West Valley PPA Update: Status and Path Forward

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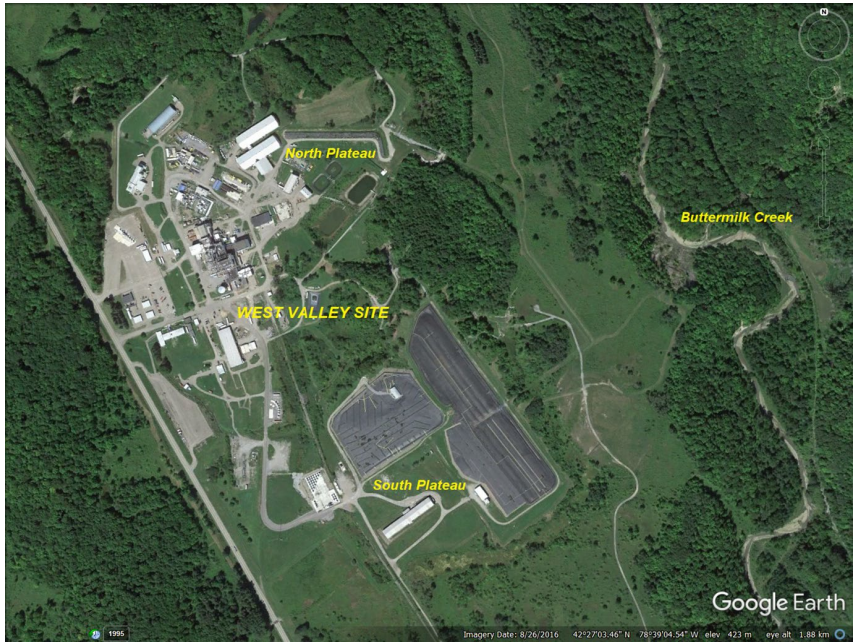
Outline

Probabilistic Performance Assessment (PPA) model

- Why are we doing this?
- What does the PPA do?
- How is this useful?



West Valley Site

- There is radioactive material in the subsurface of the site, but currently, in 2025, there is no risk to people or the environment.
- How the heck is that possible?!?
- Because there are currently no pathways for people to come into contact with it.

West Valley Site

If there is not a risk now, what about the potential for risk in the future? Several things have to occur in order for there to be a potential future risk to subsurface contamination:

- The contamination has to migrate to the accessible environment (or people have to get into the site by digging, drilling a well, etc);
- People or plants/animals have to be present in order to be exposed;
- If exposure is possible, then the routes by which exposure can occur are evaluated (ingestion, inhalation, etc)

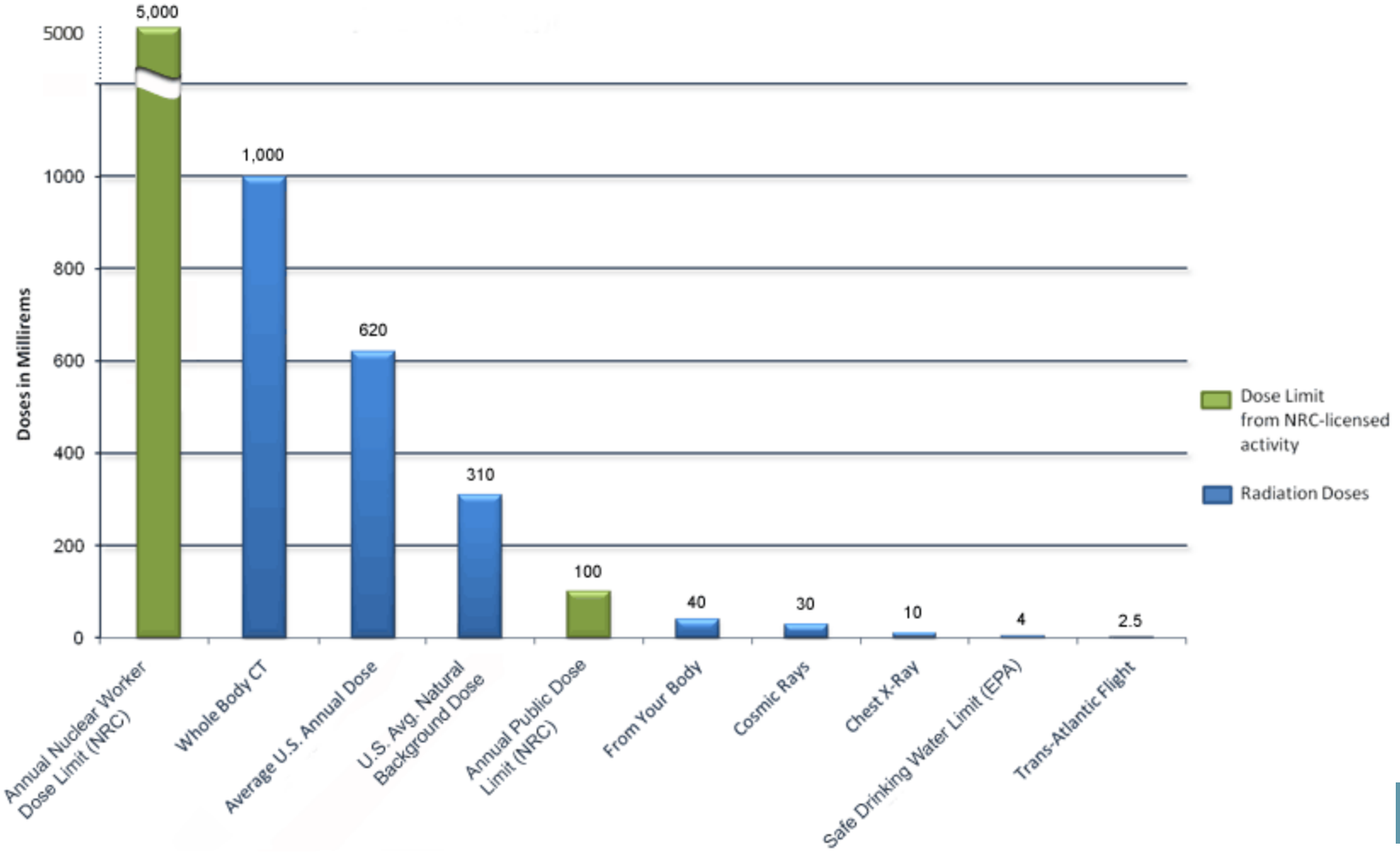
West Valley Site

The PPA Model is a tool for evaluating the nature and level of possible exposures that might occur under different closure scenarios.

The PPA model takes all the information we know about the site, and uses that to estimate three things over a long timeframe:

- Contaminant concentrations
- Levels of exposure
- Health effects

Radiation Doses and Regulatory Limits (in Millirems)

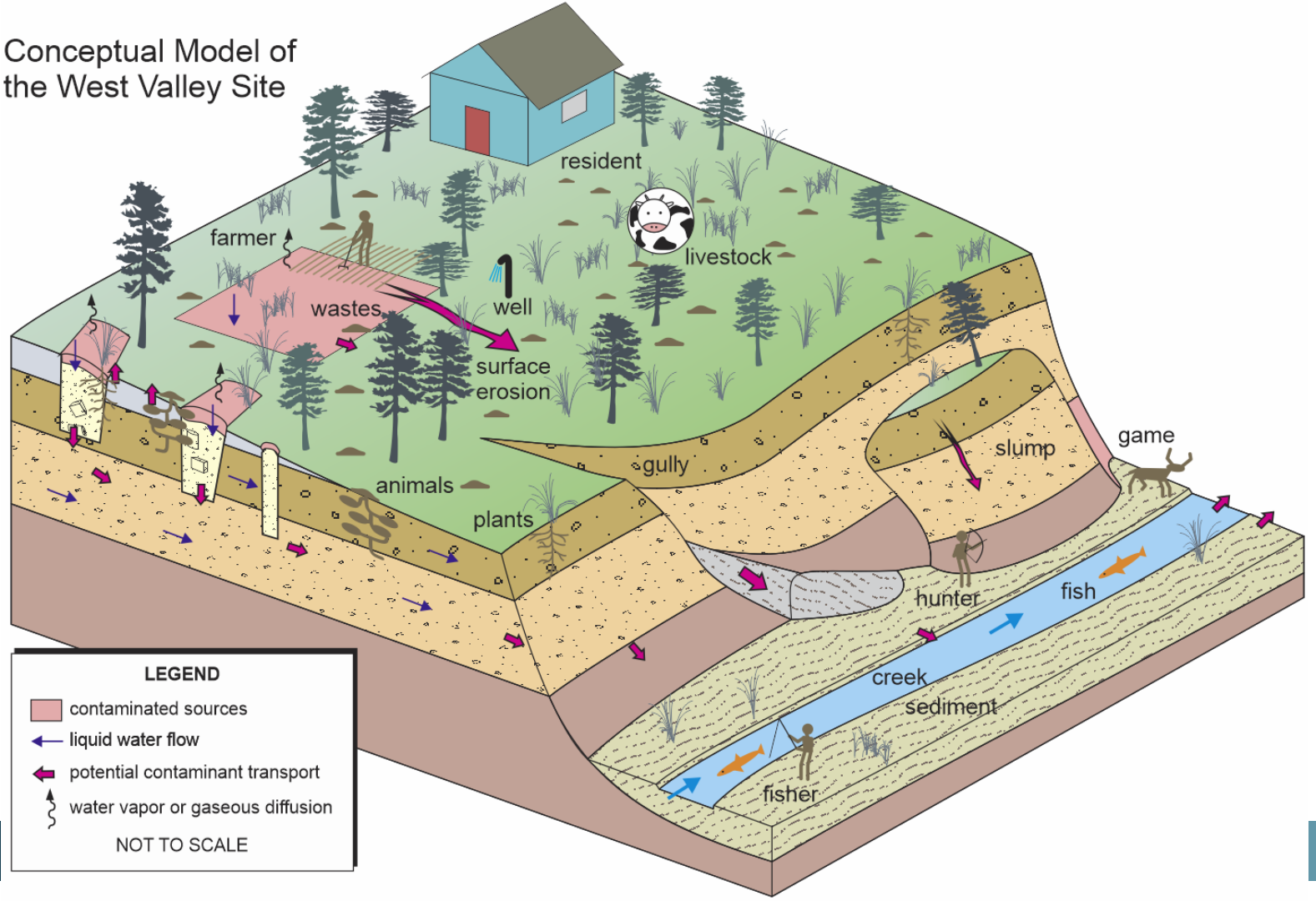


What is a Performance Assessment?

A Performance Assessment (PA) is a computer model that evaluates

- Estimates of the amount of contamination in various locations,
- How that contamination moves in the environment, both on and off site for long time periods; and
- The potential impact to people, plants and animals, in terms of radiological dose and other measures of risk.

Conceptual Model of the West Valley Site



Resident Farmer Exposure Pathways

Exposure Pathway	Exposure Media					
	Facility Surface Soil	Facility Subsurface Soil	Hillslope Surface Soil	Water	Facility Indoor/ Outdoor Air	Hillslope Outdoor Air
External Gamma	✓	✓(a)	✓			
Gas Inhalation					✓(a)	✓
Dust Inhalation					✓	✓
Chicken and Egg Ingestion	✓		✓	✓(b)		
Produce Ingestion	✓		✓	✓(b)		
Inadvertent Soil Ingestion	✓		✓	✓(b)		
Dairy Ingestion				✓		
Water Ingestion				✓		
Fish Ingestion				✓		

(a) Basement gamma exposure, and indoor intrusion of radioactive gases, assumes a basement depth of 3 m (10 ft).
(b) Potentially contaminated water is assumed to be used to irrigate garden soil.

On-Site RF Key Assumptions

Behavioral Assumptions

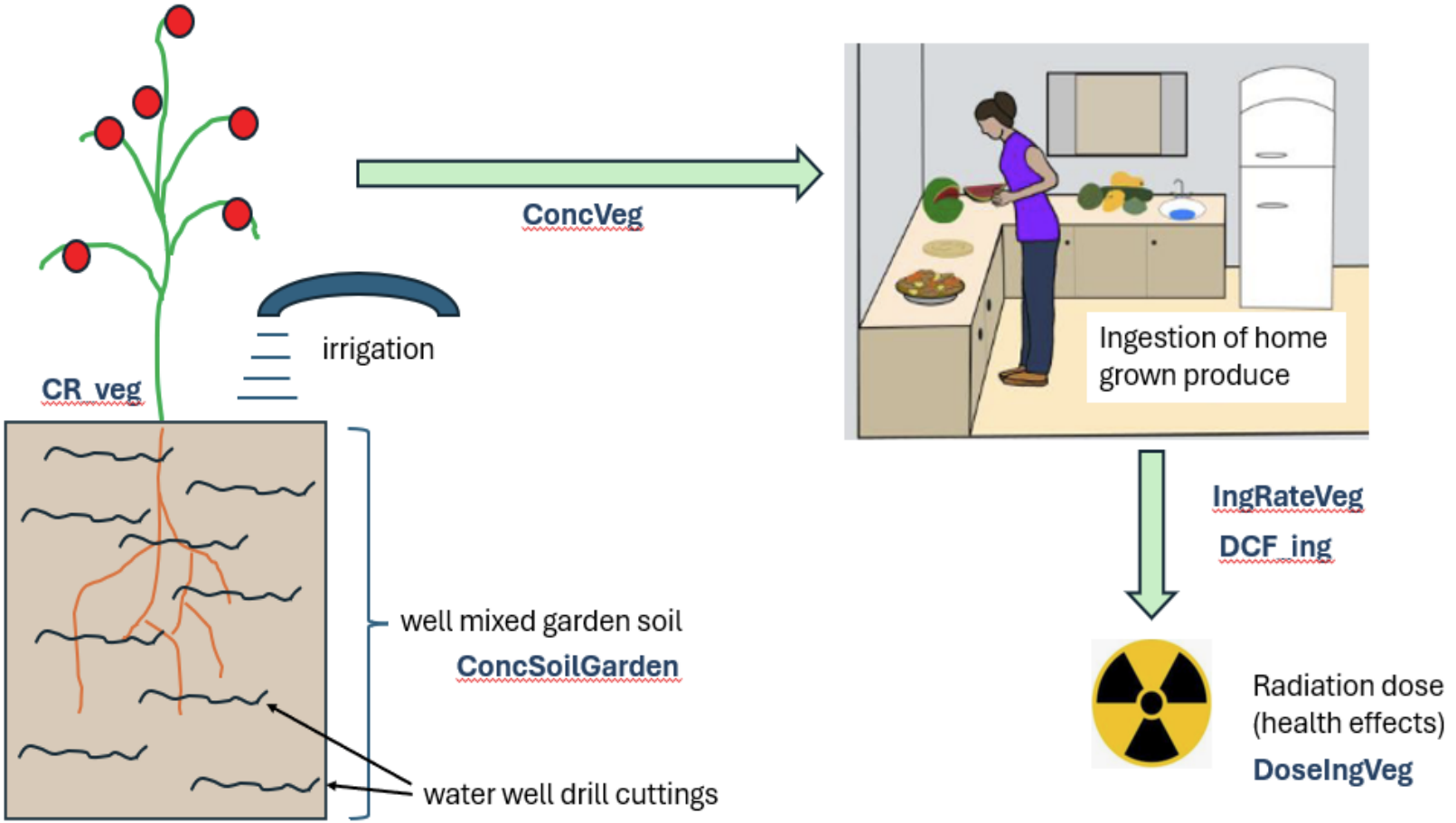
- On average, spends about >90% of their time at home.
- Has a home garden, chickens raised for meat and eggs, and a dairy cow.
- Eats fish caught in Buttermilk and Cattaraugus creeks.
- A portion of daily calories come from fish and home-raised foods.
- For Facilities where disposed waste exists (WMAs 3, 7 and 8), spends time in impacted Hillslope areas where erosion may deposit contamination.

On-Site RF Key Assumptions

Other Exposure Assumptions

- Obtains domestic water from either a well or, in the case of WMAs 7 and 8, potentially from a water system that draws from the adjacent creek.
- The impacts of contamination present in water are evaluated for direct consumption, as well as through the irrigation of garden produce and livestock.
- Either surface water or groundwater could be the domestic water source at WMAs 7 and 8; if a groundwater well is drilled through disposed waste, contaminated drill cuttings are assumed to be mixed into garden soil.

Example Dose Pathway; Garden Veggies



Information for Off Site Receptors

Contaminant transport and dose and risk assessment downstream to Lake Erie and Buffalo

FIGURE INT-2
Aerial Photo of the West Valley Demonstration Project

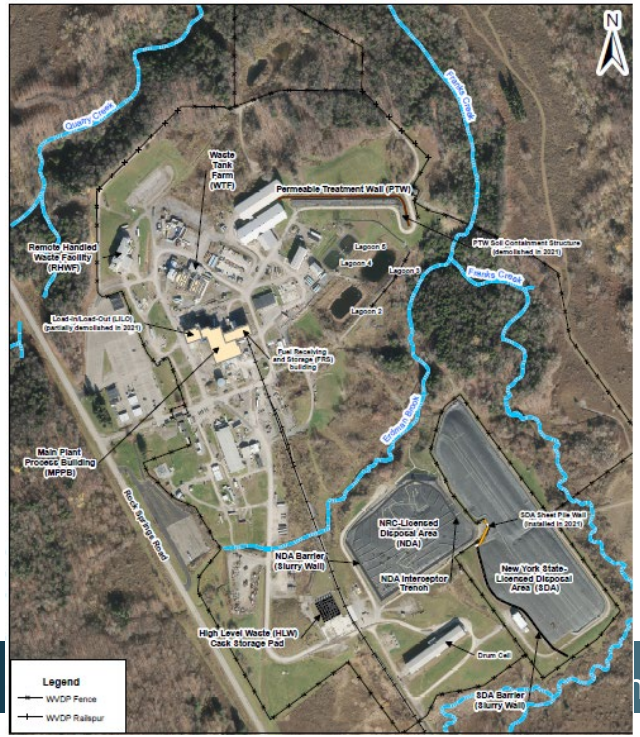
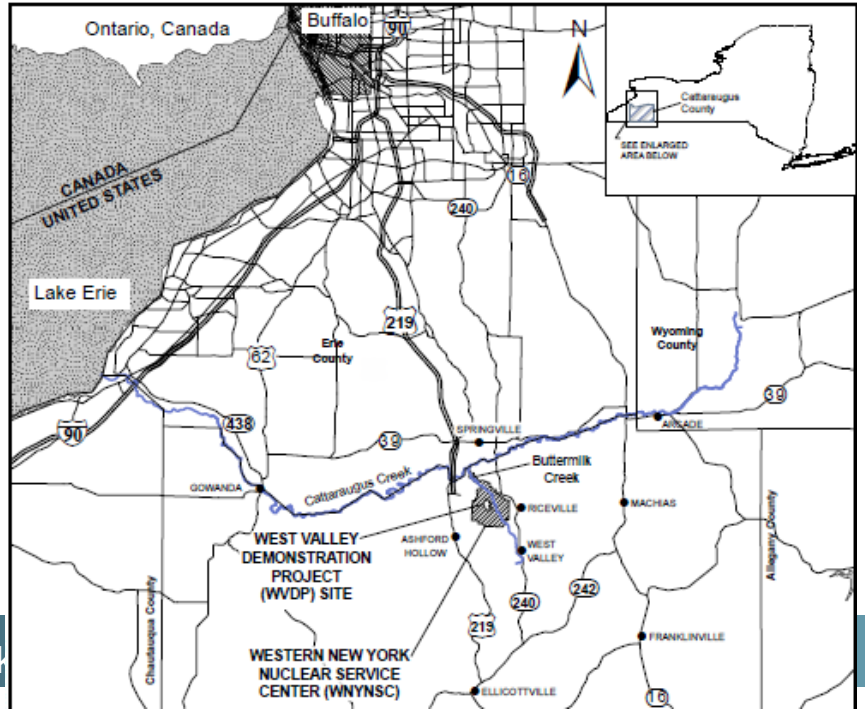
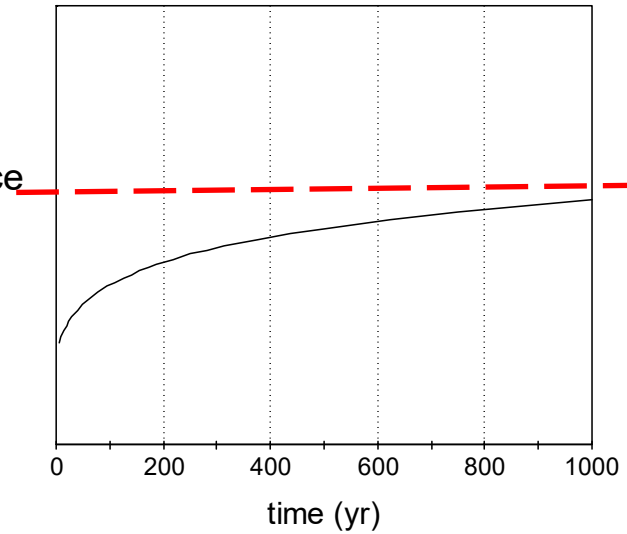


FIGURE INT-1
Location of the Western New York Nuclear Service Center (WNYNSC)



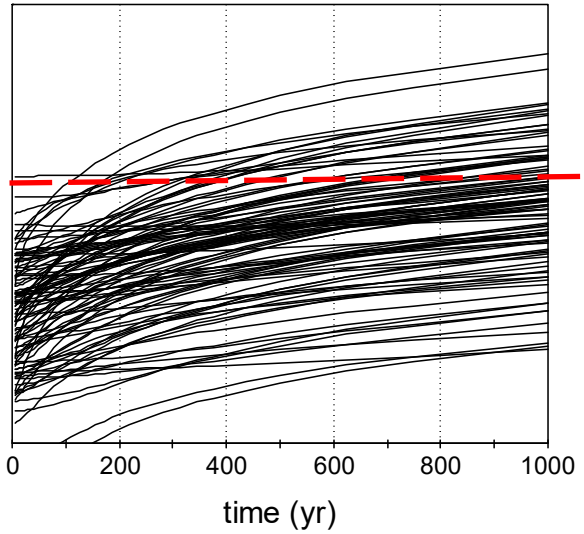
Deterministic vs Probabilistic PA

Single deterministic result

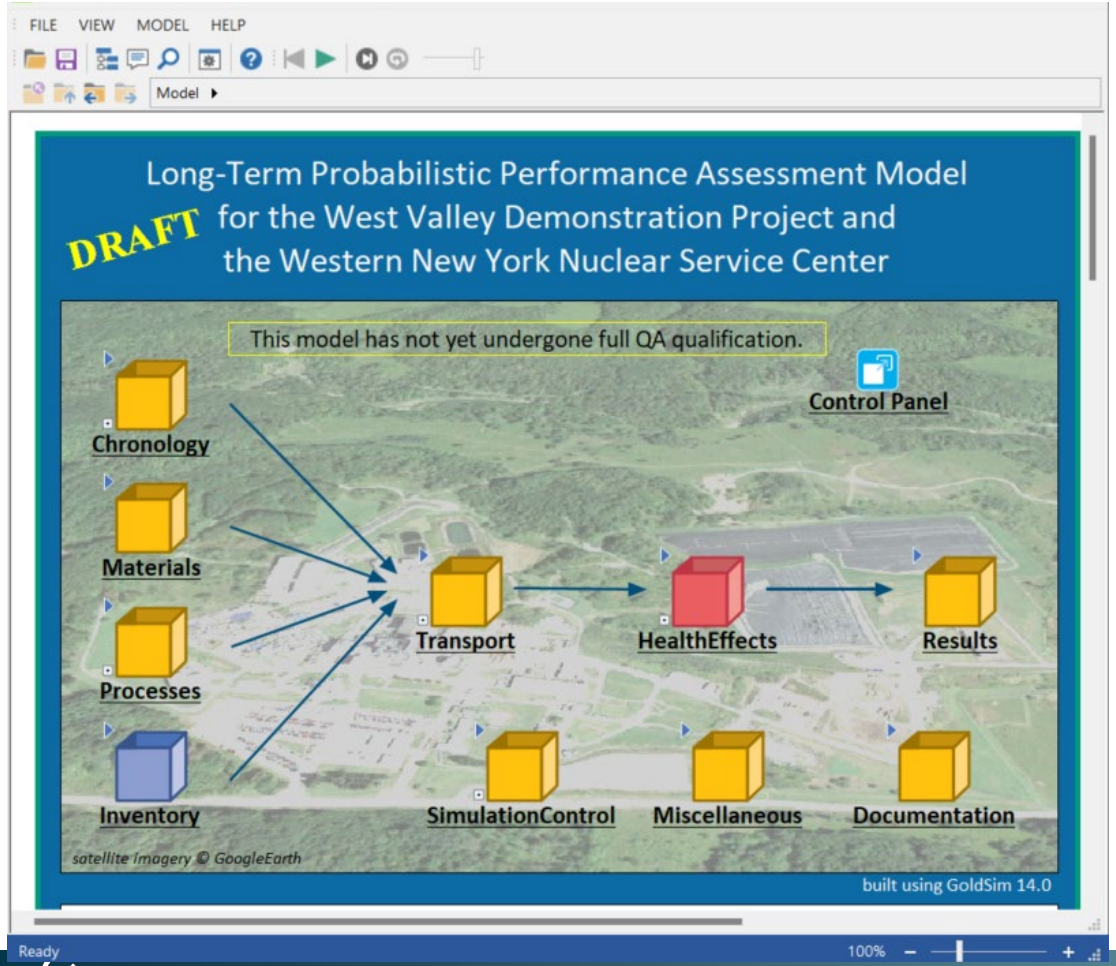


- Does not represent uncertainty
- Decision appears clearer than it really is

Many probabilistic results



- Reflects uncertainty clearly
- Decision maker has to evaluate comfort level



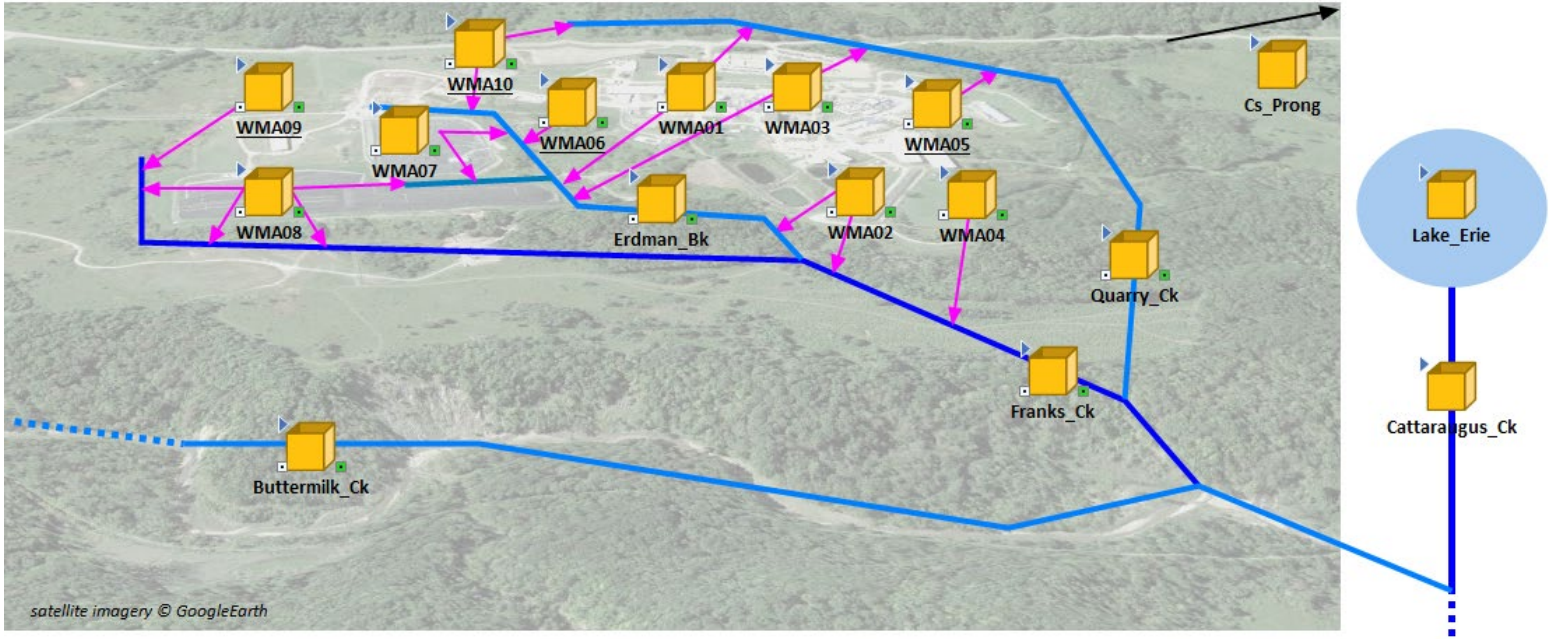
West Valley PPA Model

The West Valley PPA model is a tool to inform Phase 2 decisions.

It is built in GoldSim, which allows site-specificity and probabilistic assessment.

Model Organization: WMAs

The model is organized into 10 Waste Management Areas, which are connected by groundwater and erosion pathways to the creek system.



Model Organization: Facilities

The SDA, NDA, and HLW Tank Farm are sub-divided into Facilities.

GoldSim Player - West Valley PPA Model (West Valley PPA Model v1.907)

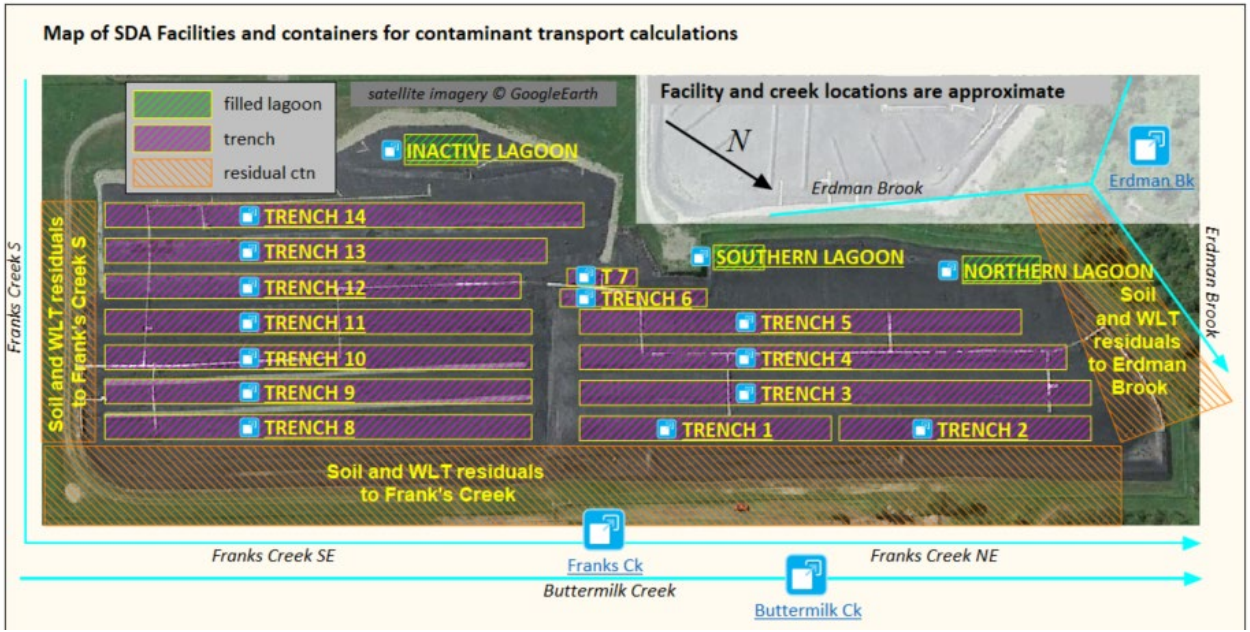
FILE VIEW MODEL HELP

Model ▸ Transport ▸ WMA08 ▸

WMA 8: The State-Licensed Disposal Area (SDA)

The modeled Facilities in WMA 8 consist of 14 SDA trenches and 3 filled lagoons. The fundamental units for analysis (each termed a "Facility") is each trench and lagoon, though most trenches consist of several subsections called intervals, which correspond to Decision Units. Trench 6 consists of 19 special purpose holes (SPHs). Trench 7 has only one interval, and is encased in concrete. Each interval or SPH is a separate Decision Unit with its own inventory. The lagoons and Trench 7 are not subdivided, so each of these Facilities is also its own decision unit.

Residual contamination exists below each Facility in the ULT, as well as in the areas neighboring the SDA, identified with orange hachure. These areas between the Facilities and the nearby creeks hold contamination that has leaked out from the trenches and lagoons into the Soils and the WLT Layers



Model Organization: Decision Units

The SDA, NDA, and WTF are further sub-divided into Decision Units.

Each Decision Unit is assigned distinct waste inventory.

Inventory in the SDA trenches is divided into 50-foot sections based on disposal records.

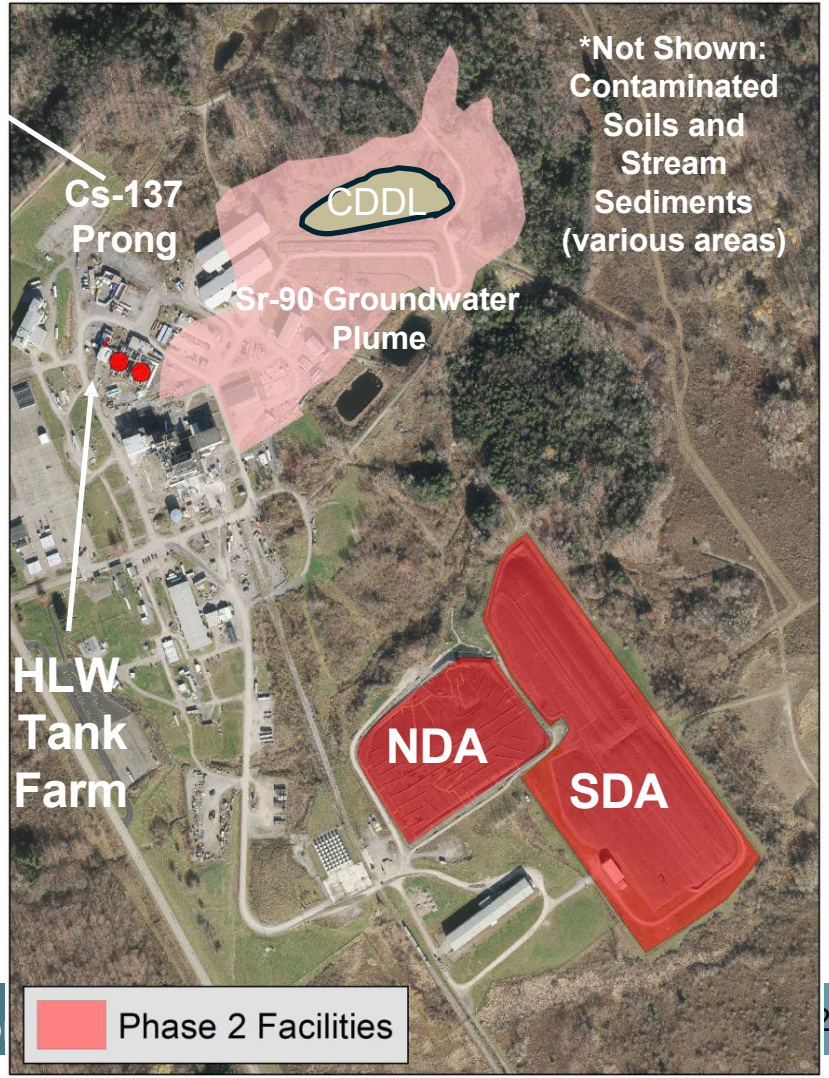
PPA Model Content

The final PPA model will account for:

- Chronology, Materials, Inventory (for Phase 2 decisions)
- Contaminant release and transport – groundwater, air, creeks, erosion
- Health Effects – onsite and offsite radiological and chemical exposure and risk, including ecological risk

Phase 2 Decisions

- High Level Waste (HLW) Tank Farm
- NRC-Licensed Disposal Area (NDA)
- State-Licensed Disposal Area (SDA)
- Construction Demolition and Debris Landfill (CDDL)
- Non-Source Area of the Sr-90 Groundwater Plume
- Cesium (Cs-137) Prong
- Contaminated Soils and Stream Sediments



SEIS Alternatives for Phase 2 Decisions

The PPA will evaluate dose and risk for SEIS alternatives:

- No Action Alternative – required by NEPA and SEQRA
- Complete/Sitewide Removal
- Complete/Sitewide In-Place Closure
- Hybrid Alternatives involve partial/selective removal

SEIS Alternatives for Phase 2 Decisions

SEIS alternatives development:

- Rank inventory contributions to dose – to evaluate impact of different closure scenarios
- Time of exposure may matter – long-lived vs short-lived radionuclides
- Location may matter – relative erosion risk of different areas
- Engineered features

SEIS Alternatives for Phase 2 Decisions

The PPA will evaluate how SEIS alternatives perform relative to regulatory criteria.

This is where the dose to the resident farmer is used as a metric to assess the performance of the alternatives.

PPA Website

Develop PPA website to include public access to:

- Model and results
- White papers
- Searchable electronic reference library

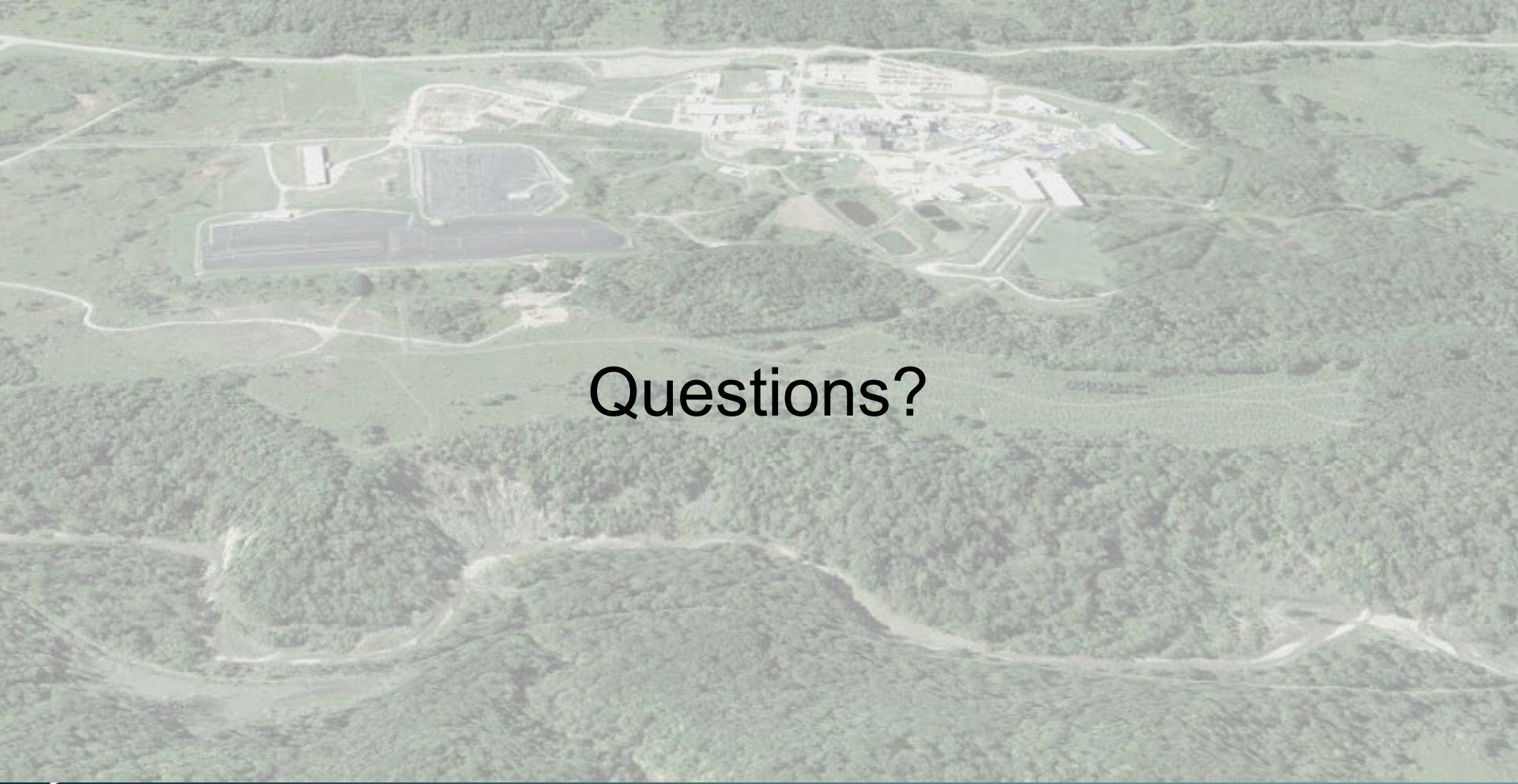
The website will be available at the start of the SEIS public comment period.

Past QPM Presentation topics

- PA Modeling Primer
- PPA Model Facilities and Decision Units
- Erosion (several)
- Inventory (several)
- PPA Model inputs and assumptions
- PPA/SEIS schedule updates (DOE/NYSERDA)

Future QPM Topics

- Health effects modeling - offsite
- Hybrid scenario development
- Introduction to the PPA Model player
- PPA model results
- Chemical modeling



Questions?