SM-32 (Rev. 9-57)

SHELL OIL COMPANY

REFERENCE

PRIVATE AND CONFIDENTIAL

DATE OCTOBER 3, 1973

TO MANAGER INDUSTRIAL RELATIONS
MR. P. E. SLACK

FROM ASSISTANT MANAGER
INDUSTRIAL RELATIONS
WOOD RIVER REFINERY

SUBJECT BENZENE MONITORING PROGRAM

The need for having a benzene-free atmosphere has been stressed at the Refinery for several years and unit modifications and operating procedures have been made. Other modifications to the Benzene Extraction Unit are being made to reduce current peak exposures and to bring background levels below the proposed limits. In addition, Operators have been trained to follow safe work practices. Although effective employee orientation has been provided for several years, continued emphasis must be given to the hazards of benzene exposure to ensure there is no lapse into careless or complacent habits.

To supplement the field air sampling data and in accordance with the Vice President Manufacturing's memorandum of August 29, 1973, a medical monitoring program (Attachment I) will be initiated involving those individuals who have routine exposure.

On October 9, 1973, management representatives plan to introduce the program on a low-key basis to the Safety Group (Attachment II). The approach will be that the program represents an additional step to assure ourselves that we do not, in fact, have a problem. After introducing the subject in this manner, we would furnish similar explanations to appropriate supervisors and to the Operators involved, with the first physical examinations to begin no later than October 16, 1973. Informal discussions with Union leadership would parallel these discussions as determined necessary or timely.

I. L. Snyder

Attachments

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ATTACHMENT I

BENZENE EXAMINATION PROGRAM

I. Program Coverage

Employees shown in Attachment I-A have been selected for inclusion in the program. They will be asked to participate by their departmental management. Participation will be on a voluntary basis. Those who do not wish to participate will be requested to sign a written statement (Attachment I-B) which shall be retained in their medical record folders maintained in the Emergency Hospital. Departmental management will notify the medical staff of those who wish to participate. The medical staff will schedule employees for examinations and maintain a call-up system for subsequent examinations required.

Staff will not be required to sign - will be noted in their record that they declined to participate.

Departmental management will monitor job assignment of selected employees to ensure their continuation in the program basis established criteria. Any deletions or additions will be communicated to the medical staff.

II. Examination Procedure

A. Employees will be examined on an annual basis. Examinations will be conducted during regular working hours on the day shift.

B. The examination will consist of:

1. Complete history - to be conducted by Dr. Mitchell
2. Physical evaluation - to be conducted by Dr. Mitchell
3. Chest X-ray - to be conducted by Alton Memorial Hospital
4. Laboratory tests - to be conducted by Alton Memorial Hospital (Attachment I-C)

III. Processing Results

A. Examination results will be reviewed by Dr. Mitchell. Laboratory test results which are outside alert limits will be repeated to verify results. If results indicate an employee may have a health problem related to his occupation, the matter will be reviewed with Refinery management and the Corporate Medical Director to determine what action should be taken next.

B. Dr. Mitchell (or a nurse) will advise each employee generally of his examination results as prudently desirable. More detailed results may be made available to an employee's personal physician upon the employee's request. Any job reassignment will be handled by departmental management with the employee involved.

IV. Record Retention

A. All examination records will be retained in an employee's medical folder until termination at which time such records will be transferred to the employee's record file.

B. Copies of all examination records will be sent to the Corporate Medical Director.

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SM-32-NMC

SHELL OIL COMPANY SHELL CHEMICAL COMPANY REFERENCE

NORCO MANUFACTURING COMPLEX

PRIVATE & CONFIDENTIAL

DATE DECEMBER 6, 1976

TO MANAGER SAFETY AND INDUSTRIAL HYGIENE

FROM SENIOR INDUSTRIAL HYGIENIST

SUBJECT INDUSTRIAL HYGIENE WALK-THRU SURVEY - MAINTENANCE AND SHIPPING

I conducted Industrial Hygiene walk-thru surveys of the Shipping and Maintenance Departments on October 6, 7, 21 and 26, 1976. The enclosed two reports detail my observations, findings and recommendations for each department. Highlights of these reports are summarized as:

- Product handler's exposure to D-D Soil Fumigant may exceed the Shell established 1 ppm 8-hour Time Weighted Average (TWA) standard and does exceed the 3 ppm ceiling limit during tank car loading operations. Table I (Shipping Department Report) identifies the short term exposure levels actually measured for up to three hour intervals and estimates maximum and minimum 8-hour TWA exposure levels. Table II summarizes air concentrations during tank car loading operations. D-D air contaminant levels measured on top of the tank car and around the loading rack ranged from 13 to 156 ppm. Engineering controls such as a vapor recovery system would reduce these emissions from the open tank car hatch. Until engineering controls are implemented, it is necessary that the product handler wear an approved respirator during D-D loading activities.

- Exposures to ECH are generally below the current 5 ppm 8-hour TWA OSHA standard although a 10 ppm 8-hour TWA is estimated for one tankerman who is not a Shell employee but rather is hired by the "barge" company. These levels exceed the NIOSH proposed 0.5 ppm standard. A review of procedures and modifications where necessary can help to further minimize ECH emissions and exposures. Respirators should be worn when collecting samples from the barge or working near open vents on the barge.

- It is important that the barge companies and common carriers of our ECH and D-D product be informed about the toxicity and safe handling procedures necessary for ECH and D-D. The business center in Houston has distributed this information on a national basis; locally, we can reinforce this program by ensuring that our local carriers and transportation offices also have this information.

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- The care, use and storage of respirators is not consistent with a good respirator program. In general respirators are missing from their storage boxes, not clean or wrapped in plastic bags and/or found on operator shelter floors etc. Care and storage of respirators is not only required by law (OSHA 29 CFR, Section 1910.134) but it is essential for health especially in the case of emergencies. All employees should be trained in the use, care and limitations of respirators; first line management can compliment the training and enforce the program with their own people. Only approved respirators should be used. A review of respirators supplied by the Purchasing Department stores is currently in progress.

- Maintenance personnel conduct much of their work activities in high noise areas. In high noise areas, necessary hearing protection requirements can be included in the work permit issued by operations. Information should be made available to maintenance personnel about where the high noise areas are in each operating unit; crafts personnel should be trained in the use of ear protectors and included in a periodic audiometric testing program.

- Other training programs are needed to make all employees of both departments more aware of the toxic effects and hazards related to the chemicals that are handled. Such training programs might include

  - safe handling and use of toxic chemicals including their toxicity and health effects

  - safe and healthy operating procedures

  - use of portable leak detectors for the individuals who have a need to use them

- Exposures to air contaminants should be evaluated. A personal monitoring program can be implemented to cover their exposures to all likely toxic chemicals. Both maintenance and shipping personnel can be included in the monitoring program of the operational sections of the Plant undergoing monitoring at the time. Currently they are included in the monitoring programs for VCM and C Unit (ECH, D-D and AC).

- Procedures of work routine must be reviewed and revised to eliminate practices which can result in organic vapor exposures. The use of local exhaust ventilation hoods when maintenance personnel break open field equipment which may have trapped organic liquids and vapors will minimize personnel exposures to these vapors. Respiratory equipment can also be worn if local exhaust systems are not feasible.

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I can assist training foreman with materials and information for educating and training personnel on the health and toxicity of chemicals, respirator programs and portable monitoring equipment. Also, I will coordinate the efforts for personal monitoring and identification of hazardous work areas with suggestions and assistance for implementing appropriate engineering controls.

S. E. Killiany, Jr.

Attachments

cc - (W/Shipping Report) - G. F. Brady THIS COPY FOR
(W/Maintenance Report) - M. Morgan
(W/Attachments) - J. G. Bridgeman
W. M. Reynolds
J. D. Ramsey
J. A. Byerly

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INDUSTRIAL HYGIENE WALK-THRU SURVEY

SHIPPING DEPARTMENT

NORCO CHEMICAL COMPANY

S. E. Killiany, Jr.

December 2, 1976

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INDUSTRIAL HYGIENE WALK-THRU SURVEY

SHIPPING DEPARTMENT

NORCO CHEMICAL COMPANY

On October 6 and 7, 1976, I conducted an Industrial Hygiene Walk-thru Survey of the Shipping Department operations with R. Roussell. Operating conditions were considered typical and normal. Personal air monitoring data for AC, ECH and D-D exposures were also reviewed as a part of this survey. Air monitoring data is not available for the other chemicals handled by this department. Exposures to ECH and D-D occur during barge and railroad tank car loading operations. The pump house on the barge loading docks is the only significant high noise area (> 90 dBA) for the Shipping Department. The care, use and storage of respirators in not consistent with a good respirator program.

FINDINGS AND OBSERVATIONS

Personal monitoring data collected during tank car loading with D-D and barge loading with ECH were reviewed. Exposures to D-D exceed the Shell established ceiling limit of 3 ppm and potentially can exceed the 1 ppm Time Weighted Average (TWA) Shell standard for long term exposures. Exposures to ECH during barge loading in general do not exceed the current 5 ppm standard but do exceed the proposed NIOSH 8-hour TWA standard of 0.5 ppm.

Table I, found in Appendix I, summarizes the results of personal sampling during D-D tank car loading operations. It also calculates 8-hour TWA exposures assuming

- a maximum exposure duration of 8 hours at the measured level
- a zero exposure level for periods outside of the actual tank car monitoring period.

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D-D tank car loading operations were not an eight hour task since D-D was loaded directly from "run-down" tanks and not storage tanks. Nevertheless, assuming zero exposure to D-D for the time not actually loading, calculated 8-hour TWA exposures still exceed the 1 ppm 8-hour TWA limit extablished as Shell policy. Table II (see Appendix I) summarizes airborne D-D concentrations during tank car (T/C) loading, gauging and quality control sample collecting. These levels range from 13 to 156 ppm around the tank car hatch and loading rack.

Table III (see Appendix I) summarizes the results of personal monitoring during barge loading activities. One exposure of (19.4 ppm) exceeded the 5 ppm standard; all other results were less than the current 5 ppm standard but greater than the proposed NIOSH 8-hour TWA standard of 0.5 ppm. Incidentally, this high exposure level was measured on the tankerman for the barge company.

VCM barge loading operations and tank car racks are other areas where routine monitoring is ongoing for exposures to vinyl chloride monomer. A review of the VCM data is currently in progress and will be reported with the report on the VCM unit walk-thru survey.

While Head Office and the Business Center has distributed toxicity, safety and handling precautionary information to Shell's customers and transportation companies (common carriers) who handle D-D and ECH, such information is not routinely distributed to the local people that handle our D-D and ECH products (i.e. common carriers and barge companies).

Employee exposure monitoring has not been conducted for the other toxic chemicals which are handled by the approximately 36 shipping department personnel.

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VCM heavy ends and D-D heavy ends are in storage at IMTT. Potential unloading hazard may exist with the extremely high VCM and chlorinated C_3 components found with the July air monitoring survey of the air spaces and vents. Personal air monitoring is planned whenever the first tank car is loaded with these waste products.

The proper care and storage of respirators is not only required by law (Title 29, Code of Federal Regulation, Section 1910.134) but is essential for the employees health in the case of emergencies. Without rigorously checking all emergency respirator storage boxes within the Shipping Department, I noted the following problems with the few emergency respiratory storage boxes I did check.

- Respirators missing from respiratory storage boxes.
- Respirators lying on floors, desks, etc.
- Respirators not cleaned and wrapped in a plastic bag especially for the outdoor storage boxes.

Two areas where these problems were noted:

- VCM tank car loading racks
- Chlorine tank car loading rack (respirators missing but two replacements on order)

Additionally, emergency exit respirators are also used on the chlorine rack; these should be replaced with NIOSH approved respirators. There is a monthly routine inspection performed by the operators and a report is sent to Safety.

Noise may be a problem only at the barge loading dock in and around the pump house. Appropriate signs are posted and ear protection is made available to the employees.

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RECOMMENDATIONS

Airborne organic vapors expecially AC and D-D are potential, if not actual, health hazards to the personnel of the Shipping Department. Table IV summarizes the current standards, Shell standards and proposed NIOSH recommendations. To minimize the health hazard and comply with current standards, I recommend

- Implementation of engineering controls to reduce D-D and AC vapors during tank car loading. Such controls may include installation vapor recovery and making the tank car a closed system during loading. Bottom outlet must also be sealed or removed to comply with DOT regulations which require the cap to be removed during loading.

- Review and modification where necessary, of operational procedures for barge loading with ECH. While we comply with the current OSHA standard, exposures are greater than the NIOSH proposed standard. ECH exposures should be reduced to a minimum (at or below the 1 ppm 8-hour TWA level and 3 ppm ceiling limit). This is a situation where the barge company has authority on the barge and they must be informed of the hazardous properties of ECH in order that they may properly instruct their tankermen.

- Information on the toxicity and safe handling of D-D and ECH should be made available to the local common carriers, barge company and transportation offices that we hire to transport these products for us.

- Respirators be worn during D-D tank car loading operations until engineering controls are installed to reduce airborne D-D concentrations to acceptable levels.

- The respirator program be reviewed; management be educated on the acceptable respirator program and be encouraged to enforce such a program with their employees. Issuing individual respirators and making the individual responsible may help the efficiency of the program.

- The employees be trained not only in the use of respirators but also trained in the care, storage and limitations of this equipment.

- A monitoring program to determine the baseline exposure for all toxic chemicals be established. Noise exposures should also be included in this program.

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TABLE IV

STANDARDS REGULATING AIRBORNE
WORK PLACE CONCENTRATION OF AC, ECH, D-D

AIR CONCENTRATIONS, ppm

	CURRENT OSHA STANDARD		SHELL STANDARD		PROPOSED STANDARD	
	8-Hour TWA	Ceiling	8-Hour TWA	Ceiling	8-Hour TWA	Ceiling
AC	1	-	1	-	1	3
ECH	5	-	(1)	(3)	0.5	5
D-D	-	-	1	3	-	-
CL_2	1	-	1	-	-	-

() An official level has not been adopted; these are suggested levels to be consistant with the Shell adopted D-D standard.

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- That a less cumbersome method for collecting D-D quality control samples from the tank car be used. Currently the product handler cannot conveniently rinse his sampling bottle without exposing himself to both the vapor and liquid.

- The emergency exit respirators used on the chlorine loading rack be replaced with NIOSH approved respirators.

- A training program be implemented for all employees which

  - trains on the safe handling and use of specific toxic chemicals used by the employees

  - educates on the use, care, storage and limitation of respirators

  - demonstrates the proper use of portable vapor leak detectors

  - emphasizes safe and healthy operating procedures

- Respirators be used to empty the storage tanks at IMTT especially when on top of the tank car or near openings and vents on or around the storage tanks.

- Personal air samples be collected when the IMTT storage tanks are emptied. By law VCM samples must be collected to determine exposure levels for all operations. Also, D-D, EDC and other chlorinated hydrocarbon samples (breathing zone) should also be collected to determine what exposures, if any, may exist.

- The product handler on the docks should be included in the periodic audiometric testing program based upon their noise exposure levels.

I will coordinate efforts for the personal air and noise monitoring program. A priority system will be worked out based upon the number of individuals exposed and the toxicity of the chemicls involved.

Finally, the Head Office Manufacturing information issued for AC, ECH and D-D should be reviewed and recommendations, wherever appropriate, be used to minimize exposures and/or educate the employees.

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APPENDIX I

AIR MONITORING DATA FOR

D-D AND ECH VAPOR EXPOSURES

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TABLE I

D-D EXPOSURES (8-HOUR TWA AND SHORT TERM)
SHIPPING DEPARTMENT
MARCH-JULY, 1976

DATE	JOB DESCRIPTION	MEASURED D-D, ppm	CALCULATED 8-HOUR TWA MAXIMUM	CALCULATED 8-HOUR TWA MINIMUM
3-18	Product Handler	7.7	7.7	1.2
3-19	Product Handler	12.2	12.2	1.8
3-23	Product Handler	156	156	19.1
7-13	Product Handler	1.9 0.6	1.4	0.8
4-29	Product Handler collect QC sample from tank car (14 minutes)	6.8	----	---
7-13	(1)Product Handler open T/C hatch, place loading arm into T/C (lo minutes)	3.0	----	---

(1) Includes 0.1 ppm epichlorohydrin

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TABLE II

AIRBORNE D-D CONCENTRATIONS, PPM
MARCH-JULY, 1976

DATE	ACTIVITY/AREA	D-D, ppm
3-18	One to four feet downwind of hatch on top of tank car	78
3-18	Four feet downwind during QC sampling of T/C and gauging	46
3-18	On loading rack during T/C loading	37
4-29	Loading rack platform - Five feet from T/C hatch	18
	Loading rack platform - Five feet from T/C hatch	13
7-13	(1) At hatch of T/C during loading	156
	110 feet downwind during T/C loading	0.3

(1) This includes 21 ppm Allyl Chloride and 2 ppm Epichlorohydrin

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TABLE III

ECH EXPOSURES (8-HOUR TWA AND SHORT TERM)
SHIPPING DEPARTMENT
APRIL-AUGUST, 1976

DATE	JOB DESCRIPTION	MEASURED ECH, ppm	CALCULATED 8-HOUR TWA MAXIMUM	CALCULATED 8-HOUR TWA MINIMUM
4-6	Product Handler	<0.5	<0.5	--
4-6	*Tankerman	19.4	19.4	10.3
4-7	*Product Handler	0.9 1.6 2.9	1.4	--
4-7	*Tankerman	1.8	1.8	0.9
7-8	*Product Handler	0.7 0.6 0.7 3.9	1.3	--
7-8	*Tankerman	1.9 3.2	2.4	2.0
6-17	Tankerman	4.0	4.0	--
6-17	Product Handler	<0.5 1.0	<0.6	--
6-17	Product Handler	<1.0 <1.0 <0.5	<0.6	--
4-7	*Product Handler-gauging barge (32 minutes)	3.9	---	--

* Allyl Chloride exposures of 0.4 to 2.2 ppm for 8-hour TWA also measured

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APPENDIX II

SHIPPING DEPARTMENT CHEMICALS HANDLED

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ADDENDUM: SHIPPING DEPARTMENT CHEMICALS HANDLED

Dock Area

- VCM
- MEK
- DMK
- SBA
- Glycerine
- NaOH (Caustic)
- p-di-chloro-benzene

SO_2 Storage Tank

- SO_2

Tank Car Racks

- Acrolein
- Acetaldehyde
- VCM
- D-D
- Chlorine
- HCl
- DIPA
- HP
- SBA Polymer
- Sulfolane
- Hexane
- Naphtha
- MEK

Barge Tank Farm

- $CaCl_2$
- 50% Caustic
- EDC
- EDC Slop
- ECH

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