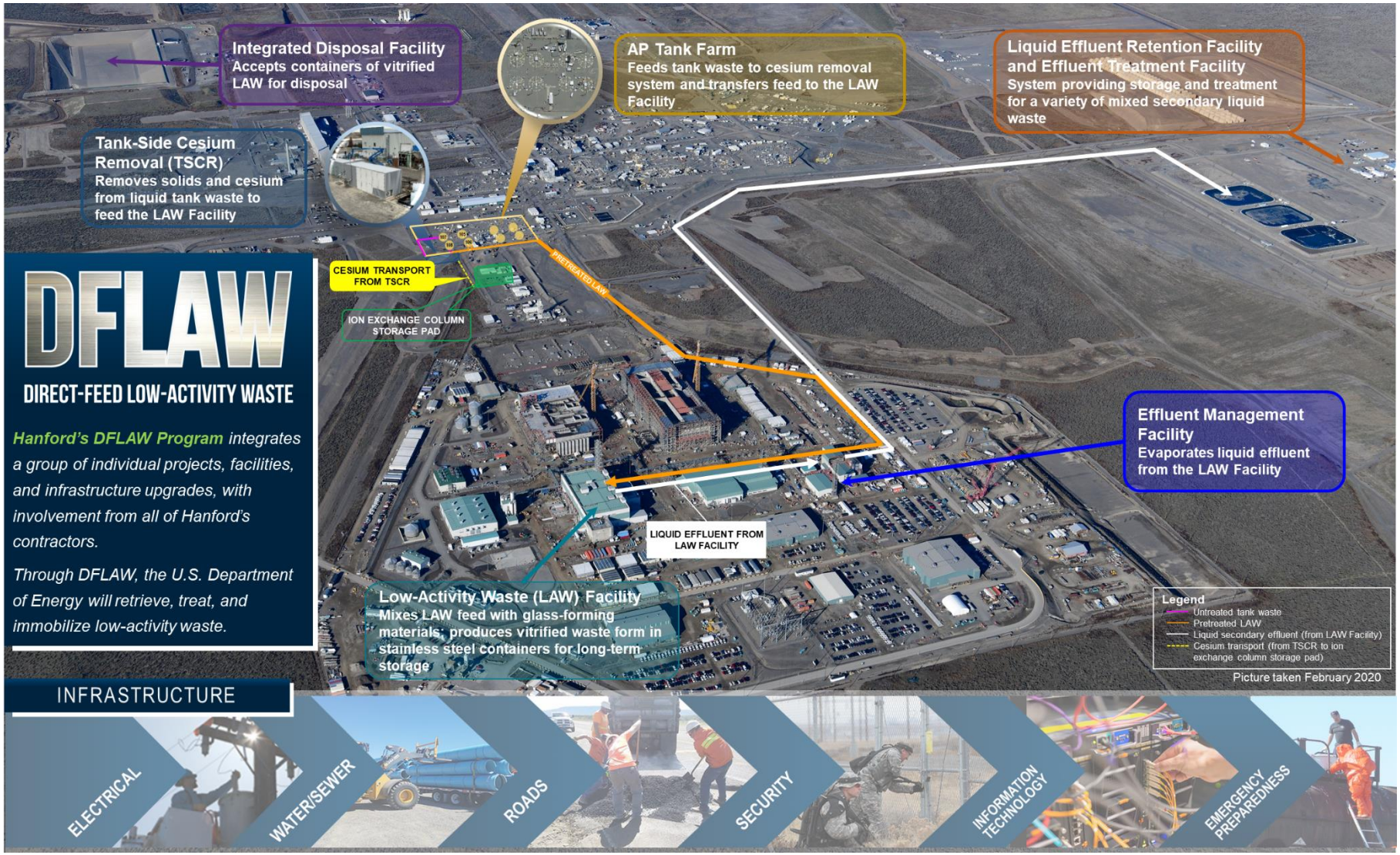
THE HANFORD SITE

Proposed Permit Modification in Support of the Effluent Treatment Facility Carbon Dioxide Removal Skid

Richard Valle, Program Manager
U.S. Department of Energy, Office of River Protection
Tank Farms Programs Division

May 3, 2022

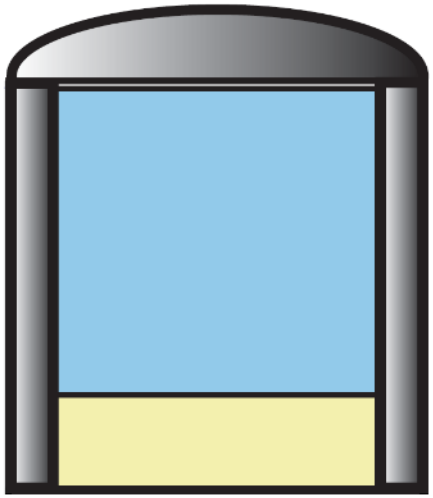
Direct-Feed Low-Activity Waste Configuration



Direct-Feed Low-Activity Waste Configuration (cont.)

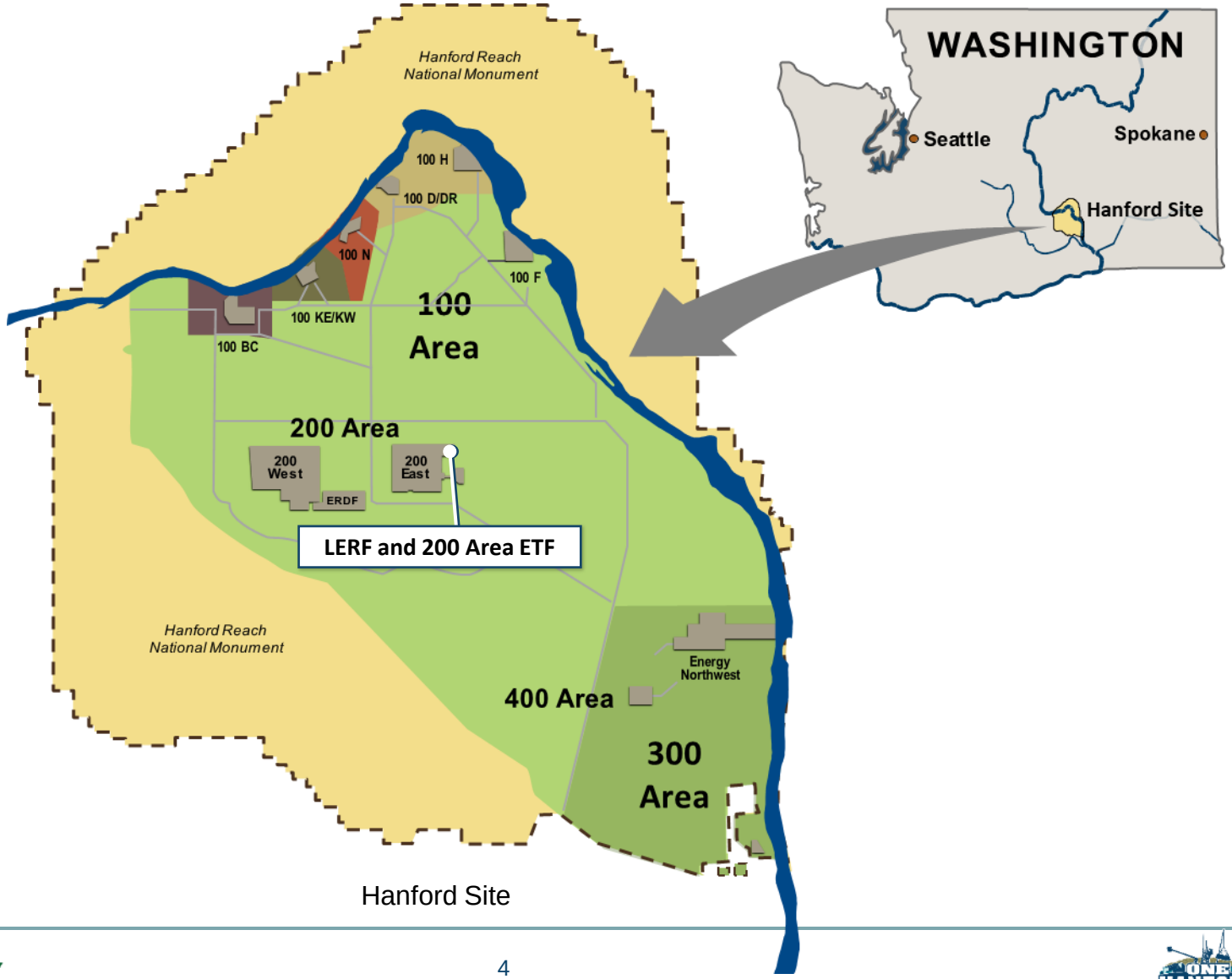
Chemical and radioactive waste is stored in Hanford's Tank Farms. The U.S. Department of Energy (DOE) will safely, efficiently and effectively treat Hanford tank waste through the Direct-Feed Low-Activity Waste (DFLAW) Program to vitrify it (immobilize it within glass).

Secondary liquid waste will be created during the vitrification of low-activity waste in the Waste Treatment and Immobilization Plant (WTP) during the program. The Liquid Effluent Retention Facility (LERF) and the 200 Area Effluent Treatment Facility (ETF) will be used to manage and treat the secondary liquid waste.



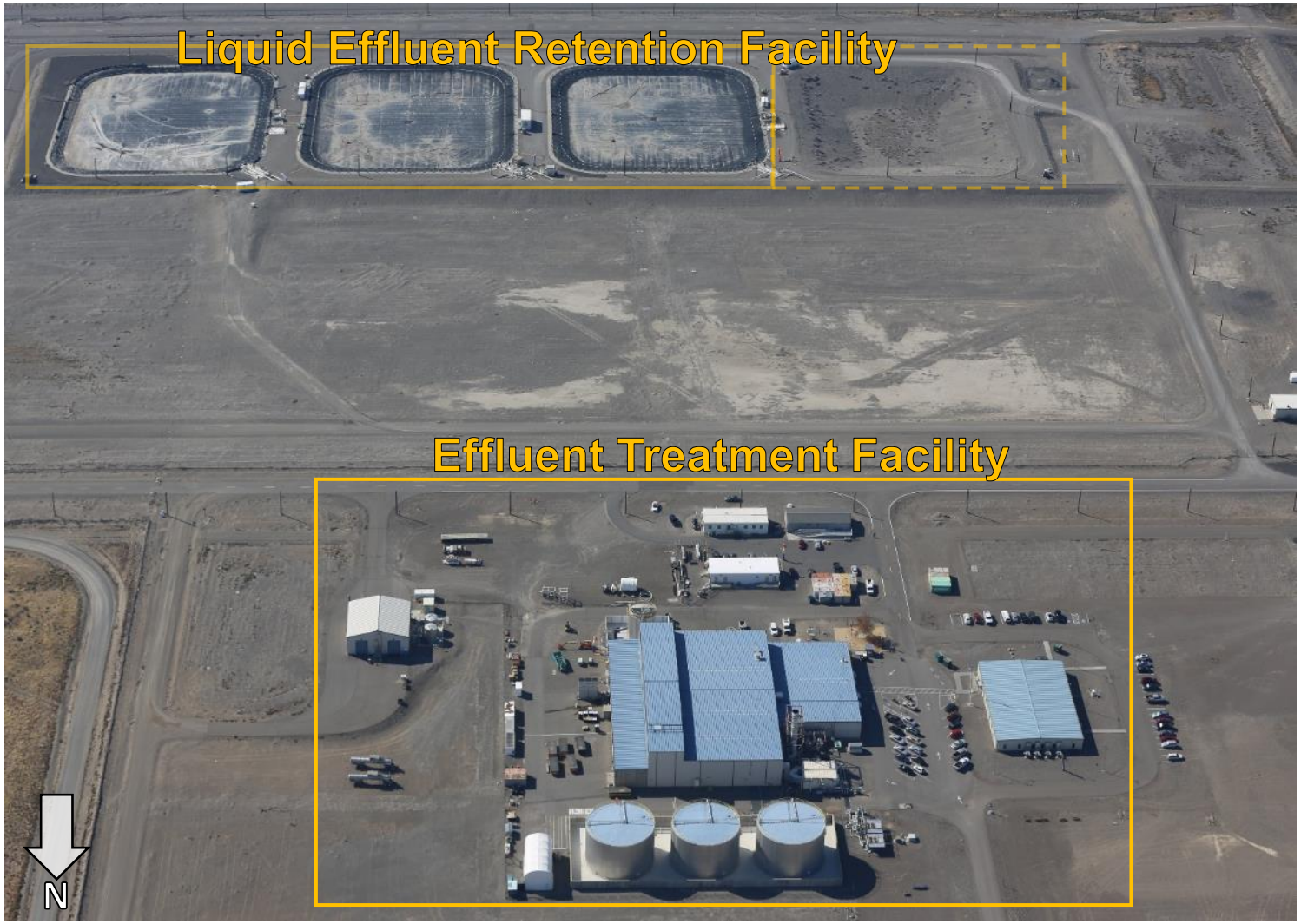
Typical tank contents with a liquid (blue) and solid (yellow) fraction shown

Hanford Site Map



Hanford Site

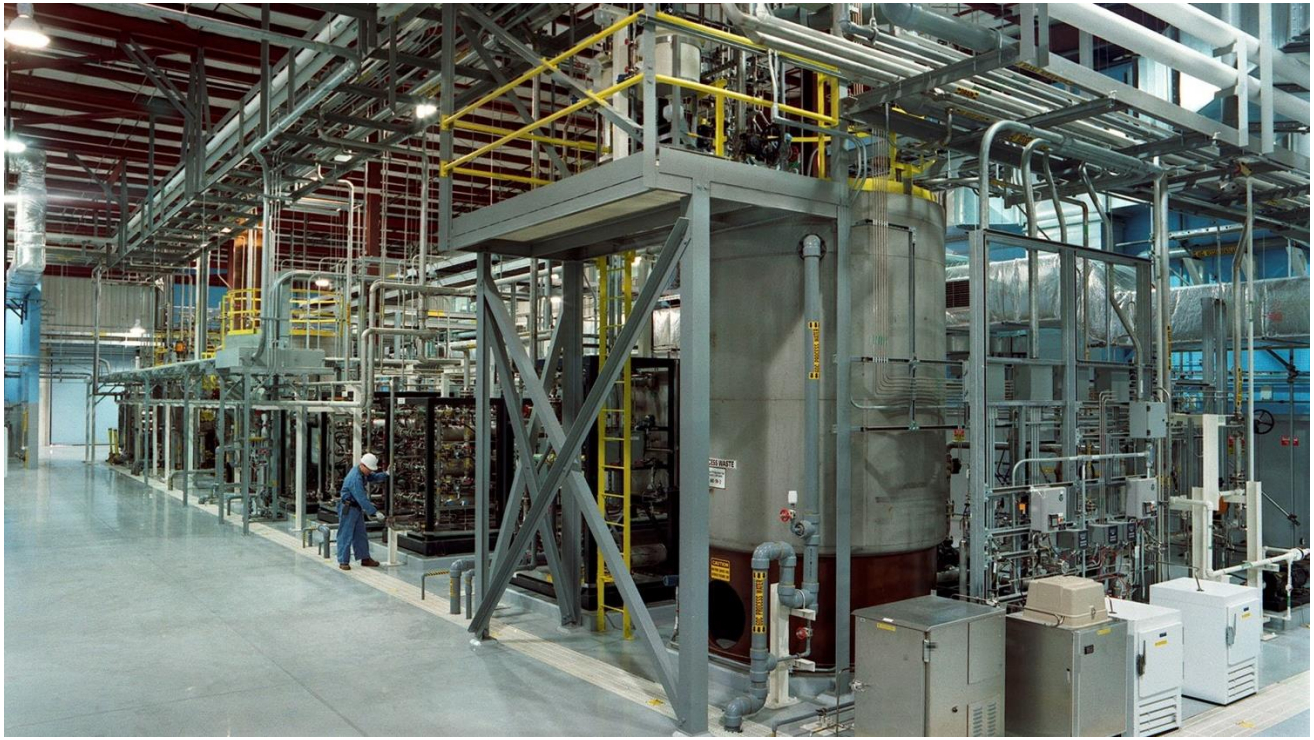
Liquid Effluent Retention Facility and 200 Area Effluent Treatment Facility



Aerial view of the Liquid Effluent Retention Facility and 200 Area Effluent Treatment Facility

200 Area Effluent Treatment Facility

The 200 Area ETF treats liquid waste from Hanford Site sources. Soon operations will expand to include management of the DFLAW secondary liquid waste.



View of the primary treatment train in the process area of the Effluent Treatment Facility

Purpose of the Permit Modification

The composition of the WTP DFLAW secondary liquid waste was reviewed and found to have a high concentration of dissolved inorganic carbon that will require additional treatment above the current capabilities of the existing 200 Area ETF

- Inorganic carbon reduces the treatment efficiency of the ETF's ultraviolet/oxidation (UV/OX) process
- Carbon dioxide (CO_2) becomes the predominant compound as pH is adjusted in the ETF's primary treatment train
- CO_2 is currently purged from waste using a degasification column within the ETF's primary treatment train
- Installation of a CO_2 removal skid (an engineered assembly) will provide additional removal capability within the ETF's primary treatment train

Regulatory Framework for Permitting Action

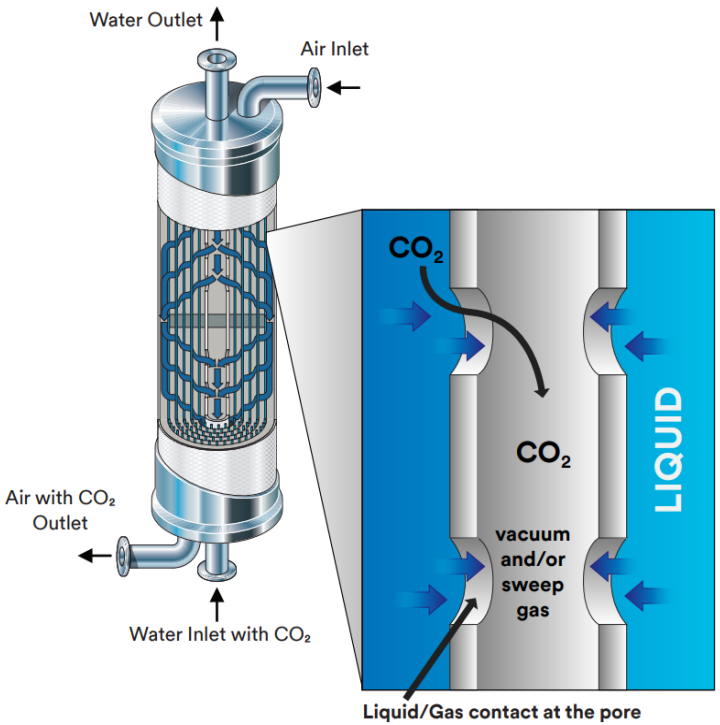
- The *Resource Conservation and Recovery Act* (RCRA) Hanford Dangerous Waste Permit governs dangerous waste treatment, storage and disposal at the Hanford Site
- The Washington State Department of Ecology (the regulator) issued the current Hanford Sitewide Permit (Revision 8C), which governs hazardous waste treatment, storage and disposal (Hanford RCRA Permit)
- Based upon the data compiled pertaining to the WTP DFLAW effluent, it was determined that the Hanford RCRA Permit would need to be modified to address changes in waste constituents and concentrations
- The permittees (DOE and contractor Washington River Protection Solutions) are proposing a Class 2 permit modification to the LERF and 200 Area ETF permit sections, Operating Unit Group 3

Proposed Permit Modification: Overview

A CO_2 removal skid is proposed for installation prior to UV/OX treatment. The system can be bypassed, as needed. The removed CO_2 is sent to ETF's vessel offgas (VOG) system.

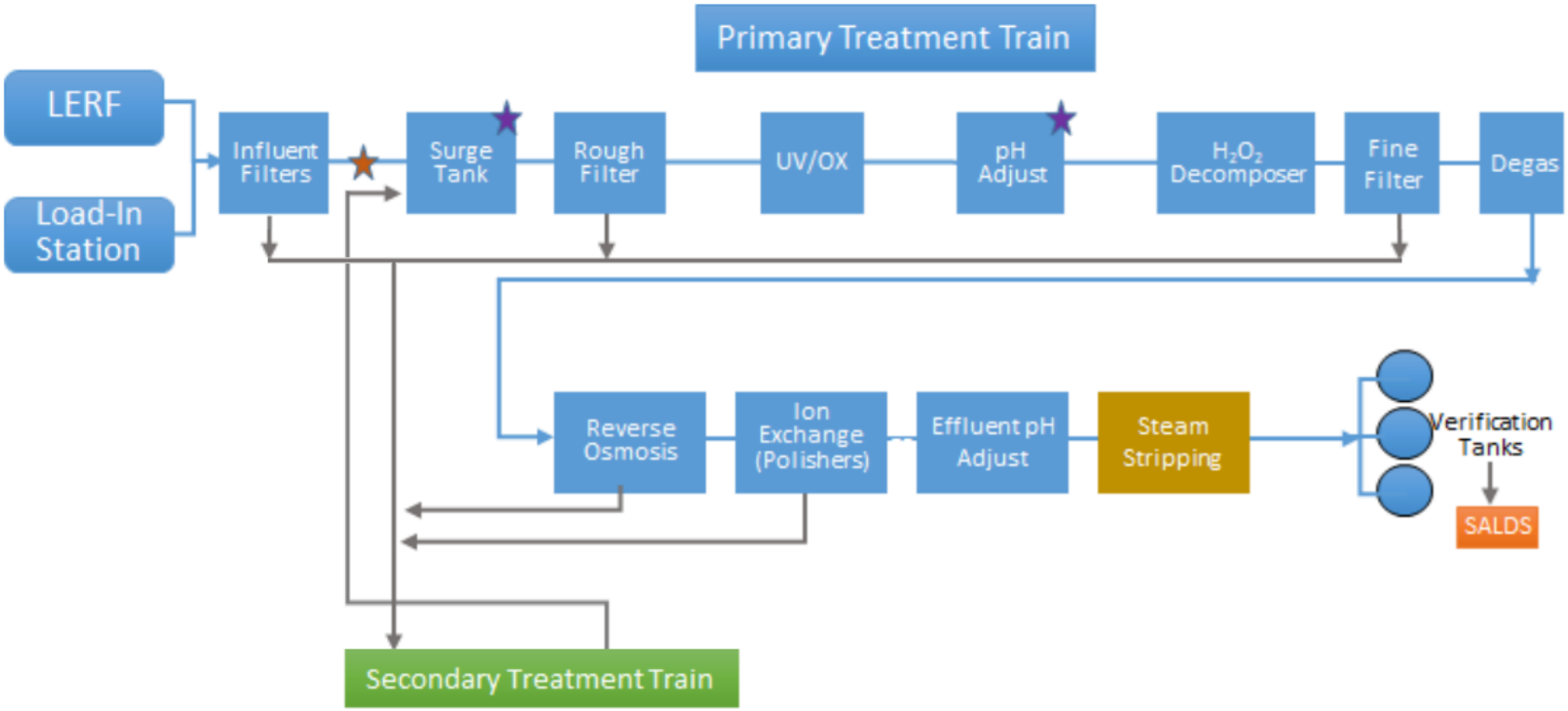
The CO_2 removal skid consists of the following:

- Four membrane contactors
- Blower with variable frequency drive
- pH and CO_2 analyzer
- Electrical junction box
- Piping and instrumentation
- Metal frame within spill pan



Membrane contactor principle

Primary Treatment Train: Before Proposed Modification



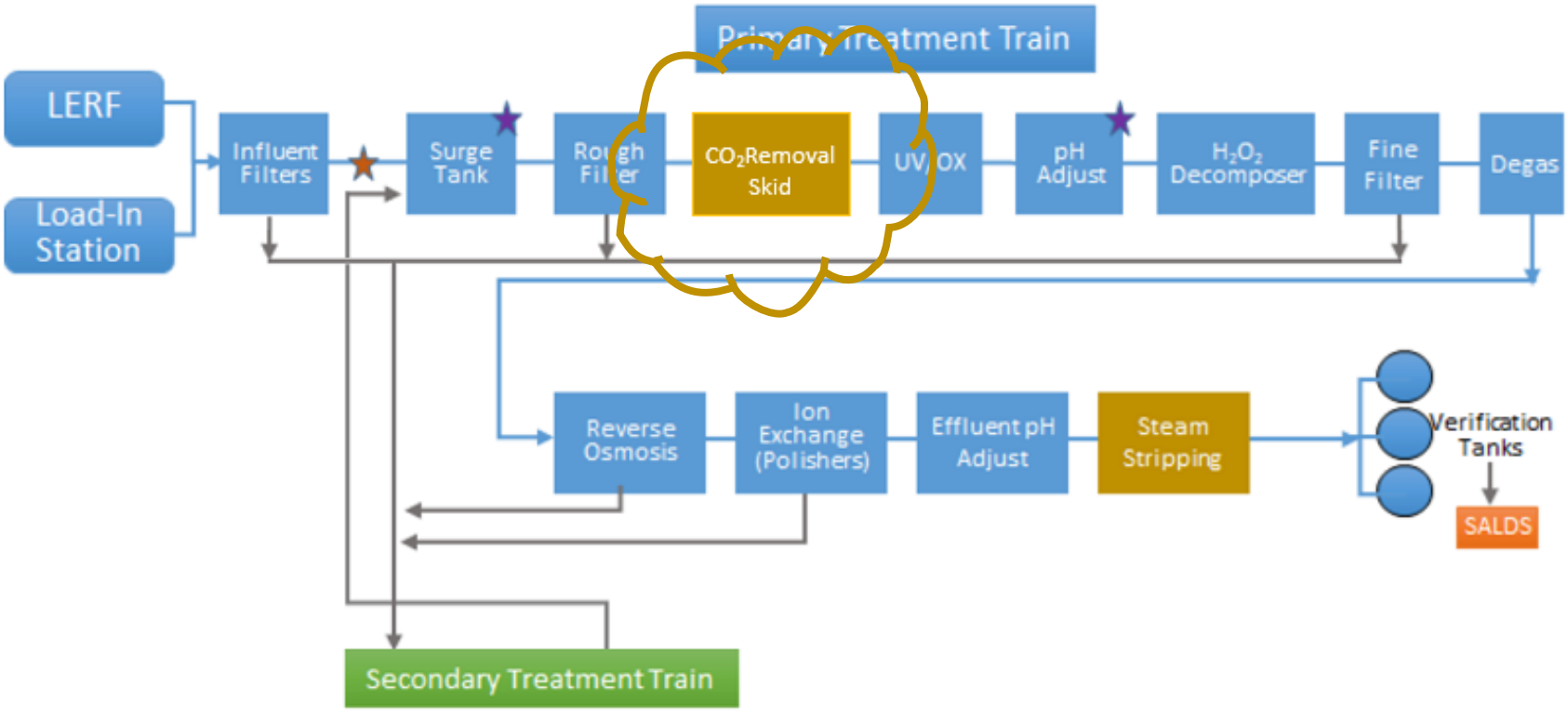
Chemical adjustment With NaOH or H_2SO_4

Chemical adjustment With H_2SO_4

Optional Operations for treating WTP DFLAW Effluent

Degas = Degasification Column
LERF = Liquid Effluent Retention Facility
pH Adjust = pH Adjustment Tank
SALDS = State-Approved Land Disposal Site
UV/OX = Ultraviolet/Oxidation

Primary Treatment Train: After Proposed Modification



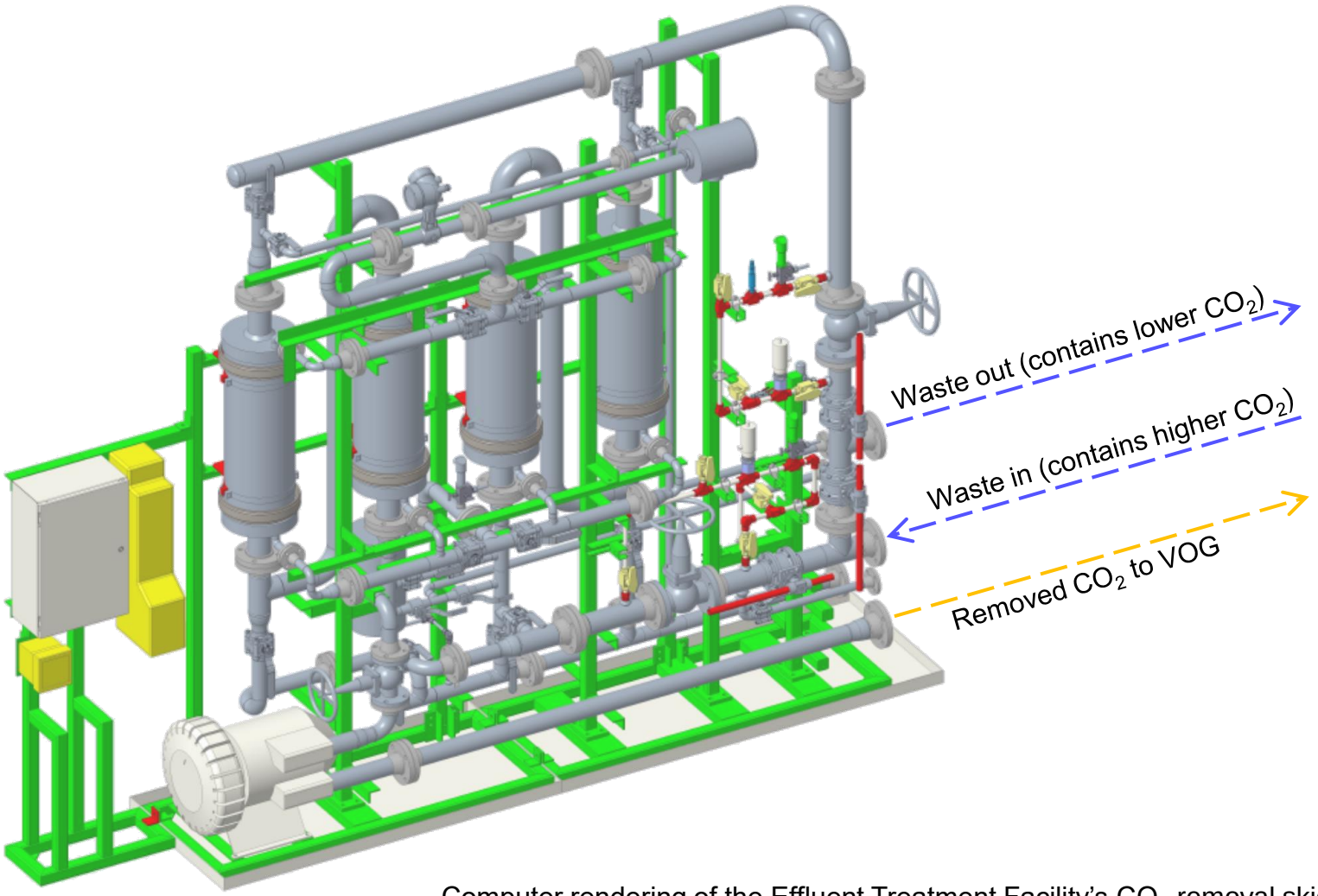
Chemical adjustment With NaOH or H_2SO_4

Chemical adjustment With H_2SO_4

Optional Operations for treating WTP DFLAW Effluent

Degas = Degasification Column
LERF = Liquid Effluent Retention Facility
pH Adjust = pH Adjustment Tank
SALDS = State-Approved Land Disposal Site
UV/OX = Ultraviolet/Oxidation

Proposed Permit Modification: CO_2 Removal Skid



Computer rendering of the Effluent Treatment Facility's CO_2 removal skid

Proposed Permit Modification: Modified Addenda

The modified addenda for the LERF and 200 Area ETF permit modification include the following:

- Addendum B, “Waste Analysis Plan”
- Addendum C, “Process Information”
- Addendum I, “Inspection Requirements”

Refer to the corresponding Hanford Dangerous Waste Permit Change Notice for a full description of the proposed changes

Permit Modification Public Process

LERF and 200 Area ETF Class 2 Permit Modification

60-day public comment period is open through May 29, 2022

Submit comments via mail or electronically (preferred) to the Washington State Department of Ecology at the address below:

Daina McFadden
Washington State Department of Ecology
3100 Port of Benton Boulevard
Richland, WA 99354
http://nw.ecology.commentinput.com/?id=3x2ea

Questions?
The Hanford Reach
White Bluffs Overlooking the Columbia River