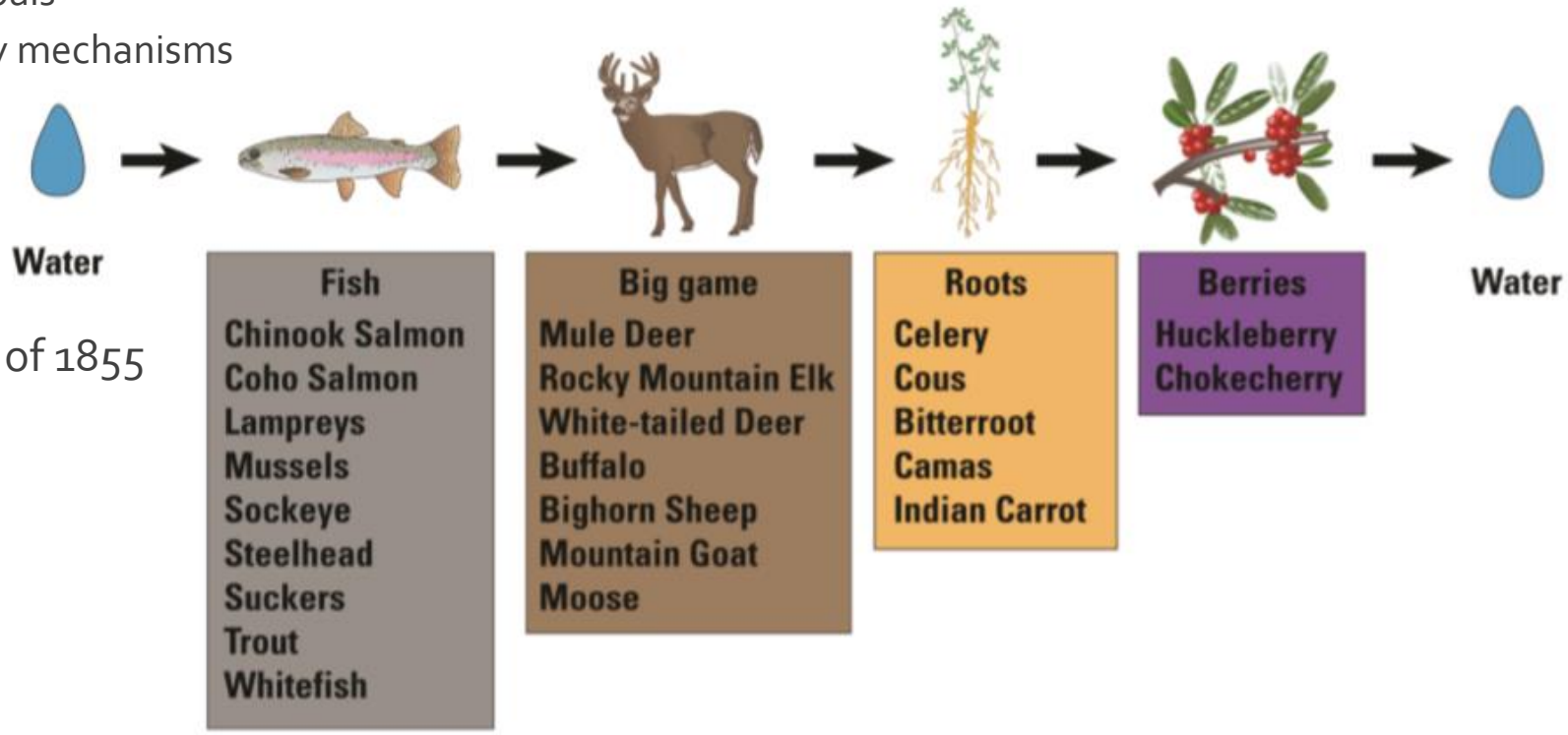
Treaty Rights Linked to First Foods through Tamánwit (natural law)

- Ties First Foods and serving order to the landscape
- Reflects explicit Treaty-identified resources
- Guides research into ecological process and restoration
- World View – TEK – Ways of knowing and relating
- Ways of valuing and establishing worth

Cúuš (Water)	Núsux (Salmon)	Yáamaš (Deer)	Xáwš (Cous)	Wíwnu (Huckleberry)
Water Rights	Fishing Rights	Hunting Rights	Gathering/Grazing Rights	

First Foods at the Center of the DNR River and Upland Vision

- Departmental Mission:
  - To protect, restore, and enhance the First Foods – water, salmon, deer, cous, and huckleberry – for the perpetual cultural, economic, and sovereign benefit of the CTUIR
- We will do this by using traditional ecological and cultural knowledge and science to inform:
  - Population and habitat management goals
  - Natural resource policies and regulatory mechanisms
- Reciprocity
- Ecosystem Resilience
- Spatial distribution of serving order
- First foods as they relate to the Treaty of 1855



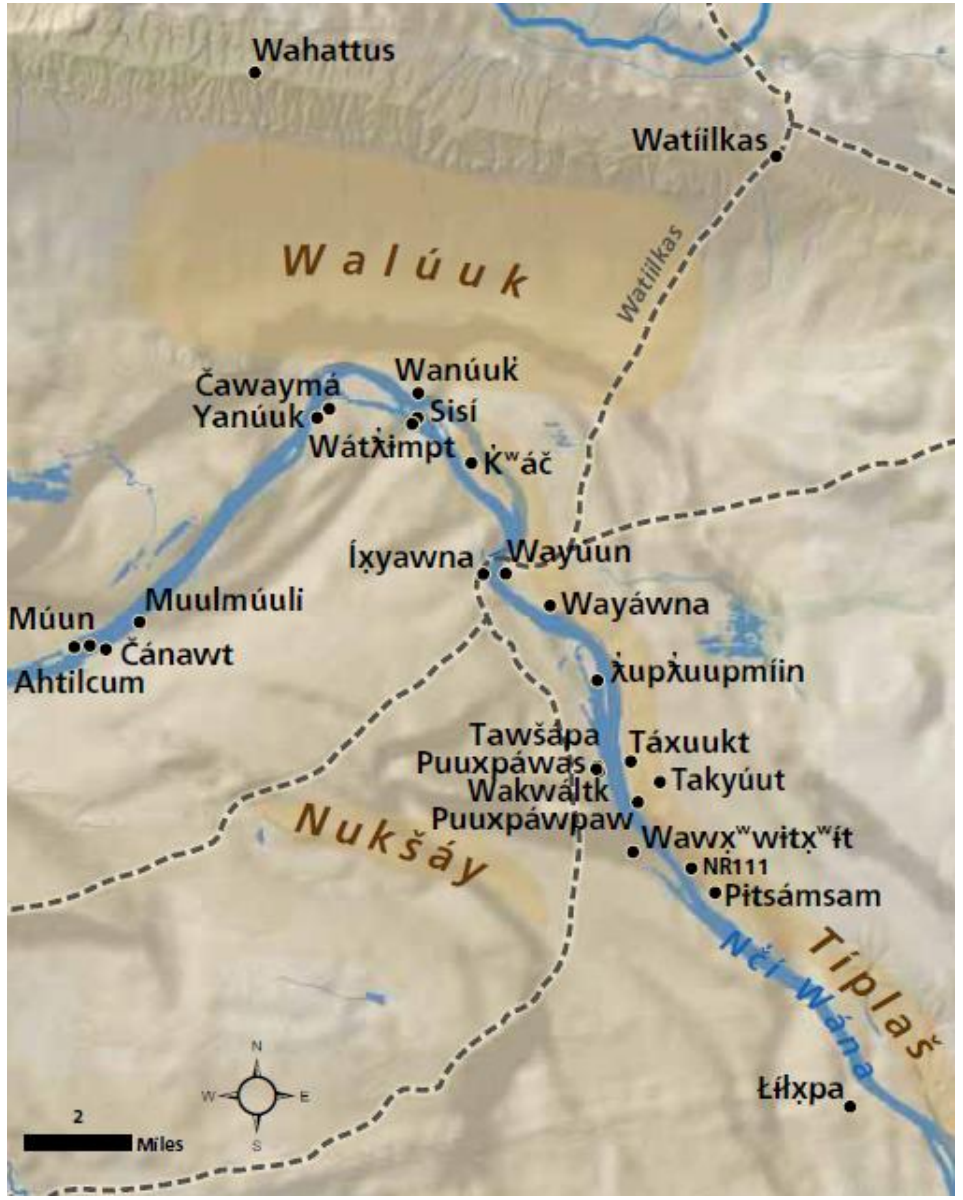
Present

Hanford Post-Contamination

Building Capacity for the Protection of First Foods from Environmental Threats

Why are the Tribes Involved at Hanford?

- Ceded Lands (Treaty 1855)
- Nuclear Waste Policy Act – "Affected Indian Tribe" (1982)
- CERCLA/Superfund
  - Cleanup (remediation)
  - Natural resource restoration (damage assessment)
- CTUIR Hanford Policy (Approved BOT Resolution 07-009)
  - Pre-1855 Conditions or Equivalent
  - Protect River
  - Long-term partners/co-managers
- Indian Self Determination and Education Assistance Act
- DOE-EM Cooperative Agreement with CTUIR



CTUIR Hanford-Related Activities Toward Long Term Stewardship(LTS)

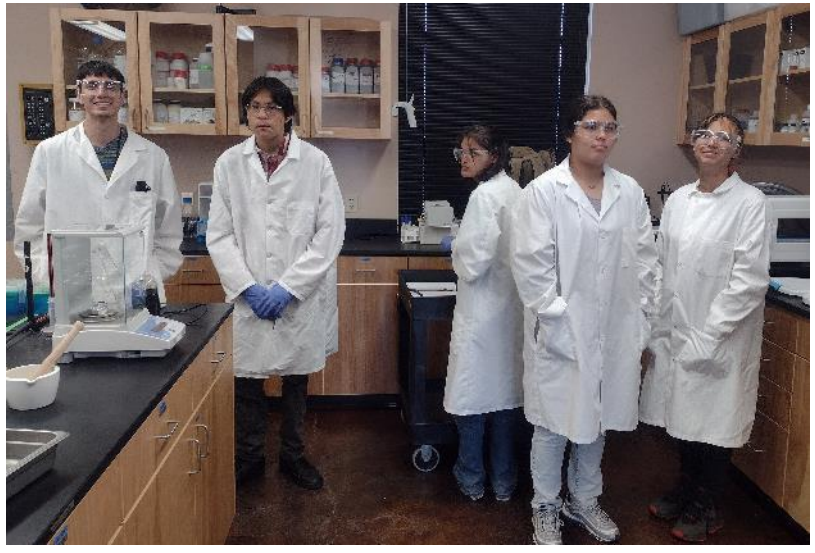
- CTUIR Field Station
  - Environmental Monitoring- Analytical laboratory
  - Botanical Mitigation and First Foods Research- Greenhouses
- Review and comment on the cleanup process
  - NEPA and RCRA analysis, review, and comment
  - Tracking and support of off-site grouting initiative(TBI).
  - Ensure that Tribal subsistence scenarios are used in all CERCLA risk assessments
- Cultural resource monitoring and compliance (Cultural Resources Protection Program)
- Natural resource damages assessment
  - Natural Resource Trustee Council
- First Foods research to understand the impacts to trust resources from Hanford Contamination
- First Foods focused restoration

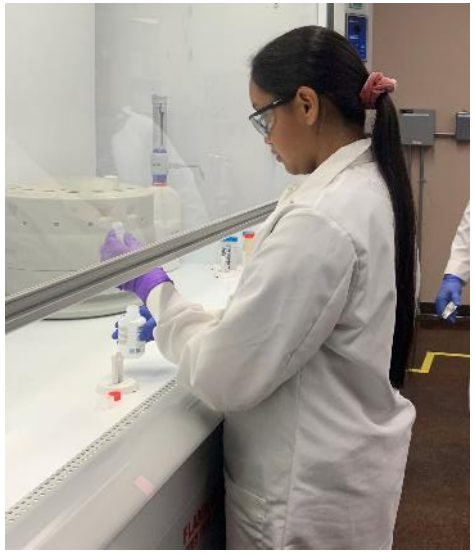
CTUIR Environmental Stewardship Timeline

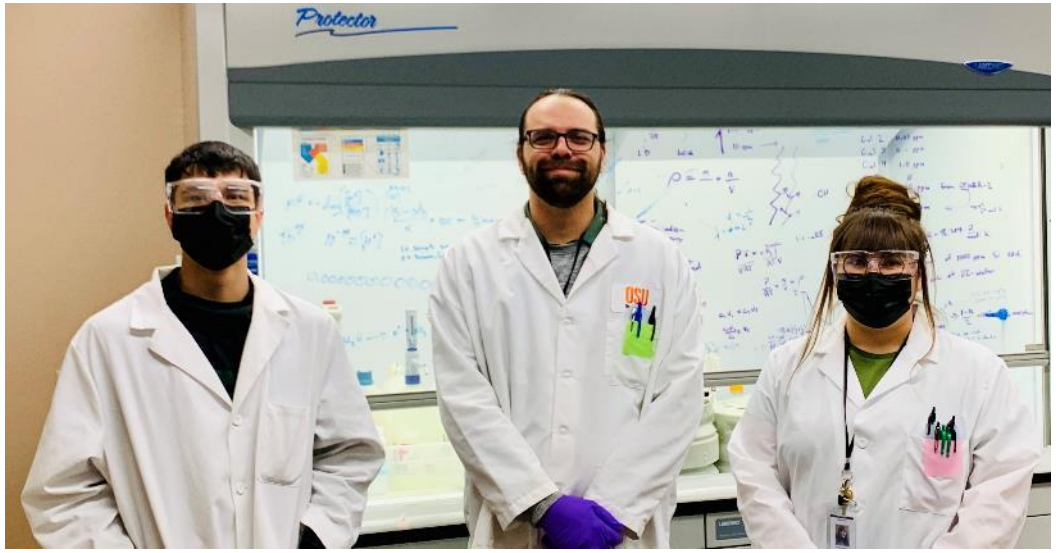
- **1997**: CTUIR Tribal Subsistence Scenario (Published in Society for Risk Analysis)
- **2003 – 2010:** Ongoing discussions/negotiations with the USDOE to establish LTS/LM capacity at the CTUIR.
- **2006**: Developed and adopted a CTUIR Hanford Policy.
- **2007-2011**: CTUIR Tribal Subsistence Scenario incorporated into the DOE River Corridor Baseline Risk Assessment
- **2011- 2015**: Field Station Construction and Systemization.
- **2016**: First Hanford plants grown at Field Station. Laboratory methods for metals analysis developed.
- **2017**: Laboratory Accreditation (2017-2019), Development of a Tribal member scientist training pathway.
- **2018**: Tribal Hanford access and sampling protocols and agreements developed (completed in FY2019).
- **2019**: CTUIR 100-F Risk calculator and CALPUFF Models completed.
- **2019**: Artificial Mussel ion exchange-based cumulative sampler studies initiated for Strontium and Uranium uptake.
- **2021:** Hired first tribal member chemist trained through the EESP scientist training track.
- **2022:** Sample Columbia River at Hanford Reach to develop a Columbia River matrix for laboratory ion exchange tests.
- **2023**: Developed and implemented our first Sampling and Analysis Plan for First Foods at Wanaket.
- **2024**: Proposed a Hanford Solar and Storage Proposal on Hanford Industrial Lands and CTUIR ceded lands.

CTUIR Tribal Member Scientist and Technician Training

- **Scientist Training Track**: Professional development for tribal members to become scientists
  - **High-School Students**
    - Youth internships for high school students for 10-week internships | 3 students/year
  - **Undergraduate Students**
    - Part-time on-going internships for students while enrolled in degree pathway | 2 students/year
  - **Graduate Students**
    - Full and part-time staff opportunities for Tribal Member Scientists and Grad Interns | 2 students/year
  - **PHD Track**
    - Recently expanded ability to offer remote PhD in Health Physics with OSU.
- **Technician Training Track:** Non-degree pathway to develop technical competence in environmental sciences







Botanical Restoration and Research

- Developed the use of a soil moisture sensor to automate greenhouse irrigation.
- Produced 39,500 plants in FY17 and replanted ~12 acres.
- Produced 40,000 seedlings in 2018 and to plant 11 acres.
- On-going cheatgrass control field trials with 4200 plants installed at PNSO in 2019
- Seeding trials of First Foods plants at the Field Station in FY 23 and 24.
- Seeding trials with Sandburg's bluegrass for cheatgrass control and fire risk reduction in FY24
- Cactus tests were completed in FY21 at PNSO and FY23 under solar panels at the FS.
- Restoration research to improve the establishment of shrub-steppe species that support First Foods.

Laboratory Accreditation | ORELAP 2017-2019

OREGON

Environmental Laboratory Accreditation Program

CTUIR Field Station

4012

46330 Timine Way

Pendleton, OR 97801

NELAP Recognized

IS GRANTED APPROVAL BY ORELAP UNDER THE 2009 TNI STANDARDS, TO PERFORM ANALYSES ON ENVIRONMENTAL SAMPLES IN MATRICES AS LISTED BELOW :

Air	Drinking Water	Non Potable Water	Solids and Chem. Waste	Tissue
			Chemistry	

AND AS RECORDED IN THE LIST OF APPROVED ANALYTES, METHODS, ANALYTICAL TECHNIQUES, AND FIELDS OF TESTING ISSUED CONCURRENTLY WITH THIS CERTIFICATE AND REVISED AS NECESSARY.

ACCREDITED STATUS DEPENDS ON SUCCESSFUL ONGOING PARTICIPATION IN THE PROGRAM AND CONTINUED COMPLIANCE WITH THE STANDARDS.

CUSTOMERS ARE URGED TO VERIFY THE LABORATORY'S CURRENT ACCREDITATION STATUS IN OREGON.

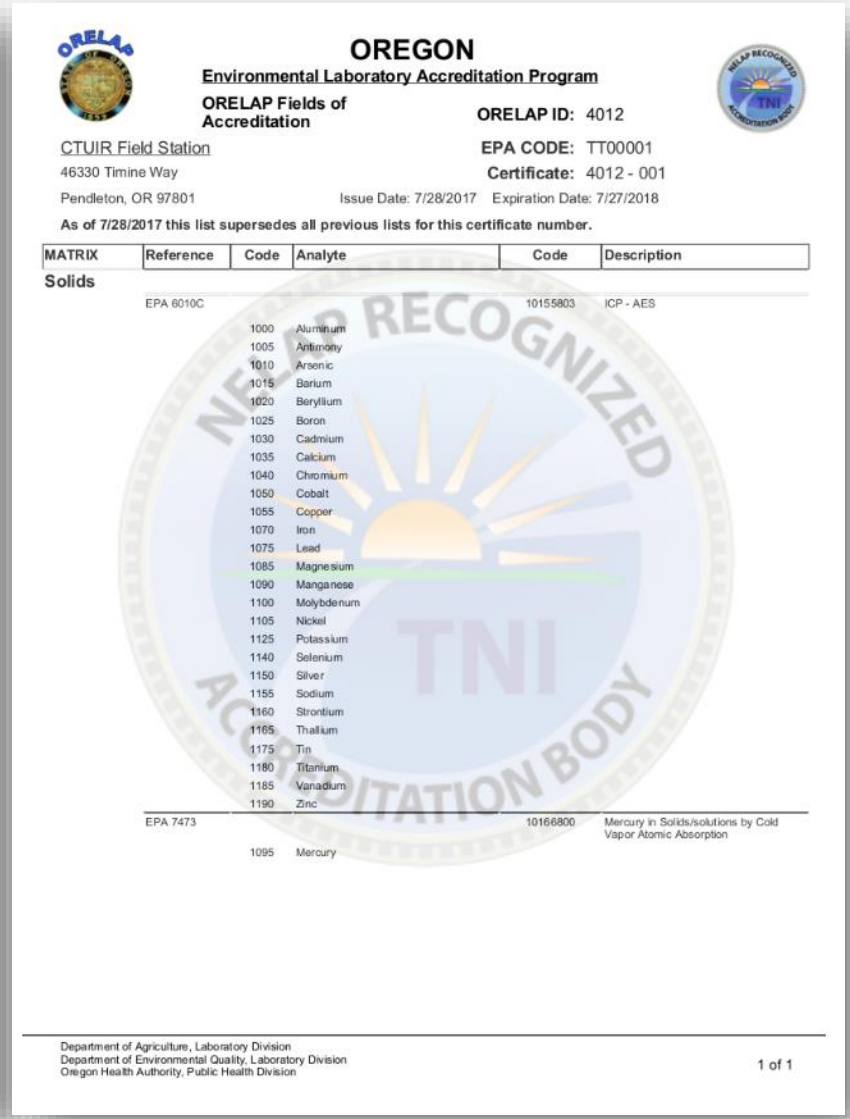
Christopher L. Redman

Christopher L. Redman, BA
Oregon State Public Health Laboratory
ORELAP Program Manager
3150 NW. 229th Ave, Suite 100
Hillsboro, OR 97124

EFFECTIVE DATE : 07/28/2017

EXPIRATION DATE : 07/27/2018

Certificate No : 4012 - 001



OREGON

Environmental Laboratory Accreditation Program

ORELAP Fields of Accreditation

ORELAP ID: 4012

CTUIR Field Station
46330 Timine Way
Pendleton, OR 97801

EPA CODE: TT00001
Certificate: 4012 - 001

Issue Date: 7/28/2017 Expiration Date: 7/27/2018

As of 7/28/2017 this list supersedes all previous lists for this certificate number.

MATRIX	Reference	Code	Analyte	Code	Description
Solids					
	EPA 6010C			10155803	ICP - AES
		1000	Aluminum		
		1005	Antimony		
		1010	Arsenic		
		1015	Barium		
		1020	Beryllium		
		1025	Boron		
		1030	Cadmium		
		1035	Calcium		
		1040	Chromium		
		1050	Cobalt		
		1055	Copper		
		1070	Iron		
		1075	Lead		
		1085	Magnesium		
		1090	Manganese		
		1100	Molybdenum		
		1105	Nickel		
		1125	Potassium		
		1140	Selenium		
		1150	Silver		
		1155	Sodium		
		1160	Strontium		
		1165	Thallium		
		1175	Tin		
		1180	Titanium		
		1185	Vanadium		
		1190	Zinc		
	EPA 7473			10166800	Mercury in Solids/solutions by Cold Vapor Atomic Absorption
		1095	Mercury		

Department of Agriculture, Laboratory Division
Department of Environmental Quality, Laboratory Division
Oregon Health Authority, Public Health Division

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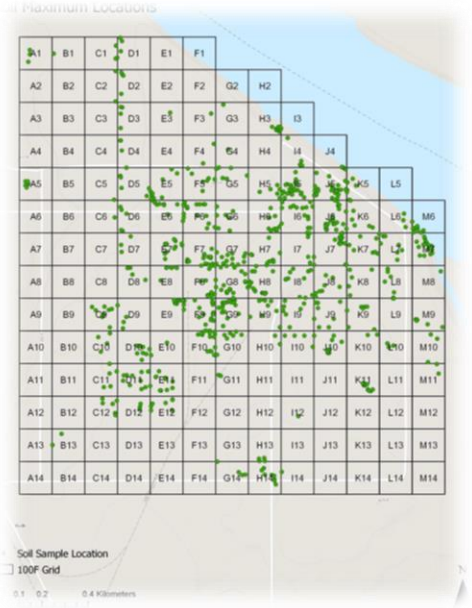
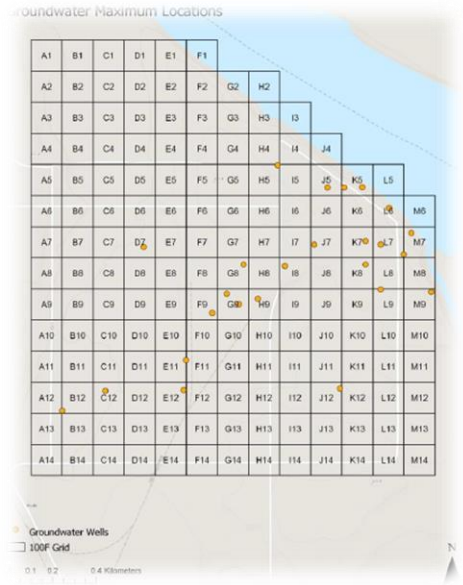
Tribal Risk Calculator

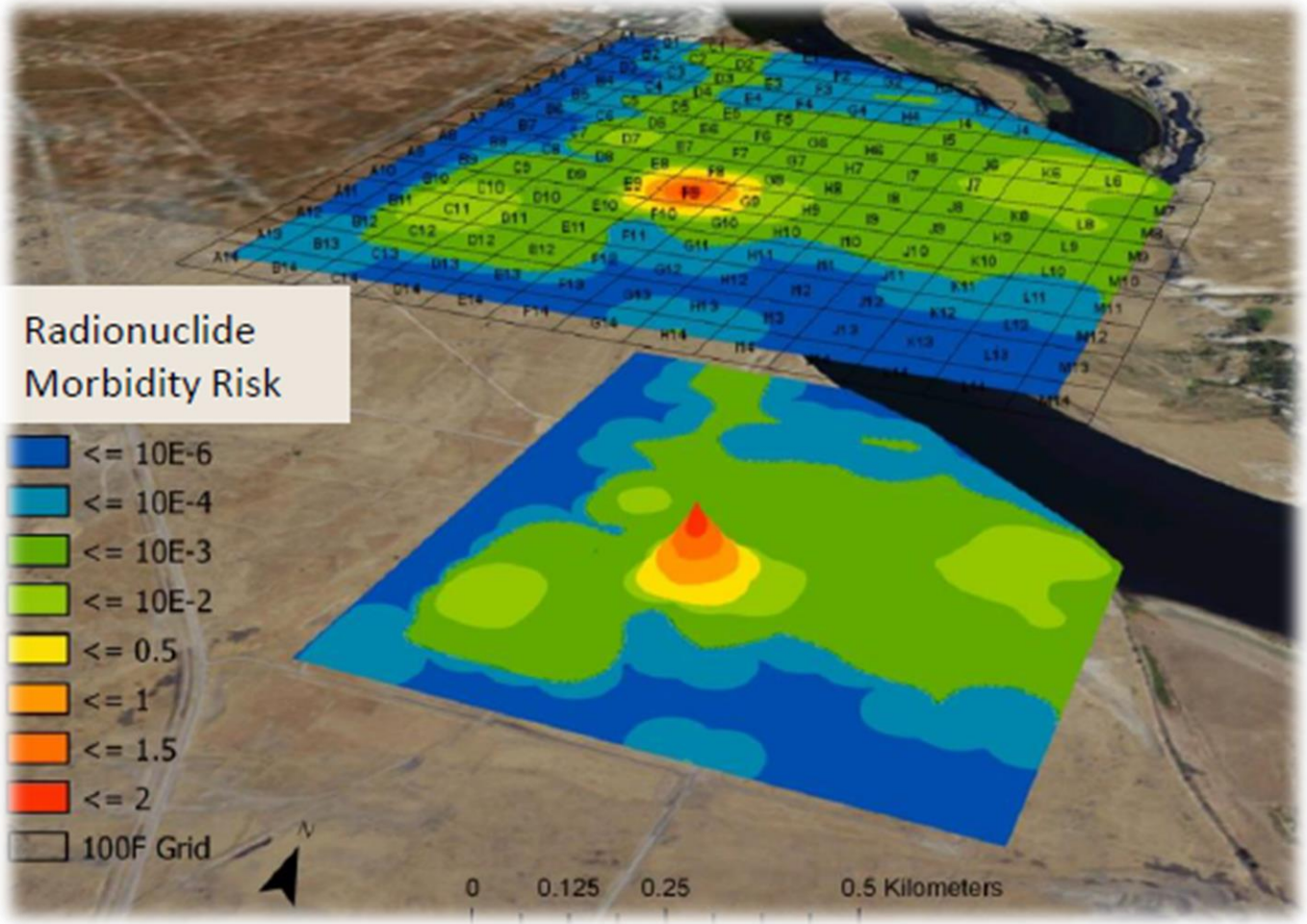
Conc'n → Risk → GIS Display



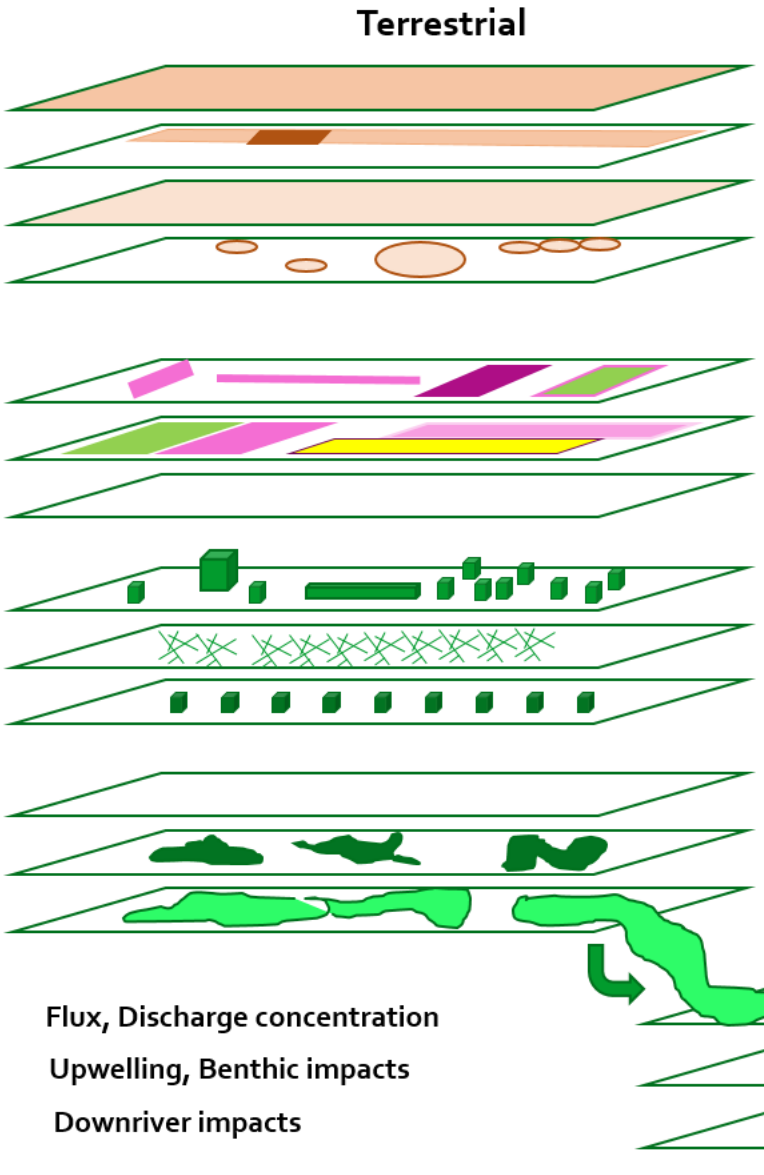


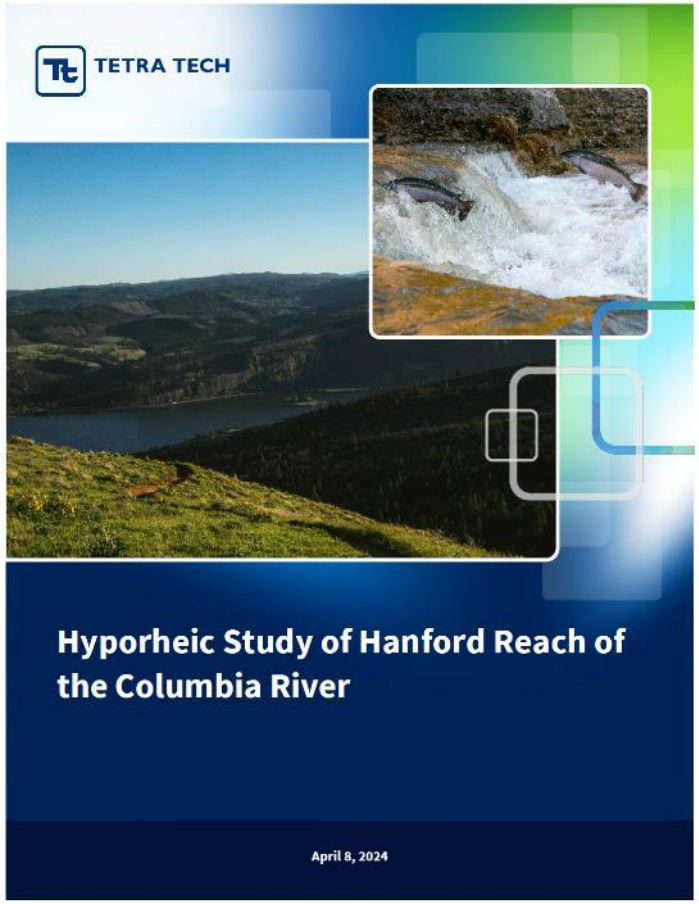
URF Calculations

$$R_k^{HQ} = \sum_i \sum_j ([C_{j,k}] \times [URF_{i,j,k}^{HQ}] \times [tf_{i,j}])$$



Natural Resource Damage Assessment





Access and Sampling Protocols

- Developed Standard Operating Procedures for Hanford Site Access Protocols
- Sampling documents were prepared to comply with TNI standards.
- First sampling and analysis plan for first foods in 2023 at a test site, Wanaket, to ensure the protocols were effective.
  - Best practices from first sampling were identified and implemented in the second sampling and analysis plan at the same test site.
- CTUIR to acquire the former Umatilla chemical depot lands
  - Long-term stewardship capacity around first foods access, sampling, and long-term management of CERCLA remedies.

Future

Long Term Stewardship

Environmental Sciences

CTUIR's Vision for Future Management of Hanford Lands*

- **CTUIR Definition of Long-Term Stewardship**: All activities necessary to ensure protection of natural, cultural, and historical resources, the health of tribal people, and the environment following completion of remediation, disposal, or stabilization of a site or a portion of a site…..
- **CTUIR Long-Term Stewardship Vision**: The CTUIR desires to return to its former role as stewards of the lands and resources at Hanford…..
- **CTUIR Commitments to DOE for Long-Term Stewardship:**
  - CTUIR will work toward being long-term partners and managers of all of the lands and resources at Hanford.
  - CTUIR will work collaboratively and respectfully with the USDOE, Yakama, Nez Perce, and Wanapum, and local communities, in managing Hanford Lands and resources.
  - The CTUIR will prudently use funding provided by the USDOE to maintain the technical, legal, and political capacity needed to fulfill its role as a co-steward and co-manager of Hanford Lands and resources.

* CTUIR, 2016. CTUIR Perspective on Long-Term Stewardship, Position paper presented to USDOE-RL, October 6, 2016, Richland, WA

End-State Vision for Hanford Lands

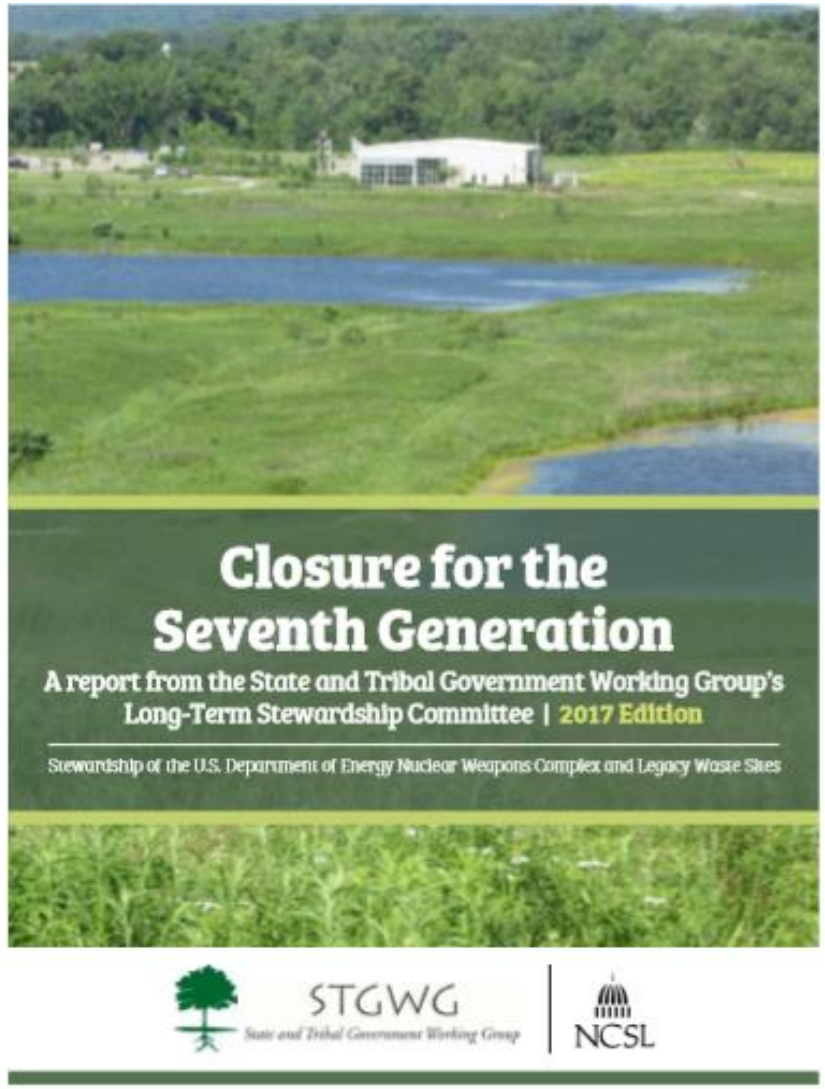
- Hanford lands, including the Hanford Reach National Monument, remain a contiguous land segment that is **CLEAN**, **RESTORED**, **PROTECTED**, **ENHANCED**, and **ACCESSIBLE**.
  - **CLEAN** – Remaining contamination below CTUIR health-based standards.
  - **RESTORED** – Site wide restoration of resources and ecosystem services.
  - **PROTECTED** – Permanently protecting the quality and quantity of CTUIR cultural and natural resources across the Hanford site.
  - **ENHANCED** – Continual improvement in the quality and quantity of accessible CTUIR natural resources on the Hanford site.
  - **ACCESSIBLE** – Safe and open access by CTUIR members to our traditional lands and resources throughout the Hanford site.

Summary of CTUIR Hanford Policy Future Use Goals (Resolution 07-009)

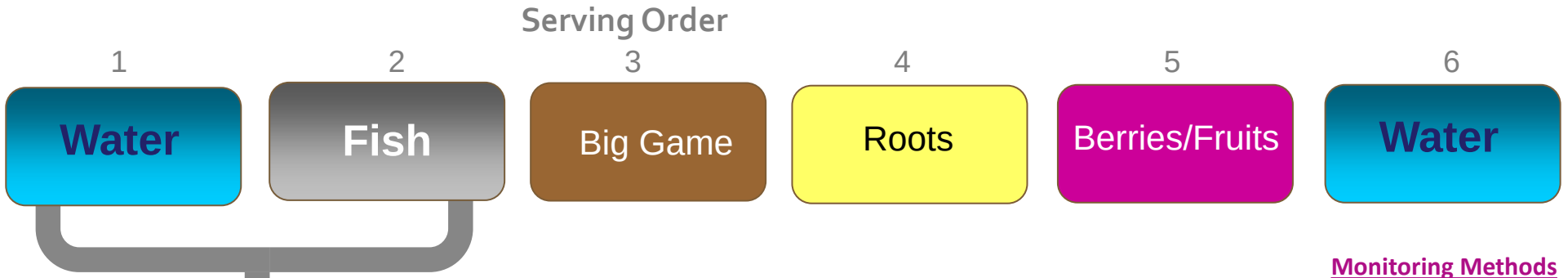
- Hanford … should not be further developed unless explicitly permitted by the CTUIR Board of Trustees through government-to-government consultation.
- The CTUIR should get the first right of refusal for remediated lands removed from federal ownership or transferred to another entity.
- CTUIR will work toward being long-term partners and managers of Hanford lands and resources.
- The CTUIR will continue to be proactively engaged in managing natural and cultural resources at or affected by the Hanford Site.

End-State Vision for Management of Hanford Lands

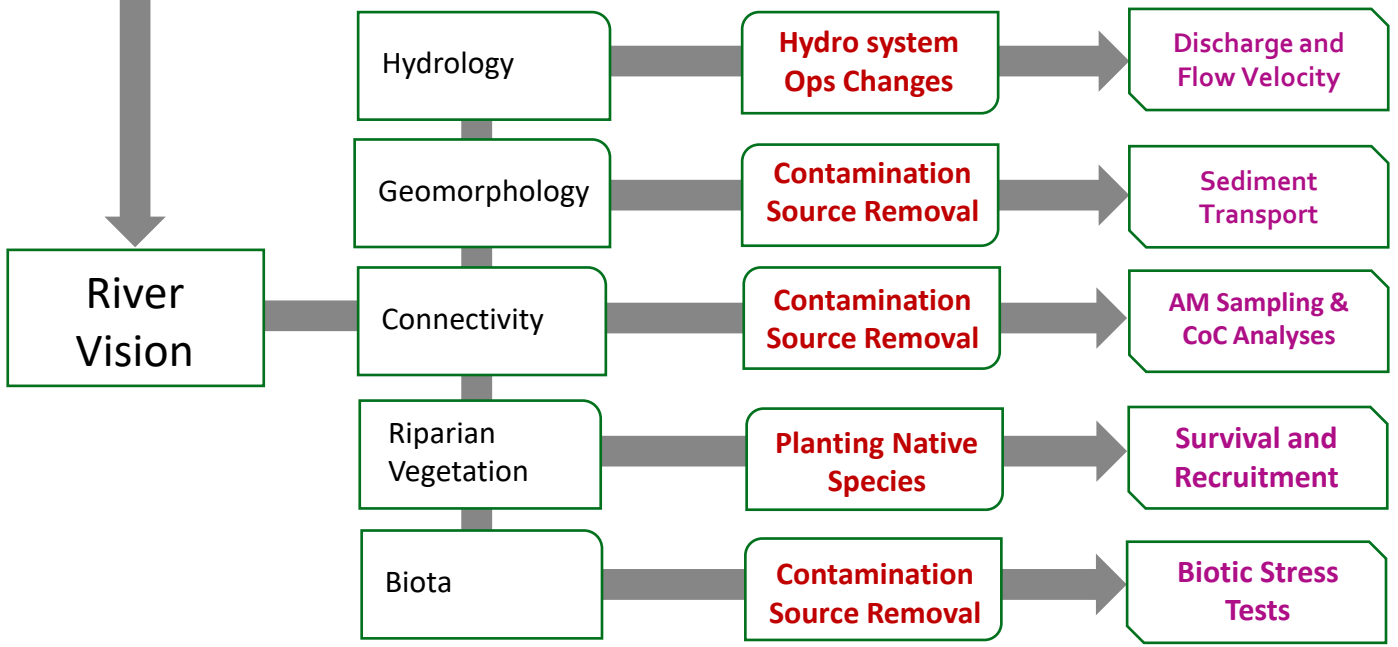
- CTUIR toward long-term partners and managers of all Hanford's lands and resources.
- CTUIR ensures the federal government uphold the Trust responsibility
- CTUIR to fully participate in this long term multi-generational mission.
- Hanford Long Term Stewardship Program Plan (April 2012)
- Closure for the Seventh Generation Report (2017)
- Long Term Stewardship (LTS)
  - Definitions are different between reports
  - Important to have similar conceptual model
  - DOE Program Plan should incorporate Tribal Viewpoints
  - Access and Use



First Foods River Vision Restoration Activities and Monitoring

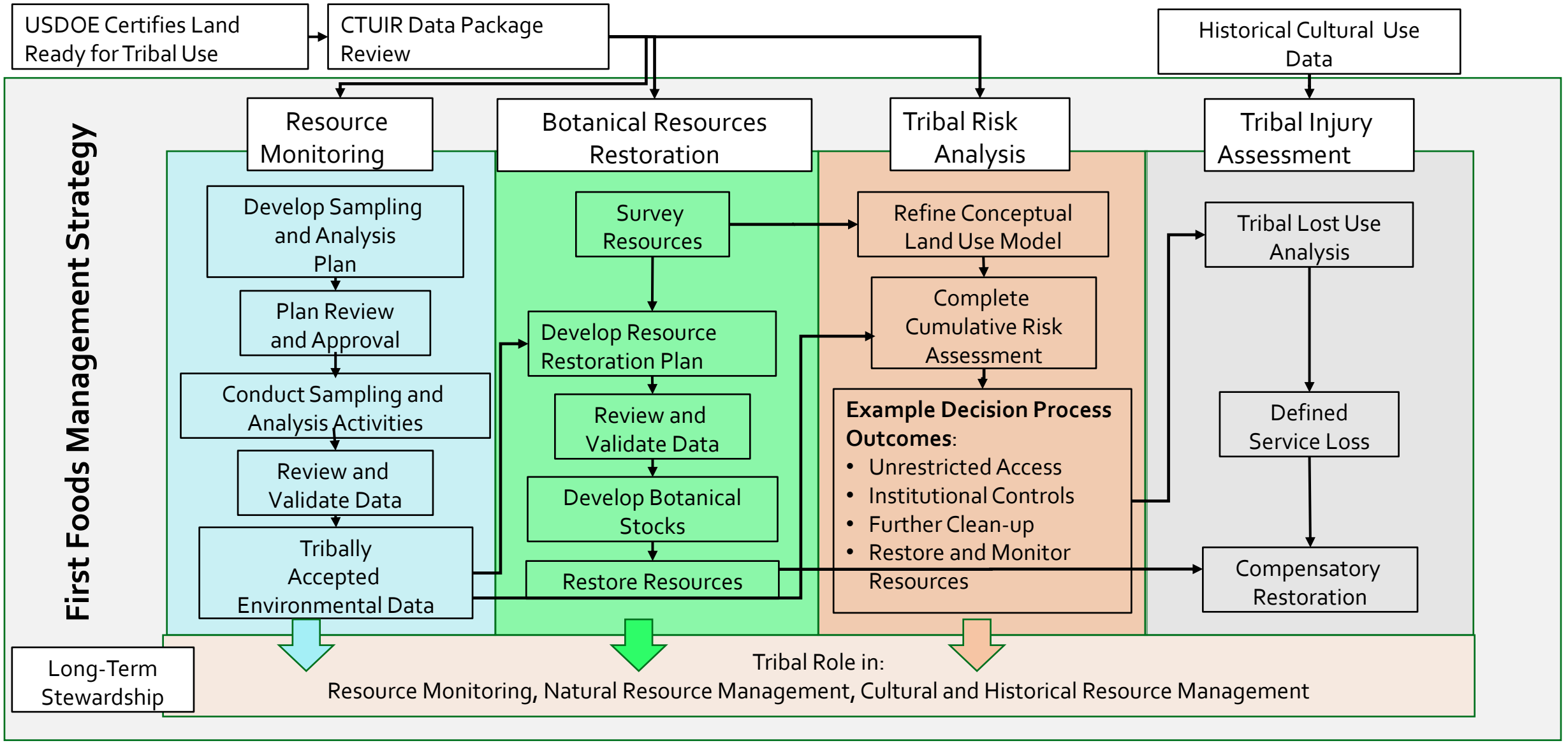


Contamination Source Removal
-Pump and Treat
-Tank Stabilization
-Tank Removal
-Grouting and Vitrifying Waste
-Disposal of Waste offsite(TBI)
-Policy support for cleanup actions
-Supplemental Waste Treatment
-Tribal Subsistence Scenario Use
  -NEPA, CERCLA, RCRA
-Natural Resource Damage Assessment



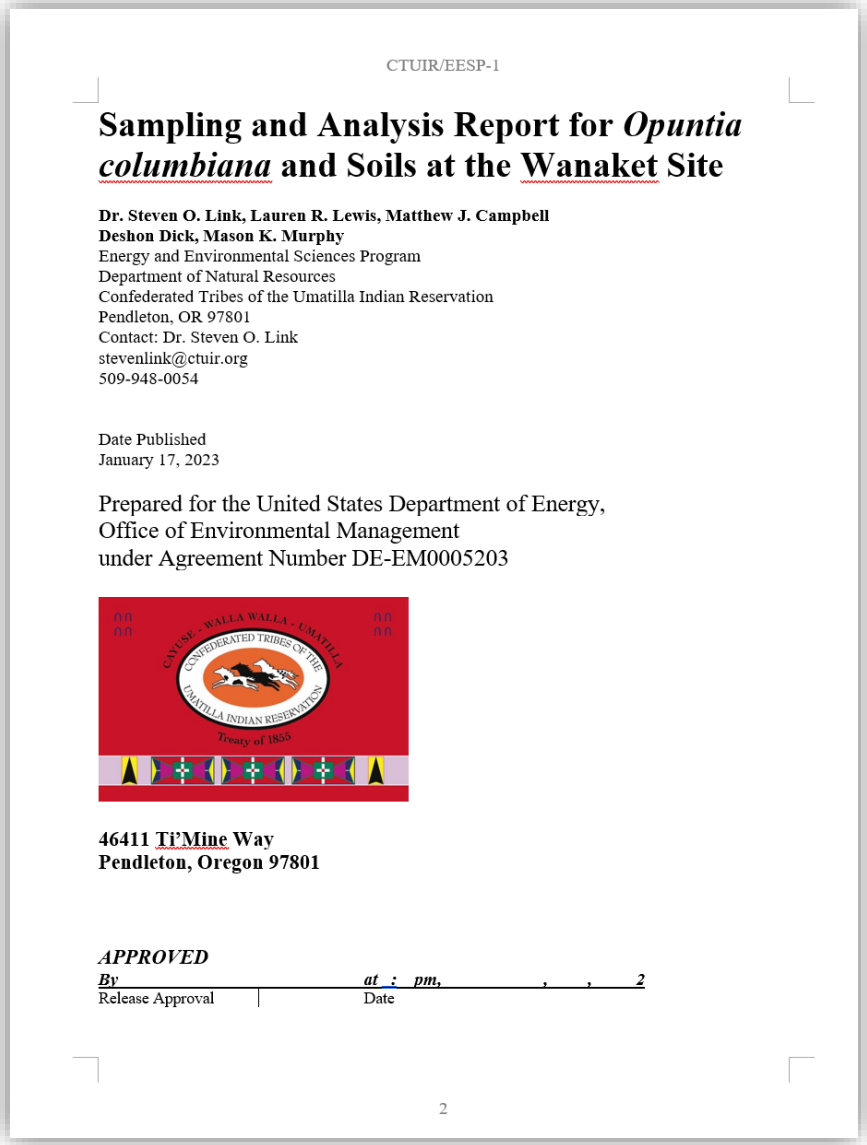
Monitoring Methods
-COC Analyses
  -Metals Testing (SW846 6020b)
  -Volatile Organics (SW846 8260d)
-Survival and Recruitment
  -Survival Monitoring (% survival)
  -Recruitment (cover and density)
-Artificial Mussel (AM) Sampling
-Biotic Stress Tests
  -Genotoxicity Tests(Comet Assay)
  -Proteomics and Transcriptomics
  -Radionuclide Testing (ICP-MS/MS)
  -Whole Effluent Tests
-Temperature Monitoring
-Sediment Transport
  -Geochemical analysis (ICP-MS/MS)
  -Turbidity
  -Bank stability

CTUIR's Vision for Future Management of Hanford Lands



Future CTUIR-Hanford Environmental Goals

- First Foods Sampling and Analysis
- Research goals
  - Contaminant Fate and Transport
  - Analytical Method Development
  - Ion-Exchange based Passive Sampler
  - Invasive Species & Restoration Research
- Toxics Reduction to Columbia River
- First Foods Resource Restoration
- CTUIR Hanford Conceptual Site Model



CTUIR/EESP-1

Sampling and Analysis Report for *Opuntia columbiana* and Soils at the Wanaket Site

Dr. Steven O. Link, Lauren R. Lewis, Matthew J. Campbell
Deshon Dick, Mason K. Murphy
Energy and Environmental Sciences Program
Department of Natural Resources
Confederated Tribes of the Umatilla Indian Reservation
Pendleton, OR 97801
Contact: Dr. Steven O. Link
stevenlink@ctuir.org
509-948-0054

Date Published
January 17, 2023

Prepared for the United States Department of Energy,
Office of Environmental Management
under Agreement Number DE-EM0005203

46411 Ti'Mine Way
Pendleton, Oregon 97801

APPROVED
By ***at : pm, , , 2***
Release Approval | Date

2

CTUIR *DNR*
ENERGY AND
ENVIRONMENTAL SCIENCES

Thank You

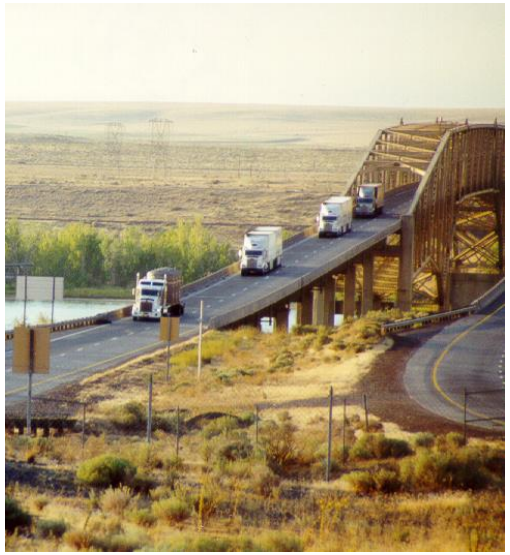
Mason Murphy | EES Program Manager

+1 541 429 7766

masonmurphy@ctuir.org

www.ctuir.org

Oregon Department of **ENERGY**



Future Transportation Issues for Oregon to Consider

Matt Hendrickson
May 21, 2024

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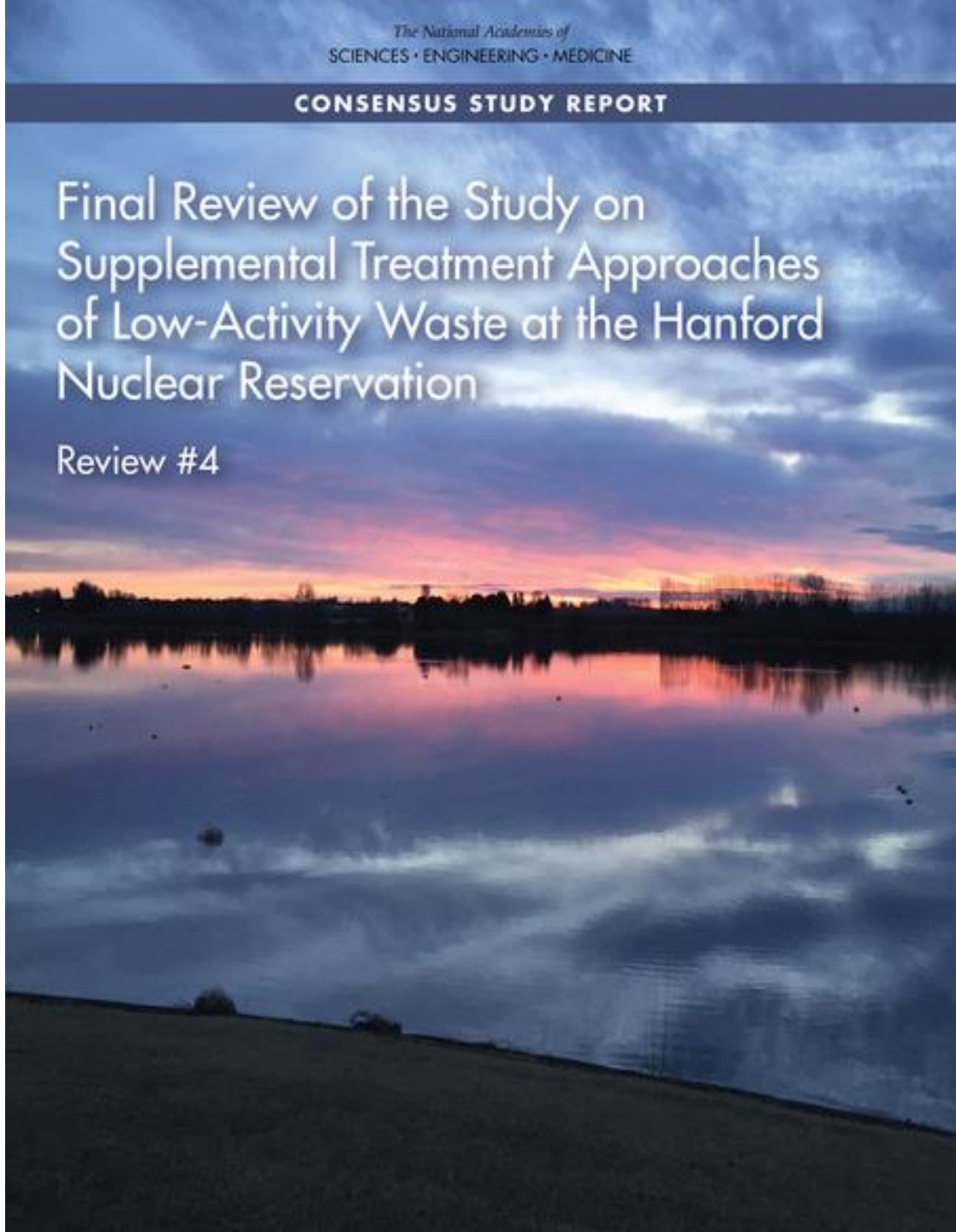
A Brief Recap

- National Academies of Science report
- What is “Supplemental Low-Activity Waste,” (or, “SLAW”)?
- Why is it important for Oregon?
- Transportation Methods evaluation
- Externalities



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TRANSPORTATION KEY NOTES

- **83%-91% of grouted tank waste is expected to be Class A destined to Clive, UT.**
- The proposed route runs along a river and through Oregon's fastest growing region.

- This continuing work should include analysis of all treatment locations, form of transportation, and destinations.
- Cost and risk differentials in the campaign including difference in shipment frequency.
- A Final "Waste Incidental to Reprocessing" (WIR) Determination for SLAW.
- Eventually, an Environmental Impact Study (EIS)

Source: PacTec, Inc. literature.

Figure H-28. Example of Soft Side Container for Shipping Low Specific Activity Materials

Figure H-32. Gondola Car from Portsmouth Site being Unloaded at Waste Control Specialists

COST For Class A Disposal

- There are definite numbers from Energy Solutions in 2019 for grouting Class A liquid waste: $37.68/Gal. (p.494 Volume II H 36). The most comparable large scale waste shipment from Rocky Flats went here. $1,160.14/m3 is the disposal cost quoted in 2022. So approximately $30 a gallon for grouting alone.
- Similar numbers were not available from WCS, though they do list “stabilization” as a treatment capability and disposal at $1,460/m3. Permafix Northwest was quoted at $40/Gallon for grouting only.
- These numbers will need updated in future analysis, but can the grouting be done at a similar cost onsite at Richland? There are several positive externalities to consider in the value calculation.

Figure H-35. Annual Waste Volume Accepted at Clive Compared to Mean Annual Volumes of Grout and Fluidized Bed Steam Reforming Waste Forms

Figure H-36. Rail Routes from the Hanford Site to Waste Control Specialists (Texas) and Clive (Utah)

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WHERE IS THE GROUTING DONE?

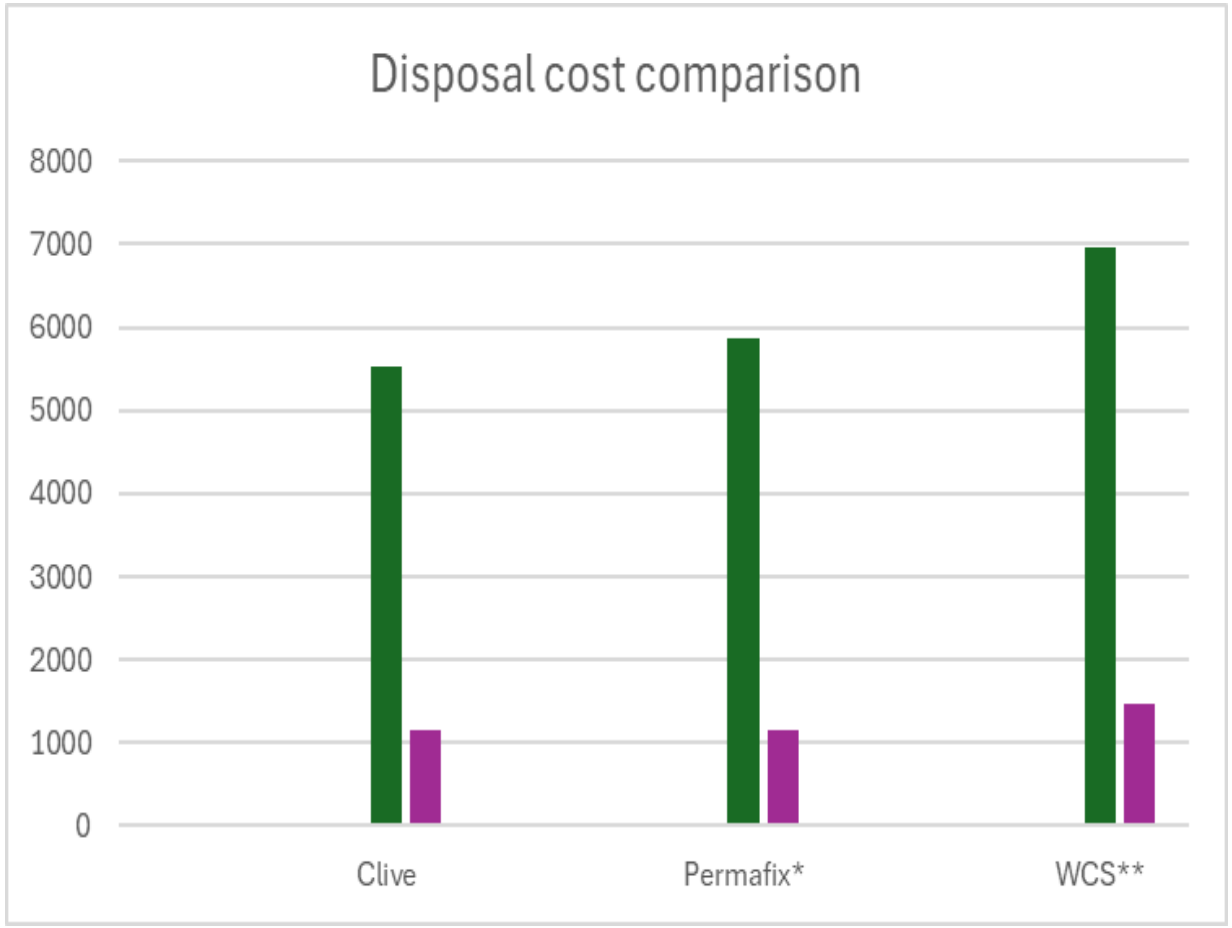

Figure H-49 compares the total costs of off-site grout disposal. The lowest total cost is in the Early Start feed vector, with off-site disposal until 2040, alternative Grout 6. Next is the SP9 1B feed vector, alternative Grout 4B. The highest cost is in the Early Start feed vector. This case is considered to evaluate the costs in an unlikely situation in which on-site disposal becomes unavailable and all grout has to be disposed of offsite.

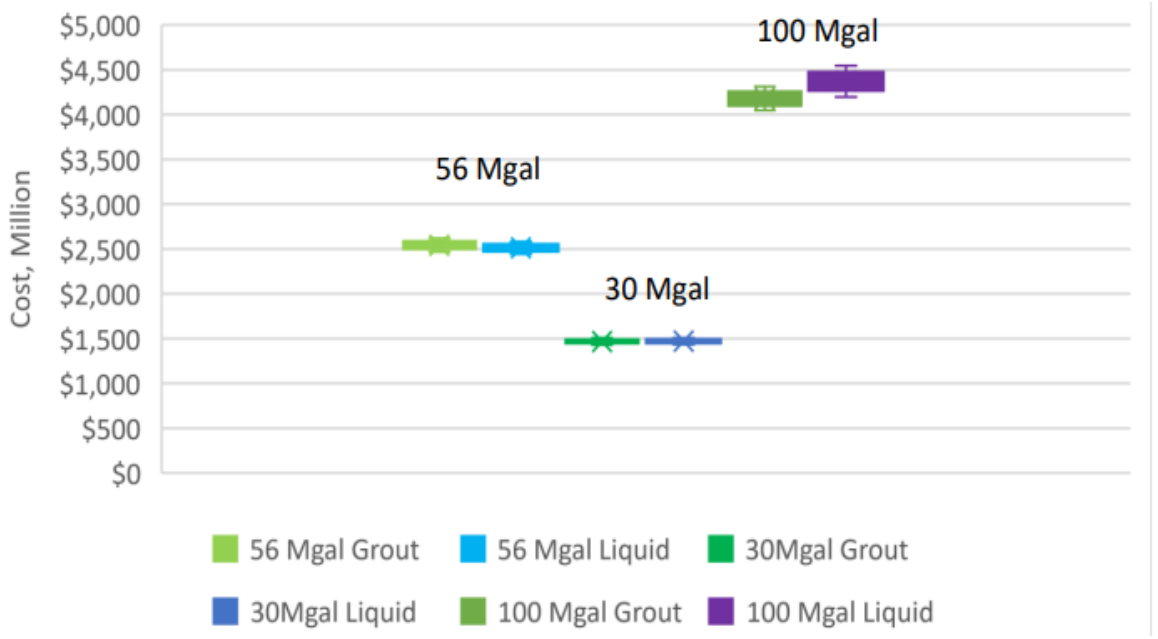

Figure H-49. Total Costs of Off-Site Grout Disposal

$37.68/Gal. To grout at Clive
Clive Burial $1160/m3
*$40/Gal. To grout at Permafix burial cost estimated to the same as Clive
**WCS did not provide a separate price/Gal. Grout. Burial was $1460/m3 if burial costs were escalated by %26 then $47.47/Gal.

264.17Gal./m3 146.76Gal. Of LAW when mix

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TRANSPORTATION

- Class A
- Clive (Utah) and WCS (Texas) can accept
- Assumption that this will have a long journey in Oregon
- Majority of shipments are Class A and, as function of distance, are listed as lower cost to go to Clive.
- The assumption is that most/all shipments will pass through Oregon.

- Keep in mind the safety aspect of the natural shielding of concrete
- Mixing radioactive liquid with grouting mix also dilutes the radioactive content
- Reduces danger of High pH (alkaline) waste to waterways

Source: Reproduced from a Clive brochure.

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TRANSPORTATION

Liquid

- Up to 50 4,000 gal. ISO containers per train
- 5 trains a month 4 months of 30 trains? Logistically less feasible

Solid

- 1 train per month with 90 gondola cars carrying 6 bags of grouted SLAW per gondola.
- Easier logistics
- Fewer shipments less potential for an accident.

Source: DOE O 435.1 training material.

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TRANSPORTATION

- The main criteria used to defend consideration of offsite vendors was the cost effectiveness of off-site grouting and the ability to start LAW treatment earlier.

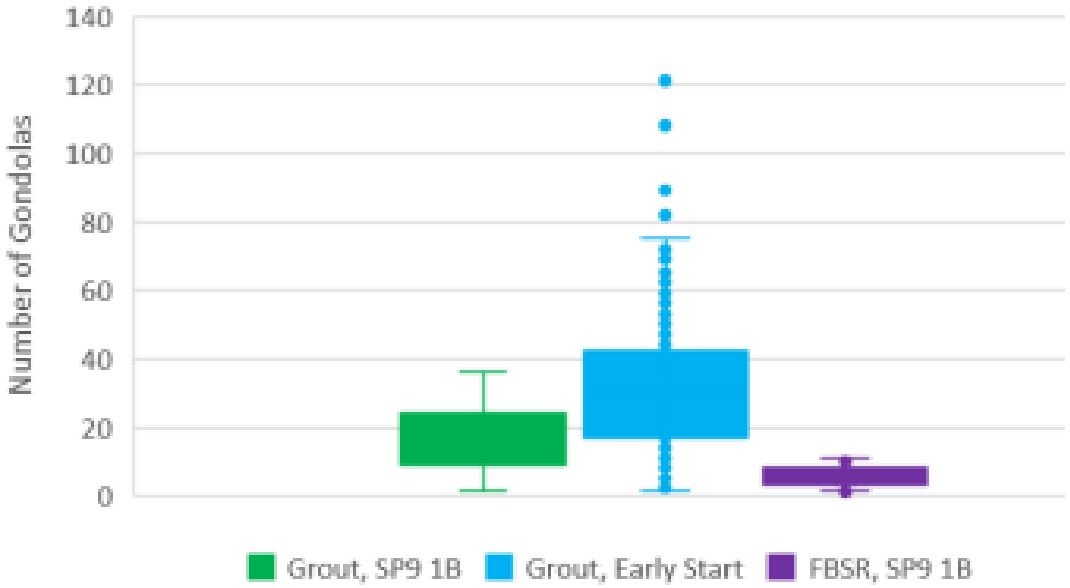

Figure H-34. Number of Gondola per Month Required to Transport Grout or Fluidized Bed Steam Reforming Waste Forms Offsite

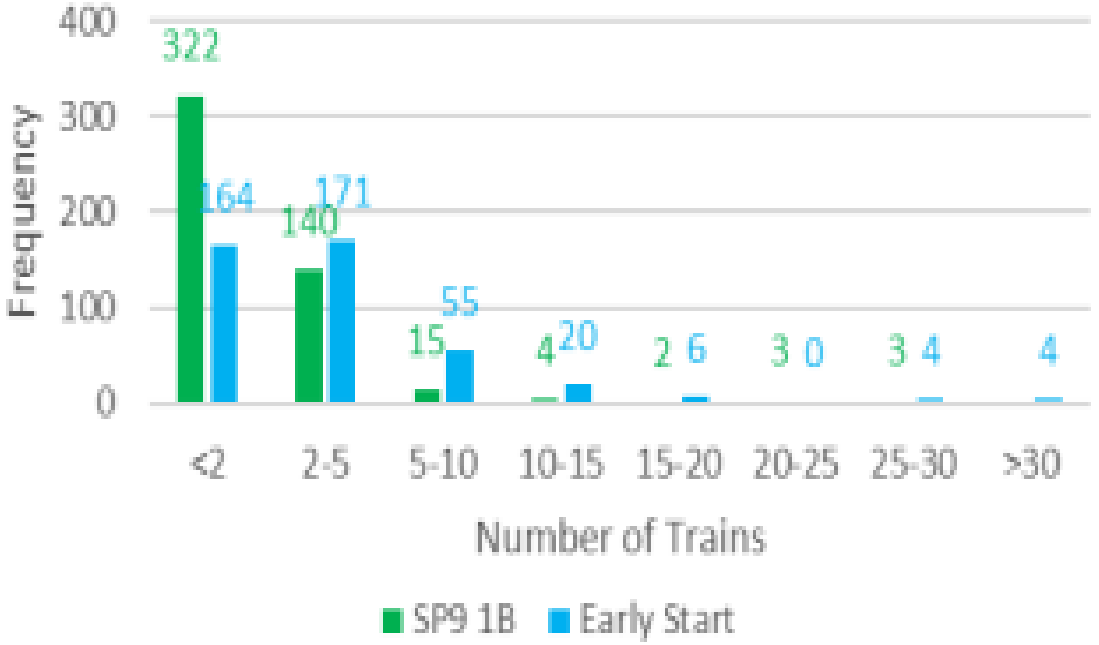

Figure H-31. Number of Trains per Months

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(FFRDC presentation January 31, 2023, slides 150 and 151, and Bates et al., 2023, Vol. I, Appendix D 3.7 and Vol. II, Appendix H).

PACKAGING

- All packages for shipping radioactive material (IP, Type A, or Type B) must be designed and prepared so that under conditions normally incident to transportation, the radiation level does not exceed 2 mSv/hour (200 mrem/hour) at any point on the external surface of the package.
- Transportation Index Less than 10: The transport index is the number determined by multiplying the maximum radiation level in mSv/hour at 1 m (3.3 ft) from the external surface of the package by 100 (equivalent to the maximum radiation level in mrem/hour at 1 m [3.3 ft])

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EXPOSURE

Figure H-15 and Figure H-16 show the calculated maximum external dose rates at four distances from the external surface of the 5,000-gal ISO tank filled with SP9 1B and Early Start feed vector liquids, respectively. These figures also show the dose rate limits at contact: at 30 cm and at 1 m. The calculated dose rates are below the corresponding limits in all the cases.

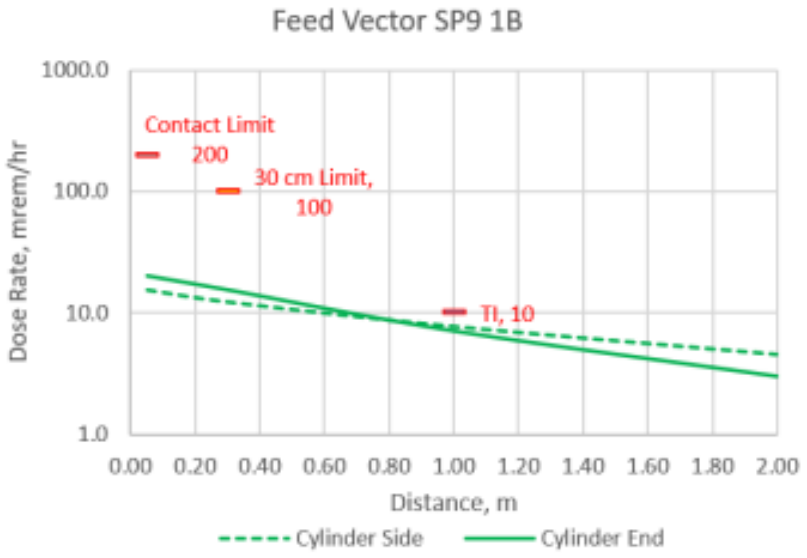


Figure H-15. Maximum External Dose Rates from a 5,000-Gallon ISO Tank with SP1 9B Feed Vector Liquids

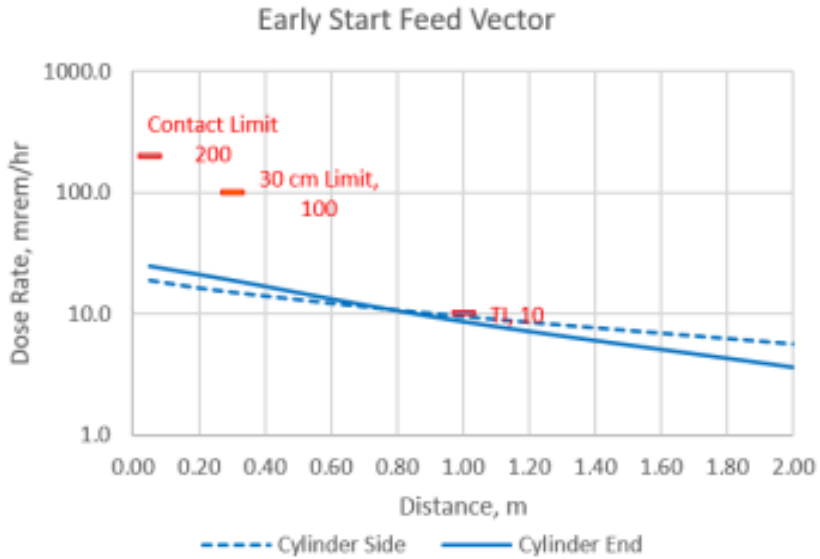
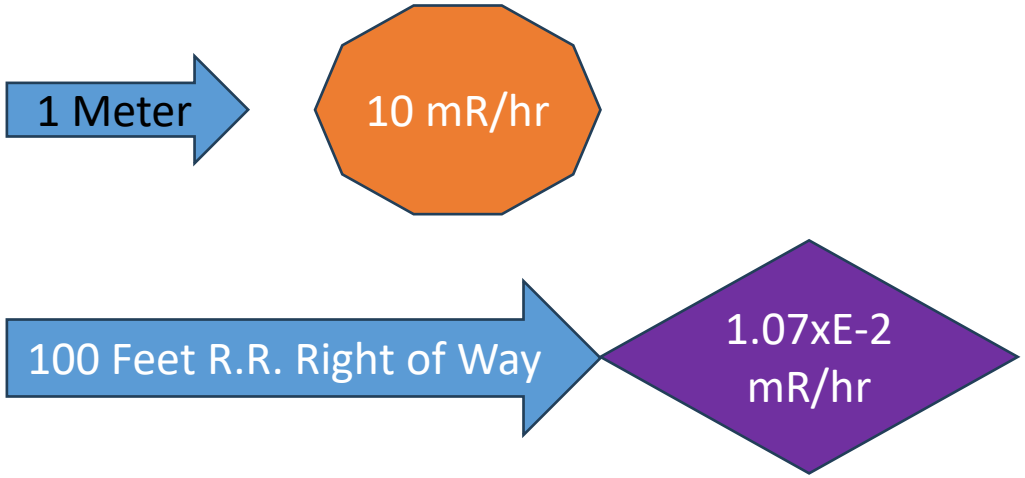


Figure H-16. Maximum External Dose Rates from a 5,000-Gallon ISO Tank with Early Start Feed Vector Liquids

The external dose rates are slightly higher in the cylinder end case at contact and 30 cm (~1 ft), and slightly lower at 1 m and 2 m (~3.25 ft and 6.5 ft) compared to the cylinder side case due to geometry. The results are summarized in Table H-2. Note that these dose rates include buildup, so the scattered photons are considered in the calculations.

LET'S PUT THIS TO BED

200mR/hr at Surface Max



3.7xE-6 mR/person/grout bag or .002mR per train
(90 cars with 6 bags/car)

Banana Equivalent Dose (BED) .1uSv/NANA
.002 mRem = .02 uSv so **5 trains would equal dose from every person eating 1 NANER**

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TRANSPORTATION

Figure H-35. Annual Waste Volume Accepted at Clive Compared to Mean Annual Volumes of Grout and Fluidized Bed Steam Reforming Waste Forms

Figure H-36. Rail Routes from the Hanford Site to Waste Control Specialists (Texas) and Clive (Utah)

Best case scenario where only solids are shipped

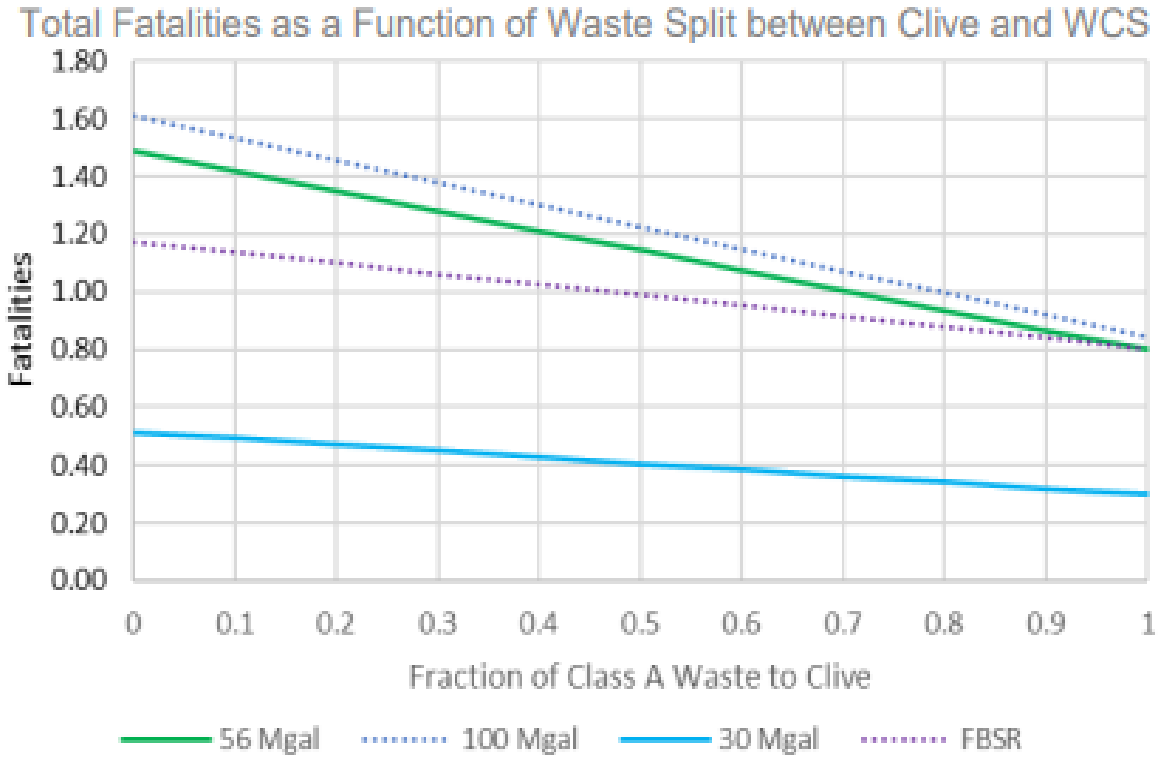

Figure H-52. Total Fatalities During Transportation Campaign

POTENTIAL BENEFITS OF ON-SITE GROUTING

The solid form is inherently better:

- Dilutes and fixes the radioactivity: safer
- Naturally self shielding: safer
- Less variability in shipping container and uses widely available materials and predictable footprint: safer
- Fewer transportation events means less potential for incidents and more efficient fuel use: safer and more sustainable
- If an accident occurs will limit pollution spread: manageable
- Supports employment and economic activity in the local region. More sustainable.

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HOLISTIC COMMENT PERIOD IS COMING!

Its finally here after 4 years of antici……pation!

Big news about grout in Attachment M milestone M-062-64/65/66

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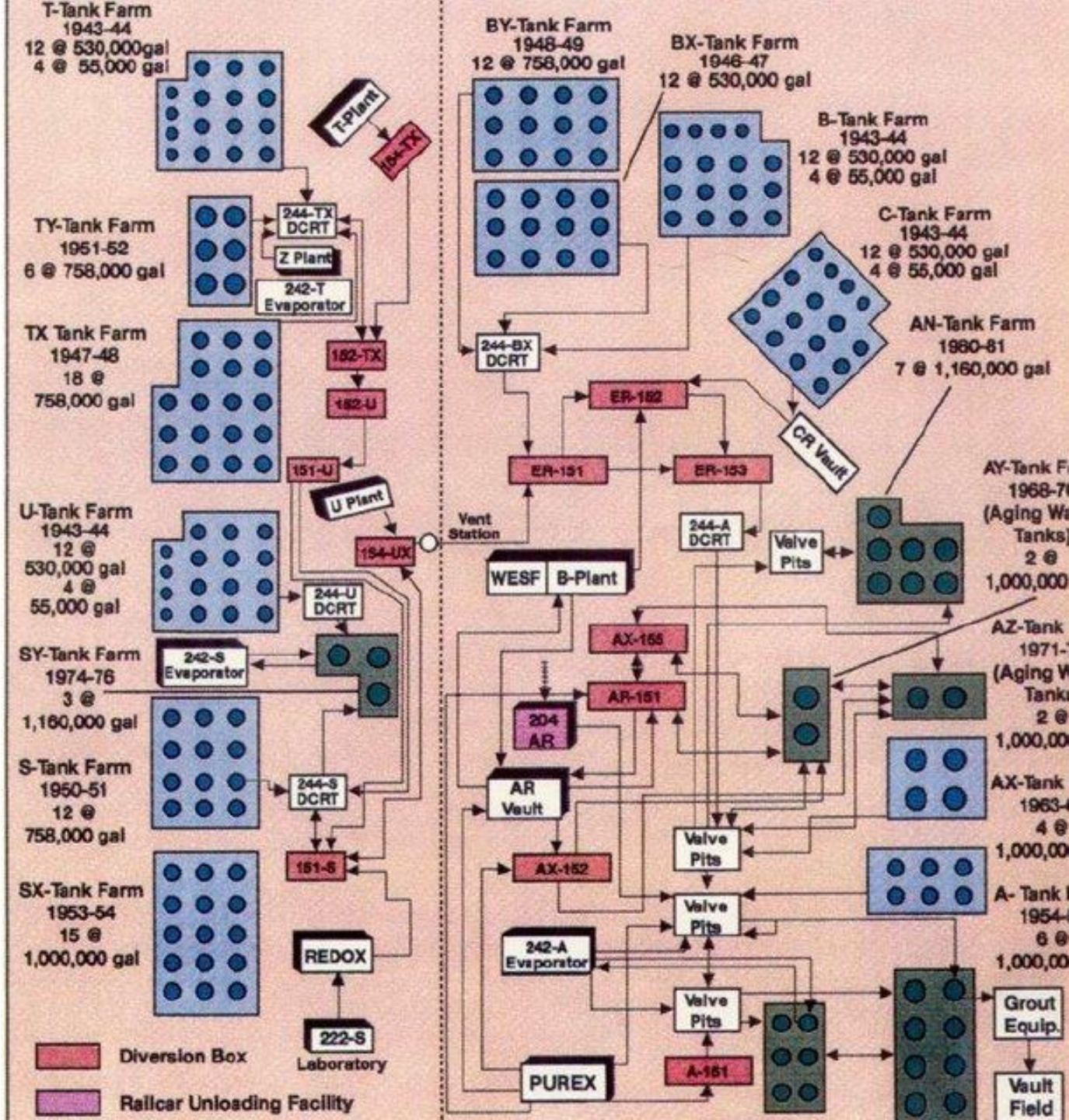
New Milestones M-062-64/65/66

- 062-64 by 12/31/2024 Make alternative selection for facilities and infrastructure needed to perform separation, pretreatment, and/or treatment, and mode of transport, for off-site disposal of low-activity waste (LAW) from 200 West Area Single Shell Tanks (SST) and apprise Ecology of that selection.

- 062-65 by 12/31/2026 or 2028 if onsite grout treatment facility will be necessary submit critical path for permitting, construction, and infrastructure

- 062-66 by 12/31/2027 submit new milestones for constructions and commissioning



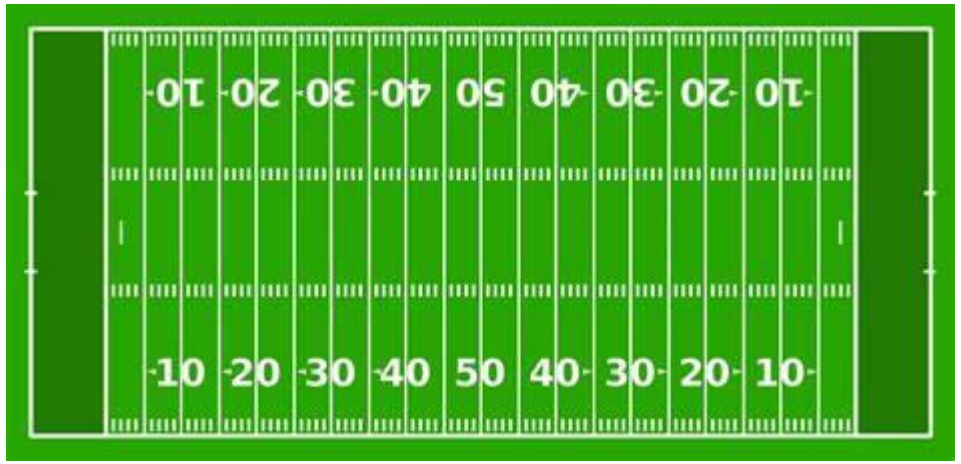
22 TANKS FROM S SX AND U

Matts best guess: S-102? 103 105 106
108 109 110 111
SX-101 102 103 104 105 106
U-102 103 105 106 107 108 109 111

22 tanks from 200 West are estimated to have LAW disposed of as grout.

My best guess: 20K Supernatant
7,318K Saltcake if solubilized 1:1 with water 15 M Gallons of LAW.

I am wrong (S-102) – be kind as it is just a guess!



A football field 35 feet deep

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22 TANKS FROM S SX AND U

Keep in mind the differences between these tanks and SLAW.

More than just TBI on steroids.

Future input potential: the WIR, potential EIS, another (broader) EPA waiver.

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WHAT ABOUT THE SLUDGE?

New milestone M-045-138 and 39

Construct 1M Gallon storage in 200 West Area (SY) by 9/30/2040

2.454M Gallons of HLW Sludge in 200W

Even with removing all supernatant and sludge in SY there might not be room for the sludge

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22 TANKS FROM S SX AND U

- Keep in mind the differences between these tanks and SLAW.
- 3 farms more variable will not have gone through a vitrification pass.
- Future input potential: the WIR, potential EIS, another (broader) EPA waiver.

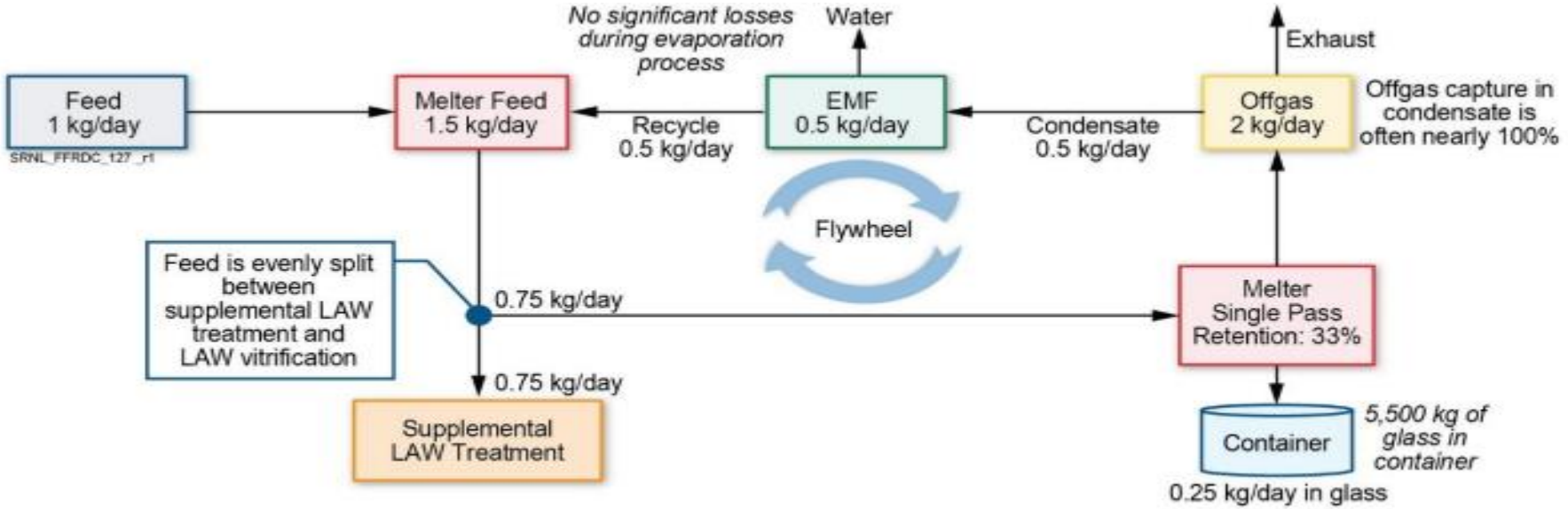

Figure B-9. Low-Activity Waste Flywheel

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Questions?

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ENERGY

Working Lunch and Presentation by Mark Reese of ODOE

Oregon Department of **ENERGY**

Hanford Radiological Emergency Preparedness & Response

Mark Reese, ORCEMS
May 21, 2024

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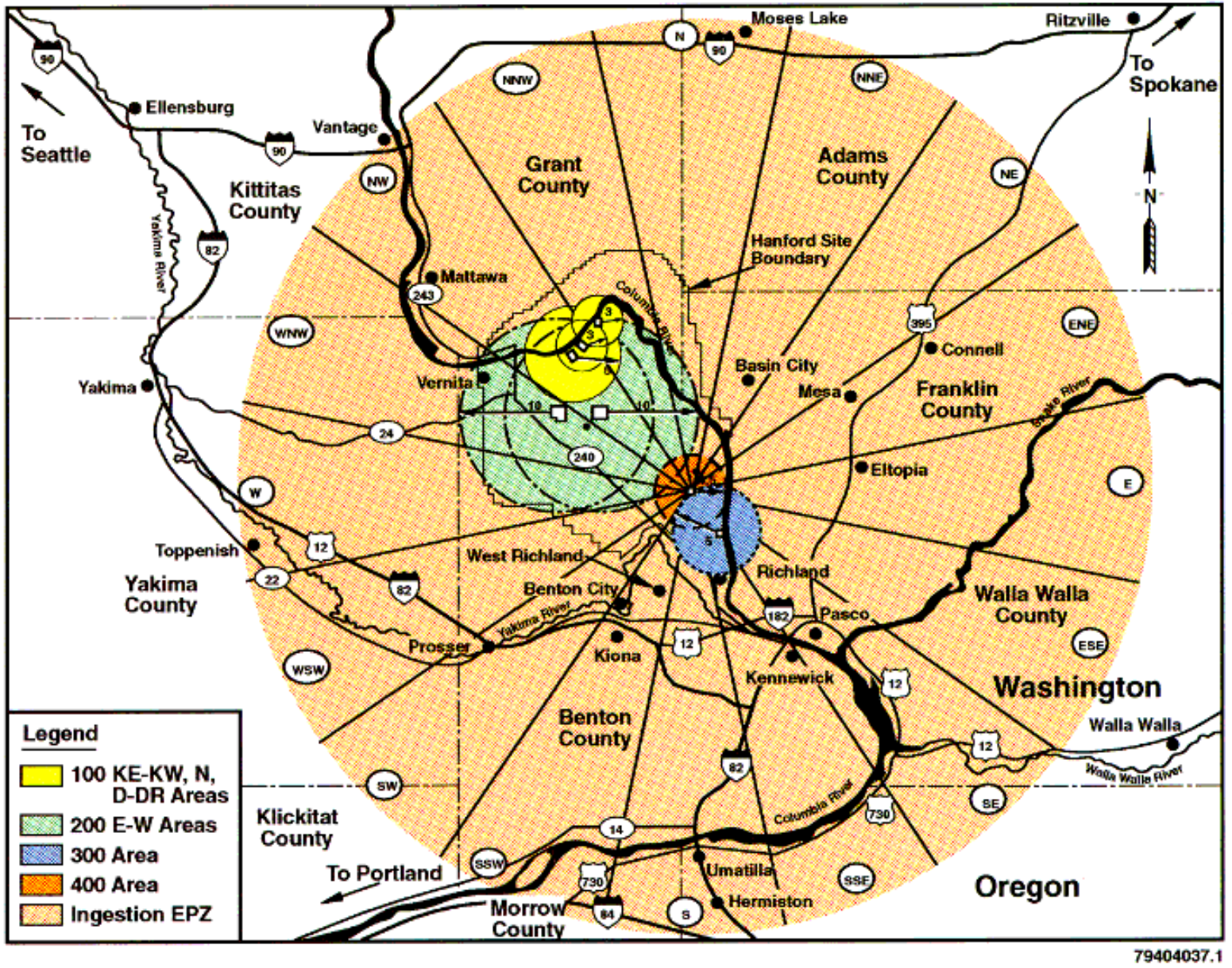
Hanford Site Emergency Planning Zones



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ODOE RADIOLOGICAL EMERGENCY RESPONSE Planning for Hanford

- ODOE is the state's lead response and coordinating agency for Hanford incidents (as well as the Columbia Generating Station, Oregon State University and Reed research reactors, Trojan spent fuel storage installation, and radioactive material shipments).

- Other response agencies include: Oregon Health Authority's Radiation Protection Services (RPS), Oregon Department of Agriculture, Oregon State University, Oregon Emergency Management, and Morrow County and Umatilla County Emergency Management.

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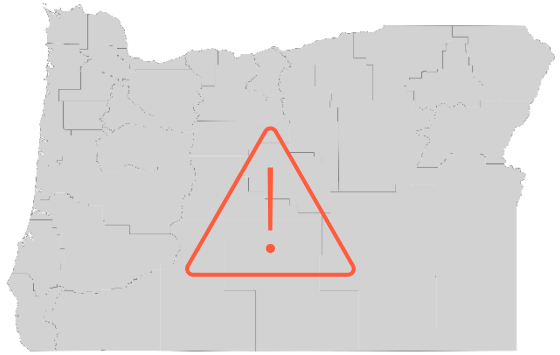
HOW OREGON IS NOTIFIED

- Notification to Oregon Emergency Response System (OERS) by Washington State, U.S. Department of Energy, or CGS (crash phone and fax)
- Direct page “All Call” Duty Officer number
- U.S. DOE Occurrence Notification Center can call OERS direct on “Crash” line for a Hanford event



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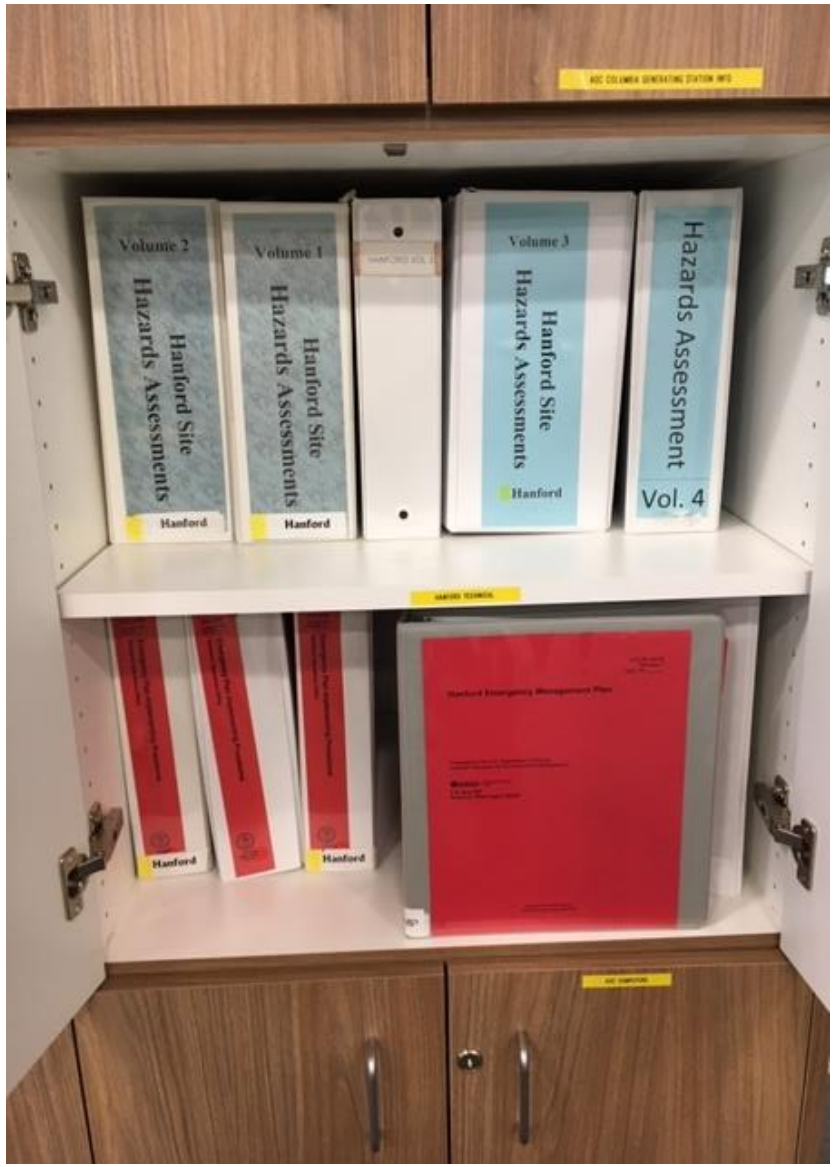
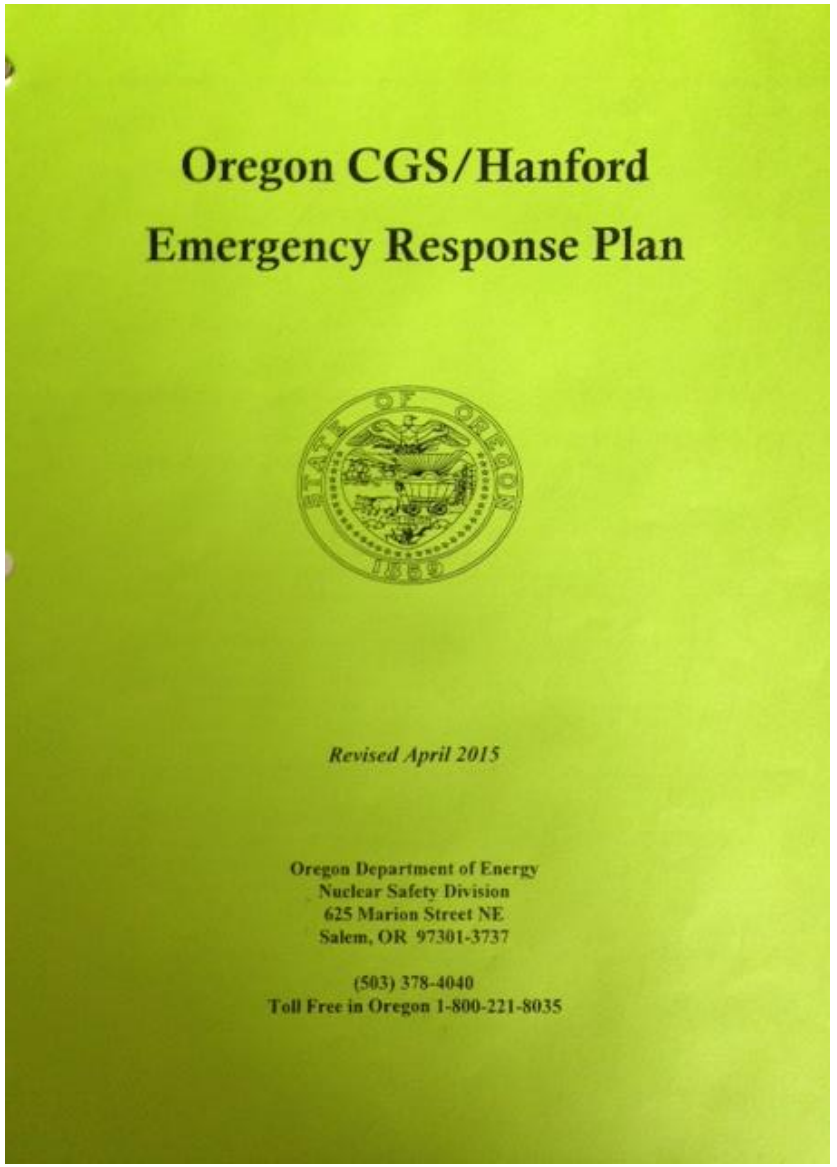
Program Planning/ Guidance Doctrine





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ODOE PRIORITIES IN A HANFORD EMERGENCY

- Getting the facts about the incident so we understand what occurred and can determine the real risk.
- Communicating with Oregonians about what is going on at Hanford and whether the public needs to take any action.
- In the event of a release of radioactive materials, ensuring that potentially contaminated food products in Morrow or Umatilla counties is quarantined until it can be tested.

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HANFORD INCIDENT CLASSIFICATION

In Order of Severity:

Abnormal Event: Not an 'emergency,' but may generate public concern.

Alert: Actual or potential degradation of safety that may or may not escalate. ODOE and Washington State notified and ODOE could activate/mobilize if necessary.

Site Area Emergency: Actual or likely major degradation with potential for a limited release of radioactivity. Requires Washington State and ODOE to mobilize and activate emergency centers.

General Emergency: Highest level of emergency with off-site impacts expected. Automatic two-state activation and mobilization.

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EMERGENCY CLASSIFICATION BY SITE

Hanford	Columbia Generating Station*
Abnormal Event	Unusual Event
Alert	Alert
Site Area Emergency**	Site Area Emergency**
General Emergency**	General Emergency**

*For CGS, the Nuclear Regulatory Commission requires offsite notification within 15 minutes.

**ODOE automatically activates its Agency Operations Center at a Site Area Emergency or General Emergency. Activation can occur at an Alert, depending on circumstances.

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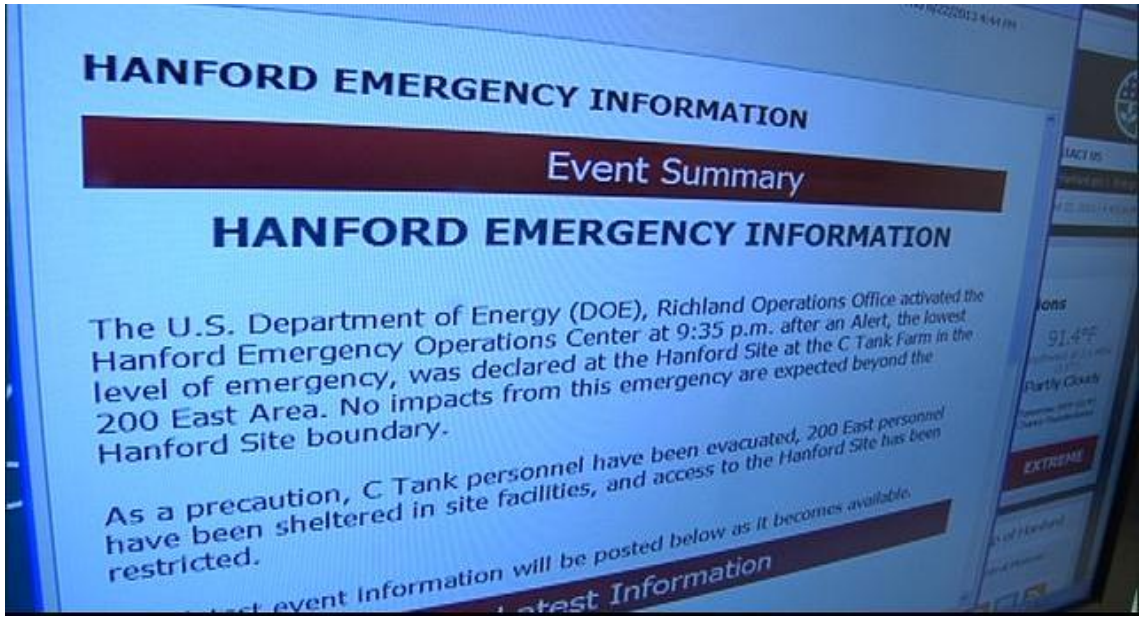
HANFORD INCIDENT RESPONSE

Annual Exercises with Hanford

- Washington State and Oregon have one full-scale radiological emergency exercise with the Hanford Site annually (usually in May)
- ODOE responds to an average of four declared incidents each year at Hanford
- In 2017, there were 10 Abnormal Events and one Site Area Emergency



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EXAMPLE: NOTIFICATION FROM SITE

Date/Time of Event: 03/27/24 1035

Facility Name: 222-S Labs Room 4-B / 200 West Area

Date/Time EOC Shift Office Notified: 1109

Date/Time Event Categorized: 03/27/24 1109

Abnormal Event Criteria: **FACILITY CONDITION, 1.:** Any fire within primary confinement/containment boundaries of a nuclear facility.

NOTE: Does not include small “flash” type fires that are anticipated and immediately extinguished as part of the work evolution.

Description of Event: On 03/27/24 at 1035 hours, while conducting work activities in 222-S Laboratory, Room 4B, Hood 10, Nitric Acid was spilled onto a paper towel. The nitric acid ignited the paper towel, causing a small fire. Workers activated the fire alarm system and were able to extinguish the fire. Hanford Fire Department responded and verified the fire was out.

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EXAMPLE: ODOE NOTIFICATION

Good afternoon.

On 02/20/2024, shortly after 3 :00 p.m., Oregon Department of Energy Duty Officers were notified that an Abnormal Event incident had been declared by the U.S. Department of Energy(DOE) at the Hanford Site in nearby Washington State due to a potentially explosive compound located at the 222-S Lab (https://www.hanford.gov/page.cfm/222-SLaboratory .) There is no risk to Oregon or Oregonians.

The event details are as follows:
Richland Police Department Bomb Squad is responding to the 222-S Labs in 200 West Area for the discovery of a potentially explosive chemical compound (Crotonaldehyde). Approximately 2 ml. of the compound was discovered in a small tube and has crystallized. The area has been isolated and there is no threat to personnel.

Abnormal Event notifications are intended to allow offsite response organizations the opportunity to increase their state of readiness. The Oregon Department of Energy (ODOE) monitors all Abnormal Events and will provide updates as appropriate.

If an Abnormal Event were to escalate to a classified emergency, ODOE would implement the CGS/Hanford Emergency Response Plan as appropriate.

If you have any questions about this incident, please contact our office.

Please direct any media inquiries to our Public Information Officer Jenny Kalez at 503-480- 9239

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Our Biggest Challenge:

Managing Perceptions

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Questions?

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