

SHELL CHEMICAL COMPANY

SHELL CHEMICAL
MFG. & DIST. B.
ENV. & SAFETY

DATE JUNE 7, 1973

TO HOUSTON - ENVIRONMENTAL ENGINEERING -
MANAGER

FROM MANAGER - HOUSTON PLANT

PLAINTIFF'S EXHIBIT

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SUBJECT WALK-THROUGH INDUSTRIAL
HYGIENE SURVEY -
HOUSTON CHEMICAL PLANT

We have considered the recommendations made in the subject report issued by Industrial Hygienist - Department of Occupational Safety and Health, covering the survey conducted in the Houston Plant in early November 1972. An item-by-item discussion and status of the recommendations is presented in this report.

Chemical Injection Building - OP-II

We have reviewed our procedures for handling the 35% hydrazine solution and Betz Neutramen. These materials are now handled in closed containers to preclude spillage; operating personnel will continue wearing goggles and gloves. Measurements were taken during the addition of the 35% hydrazine solution to the mix tank; no detectable concentration of airborne material was present.

We believe our procedures for handling these materials are adequate to prevent personnel exposure.

Denaturing Area

The facilities and procedures for handling brucine, Bitrex and ethyl acrylate have been reviewed. A project is being initiated to provide a vented hood for weighing brucine and Bitrex. The existing brucine mix tank vent and temperature control systems will be improved to better control brucine and hot ethyl alcohol vapors. Bitrex has been added as a dry powder to shipping containers; in the future, this material will be mixed with TBA and added as a "wet" solution to preclude dust exposure.

Ethyl acrylate will be handled outdoors to avoid odor problems within the building. The "leaking" hand pumps will be eliminated as part of the procedures to handle ethyl acrylate outdoors.

Chemical gloves and goggles will be worn by personnel when handling these materials. Respiratory protection is also available to cope with abnormal situations.

Benzene will be added to the list of items checked in the air contaminant sampling program since it is used periodically in this area.

Laboratory Warehouse Building

The reagent preparation room is ventilated by an air conditioning unit mounted in the outside wall of the building. Any vapors that exist in the room can be exhausted or fresh air supplied by the air conditioning unit. Use of plant air for additional purging of personnel areas is contrary to plant

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practices; this has been reviewed with employees who work in these areas. In the future, a portable exhauster will be used if substantial vapors are created in this area which cannot be effectively removed by the air conditioning system.

Reagents containing toxic chemicals are prepared under an exhaust hood; thus, fumes from handling chemicals inside the building are not considered a problem.

The facilities for emptying and discarding waste chemical samples on the laboratory warehouse porch are considered unacceptable. An overhead exhaust fan will be installed to minimize personnel exposure to airborne contaminants.

Hydrotreater Analytical Building - OP-II

Sample streams containing H_2S are routed through stainless steel tubing to on-line analyzers in this small building. An exhaust fan is installed to prevent the accumulation of H_2S and subsequent exposure to personnel who may have occasion to enter the building. Presently, an alarm is sounded in the main control room if the exhaust fan shuts off. This system, together with the Operator "Safe Work Permit", gives adequate protection to persons who may be required to work in this area. H_2S warning signs are posted on the entrance door.

AA Unit

A work order was initiated prior to the survey providing minor revisions to the vent system and a "water scrubber" to contain AA vapors, and this has now been completed. Additionally, a mechanical seal has been installed in the C-24 bottoms pump which has on occasion been a source of AA vapors in this area. These changes have eliminated AA vapors entering the A & B control room.

Petrochem Furnace Area

The sample location on the No. 1 Petrochem accumulator (V-3141) has been connected into a nearby sample funnel which drains to a covered collection system. This has reduced the MEK vapors when sampling.

MSH Unit

Pumps in this area have been repacked, thereby correcting leakage from this source. Additionally, heavy ends from the M-Plant water rejection column (C-38) going directly to the sewer have resulted in fumes in this area; this stream has been rerouted to minimize vapors from this source.

G Department - Rock Box

Fumes from the "rock box" have occurred on occasion because of leakage from the system. The "rock box" was taken out of service and some points of leakage repaired. Extensive repairs have been made during a scheduled shutdown. Additionally, the CO_2 scrubber and vacuum systems have been repaired; thus, eliminating fumes due to poor performance of these auxiliaries.

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G-100/200

Centrifugal pumps in these units which use packing for shaft sealing were recognized in an earlier audit as a source of noxious materials (primarily HCl) emitted to atmosphere. This problem results from inadequate performance of lubricated packing. Tandem mechanical seals will be installed on the HCl column bottoms pump (P-707) and reflux pumps (P-718 and 718A). Single mechanical seals will be installed on the prefractionator bottoms pumps (P-722, 7037 and 7038).

Vapors generated during the dumping of spent ferric chloride catalyst from the EC pan dryers has presented a problem. Facilities previously installed which provide for diluting the concentrated catalyst with oil and more complete stripping of HCl prior to dumping the catalyst have been tried. Additional effort will be required to correct this situation since this revised mode of operation does not appear adequate.

G-300 Unit

Vapors (ECH, HCl, AC and Cl₂) have on occasion entered the G-300 control room. Revised seal systems on the G-100/200 pumps should eliminate these as a source of contaminants. Additionally, the air conditioning system in this control room has been repaired to preclude vapor entry. Operating personnel have been instructed to more promptly correct leaks that may occur and to discontinue purging equipment directly to atmosphere.

Chlor-Alkali Plant

Chlorine vapors from draining spent sulfuric acid into the sewer system has occurred infrequently while the spent acid pump has been out for repair. High maintenance priority is given to this pump when it is not serviceable; additionally, the attendant vapors from the acid draining to the sewer affect only a small local area where personnel do not generally have to work.

When equipment in chlorine service is prepared for maintenance, such as the chlorine compressors, it is necessary to purge the equipment with nitrogen to remove residual chlorine. Past practice has been to purge into a drum filled with cell liquor (ca. 10% caustic) to capture the chlorine. Operating personnel have been instructed to use existing vent collection systems for purging and to use the drum of cell liquor only when absolutely necessary. When the latter method is required, the area is to be roped off to safeguard personnel.

Ethyl Alcohol Unit

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The plugged sampling system drain line has been cleared and benzene sampling results in no appreciable vapors in the area. Explicit procedures for wearing protective equipment while sampling the benzene are being enforced.

Government Building

Ethyl acrylate has been stored intermittently in the weigh room since mid-1972. The storage tank is vented outside the building and improvements have

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been made in the T/T unloading facilities (i.e., moved outdoors). Per discussions with Rohm and Haas, the odor threshold is approximately 0.5 ppb, considerably less than the TLV of 25 ppm. When odors of this material are detected, the source will be eliminated.

Benzene will be added to the list of items checked in the air contaminant sampling program since it is used in the area on occasion.

EP Feed Prep

The odors from the vent on the slop caustic tank (T-1001) will be eliminated as part of the approved plan to use OP-II spent caustic in EP and to vent to the flare system.

BA Unit

The IBA transfer pump problem has been corrected. The pump no longer loses suction and the intolerable practice of bleeding to the sewer to reestablish pumping has been eliminated.

The characteristic odor in some parts of the unit is attributed to butyraldehydes. Effort is being made to correct packing leaks and to promptly clean up any spills that may occur to minimize these odors. We believe this material constitutes primarily an odor problem due to its low odor threshold; however, we would appreciate information and suggestions on measuring air concentrations of this material.

Sulfur Plant

The air intake to the control room has been elevated, thus minimizing odors of H_2S-SO_2 . The emission of fumes from trucks during loading is under study.

PDU Building/EPON-I Building

The handling of solvents and reactants in drums has been minimized in the last two years; these commodities are purchased in bulk and handled in closed systems whenever practical. From observation, exposure from drumming or undrumming appears minimal; however, attempts will be made to quantify this.

Odors from kettle manways is more prevalent in the PDU Building since the majority of custom solutions are made there. An extensive ventilation system in this building changes the air at a high rate; the possibility of extending duct work to the proximity of the manways to further minimize odors will be considered. The facility at EPON-I Unit will also be studied to minimize odors.

Intensive effort has been in effect in recent months to improve housekeeping in these areas. Unused piping and equipment which hinder cleanup is being removed and a concerted effort is proceeding to keep "clutter" out. An approved project for a truck loading and unloading facility will aid in eliminating or containing spills.

EPON IV

An accumulator containing MIBK in the brine extraction system has overflowed to the pad on occasion; the instrumentation on this system has been revised and thus far has prevented overflow.

EPON III

The MIBK vapor and polymer handling problems associated with the open sump have been under active study; a capital budget item should be completed by the fourth quarter of 1973. Partial corrective measures in the interim are being considered; e.g., vented cover, and the first step of the above project.

EPON II

Some fumes from hot resin, possibly containing small concentrations of MIBK, have on a few occasions risen from ground floor to the upper levels of the building. The chute referred to is covered within a few feet of its discharge. We will continue evaluating this situation to determine if a real problem exists.

The shrouding around the BPA weigh hoppers has been inspected and repairs made. A review is intended to evaluate the air flow in the dust collecting system to improve its efficiency. The need for additional shrouding will be evaluated as part of this study.

BPA dust is washed from floors every shift. Dust accumulation in inaccessible areas (e.g., tops of beams and other elevated areas) is periodically removed by vacuuming. The entire area is inspected routinely.

Polymers Shipping

Hopper Car Loading - A project to minimize dust problems associated with the loading of hopper cars is currently being pursued on an active basis.

Small Container Filling Station - An exhaust system is being installed in this area. Repackaging of ether compounds has been suspended until the completion of the project.

EPON Resin and BPA Bag Filling Stations - Construction of new bagging facilities has begun and will be completed in October 1973, and will include an effective dust collection system.

Drum Loading Station - New facilities for the drumming station will be designed and installed on a priority basis. Effort is being expended to improve housekeeping.

Phenol Unit

The Unit is shut down for long-term and is being decontaminated. (The sample station at P-2430 had been repaired prior to shutdown.)

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Main Shop

Welding Area - The ventilation equipment in the welding shop has been reviewed and repairs made where necessary. On occasion, it is necessary to perform some work where there is no exhaust hood; personnel have been instructed to take necessary precaution to prevent breathing welding fumes.

Equipment Cleaning Area - Methyl ethyl ketone is not an approved solvent for use in the main shop; personnel have been made aware of this. In the future if it is necessary to use MEK for cleaning resin from equipment, this will be done in an open area and precautions taken to prevent exposure of personnel to the fumes.

Grinders, Abrasive Cleaners and Small Paint Spray Booth - This equipment has been reviewed and is considered satisfactory.

Lead Burning Building - No work has been performed in this area since the survey. We will review conditions here as soon as practical.

Brick Masons Building - We have not observed any "dusty" conditions in this area. We will evaluate the situation further and make improvements if advisable.

Precipitator - Rectifier Building - Air samples have been made for ozone; concentrations are well below the TLV of 0.1 ppm. Additionally, personnel do not have occasion to enter the rectifier building except for brief periods. Personnel exposure to ozone is not considered a problem.

Effluent Area

An improved ventilation system is being provided in the building where Primafloc is handled to prevent operator exposure to this acidic material. Respiratory equipment has been provided in the interim.

Laboratories - Administration Building

ICD Laboratory - Acid Dumping Sink - An exhaust system is being installed to remove vapors from waste acid disposed in the laboratory sink.

Polymers Laboratory - An exhaust hood has been installed to remove vapors from the solvent-washing sink.

With the shutdown of the Phenol Unit, there will be only an occasional need for Phenol handling. Similarly, Benzene is used sporadically in ethyl alcohol solutions and employees are not subjected to it on a routine basis.

OP-II/VCM Wet Laboratory - Carbon tetrachloride handling in the OP-II/VCM Wet Lab will be relocated within a new hood when the latter has been installed. Monies were approved last year, awaiting available manpower. Used ERC hood is available here and now for installation.

Environmental Laboratory - Carbon tetrachloride handling will be relocated to existing hood after installation of an appropriate rack.

Steam Ejector System - The relatively low discharge elevation of this system used to empty gaseous sample bombs is to be raised to a height precluding the entry of the vapors into the building air conditioning intake.

General Comment on Laboratory Hoods - Measurements of inlet velocity at the laboratory hoods have been made under various conditions of hood door openings and in general they do not meet the ACGIH recommended flow of 100 cubic feet of air per square foot of open door area. Laboratory personnel have measured air concentrations while handling chemicals such as ethyl chloride under adverse conditions and in all cases concentrations are well below the TLV's; thus, we feel the exhaust systems are generally adequate. Some improvements in exhaust blowers have been made. Laboratory personnel have also been instructed to keep hood doors closed when not in use.

Unit Control Rooms

We are surveying our control rooms in which samples are analyzed for need of special ventilation. The proximity of eating and laboratory facilities will be reviewed to determine if any hazardous situations exist or if OSHA standards are not being met.

Polynuclear Aromatics

A primary area for possible employee exposure to these materials is truck loading operations of special pitch blends carried out at 250-300°F. An attempt has been made to quantify airborne contaminant during this operation. Consideration is being given to revising the facility; however, loading of these materials has been discontinued. We shall await more information on this subject from DOSH.

General Recommendations

Our air survey program at this stage is considered satisfactory in complying with requirements. We feel that the detector tubes, although having an accuracy of $\pm 25\%$, are the only practical means available for conducting widespread measurements in our Plant. Measured concentrations indicate normal personnel exposure to be well below present threshold limit values. In those few cases where concentrations near the TLV have been measured, causes were generally of a temporary nature. Measurements of vapor concentrations are obtained at the location of strongest perceivable concentration and not in areas where personnel work for any appreciable length of time. There are times such as when a piece of equipment fails that concentrations may exceed threshold limit values. A program to monitor these transient conditions would be very difficult to implement; additionally, measurements during these situations would not be representative of actual employee exposure. In these cases, we rely on our supervisory personnel to see that employees use available respiratory protective devices until conditions can be corrected.

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We welcome any specific suggestions for inclusion of additional materials in our sampling program and the sampling devices which are available and practical for widespread in-plant testing. The analytical technique submitted for ECH determination is appreciated, but is obviously a laborious one. We are appreciative of the information provided and welcome assistance in expanding the availability of detector tubes or other expedient methods for monitoring.

We will review the status of uncompleted items in this report in three months.



E. S. Martin

FGR/CAB:s

cc: Houston - Manufacturing & Distribution -
General Manager

Houston - Department of Occupational
Safety and Health - Manager



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