

Solutia Steam Project Workshop Outline

Date: December 22, 1997

In attendance: Solutia/Rich Fleschner
Solutia/Dave Richardson
Solutia/Gerry Walther
Solutia-Magnum/John Saufnauer
Solutia-Tom Flynn
Sachs/Chris Garofalo
Sachs/Myron Bernard
Paric Corporation/Eric Uhlenhop
Paric Corporation/Charlie Buescher
Paric Corporation/Tim Muse
EMC/Bob Goeltz
Murphy/Dick Prah
Murphy/Kevin Cook
Murphy/Matt Schumacher
Rogers-Schmidt/Eric Schmidt
Gateway/Ted Vehige
Burns & McDonnell/John Woodson
Burns & McDonnell/Todd Sweeney

A. Introduction of all Team Members and Roles

Introduction of all team members by Ted Vehige/Gateway Energy.
Financially, Legal issue were discussed by Gerry Walther. Things are moving along well in that area. Anyone with any plans or action items please give to Ted or Rich, who will distribute to the other team members.

Meeting was turned over to Charlie. Who encouraged open discussion, anyone with questions feel free to ask questions. The intent of this workshop is to gather everyone's idea and input, overview of design build process, working on sixty days to optimize cost, and find ways to decrease the operating cost. Also, focus on long lead items.

Overview of agenda by Bob Goeltz. Ground rules are to respect each other and come up with the best solutions. 4 phase program. See attached agenda.

B. Phase 1 Information Phase

Goals

- Cost Savings
- Showcase Facility
- Pollution Reductions
- Service and Reliable
- Schedule is critical
- Establish a long term partnership
- Life cycle cost (lowest lifecycle cost, decrease total annual operating cost).
- Design safety for long term
- Utility capacity/efficiency
- Plant Flexibility

Future plant load increases will be controlled by:

1. Management of peak requirements
2. Conservation -- Reduce loads
3. New equipment as required

C. The latest and greatest utilities volumes:

	Cond. 1 Average K-lb./hr	Cond. 2 Average K-lb./hr	Cond. 1 Peak K-lb./hr	Cond. 2 Peak K-lb./hr	Annual Total K-lb.
635 psig steam	44	12	65	13	385,440
210 psig steam	76	66	155	155	665,760
85 psig steam	17	43	52	98	148,900
	137	121	272	266	
Compressed Air	1860 SCFM Average 2175 SCFM Peak 977,600 KCF total annual use				
Softened Water	30 gpm average 120 gpm peak 15,770 K-Gal total annual use				
Boiler Feedwater	20 gpm average 40 gpm peak 10,500 K-Gal total annual use				

D. Basic Flow Diagram

Boilers

- All boilers in existing plant operate at 635 psig.
- To minimize costs, new boilers will be; one @ 635 psig and the remainder @ 210 psig.
- All boilers will be superheated steam.
- Boilers are gas fired with backup No 2 oil.

Water supply -

- 0 Condensate return, water supply coming from the city, all of the water through softeners and 635 psig water will also be treated with a reverse osmosis system.
- Cool air compressor from softened water.
- 3 Feed water pumps at 50 percent peak capacity each for 210 psig.
- 2 Feed water pumps at 100 percent peak capacity each for 635 psig.

Oil Storage

- 24 hour oil storage capacity at peak requirements.

Air compressor

- 2 units can handle flow requirements, one installed spare.

E. Plant General Arrangement Drawing

- Original layout with individual boiler stacks.
- Alternate layout with single stack.

F. Project Constraints

- Plant Location.
- IEPA-NSPS Permit/credits (3 months to a year for permits) sub-committee needs to be established-report due on January 20.
- Stack Monitoring.
- Soils – Chlorine plant was preexisting for the last 25 years.

G. Action Item - Environmental

1. Environmental-Eric Schmidt – Team Leader.
2. Make sure of No_x off sets .
3. Make sure it is a minor not a major permit.
4. Eliminate C.E.M. requirements.
5. Determine schedule for permit process.
6. Determine cost for permitting.

H. Criteria for Site

- Survey needed for selected site for legal description.
- Soils - cost of cleanup.
- Construction.
 - Distance to process connects.
- Existing Structures.
- Gas/utility/sewer.
- Water by Solutia or City (Illinois-American).
- Easements/R.O.W./Constraints.
- FAA/Stack Location (Eric to write Kansas City for new map, should have new plans in two to three weeks).
- Labor Union Jurisdiction.
- Access-separate gate entrance.
- Financing – TIF.
- Safety.
- Power supply (switching power from the existing facility to the new facility, there is plenty of power, how to use the switch gear).

I. Site Selection

Discussion was held on which site to plan the plant. The only issue stopping us from planning on Site D is the Labor Union Cost. More research is needed. Solutia feels that an annual cost savings report is needed on both sites before a concrete decision can be made. Cost analysis group for site selection was formed, which will be headed by Eric Uhlenhop. A vote was taken to use Site D as the potential plant site for the rest of the day.

RESIDENTIAL SITE "G"

Pros

Good Access
Clean Site
Off-site Labor
Site available

Cons

Railroad Crossing
Zoning (formality)
Single Power feed
FAA
Easements (road-Rail)
Gas Cost
Construction
Schedule impacts (permits)
Hydrogen plant site/liabilities
Unknown utilities

ON-SITE "D"

Pros

Power Availability & Redundancy
Feeder available from Solutia/Union Electric
Utility Flexibility
\$500,000 + savings
Reduced water rates
Waste water plant capacity available (currently below minimum flow fixed costs)

Cons

Soil Contamination
Site/building limitations
Labor dollars

J. Gas Issues

- # sales points from MRT
- Meter upgrades required?
- New tap on MRT line
- Cost for taps and upgrades
- Spot vs. long term
- Amount of firm gas vs. oil storage

- Amount of oil/year
- MRT firm capacity - sold out now
 - expansion status
- Subcommittee for gas issues: - Ted Vehige
 - Dave Richardson
 - Gary Kajander

K. Building Issues

Assumptions on the Building

- 20,000 SQ. Foot building.
- Completely enclosed building.
- Precast Concrete Construction.
- B.U.R. system.
- Additional fill required for Site "D".
- Sound Attenuation (Dave will provide noise requirements @ fence).
- Dike System - industry standards.
- 10,000 gallon tank is available if needed.
- Chain link fence needed for security.
- Fire protection not included.
- Solutia wants to follow industry standards and code requirements.

L. Demolition

Demolition-\$1.2M (Paric to establish cost).

- Environmental – Asbestos removal by Solutia after shutdown of power plant.
- Lead paint expected on all steel, part of demolition
- Utilities disconnect and reroute.
 - Power.
 - Water Pressure Monitoring.
 - Nitrogen Monitoring.
 - Process (Chemical Transfer).
 - Power Switching (Included in Header \$1.6M).
 - Fire Alarm Relocation (Included in Header \$1.6M).

- Salvage.
 - Copper Cable.
 - Outside Vendor for surplus equipment.
- Sequence.
 - Pre-Work (headers tie ins) requires plant shutdown in fall 1998.
 - Isolation - scheduled shutdown in summer 1999.
 - Demolition (2-3 months asbestos removal) after new plant operating.
- Final Site.
 - Sub Station Building to remain.
 - Limestone over entire area.
- Re-Use.
 - Air compressors (Dave to provide information).
- Ethyl Steam Backup (future consideration).
- Not Addressed in Demolition.
 - Sewer.
 - Water.
 - Gas.
 - Power.
- John Saufnauer provided written scope for demolition and preliminary pricing.

PHASE 3 – EVALUATION OR ANALYTICAL PHASE

M. Brief description of engineering responsibilities.

- Rogers-Schmidt Engineering Co.
 - Major Mechanical Equipment – Specifications.
 - Inside Boiler House.
 - Heat Balances.
 - General Arrangement Drawing.
 - P & ID.

-Electrical one line.

-Air permits.

- Murphy.
 - D/B Routing – Tie in.
 - HVAC.
 - Plumbing
- Sachs.
 - D/B Electrical.
 - Routing – feeder – Air Conditioning.
- B&M.
 - Architect /Civil/Structural to Paric.
 - Site Utilities.

N. Process Issues.

- Boiler Criteria.
 - Saturated Steam.
 - Superheated Steam.
 - 635 # Boiler 1 vs. 2.
 - Redundancy/Flexibility.
 - 210# 2 vs. 3 (2 at 150,000 pph or 3 at 100,000 pph).
 - Environment Considerations.
 - Maintenance.
 - Guarantees – 99.5 percent Reliability.
 - Rental Tie-ins?
 - ‘D’ or ‘O’ type boilers preferred.
 - Confined Entry – Safety.
 - Sound.
 - Intake Air From Exterior.

- Boiler Stack Criteria.
 - 1 vs. Individual Unless environmental impact.
 - Cost Impact.
 - Safety.
 - Fans.
 - Isolation dampers in ductwork.

Saturated vs. Superheat

Superheat steam is a requirement.

De superheat from 635 to 210 and from 210 to 85.

Saturated not feasible due to existing plant improvements required (\$).

Review of superheated steam temperature requirements for Solutia (Dave Richardson).

635 # Boiler Discussion

One Boiler

Pros

\$ Initially

Cons

No Redundancy
Potential Outages

Two Boilers

Pros

Redundancy

Cons

Add R.O. increased equip cost
D/A increases
Feedwater Pumps
Higher operating costs

Consensus.

Will stay with the one boiler concept for 635 #.

210 # Boiler Discussion

2 @ 150,000 pph

Pros

Lower initial \$

Cons

Winter concerns
Reliability problems

3 @ 100,000 pph

Pro

peak + freeze prot

Cons

DSW 134450

What is Load? 146,000 Winter Average (1-150,000 pph boiler would be too marginal).

Freeze Protection criteria (Dave Richardson will review).

- 600 # System?
- Solutia Criteria? Volume Required?

Consensus is 3 @ 100,000 pph (unless environmental permitting favors 4-75,000 pph boilers).

Miscellaneous Cost Saving Options

- Condensing economizer.
- PRV locations.
- Single meter (210/85).
- Compressor pressure (reduce).
- D/A heater reduce to 1.
- Steam Turbine – existing reuse/add.
- Cost savings in header modification estimates.

Utility Plant

1. Condensing economizers.
CHX equip, \$ initial, fuel savings, operating cost, reliability.
(Ted to investigate in more detail).
2. D/A Heater (Qty) 2 vs. 1 (Ted & Murphy to price out savings).
3. Condensate return – cost savings potential, no apparent opportunity now.
-Future savings may be possible.
4. Steam Turbine Drives.
-Potential savings.
-Determine with heat balance requirements.
5. Back-up utilities (electric, others).
-Generator #6 re-use (425 kw induction)?
-No help with loss of power from U.E.

6. Treated Water.
 - Softeners cold vs. hot (check on heat balance).
7. Oil Storage – use new 10,000 gallon tank if wanted.
8. Equipment re-use
 - Air compressor 1750 cubic feet per minute (cfm).
 - Feedwater Pumps.
9. PRV 85# - 1 vs. 2.
 - -Noise concerns.
10. Control System compatibility.

D/A Heater 1 vs. 2

Cons of 1

Inspection
Maintenance
Insurance requirements

Pros of 1

Cost
Rental available
Use chemicals during outage

Investigate 1 D/A heater more closely.

Utilities – backup.

Single feed – Union Electric.

- General service or primary.

Solutia can provide (site “D”).

- 2-13.8kv feeds or second feed back-up only.

Gateway to Review Electric.

- Back-up for reliability.

Water – Site “D”.

- Tie into Solutia Water.

Firemain – Site ‘D’ 2-600,000 gallon storage tanks.

- Compressor Back-up emergency cooling potential.

Phase #4 Evaluation Investigative Phase

Teams

Fuel Supply	Gateway/Solutia
Site Selection(soils & survey)	Burns & McD/Paric/Murphy/Sachs/Solutia
Demo/Header Price Verif.	Paric/Murphy/Sachs/Solutia
Environmental (air)	R/S/Solutia/Gateway
Finance	Evets/Gateway/Solutia
Labor (Operations)	EMC/Solutia
Gas Supply	Gateway/Solutia

Next workshop review meeting will be held January 13, 1998.