INTERNAL CORRESPONDENCE

EDMS I

FILE EAC

EAC

NPM 99-0749

To: Engineering Advisory Committee Members
From: Lori Armstrong
Date: July 9, 1999
Subject: ENGINEERING ADVISORY COMMITTEE MEETING MINUTES OF 06/30/99
Copy To: EAC Attendees R. G. Mende C. R. Peterson J. R. Anderson V. Kaminskas T. P. Kirwin M. J. Reiff File

ATTENDEES:

Alex Foltynowicz	Greg Rozga
Ivy Netzel	Red Hollander
Jim Schweitzer	Carl Gray
Lori Armstrong	Tim Corbin
Jane Marean	Dick Hornak
Brian O'Connell	Lee Dubois
Joe McNamara	

PRESENTATION:

Brian O'Connell

CR 99-1478, Abandon Boron Recycle System
Ref. MR 96-067, priority B5D

This CR was to discuss isolation of the old Boron Recycle gas strippers. As discussed in CR 99-1478, a gas decay tank was released due to isolation of air to the AOV which is the boundary between the old gas stripper and the waste gas system. The AOV fails open.

The EAC discussed abandoning the gas stripper (cutting and capping), and the priority for completion of the mod. Also discussed was the possible isolation of this line through a temp mod in the interim to installing a mod.

EAC Recommendation: **Cut and cap the lines that are urgent with a priority of B1C.**

ACTION ITEM: **Check with OPS and construction, Dick Hornak to come up with a small mod for the cut and cap in August, if he has available resources. Finish this mod in the 2000 non-outage. If not, then Jim Schweitzer to see if his staff can support a possible temp mod.**

A183

Al Foltynowicz

Problem Description

CR 96-0574, CR 97-0720, and EWR 99-031 had been written to report that operation of the AF pumps in the recirulation mode results in high level of noise in Control Room and Operation Offices.

Problem Evaluation

The entire subject of noise in recirculating lines can be traces to two separate areas:
1) The piping itself.
2) The pressure-reducing orifice installed in the line to establish a specific flow under the prevailing pressure differentials.

Each of the above areas have been reviewed for the possible contribution to the high level of noise in the AF recirculating piping system. Field walkdown of piping lines involved, confirmed a high level of noise in the area. In addition, piping vibration of high frequency and low amplitude was also observed.

Piping supports inspection, performed by J. McNamara-Civil, indicated that some of the U-bolts for supports could be tightened. This would result in possible alleviation of some of the vibration. However, this will not help in elimination or significant reduction of noise caused by cavitation erosion of recirculating line pressure reducing orifice.

The pressure-reducing orifice in AF recirculation line controls the amount of water that is recirculated for the AF pump and provide initial pressure reduction of this high pressure fluid (1190 psig to 14.7 psig). The orifice is typically a stainless steel pipe with a multiple pressure reducing orifice plates in series inside.

High pressures drops require multiple orifices to prevent noise and cavitation. The solution to cavitation is to reduce the pressure from the inlet to the outlet gradually- without allowing the liquid pressure to drop below its vapor pressure. By always keeping the pressure through the component above the vapor pressure, cavitation can be successfully avoided. In this case, orifice with six (6) to eight(8) stages is required to eliminate cavitation and to have predicted noise level of less than 70 decibels.

Although, drawing of the installed pressure-reducing orifice was not located, thus, making verification of the number of stages not feasible. Based on the length of the orifice - 7 1/2", it was concluded that the installed orifice does not have required number of stages (6 to 9) to preclude cavitation. Furthermore, the type of noise, which sounds like gravel flowing through the piping is typical to the noise associated with cavitation.

Based on the above, it was determined that the noise problem in AF pumps recirculating piping is caused by cavitation erosion in the pressure-reducing orifice. To further support this, the past visual inspection of pressure-reducing orifice RO-4008 (P-35A pump) had found deterioration resulted from cavitation.

Options:

1) Do nothing
Do nothing option was evaluated in view of the NRC Information Notice 98-45. NRC Information Notice 98-45 has been issued to address similar problem caused by cavitation erosion in orifices. Review of this notice reveals that orifice damaged by cavitation can cause flow-induced vibration. The vibration, in turn may cause socket welds to fail and also cause some damage to pipe supports and increased component failures.

2) Piping Modification
Piping modification option results in piping changes which will require a modification, Cost associated with this option is outlined in the following part.

Proposed Corrective Work

To resolve this issue, it is recommended that existing pressure-reducing orifice be replaced or eliminated. The replacement or elimination will be accomplished by either of the following three options which were evaluated by the EAC:

OPTION A: Install a multi-stage pressure-reducing orifice.
The cost (budget-grade) associated with this option would include:

- Material (procurement of new orifice) - $24,000
- Labor - $2000 (50 hrs.)
- Project Management - $3,000 (40 hrs)
- Engineering - $17,500
    - reconciliation of piping analysis - $3,000 (40 hrs)
    - modification - $9,000 (120 hrs)
    - reconciliation of supports - $1,000 (20 hrs)
    - seismic qualification - $2,000
    - sizing calculation - $1,500
- Shipment approximately 20 wks

TOTAL ESTIMATED COST PER PUMP - $43,500

OPTION B: Replace existing pressure-reducing orifice with a pressure-reducing flow element in valve body.

The pressure-reducing flow element consists of set of multi-stage trim for energy dissipation installed in a valve body, capped with a blind bonnet flange. The use of this trim will eliminate cavitation damage.

The cost (budget-grade) associated with this option would include:

- Material (procurement of device) - Valtech - $12,000
  CCI - $23,000
- Labor - $2,000 (50 hrs)
- Project Management - $3,000 (40 hrs)
- Engineering - $17,000
  - reconciliation of piping analysis - $3,000 (40 hrs)
  - modification - $9,000 (120 hrs)
  - reconciliation of supports - $1,500 (20 hrs)
  - seismic qualification - $2,000
- Shipment approximately: Flowserve (Valtech) - 6-8 wks
  CCI - 20 wks

TOTAL ESTIMATED COST PER PUMP - VALTECH - $32,500 OR CCI - $43,500

OPTION C: Retrofit Copes-Vulcan control valve with multi-stage pressure-reducing trim.

The cost (budget-grade) associated with this option would include:

- Material (procurement of new valve trim) - CCI - $23,000
  Copes-Vulcan - $13,600
- Labor - $2,400 (60 hrs)
- Project Management - $3,000 (40 hrs)
- Engineering - $12,500
  - reconciliation of piping analysis - $1,500 (20 hrs)
  - modification - $9,000 (120 hrs)
  - seismic qualification - $2,000
- Shipment approximately: CCI - 16 wks
  Copes-Vulcan - 14 to 16 wks

TOTAL ESTIMATED COST PER PUMP - CCI - $40,900 OR COPES-VULCAN - $31,500

EAC Recommendation: **Work on the two motors (urgent) in 2000. Evaluate performance, then if necessary change the turbines in 2001. Priorities given B3D for turbines and A3D for motors.**

Lee Dubois

Options for supporting installation of temporary chiller packages.

Installation Scope: 1) Fully Installed and Tied into both VNCR and VNCSR
2) Staged, filled and ready to hook up

Fully installed:

Pros: Ease of start up for operations and plant personnel
Time to start the system is low (estimated at 1 hour)
Less capacity loss because we can insulate the lines-minor
Less potential for condensation/water problem above WCC

Cons: Increased cost of equipment and installation
Cost of hourly fire rounds (38K over 9 months)
OR
Alternate cost of installing core hole wall sleeves
This will be useful for future maintenance.

Staged, filled and ready to hook up:

Pros: Cost savings of installation and hook up
Cost savings of fire round patrol (38K)
Cost of not installing a core hole wall sleeve

Cons: Increased time required to start the system (estimated at 8 hours)
Capacity loss because we can't insulate the lines - minor
Potential for condensation/water problem above WCC

Engineering Preference:

Design Engineer-Stage Unit, Probability of full failure of unit is medium to low
System Engineer-Stage Unit, Probability of full failure of unit is medium to low

Equipment Selection: 1) Go with lowest bidder for rental chiller
2) Go with chiller package that has similar components to the new chillers we plan on installing.

Go with lowest bidder:

Pro: Save approximately 7K on rental

Con: Increased cost of procedure writing
Increased training for Operations, Maintenance, and Engineering

Go with chiller package that has similar components to the new chillers we plan on installing:

Pro: Decreased training costs-Operations, Maintenance, and Engineering can get familiar with package before we install new chiller packages.
Decreased procedural development cost for operations-temp procedure can be rolled into new procedure for new chiller packages.
Rental company is manufacturing company-not a third party-parts, local service

Con: Increase in cost on rental, 8K

Engineering Preferences:

Design Engineer - Go with package that has similar components to the new chillers we plan on installing

System Engineer - Go with package that has similar components to the new chillers we plan on installing.

EAC Recommendation: **Stage the unit. Go with a similar unit, but investigate possibility of purchasing in lieu of renting. Check with Ops for concurrence. NOTE: Option of purchasing was ruled out due to funding issues. Ops concurrence obtained.**

Tim Corbin

CR 1570, Installation of Recirc Line Support

Evaluate issue and make recommendations for correction and to prevent recurrence.

EAC Recommendation: **Priority B3D**