Continuous Processing Scale Up Facility (CPSF)

- Background
- Scope of Work
- Accomplishments to Date
- Current Status
- Issues
- Summary

Background

- Indian Head has been Developing Continuous Processes for Producing Energetic Products for 15 Years
- Plans Were Developed to Build a Completely Automated, Scaled up Continuous Processing Plant Approximately 5 Years Ago
  - After the Loss of a Mixer in ‘99, Decision Made to Replace with Continuous Process Scale Up Facility (CPSF)
- July ‘00 Contract awarded to Raytheon Engineers and Constructors for a Design/Build Turn Key Facility
  - Raytheon’s name changed to Washington Group International Shortly After the Contract was Awarded

Scope of Work

- Design & Build a Facility that Encloses a Scaled Up Twin Screw Process Capable of Processing a Range of Energetic Products
  - Product Collection Equipment Focused on LOVA
  - Includes Procurement and Installation of all Equipment
- Design for Future Incorporation of Total Automation and Flexibility
- Working with Government Personnel, Support PRB and Operational Check out

The Process Equipment

- The Continuous Process for Producing Energetics is Composed of:
  - Solids Feed Systems
  - Liquid Feed Systems
  - Twin Screw Extruder
  - Product Collection
  - Refill Capability

Solids Feed Systems

- There are 4 Solids Feed Systems Designed to be Capable of Being Refilled
- Each System is Composed of a K-Tron loss-weight feeder, and a Matcon IBC Discharge Station
- Feeders are Sized to Provide a Wide Range of Feed Rates
- IBC Refill bins Have a Volume of 1000 Liters = Working Volume of ~28 Ft^3
- Feed Systems are Designed to be Portable
  - Can be Moved to Support Feeding to any of 5 Solids Feed Ports in the Extruder
- There is one Volumetric Feeder Dedicated for Purging the Extruder

Liquid Feed Systems

- There are 3 Liquid Feed Systems That do not have Refill Capability
- One 150 Gallon Tank & 2 (each) 75 Gallon Tanks
- For LOVA Processing, the 150 Gal. Tank Provides Sufficient Capacity for a Day's Running
    - Tanks are Jacketed, Agitated and Rated for Pressure
- Liquids are Metered using Gear Pumps and Mass Flow Meters in a Closed PID Loop
- A Progressive Cavity Pump is Included for Feeding Slurries

Twin Screw Extruder

- 88 mm Screw Diameter with L/D of 30 Manufactured by Clextral
- Designed with a Horizontally Split Barrel
- Barrel Design is Modular for Maximum Flexibility
  - Five Barrel Zones with Independent Temperature Controls
- Drive is Hydraulic

Product Collection

- Plan to Extrude 8 0.430” Diameter LOVA Strands at a Rate of 320 Lb/Hr
- 8 Strand Pelletizer Supplied by Romeo Engineering
  - Based on 4 Strand Prototype Purchased for the 40 mm Pilot Plant
- Cut Grains are Collected in Baskets Which are In a Toroidal Tank on an Indexing TurnTable
  - Grains will be Collected in Water
- Baskets are Sized to Collect 3,500 lbs of Cut Grains

Refill Capability

- A Truly Continuous Process, Must be Able to Remove Product From the Building and Refill
- Original Vision for This Facility was to Use Automated Guided Vehicles (AGVs) to Remove Collected Product and to Bring in Fresh Materials
- The Crane Will Automatically Remove the Bin on the Feeder Stand and Replace it With a Full One
- Cost Constraints on This Project Have Forced the Complete Automation and Liquid Refill Out into the Future

The Crane

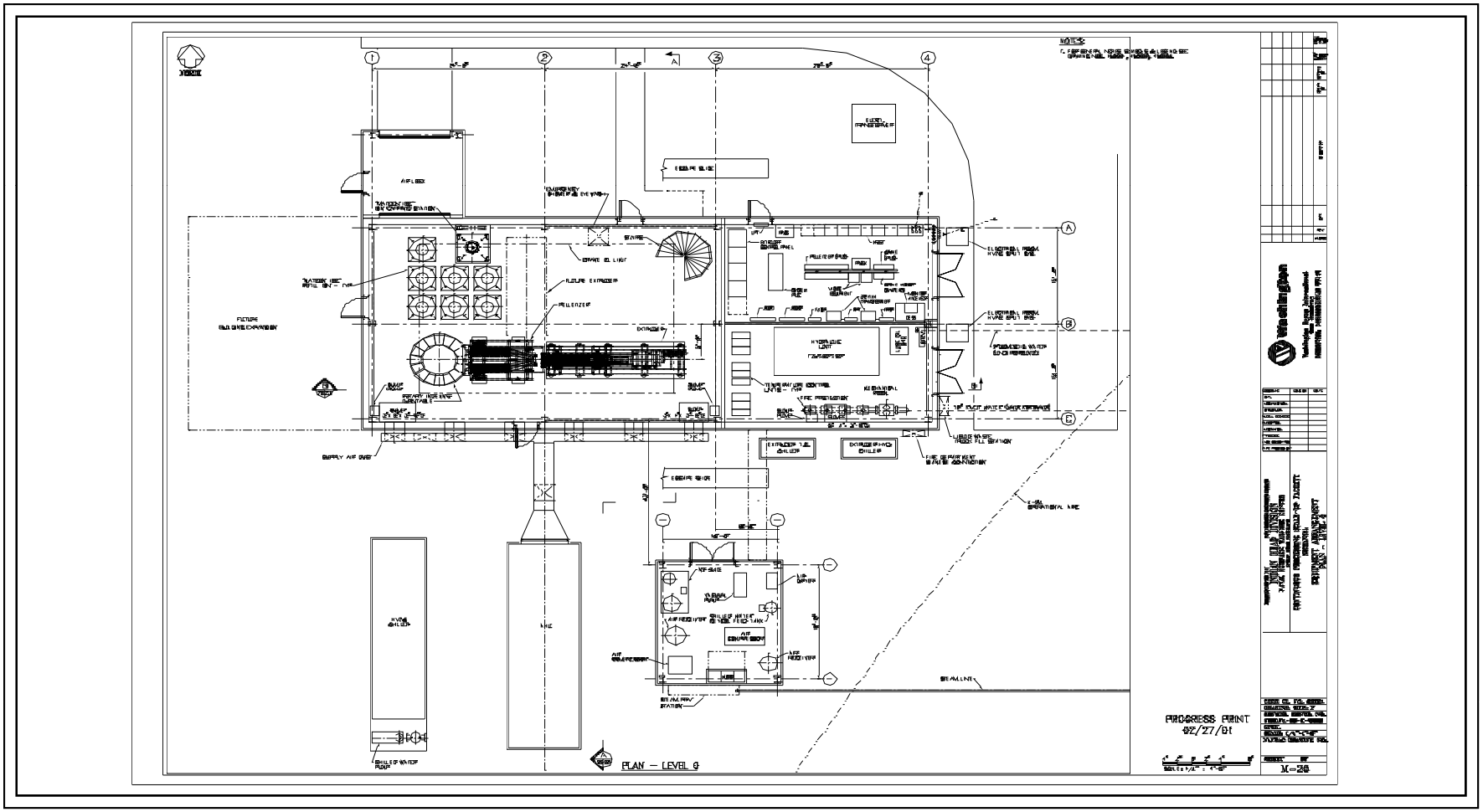
- A Custom Designed Top Running, Double Girder, Explosion Proof Crane with a Specialized Device for Handling Matcon IBCs
  - Supplied by American Crane and Equipment Company
- 5 Ton Main Hoist with a 3 Ton Auxiliary
- Span ~ 28’/Runway Length ~46’
- Electrical Hazard Class - Class I, Div. 1 Groups C&D, Class II, Div. 1, Groups E, F &G

The Facility

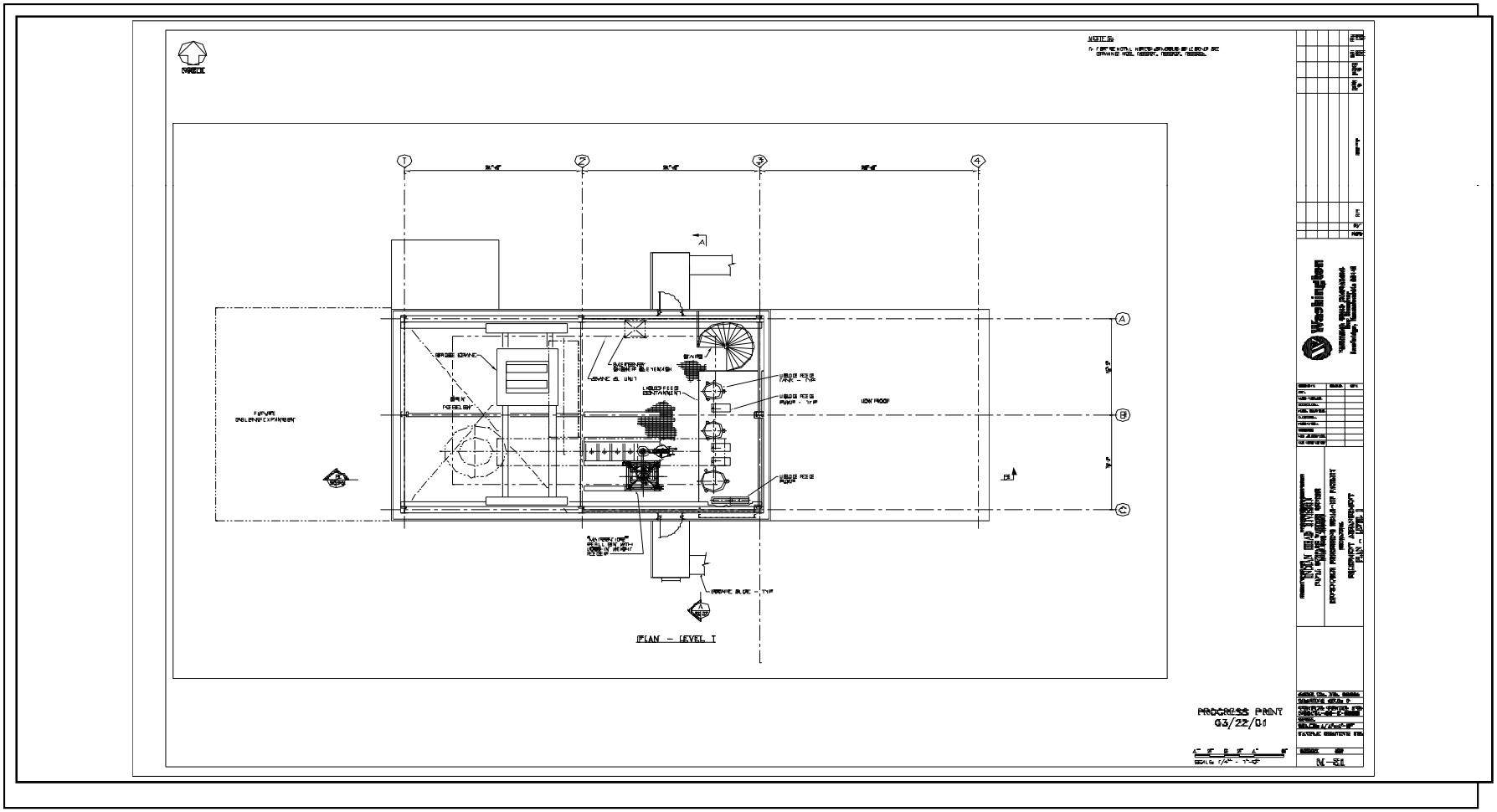
- 2,900 ft^2 Building Composed of Three Rooms
  - A Processing Bay, An Electrical Equipment Room and A Mechanical Equipment Room
- There is an Air Lock Entrance into the Processing Bay
- Over the Extruder There is an Equipment Stand or Mezzanine
- Air in the Processing Bay is Controlled at 70 +/- 5 and 40 Grains Moisture +/- 10, With 10 Air Changes Per Hour

NAVSEA
INDIAN HEAD
Surface Warfare Center Division

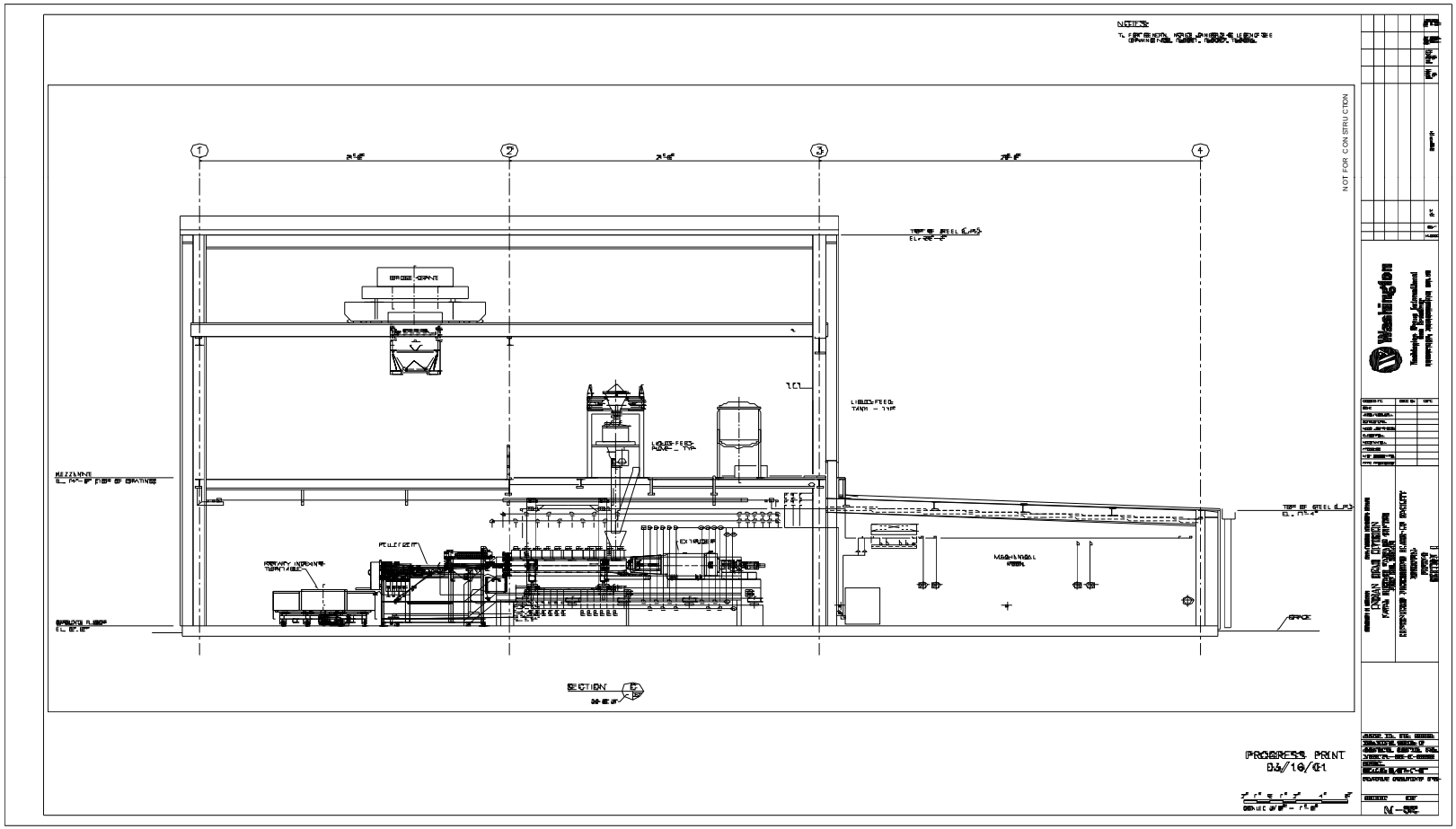
Level 0 Layout



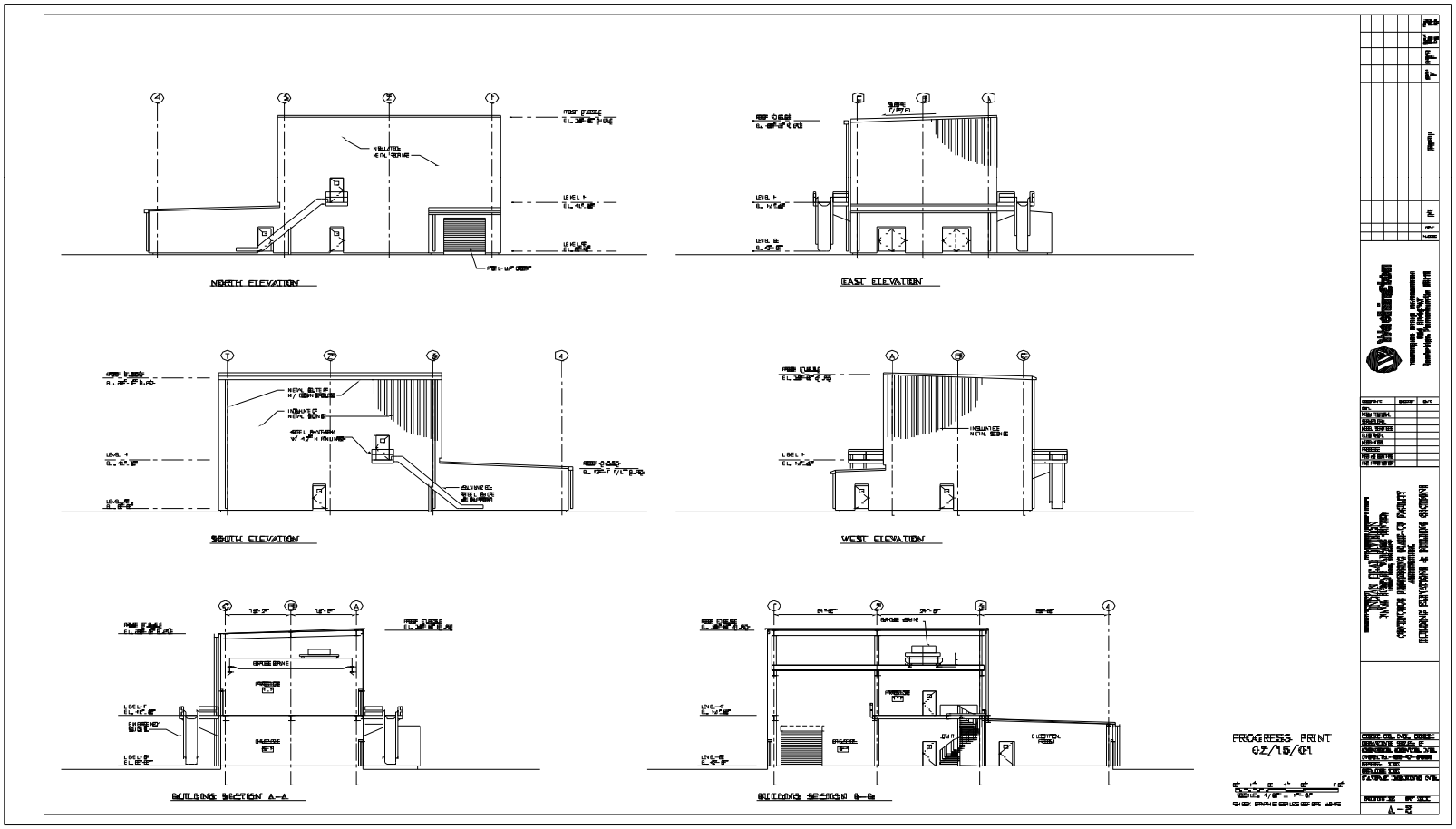
Level 1 Layout



Side View



Architectural View



The Process for LOVA

- Lacking Total Automation, the Facility will be Run in a Semi-Continuous Batch Mode
- Building Load Limit = 3,500 Lbs 1.1
- There are 2 Feed Streams: LOVA Powder & Solvent
- Charge the Building with ~3,000 lbs LOVA Powder in 4 IBCs & Solvent
- Ramp Up and Run Until the LOVA Powder is Almost Exhausted
- Ramp Down, Stop, Remove Product &Re-Stock Materials
- Ramp Up and Resume Process

Project Milestones

- Award Building Contract – 4/01
- Award Mechanical Contract –5/01
- Award Electrical Contract –6/01
- Deliver & Install Extruder – 12/01
- Commission Facility – 2/02

Current Status

- Design Status
  - Facility
    - Architectural & Mechanical - 100%
    - Electrical & Utilities - 60%
    - Controls - 40%
  - Equipment
    - Clextral - 90%
    - K-Tron - 70%
    - American Crane - 60%
    - Romeo - 80%

Summary

- The Approach Taken on This Project is Working Well
  - Relationship with WGI is Positive and Success Oriented
- Design Process is on Track
  - No Significant Problems Identified in PHA
- Building Construction Begins this Month