

SHELL OIL COMPANY

PLAINTIFF'S EXHIBIT

SH-986

PRIVATE AND CONFIDENTIAL

TO GENERAL MANAGER - REFINING

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DATE JUNE 4, 1973

FROM INDUSTRIAL HYGIENIST -
DEPARTMENT OF OCCUPATIONAL
SAFETY AND HEALTH - HEAD OFFICE

SUBJECT INDUSTRIAL HYGIENE WALK-THROUGH
SURVEY - HOUSTON REFINERY

This report will summarize the results of the walk-through survey which was conducted by R. K. Jones and D. P. Atwood at the Houston Refinery on February 26-28 and March 9, 1973. We appreciate the courtesies extended to us at that time by J. G. Pratt, B. Baldwin, and D. Urbanek. The general impression of both Mr. Jones and myself during the survey was that the staff employees operating the refinery were very safety conscious as a result of considerable training by refinery personnel. No "imminent danger" situations were observed during the survey. During the survey it was noted that considerable air contaminant sampling is now being done by the refinery safety department. Both area and personal (breathing zone) sampling has been done. The sampling program at this time includes benzene, toluene, xylene, ammonia, TEL, phenol, carbon monoxide, hydrogen sulfide, sulfur dioxide, mercury, and acetone. Carbon disulfide sampling is done during the sulfiding of the hydrocracker catalyst. Nickel carbonyl sampling is done before entering hydrotreater vessels. Asbestos sampling has been done. Also, it was noted that noise contour diagrams have been posted in the control rooms. Specific recommendations as a result of the survey are given below.

Aromatics Concentration Unit

1. Operators in this unit complained about gases and vapors from the Shell Chemical ground level burner. We understand that this is a long-standing problem. Air sampling to determine the nature and amount of these atmospheric contaminants is recommended. In view of the apparent irritation experienced by employees exposed to the gases and vapors, we recommend renewed efforts to control this exposure.
2. Xylene odors were quite apparent in the Para-xylene Unit. We understand that air sampling with detector tubes has shown atmospheric levels to be below the threshold limit value. We recommend that employee exposure to xylene be well documented as it is obvious that the material is present in the working atmosphere.

Catalytic Cracking Unit

A silica-alumina catalyst is used in this unit. Discussions with refinery personnel have indicated that a certain amount of this catalyst continuously escapes from the unit. We recommend that employee exposure to free silica dust be evaluated by respirable dust sampling.

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Lubricating Oils Department - Shell Sol 71 Finishing

Bauxite is used as a filtering medium in the finishing operation. This material usually has a silica content ranging from 2-9%. The potential for high dust levels being generated when the bauxite is dumped from hoppers onto an open conveyor belt was noted. We recommend that employee exposure to free silica be evaluated by means of respirable dust sampling. It may be desirable to enclose the dumping-conveying operation to control dust generation.

Catalyst Changeout/Regeneration

Catalysts containing silica, nickel, cobalt, molybdenum, tungsten, platinum, and copper are used in the refinery. No changeout or regeneration operations involving these materials were noted during the survey. We recommend that the Regional Industrial Hygienist be advised when these operations will take place so that he may evaluate whether air sampling would be desirable.

Automotive Shop Area

1. The operating procedures in the paint spray room were questionable. It appeared during the survey that the parts being painted were being placed next to the air intake filters. Such an arrangement would not allow for the man painting to be upwind of the spray. Also, no rotating table was noted in the room. A rotating table allows the painter to rotate the piece being painted and, therefore, always be upwind of the spray. We recommend that painting procedures in the spray room be reviewed.

The adequacy of ventilation in the spray room is also questionable. The OSHA standard [Section 1910.94 (c)(6)(i)] calls for a minimum air velocity of 100 feet per minute within the booth.

We recommend that the spray booth and drying room be completely inspected for compliance with Sections 1910.94 and 1910.107 of the OSHA standards.

2. Welding equipment was noted in the automotive shop. Protective eye screens were available, but no local exhaust system was noted. We recommend you review the need for local exhaust ventilation in this area.

Refinery Laboratories

1. A survey of the main refinery laboratory and the unit laboratories showed that toxic materials were generally being handled in exhaust hoods. Air speeds into the laboratory hoods were not checked during the survey. However, we wish to point out that the American Conference of Governmental Industrial Hygienists recommends a minimum air speed of

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100 feet per minute at the open face of laboratory hoods. Hoods must often be used with the doors in a lowered position to maintain this air velocity. We recommend that the face velocities of laboratory hoods where toxic materials are handled be periodically checked for proper operation.

2. Two unit laboratories where the adequacy of ventilation was questionable were noted during the survey. These were the unit laboratories in Distilling Unit 2 and the Catalytic Cracking Unit.
3. One area where no local exhaust ventilation was noted was the Crude Assay Room in the main laboratory where benzene is occasionally used in the column chromatograph. We recommend that air sampling for benzene be done when this equipment is being operated. Benzene should always be handled in exhaust hoods unless unusual situations dictate otherwise. In those cases, air sampling should be done.
4. Aniline is handled in the main laboratory and also in the Light Oil Fractionation Unit Laboratory. We recommend that employee exposure to this material be evaluated by air sampling as it is not handled in laboratory hoods. In view of the ease of absorption of this material through the skin, we recommend that protective equipment be used when handling this material. The threshold limit value (5 ppm) for aniline is based on the assumption that there is no skin contact with liquid aniline.

Maintenance Shop

A number of improvements were being made in the shop during the survey. Some of these improvements are:

1. Improved lighting through the installation of mercury lamps.
2. Relocation of the lead burning operation to allow the installation of local exhaust ventilation.
3. Installation of local exhaust ventilation on the metallizing lathe.
4. Installation of local exhaust ventilation at the abrasive cutting saw.
5. General housekeeping improvements.

In view of these improvements, the only recommendations we have as a result of the survey are the following:

1. The need for additional exhaust ventilation for the welding operation should be studied. More welding tables

than exhaust hoods were noted. Also, no local exhaust ventilation was noted at the workbench where silver soldering is performed. Information on the hazards associated with silver soldering is attached for your reference.

2. The workbench where mercury distillations were once done appeared contaminated with mercury. We recommend that this bench be either decontaminated or discarded.

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General Recommendations and Comments

- ★ ① We recommend that the refinery sampling program be summarized in a form that would be presentable to an OSHA compliance officer should an inspection take place. Such a summary should show each contaminant sampled, method of sampling, location and frequency of sampling and type of sample (area, process, or breathing zone). The summary should also show method and frequency of calibration of sampling equipment.
2. Sampling at this time is primarily being done with detector tubes. The inherent inaccuracies of such tubes requires that they be used only as screening devices. When the inaccuracies of detector tubes make questionable whether or not employees are being overexposed, more accurate methods of sampling and analysis are recommended. The results of testing four detector tubes (H_2S , SO_2 , CO and Benzene) by NIOSH is attached.

This department is available to assist you with any of the evaluations noted above, or on any aspect of your industrial hygiene program.

D. P. Atwood

D. P. Atwood

Attachments

cc - Mr. H. L. Kusnetz

Working with Silver Solder

Silver brazing alloy, frequently called "silver solder," is an extremely valuable industrial material used for joining metals and alloys such as silver, copper, brass, bronze, stainless steel, carbon steel and dissimilar metal combinations where it is necessary to perform the joining of these metals at low temperatures. Its wide variety of applications include use in home jewelry making, dental laboratories, refrigeration and electronic equipment, and in the aerospace and missile industries.

Brazing is a safe operation when proper practices are followed. As in all operations, there are certain hazards to be avoided. In brazing the major hazards are heat, chemicals and fumes.

Hazards

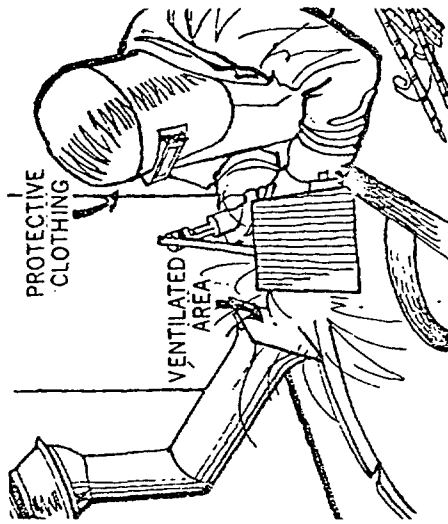
Since brazing is a process requiring heat, precautions should be taken for handling hot objects to prevent workers from being burned. Proper outer clothing, preferably woolen, and eye protection should be worn. Chemicals such as acids and alkalis are sometimes used to clean parts before brazing and can produce chemical burns if allowed to come in contact with the skin. Protective gloves should be worn when handling these chemicals. Brazing fluxes are mixtures of chemicals and the caution notice on the package should be followed.

Fumes generated during brazing can be a serious hazard. Brazing fluxes generate fluoride fumes when heated. Cadmium in silver brazing alloys vaporizes when overheated and produces cadmium oxide, a highly toxic substance. If cadmium oxide fumes are inhaled into the respiratory tract, they can cause pulmonary distress, shortness of breath, and in cases of severe exposure, may cause death.

How to Use Safely

The American Welding Society and the American Society for Testing and Materials designations for silver brazing filler metals containing cadmium are: BAg-1, BAg-1a and BAg-2 and BAg-3. These silver brazing alloys can be safely used, however, if precautions are followed.

The BAg-1 and BAg-1a classes, of silver brazing filler metal can be successfully and properly used at temperatures below 1400°F. Since the boiling point of cadmium is 1412°F, brazing can be carried on safely using these two classes of filler metal. The remaining two classes of silver brazing filler metal, BAg-2 and BAg-3, have recommended brazing temperature ranges of 1295 - 1550°F and 1270 to 1500°F respectively. Brazing can be carried on safely using



temperatures below 1400°F with these latter classes of filler metal. Since temperatures in the upper portion of these ranges can be reached, it is important to provide adequate local exhaust ventilation or, where this is not possible, individual air-supplied respirators. The American Welding Society states that: "Local exhaust or general ventilation systems shall be provided and arranged to keep the amount of toxic fumes, gases or dusts below the maximum allowable concentration as defined by the Acceptable Concentrations of Toxic Dusts and Gases, American Standard Z37, or the latest threshold limit value of the American Conference of Governmental Industrial Hygienists." The 1969 threshold limit value for cadmium is 0.1 mg per cubic meter of air.

It should be noted that the most serious cause of cadmium oxide fume generation occurs when all of these silver brazing filler metals are

overheated. Care must be taken to control the temperature of the silver brazing operation. Under no circumstances should a torch flame be applied directly to the silver brazing alloy. The heat of the base metal should be used to melt and flow the brazing filler metal.

Another source of cadmium fumes is from brazing on cadmium plated parts. Since the torch flame is applied directly to the base metal, cadmium plated parts are potentially more hazardous than cadmium-bearing silver brazing alloys. When in doubt about a base metal, check with the supplier of the part. Cadmium plating should be removed before heating for brazing.

By following safety procedures, cadmium-bearing silver brazing alloys can be handled without hazard to health.

Do's and Don'ts in Working with Silver Solder

1. Know what materials you are working with. Be sure you are not brazing on cadmium plated parts.
 2. Read warning labels on filler metals and fluxes and follow label instructions.
 3. Wear eye and face protection and protective clothing as required by the job.
 4. Work in well ventilated areas, or use air-supplied respirators as required by the job.
 5. Apply heat to base metal—not directly to the brazing filler metal.
 6. Do not overheat either the base metal or the brazing filler metal.
 7. Wash hands thoroughly after handling brazing fluxes and filler metals.
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DETECTOR TUBE EVALUATIONS

<u>Gas</u>	<u>Manufacturer</u>	<u>Type</u>	<u>Accuracy</u>	<u>Date Approved</u>
CO	MSA	47134	± 25% at 95% C.L.	Feb. 1971
	Bacharach	19-0195	"	"
	Dräger	256	"	"
	Dräger	289	"	"
SO ₂	MSA	92625	± 25% at 95% C.L.	June 1969
	Dräger	CH-317	"	"
	Unico-Kitagawa	103-C	"	"
	Unico-Kitagawa	103-D	"	"
C ₆ H ₆	MSA	93074	± 50% at 95% C.L.	June 1971
	Dräger	CH-248	"	"
	Unico-Kitagawa	118-A	"	"

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