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Shell Oil Company
Interoffice Memorandum

PLAINTIFF'S EXHIBIT
SH-1826

NOVEMBER 21, 1990 I90-410

FROM: M. J. VASQUEZ, SENIOR INDUSTRIAL HYGIENIST, HS&E, E&EA MJV

TO: A. SVOBODA, INDUSTRIAL HYGIENE TECHNICIAN, DPMC

SUBJECT: CAT CRACKER TURNAROUND I.H. CRITIQUE

Enclosed is my critique of operations conducted during the Cat Cracker turnaround. Operations or programs that posed a particular concern are outlined. When possible I have tried to offer you recommendations. Some of these concerns should and may have been address with each contractor as part of the bid process. Contractor should be aware that you intend to audit their programs during the event. Safety items and program you intend to audit should be reiterated at the kick off meeting. I recommend you make it clear to contractors they must have all requested information to your office prior to the kick off meeting.

Overall, I was very impressed with the caliber of the Shell safety staff assigned to this project. I received tremendous support and assistance from all Shell staff working on this turnaround. The daily meetings between staff and contractors were beneficial to both parties. It opened up communications on issues that needed to be resolved. The quick response staff provided in correcting problems was a testament to their commitment to safety and health.

I want to thank everyone associated with his project for their patience. I learned a great deal about refining and saw first hand the inner workings of a Cat Cracker. This was a tremendous learning experience for me.

Please look over this outline and contact me if you have any questions. Should you need further support on a future project, call me. I would be more then happy to try to help you in any way I can.

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MJV/bvr

Attachment

cc: C. F. Phillips
T. A. Colangelo
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E&EA-A (2)

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DEER PARK CAT CRACKER TURNAROUND CRITIQUE

1. Ventilation

   a. Cooled, supplied-air was not being provided where needed. For example, in the Cat Cracker, all air drops were initially located along the walls of the vessel, instead of on top and in between the cyclones where the welders were located. Moving the air drops on top of the cyclones improved work conditions and reduced visible fume.

   b. There was a shortage of supply air drops. There were not enough drops provided so each welder could receive sufficient cooling and dilution ventilation. High weld fume generating operations, such as, welding operations performed between the primary and secondary cyclones was not provided with tempered air that could dilute the fume and gases present. Because of the location of the weld, welders doing this operation worked with their heads in the weld plume. The toxic nature of the fume was of special concern since the base and filler metals were stainless steel. Airline respirators should have been specified for stainless steel welding operation.

      An attempt was made to supply air to one welder from behind. It reduced the amount of weld fume and gases that rose into his breathing zone (BZ). However, there were not enough air drops available to do the same for each welder doing same operation at different locations within the Cat Cracker. The 3M, 9970, disposable respirators worn by welders were not designed to provide protection at the high fume levels observed at this operation. Nor do they remove welding gases that may be present. Without adequate local exhaust and supply ventilation, airline respirators offer the only adequate means of protecting welders welding stainless steel under these conditions.

   c. Exhaust and supply ventilation systems were improperly positioned. The location of supply air drops in vessels and work spaces resulted in clean, cool air being exhausted before it had served its purpose. We may need to provide contractors with guidelines or procedures to assure good air flow patterns are established. Contractor would then be made responsible for assuring that all supplied and exhaust air systems are located properly.

   d. Scaffolds, platforms and other structures blocked the flow of cool, clean air being supplied. Exhaust air systems suffered the same fate. It was a common occurrence in ducts, risers, and air cleaning units being repaired that required platforms

or scaffolds. Because of these obstacles, channeling of air along vessel walls was also common. This resulted in poor air circulation, little to no dilution of contaminants and inadequate cooling of workers. Channeling when combined with air tool discharge caused noticeable air turbulence. I believe this turbulence contributed to the already high airborne contaminant levels present by disturbing settled dust. We may want to review the construction and location of scaffolds and platforms. The use of lightweight, expanded metal forms, in place of wood planks for floors on platforms should be investigated.

2. Respiratory Protection

   a. A conversation, regarding respiratory protection, was held with a safety representative for one contractor on the turnaround. Our discussion revealed he had not received any formal respirator training. He was unfamiliar with terms, such as, protection factors and quantitative-qualitative fit testings. Further, most of the worker he was responsible for had been not been fit tested. They had only been shown how to leak test one brand of respirator. Workers, however, were seen wearing several different types of respirators exclusive of the one for which they were trained.

      As part of the bid package, we should require contractors to produce copies of their respirator programs. The package should include the name of the person(s) responsible for the program and training, as well as experience in administering a program. We should also require them to certify they have conducted the necessary training, medical evaluations, and fit testing for each worker who may wear a respirator in the course of any work assignment. They would produce their records when attending the kick off meeting. This should be reviewed by the site IH before the start of the project. At that time we would provide them with copies of our respirator guideline.

   b. We should consider upgrading the type of respiratory protection to match the operation with the highest hazard. For example, a welder and helper working in areas where exposure to high levels of fumes and gases are anticipated should both wear equal levels of respiratory protection. If a chipper is required to wear an airline respirator, then a helper or welder working in the immediate area should wear the same.

   c. Contractors were not evaluating the nature of the hazard prior to job assignment. For example, a welder sent to inspect welds, in a semi-confined area, using a solvent based, penetrant dye system. They had not anticipated a problem with the solvent. A half-face organic cartridge respirator was

available from the contractor's tool crib. Because of the irritating nature of the solvent, a full face respirator would have been more appropriate. We later determined workers needed to wear full-face airline respirators because of the high airborne solvent concentrations produced.

3. Noise

   a. Sound levels generated by air-powered fans on dog houses exceeded 105 dBA. Hole watchers would at times sit inside the dog house during the entire shift. The relative effectiveness of the hearing protection provided, at this intensity, may not be adequate for the following reasons.

      1) Most watchers wore foam insert type hearing protectors (HP).

      2) To get maximum protection they must be inserted correctly.

      3) It was difficult of tell if the worker was wearing HP.

      4) In several instances, worker wore HP incorrectly.

      Therefore I recommend reviewing the type of HP worn by hole watchers. I would encourage you to require earmuff-type HP be worn by hole watchers.

   b. Laborer removing refractory from inside of ducts and vessels were exposed to very intense sound levels. As expected, levels were much higher when two or more chipper worked close together. Redundant hearing protection (earmuff and foam insert) was worn by these workers. I believe we need to review the literature to assure the efficacy of redundant HP. Secondly, we should review the literature for the possibility they are experiencing exposure through bone conductance. Most wore only cotton glove during chipping. Modification of hand tools may be necessary to reduce exposures, if they are occurring. Modifications might also reduce vibration transmission to the hands, a major cause of Raynaud's Syndrome.

4. Man Made Mineral Fibers - MMMF

   Contractors should be provided with Shells guideline for MMMF. Several contract workers were observed cutting and shaping sheets of MMMF with hand saws and other hand tools. No effort was made to clean up the large amounts of dust generated. Scrap insulation and dust could be found on or around the area where MMMF had been cut and installed. The need for good Housekeeping should be emphasized to workers.

I recommend all MMMF containing insulation be labeled. A historical record, by type and manufacturer of the MMMF installed during turn-a-round, should be kept. This will prevent unnecessary analysis to reassess the make up of the insulation material at a future date.

5. Spraying of Refractory Material

Airborne levels of sprayed refractory materials were found to exceed 200 mg/m^3. These levels were measured using a direct reading dust monitor. Most of the workers doing this operation worn half face negative pressure air purifying dust respirators. I recommend an upgrade in respiratory protection to airline respirators. Dust at this concentration quickly clog respirator filters. Use of airline respirators will increase the productivity of workers because they will not have to stop the operation to replace the filter cartridges. And it will improve worker protection. Clogged filters not only increase breathing resistance but can void the protection. As breathing resistance increases, the respirator becomes uncomfortable and hot. Workers trying to adjust a respirator in a contaminated environment allow the contaminant to leak into the respirator. Providing the right respirator reduces our cost and protects the health of the worker.

6. Enclosing of Operating Equipment for Increment Weather

A gasoline powered refractory mixing operation and storage area had been enclosed in a plastic tent to protect it from the rain. The enclosure captured exhaust gases from the gasoline engine. Carbon monoxide levels in excess of 200 ppm were measured in the BZ of a worker on a platform above the mixer. The CO levels in the BZ of workers on ground level exceeded 50 ppm. A fresh-air blower was positioned on the platform next to the worker above. This reduced the exposure on the side next to the blower to just over 100 ppm. Levels of 200 ppm continued on the opposite side of the worker.

The tent roof and side walls were continuous sheets of plastic that extended to the ground at several places. I was told total enclosure was necessary to keep the bags of refractory dry. Because of the tight enclosure, supplied-air and engine exhaust mixed with only limited reductions in CO concentration. If such enclosures are required in the future, the following suggestions should be considered.

a) The engine exhaust should be vented beyond the roof.

b) The roof on the tent should not extend down below the roof line.

If there is a concern that rain may be blown into the work area, make the tent wider or longer then the work area. Dry storage areas should separate from the mixing area.

7. Personal Protective Equipment

   a. Helpers should be provided with appropriate PPE.

      In several instances the helper was not provided the same level of protection as the operator. Several examples to highlight this problem.

      1) A welder was attaching metal rods that functioned as refractory block holders. A helper held the metal rods in place until the welder could tack weld them in place. The worker was instructed to turn his head after positioning the rod.

      2) In another case, a worker cutting stainless steel with an air arc had a helper who wore no hearing, face or respiratory protection. The worker cutting the metal wore a supplied-air welder's helmet. It was the helper's job to hold the metal plate as it was cut.

8. Industrial Radiography

   Prior to any industrial radiography, request copies of the radiographer's license, and operating procedures. After the job is complete require exposure records for all worker involved in the radiographic operation. When tight schedules require extensive or concentrated radiography, make use of lights and other warning devices to enhance the perimeter of the restricted area. Make all workers on the project aware of the potential dangers.

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