

Planning and Preparing a Power Plant for Decommissioning Lessons Learned

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Plant Overview

- Navajo Generating Station (NGS)
 - 3 – 800 MW Coal Fired Units
 - Commercial 74, 75, 76
 - Scrubbers
 - Low Nox
 - Mercury Controls
- ~520 employees at normal operation
- Electric railroad for coal supply, 80 miles away
- 5 owners, SRP is the operator
- On Navajo Nation Reservation and remote, nearest big city is 4-5 hours away



Planning Topic Areas

- Pre-shutdown activities
- Unit order shutdown
- Common Equipment & Power
- Deferred Maintenance
- Warehouse stock reduction & Inventory of Materials
- Temporary Power
- Black Plant
- Staffing
- Employees concerns and morale
- Operations
- Coal burn plan
- Shutdown process
- Chemicals and Materials
- NERC-CIP

Pre-Shutdown Activities

- Asbestos landfill removal
 - Any removal of waste beforehand while operating is recommended
- Water - High Total Dissolved Solids (TDS) in evap ponds
 - 80M gallons of water to be removed
 - Understand plant water balance process
 - Operational, natural (evaporation), physical removal of water
 - Environmental oversight needed.
- Records Management (paper/electronic)
 - Records survey, classification retention, etc.
 - Early removal of records off site for storage or destroy.

Unit Order shutdown

- What makes sense from a demolition standpoint?
- Take into consideration prioritization needs from demolition contractors and others to determine sequence that hopefully works for everyone.
- Communicate with other entities that may own the transmission yard on plant shutdown conditions, power ties between plant and yard and black plant condition.

Common Equipment & Power

- Plant common systems and equipment will also need to have shutdown procedures.
- After unit shutdowns, may need to operate equipment to process water in our case.
 - Understand impact of system inputs from unitized system shutdowns, ie. compressed air, power, service water, controls, etc
 - Custom clearances need to be planned ahead of time and tracked for later offline conditions.

Deferred Maintenance

- Keep record and track deferred maintenance in case a new owner wants to take over plant in our case.
- Work with departments on course of action for maintenance equipment issues
 - Discuss tradeoff of repairs towards end of life
- Focused on PMs and plant system health to drive priorities
 - PdM actively engaged
 - Summer prep outages replaced overhaul outages
 - PM compliance metric enforced
 - Summer EAF (Equivalent Availability Factor) goals only

Warehouse Stock Reduction/Inventory Management

- Early effort to identify stock items to remove/salvage during operation
 - Identify service contacts no longer needed or reduce scope
 - On-demand ordering vs automatic restocking
- Identify what items can re-used for demolition support for cost savings
- Team with asset inventory group to determine what is to be salvaged by plant and insure it is align to demolition bidder responsibility and chemical/material work scopes.

Temporary Power

- What are the options? Determine the expected loads.
- Decide to use in house (plant), company resources or external to manage temporary power plans
 - Power availability from external sources
 - Resource availability
 - Development
 - Combined contractor and company effort
 - Work with demo team to determine required loads early
 - Establish reliability assessment of using plant equipment
 - Metering issues resolved by utility installation
 - Contingency power needed?

Black Plant

- Planned shutdown procedures for black plant condition needed as well.
- Grounding plans in place
 - Partnership with contractor to leave a safe condition to work
- Power yard disconnect plans with other utilities
 - Early scheduling and sharing of preliminary plans for disconnection is critical

Staffing

- Developed mitigation plans of key operational areas to maintain business continuity with contractors.
- Contracts for contractors – all Occ codes included if you can (hourly & salaried)
- Contractor onboarding tool to streamline process
- Simplified Organizational Structure (blended roles)

Employee concerns and morale

- Safety - Safety trumps production (SAFE)
 - Strong culture/SoS (safety observation system)
 - Recognition/Daily safety messages from leaders
- Active Management and Supervision
 - Slogan to “Finish Strong”
 - One team concept
- Redeployment
 - Communication and transparency is priority
 - Be flexible

Operations

- Outsourced LOTO
- Removed relief shift and partial backshift support from maintenance
- Operating practices were simplified
- Assigned contract operators to their area of expertise, no previous rotations of people for development in normal operation.

Coal Burn Plan

- Ongoing communication with Fuels organization on coal burn forecast
- On site coal pile and coal pad reduction. Assess impact to plant system as coal quality trends down
- Heavy equipment and coal handling reliability during last remaining months

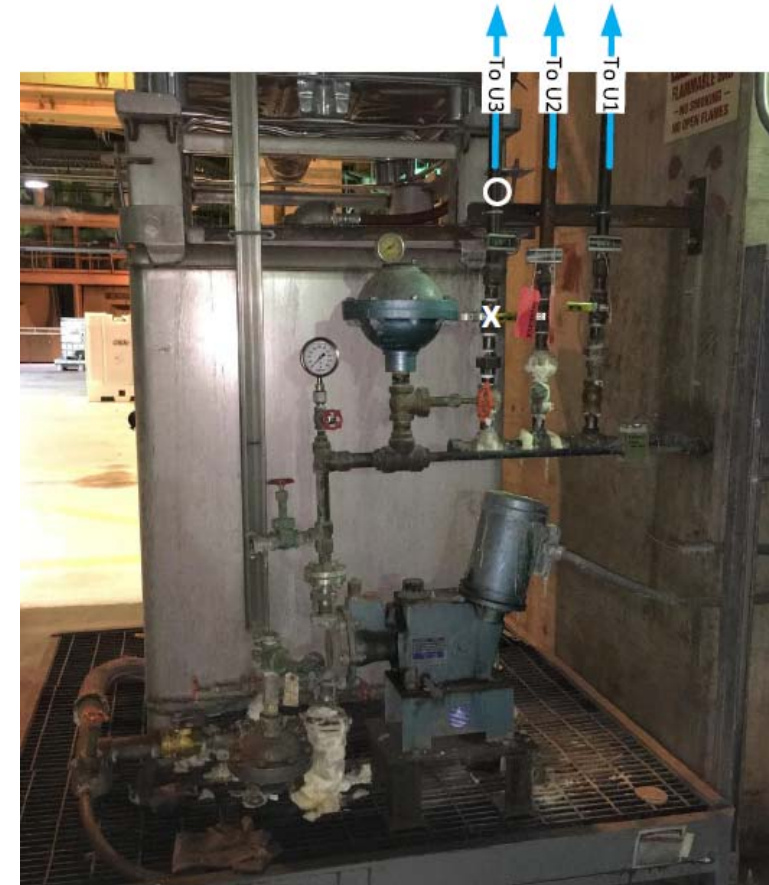
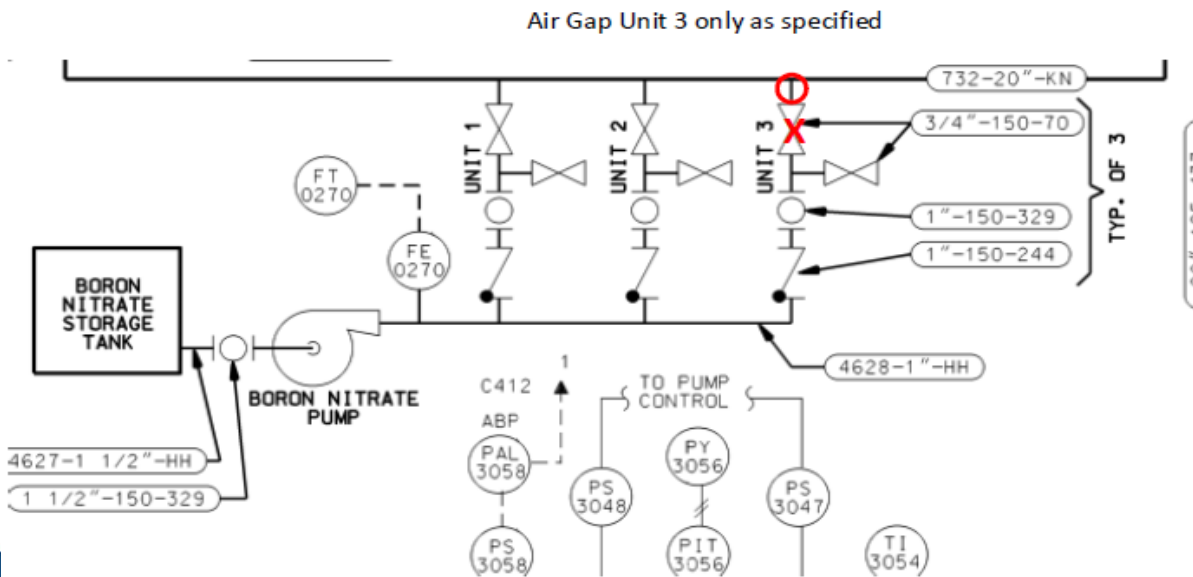
Shutdown Process

- Take advantage of existing overhaul shutdown process.
 - Combined & simplified plant clearance systems, reduced isolation points.
- Turnover procedures were created with isolation points, mechanical and electrical air gapping with schematics and pictures.

Absorber Tower ABS
Aux Steam 620
Bearing Cooling Water 410
Bottom Ash 510
Circulating Water System 360
Condensate 310
Demins / Chemical Injection / Regens 311
Feedwater 290
Instrument and Service Air 640
Main Boiler Air and Gas 210 (FIRESIDE)
Main Boiler Waterside 230
Main Generator 800
Main Turbine 750
Nitrogen 610
Pulverizer All 150
Precipitator 270
Scrubber Drains and Pumps DSS
Scrubber FGS Fuel Gas System
Scrubber LSF Limestone Feed Tank

Shutdown Process

- Turnover procedures identify locations and show where to air gap mechanically/electrically.



Chemicals & Materials

- Utilize existing plant drawing plans and records to highlight plant chemical locations for removal strategy.
 - Compiled info in spreadsheet by chemical and material
 - Known quantity usage, substance, responsibility, expected shutdown qty remaining
 - Used to address environmental disposal requirements
 - Contractor program manager developed into removal work scopes as resources and experience were limited

NERC-CIP/IT Systems

- Once not generating power, determine level of NERC criteria and timing
 - Identify and plan for assets that need to be handled for processing
 - Relays, DCS, computers, PLCs, etc.
 - Utilized contractors and former employees to maintain NERC-CIP compliance during last year of operation.
 - Establish relationship with other groups to support effort
- Work with corporate on system applications in place to remove and stop accruing additional expenses.

Questions



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