



PDC Project - Conceptual Design
Formal Design Review, August 2010



F/H Laboratory Modifications

Analytical Labs and F-Area Operations

•**Unclassified/Non-UCNI**
• DOES NOT CONTAIN
• UNCLASSIFIED CONTROLLED
• NUCLEAR INFORMATION
• Reviewing Official: R. Shoberg
• Date: 8/12/2010



Task Requirements and Criteria (TR&C)

- G-TC-F-00021, “Refurbish Laboratory 174 in the F/H Laboratory, 772-F, to Support the Stabilization and Packaging Sub-Project of the Pit Disassembly and Conversion Project (U)”
- G-TC-F-00022, “Refurbish F/H Laboratory, 772-F, to Support the Pit Processing Sub-Project of the Pit Disassembly and Conversion Project (U)”
- As stated in FDD (R.1.4.B and elsewhere), an ICD will be developed between KAC and F/H Lab to provide definitive requirements



PDC Project - Conceptual Design

Formal Design Review, August 2010



772-F Main Floor





Phase 1A Modifications

- Lab mission limited to Pu oxide samples
- Limited to 772-F Lab 174
 - Remove equipment from north portion (~60%) of lab
 - Install three new gloveboxes, two radio hoods
 - Install capability for:
 - Moisture (TGA-FTIR; 60 samples/year)
 - Dissolution (Closed vessel microwave; 167 samples/year)
 - Impurities (ICP-MS; 167 samples/year)
 - Use existing F/H Lab capabilities for isotopics

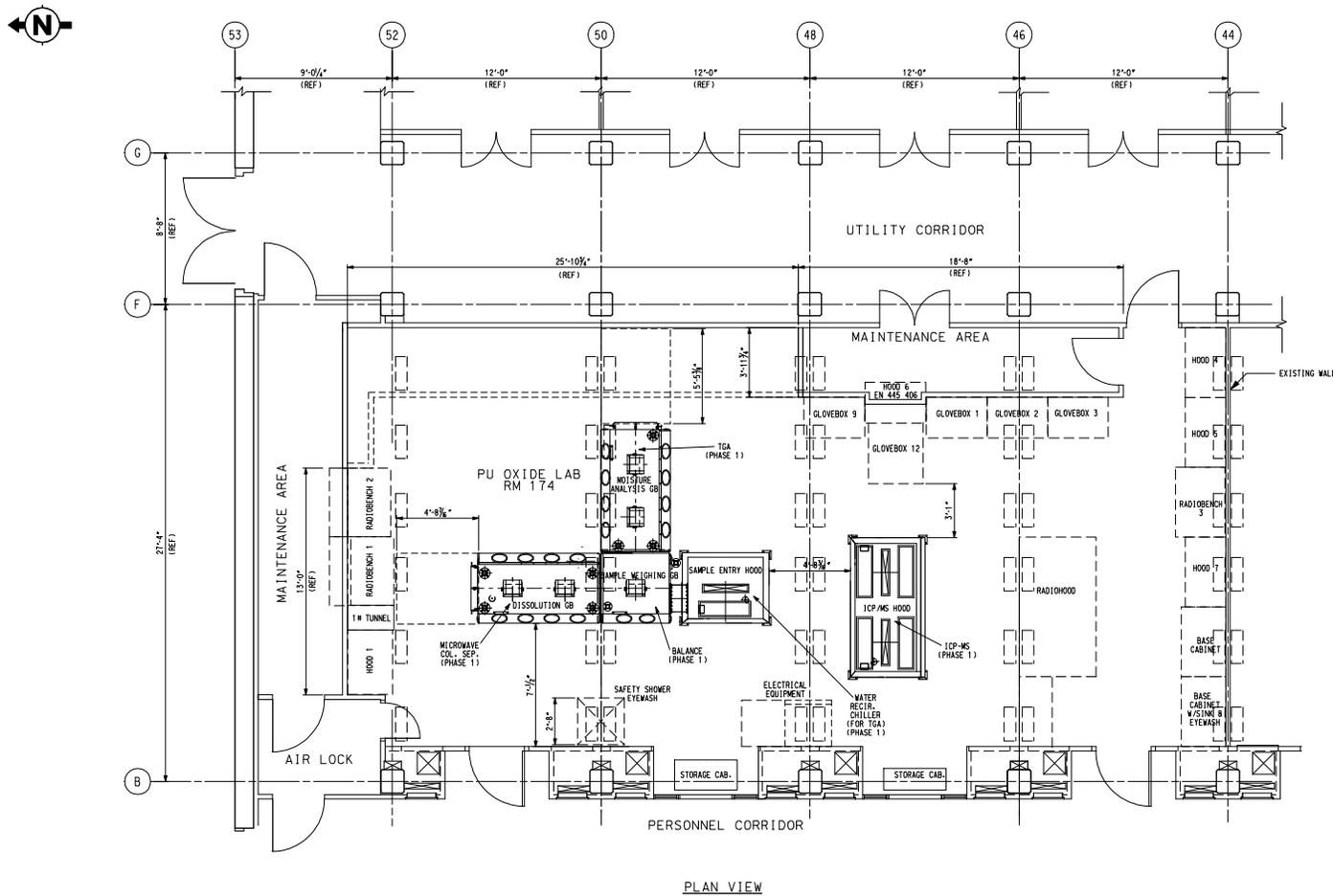


PDC Project - Conceptual Design

Formal Design Review, August 2010



Phase 1A Modifications





Phase 2 – Sample Types

- Pu Oxide Product
- HEU Oxide
- HEU Alpha Swipes
- Tritium (bubbler samples)
- Electrodecontamination Spent Sludges and Solutions
- Beryllium Swipes and Air Filters
- Potentially Contaminated Water Samples
- High Activity Waste Tank Samples (from lab)
- Concentrated U/Pu Liquid Samples (from lab)



Phase 2 Overview

- PDCF Greenfield – ten labs/rooms, approx. 7000 sq. ft.
- F/H Lab Modifications – seven 12' x 24' modules, approx 5400 sq. ft.
 - D&R, decontaminate, install new containment units and analytical equipment
 - Lab 174 (Phase 1) will have more equipment installed for Phase 2
 - Some existing lab spaces will be utilized without modifications



Phase 2 Mods – Labs 126 and 130

- Currently two 12' x 24' rooms; would be combined into a single 24' x 24' room
- Primarily impurities measurements
- Radio hoods and benches; no gloveboxes
- Key equipment/activities:
 - Sample dissolution
 - Column separation
 - Titrations
 - pH, conductivity, density



Phase 2 Mods – Labs 134/138

- Currently two 12' x 24' rooms; would be combined into a single 24' x 24' room
- Primarily beryllium swipes and filters
- Radio hoods and benches
- One glovebox for a carbon analyzer
- Key equipment for beryllium analyses:
 - Sample preparation (hot block, microwave)
 - ICP-MS (for air filters)
 - ICP-ES (for wipes); may change this to automated fluorescence analyzer now being tested at Y-12

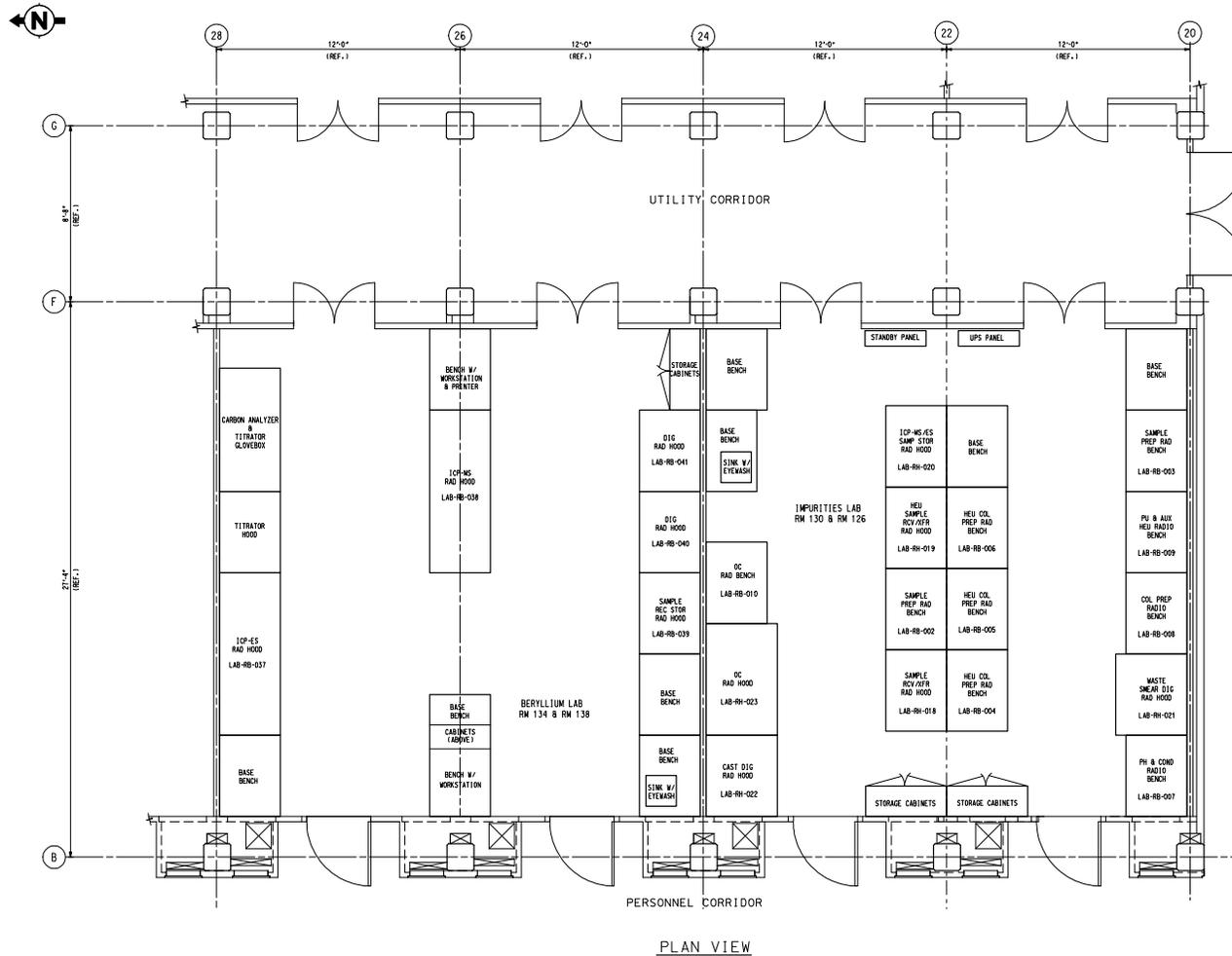


PDC Project - Conceptual Design

Formal Design Review, August 2010



Phase 2 Mods – Labs 126/130 and 134/138





Phase 2 Mods – Lab 127

- Single 12' x 24' room
- Uranium oxide and additional impurities measurements
- Radio hoods and benches; no gloveboxes
- Key equipment:
 - Ion chromatographs (2)
 - ICP-ES (1)



Phase 2 Mods – Lab 154

- Single 12' x 24' room
- Uranium Oxide analyses
- Radio hoods; no gloveboxes
- Key equipment:
 - Nitrogen analyzer
 - Carbon analyzer
 - Fluoride/chloride pyrohydrolysis system
 - Sample dissolution
 - Column separation



Phase 2 Mods – Lab 171

- Single 12' x 24' room
- Thermal ionization mass spectrometer (TIMS) for isotopic abundance measurements
- Additional capacity
 - We have two TIMS units in Lab 162
 - Relatively high downtime requires a third unit to assure throughput

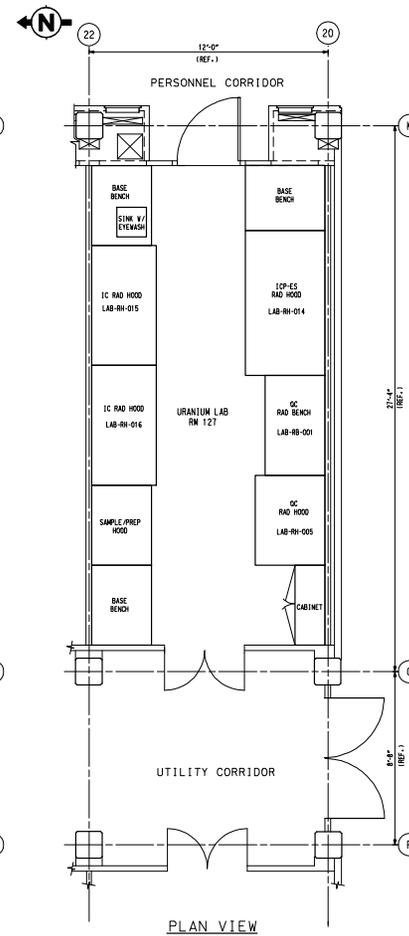
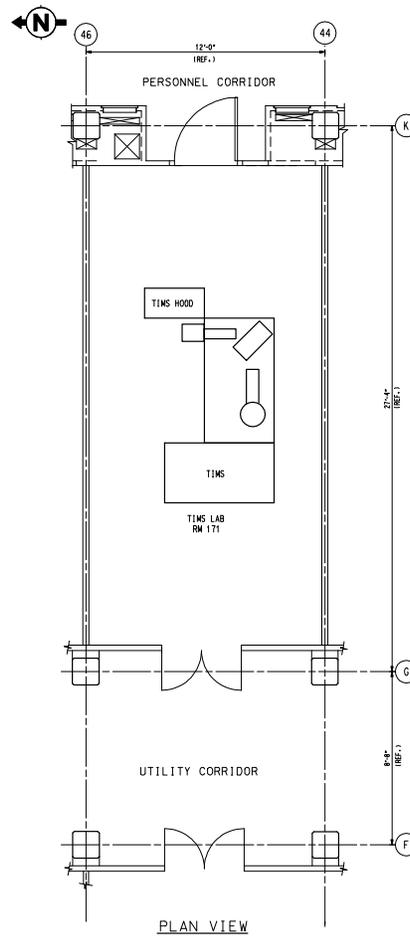
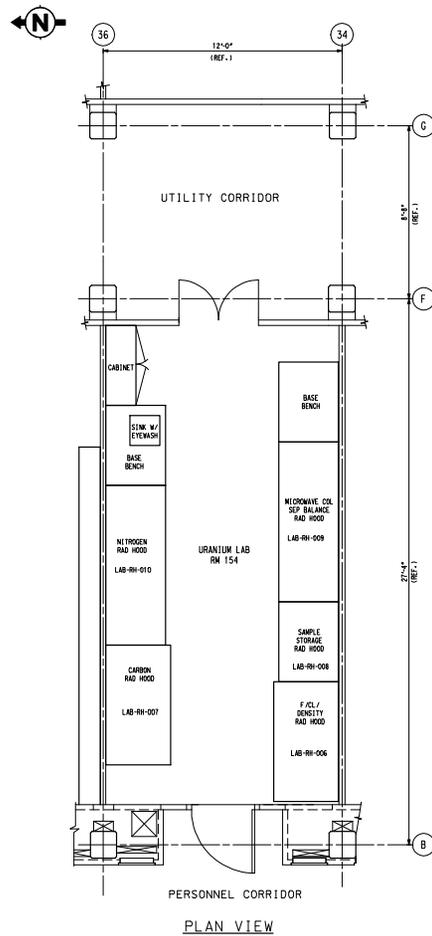


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Formal Design Review, August 2010



Phase 2 Mods – Labs 127, 154, 171





Phase 2 – Additional Lab 174 Equipment

- Supports Pu oxide measurements
- No additional renovations required
- Fluoride/chloride pyrohydrolysis system
- Laser ablation system (undissolved solids)
- ICP-MS (one additional unit)
- Bulk/tap density tester
- Digital density meter

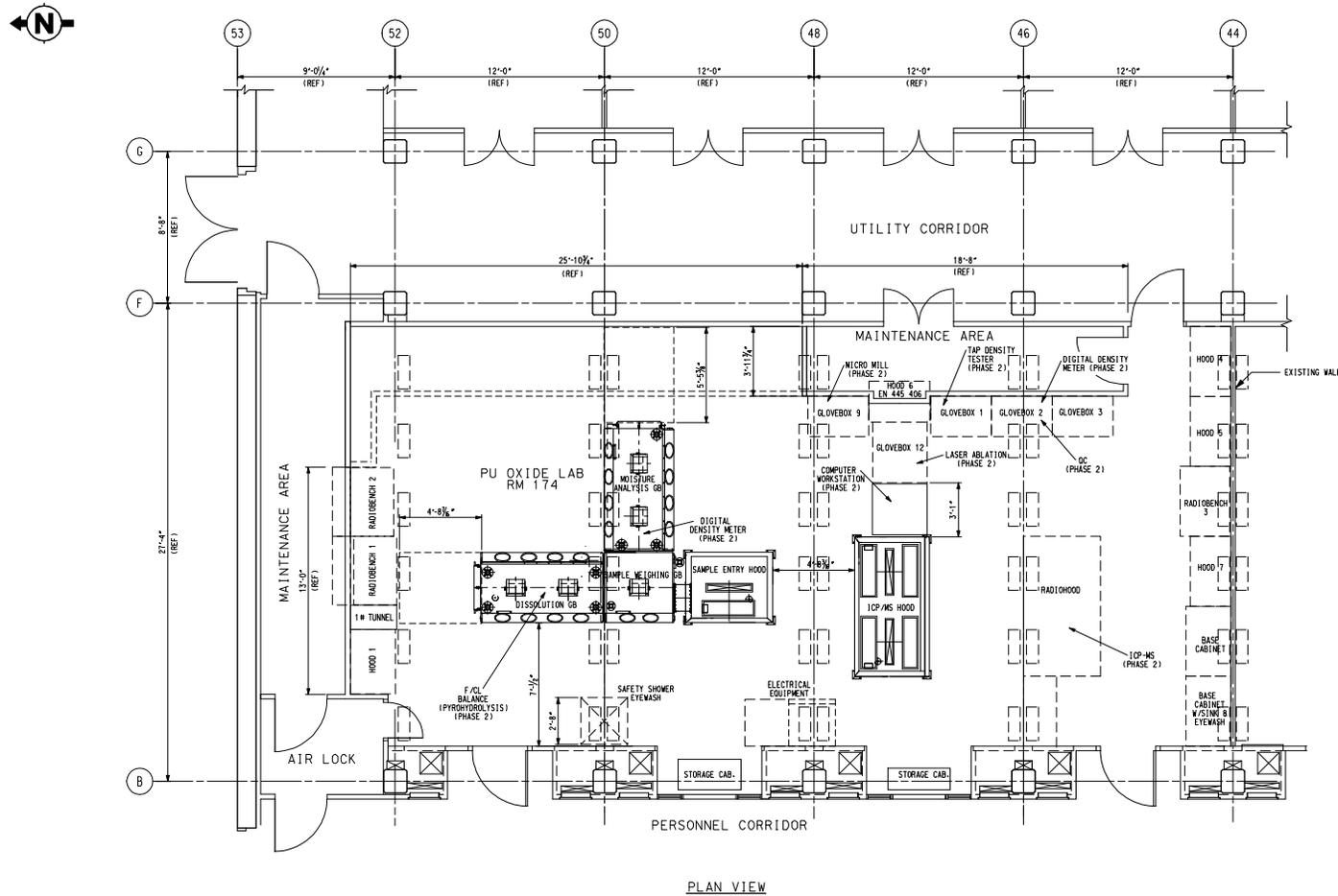


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Formal Design Review, August 2010



Lab 174 with Phase 2 Equipment Installed





Phase 2 – Lab 175

- Equipment to be installed in existing gloveboxes; no renovations required
- Loss on ignition furnace
- Second TGA-FTIR, if needed for throughput

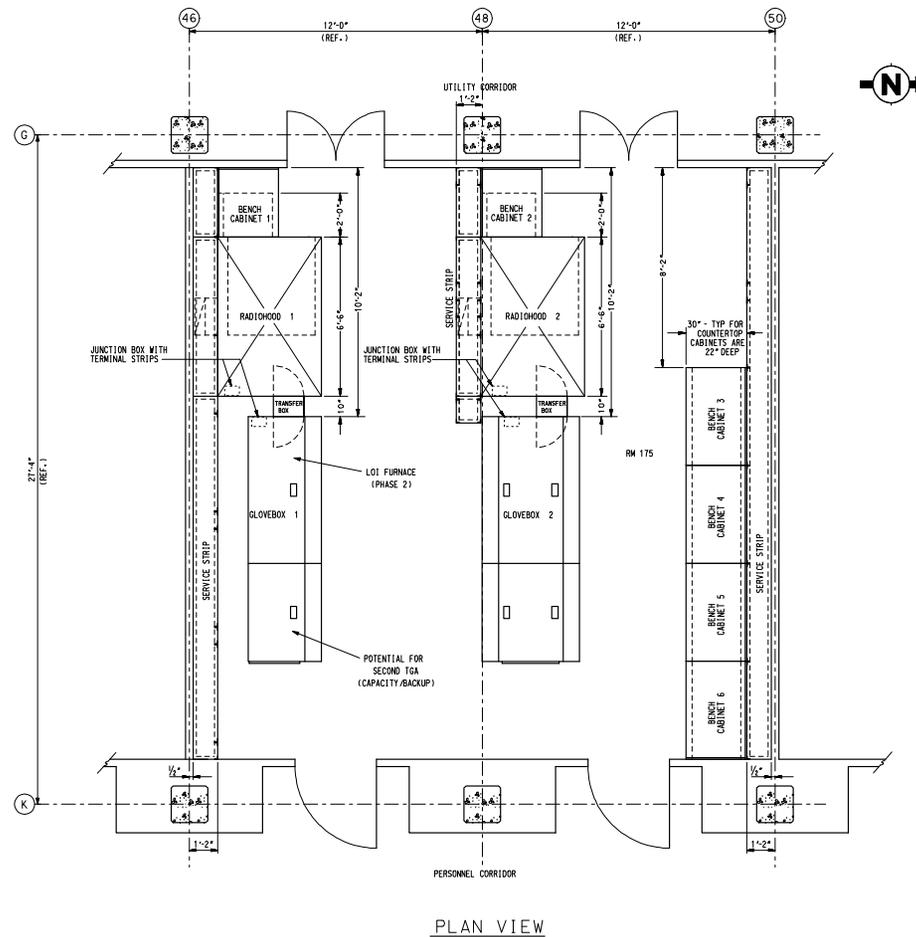


PDC Project - Conceptual Design

Formal Design Review, August 2010



Lab 175 with Phase 2 Equipment Installed





Existing Labs/Equipment Supporting Phase 2

Labs not requiring renovations or new equipment:

- 772-F Lab 183
 - TIMS Sample Prep, HEU Column Separation
- 772-1F Lab 108 (Counting Room)
 - Alpha Spec, Gamma Spec, Liquid Scintillation
- 772-1F Lab 136
 - Reagent Preparation



Safety Class/Safety Significant Functions

- No SC functions (current or anticipated)
- SS functions:
 - Glovebox boundary (including HEPA filters and orifices for gas services)
 - Fire suppression system (not currently SS but expected to be prior to Phase 1)



Safeguards and Security

- F/H Lab currently Category IV
- Phase 1 not expected cause change to Category III
- Phase 2 will cause change to Category III
- For Phase 2:
 - F/H Lab will become a Limited Area
 - Rollup study performed last year indicated Category II threshold would not be exceeded
 - Classified computing capability will be required



Liquid Effluents

- Current capacity/configuration sufficient for Phase 1
 - 370 gallon HAD tank on 772-F service floor
 - Trucked to H-Canyon for further processing
 - NOT a waste stream
- Additional capacity required for Phase 2
 - Up to 1000 gallons per month generated
 - Different disposition path (WSB rather than H-Canyon)
 - Truck or pipe to WSB