



**Savannah River
Remediation**

ACCUM | BECHTEL | CH2M | BWXT

LIQUID WASTE OPERATIONS OVERVIEW

Peter Hill



We do the right thing

THE WHITE HOUSE
WASHINGTON

July 25, 1950

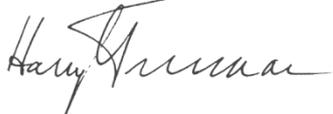
Dear Mr. Greenewalt:

The Atomic Energy Commission has informed me that it has requested the DuPont Company to undertake the design, construction and operation of certain new facilities for the atomic energy program.

The Commission advises me that the Company has within its organization technical, scientific, engineering, construction and operating staffs capable of handling a task of this magnitude. The great resources of your Company in these fields, together with the experience which it has acquired through the successful handling of the design, construction and operation of the Hanford Project during the War make it uniquely qualified to undertake this most essential task.

I want you to know that I consider this project as one of highest urgency and vitally important to our national security and defense.

Very sincerely yours,



Mr. Crawford H. Greenewalt
President, DuPont Company
10 Market Street
Wilmington, Delaware

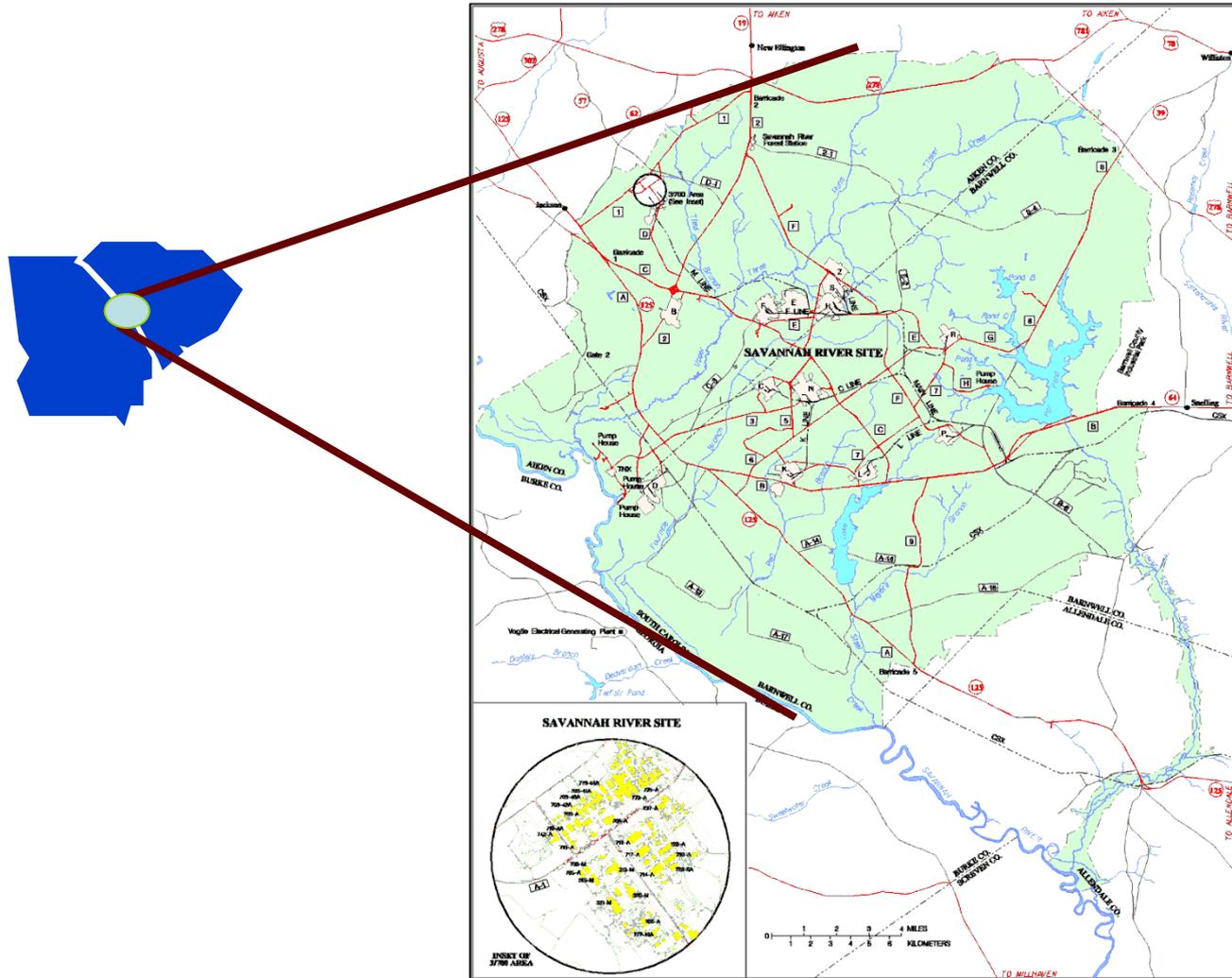
RECEIVED

JUL 26 1950

C. H. GREENEWALT

- Request from President Truman to DuPont 1950
- SRP Site acquired 1951
- DuPont begins operations 1952
- WSRC assumes operations 1989
- SRR contract begins July 2009

We do the right thing.



We do the right thing.

- Site Construction begins Feb 1951
- D-Area – Heavy Water, operations begin Aug 1952
- M-Area – Fuel & Target Fab, slugs produced Dec 1952
- 100 Areas – R Reactor goes critical Dec 1953
- 200 Areas – Separations
 - 221-F operations begin Nov 1954
 - 221-H operations begin Jul 1955
 - Tank Farms –
 - F-Area Tanks 1-8 built 1951-1953, received first waste 1954
 - H-Area Tanks 9-12 built 1951-1953, received first waste 1955

We do the right thing.



F Canyon & Tank Farm

We do the right thing.



We do the right thing.

- Pu-239 recovery
 - Depleted uranium targets dissolved in nitric acid and processed through solvent extraction
 - Acidic waste stream evaporated and neutralized with sodium hydroxide
 - High amounts of radioactivity (fission products)

H-Canyon and Tank Farm

We do the right thing.



We do the right thing.

- **U-235 / Np-237 recovery**
 - Uranium fuel dissolved in nitric acid and processed through solvent extraction
 - Acidic waste stream evaporated and neutralized with sodium hydroxide
 - High amounts of radioactivity (fission products)

- **Pu-238 recovery**
 - Neptunium targets dissolved in nitric acid and processed through solvent extraction
 - Acidic waste stream evaporated and neutralized with sodium hydroxide
 - High amounts of radioactivity (fission products)

Type III Tank Under Construction

We do the right thing.

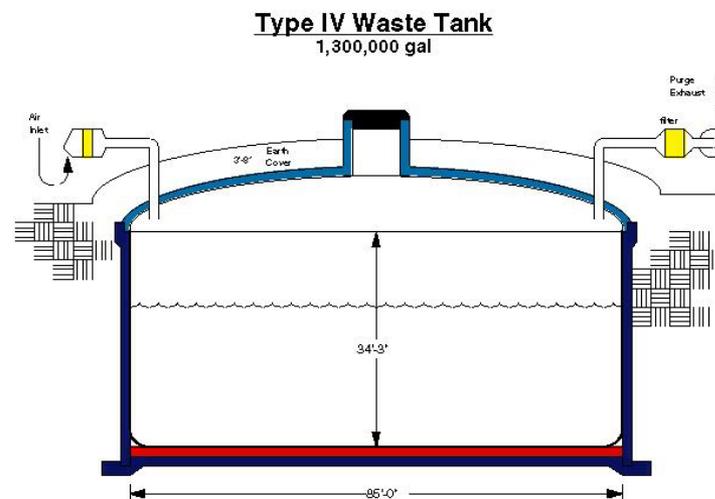
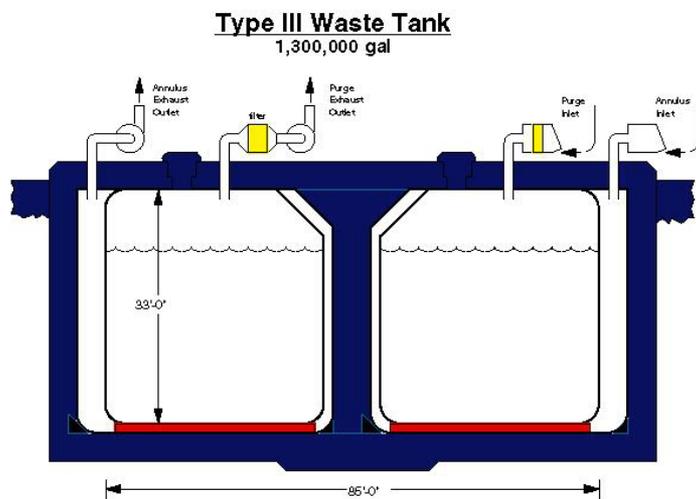
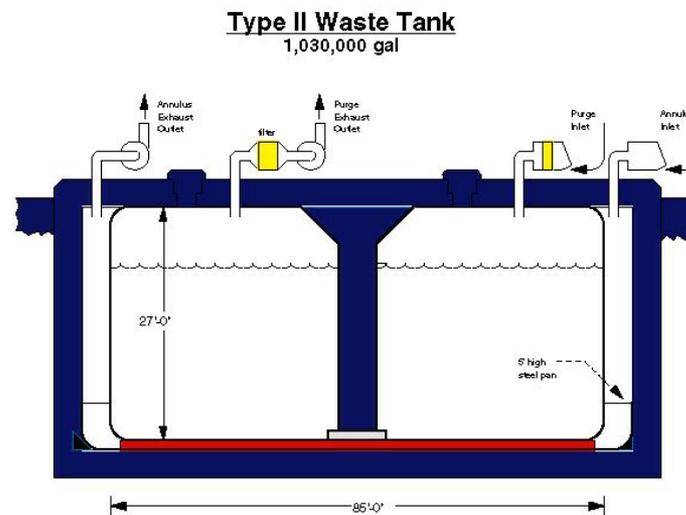
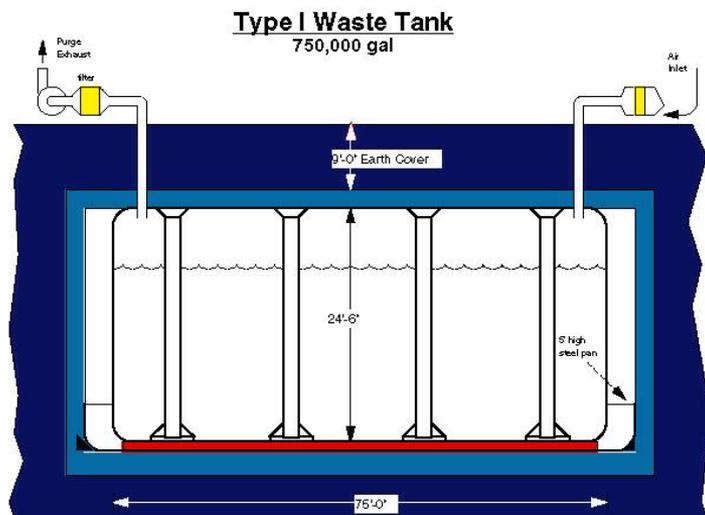


Tanks are built at grade and then backfilled with dirt to provide shielding.

We do the right thing.

- Safely receive and store liquid radioactive waste
- Process that waste into stable, inert solids
- Operationally close the tanks

We do the right thing.



High-Level Waste Facilities

We do the right thing.

170 acres
3 miles in length

Saltstone Processing/
Disposal Facilities

SWPF

DWPF

H-Tank Farm

- 29 tanks
- 2 evaporators (2H & 3H)
- Volume reduction and pre-treatment occurs in H Area

F-Tank Farm

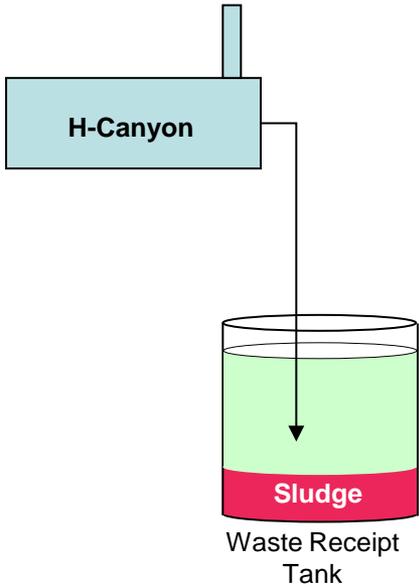
- 22 tanks

Inter-Area Line

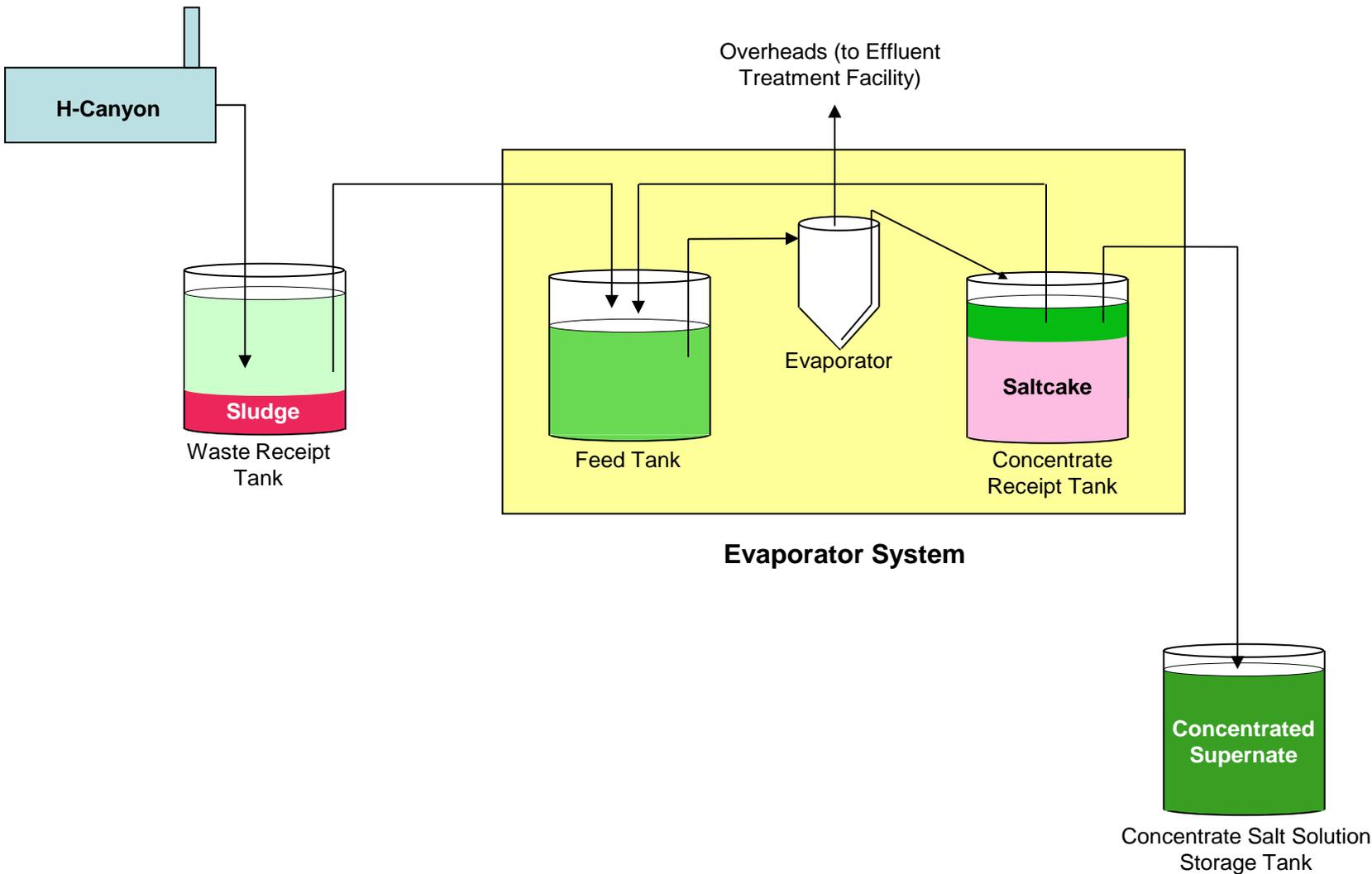
- 2.2 miles
- Pump pits at each end
- Diversion boxes at each end and at high point in the middle

Effluent Treatment Facility

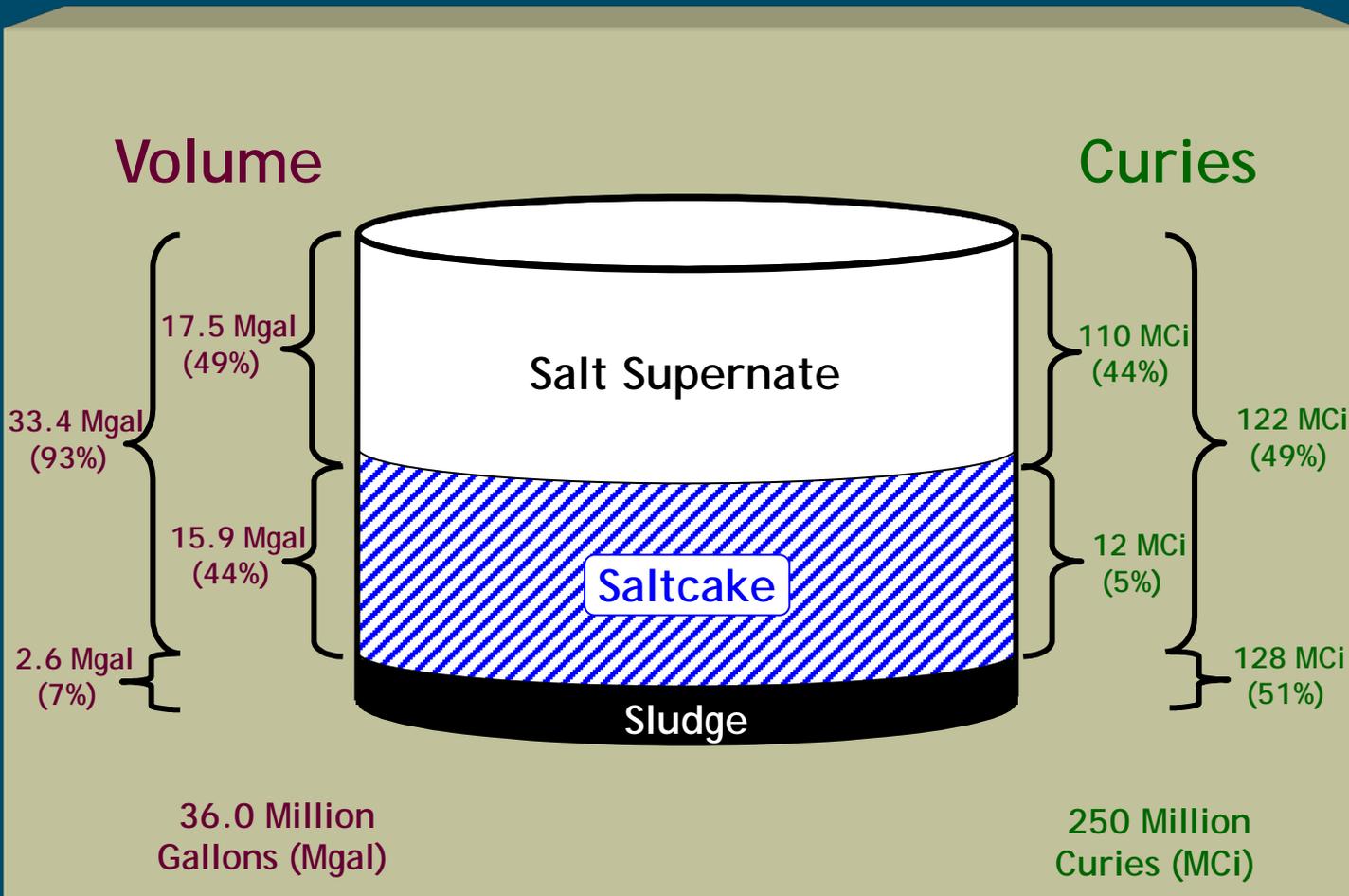
We do the right thing.



We do the right thing.



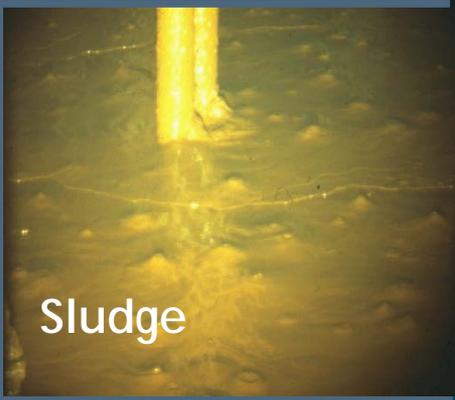
We do the right thing.



Salt Supernate



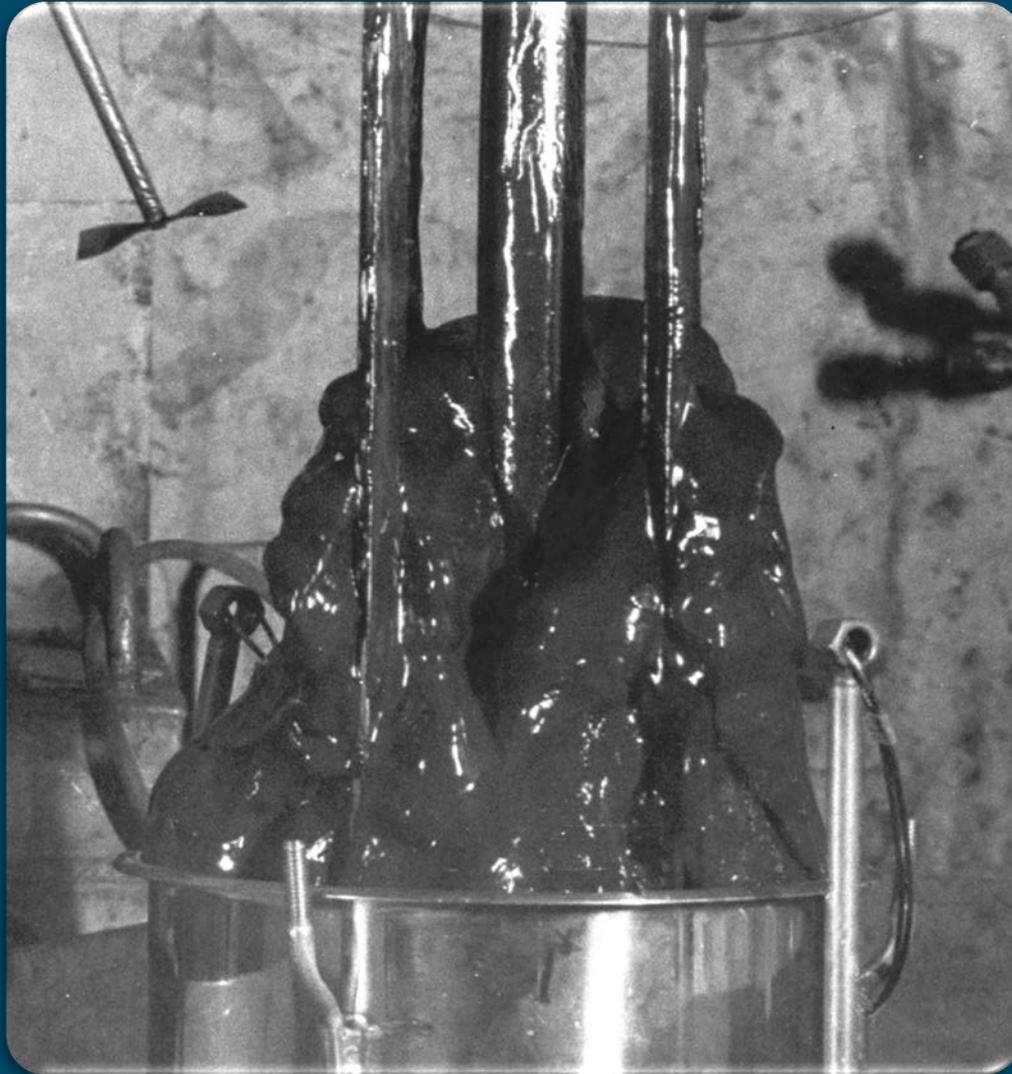
Saltcake



Sludge

Inventory values as of 2015-12-31

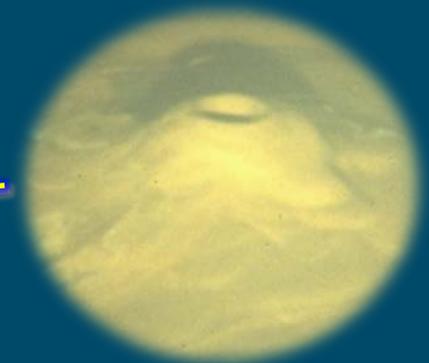
We do the right thing.



Sludge Stored in a Waste Tank

We do the right thing.

- Insoluble solids contained in the waste
- Settles to the bottom of a tank
- Consistency of thin peanut butter
- 7% of volume (2.6 million gallons)
- 51% of radioactivity (128 million curies [Ci])



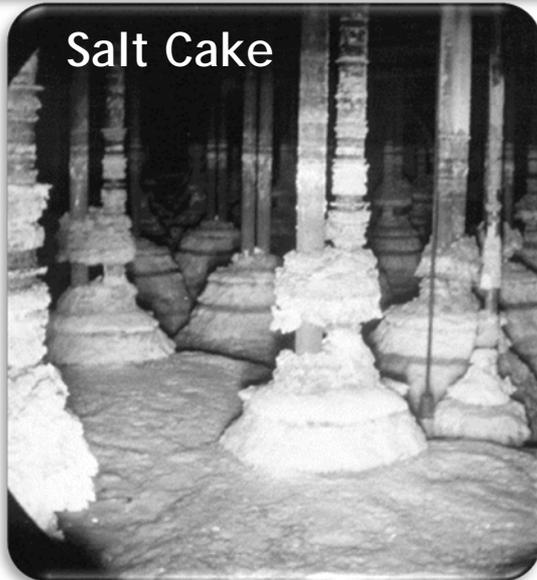
Hydrogen (generated from radiolysis) bubbles up through the sludge

We do the right thing.

Concentrated
Supernate

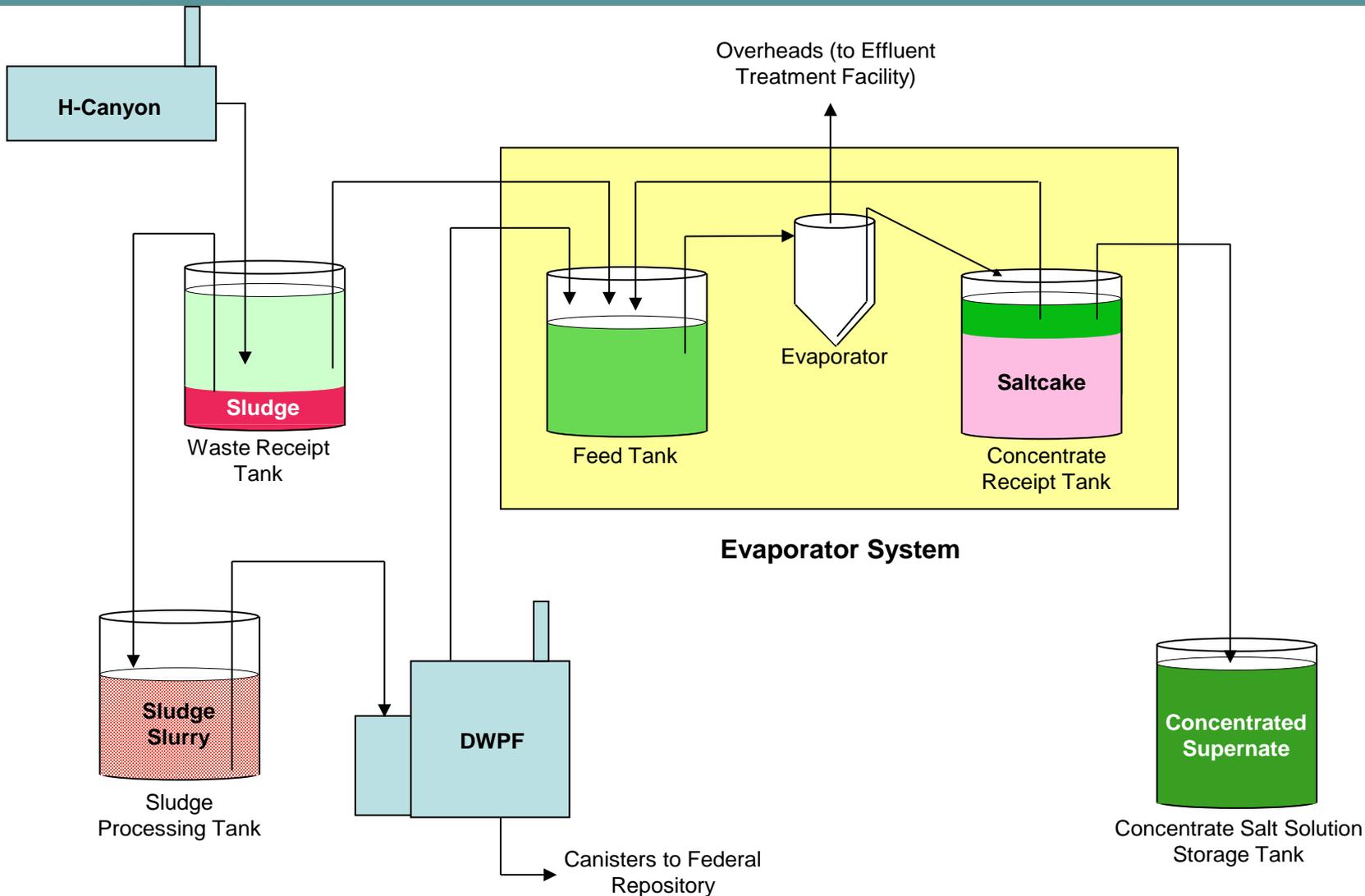


Salt Cake

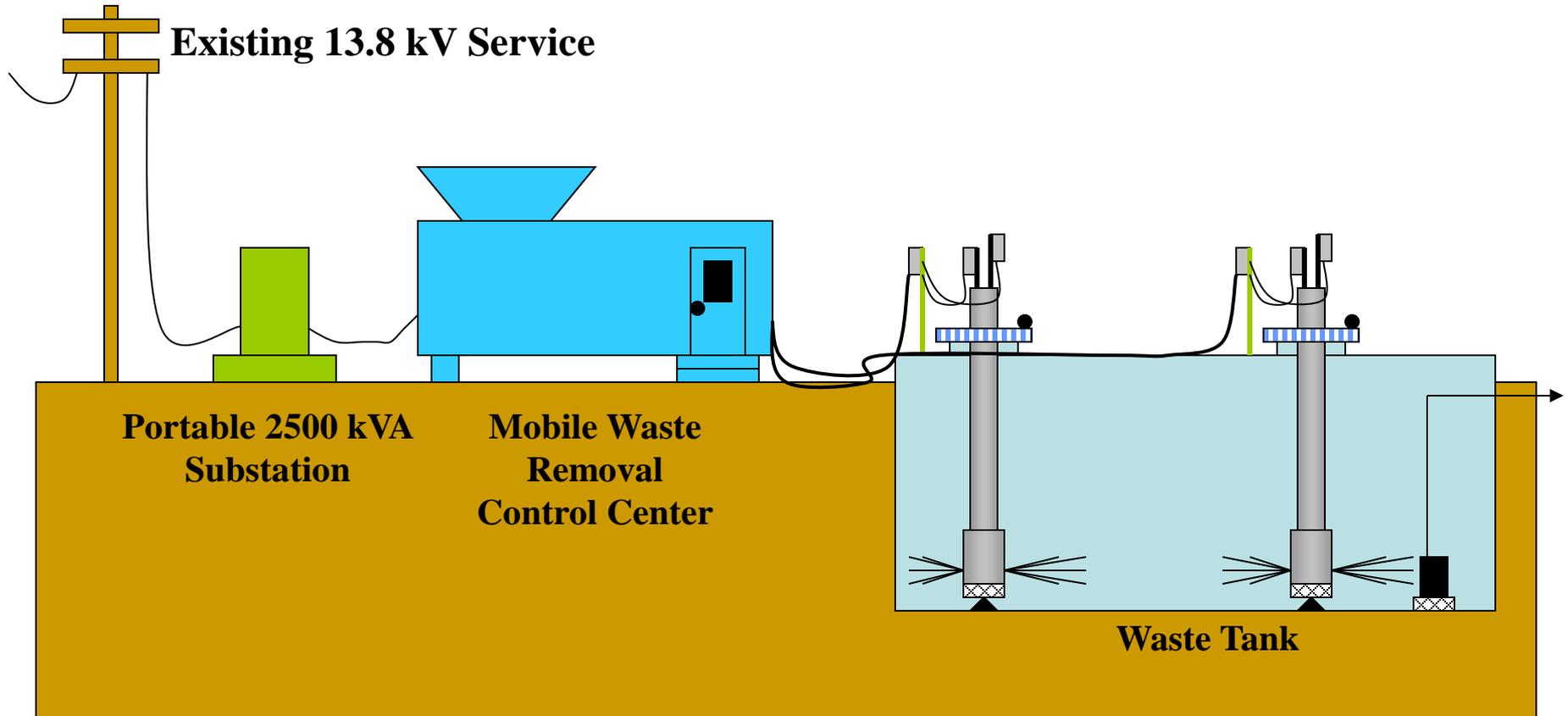


- **Liquid portion of the waste**
- **Contains dissolved salts**
- **Stored in three forms**
 - Decanted liquid ...
 - Supernate**
 - After evaporation ...
 - Concentrated Supernate**
 - Salt Cake** (crystallized out of solution)
- **93% of volume (33.4 million gallons)**
- **49% of radioactivity (122 million curies)**
- **Primarily Cesium-137**

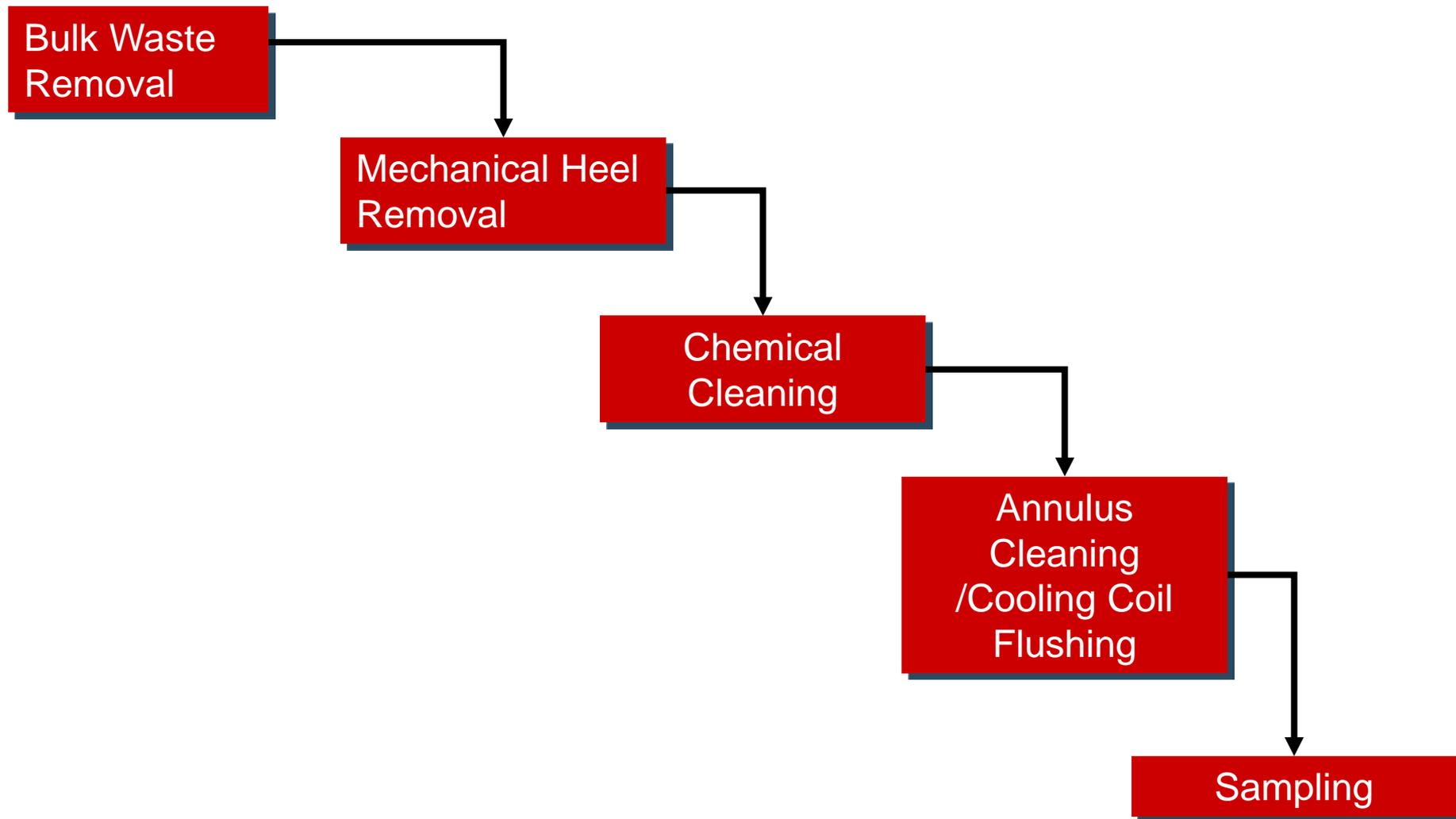
We do the right thing.



We do the right thing.

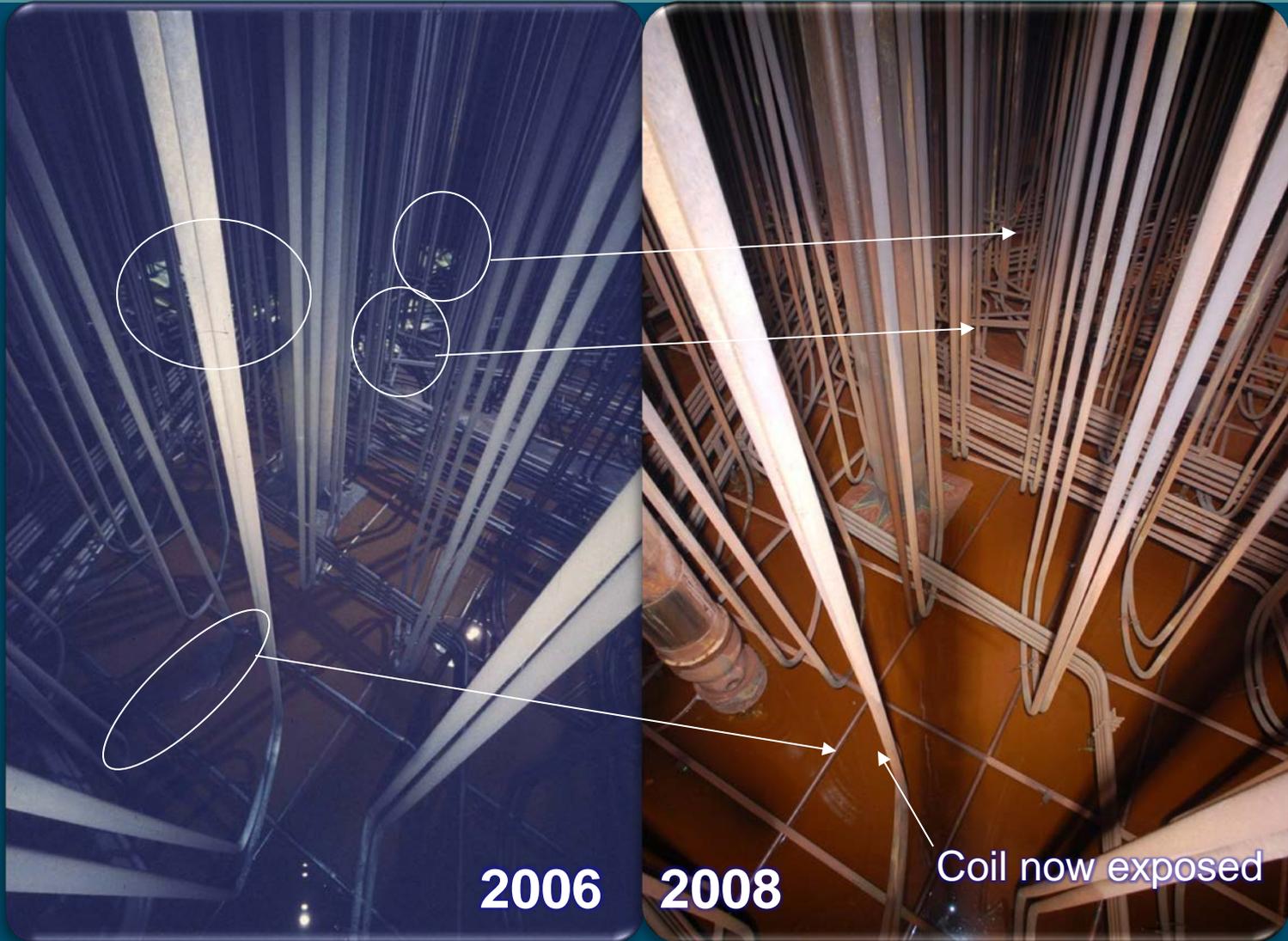


We do the right thing.

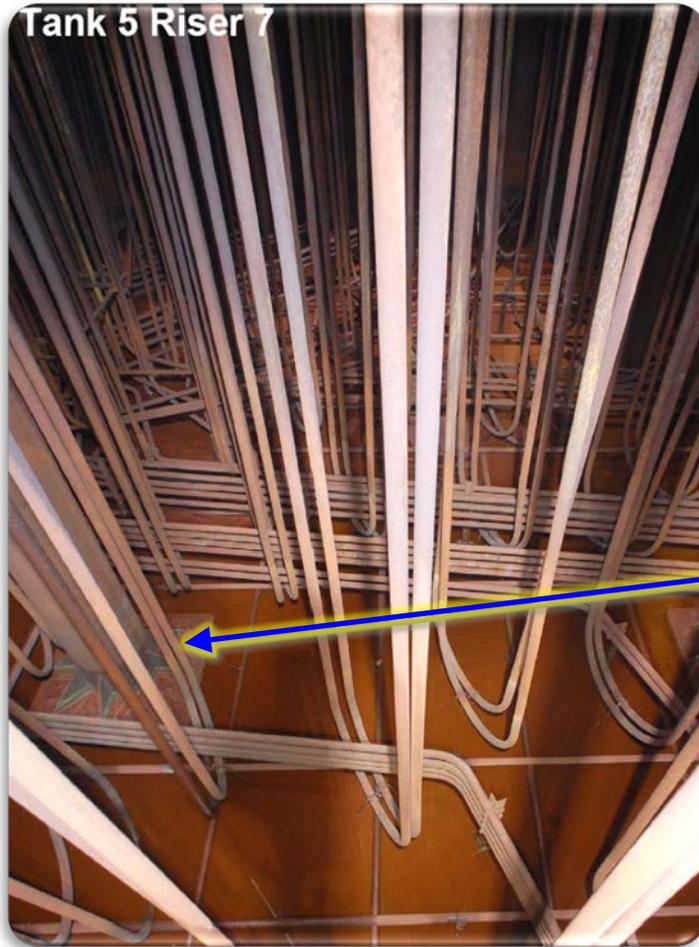


Tank 5 - Chemical Cleaning Results

We do the right thing.



We do the right thing.



We do the right thing.

Resulted in Waste
Leaking
into Annuli of 12
Tanks

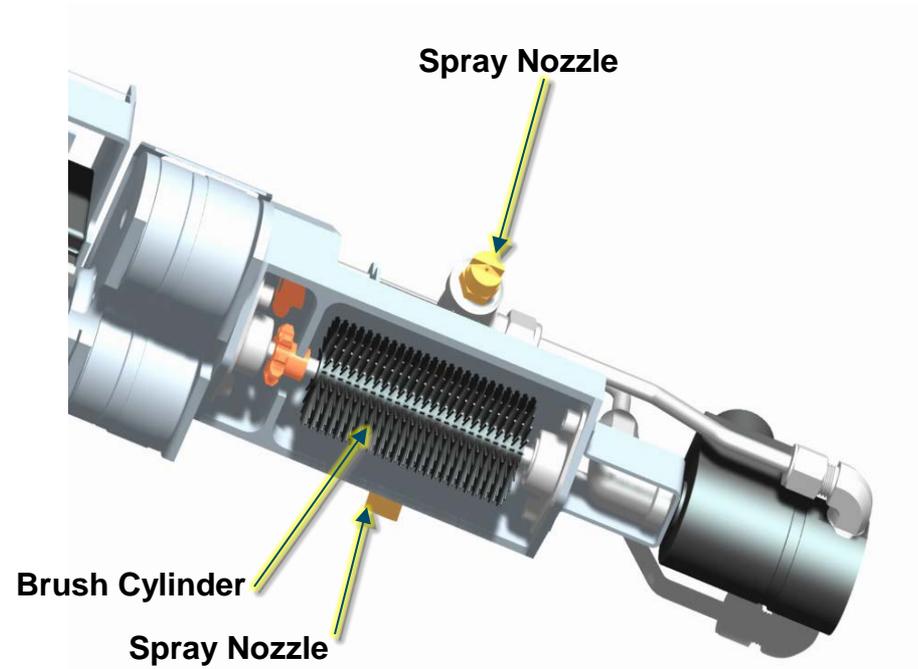
5 foot
Annulus Pan



Primary
Tank Wall

Crystallized
Salt
Supernate

We do the right thing.



- Wall Crawler used to clean and inspect Tks 5 & 6 annulus wall (Tank 5 ~ 10 gallons of salt - Tank 6 ~ 90 gallons of salt)

We do the right thing.



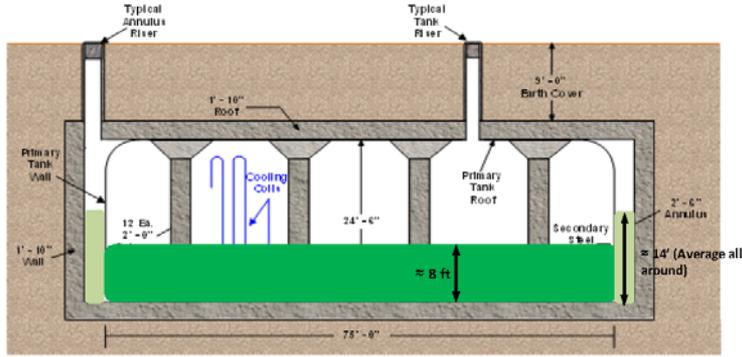
We can get
some tanks
nearly clean

12" x 12" x 3/8"
construction
plates

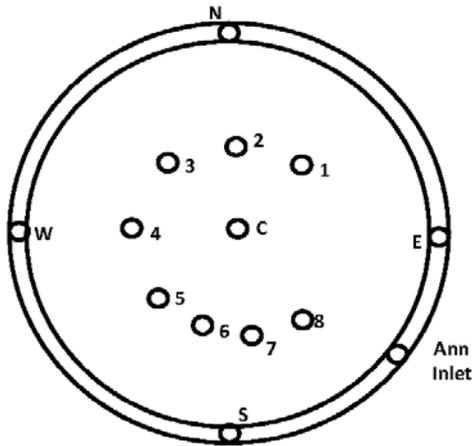
July 16, 1996

We do the right thing.

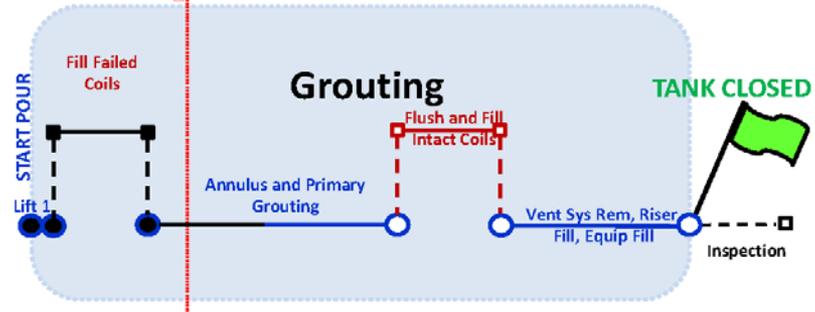
Tank 12 Bulk Fill – 34.8 % Complete



Type I Tank Profile View



Type I Tank Plan View



GROUT DELIVERY NUMBERS

Total Volume ≈ 4,529 yd³
 8 yd³ per Truck
 6 Trucks per Hour (max)
 Pour 7 Hrs each 10 Hr Day
 ≈ 336 yd³ per Day (max)
 4 Days per Week

NOTES

This Week
 No safety events this week
 94,118 gallons of grout – 467.5 cubic yards of grout – 59 trucks

Tank 12 Total To Date
 No safety events
 318,406 gallons of grout
 1,576.5 cubic yards of grout
 199 trucks

28 of 28 failed coils – Complete
 0 of 20 pieces of equipment
 0 of 8 intact cooling coils
 0 of 13 risers complete

GROUT LIFTS

Approximate Values per Tank

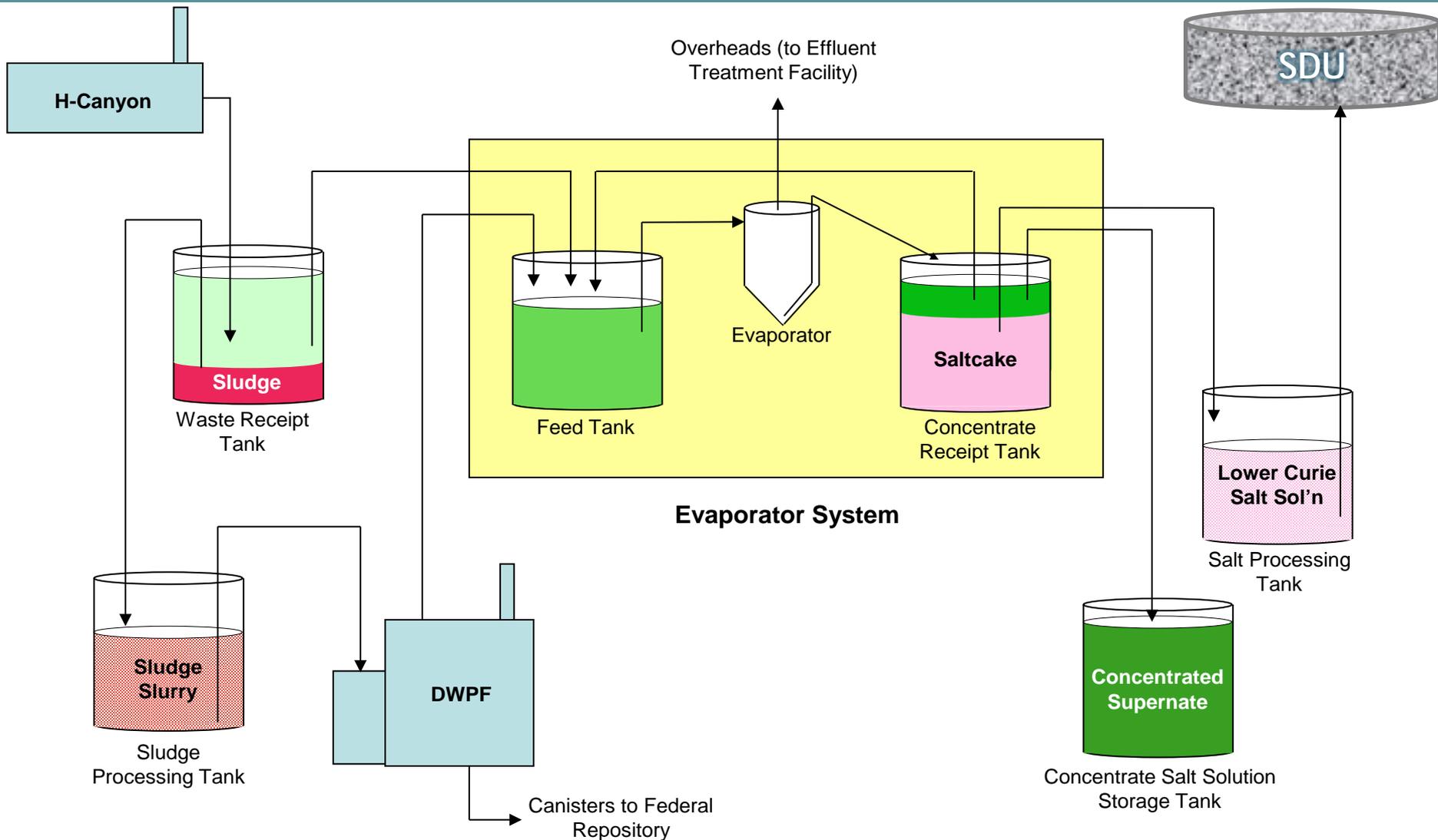
LIFT	yd ³	Trucks	Gallons
1	322	40	65,000
2	23	3	4,500
3	32	4	6,500
4	483	60	97,500
5	203	25	41,000
6	1,610	201	325,000
7	225	28	45,500
8	1,530	191	309,000
9	101	13	20,500
Total:	4,529	565	914,500

- Grouting Risk Tracking**
- Weather Delays – 2 hr delay, each of 3 days total to date, due to cold weather. 2 days lost to rain. Total weather delays to date 26 hours (2 work days, and 6 hours).
 - Grout Delivery Issues – Only 6 trucks in the rotation days 2 and 4 of grouting delayed progress. 3 trucks rejected due to out of spec flow/spread on 2/10.
 - Readiness Rework – none to date
 - Annulus / Coil Fill Issues – none to date
 - Equipment Issues – none to date
 - Resource Limitations – none to date
 - In-process Inspections Delays – none to date
 - Grout Flowability Issues – none to date

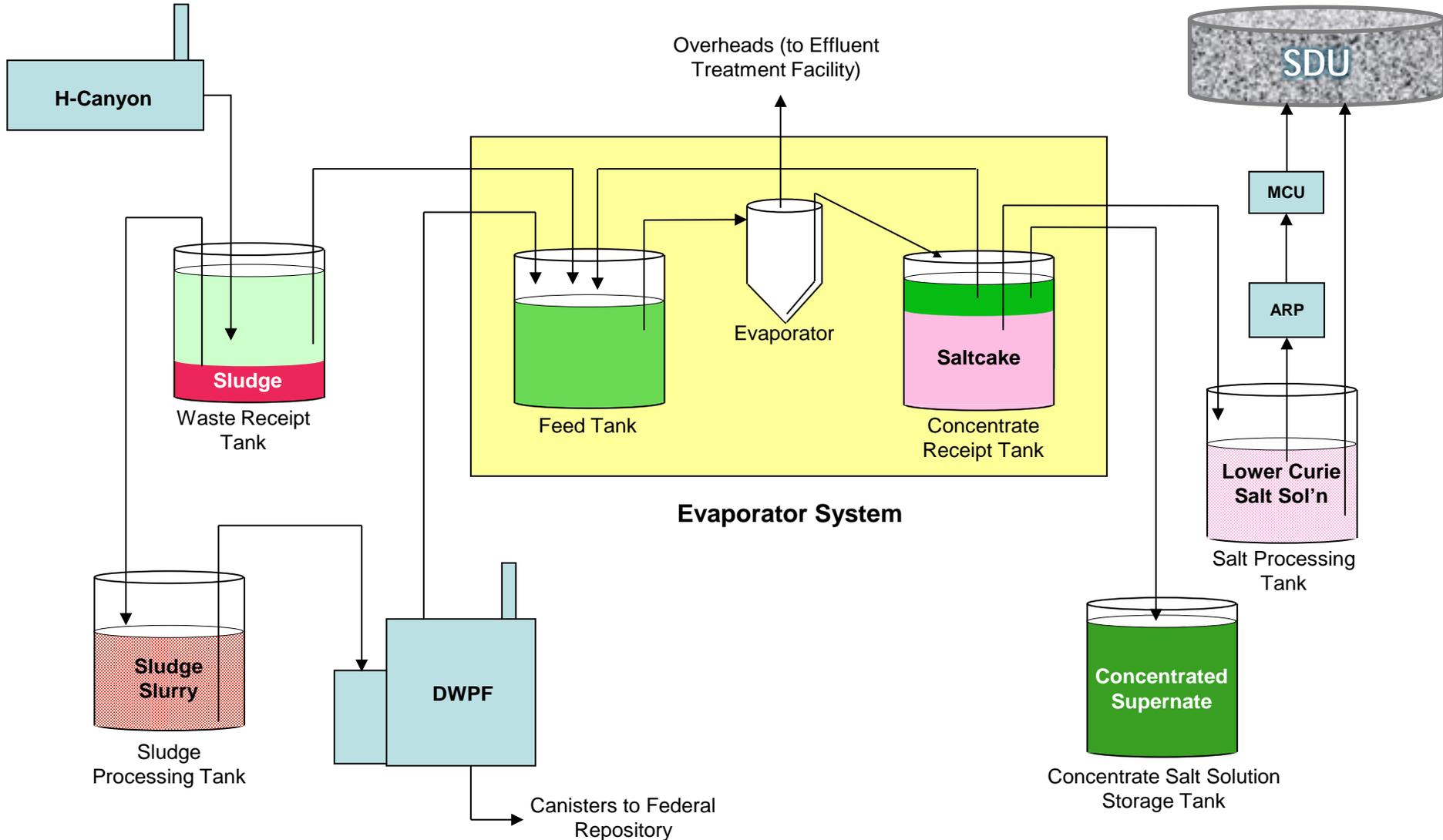
We do the right thing.



We do the right thing.

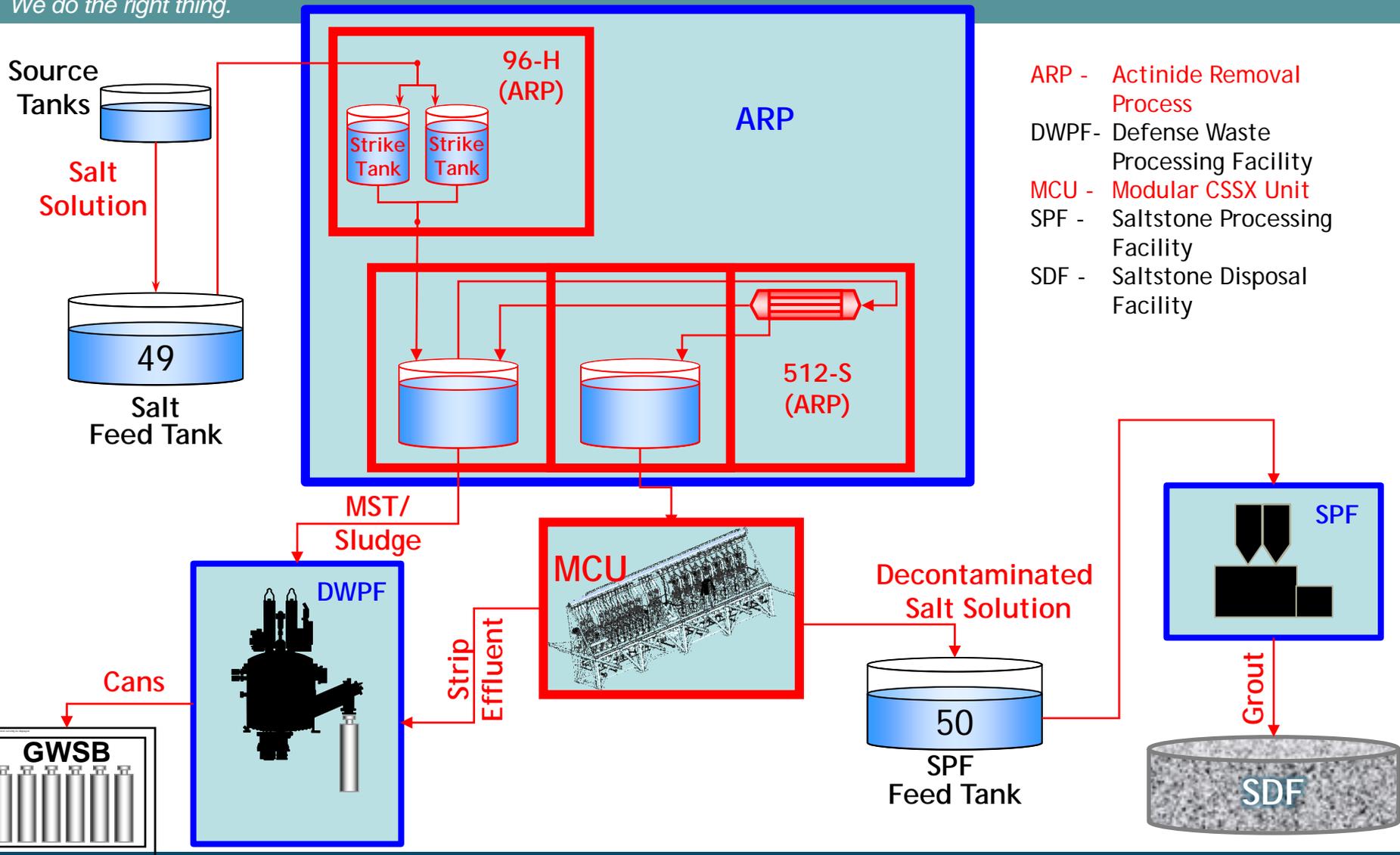


We do the right thing.



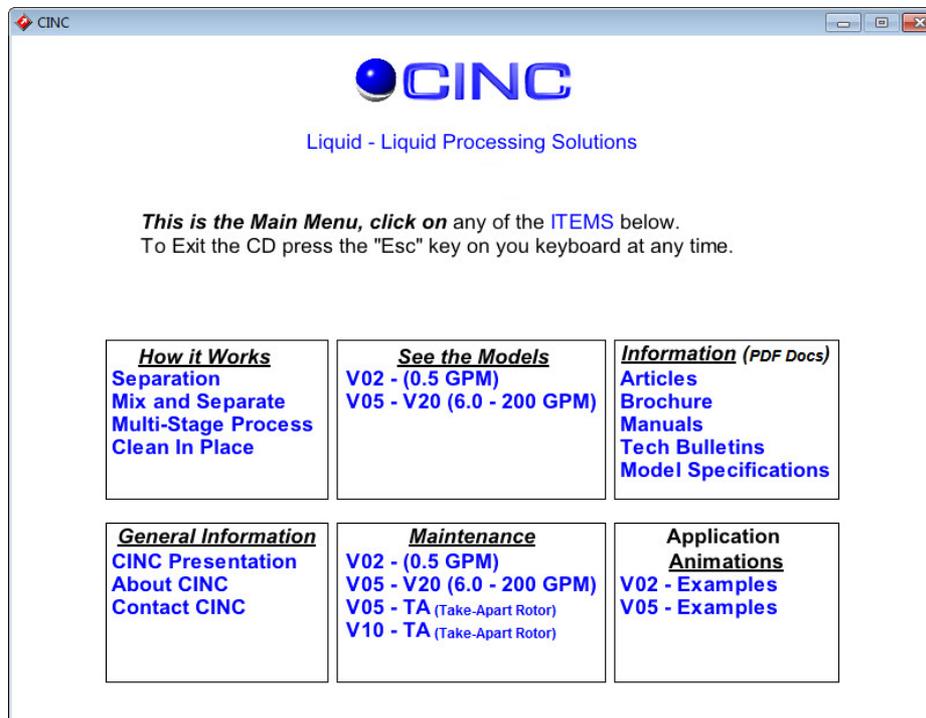
ARP/MCU Flowpath

We do the right thing.

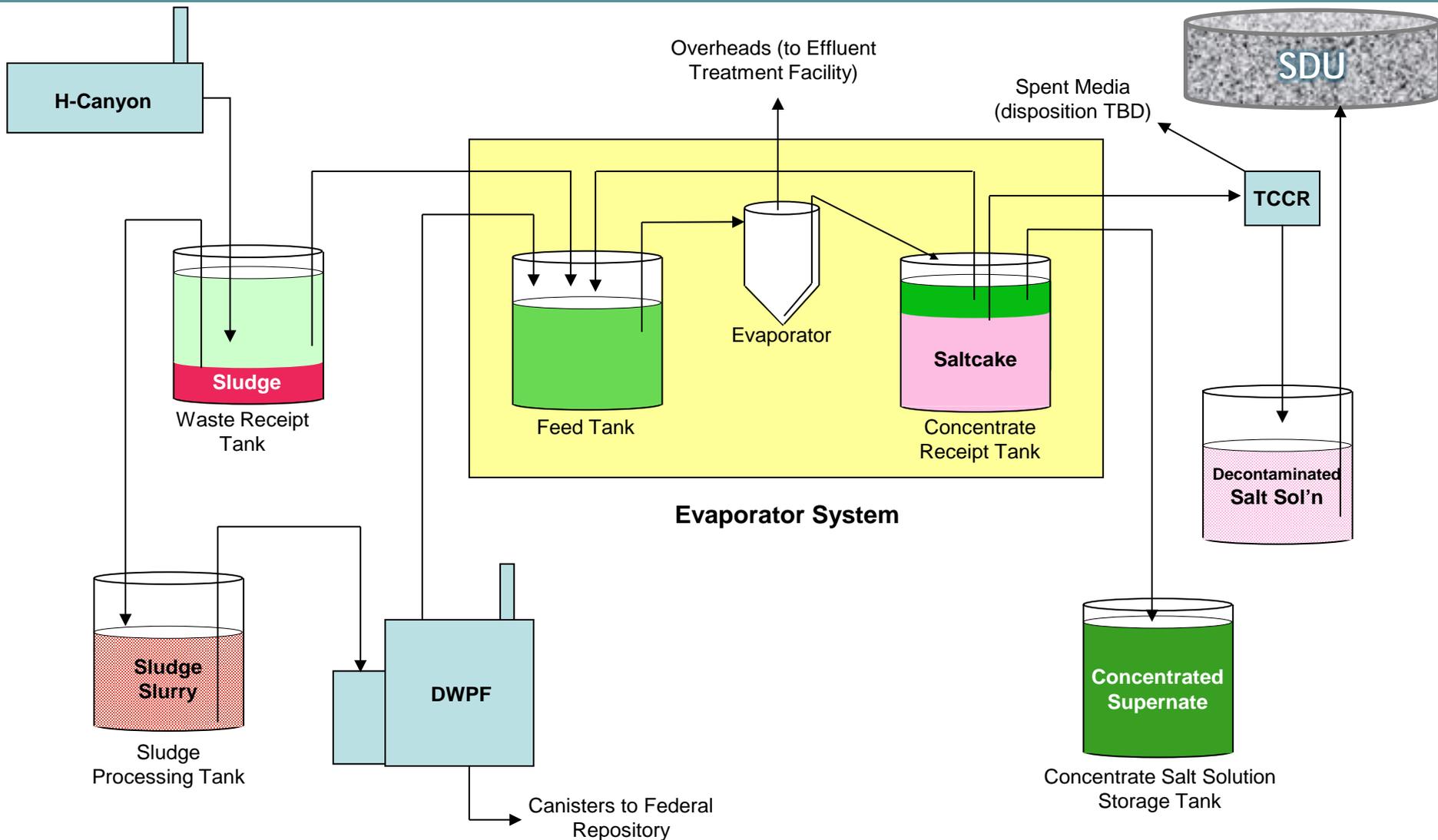


- ARP - Actinide Removal Process
- DWPF- Defense Waste Processing Facility
- MCU - Modular CSSX Unit
- SPF - Saltstone Processing Facility
- SDF - Saltstone Disposal Facility

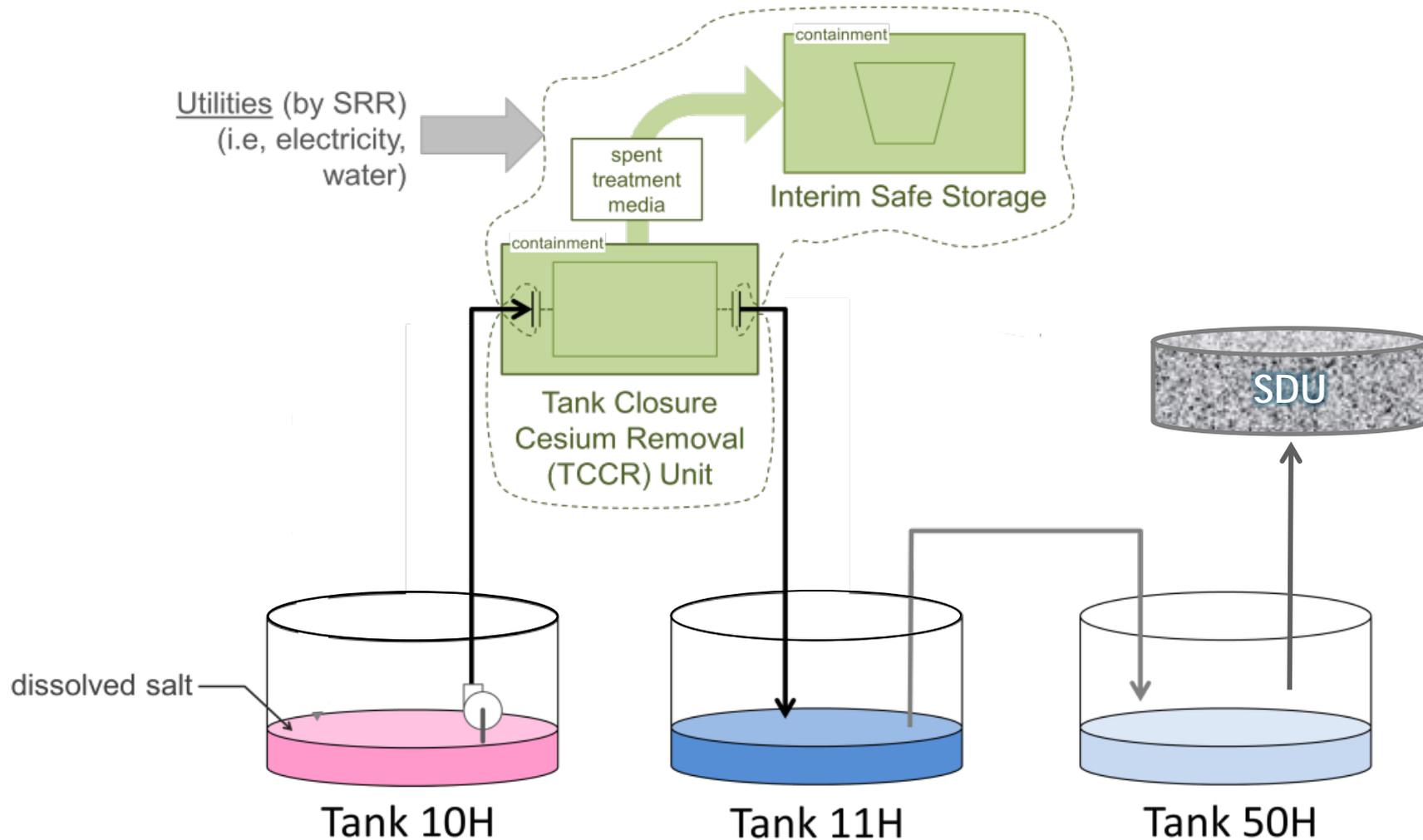
We do the right thing.



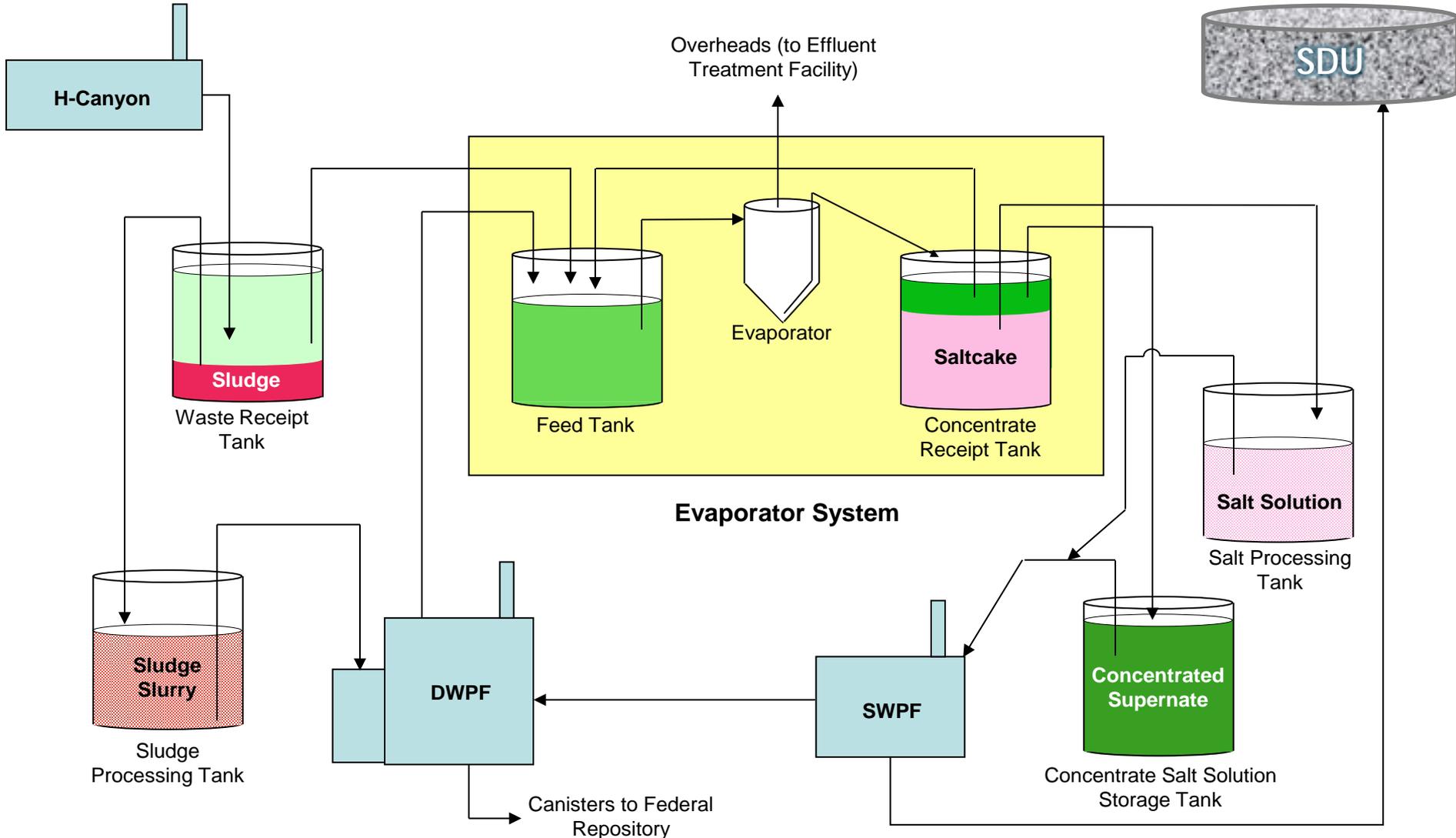
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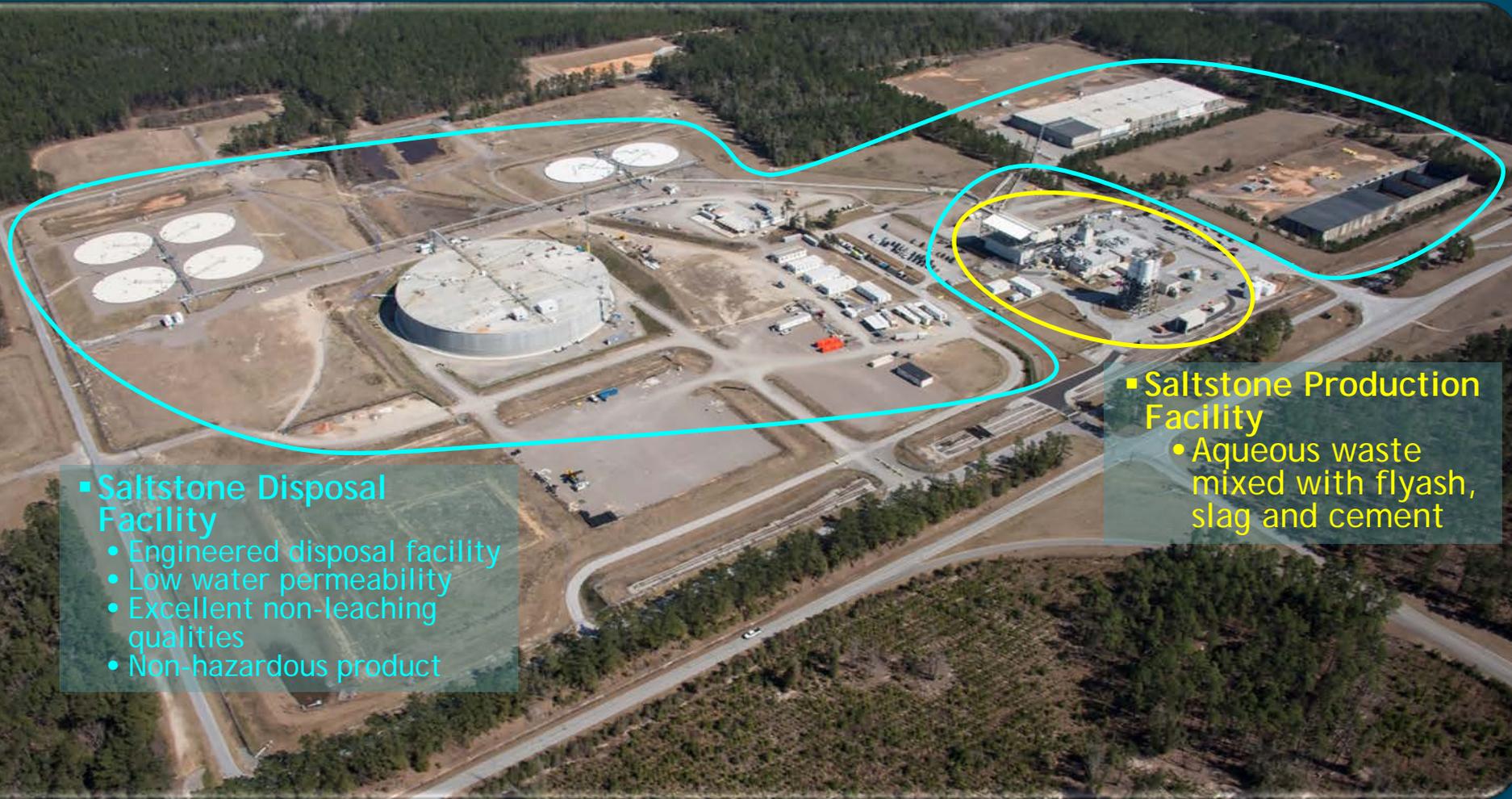
We do the right thing.



We do the right thing.



We do the right thing.



- Saltstone Disposal Facility
 - Engineered disposal facility
 - Low water permeability
 - Excellent non-leaching qualities
 - Non-hazardous product

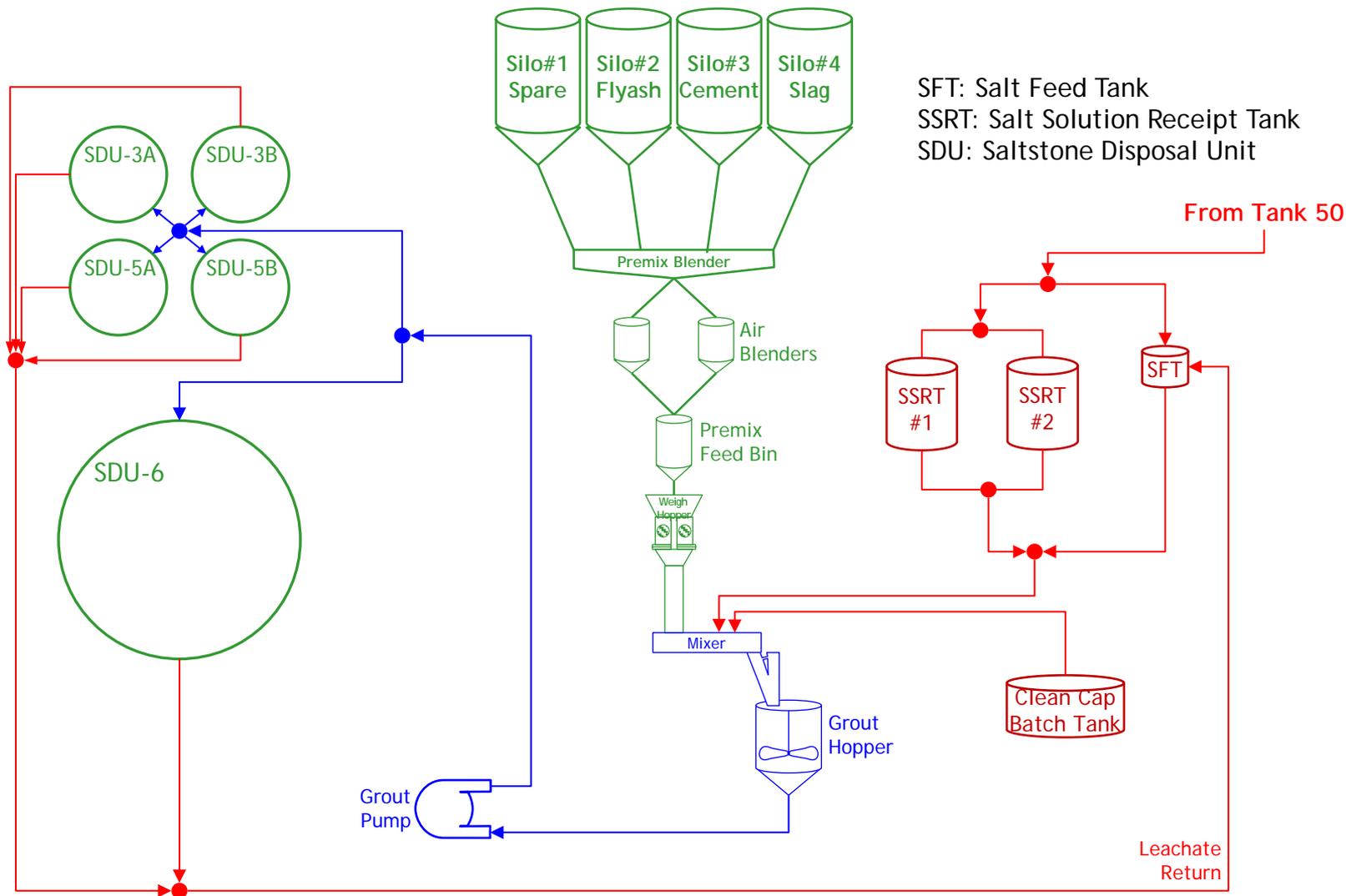
- Saltstone Production Facility
 - Aqueous waste mixed with flyash, slag and cement





Saltstone Flow Diagram

We do the right thing.



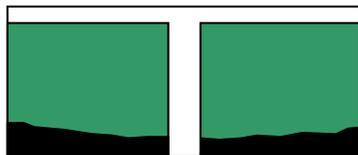
We do the right thing.



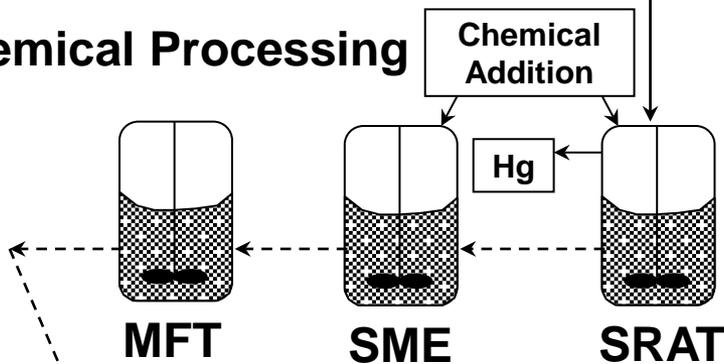
DWPF receives waste for processing from H Tank Farm. The waste is “vitrified” and poured into stainless steel canisters that are sealed and decontaminated.

We do the right thing.

**H-Tank Farm
(Tank 40)**



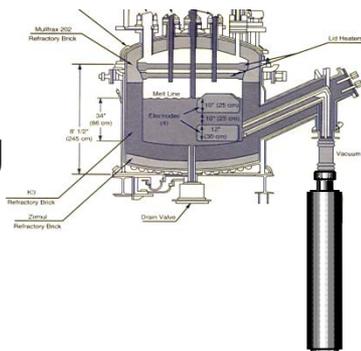
DWPF Chemical Processing



Glass Waste Storage Building



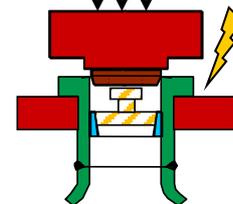
Glass Melting



Canister Cleaning

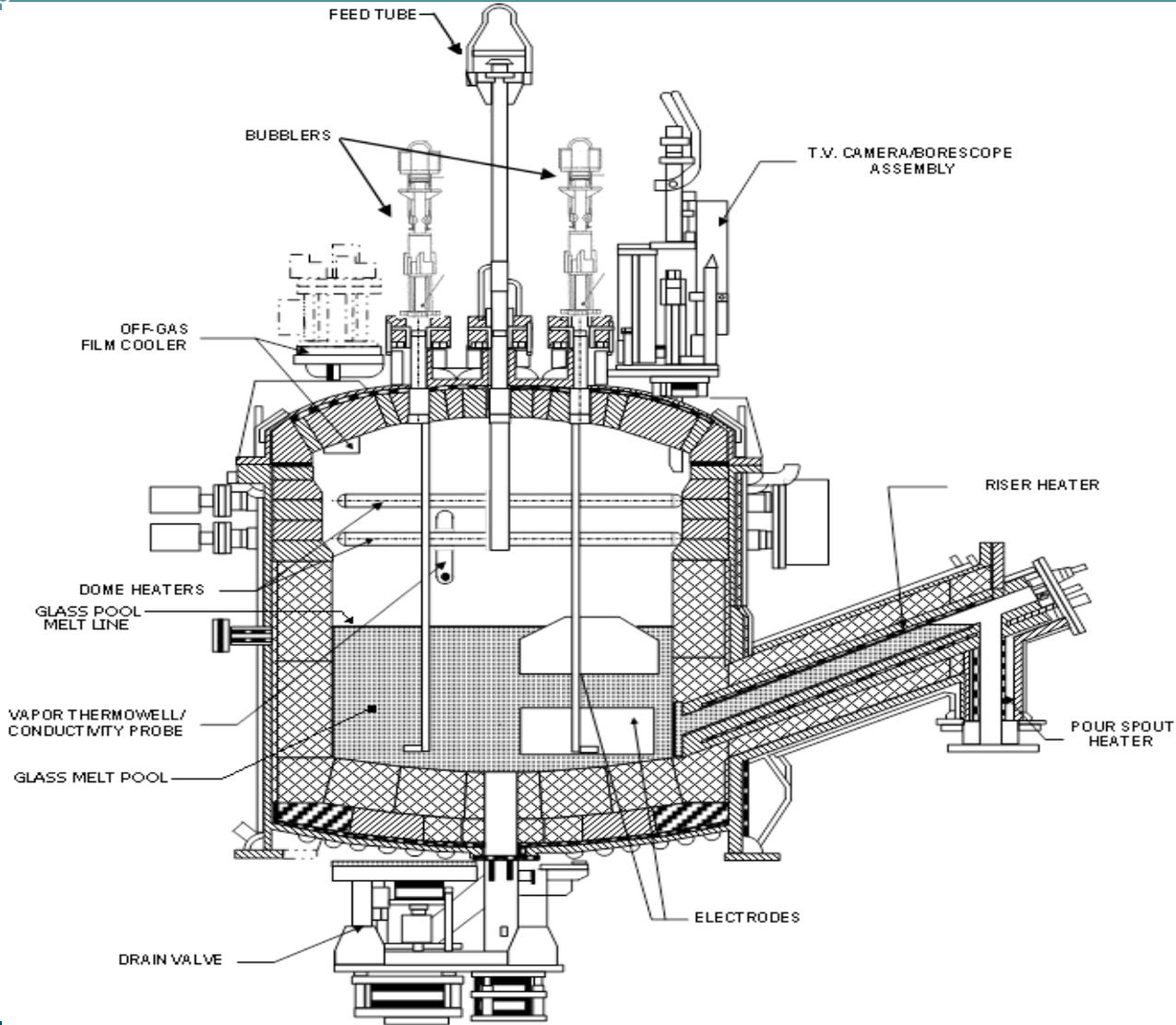


Welding

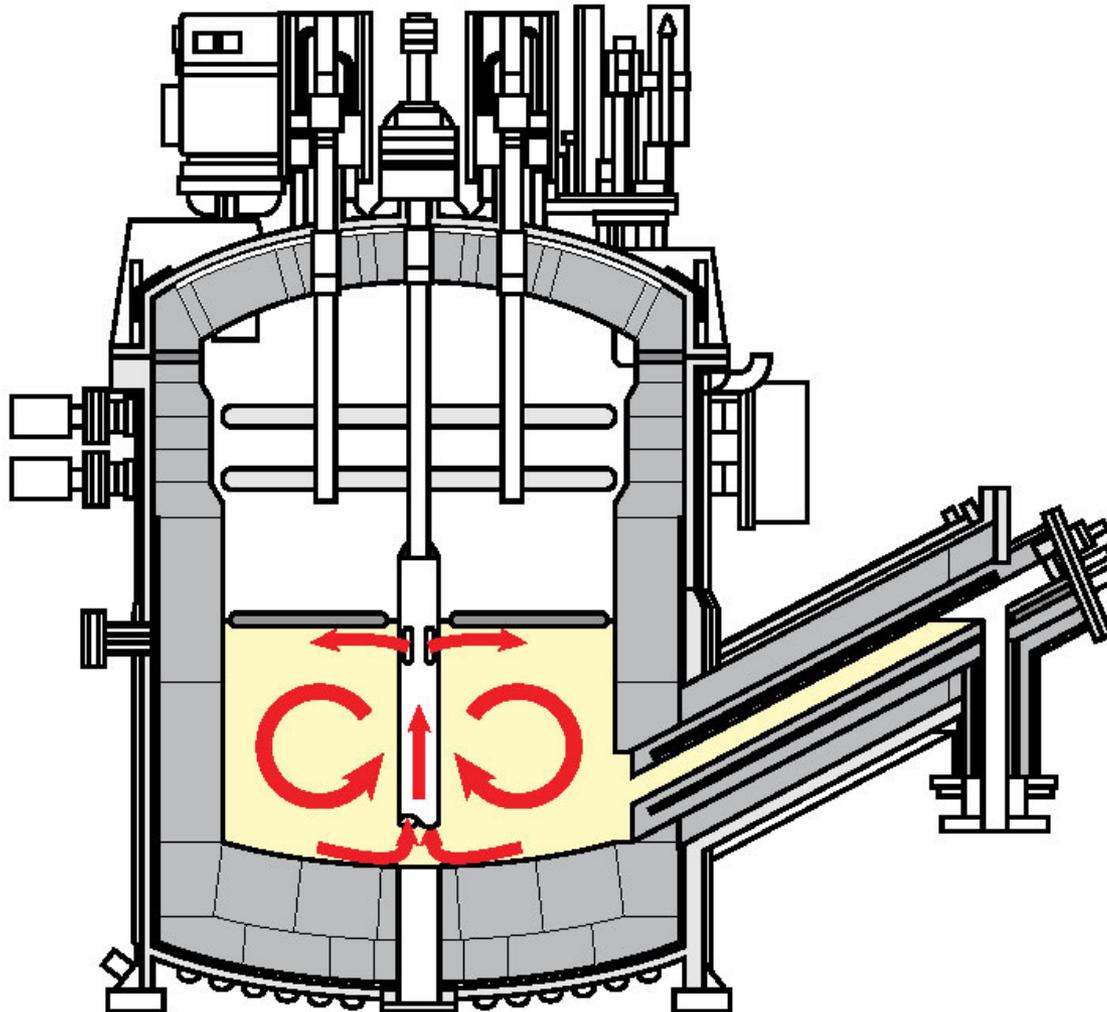


Largest Vitrification Plant in the World

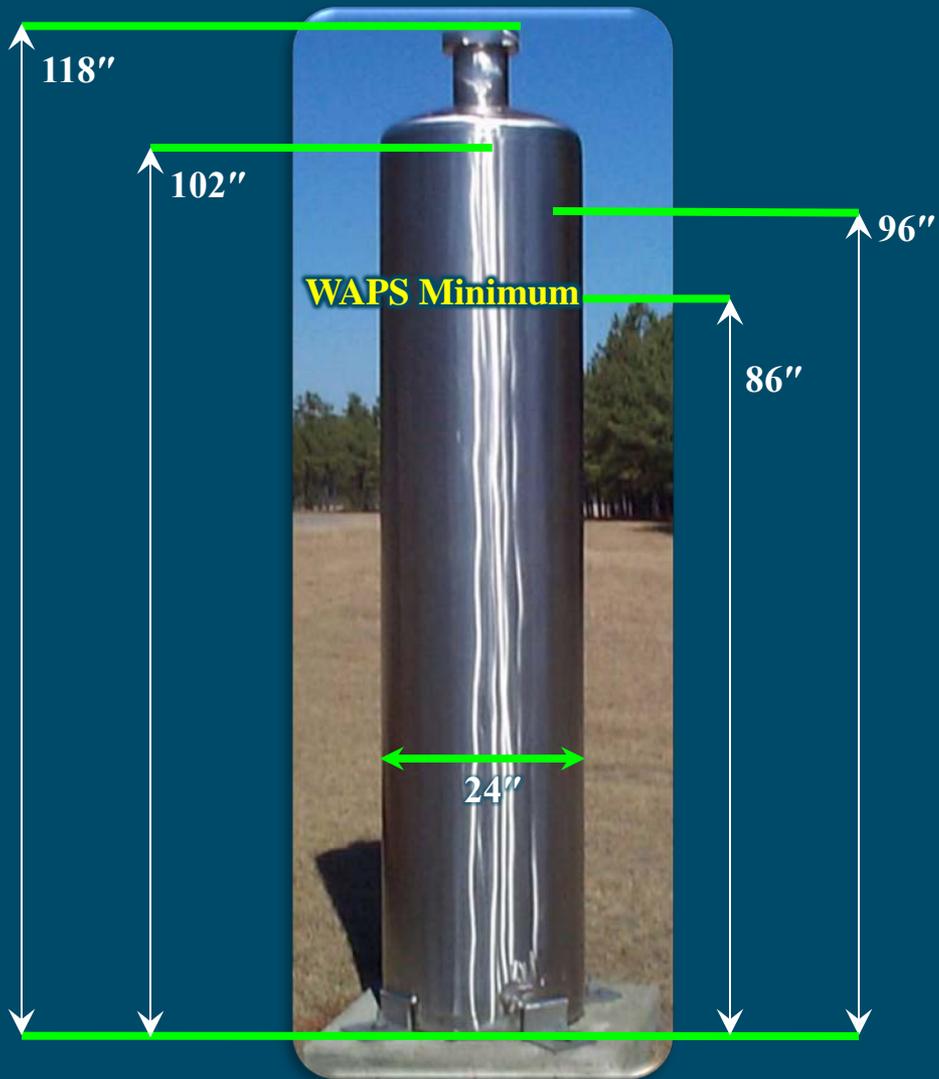
We do the right thing.



We do the right thing.



We do the right thing.



Filled Canister

Materials: 304L Stainless Steel
Empty Weight: 1,150 lbs.
Glass Weight: 4,000 lbs.



We do the right thing.

- ▶ **Canisters**
 - Filled
 - Cleaned
 - Sealed . . .
- Ready for Transport*



We do the right thing.

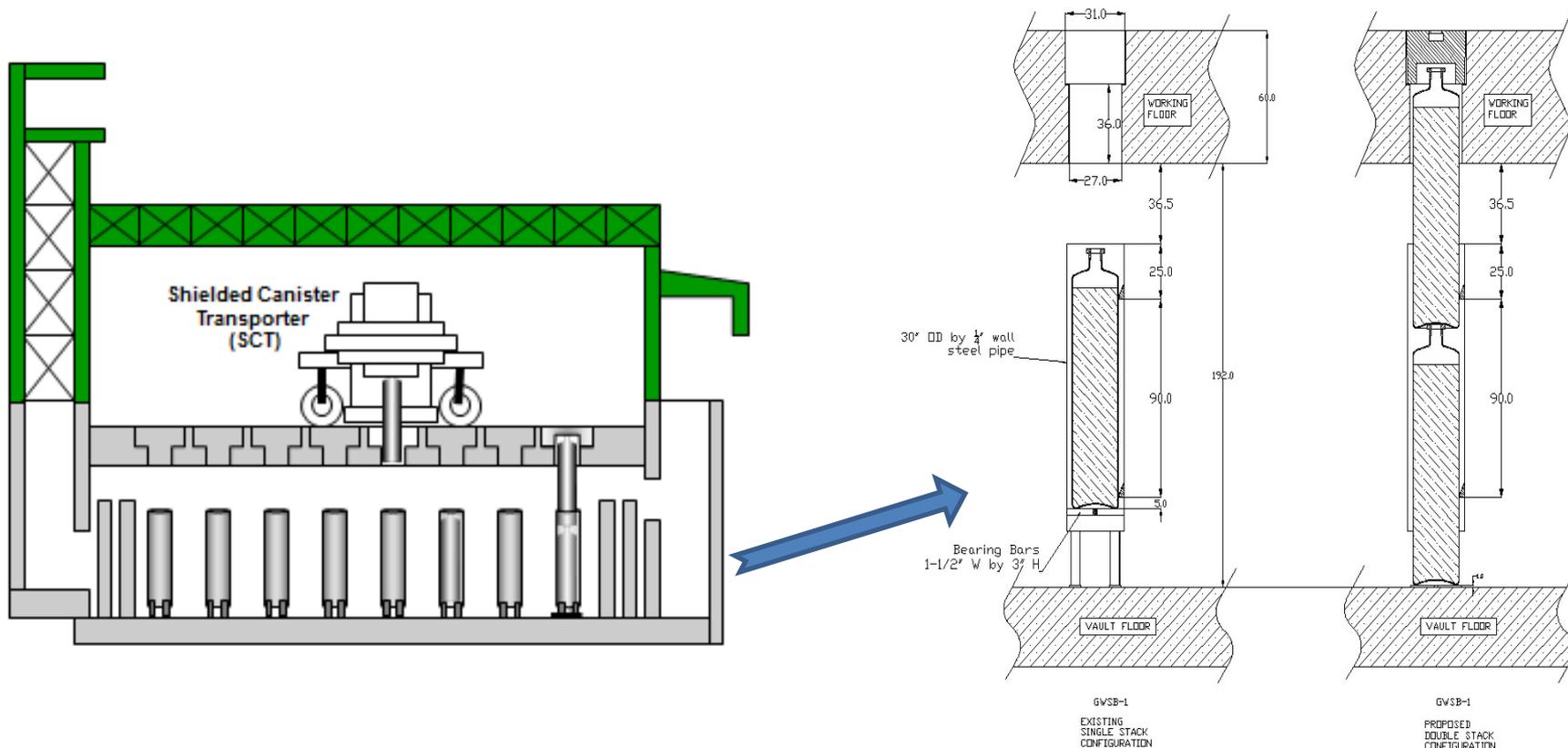


Glass Waste Storage Building #1
provides earthquake-resistant, safe
interim storage for radioactive
waste canisters



Glass Waste Storage Building #2
provides interim storage for an
additional 2500 canisters

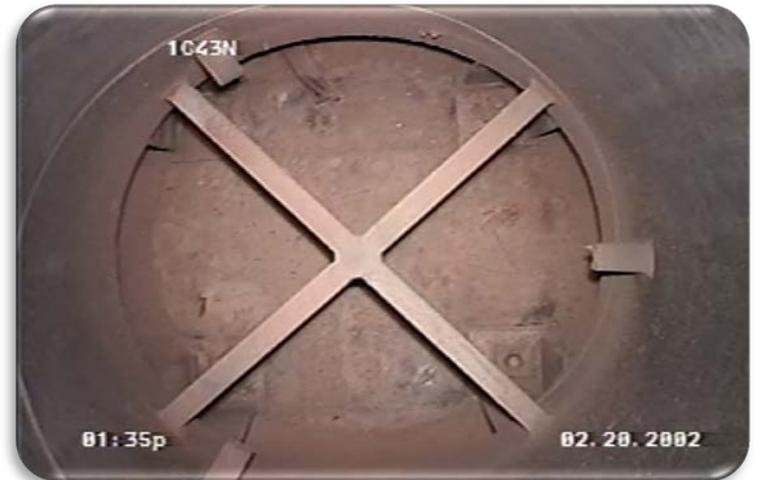
We do the right thing.



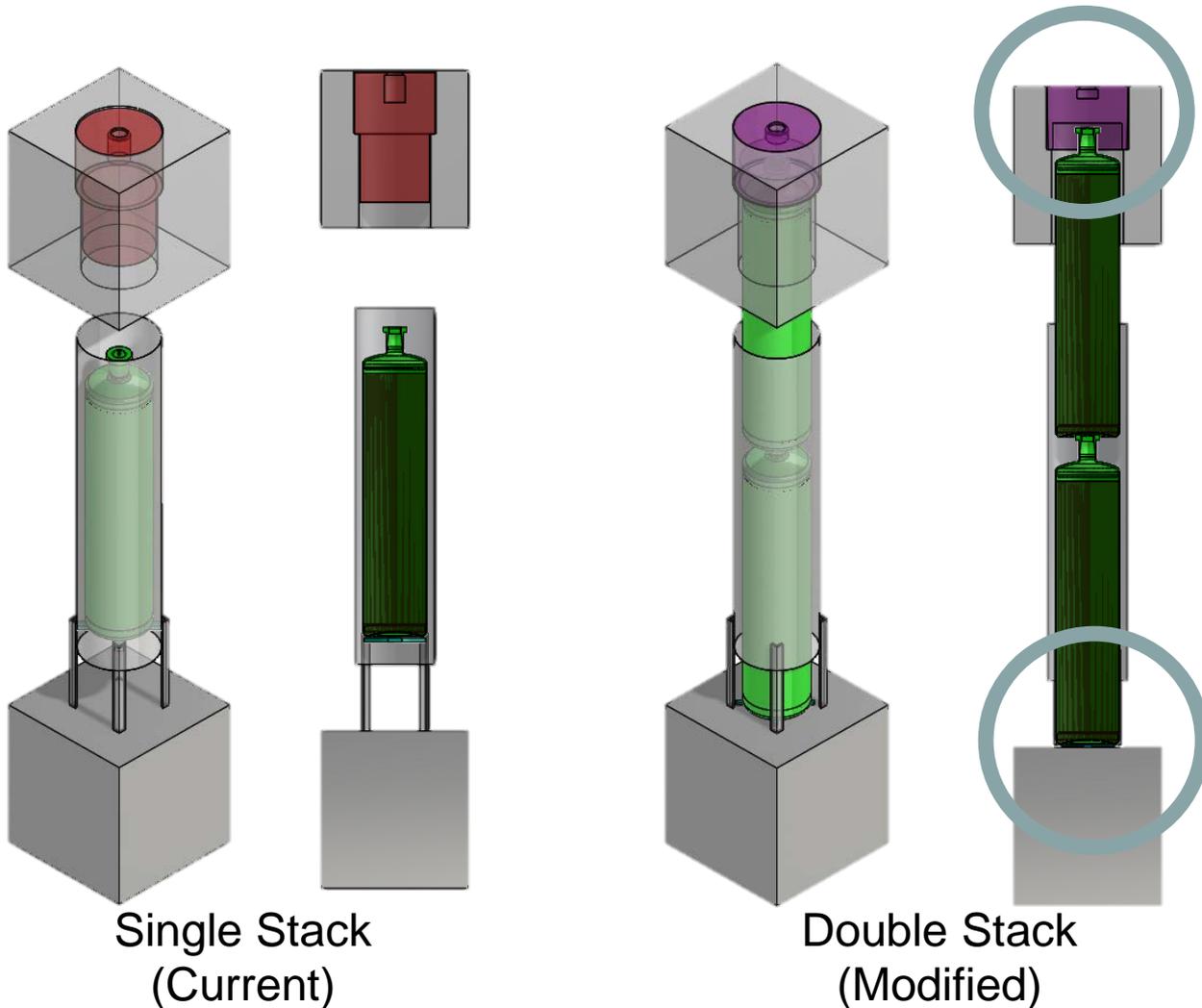
- Two canisters per location (vs. one can per location)
- Lower canister on support plate on vault floor (vs. cross bar support 3' off floor)
- Upper canister placed directly on top of lower canister
- Upper canister extends into operating deck floor, but remains below grade
- Shield plug redesigned for equivalent radiological protection

We do the right thing.

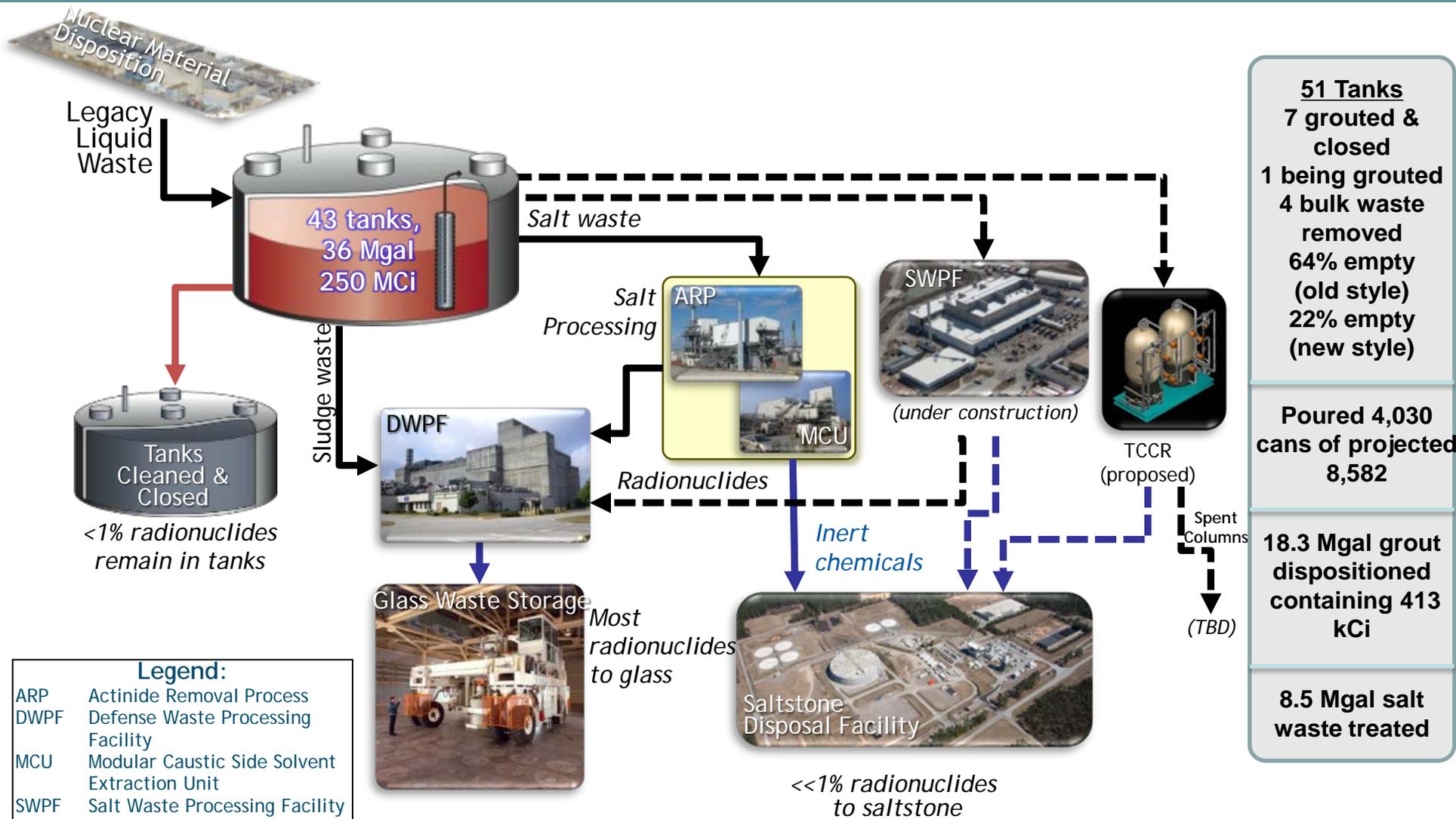
- **Inside vault looking across rows of canister supports**
- **Inside canister storage location**
 - Minimum Opening in floor is 27 inch ID
 - Cross Bar Assembly is 1 ½ inch x 3 inch galvanized carbon steel bars
 - Cross Bar Assembly~ 18 ft down with 30 inch OD
 - 2 sets of guides (3 tabs each) to guide canisters
 - Bottom guides sit 5 inches above cross bar assembly



We do the right thing.



We do the right thing.



Legend:

ARP	Actinide Removal Process
DWPF	Defense Waste Processing Facility
MCU	Modular Caustic Side Solvent Extraction Unit
SWPF	Salt Waste Processing Facility