TF-5465

BUSINESS CONFIDENTIAL

FINAL REPORT

OPERATIONAL SAFETY/HEALTH SURVEY

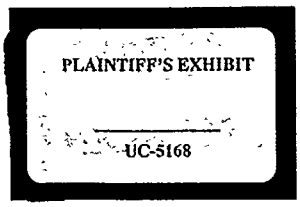
NO. 3 POWER HOUSE

TEXAS CITY PLANT

SURVEY DATE: FEBRUARY 13-17, 1984

OS/HS SURVEY TEAM:

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ACL Doc 19655 · Page 1 of 13 asbestosclaims.law/library/19655/1

SUMMARY - Cont'd

6. The safety awareness of all levels of management was quite evident and is perceived by all levels of unit operation.

7. A strong "team" relationship exists among staff, operations, and maintenance personnel.

8. Unit and maintenance personnel that were interviewed had an overall very positive attitude toward working in the unit and the unit itself.

None of the deficiencies or concerns identified by the OS/HS Team were judged to represent an 'imminent' hazard requiring immediate correction. Two equipment related safety concerns were identified as "major", deserving special attention. These were:

M.1 - Frequent excursions allowing water carry-over into Nos. 35 and 36 superheaters, with potential for damage from thermal and physical shocks.

M.2 - Potential for runaway of No. 31 Steam Turbine if a power operated check valve fails to operate properly.

A number of other concerns were classified as "less serious" but still deserving of attention. These less serious concerns have been categorized as:

SL.1 - Fire Protection Concerns
SL.2 - Equipment/Facilities Concerns
SL.3 - Control Systems/Instrumentation Concerns
SL.4 - Pressure Relief/Emergency Venting Concerns
SL.5 - Operator Training Concerns
SL.6 - Boiler Safety Criteria Deficiencies
SL.7 - Personnel Exposure Hazard Concerns
HL.1 - Knockout Pots, Health Exposure
HL.2 - Removal of Asbestos-containing Insulation Concerns

Details pertaining to all of these concerns together with comments and/or recommendations are presented in the "Discussion" section of the report. A laundry list of minor concerns was presented separately to departmental personnel at the time the Team was on-site.

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ACL Doc 19655 · Page 2 of 13 asbestosclaims.law/library/19655/2

DISCUSSION

MAJOR CONCERNS

M.1 Water Carry-over to Nos. 35 and 36 Superheaters

The water separator in the high pressure steam line from No. 3 Olefins does not adequately protect Nos. 35 and 36 superheaters against water carry-over. Upsets at No. 3 Olefins reportedly result in conditions that allow carry-over an estimated once or twice a month. Water carry-over results in thermal shock to the superheaters (200 to 300°F rapid temperature changes are reportedly not uncommon), the potential for water hammer, and excessive swings in loads at the superheaters - which usually require going to manual control of No. 36.

Recommendation

Consideration should be given to providing an adequately designed water separator to protect Nos. 35 and 36 superheaters against water carry-over under the most severe upsets likely in the No. 3 Olefins high pressure steam supply.

M.2 Potential for Runaway of No. 31 Steam Turbine

The 1100 psig No. 31 steam turbine has a power operated check valve to prevent backflow from the extraction 600 psig header backwards through the second stage to the exhaust 200 psig steam header when the machine trips. Failure of this power check valve to operate will result in a runaway of the steam turbine. The reliability of this valve for this type of service is questionable. Recently the valve failed to operate during a non-routine test (the valve is not on the RM program).

Recommendation

The design and reliability of this valve should be reviewed to determine whether or not the valve is acceptable for this type of service. Consider installing a standard design steam stop valve to prevent backflow. The valve should be added to the RM program.

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ACL Doc 19655 · Page 3 of 13
asbestosclaims.law/library/19655/3

LESS SERIOUS SAFETY CONCERNS

SL.1 Fire Protection Concerns

1.1 The No. 31 Motor Control Center (underneath the Control Room in Bldg. 180) has extensive overhead wiring in cable trays with difficult access for manual fire fighting. Wiring openings into the control room above are not well sealed. The room had storage of "Microwipes" and paper towels in cardboard cartons.

Recommendation

Consideration should be given to providing smoke detectors and automatic Halon or Carbon Dioxide protection for this room. Openings through the ceiling should be adequately sealed. All maintenance supplies should be removed from this room.

1.2 An oil leak and oil accumulation above the lube oil reservoir at No. 31 Gas Turbine presents a fire hazard in this area. The hazard is increased by the presence of a large amount of paper towels which are being used to soak up the oil.

Recommendation

Repair the source of the oil leak and clean up the area.

1.3 The Computer Room has no fixed fire protection or fire detection for the cable area under the raised floor.

Recommendation

Consideration should be given to providing fixed Halon protection for the raised floor area of the Computer Room, automatically actuated by cross-zoned ionization and photo electric smoke detectors. Actuation of this protection should also be interlocked to shut down the air conditioning system.

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ACL Doc 19655 · Page 4 of 13 asbestosclaims.law/library/19655/4

SL.1 Fire Protection Concerns - Cont'd

1.4 The "Bowser" oil filter on No. 31 Steam Turbine has a leak at the pump seal and leaking oil has the potential of exposing adjacent facilities (including the overhead cable trays) to fire damage.

Recommendation

The oil leak should be repaired and oil deposits cleaned up in this area.

SL.2 Equipment/Facilities Concerns

2.1 The deaerators have a high water level alarm but do not have a high level trip that would prevent flooding. Deaerator flooding has the potential of causing serious damage to the low pressure steam lines from water hammer in case the high level alarm in the control room is disregarded or not acted upon quickly enough.

Recommendation

The addition of high-high water level trips should be considered for all deaerators to prevent this potential for water hammer.

2.2 There is no level indication in the first stage entrainment separator at No. 31 compressor. Tube leaks or breaks in the first stage intercooler for the Compressor might not be noticed until severe damage had occurred due to water entering the second stage compressor.

Recommendation

Consideration should be given to addition of a high level alarm in the water entrainment separator for the first stage intercooler for No. 31 Compressor.

2.3 There have been reported failures of instrument leads in high pressure steam and condensate service due to internal erosion and exterior corrosion. In either case, the condition of these lines is not apparent because most are insulated.

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ACL Doc 19655 · Page 5 of 13 asbestosclaims.law/library/19655/5

SL.2 Equipment/Facilities Concerns - Cont'd

Recommendation

The OS/HS Team recommends that a program for checking the integrity of these leads be instigated to insure that failures will not occur.

SL.3 Control Systems/Instrumentation Concerns

3.1 TDC-2000 System

Several concerns were expressed to the OS/HS Team regarding automatic operation by the TDC-2000 System, including:

1) The alarm configuration is inconsistent among the different groups in the system.
2) Some alarms are duplicated in the TDC and the Panalarm Systems.
3) Instrument repair at Bldg. 11 can affect the TDC controls at Bldg. 180 without the knowledge of the Powerhouse No. 3 operators.
4) Miscellaneous keys can be used to enter the TDC-2000 security system.
5) Some critical process controls, such as drum levels, are not controlled by the TDC-2000 system.
6) Numerous nuisance alarms from Bldg. 11 also alarm in Bldg. 180, which causes operators to routinely de-activate and disregard control room alarms.

The OS/HS Team also noticed that the TDC-2000 printers are not readily accessible to the operators (printers are located in the computer room) and that computer files and the highway traffic director were not secured and were accessible to anyone.

Recommendation

Consideration should be given to reviewing the TDC-2000 system with the objective of:

1) Regrouping and simplifying alarms to minimize operator confusion.
2) Including all critical process controls on the TDC-2000,

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ACL Doc 19655 · Page 6 of 13 asbestosclaims.law/library/19655/6

SL.3 Control Systems/Instrumentation Concerns - Cont'd

3) Improving effectiveness of system by moving the printers to nearby access by the operators.
4) Securing the computer room to prevent access by unauthorized personnel.

3.2 Steam tracing for freeze protection is sometimes left on during periods of warm weather and has caused false readings in important process instruments, such as boiler drum water level controls, by vaporizing the process fluids in the instrument leads.

Recommendation
Consideration should be given to installation of a thermostat in the steam tracing line to critical instruments.

3.3 The flame scanners on No. 33 and 34 Boilers have a shutoff valve in their mounting pipe which, if closed, will cause a false indication of flame failure.

Recommendation
Remove the valves or car seal the valve handwheels open.

SL.4 Pressure Relief/Emergency Venting Concerns

4.1 Flanges on safety valve discharge piping were noted to have 50% of the flange bolts missing. Some specific examples include:
1) 4 of 8 bolts missing on No. 34 Boiler mixed fuel gas line safety valve discharge.
2) Missing bolts on steam safety valve discharge at No. 34 Boiler.
3) 4 of 8 bolts missing on the 70 psig flash tank safety valve discharge.
4) 4 of 8 bolts missing on the No. 33 and 34 flash tank safety valve discharges.
5) 4 of 8 bolts missing on the No. 33 and 34 Deaerators safety valve discharges.

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ACL Doc 19655 · Page 7 of 13 asbestosclaims.law/library/19655/7

SL.4 Pressure Relief/Emergency Venting Concerns - Cont'd

6) Missing bolts on the safety valve for the 1100 psig No. 3 Olefins knockout steam separator.

The OS/HS Team is concerned that the reaction force developed by the venting process could result in failure of the flange bolts if less than a full compliment of bolts are provided.

Recommendation

Review the reasons for this common practice and consider replacement of the missing flange bolts during the safety valve inspection procedures.

4.2 The OS/HS Team observed that safety valves are not provided at the following locations:

1) No. 31, 32, 33, and 34 lube oil transfer pump discharges.
2) Bowser oil filter pump on the No. 31 steam turbine.
3) No. 33 and 34 lube oil filters and coolers.
4) No. 31, 33, and 34 Boiler mixed fuel gas knockout pots.
5) No. 35 and 36 superheaters mixed fuel gas knockout pots.
6) Cooler 2204E-434 near the sulfite tank.
7) No. 31 Boiler feedwater pump cooler and filter.
8) No. 31 Air Compressor Coolers on the water side.

Recommendation

Review this equipment and install safety valves where needed according to CED S/H Technology Manual Standard Practices and Criteria.

1. The following safety valves should be sized for positive displacement pump closed discharge:
   - No. 31, 32, 33, and 34 lube oil transfer pump discharges
   - Bowser oil filter pump on the No. 31 steam turbine

Union Carbide trial exhibit UC-5168: Final Report: Operational Safety/Health Survey of No. 3 Power House, Texas... Published by AsbestosClaims.Law
ACL Doc 19655 · Page 8 of 13 asbestosclaims.law/library/19655/8

SL.4 Pressure Relief/Emergency Venting Concerns - Cont'd

2. The following safety valves should be sized for fire exposure:
   - No. 33 and 34 lube oil filters and coolers
   - No. 31, 33, and 34 Boiler mixed fuel gas knockout pots
   - No. 35 and 36 superheaters mixed fuel gas knockout pots

3. The following safety valves should be sized for valving in the coolant in the heat exchanger:
   - Cooler 2204E-434 near the sulfite tank
   - No. 31 Boiler feedwater pump cooler and filter
   - No. 31 Air Compressor Coolers on the water side.

4. The No. 33 and 34 lube oil coolers should have safety valves that are sized for fire exposure or for the coolant valved in, whichever is greater.

4.3 The two safety valves on top of No. 31 Boiler feedwater heater do not have supports on their outlet piping. Overstressing might occur if those valves discharge.

Recommendation

These valves should be analyzed for reaction forces and adequate supports for both safety valve discharge lines should be designed and installed.

4.4 The 10 psig excess steam vent, supported off No. 31 deaerator, discharges near the adjacent operating platform.

Recommendation

Raise this vent discharge to at least 8 feet above the platform level.

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ACL Doc 19655 · Page 9 of 13 asbestosclaims.law/library/19655/9

SL.4 Pressure Relief/Emergency Venting Concerns - Cont'd

4.5 The portable sample cooler stored on the top platform at No. 31 Deaerator has a blind flange in place of a rupture disc.

Recommendation

Replace the blind flange with the required rupture disc.

SL.5 Operator Training Concerns

Although the operating personnel are well experienced in powerhouse operations, the need for better initial and periodic training was reported to the OS/HS team from various sources. The operators appear overly dependent on the SOP's and are reluctant to use the new TDC-2000 controls during upsets because they lack training. Operators must rely on staff and instrument mechanic assistance to startup the unit and to handle upsets. The OS/HS Team is also concerned that the unit can sometimes be operated entirely by relief operators who may lack experience with operation of No. 3 Powerhouse.

Recommendation

Consideration should be given to implementation of a refresher operator training program on the TDC-2000. Training for relief operators should be reviewed and, where feasible, supplemented with additional training.

SL.6 Boiler Safety Criteria Deficiencies

6.1 Fuel Trip Valves

1) No. 33 and 34 Boilers and No. 35 Superheater do not have automatic vent valves on the main burner fuel gas lines between the existing double trip valves.

Union Carbide trial exhibit UC-5168: Final Report: Operational Safety/Health Survey of No. 3 Power House, Texas... Published by AsbestosClaims.Law
ACL Doc 19655 · Page 10 of 13 asbestosclaims.law/library/19655/10

SL.6 Boiler Safety Criteria Deficiencies - Cont'd

Recommendation

Add main burner gas automatic vent valves to these boilers and superheater to comply with Standard Practice ES-101, Paragraph 3.6.

2) Nos. 33 and 34 Boilers and No. 35 Superheater do not have automatic double trip valves and vent valves on the pilot gas lines.

Recommendation

Provide pilot gas double trip valves and vent valves to these boilers and superheater to comply with ES-101, Paragraph 3.6.

6.2 Master Fuel Trips

Nos. 33 and 34 Boilers and No. 35 Superheater do not have high/low fuel gas pressure trips.

Recommendation

Provide high/low fuel gas pressure trips to these boilers and superheater to comply with ES-C110 Paragraph 3.2. Also refer to ES-101 Paragraphs 3.10.2 and 3.10.3.

6.3 First Out Alarms

Nos. 33 and 34 Boilers do not have first-out trip alarms.

Recommendation

Provide first-out trip alarms to these boilers to comply with ES-C110 Paragraph 3.8. Also refer to ES-101 Paragraph 4.3

6.4 Fuel Gas Knockout Pot Alarms & Trips

Nos. 33 and 34 Boilers and No. 35 Superheater do not have high level alarms nor high-high level trips on their mixed fuel gas liquid knockout pots.

Union Carbide trial exhibit UC-5168: Final Report: Operational Safety/Health Survey of No. 3 Power House, Texas... Published by AsbestosClaims.Law
ACL Doc 19655 · Page 11 of 13 asbestosclaims.law/library/19655/11

SL.6 Boiler Safety Criteria Deficiencies - Cont'd

Recommendation

Provide high level alarms and high-high level trips on these knockout pots to comply with ES-C110, Paragraph 3.12.

6.5 Indication of Bypassed Trips

Nos. 33 and 34 Boilers do not have indication of bypassed trips.

Recommendation

Provide indication of bypassed trips on these boilers in accordance with ES-C110, Paragraph 3.7. Also refer to ES-101, Paragraph 3.13

SL.7 Personnel Exposure Hazard

7.1 Motor heaters fed by Substation No. 37 do not disconnect when the main motor breakers are pulled (for example to feed water pump motors 33-A and 33-B). This could result in a serious injury to personnel when working on these motors because, even though the main breaker has been pulled and locked out, there will be a live circuit at the motor. This is complicated by the fact that the breaker which serves the motor heaters handles more than one motor.

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ACL Doc 19655 · Page 12 of 13 asbestosclaims.law/library/19655/12

3) Insulator's outer clothing which is contaminated with asbestos fibers is not properly removed.

4) Winds carry the asbestos fibers outside the area that is barricaded for the removal operation.

Recommendation

Continue emphasizing to unit personnel the importance of obeying barriers and the importance of following established procedures when removing asbestos-containing insulation and when removing asbestos-contaminated clothing. When the insulation material is unknown, the insulation should be treated as though it contains asbestos.

15490

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ACL Doc 19655 · Page 13 of 13 asbestosclaims.law/library/19655/13