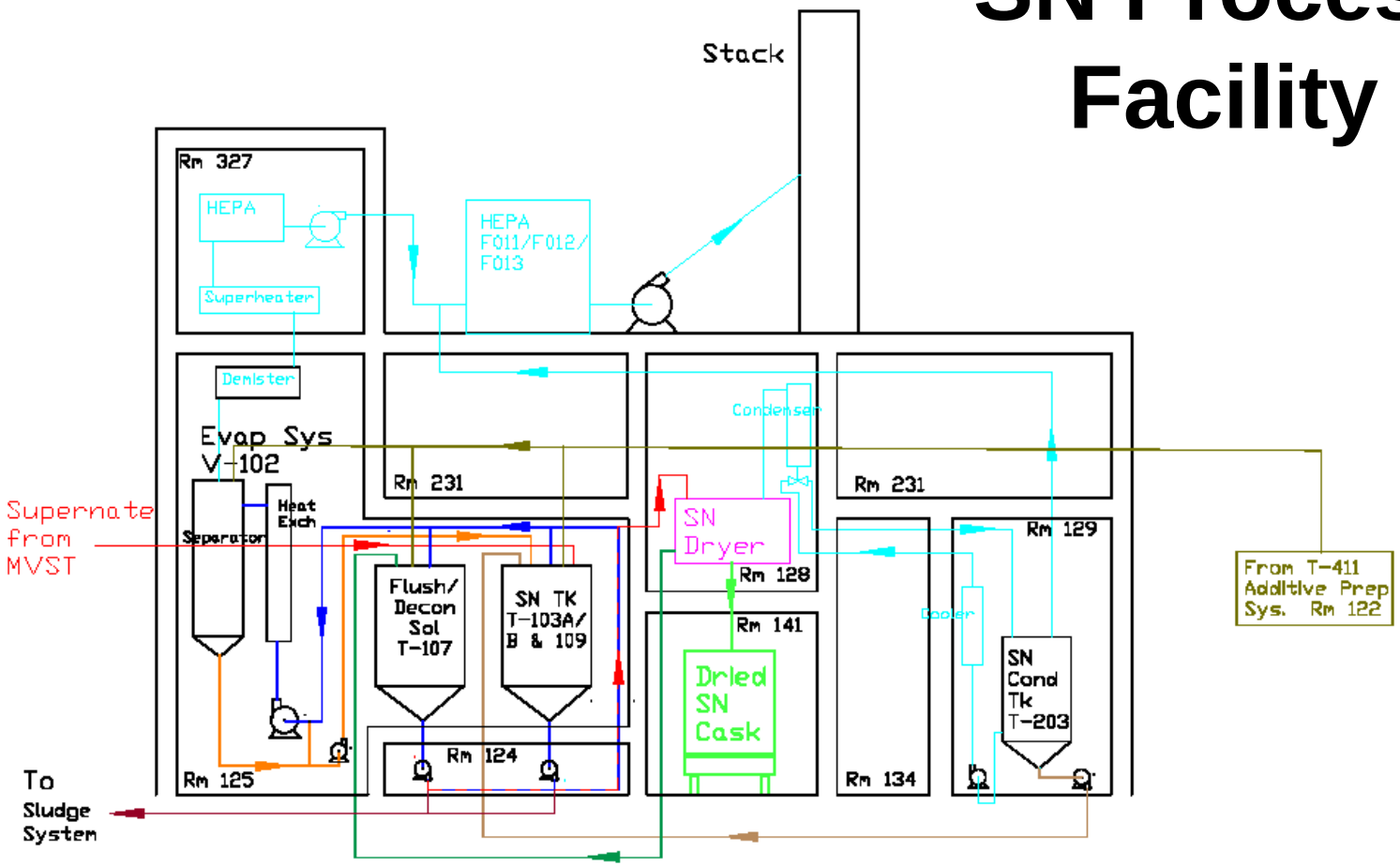
ORNL TRU Waste Processing Center
Tank Waste Processing
Supernate (SN) Processing System

Presented by Don F. Gagel
Vice President and Chief Technology Officer
EnergX LLC

WPF - Supernate Process Flow

SN Process Facility



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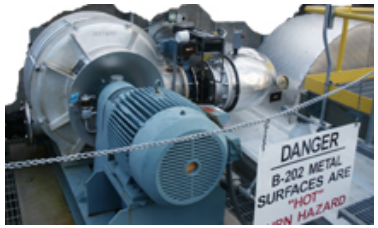
Waste Concentration Using Evaporator

Vapor stream exhausted to main ventilation system

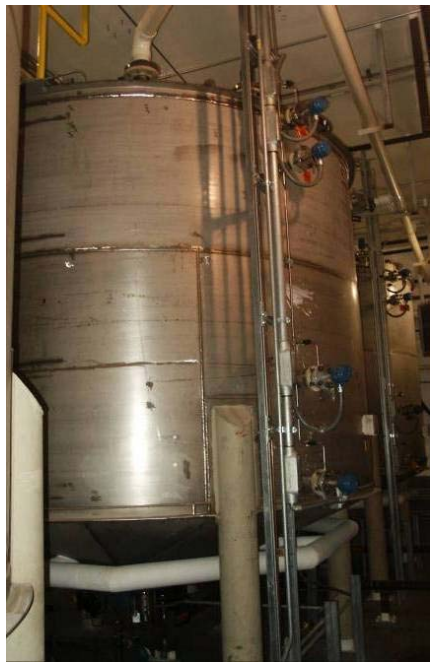
Evaporator Exhaust Blower



Supernate Pump

Vapor stream superheated and HEPA-filtered

Supernate Pump and Evaporator Discharge Pump circulate waste between selected tank and evaporator during concentration.



Supernate Tank

Evaporator Concentrates Waste

Evaporator Discharge Pump

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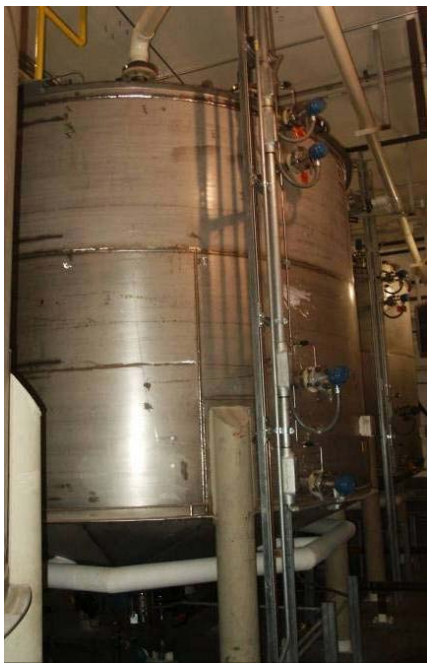
Tank Sampling/ Transfer To Dryer



Supernate Tank

Tank Sampled

Isolok Sampler

Statistical Process Control

Supernate Pump

Supernate Pump Transfers Wastes From Selected Tank To Dryer

Rotary Dryer

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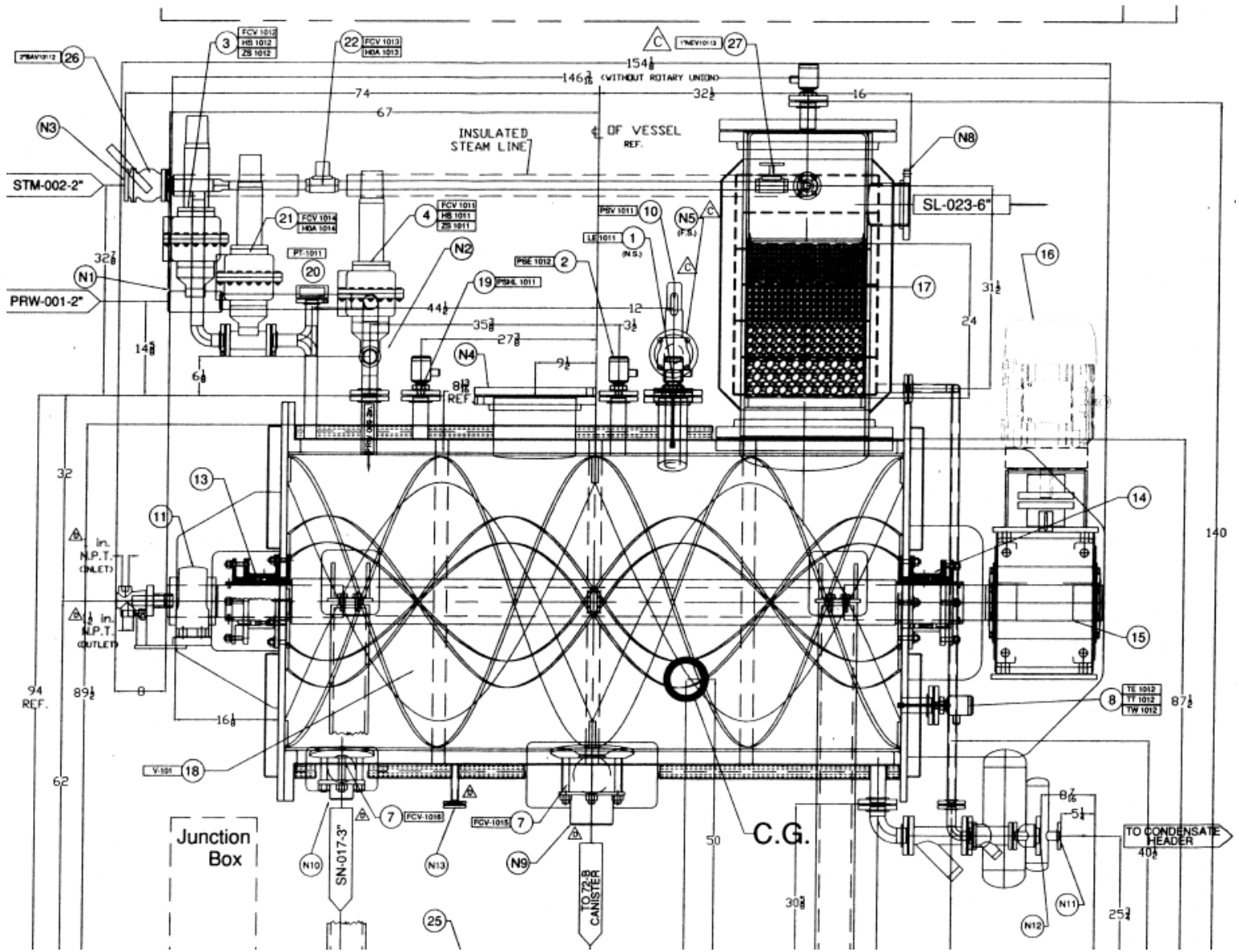
Dryer Schematic



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Waste Drying/ Transfer To Shipping Cask

Rotary Dryer

Metasilicate Hopper

Metasilicate Addition

Waste Form Gravity Fed to Cask Liner Via Waste Chute

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Waste Shipping

Supernate Bay Door

Cask & Liner Placed on Bogie to Receive Dryer Discharge

Cask Liner

Ship To NTS

Final Waste Form Attributes

- Zero bleed water at any time
- Low dose rate (1 R/hr on contact, much lower than 2004 Supernate campaign)
- Robust/solid monolith that is remote handled, high alpha LLW
- Non-hazardous at “Point of Generation”

SN Score Card

Average Burial Volume & Vol. Reduction for 2004 ORNL SN Campaign	
Starting Volume of SN (cubic meters)	1,600
Starting Volume of SN (cubic feet)	56,480
SN LLW Liners buried at NTS	97
NTS assigned burial volume (cubic feet per liner)	240
Actual waste volume (cubic feet per liner)	150
Actual waste volume (cubic feet)	14,550
SN Burial Volume 1st Campaign (cubic feet)	23,280
SN Burial Volume 1st Campaign (cubic meters)	659
Volume Reduction (starting vol./actual waste vol.)	**3.9**

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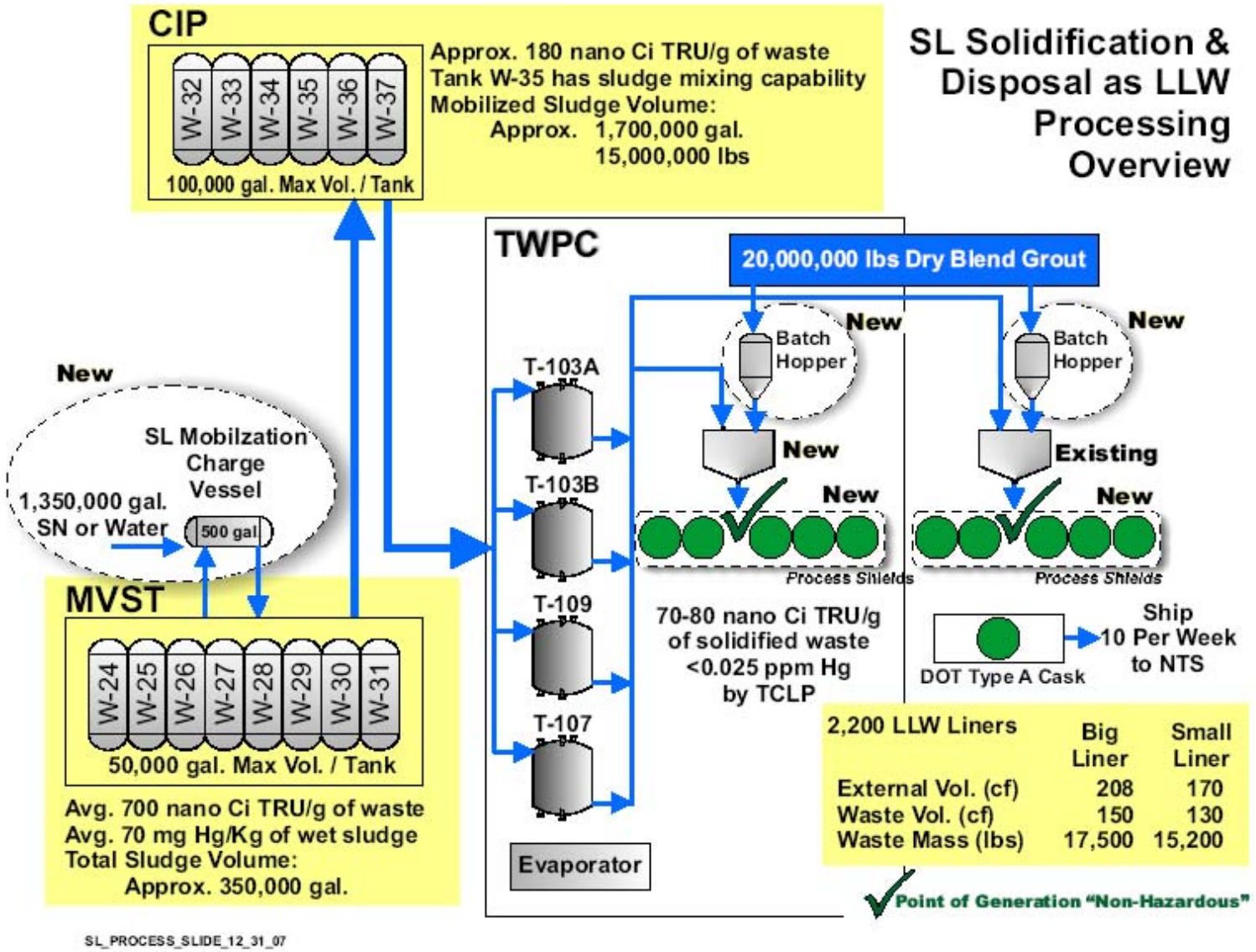
ORNL MVST Sludge (SL) Solidification Project Overview



Volume XV Baseline – Olde History relative to re-bid

Process Risk

- Lowest process risk
- Mature and established technology
- Reliable SN equipment, with minor modifications

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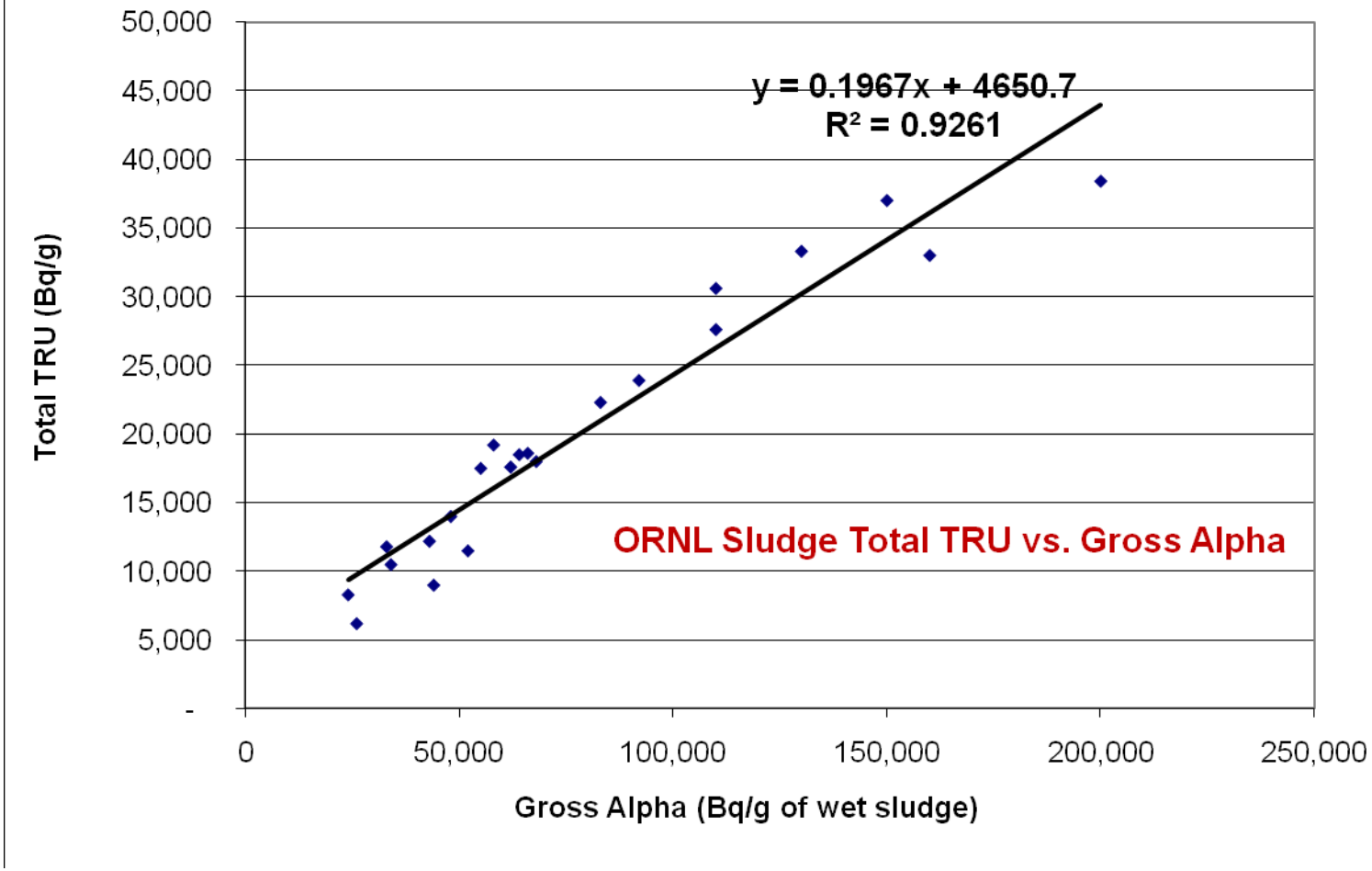
TWPC Approach to Process Control: Reduces Analytical Turn-around



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Grout Recipe

Grout Formulation	BFS	Flyash
EnergX proprietary recipe Confirmed by bench testing MVST SL	Reduced setting rate to extend "work" time	Improves fluidity of grout – particle morphology
45% Fly Ash (Class F) 45% Blast Furnace Slag 10% Portland Cement	Lower heat of hydration	Reduces cure temperature
SN Monolith Blend: Portland Cement, BFS, Flyash, and Fumed Silica	Lower diffusion and permeability rates	Consumes excess caustic

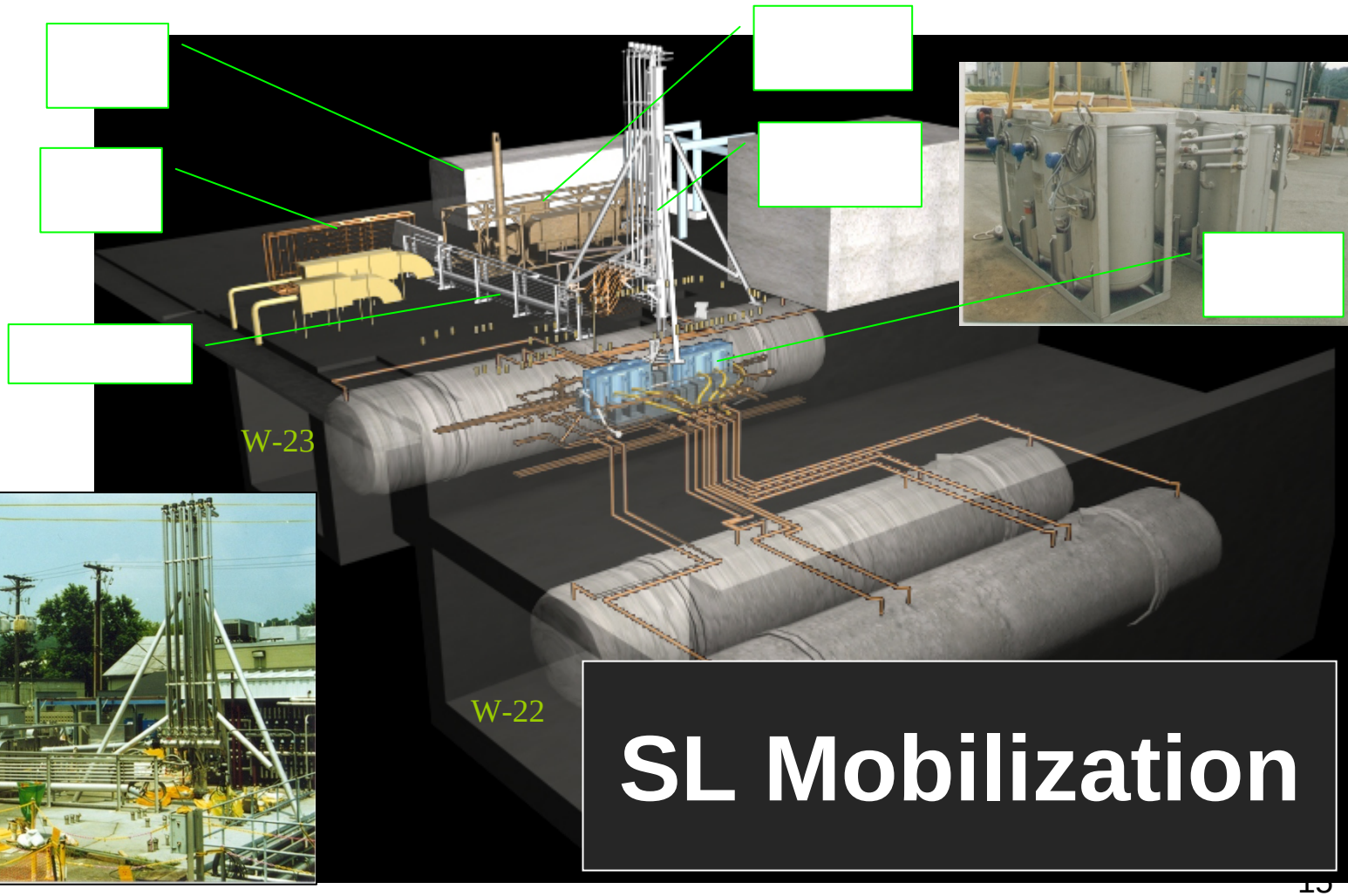
Process Control

- "Big Batch/CIP Tank" – simpler characterization
  - Validated Process Control Program (PCP)
  - Confirmatory bench scale testing for each Tank Batch
  - Monolith with no free liquid
  - Mass ratio control via SL metering and SA weight

- Visual observation (camera) of mixing and LLW filling ensures grout consistency

NuVision (AEA) Tank Mobilization Systems - Equipment On Site

BVEST W-Tank System



SL Mobilization

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Questions