INDUSTRIAL HYGIENE SUMMARY REPORT

PERIOD JANUARY 1 - JUNE 30, 1963

The attached report reflects the increasingly pertinent role of industrial hygiene in the Chemicals-Olefins-Plastics Divisions' production and marketing efforts. In two instances, specific information utilizing accumulated industrial hygiene "know-how" was made available to assist customers in the use of our products. The manner in which more of this kind of customer service can be provided within the recognized medical-legal limitations is being explored on a continuing basis.

The Institute-South Charleston-Technical Center locations experienced a remarkably thorough three-day inspection of radiation facilities and employee exposure records. This inspection was conducted by an Atomic Energy Commission representative, accompanied by a member of the West Virginia State Health Department. Some items of noncompliance were found and have been corrected. The essential contributions of the location industrial hygiene programs in making possible the safe and legal use of radioactive materials was clearly demonstrated as a result of this detailed inspection. The Agricultural Chemicals Laboratory at Clayton, North Carolina and several of our plants were also inspected during this period by the AEC or responsible state agencies.

For the first time, pertinent items selected from reports of the Chemical Hygiene Fellowship at Mellon Institute have been included in this summary report. These welcome additions are especially valuable because they illustrate the important but complex relationship between the measurement of toxicity using animals and the evaluation of hazard to humans under actual working conditions. The items selected illustrate the important role of the toxicologist working together with the medical and industrial hygiene staffs in assuring the safe use of chemicals in our plants and the plants of our customers.

Reviewing engineering plans for new construction offers an opportunity to eliminate problems at the stage where they are easiest and cheapest to correct. This important aspect of an industrial hygiene service is being accomplished with steadily improving effectiveness. During this reporting period, significant contributions were made in the plans for the Tolylene Diisocyanate Unit being built at Institute, the Sorbic Acid Unit being built at South Charleston, and the rocket fuel production and firing facilities being built for the Research and Development Department at Blue Creek, W. Va.

A small committee was appointed at the suggestions of Mr. R. C. Hieronymus to study alternative methods for disposal of chemical wastes now being burned at the South Charleston City Dump. This culminated an intensive effort of the industrial relations departments in the

Institute-South Charleston-Technical Center area to bring into focus the long-standing safety, health, and public relations problems resulting from the incineration of chemicals at the dump.

Submitted by: N. H. Ketcham

N. H. Ketcham
Industrial Hygiene Consultant

NHK/dww
10-25-63

CONTENTS

TECHNICAL CENTER

Mr. Fred Williams, Technical Center Industrial Hygienist, prepared the following summary of information contained in 11 pages of quarterly progress reports. Additional information may be obtained from Mr. Williams.

ROCKET PROPELLANTS The first phase for the production of a liquid fuel containing beryllium was completed during this period. Building 709 was remodeled to include facilities that were suitable for work with this type of material. The remodeling included an air filter system in which all exhaust air passed through an American Air Filter Company, Inc. "Roll-O-Matic" pre-filter and absolute filters. All water drains from the hoods, sinks, and floor were connected to a settling tank that emptied into a drain field of gravel covered with soil. The mixing was performed in a stainless steel drybox in a hood, and the reaction and distillation were done in an adjacent hood. Air sample and wipe test results show that the beryllium was confined to the drybox, hoods, and air filters. Even though some small fires occurred, there were no known personnel inhalation exposures and no significant releases of beryllium to the atmosphere.

AGRICULTURAL CHEMICALS Miticide Compounds 20047 and 21149 were processed and formulated without any serious exposure of personnel. Special precautionary measures were taken to prevent inhalation and skin contact during work with Compound 21149, a highly toxic material. Air-supplied hoods, special protective clothing, rubber boots, and rubber gloves were used to prevent exposures to personnel. Air sampling was done with Greenburg-Smith impingers containing 1:1 acetic acid solution. The analyses were performed by the Research and Development Department's Industrial Hygiene Laboratory.

RADIOACTIVE MATERIALS Film badges that had been subjected to known radiation exposures were used to evaluate the reliability of results reported by Tracerlab Twin-film Service. The results reported by Tracerlab were in serious error on the basis of the calibrated exposures. Corrected reports were later submitted by Tracerlab, after they were informed that the original results did not confirm the controlled exposures. The corrected results were within the limits of error for such a program.

Film badges with known exposures were also sent to Nuclear-Chicago to evaluate their film badge service supplied to another group in the Technical Center. The results reported by this service were within acceptable limits of error.

An inspection was made by a representative of the Atomic Energy Commission to determine whether compliance with license agreement numbers 47-260-2, 47-260-3, 47-260-4, and 47-260-6 were being met. The inspector was accompanied by a representative

(Continued)

of the West Virginia State Health Department. Satisfactory reports were received for licenses47-260-2, 47-260-3, and 47-260-4. A violation has been cited on the committee license 47-260-6 as a result of improper disposal of tritium (hydrogen-3).

A new radiation source storage facility was completed and all sources moved from the former storage area at the South Charleston Plant. The sources were wipe tested for leaks, properly labeled, and the test date placed on each source with Dymo embossing tape.

The facility that houses 1600 curies of cobalt-60 pencils in Building 722 was surveyed in compliance with AEC regulations.

All X-ray units that are in operation were checked and found to be adequately shielded.

The number of cesium-137 encapsulated sources was reduced by the transfer of 12 sources with a total of 2760 millicuries to the licenses of the Institute and South Charleston Plants.

Increased utilization of unencapsulated radioisotopes in research and development work is anticipated. Carbon-14 has been the most commonly used radioisotope as a tracer during this period.

NOISE The results of a noise survey in an area using steam and air jets for fiber manufacture showed a narrow band noise that could cause damage to hearing. In fact, three of four employees assigned to this area showed hearing loss, part of which may be attributed to the noise.

INSTITUTE PLANT

The following excerpts from a ten-page summary report were written by Mr. R. E. Peele, Institute Plant Industrial Hygienist. More detailed information may be obtained from Mr. Peele.

"SEVIN" UNIT CARBON MONOXIDE HAZARD Carbon monoxide exposures and hazards, associated with the Synthesis Gas Department of the SEVIN Insecticide Unit, have been corrected. This has been achieved through the addition of more adequate ventilation and the successful use of a continuous air sampling instrument, a Mine Safety Appliances Company "Lira".

NEW TOLYLENE DIISOCYANATE UNIT Tolylene diisocyanate and the other hazardous materials to be used in the forthcoming TDI Production Unit are being identified and investigated. The engineering drawings for many phases of the design have been reviewed in an endeavor to disclose and correct hazards to health. Preparations are now being made to extend this preventive approach to include a complete air sampling and analysis program for the unit.

PLATINUM CATALYST Platinum concentrations in air are being evaluated in the catalyst lab of the Works Laboratory where chloroplatinic acid is used. This work has resulted in dermatitis and other reported symptoms that agree with those described for excessive platinum exposure.

FABRICATING INSULATION BLOCKS Inorganic dust exposures in the Construction Department's Fabrication Insulation Shop have been revealed to be excessive when fabricating certain makes of insulation blocks. Corrective action has been taken by the users to reduce the exposure in accordance with recommendations.

INSPECTION OF LICENSED RADIATION SOURCES The radiation program of monitoring and recording all licensed radioactive sealed sources was inspected by the Atomic Energy Commission. This was the first time that the Institute Plant has been visited by an AEC representative, and several incorrect procedures were uncovered. These are being corrected.

NOISE REDUCTION Noise reduction corrective action has been undertaken in two areas of the Maintenance Department. In one instance the department complied with recommendations and installed personal protective hearing devices for use in the Metalizing Shop. In the second instance, the Works Engineering Department adhered to recommendations and sought the assistance of noise reduction specialists, under the direction of Mr. E. C. Harry of Olefins Engineering, before proceeding with plans to move a sheet metal shop into an area adjoining an office.

AIR POLLUTION The Plant Managers of each of the three Union Carbide Corporation installations located in the Kanawha Valley established a committee to study and evaluate the problems associated with the disposal of chemical residues which are now being burned at the South Charleston City Dump. The Industrial Hygienist at the Institute Plant was selected to represent his location and initially was assigned the responsibility of completing the first objective of the committee, i.e., an accumulation of all available plant information on all identifiable residues. This objective has been completed.

Collection efficiencies on three of the total of nine collectors installed at the #1 Power Plant were determined and evaluated by George D. Clayton and Associates, Inc., an air pollution consultant firm from Detroit, Michigan. Sampling assistance was extended by the Industrial Hygiene Department in the interest of reducing the expense of the evaluation.

Complaints of paint damage to cars located in the main parking lot were investigated.

Corrosion damage to the new interstate bridge located at Nitro, W. Va. was investigated. This was done at the request of the State Road Commission in the company of four members of the Commission, two representatives from the South Charleston Plant, and two representatives from the Institute Plant's Works Engineering Department.

PLANT AIR FOR BREATHING USE A plant air report, disclosing the policy and techniques utilized in providing air for breathing purposes through the use of the plant air system, was submitted to the Plant Managers at the request of Mr. S. C. Giambruno of the Industrial Relations Department. Incidents of contamination of this air supply have occurred.

SOUTH CHARLESTON PLANT

This summary was written by Mr. B. L. Murray, South Charleston Plant Industrial Hygienist, as part of a 10-page progress report. Further information may be obtained from Mr. Murray.

SOUND STUDIES The status of the plant-wide sound level study is: (1) the noise exposure of employees in 272 units has been defined as not detrimental to hearing; thus ear protection is not required, (2) engineering control in 27 units is under study to reduce noise levels defined as hazardous, and (3) exposure evaluation studies in 19 units are incomplete.

Magnetic tape recordings of noise in Buildings 25 and 41 (Gas Separation Unit No. 2) and Building 190 (Dispersion Resins Micro Atomizer Operations) were analyzed by use of a narrow-band spectrograph. The tape recordings were made by the Special Instrumentation Department and were helpful in further defining the degree of risk to hearing.

SAMPLING OF GASES, VAPORS, AND FUMES IN AIR As requested by unit supervision, toxic vapor studies were made in 15 units to determine the exposure levels. Routine air samplings of the working environment were made in 26 other units.

At the request of unit supervision, an industrial hygiene program was started at the new Glyoxal Unit, Building 134, to control the potential exposure to nitrogen dioxide gas. A nitrogen dioxide detector and tubes were provided along with applicable hygiene instructions.

A program was initiated to develop and explain, if possible, any minor health effects that sorbic acid might have on the operators. The initial studies defined preliminarily the vapor and particulate concentrations in air in Building 174 (Plasticizer-Esters Unit) and Building 156 (Fine Chemicals Unit). The air sampling is being continued and the results are being evaluated. A serious noise problem was found to exist in the drier room of Building 174. These data will be of assistance to the Design and Construction Department in formulating their plans for the new Sorbic Unit.

SAMPLING OF VAPOR IN VENT STACK Sampling of the stack gas at Building 152 (Vinyl Resin) for acetone revealed sufficient solvent discharge to justify engineering effort to reduce the amount lost.

SAMPLING OF DUSTS IN AIR Air-borne particulate contaminants were sampled in several locations and, where possible, recommendations were made to assist in obtaining a solution to the problems.

(Continued)

The specific locations studied were: (1) community and plant areas, (2) South Charleston City Dump, (3) sorbic acid production, and (4) sandblasting operations.

VENTILATION STUDIES The performance of the chemical fume hoods in the Plant Laboratory and the ventilation of the arc welding and degreasing operations in the Maintenance Shops were evaluated under a variety of conditions. The evaluations included air velocity measurements, as well as atmospheric sampling. These studies clearly demonstrated a need for, and value of, periodic testing and maintenance of ventilation systems.

These ventilation problems have been referred to the Works Engineering Department; job orders have been issued, and, in most instances, field work has started.

RADIOLOGICAL HEALTH Results of an inspection made by the Atomic Energy Commission of the radioactive sources and procedures were gratifying. There were no items of non-compliance. The most recent inventory shows 46 radioactive sources in the plant.

Upon completion of a special training course in Radiological Monitoring, a kit was assigned to this plant by the Office of Civilian Defense. This kit will be used to provide timely and accurate information required for the proper analysis and evaluation of the radiological hazard in case of radiation fallout or an atomic attack.

TOXICITY AND INDUSTRIAL HYGIENE DATA Individually-prepared toxicity and industrial hygiene information files covering 30 chemicals were supplied to production supervisors upon request.

PERSONNEL ASSIGNMENT The industrial hygiene program received added impetus when Mr. J. B. Kessler, Quality Control Chemist, joined the industrial hygiene team at the laboratory to give added support to the plant hygiene function.

SANITATION PROJECTS The program for the Standardization of Purchased Commodities continues to show an annual savings of $6,000 to date.

The Camp Sanitation Program at the three camp locations and the Hunting and Fishing Club area necessitated a collection of over 100 stream samples and 19 well water samples for bacteriological examination. These data, in addition to the other sanitation findings, have enabled us to assist the Camp Directors in protecting the campers' health.

A general contamination of the city water supply throughout the Upper Island Area and the No. 3 Gas Separation Area was surveyed and corrected. Four other locations were detected for contamination of the drinking water. These areas were also surveyed and corrected.

We are assisting the Works Engineering Department in providing approved sanitary facilities for four barge dock locations, as was requested by the Bulk Handling Materials Department.

RESEARCH AND DEVELOPMENT DEPARTMENT

INDUSTRIAL HYGIENE LABORATORY

The work described below is representative of efforts made by the Industrial Hygiene Laboratory in support of programs being conducted by the plants and the Technical Center. Further information about this work or related services may be obtained from Mr. J. N. Dermit or Mr. N. H. Ketcham.

BERYLLIUM - ANALYSES FOR MONITORING PERSONNEL EXPOSURE — A National Spectrographic Laboratories' beryllium monitor was placed in service early in January of this year to accomplish rapid analysis of samples of air and settled dust. These analyses are performed as part of a contractual requirement to provide industrial hygiene monitoring of personnel working with beryllium-containing rocket fuels. Samples of air and settled particles are collected on filter paper and placed directly in the spectrometer. The analysis is read out in one minute. The instrument can detect <0.02 micrograms of beryllium and has proven to be a useful and reliable analytical tool.

SORBIC ACID - ANALYSIS IN AIR — Two methods for determining microquantities of sorbic acid in air were developed for use by both the South Charleston Plant and the National Dairy Products Corporation. This work was done at the request of Dr. C. U. Dernehl, Assistant Medical Director of Union Carbide Corporation, when it became known that National Dairy Products Corporation personnel were encountering eye and upper respiratory irritation and nosebleeds attributed to sorbic acid. Both methods, a colorimetric procedure and an ultraviolet absorption technique, have been given to the customer.

COMPOUND 21149 - ANALYSIS IN AIR — A method for the determination of microquantities of 2-methyl-2-methylthiopropionaldehyde N-methylcarbamoyloxime (Compound 21149) in air has been developed. Due to the unusually toxic effects of this agricultural chemical by inhalation or skin absorption it was necessary to take special precautions to minimize the exposure of personnel during preparation and field testing of this compound.

The procedure, a modification of a test reported by Feigle, detects as little as 1.0 microgram of Compound 21149 in air. The method is applicable to a number of related oxime compounds.

ANILINE - ANALYSIS IN AIR — The South Charleston Plant requested a procedure for the determination of aniline in air, capable of detecting a lower limit of at least 1 ppm. The requirements were met by a procedure employing a water-filled impinger as a scrubber and analyzing by ultraviolet absorption. A sensitivity of 0.01 ppm was obtained.

RADIATION HEALTH SERVICES — The periodic calibration of radiation survey meters used in the Charleston area was continued.

At this time all of our Company plants use, or plan to use, wipe test kits supplied by this laboratory to facilitate compliance with the periodic leak testing required by the Atomic Energy Commission and state licenses. The used wipe test kits are returned to this laboratory for counting and the results are reported by mail or telephone to the licensee.

At the request of Mr. Fred Williams, film badges from two commercial badge services were exposed to known radiation dosages and submitted to the contract film service companies for evaluation. The results reported by one of the companies were disturbingly inaccurate. A report of this study has been issued by Mr. Williams.

SHELF LIFE OF MSA CARBON MONOXIDE DETECTOR TUBES — Approximately 2 dozen carbon monoxide detector tubes which had been stored up to 3 years beyond the manufacturer's suggested shelf life were tested. Based on the tests, it was concluded that the tubes were still suitable for use. A slight loss of sensitivity was found. Because of this, a wait of approximately one minute, instead of the manufacturer's recommended waiting time of 35 seconds, is suggested to let the color develop before reading the final carbon monoxide concentration.

ANALYSIS OF ACETIC ANHYDRIDE IN THE PRESENCE OF ACETIC ACID — Our report 92E-F27 "Determination of Acetic Anhydride in Air", dated August 1, 1962 stated that acetic acid did not interfere. The statement was based on a literature reference and was not proven by our own work. Subsequent interest in this resulted in further work. Concentrations up to 1 part acetic acid to 1 part acetic anhydride were prepared and analyzed. It was found that acetic acid does not interfere.

TOLYLENE DIISOCYANATE (TDI) - ANALYSIS IN AIR — Because of widespread use of tolylene diisocyanate in foam work, this laboratory has been analyzing air for that material for several years. Our experience to date is summarized below.

The most satisfactory method of air analysis is that described by Marcali, Analytical Chemistry, 29, April, 1957. A stepwise procedure for inclusion in Volume 38 of the Laboratory Manual is being prepared. The Ranta method used commonly for the earliest studies does not attain the needed sensitivity of 0.02 ppm, by volume in air.

A TDI detector kit, sold by Union Industrial Equipment Corporation, uses the reagents described by Marcali. Use of the kit would be expensive if a large number of analyses were needed, and the range of TDI concentration which can be analyzed is limited. The color comparison standards used in the kit are harder to use than the standards used by Marcali. Under some circumstances, use of the kit could be recommended if it's limitations were understood and taken into account.

(Continued)

Collection of TDI in isooctane and analysis by ultraviolet absorption, using a Beckman Model DK-1 spectrometer and 10-cm cells, results in a simple and rapid analysis but the desired sensitivity is not obtained. This method detects about 0.1 ppm.

METHODS DEVELOPMENT REPORTS ISSUED

Micro Determination of Beryllium in Air Samples and Wipe Test Smears, Research and Development Department, March 21, 1963, File No. 435.

Beryllium - Determination by Emission Spectroscopy for Monitoring Personnel Exposure, Research and Development Department, June 6, 1963, File No. 873.

Agricultural Chemicals - Compounds 21149 and 20047 and Other Oximes, Determination of Micro Quantities in Air, Research and Development Department, July 8, 1963, File No. 997.

LABORATORY MANUAL PROCEDURES PREPARED FOR VOLUME 38, INDUSTRIAL HYGIENE

Beryllium - Micro Determination of Air Samples and Wipe Tests, March 28, 1963, Method No. 38C-29A4-R2.

2 Methyl-2-methylthiopropionaldehyde N-methylcarbamoyloxime (Compound 21149), Micro Determination in Air Samples, July 5, 1963, Method No. 38C-21V5-R2.

Ethylene Oxide - Determination in Air Samples Collected in Midget Bubbler or in Evacuated Flasks, March 29, 1963, Method No. 38C-K2B-R2.

Ethylene Oxide - Determination in Air Samples Collected in Silica Gel Absorption Tubes, April 1, 1963, Method No. 38C-K2B-R2.1.

Sorbic Acid - Determination of Micro Amounts in Air by the Thiobarbituric Acid Method, July 2, 1963, Method No. 38C-3F3-R2.

Sorbic Acid - Micro Determination in Air by the Ultraviolet Absorption Method, July 2, 1963, Method No. 38C-3F3-R2.1.

RESEARCH AND DEVELOPMENT DEPARTMENT

CHEMICAL HYGIENE FELLOWSHIP,

MELLON INSTITUTE OF INDUSTRIAL RESEARCH,

PITTSBURGH, PENNSYLVANIA

The following exerpts from recent Chemical Hygiene Fellowship reports were selected by Dr. C. P. Carpenter as being of special interest to readers of the Company industrial hygiene summary report. Further information on these or similar problems may be obtained by writing to Dr. Carpenter, Fellowship 274, Mellon Institute.

The Inhalation Hazards of UCON Lubricants 50-HB-400 and LB-385 at Elevated Temperatures, Report 25-19

"The results of these studies indicate the inhalation hazard of the vapors and decomposition products of at least two UCON lubricants is not only a function of the temperature during aeration but also of the presence or absence of oxygen. These results lead us to emphasize the necessity of evaluating the hazards of chemicals under conditions which simulate actual use conditions."

Comparative Inhalation Toxicities of Perchlorethylene, UCON Refrigerant 11 and UCON Fluorocarbons 112, 113, and 215, Report 25-49

"Although the four UCONS have been shown to be considerably less toxic to rats than perchlorethylene, it should be noted that because of their higher vapor pressures, they can produce higher concentrations. It is strongly suggested, therefore, that they be used with the same safety precautions as those employed for perchlorethylene."

Addendum on UCON 122, Report 25-72

"These data indicate the single-dose toxicity of UCON 122 to be essentially the same as that of perchlorethylene, and also the symptomatology followed a fairly consistent dose-related pattern of loss of coordination, anesthesia and death."

Additional Safety-Evaluation Studies of Perchlorethylene and UCON Fluorocarbons 112, 113, and 215, Report 25-89

"The suspicion that the relative hazard of perchlorethylene and UCONS 112, 113, and 215 to human life should not be predicted solely from toxicity (predetermined ppm) data has been confirmed by these studies. However, a hazard prediction based solely on these saturated vapor studies should also be questioned, because in practice, massive quantities of UCONS 113 and 215 would have to be evaporated in a relatively closed space to produce atmospheres considerably more hazardous than that of perchlorethylene.

(Continued)

Therefore, we repeat our suggestion, presented in Report 25-49, that UCONS 112, 113, and 215 be used with the same safety precautions as those employed for perchlorethylene. Canister-type gas masks usually rated for a maximum of 20,000 ppm for all gases and vapors except ammonia, should not be used when spillage occurs with any of these solvents. Air-line or tank-supplied respirators should be available at all times in areas where these solvents are most likely to be accidentally spilled during bulk handling."

The Feasibility of Using Methyl Isocyanate as a Warning Agent in Liquid Carbon Monoxide, Report 26-23

"Methyl isocyanate (MeI) has been suggested as a warning agent in the shipment of liquified carbon monoxide. It was selected on the basis that it would cause minimum adulteration in the immediately planned use of the CO.

Only 3 of 7 subjects could detect 5 ppm MeI by odor. Furthermore, there was no consistent relationship between odor detection and vapor concentration. All subjects who perceived an odor reported olfactory fatigue. The only unanimous responses consisted of eye irritation and tear formation at 5 ppm vapors in 50 seconds or less. All responses disappeared within 3 minutes after exposure.

It is apparent MeI would fulfill its role as a warning agent by virtue of its lacrymatory properties rather than because of its odor. If we select 1 ppm MeI as the 5-minute warning level, and a permissible level of 200 ppm carbon monoxide in the event of a spill, there would be present 0.2290 mg CO and 0.00233 mg MeI per liter of air. Assuming that all the technical problems mentioned in the first paragraph have been solved, the theoretical proportion of MeI to CO in the liquid phase would be $\frac{0.00233}{0.2290}$ or 1.02% (W/W) MeI in liquified CO.

In view of the foregoing data and discussion, we feel that MeI is not a feasible warning agent for the liquified carbon monoxide transport problem. A substance with a low odor threshold and minimal additional physiological properties would appear to be more suitable. Lists of substances with odor thresholds ranging down to 0.001 ppm and lower are available. These lists include such substances as butyl mercaptan, diphenyl ether, ethyl mercaptan, ethyl sulfide phenyl isocyanide, and thiophenol which have corresponding odor thresholds of 0.001, 0.001, 0.0003, 0.003, 0.001, and 0.0003 ppm. Naturally, the choice of an odorant would have to be made with consideration of the technical problems previously mentioned and its lack of interference in the proposed use of the CO."

A Basis for Projecting the Probable Inhalation Hazards of UC 21149 to Humans Under Field Use Conditions, Report 26-32

"An attempt to predict the probable hazard of a pesticide under field use conditions involves the consideration of many factors. These include a knowledge of the actual airborne concentration and a reasonable extrapolation of experimental animal data to probable human response. Because of the lack of information on the actual airborne concentration of UC 21149, the following assumptions and calculations have been made:

(Continued)

Assume that a field worker sprayed UC 21149 at the rate of 1/2 pound active agent per acre on a windless day and that most of the spray remained within a 6-foot layer above the ground. What would be the theoretical concentration of active agent in this 6-foot layer?

1 acre = 43,560 square feet
Volume of 6-foot layer = 43,560 x 6 cu.ft.
1 cu. meter = 35.3144 cu.ft.
Therefore volume of 6-foot layer over an acre =

$$\frac{43,560 \times 6}{35.3144} \text{ or } 7400 \text{ cu. meters}$$

0.5 lb. = 226,796 mgs.
Therefore concentration of UC 21149 (active agent) in the 6-foot layer would be:

$$\frac{226,796}{7400} = 29.83 \text{ mg./m}^{-3}$$

Assuming that only 5% of the sprayed UC 21149 remained airborne and respirable, we obtain a probable exposure concentration of 1.5 mg./$\bar{m}^3$.

The response of the rats followed a fairly consistent time and dose-related pattern. Note that the typical anticholinesterase symptomatology commenced in only 90 minutes at the 1.91 mg./$\bar{m}^3$ level, which is not significantly higher than the estimated value of 1.5 mg./$\bar{m}^3$ for field use conditions. (Previous experience with anticholinesterases in this laboratory has shown that cholinesterase levels were depressed before the onset of the typical cholinesterase symptoms.) Deaths occurred at the 35.13 mg./$\bar{m}^3$ level in one hour and at the 7.61 mg./$\bar{m}^3$ level in approximately 8 hours.

If man's response parallels that of rats to 21149 and parathion, it appears that 21149 should be used under stricter regulations and safety precautions than those that apply for parathion. The validity of this recommendation is strengthened by the fact that to the best of our knowledge the proposed concentrations of 21149 for field use are considerably higher than those recommended for the sample of parathion 15 WP which we studied, viz., 1/4 to 1 pound 21149 active per 100 gallons of water versus 1-1/2 to 2 pounds parathion 15 WP (0.225 to 0.30 pound active) per 100 gallons of water."

RESEARCH AND DEVELOPMENT DEPARTMENT
TARRYTOWN DIVISION
TARRYTOWN, NEW YORK

The following information relating to a customer service activity was supplied by Mr. W. B. Leighton.

CUSTOMER SERVICE - METHANOL VAPOR MONITORING

On the recommendation of the Tarrytown Division and the New York Office Toxicology Department, the Detroit District Sales Office made available to the Rochester Paper Company a Davis Emergency Equipment Company detector tube kit to monitor methanol vapors in plant process areas. Outright presentation of this relatively low-cost detection unit promoted customer good-will and at the same time placed the customer in a position to maintain a continuing safety check through use of the instrument by their own personnel.

TORRANCE PLANT

Mr. W. E. Knight, supervisor of the Torrance Plant Laboratory, reported the following. Further information may be obtained from Mr. Knight.

COMPLIANCE WITH STATE RADIATION REGULATIONS Wipe tests were conducted on all cesium-137 holders in compliance with the new California regulations. The swabs were submitted to the Research and Development Department for counting. No leakage was found.

COMPLIANCE WITH STATE NOISE CONTROL REGULATIONS Sound survey measurements have been made in several of the plant areas where noise levels are high. The State of California has adopted regulations covering sound, so regular measurements will be made to determine if the limits are exceeded. In the one area where ear protection is mandatory under the new regulations, ear plugs are provided for Carbide, as well as contract, personnel who work in the area.

TEXAS CITY PLANT

The following items were submitted by Dr. R. E. Joyner, Texas City Plant Medical Director. Further information may be obtained from Dr. Joyner.

OXO UNIT - COBALT EXPOSURE Urinary cobalt determinations in persons exposed to the Oxo process have continued. We have averaged running about 4 or 5 patients every other week since the beginning of the year. A total of approximately 85 urine samples have been analyzed. The problem of high urinary cobalt values in laborers cleaning filter presses continues to plague us and the ultimate solution has not yet been found.

NOISE CONTROL Sound surveys were made at 4 sites in our plant. One of these surveys was for the purpose of establishing background noise at the proposed site of the No. 3 power plant.

PUBLICATIONS AND PROFESSIONAL ACTIVITIES

(Not including Chemical Hygiene Fellowship, Mellon Institute)

Publications

None during this report period.

Professional and Educational Meetings

Mr. Fred Williams, Technical Center Medical Department; Mr. J. N. Dermit, Research and Development Department; and Mr. R. E. Peele, Institute Plant Medical Department, attended the American Industrial Hygiene Conference for 1963 in Cincinnati, Ohio, May 1963.

Mr. B. L. Murray and Mr. C. G. Copley, South Charleston Plant Medical Department, attended a four-day training course on Insect and Rodent Control, given at South Charleston, W. Va. by the U. S. Public Health Service.

DISTRIBUTION

Business Department Managers

Mr. F. H. Belden
Mr. A. B. Burns
Mr. R. W. Eddy
Mr. K. J. Gutshaw
Mr. M. Hill
Mr. R. W. King

Brownsville Plant

Mr. H. B. Coons
Mr. W. E. Warren
Mr. R. G. Wilson

General Safety and Fire Protection Department

Mr. V. V. Tilton

Institute Plant

Mr. L. N. Dickinson
Mr. S. C. Giambruno
Mr. R. A. Huber
Mr. P. A. Laine, Jr.
Mr. R. E. Peele
Mr. E. W. Poinier, Jr.
R. J. Sexton, M. D.

New York Offices

C. U. Dernehl, M. D.
Mr. J. S. Freeman
Dr. J. L. Marsh
Mr. P. W. McDaniel
Mr. A. P. Moss
Mr. O. C. Thompson (Bldg. 82)

Niagara Falls Plant

Mr. D. M. Rupert

Seadrift Plant

Mr. R. P. Barry
Mr. A. E. Bransford
Mr. J. H. Hill
Mr. J. J. Walthall

Texas City Plant

Mr. H. E. Allspach
Mr. O. T. Carlisle
Mr. B. H. Clark
R. E. Joyner, M. D.
Mr. W. J. Suiter

Torrance Plant

Mr. W. E. Knight
Mr. C. N. Rucker

Whiting Plant

Mr. G. O. Bunch
Mr. J. M. Elliott
Mr. P. C. Kelly
Mr. G. J. Klebs
Mr. D. J. Mixan

South Charleston Plant

Mr. M. A. Aitken
Mr. E. E. Buxton
Mr. B. R. Harper
Mr. W. F. Hartling
Mr. R. C. Hieronymus
E. Q. Hull, M. D.
Mr. J. B. Kessler
Mr. R. J. Murphy
Mr. B. L. Murray
Mr. L. A. Roebke
Mr. W. W. TenEyck

Technical Service Laboratory

Dr. A. B. Steele
Mr. W. B. Leighton

Mellon Institute

Dr. C. P. Carpenter
Dr. H. F. Smyth, Jr.

Technical Center

Mr. R. M. Berg
E. M. Best, Jr., M. D.
Mr. J. W. Biddle
Dr. F. B. Brown
Mr. J. N. Dermit
Mr. P. W. Gregory, Jr.
Mr. E. C. Harry
Dr. F. Johnston
Mr. W. A. Katholi
Mr. J. W. Perry
Dr. B. Phillips
Dr. J. B. Reid
Mr. S. H. Rose, Jr. (2)
Mr. H. T. Sessions
Mr. Fred Williams

~~CFM - KAR - BLG - JL~~

VED

APR 27 1964

INDUSTRIAL RELATIONS

INDUSTRIAL HYGIENE SUMMARY REPORT

JULY 1 - DECEMBER 31, 1963

During this reporting period the industrial hygiene services in the Chemicals-Olefins-Plastics Divisions continued to be utilized to an increasing extent. Especially gratifying progress has been made in assisting the engineering departments in recognizing and minimizing potential health and community air pollution problems at an early stage of the design of new production facilities. Specific examples included development of information and a method of air sampling to help assure the safe handling of ethylenimine at the Technical Center, application of accumulated knowledge to the design of new units for the production of tolylendiisocyanate and chlorocarbons at the Institute Plant, and consideration of air pollution abatement aspects in the design of catalyst production facilities at the Institute Plant.

Noteworthy progress was made in improving existing working environments by assisting plant engineering groups in the reduction of noise and the application of ventilation. An example of this is reported by the South Charleston Plant (Page 3) where a drastic reduction of potassium sorbate dust in the air resulted from the installation of a ventilated drum-filling station.

The marked tendency of the research and development activities of the Divisions to become market oriented is resulting in a much larger number of people making contacts with customers and prospective customers to supply them with information related to the potential health problems in the use of our products. Considerable effort is being required to keep up with the rapidly growing need for this information and to help make certain that it is given to the customer in a manner to minimize our legal liability. This is going to become an increasingly serious problem which will require the concerted attention of the Business Departments.

The continuing trend toward more governmental regulation of health and air pollution matters is being felt. One aspect of this is the probability that some of our production facilities will be inspected by the Food and Drug Administration. The U. S. Labor Department, largely as a result of interest from labor groups, is preparing to provide further control of radioactive materials under terms of the Walsh-Healey Act. In some locations, this would be a duplication of existing state control and it is being resisted by those states, including Texas and California. A table is attached to this report showing the "box score" status of bills now in Congress relating to occupational health, air and water pollution, foods and drugs, radiation, and pesticides. This table was prepared by the American Industrial Hygiene Association as a service to its members.

The severe noise problems and other occupational health problems in the Seadrift, Brownsville, and Texas City Plants were surveyed. The results of this study have been discussed with the plant managers and appropriate recommendations made.

Twelve of the most toxic materials tested during the year 1963 by the Chemical Hygiene Fellowship at Mellon Institute are tabulated on Pages 15 and 16. This illustrates the continued trend to produce, process, and market increasingly toxic materials in order to remain competitive in certain market areas.

Page 4 lists a tabulation by the South Charleston Plant of dispensary visits analyzed to show what kind of industrial hygiene problems are encountered in the plant. It is believed that this is the first analysis of that nature undertaken by any of our major production facilities.

A complete listing of encapsulated radioactive materials, including radium, possessed by the Chemicals-Olefins-Plastics Divisions is appended to this report. The previous (initial) report of this data given a year ago did not include radium. Radium sources will be included in our future periodic reports of sealed radiation sources, as they are now subject to licensing in most of the states in which our plants are located.

Submitted by:

N. H. Ketcham

N. H. Ketcham
Industrial Hygiene Consultant

NHK/dww
4-20-64

CONTENTS

SOUTH CHARLESTON PLANT

This information was written by Mr. B. L. Murray, South Charleston Plant Industrial Hygienist, as part of a 9-page progress report. Further information about these activities may be obtained from Mr. Murray.

PLANT-WIDE NOISE STUDY COMPLETED The plant-wide sound level study initiated in 1952 to assist the Engineering Department in recognizing, eliminating, or reducing potential noise problems was completed. Quantitative and qualitative information on the extent and magnitude of the noise conditions were submitted to unit supervision. Engineering control measures were established where feasible, and personnel protective devices recommended where necessary.

The noise exposure of employees in 254 units has been defined as not detrimental to hearing and ear protection is not required. Engineering control has eliminated the high noise level in 7 units and is under study in 66 units.

ELEVATED SOUND LEVELS FROM HIGH PRESSURE WATER JET CLEANING OMITTED FROM DECEMBER, 1963 ISSUE OF "CHEMICAL PROCESSING" FEATURE ARTICLE Unfortunately, this fine article dealing specifically with the economics and efficiency from high pressure water jet cleaning failed to mention the noise problem resulting from the machinery and jet spray operation. The sound level measurements recorded and reported in October, 1962 showed noise levels as high as 100 decibels in the 600-4800 cycles per second frequency. The operators use ear plugs for protection.

AIR DRYING OPERATION INSIDE TANK CAR SHOWS ELEVATED NOISE LEVEL The operator used plant air to dry the interior of an 8,000-gallon tank in approximately two minutes. The sound level measurement was 109 decibels in the 2400-4800 cycles per second frequency. Ear protectors were recommended until the condition could be corrected through engineering control.

TOXIC VAPOR TESTS ASSURE SAFE OPERATIONS At the request of unit supervision, toxic vapor studies were made in 10 units to determine the exposure levels. Routine air sampling of the working environment was made in 20 other units.

Toxic vapor checks were made inside 7 tanks to assure the Maintenance Department employees a safe operation, from the health standpoint. Two tanks which had contained ethylene dichloride and methyl CELLOSOLVE required additional cleaning and improved ventilation to assure a safe working atmosphere

BENZENE VAPORS AT BREATHING LEVEL LESS THAN THRESHOLD LIMIT VALUE

Routine air sampling using the Drager Gas Detector to determine the concentrations of benzene vapor in the work atmosphere at the Refinery and Gas Separation Units showed readings less than the Threshold Limit Value of 25 ppm. The concentrations near the pump packing area ranged from 25 to greater than 420 ppm. The operating department was encouraged to continue the maintenance program of repairing the pump packing which helps to maintain a low level of vapor in the work room air.

NITROGEN DIOXIDE GAS RELEASES CONTROLLED AT THE GLYOXAL UNIT

The installation of a new cylinder manifold system has assured further control of NO_2 gas releases at the Glyoxal Unit, Building 134. Spot checking of the area with the MSA nitrogen dioxide gas detector and routine sampling of the atmosphere by the Industrial Hygiene Group show low concentrations in the work room atmosphere.

MOLTEN SALT BATH SYSTEM EVALUATED

A system was evaluated for cleaning used valves and parts with a 700°F molten salt bath containing 70 per cent sodium hydroxide with sodium nitrate and sodium nitrite added. The obvious heavy laden vapors and the irritating effects on the skin made it unnecessary to do air sampling. As an engineering control measure, a ventilation exhaust system was installed. The use of safety glass shields and protective clothing was recommended.

CONSTRUCTION PIPE LINE PIT CONTENTS SHOW HIGH CONCENTRATION OF BENZENE VAPOR

A mixture of hydrocarbon material leaking into a pipeline pit necessitated an evaluation of the potential danger to the personnel working inside the pit. Benzene vapors at breathing level were negligible; at the bottom of the pit the concentration was 100 ppm. It was recommended that respiratory and full-body protection with adequate clothing be provided when necessary.

DUST FALL STUDY AND AIRBORNE PARTICULATE MATTER RECORDED

Dust fall sampling results in the plant and community were recorded as tons per square mile per month. The heaviest dust concentration was recorded within the plant proper. The filter paper type samplers used to collect both the settled and suspended particles in air show results comparable to collections made during the past year.

AVERAGE CONCENTRATION OF SORBIC ACID DUST IN AIR AT THE OPERATORS' BREATHING ZONE - 6 mg/M^3 and ELEVATED SOUND LEVEL NOTED

An industrial hygiene study was initiated to evaluate possible health effects that sorbic acid might have on the operators. The 32 air samples showed an average concentration of 6 mg/M^3 of sorbic acid particulate in the operators' breathing zone. Unit supervision was advised to provide the employees with respiratory

(Continued)

protection and vapor-proof goggles when they are transferring, handling, or sampling sorbic acid. The sound measurements taken in the drier room area showed that the operators' exposure time should be limited to six minutes without ear protection. Ear muffs were provided. Data from this study was utilized by the Design and Construction Department for the design of the new Sorbic Acid Unit, Plant No. 2.

DUST CONCENTRATIONS OF POTASSIUM SORBATE IN EMPLOYEES' BREATHING ZONE DECREASED THROUGH IMPROVED VENTILATION

Six air samples of potassium sorbate dust collected before the installation of a vented drum-filling booth showed 12 mg/M^3 in air. The improved ventilation system helped to reduce the concentration to 1 mg/M^3.

VENTILATION SYSTEMS FOR HANDLING TOXIC CHEMICALS TESTED - NEW SYSTEM INSTALLED

The drum-filling booths for handling toxic chemicals at the Shipping Department, the fume hoods in the plant laboratories, and the degreasing and welding operations in the Maintenance Shops were evaluated by air velocity measurements and air sampling. These performance tests and air sampling showed the efficiency of these systems to capture and remove the toxic materials. The importance of evaluating the employees' exposure and of obtaining the highest efficiency from this costly investment (ventilation systems) cannot be over emphasized.

DEGREASER VENT SYSTEM - ENGINEERING CONTROL MEASURES INITIATED

The ventilation system for handling perchloroethylene vapor at the Maintenance Electrical Shop in Building 307 is being renovated to assure further toxic vapor control.

WELDING FUME STUDY CONTINUING - VENT SYSTEMS STUDIED

The welding operations in the Maintenance Shop in Building 307 have been improved through the installation of roof fans. Further improvement using ventilation "snouts" to collect fumes at the source is being studied by the Engineering Department.

FUME HOODS TESTED AND EVALUATED

A study was initiated to determine the efficiency of the 69 fume hoods throughout the laboratory area. The hoods were classified as handling highly or moderately toxic chemicals.

TUNNEL AIR TESTED FOR TOXIC VAPORS AND VENTILATION

Four utility tunnels were tested for toxic vapors, oxygen content, and performance test on the ventilation systems. Two tunnels proved safe from the health standpoint; two others, located in Buildings 82 and 107, are under further study.

AMINE VAPORS CONTROLLED BY DRUM-FILLING BOOTHS FOR HANDLING TOXIC CHEMICALS

The Oilyard Shipping Department in Building 303 has two drum-filling booths for handling toxic chemicals. Ventilation and toxic vapor checks show the systems to be satisfactory for controlling the vapors.

EMPLOYEE'S REPORT OF INJURY - CHEMICAL EXPOSURES CLASSIFIED — Two hundred eleven exposure cases taken from Dispensary visit records were studied and classified as follows:

Exposure	Injury	Number
Skin Contact	No burn	78
	Burn	14
	Blister	18
Eye Contact	No burn	51
	Burn	19*
Breathing Vapor		31
	Total	211

*Two hospital cases - sulfuric acid and diethylamino propylamine

USE OF RADIOACTIVE SOURCES INCREASING — The use of instrumentation containing radioactive sources is rapidly increasing. This necessitated a renewal of the radioisotope license issued by the Atomic Energy Commission to increase the quantity of radioactivity the South Charleston Plant can possess from 5.5 curies to 10.0 curies.

RADIOACTIVITY PROCEDURES APPROVED — A set of procedures for the Plant Instrument Department for handling, using, and transferring instruments containing radioactive materials has been prepared and approved.

HEALTH AND HYGIENE DATA FILES ISSUED — Individually prepared Health and Hygiene Data Files covering 11 chemicals were provided to production supervision upon request.

In cooperation with the General Industrial Relations Department, industrial hygiene data has been added to the Reactive Chemical and Hazardous Chemical Data Sheets.

$7,000 ANNUAL SAVINGS — The sanitation program for the standardization of purchased commodities showed an annual savings of $7,000.

NEW LOCKER ROOM — Efforts to provide ample sanitary facilities continues, as another new locker room was approved for the North Charleston Area.

TECHNICAL CENTER

Mr. Fred Williams, Technical Center Industrial Hygienist, prepared the following summary of information reported in more detail in quarterly progress reports. Further information may be obtained from Mr. Williams.

ROCKET PROPELLANTS The second phase in the production of a liquid fuel containing beryllium has been planned and construction has started on this HYBALINE "B" facility at the Blue Creek Site. Work was done in cooperation with personnel of the Engineering Department and Research and Development Department to design the facility, select equipment, and establish procedures for operations. Production is scheduled to begin May 15, 1964.

The HYBALINE "A" facility completed production on schedule without serious incident. However, six persons experienced exposure to pentaborane during a week end while cleaning pentaborane cylinders. All six related symptoms similar to those for pentaborane. An atmospheric inversion occurred in the area which concentrated the contaminant near the breathing level of personnel, and the material also entered the building through the air supply system.

The results of air samples taken to measure ferrocene (dicyclopentadienyliron) vapors from an additive in solid rocket fuels showed amounts that could be injurious to personnel. Ferrocene has a camphor odor, sublimes about 100°C and forms iron carbonyl as a decomposition product. The ferrocene did not give the qualities to the fuel that was desired; thus, eliminating the need for extensive control methods.

AGRICULTURAL CHEMICALS A survey was conducted to evaluate equipment and the possible contamination that could result from chloroform while producing "Instant SEVIN" at the South Charleston Plant by Research and Development Department personnel. The pilot-scale production was done without incident and plans are being made to produce larger quantities.

Compound 21149, a toxic chemical, continues to show promising results and increased industrial hygiene activities are anticipated.

The Agricultural Research Station at Clayton, North Carolina was visited. Measurements were made of the exhaust ventilation of all hoods and potential problems about current products and radiation handling procedures were discussed.

RADIATION Carbon-14 was used successfully as a tracer in an ethylene oxide experiment. Special precautions were taken to prevent exposures from accidental releases. Air sample results showed that the carbon-14 emissions were kept well within AEC regulations.

Plans have been initiated to use potassium-42 as a radioactive tracer in addition to extended work with carbon-14.

NOISE A noise survey made during the operation of a Perkins-Southwick Bond Tester showed impact readings in excess of 110 decibels. The rapidity of the impact noises and the difficulty involved to engineer controls made ear muffs mandatory for the operator.

The results of a survey to evaluate the noise level created when a 100-pound rocket motor was fired showed that an impact noise in excess of 120 decibels was received at a distance of approximately three hundred fifty yards from the firing stand.

CHEMICALS, GASES, AND FUMES Special air sampling surveys and plans were made for handling the following materials in addition to the routine work that was conducted:

Surveys made to evaluate ozone concentration from a Lepel high-frequency generator that is used to cause oxidation on polyethylene sheets showed quantities in excess of safe operating limits. A spot exhaust system installed at the source of the ozone formation was recommended.

Hydrogen fluoride measurements were made to determine the quantity of material released as a decomposition product from a reaction involving vinyl fluoride. No significant quantities were detected.

Preparations have been made to make a polymer of ethylenimine and to construct a pilot facility to produce the monomer. An industrial hygiene program has been submitted and special reports will be issued upon completion of each operation.

The results of a survey show that excessive quantities of tolylene diisocyanate vapors were released during experiments to test the "burning" qualities of foam caused by exothermal heat while using different mixtures of polyol, iron, and water. A "Jectair" exhauster was used to remove the vapors.

INSTITUTE PLANT

Mr. R. E. Peele, Industrial Hygienist for the Institute Plant, submitted the following summary. Additional information about the reported activities may be obtained from Mr. Peele.

This summary is being presented under two major headings, i.e., Industrial Hygiene and Air Pollution, since the Industrial Hygiene Department is responsible for both fields.

Industrial Hygiene

Eight major reports were submitted during this period, four of which merit specific identification:

Noise Problem at Shipping Racks: An extremely severe hazard to hearing was revealed to be in existence when drying out (with a compressed air stream) the interiors of empty chemical tank cars. Recommendations specified the immediate and continued use of ear plugs until the intensity of the noise could either be reduced or eliminated at its source.

Lighting Problem in the Instrument Shop: Complaints of poor lighting in the Maintenance Department's Instrument Shop were investigated. An evaluation of the actual conditions disclosed the existence of inadequate lighting in most areas of the shop and recommendations were submitted for eliminating these inadequacies by improving the lighting.

Dust Problem at Fabrication Insulation Shop: A third evaluation of the hazard to health from atmospheric dust was conducted and included a re-evaluation of two types of insulation blocks, and an initial evaluation of a third. Results revealed that a hazard to health exists when fabricating two of the three types of block under existing conditions.

Clothing Program at the Coal Hydrogenation Unit: An evaluation of coal product contamination on clothing revealed that the program is continuing to serve a valuable service. However, there are indications that revision of the program may be in order since adequate protection appears to be provided through the use of coveralls only.

Numerous letters were submitted in response to specific requests for information concerning various subjects such as:

Dimethyl Sulfate: Its relative hazard and toxicity.

Insulation Dust Conditions: A clarification of the conditions in the Fabrication Insulation Shop.

Sealed Radiation Sources: The need for storage facilities.

Detector Tubes: Description of specific types of tubes for use by the new Alkylbenzene Unit.

Substantial time was consumed in investigating the layout of equipment (for both the TDI and Alkylbenzene Units) before installation; thereby attempting to anticipate and correct problems that could be identified as being potentially hazardous to health.

Extensive investigation of the atmospheric concentrations of phosgene and TDI in and around the TDI Unit was initiated. This program was in addition to existing benzene and platinum sampling programs involving periodic sampling for benzene in various areas of the #1 and #2 Styrene Units, the Gas Separation Unit, and the High Pressure Hydrogenation Unit, and extensive sampling for platinum in the Catalyst Area of the Works Laboratory Building.

Short investigations were conducted on a wide variety of subjects such as: the identification of solvents, spills of dinitrotoluene, disposal of cylinders of sulfur dioxide, complaints about odors in the Works Laboratory Building, complaints about noise in the Maintenance Welding Shop, and complaints about noise in the Fluorocarbons Unit.

Specific items of equipment were either investigated and/or evaluated, as for example: portable oxygen meters, a portable explosion meter (UNICO), and the new ventilation system for the TDI drumming station in the Polyols Shipping Building.

Lectures and demonstrations were presented on various subjects such as: an industrial hygiene health education lecture, a talk and film on noise and demonstrations of sampling equipment to personnel in both the TDI and Alkylbenzene Units.

Air Pollution

The majority of time expended in behalf of air pollution was distributed between three general categories of interest, i.e., attendance at meetings, participation in the discussion of problems and investigations of complaints, concepts, etc. Very little was accomplished in relation to atmospheric air sampling, although the regular flyash fallout samples continue to be collected as in the past.

Meetings of interest were comprised of committee meetings such as: "The Area Managers' Pollution Advisory Committee" (AMPAC), "The Committee on Residue Disposal", and "The Toxic Gas Emissions Committee".

Discussions of interest included: those held with the Executive Secretary of the West Virginia Air Pollution Commission, the residue disposal problem at Plant 512, and the application of the mass spectrographic techniques to air pollution.

Investigations of interest included: complaints resulting from odors, corrosion, irritation, flyash, etc., new concepts in control equipment for flyash, nitrous oxides and platinum,

compilation of recorded weather data and residue data, and compilation and interpretation of accumulated flyash fallout data.

RESEARCH AND DEVELOPMENT DEPARTMENT

INDUSTRIAL HYGIENE LABORATORY

The following information reported by Mr. J. N. Dermit is representative of work done by the Industrial Hygiene Laboratory on the development of analytical and instrumental methods for use with new products or processes. Some special analytical work in specific support of plant and Technical Center industrial hygiene programs was also undertaken. Further information may be obtained from Mr. Dermit.

ETHYLENIMINE - DETERMINATION IN AIR — A method of sampling and a colorimetric procedure for the determination of ethylenimine in air have been developed. The procedure will detect ethylenimine well below the Threshold Limit Value of 5 ppm by volume in air. Interferences from ammonia and other amines that would be expected at a production unit have been eliminated.

PHOSGENE - EVALUATION OF MSA "BILLIONAIRE" — The Mine Safety Appliances Company "Billionaire" has been evaluated and found satisfactory for the detection of phosgene in air for concentrations from 0.5 to 20 ppm by volume in air. The instrument response to phosgene is rapid, reproducible, and accurate. A radium foil (150 μg) causes a constant flow of ions to be produced inside a detector chamber. Phosgene when mixed with dimethylamine forms particles. These particles reduce the ion flow causing a bridge imbalance which is a direct measure of the amount of phosgene present in the air. This equipment is small, has virtually no mechanical parts, and uses a minimum of electronic components, thus should require little servicing for plant use. It responds to gaseous HCl, which might offer interference in some circumstances.

PHOSGENE - EVALUATION OF CONDUCTOMETRIC ANALYZER — The Special Instrumentation Department recently designed and constructed an instrument to measure phosgene in air by conductivity, which has also been evaluated. Air containing phosgene contacts demineralized water and is hydrolyzed to hydrochloric acid. Two legs of a sensitive bridge circuit are conductivity cells, one for the sample and the other for reference. The hydrochloric acid formed causes a bridge imbalance which is measured and recorded. The equipment is rather cumbersome and would probably require considerable servicing to keep it in operation. The initial response to phosgene is quite sensitive but slow, and the recovery time is excessive.

PHOSGENE - ANILINE COLORIMETRIC PROCEDURE — A method was developed for the colorimetric determination of phosgene, in air, in the 0.1 - 10 ppm range. Aniline in the presence of p-nitrobenzenediazonium fluoborate forms an intense red color. Phosgene

reacts with aniline to form diphenyl urea. The decrease in the intensity of the red color is a measure of the phosgene present in the air.

MASS SPECTROMETER EVALUATION FOR DETERMINING ATMOSPHERIC CONTAMINANTS — Development by the Research and Development Department of a static cold trap method for introducing gas samples into a mass spectrometer has reawakened interest in using this instrument for the analysis of contaminants in air. Known concentrations of selected contaminants are being prepared in the laboratory and analyzed with the mass spectrometer. Methods of sampling which are being evaluated as part of this continuing study include use of syringes and plastic bags.

TETRAMETHYL SUCCINONITRILE (TMSN) - DETERMINATION IN AIR — During the polymerization of acrylonitrile, the Vazo catalyst (azobis-isobutryionitrile) decomposes into two free radicals with the release of nitrogen. When the two free radicals combine, tetramethyl-succinonitrile (TMSN) is formed. TMSN is quite toxic and has been found in resulting products. TMSN has been successfully analyzed chromatographically. The sample is collected in methylene chloride containing a few drops of CARBOWAX. It is then evaporated to near dryness (several drops remaining), then diluted to 2 ml with methylene chloride and analyzed.

GLYCIDYL ACRYLATE - DETERMINATION IN AIR — A procedure for the determination of epichlorohydrin in air (38C-K2C4-R2.1) was found applicable for glycidyl acrylate (38C-K2C28-R2). The method is quite sensitive (0.3 to 13 ppm by by volume in air). The method is not specific, as any compound that can be oxidized to formaldehyde will interfere.

FERROCENE DETERMINATION IN AIR — Ferrocene (dicyclopentadienyliron) in air has been satisfactorily analyzed by modifying an existing Volume 38 procedure (38C-27P1-R2). Ferrocene is of interest to industrial hygienists because under some conditions of thermal decomposition it could yield toxic iron carbonyl.

BERYLLIUM SPOT TEST METHOD — A recently-published article described a spot test for beryllium. The test was evaluated by us and found to be rapid and simple with a lower limit of detection being 0.1μg. A color is developed between beryllium and erichrome cyanine R that is easily discernible with the naked eye. Removal of interferences from sixty two other ions are described in the publication.

EVALUATION OF PHOSGENE - DETECTOR CRAYONS — Apparently the indicator used in the Aromil Phosgene Number 1 Detector Crayon has been changed by the manufacturer since our earlier evaluation of the crayon. The detector crayons now supplied are still extremely sensitive to phosgene, but should not be relied upon for quantitative measurement. They are, nevertheless, most useful for detecting the

presence or absence of phosgene in the work area. It has been our experience that the effective shelf life of these detector crayons is one year longer than the date indicated by the manufacturer (if the crayon has been kept in the stoppered glass tube and not exposed to unusual heat).

EVALUATION OF PHOSGENE - DETECTOR TUBES

A new Drager Phosgene Detector Tube Number 0.25/b, which replaces Tube 1/a, has been evaluated and found satisfactory for a semi-quantitative measurement. Three minutes are required for the tube to reach a maximum color change in the 1 ppm range. In higher phosgene concentrations (5-15 ppm), less than one minute produces a color change.

NITROGEN DIOXIDE - DETECTOR TUBE EVALUATION

Nitrogen dioxide detector tubes purchased from Mine Safety Appliances Company (Tube Number 0.1-50), Dràger (Tube Number 0.5/c), and Kitagàwa (Tube Number 1-1000) were evaluated with known concentrations prepared in a dynamic system. The ranges covered were between 1.3 and 12.6 ppm NO_2 by volume in air. Drager and Kitagawa tubes both gave acceptably accurate and consistent results and are recommended for field use.

METHACROLEIN - DETERMINATION IN AIR

Methacrolein can be determined well below the suggested Threshold Limit Value of 0.1 ppm by volume in air using an ultraviolet absorption method. The sample is collected in 10 per cent glacial acetic acid and measured spectrophotometrically at a wavelength of 310 mμ.

ANALYSES IN SUPPORT OF PLANT AND TECHNICAL CENTER INDUSTRIAL HYGIENE PROGRAMS

In addition to industrial hygiene methods development work for new products or processes, we continued to do special analytical work for the plant and Technical Center industrial hygiene programs. Listed below is the approximate number of samples analyzed. Calibration of radiation survey instruments is included in this list.

Type of Analysis	Approximate No. of Samples	Work Requested By
Hydrogen fluoride in air	11	Tech. Center
Beryllium	283*	Tech. Center
Compound 21149 in air	2	Tech. Center
Radiation wipe tests	83	**
Carbon-14 in air	2	Tech. Center
Sorbic acid in air	10	So. Charleston
Tolylenediisocyanate in air	31	Tech. Center
Lead in urine	5	So. Charleston
Platinum in air	7	Institute
Ozone in air	3	Tech. Center
Tetramethylsuccinonitrile in air	12	Tech. Center
Cement dust in air	4	Tech. Center
Total sulfur in air	1	Tech. Center
Radiation survey instruments calibrated	11	**

*Includes analyses of wipe tests and air samples.

**South Charleston-Institute-Technical Center

METHODS DEVELOPMENT REPORTS ISSUED

1. Sorbic Acid - Determination of Micro Amounts in Air, Research and Development Department, September 1963, File No. 1261.

2. Tolylene Diisocyanate - Determination in Air, Research and Development Department, December 19, 1963, File No. 1785.

LABORATORY MANUAL PROCEDURES PREPARED FOR VOLUME 38, INDUSTRIAL HYGIENE

Tolylenediisocyanate - Determination in Air, December 23, 1963, Method No. 38C-B22N2-R2.

Epichlorohydrin - Determination of Trace Amounts in Air, Using the Acetyl Acetone Method, December 27, 1963, Method No. 38C-K2C4-R2.1.

Glycidyl Acrylate - Determination of Micro Amounts in Air, December 30, 1963, Method No. 38C-K2C28-R2.

RESEARCH AND DEVELOPMENT DEPARTMENT

CHEMICAL HYGIENE FELLOWSHIP

MELLON INSTITUTE OF INDUSTRIAL RESEARCH

PITTSBURGH, PENNSYLVANIA

The information described below was provided by Dr. C. P. Carpenter as being of particular interest to the readers of this summary report. Further information may be obtained from Dr. Carpenter.

HIGHLY TOXIC COMPOUNDS OF 1963 Twelve of the most toxic materials tested by the Chemical Hygiene Fellowship during the year 1963 are listed on the attached table. Persons working with any of these compounds should inform themselves of the nature of the hazard and take appropriate precautions.

PUBLICATIONS Continuing an established policy of reporting much of the work of the Fellowship in professional journals, five papers were published during 1963. The references are listed on an attached sheet.

PROPOSED FEDERAL INSECTICIDE, FUNGICIDE, AND RODENTICIDE ACT, S 362.8 An unpublished argument for adjusting the dust inhalation test level to a more appropriate figure has been prepared and distributed to selected Corporation personnel concerned with agricultural chemicals. A level of 0.2 mg/l (200 mg/cubic meter) is proposed as a realistic test level for making the decision whether the product should be classified as an economic poison highly toxic to man.

CHEMICAL HYGIENE FELLOWSHIP

HIGHLY TOXIC COMPOUNDS OF 1963

	Single Peroral Doses, Rat LD 50	Single Skin Penetration, Rabbit LD50	Inhalation, Rat	Skin Irritation Uncovered, Rabbit	Eye Injury, Rabbit
Allyl Methacrylate Report 26-11	0.43 gm./kg. as 1% in CO; 0.25 ml./kg. and killed 3/5.	0.50 ml./kg. und.	Conc. vapor: 15 min. killed 4/6, 7.5 killed 0/6.		
Isopropyl Morpholine Report 26-35	0.71 ml./kg.	0.10 ml./kg.			
Fumaroyl Chloride Report 26-120			Conc. vapor: 30 min. killed 3/6.		Grade 10
Quaternary Silicone Y-4542 Report 26-115	0.23 gm./kg. 5% W	0.035 ml./kg.			0.005 ml. killed within 5 min.
Methyl Isocyanate Report 26-75	0.071 gm./kg., 10% in Deobase.	0.22 ml./kg. und.	2 mg./l. killed 6/6 in 1 hr.		Grade 10
16/16 Guinea Pigs were sensitized by the intradermal test.					
Diketene 98% Report 26-82	0.56 ml./kg.				Grade 10
Compound 20081 2,3-Dichloroacrylonitrile Report 26-93	0.041 gm./kg., 1% in CO.	0.0050 ml./kg.	7.8 ppm. killed 5/6, 4 hrs. 3.9 ppm. killed 2/6, 4 hrs.		Grade 10
Quaternary Silicone Y-4543 Report 26-114		0.35 ml./kg.			0.1 ml. in eye killed within 1/2 hr.

(Continued)

CHEMICAL HYGIENE FELLOWSHIP

	Single Peroral Doses, Rat LD_{50}	Single Skin Penetration, Rabbit LD_{50}	Inhalation, Rat	Skin Irritation Uncovered, Rabbit	Eye Injury, Rabbit
Compound 22437 2-(p-chlorophenyl)-2,4,6-tris(chlorodifluoromethyl)-1,2-dihydro-1,3,5-triazine	0.0021 gm./kg. 0.01% in CO.			0.01 ml. killed 6/6 in uncovered application. N.B. This is on the order of 0.004 ml./kg. as a lethal dose by uncovered skin penetration!	0.01 ml. killed 1/1 within 24 hrs., 0.02 killed 1/1 within 6 hrs.

All the N-methyl carbamoyloximes are of extremely high toxicity. We list those that kill when small amounts are introduced into the rabbit eye. They are hazardous to handle!

Compound 21823 2-methyl-2-methylsulfinylpropionaldehyde N-methylcarbamoyloxime Report 26-29	0.00088 gm./kg.-males; 0.0014 gm./kg.-females 0.1% in CO.	0.0049 gm./kg., 5% in PG.		100 mg. dry powder killed within 30 min.; 0.5 ml. of 5% PG killed within 25 min.
Compound 23527 2-methyl-2-nitrocyclopentanone N-methylcarbamoyloxime Report 26-119	0.0035 gm./kg., 0.1% in CO.	0.071 gm./kg., 5% in PG or acetone.		powder killed within 45 min.
Compound 22746 2-formamido-2-methylpropionaldehyde N-methylcarbamoyloxime Report 26-16	0.0020 gm./kg.-males; 0.0035 gm./kg.-females 0.1% W	0.025 gm./kg., 5% W		0.5 ml. of 5% W killed within several hrs.

CHEMICAL HYGIENE FELLOWSHIP

Papers Published in 1963

Psychopharmacological and Biochemical Effects of N-Methyl 3-Isopropyl Phenyl Carbamate (Compound 10054).
Goldberg, M. E., H. E. Johnson, J. B. Knaak, and H. F. Smyth, Jr.
Fed. Proceedings 22, paper 2091, 1963.

Industrial Hygiene in Retrospect and Prospect--Toxicological Aspects.
Smyth, H. F., Jr.
Amer. Ind. Hyg. Assoc. J. 24, 222-226, 1963.

Experimental Carcinogenicity and Acute Toxicity of Representative Epoxides.
Weil, C. S., Naomi Condra, Charles Haun, and J. A. Striegel
Amer. Ind. Hyg. Assoc. J. 24: 305-325, 1963.

Psychopharmacological Effects of Reversible Cholinesterase Inhibition Induced by N-Methyl 3-Isopropyl Phenyl Carbamate (Compound 10054).
Goldberg, M. E., H. E. Johnson, J.B. Knaak, and H. F. Smyth, Jr.
J. Pharm. Exper. Therapeutics 141, 244-252, 1963.

Relationship Between Short- and Long-Term Feeding Studies in Designing an Effective Toxicity Test.
Weil, C. S., and D. D. McCollister
Ag. Food Chem. 11, 486-491, 1963.

BROWNSVILLE PLANT

The following was submitted by Mr. W. E. Warren, Industrial Relations Department Head. More detailed information may be obtained from him.

The Brownsville Plant requested Mr. N. H. Ketcham to visit and measure noise levels in the Oyxgen Plant. Mr. Ketcham had previously measured noise levels, plant-wide, on October 31, 1961. The request was based on apparently higher noise levels, which were caused by changes in operating conditions and equipment.

Mr. Ketcham visited the plant September 30, 1964. All suspect areas in the Oxygen and Utilities areas, which were measured in 1961, were again measured. As suspected, the noise level in the Oxygen Plant, 2 feet below a recycle line, which had been installed since the original survey (10-31-61) was 113-115 decibels.

As the result of the noise levels found, and the attendant recommendations, process revisions have been approved which should eliminate the specific problem in the Oxygen Plant. No significant changes were found in other areas in the plant.

TEXAS CITY PLANT

Dr. R. E. Joyner, Plant Medical Director, reported the following information. Further details may be obtained from him.

Follow-up studies on urine cobalt excretion were run.

Several noise exposure studies were made as a part of a continuing hearing conservation effort.

Additional industrial hygiene work, which had been recognized as needing attention, could not be done because of lack of personnel. In order to obtain an accurate estimate of the volume and nature of work needing to be done, Mr. N. H. Ketcham was asked to survey the entire plant. This was done during a four-day period in October. The results of this survey have been reviewed with the plant management and appropriate recommendations made.

The use of encapsulated sources of radioactive materials in plant instrumentation is increasing rapidly. These sources are procured and used in accordance with the terms of a license issued by the Texas State Health Department. Mr. B. H. Clark is the plant's licensee representative and also serves as the plant Radiation Protection Officer.

TABLE I

LICENSED ENCAPSULATED RADIATION SOURCES

Inventory as of December 31, 1963

Manufacturer's Name and Type of Housing	Kind of Isotope	No. of Sources	Amount in Each Source* (millicuries)	Total Amouht* (millicuries)	Required Frequency for Leak Test	Responsible Agency
BROWNSVILLE PLANT						
Ohmart HM-8	Cs 137	1	750	750	6 mos.	Texas
U.S. Rad. Lab-713-E	Ra 226	1	0.1	0.1	6 mos.	Texas
SEADRIFT PLANT						
Ohmart SHRM	Cs 137	1	125	125	3 yrs.	Texas
Ohmart SHRM	Cs 137	6	150	900	3 yrs.	Texas
Ohmart SHRD	Cs 137	2	300	600	3 yrs.	Texas
E. K. Cole SKS 101/233	Co 60	1	0.03	0.03	6 mos.	Texas
Ohmart HM-8	Cs 137	2	750	1500	3 yrs.	Texas
U. S. Nuclear Source G 223	Co 60	1	1	1	3 yrs.	Texas
Ohmart RTSN	Ra 226	2	0.025	0.050	3 yrs.	Texas
Ohmart RTSN	Ra 226	1	0.100	0.100	3 yrs.	Texas
SOUTH CHARLESTON PLANT						
Ohmart SHRM	Cs 137	11	100	1100	3 yrs.	AEC
Ohmart SHRM	Cs 137	4	50	200	3 yrs.	AEC
Ohmart SHRM	Cs 137	4	150	600	3 yrs.	AEC
Ohmart SHRM	Cs 137	1	1000	1000	3 yrs.	AEC
Ohmart SHRM	Cs 137	3	20	60	3 yrs.	AEC
Ohmart HM-8	Cs 137	1	1000	1000	6 mos.	AEC
Ohmart LASR-3	Cs 137	1	500	500	6 mos.	AEC
Ohmart ASR-3	Cs 137	1	500	500	6 mos.	AEC
Jordan Meter	Sr 90	1	0.003	0.003	6 mos.	AEC
Ind. Nucleonics LS-101	Cs 137	1	25	25	6 mos.	AEC

(Continued)

TABLE I (Continued)

Manufacturer's Name and Type of Housing	Kind of Isotope	No. of Sources	Amount in Each Source* (millicuries)	Total Amount* (millicuries)	Required Frequency for Leak Test	Responsible Agency
		SOUTH CHARLESTON PLANT (Cont'd)				
Ind. Nucleonics DH-3	Sr 90	1	500	500	6 mos.	AEC
Comp. Cell	Ra 226	5	0.1	0.5	None ***	None **
Comp. Cell	Ra 226	1	0.05	0.05	None	None
Pipe Wall Gauge 101-T	Ra 226	1	0.2	0.2	None	None
Gamm-O-Switch	Ra 226	1	0.25	0.25	None	None
Gamm-O-Switch	Ra 226	2	0.5	1.0	None	None
		TECHNICAL CENTER				
AECL KCP-1 and C-129 pencils	Co 60	39	up to 250 curies ea.	1600 curies	6 mos. (water)	AEC
Tracerlab R-31	Co 60	1	1.1	1.1	6 mos.	AEC
Ohmart SHRM	Cs 137	1	20	20	3 yrs.	AEC
Ohmart SHRM-P	Cs 137	1	20	20	3 yrs.	AEC
Ohmart SHRM-P	Cs 137	1	50	50	3 yrs.	AEC
Ohmart SHRM-P	Cs 137	1	100	100	3 yrs.	AEC
Ohmart SHRM	Cs 137	3	150	450	3 yrs.	AEC
Ohmart SHRH	Cs 137	3	200	600	3 yrs.	AEC
Ohmart SHRM	Cs 137	1	200	200	3 yrs.	AEC
Nuclear-Chicago Model 506	Cs 137	1	450	450	6 mos.	AEC
Ohmart HM-8	Cs 137	1	500	500	6 mos.	AEC
Ohmart SHRH-A	Cs 137	2	1000	2000	3 yrs.	AEC
Nuclear-Chicago Model 506	Cs 137	1	1750	1750	6 mos.	AEC
Jordan Meter	Sr 90	1	.003	.003	6 mos.	AEC
USRC foil 2230	Sr 90	1	0.1	0.1	6 mos.	AEC
RSC Chromatograph-foil	Sr 90	1	10	10	6 mos.	AEC
USRC Foil 369	Sr 90	2	20	40	6 mos.	AEC
Ind. Nucleonics C-5	Sr 90	1	20	20	6 mos.	AEC

(Continued)

TABLE I (Continued)

Manufacturer's Name and Type of Housing	Kind of Isotope	No. of Sources	Amount in Each Source* (millicuries)	Total Amount* (millicuries)	Required Frequency for Leak Test	Responsible Agency
			TECHNICAL CENTER (Cont'd)			
Foil	Ra 226	1	0.001	0.001	None**	None**
Foil	Ra 226	3	0.005	0.015	None	None
Foil	Ra 226	1	0.026	0.026	None	None
Foil	Ra 226	5	0.1	0.5	None	None
Foil	Ra 226	2	0.5	1.0	None	None
Pellets	Ra 226	4	0.1	0.4	None	None
Pellets	Ra 226	32	1.0	32.0	None	None
Zero Source	Ra 226	3	0.1	0.3	None	None
Zero Source	Ra 226	3	0.15	0.45	None	None
Zero Source	Ra 226	1	0.2	0.2	None	None
Zero Source	Ra 226	2	0.3	0.6	None	None
Zero Source	Ra 226	1	0.5	0.5	None	None
Zero Source	Ra 226	2	1.0	2.0	None	None
Zero Source	Ra 226	1	1.6	1.6	None	None
Zero Source	Ra 226	1	2.6	2.6	None	None
Screw	Ra 226	1	.002	.002	None	None
Salts	Ra 226	1 sealed pkg.	Unknown	Unknown	None	None
			TEXAS CITY PLANT			
Ohmart SHRM	Cs 137	4	50	200	3 yrs.	Texas
Ohmart SHRH	Cs 137	1	200	200	3 yrs.	Texas
U. S. Radium Corp.	Ra 226	5	1	5	6 mos.	Texas
United Engr.	Ra 226	1	1	1	6 mos.	Texas
U. S. Radium Corp.	Ra 226	1	0.150	0.150	6 mos.	Texas
			TORRANCE PLANT			
Ohmart SHRM	Cs 137	12	50	600	6 mos.	Calif.
Jordan Meter	Sr 90	1	0.001	0.001	6 mos.	Calif.

(Continued)

TABLE I (Continued)

Manufacturer's Name and Type of Housing	Kind of Isotope	No. of Sources	Amount in Each Source* (millicuries)	Total Amount* (millicuries)	Required Frequency for Leak Test	Responsible Agency
			WHITING PLANT			
Ohmart SHRM	Cs 137	1	150	150	3 yrs.	AEC
Ohmart SHRM	Cs 137	1	100	100	3 yrs	AEC
Ohmart SHRM	Cs 137	1	50	50	3 yrs.	AEC
Ohmart SHRM	Cs 137	4	100	400	3 yrs.	AEC
Ohmart SHRM	Cs 137	8	50	400	3 yrs.	AEC
Ohmart SHRM	Cs 137	10	50	500	3 yrs.	AEC
Comp. Cell	Ra 226	1	.05	.05	None **	None **
			INSTITUTE PLANT			
Ind. Nucleonics BB-0041	Cs 137	1	150	150	3 yrs.	AEC
Ind. Nucleonics BBS-10051	Cs 137	1	50	50	3 yrs.	AEC
Ind. Nucleonics BBS-10073	Cs 137	1	1,000	1,000	6 mos.	AEC
Ohmart Lab 236-CI-4	Cs 137	1	200	200	3 yrs.	AEC
Ohmart Lab 236-CI-4	Cs 137	2	500	1,000	3 yrs.	AEC
Ohmart Lab 236-CI-4	Cs 137	4	20	80	3 yrs.	AEC
Ohmart LS 101	Cs 137	1	500	500	3 yrs.	AEC
Ohmart LS 102	Cs 137	1	50	50	3 yrs.	AEC
Ohmart LS 102	Cs 137	1	250	250	3 yrs.	AEC

*Amount of activity at time of purchase. No decay correction has been made.

**Radium usage is not licensed by the AEC or by the State of West Virginia. Both the South Charleston and Whiting Plants and the Technical Center control the procurement and use of radium in the same manner as required by the states which license its use.

LEGISLATIVE BOX SCORE - 88th Congress

H = Hearings
R = Reported

P = Passed
C R A = Conference Report Accepted

SUBJECT	Bill No.	H House	H Senate	R House	R Senate	P House	P Senate	C R A House	C R A Senate	SIGNED
Air Pollution	* H.R. 3507									
	H.R. 3765									
	* H.R. 4061									
	* H.R. 4415									
	* H.R. 4750									
	* H.R. 5024									
	H.R. 6518		X	X	X	X	X	X	X	X P.L. 88-206
	H.R. 8884									
	* S. 432		X		X					
	S. 444		X							
	* S. 1009		X							
	S. 1040		X							
	S. 1124		X							
	S. 1472									
Food, Drugs and Cosmetics	H.R. 1235									
	H.R. 6788									
Occupational Health and Safety	H.R. 23	X								
	H.R. 133	X								
	H.R. 1926									
	H.R. 9000			X						
	S. 1949									
Pesticides	* H.R. 6828	X								
	* H.R. 6913	X								
	* H.R. 7336									
	H.R. 7353									
	S. 1250		X							
	S. 1251		X							
	S. 1605	X	X		X		X			
Radiation	H.R. 4899									
	* H.R. 7455									
	S. 1754									
Water Pollution	H.R. 2105									
	* H.R. 3166	X								
	* H.R. 3167									
	* H.R. 3819									
	* H.R. 3867									
	* H.R. 4571	X								
	* H.R. 5740									
	* H.R. 5848									
	* H.R. 5911									
	H.R. 6494									
	* H.R. 6497									
	* H.R. 6675									
	* H.R. 7727									
	S. 649	X	X		X		X			
	* S. 1118									
	S. 1183		X							

SUBJECT	Bill No.	H House	H Senate	R House	R Senate	P House	P Senate	C R A House	C R A Senate	SIGNED
Animal Care	H.R. 4620									
	H.R. 4840									
	H.R. 4843									
	H.R. 4856									
	H.R. 5430									
	* H.R. 8077									
	S. 533									
	S. 1041									
Workmen's Compensation and Social Security	H.R. 5210									
	H.R. 5211									
	H.R. 6201									

* H.R. 3507 - Identical to S. 432 as reported in the last legislative digest.
* H.R. 4061 - Identical to S. 432 as reported in the last legislative digest.
* H.R. 4415 - Similar to H.R. 6518 as reported in the last legislative digest.
* H.R. 4750 - Identical to H.R. 4415 as reported in the last legislative digest.
* H.R. 5024 - Identical to H.R. 4415 as reported in the last legislative digest.
* S. 432 - Similar to H.R. 6518 as reported in the last legislative digest.
* S. 1009 - Identical to S. 1124 as reported in the last legislative digest.
* H.R. 6828 - Identical to S. 1605 as reported in the last legislative digest.
* H.R. 6913 - Identical to S. 1605 as reported in the last legislative digest.
* H.R. 7336 - Identical to S. 1605 as reported in the last legislative digest.
* H.R. 7455 - Similar to S. 1754 as reported in the last legislative digest.
* H.R. 3166 - Action taken on identical bill, S. 649 (Before House Committee).
* H.R. 3167 - Similar to S. 649 as reported in the last legislative digest.
* H.R. 3819 - Similar to S. 649 as reported in the last legislative digest.
* H.R. 3867 - Similar to S. 649 as reported in the last legislative digest.
* H.R. 4571 - Identical to H.R. 2105 as reported in the last legislative digest.
* H.R. 5740 - Similar to S. 649 as reported in the last legislative digest.
* H.R. 5848 - Similar to S. 649 as reported in the last legislative digest.
* H.R. 5911 - Similar to S. 649 as reported in the last legislative digest.
* H.R. 6497 - Identical to S. 1183 as reported in the last legislative digest.
* H.R. 6675 - Identical to H.R. 2105 as reported in the last legislative digest.
* H.R. 7727 - Similar to S. 649 as reported in the last legislative digest.
* S. 1118 - Similar to S. 1183 as reported in the last legislative digest.
* H.R. 8077 - Similar to H.R. 4620 as reported in the last legislative digest.

NOTE: The information in this table was compiled by the American Industrial Hygiene Association.

DISTRIBUTION

Business Department Managers

Mr. F. H. Belden
Mr. A. B. Burns
Mr. R. W. Eddy
Mr. K. J. Gutshaw
Mr. M. Hill
Mr. R. W. King

Brownsville Plant

Mr. H. B. Coons
Mr. W. E. Warren
Mr. R. G. Wilson

General Safety and Fire Protection Department

Mr. V. V. Tilton

Institute Plant

Mr. L. N. Dickinson
Mr. S. C. Giambruno
Mr. R. A. Huber
Mr. P. A. Laine, Jr.
Mr. R. E. Peele
Mr. E. W. Poinier, Jr.
Mrs. Jane H. Ross
R. J. Sexton, M. D.
Mr. L. B. Weddell

New York Offices

C. U. Dernehl, M. D.
Mr. J. S. Freeman
Dr. J. L. Marsh
Mr. P. W. McDaniel
Mr. A. P. Moss
Mr. O. C. Thompson (Bldg. 82)
J. J. Welsh, M. D.

Niagara Falls Plant

Mr. D. M. Rupert

Seadrift Plant

Mr. R. P. Barry
Mr. A. E. Bransford
Mr. J. H. Hill
Mr. J. J. Walthall

Texas City Plant

Mr. H. E. Allspach
Mr. O. T. Carlisle
Mr. B. H. Clark
R. E. Joyner, M. D.
Mr. W. J. Suiter

Torrance Plant

Mr. W. E. Knight
Mr. C. N. Rucker

Whiting Plant

Mr. G. O. Bunch
Mr. J. M. Elliott
Mr. P. C. Kelly
Mr. G. J. Klebs
Mr. D. J. Mixan

South Charleston Plant

Mr. M. A. Aitken
Mr. E. E. Buxton
Mr. B. R. Harper
Mr. W. F. Hartling
Mr. R. C. Hieronymus
Mr. J. B. Kessler
Mr. R. J. Murphy
Mr. B. L. Murray
Mr. L. A. Roebke
Mr. W.W. TenEyck
E. Q. Hull, M. D.

Tarrytown Laboratory - Research and Development Department

Dr. A. B. Steele
Mr. W. B. Leighton

Mellon Institute - Research and Development Department

Dr. C. P. Carpenter
Dr. H. F. Smyth, Jr.

Agricultural Research Station - Research and Development Department

Dr. H. H. Moorefield

Technical Center

Mr. R. M. Berg
E. M. Best, Jr., M. D.
Mr. J. W. Biddle
Dr. F. B. Brown
Mr. J. N. Dermit
Mr. P. W. Gregory, Jr.
Mr. E. C. Harry
Dr. F. Johnston
Dr. J. B. Reid
Mr. L. J. Rogers
Mr. S. H. Rose, Jr. (2)
Mr. H. T. Sessions
Mr. H. B. Walker
Mr. Fred Williams
Mr. F. B. Wotiz

INDUSTRIAL HYGIENE SUMMARY REPORT

PERIOD JANUARY 1 - JUNE 30, 1962

The growing competence of the industrial hygiene programs conducted by the plants and the Technical Center makes possible a simplification in the periodic Company-wide reporting of the work. Because the full-time programs are well established and functioning effectively on a daily basis, the reports of their work are of interest mainly to supervision at the location where the work is being done. Thus, to conserve the time of many of the readers of this periodic Company summary report, only brief reference to the most significant developments will be included.

Some readers need to receive detailed information on the industrial hygiene work being done in all of the Company locations. For these persons, copies of the complete summary reports prepared at each location are attached. In addition, this information will be supplied to others requesting it.

The following activities have been selected as being of particular interest or significance. Almost invariably the prime stimulus for the work is the protection of our own employees at the locations in question. It is notable, however, that in many instances the knowledge and experience gained is also useful to the customer who buys the product and needs to know how to protect the health of his workers. Utilization of this accumulated industrial hygiene experience by our market-oriented business departments is anticipated.

Scheduled pilot-scale production of both solid and liquid rocket fuels involve major potential health problems. Thorough medical and industrial hygiene coverage is mandatory under the terms of the contracts. Because of the highly toxic nature of some of the materials being handled, this service would have been provided in any event as a part of our usual program to protect employees from health hazards.

An experienced industrial hygienist, Mr. Fred Williams, has been added to the staff of the Technical Center Medical Department. Mr. Williams transferred from the Y-12 Plant of the Nuclear Company, bringing with him pertinent specialized experience in the fields of rocket fuels and radioactive materials.

New agricultural chemicals of increased toxicity, which require carefully planned health protection effort, are being handled in larger numbers. Minor illnesses resulting

from formulating Compound 10854 at the Technical Center dramatically illustrated the need for improved facilities for processing these materials. A new formulation laboratory is now under construction. Experience gained in the safe handling of the new agricultural chemicals will be valuable when the products go into large-scale production and are marketed.

Evaluation of the effectiveness of respiratory protection for employees working in high concentrations of SEVIN dust has been undertaken as a joint effort of the Institute Plant and the Research and Development Department.

Anticipation of production of dicobalt octacarbonyl in Texas City Plant equipment required the development of information on certain of the health and safety hazards inherent in such work. In addition, the possible presence of small amounts of highly toxic nickel carbonyl as a contaminant in the product has been called to our attention by a potential customer.

Solution of a sales problem involving flexible foam products was enhanced by studies showing that the selected volatile organometallic additive could be used without health hazard to the formulators. This was demonstrated by means of air samples taken in the working environment, analyses of urine specimens from employees working with the process, and animal studies conducted by the Chemical Hygiene Fellowship at Mellon Institute.

On July 1, 1962, the State of California took over from the Atomic Energy Commission the responsibility of licensing and inspection of radioactive materials and radiation-producing equipment. Some of the other states are also preparing to do this. Our existing radiation protection programs are in a position to assure compliance with any changes or additional requirements this may impose. If the California law is representative, state control will be no less, and perhaps more, thorough than the AEC control. The California regulation calls for registration, periodic inspection, and payment of a license fee for each radiation source.

A laboratory service of the Research and Development Department in support of the plant and Technical Center industrial hygiene programs was transferred to the supervision of Mr. N. H. Ketcham on May 1, 1962. This will facilitate close coordination between this laboratory activity and the industrial hygiene consulting service which has been available for many years. The adaption or application of known instrumental and analytical procedures for industrial hygiene use will be one important part of the laboratory service. In addition, specific help in the measurement and evaluation of health hazards in the working environment will be given to the Company locations which do not require a full-time industrial hygiene program.

The South Charleston Plant is using a revised "Hazardous Work Permit" which includes information relating to radioactive sources, potential toxicity hazards, and special ventilation requirements. It is felt that this revised Permit has increased the safety with which certain jobs are performed and has led to the recognition of a number of new problems, especially involving contamination of air with gases and vapors.

N. H. Ketcham

N. H. Ketcham
Industrial Hygiene Consultant

NHK/dww
9-26-62
Attachments*

*See attached distribution list

DISTRIBUTION

* Recipients identified with an asterisk after their name receive copies of the complete reports prepared at the locations having full-time industrial hygiene programs.

Business Department Managers
- Mr. F. H. Belden
- Mr. A. B. Burns
- Mr. R. W. Eddy
- Mr. K. J. Gutshaw
- Mr. M. Hill
- Mr. R. W. King

Brownsville Plant
- Mr. H. B. Coons
- Mr. W. E. Warren*

General Safety and Fire Protection Department
- Mr. V. V. Tilton*

Technical Service Laboratory
- Dr. A. B. Steele

Institute Plant
- Mr. F. D. Bess
- Mr. L. N. Dickinson
- Mr. S. C. Giambruno
- Mr. R. A. Huber
- Mr. R. E. Peele*
- Mr. E. W. Poinier, Jr.*
- R. J. Sexton, M. D.*

Mellon Institute
- Dr. C. P. Carpenter*
- Dr. H. F. Smyth, Jr.*

New York Offices
- Dr. R. L. Bateman
- C. U. Dernehl, M. D.*
- Mr. J. S. Freeman
- Dr. J. L. Marsh
- Mr. P. W. McDaniel*
- Mr. A. P. Moss
- Mr. O. C. Thompson (Bldg. 82)

Niagara Falls Plant
- Mr. D. M. Rupert

Seadrift Plant
- Mr. R. P. Barry
- Mr. A. E. Bransford*
- Mr. J. H. Hill*
- Mr. J. J. Walthall

Torrance Plant
- Mr. W. E. Knight*
- Mr. J. T. McClure
- Mr. C. N. Rucker

Texas City Plant
- Mr. H. E. Allspach
- Mr. O. T. Carlisle*
- R. E. Joyner, M. D.*
- Mr. W. J. Suiter

Whiting Plant
- Mr. G. O. Bunch*
- Mr. J. M. Elliott
- Mr. P. C. Kelly
- Mr. G. J. Klebs*
- Mr. C. A. Smith

South Charleston Plant
- Mr. M. A. Aitken
- Mr. H. L. Babcock
- Mr. E. E. Buxton
- Mr. B. R. Harper
- Mr. W. F. Hartling
- Mr. R. C. Hieronymus
- E. Q. Hull, M. D.*
- Mr. R. J. Murphy
- Mr. B. L. Murray*
- Mr. L. A. Roebke*
- Mr. W. W. TenEyck

Technical Center
- Mr. R. M. Berg
- E. M. Best, Jr., M. D.*
- Mr. J. W. Biddle
- Mr. J. D. Cavender*
- Mr. P. W. Gregory, Jr.
- Mr. E. C. Harry
- Dr. F. Johnston
- Mr. W. A. Katholi
- Dr. J. V. Murray
- Mr. J. W. Perry
- Dr. B. Phillips
- Mr. S. H. Rose, Jr. (2)
- Mr. H. T. Sessions
- Mr. Fred Williams*

INSTITUTE PLANT

512 INDUSTRIAL HYGIENE ACTIVITIES

1 February 1962 - 1 July 1962

I. Investigations

A. Physical Stresses

1. Noise

a. The two pump houses, located on the river, were visited and examined with note being made of the existence of noise levels that could be classified as disturbing to hearing. This condition will be thoroughly evaluated in the near future.

b. One of several visits to the Fluorocarbons Shipping Building disclosed the existence of a potentially hazardous noise condition in existence on each of two air instruments. Unmuffled exhaust ports undoubtedly served to produce the excessive noise. Noise level measurements will soon be conducted.

B. Chemical Stresses

1. Dust

a. Complaints of disturbing dusty conditions, in existence on the second floor of the Fluorocarbons Shipping Building, were investigated and found to be warranted. However, an evaluation of the atmospheric conditions was not deemed necessary when it was determined that the dust was not in itself harmful to health and that the problem could be easily relieved through the installation of a small vent line to the outside.

2. Gases

a. Detector tubes are still being used at regular monthly intervals in revealing an indication of the HCN concentrations present in various areas of the Hydrogen Cyanide Unit.

b. Complaints of hazardous gas conditions in existence over the Fluorocarbon Units "HCl Leaching Pit" were investigated. Carbon monoxide and hydrogen sulfide concentrations were measured with detector tubes and found to be of such sufficient volume as to warrant further more extensive evaluation. Preparations for the initiation of such a program are now under way.

3. Vapors

a. A request for assistance by the Safety Department, in uncovering a safe substitute solvent for use in the Safety Supply Room disclosed the existence of a completely ineffective exhaust system and a hazardous working condition as produced by the use of a combustible solvent. Temporary relief and protection was realized after substituting a safe solvent for use and then utilizing an available washing machine for difficult scrubbing problems such as clothing contaminated with

1-Naphthol deposits. Further investigation into this exhaust system is scheduled for the near future.

b. Routine monthly surveys of the benzene concentrations in air in the #1 and #2 Styrene and Gas Separation Units continue to be conducted, with the result that some desire has been expressed to discontinue the sampling program in the Gas Separation Unit. Thorough analysis of all existing data is being conducted so as to clarify the status of the program.

c. Infrared instrumental techniques are being utilized in an endeavor to establish the connection, if any, between the concentrations of toluene vapors present in the finished "SEVIN Insecticide" product and the production of several cases of illness as experienced by laborers packaging the material by hand. The same technique is also being applied in relation to another case of possible over-exposure to toluene as revealed in the paint spraying area of the Fluorocarbons Shipping Building.

d. Monthly sampling for acetonitrile vapor concentrations in air are still being conducted in various locations of the Fiber T Unit.

C. Air Pollution

1. Regular collection and analysis of fly ash concentrations as obtained from various sites within the plant, in Nitro, and in St. Albans are still being routinely conducted each month.

II. Investigations and Evaluations

A. Physical Stresses

1. Noise

a. Objectionable noisy working conditions, in existence in Room 228 of the Plant Laboratory, were investigated as requested by Mr. R. L. McNeer. All physical noise measurements were obtained through the cooperative efforts of Mr. E. C. Harry and his Olefins Engineering Staff. A complete evaluation of this data is expected to be soon received from this group and recommendations will then be forthcoming.

b. A report of objectionable noisy working conditions in existence in Room 6 (the I.B.M. Key Punch Room) of Building 2, as received from Mr. C. O. Crawford of the Safety Department, was also investigated with the help of Mr. E. C. Harry's staff. Physical noise measurements were obtained at this time and a complete evaluation of all data is expected to be soon received. Recommendations will follow.

2. Radiation

a. Shortly after the addition of a new X-ray Spectrograph to the Plant Laboratory's inventory of fine instrumental equipment, Mr. F. L. Boggs submitted a request for an evaluation of the hazard to health (if any) experienced by any individual employed in working with such instruments. An Industrial Hygiene Radiation Survey of the problem was conducted as requested and a report of all findings, complete with recommendations, will soon be submitted.

3. Lighting

a. Measurements of the illumination in all areas of the Dispensary were obtained as requested by Doctor Sexton just prior to and following a service and maintenance check of the lamps and fixtures. This data was drawn up and submitted to him for future use.

B. Chemical

1. Dust and Fumes

a. Atmospheric dust samples of the "'SEVIN' Insecticide dust in air" concentrations continue to be taken at the "SEVIN" Unit. Errors were uncovered in the sampling methods as used in the past with the result that a new collection and analysis procedure is now being employed. This new method was adopted from a proven procedure utilized by the Analytical Laboratory in their "SEVIN" work and it is hoped that it will serve as a dependable replacement for the old method. This adaptation was made possible only through the cooperative efforts of Mr. W. C. Ross, Mr. W. E. Bird, and Mr. P. F. Jenkins.

b. Questions relative to the health hazard of two inhibitors used at the Acrolein Unit, i.e., hydroquinone and phenothiazine, led to the initiation of an unsuccessful attempt to sample and evaluate the hydroquinone concentrations in air. The problems encountered in the analytical method have been corrected and plans for further study into this problem both at the Acrolein Unit and the new Acrylic Esters Unit are now in the making.

c. Chromium exposures in existence, in the #1 Catalyst Unit, have been initially re-evaluated, however, these findings will not be submitted in the form of a report until a second sampling program has been completed.

2. Gases and Vapors

a. Nitrogen dioxide exposures in existence, in the #1 Catalyst Unit, have been initially re-evaluated; however, these findings will not be submitted in the form of a report until a second sampling program has been completed.

b. Numerous complaints of the existence of disturbing concentrations of ammonia vapors in air in the Office Building promoted a short investigation into the problem of where, why, and how the material is released. A report will soon be forthcoming on this matter.

c. The periodic six-month check of 1-Naphthol vapor concentrations in air in the 1-Naphthol Department of the "SEVIN" Insecticide Unit has been completed and a report is soon to be released relating the findings.

d. Atmospheric mercury vapor concentrations have been evaluated in one section of the Laboratory. This investigation was conducted by Mr. A. Barthelmess through the use of a newly acquired "Beckman Mercury Vapor Meter".

C. Ventilation

1. The recent acquisition of very sensitive air measurement instruments, i.e., the "Anemotherm Air Meter", made it possible to obtain valuable data on the efficiency of ventilation systems in three different areas of the plant.

a. Velocity measurements were obtained on the paint spray booth located in the Fluorocarbons Shipping Building. A report of this investigation will be submitted in the very near future.

b. Velocity measurements were obtained on the exhaust system in use at the #1 Catalyst Unit. This data was submitted directly to Mr. C. D. Miller for his direct use.

c. Velocity measurements of the Dispensary Building's ventilation system revealed a complete lack of air movement. It was later disclosed that this deficiency resulted from the presence of excessive quantities of materials deposited on the fan blades and on the screen attached to the exhaust end of the duct work. This problem is now being corrected and further measurements will be obtained when corrections have been completed.

III. Investigations, Evaluations, and Recommendations

A. Physical Stresses

1. Noise

a. Two noise surveys of the Acetone Unit were conducted and reported on. In the first case, the entire unit was evaluated in relation to the "Hazard to Hearing" of one operator. In the second case one specific type of noise, i.e., that being produced once a week for continuous periods of about 36 hours, during periods of "Catalyst Reactivation", was evaluated. This problem has been corrected.

b. The entire "Gas Cracking and Compression Departments of the Olefins Area" was surveyed and evaluated for hazards to hearing. This included each of the four separate buildings which comprise the Gas Cracking and Compression Departments, i.e., Gas Compression, Furnace, Air Compression, and Wulff Furnace. All data, evaluations, and recommendations were submitted to all concerned persons in final report form with each hazardous area being identified.

c. The new "Oxygen Plant" was evaluated throughout for all hazards to hearing. All data, evaluations, and recommendations were then submitted to concerned persons in a final report form with each hazardous area being identified.

d. The #1 Dowtherm Unit was surveyed for hazard to hearing of all persons working around and on the furnaces. All data, evaluations, and recommendations were also submitted in final report form to all concerned personnel, with each hazardous area being identified.

e. A joint "Acoustical Survey" of the Plant Cafeteria was conducted with members of Mr. E. C. Harry's Olefins Engineering Staff. A report of all findings and recommendations was submitted in its final form and corrections were soon partially initiated and the remainder will be completed in the near future. After completion, further measurements will be made.

2. Radiation

a. A routine six-month follow-up survey of one Strontium-90 sealed source was conducted and reported on in accordance with both the A.E.C. and Company requirements.

3. Lighting

a. A lighting problem in the Plant Mail Room was investigated, evaluated and reported on. The problem, stemming from the intense lighting system used on a "XeroX" machine, has been corrected in accordance with submitted recommendations.

B. Chemical Stresses

1. Dust

a. A second dust survey was conducted in the Construction Insulation Fabrication Shop for the purpose of evaluating three new insulation materials. These materials were produced by the Johns Manville Company as possible substitutes for their "Thermobestos" material which had been condemned by an earlier survey as being hazardous to health when processed with band saws. All data, evaluations, and recommendations were submitted to concerned persons in a final report form revealing the inadequacies of the material in relation to health.

C. Miscellaneous

1. The protective clothing program in use at the Coal Hydrogenation Unit was evaluated at the specific request of Mr. D. G. Hulett. This evaluation was actually carried out by examining all clothing for any fluorescent contamination with an ultraviolet lamp and then by comparing all findings in accordance with predetermined procedures. A report of all data, complete with recommendations, was issued to all concerned persons.

2. A resumé of the toxic properties and recommended safe handling procedures for "Dibutyl Carbitol" was submitted to Mr. Thomas B. Howard, Jr. (an employee of the Electron Tube Division of R.C.A.).

3. A resumé of the toxic properties and possible safe handling procedures for both "Hydroquinone" and "Phenothiazine" was submitted to Mr. P. G. Schrade upon request. Mr. Schrade was, at this time, assigned to the Acrolein Unit.

4. Mr. J. B. Chenoweth, Safety Director for Goodrich Gulf Corporation, was introduced to our benzene sampling program and our philosophy in relation to this problem. This was conducted in an effort to help Mr. Chenoweth in his approach to a new problem at his plant.

5. An explanation of industrial hygiene, i.e., what it is, where it is used, why it is needed, and how it is carried out, was given during an orientation meeting for newly-hired technical personnel in conjunction with an explanation of the Toxicology Program given by the Plant Medical Director.

6. A resumé of an "Industrial Defense Course" given at the Technical Center by Mr. A. L. Keyser, of the W. Va. Department of Civil Defense, was submitted to all interested persons.

7. Minutes of an Industrial Hygiene Seminar on Noise, as conducted at the Technical Center by Mr. N. H. Ketcham, were submitted to all interested persons.

IV. Projects to be Instituted

A. Physical

1. Noise

a. A complete evaluation of the noise problem in Construction Shops.

b. An evaluation of the noise problem at the Glycol Unit.

c. An evaluation of the noise problem in the Maintenance Welding Shop.

d. An evaluation of the noise problem in Fluorocarbons Shipping.

B. Chemical

1. Dusts and Fumes

a. An evaluation of safe respirators for use in atmospheres contaminated with "SEVIN" Insecticide dust.

b. An evaluation of the hazard to health at the Acrylic Esters Unit resulting from the handling of three inhibitors, i.e., hydroquinone, monomethyl hydroquinone, and phenothiazine.

2. Gases and Vapors

a. An extensive sampling program for the evaluation of the benzene exposure at the Coal Hydrogenation Plant.

b. An evaluation of the hazard to health resulting from ammonia exposure in the Mailroom.

c. A study of the vanadium pentoxide hazard at the Phthalic Anhydride Unit.

d. An evaluation of mercury vapor hazard in the Maintenance Instrument Shop and the Works Laboratory.

e. An evaluation of the phenol, acrolein, TDI, trichloroethylene, and propylene oxide hazard at the Polyols Unit.

C. Ventilation

a. An evaluation of the ventilation system in the Works Laboratory.

b. An evaluation of the ventilation system installed on the "SEVIN" Insecticide bagging equipment.

c. An evaluation of the exhaust facilities in the Safety Department's Supply Room.

D. Air Pollution

a. An evaluation of all accumulated sampling data.

Submitted by: R. E. Peele

R. E. Peele
Industrial Hygienist - Plant 512

REP:gl

27 August 1962

UC 143-2

TECHNICAL CENTER

UNION CARBIDE — INTERNAL CORRESPONDENCE

UNION CARBIDE CHEMICALS COMPANY • SOUTH CHARLESTON 3, WEST VIRGINIA

To (Name) Mr. N. H. Ketchom
Company TECHNICAL CENTER
Location

Date September 26, 1962
Originating Dept. Medical Department
Answering letter date

Copy to Earl M. Best, Jr., M.D.

Subject Industrial Hygiene Report - January 1962 through June 1962

Dear Mr. Ketcham:

A majority of the items shown in this report were performed during the period January through April, with some work done on request during May and June.

Mr. J. D. Cavender performed the assigned duties of an Industrial Hygienist until May 1, at which time he returned to the Research and Development Department's Industrial Hygiene Laboratory.

The following investigations, surveys, etc. were made upon request of supervision, medical department, and engineers associated with the job.

Radiation:

The use of radioactive materials is increasing. These materials are used in the form of sources (encapsulated substances and foils) and tracers (tritium, carbon ^{14}, iodine ^{131}, gold ^{196}, etc.). (a) A total of sixteen radiation survey meter calibrations and twenty-one source surveys were made as required for personnel protection by the Atomic Energy Commission and/or the "Manual For The Use of Radioactive Materials" at the Technical Center. (b) An inventory of the sources was attempted at the source storage vault in the mainland powerhouse stack. Persons responsible for source storage initiated a procedure to improve the numbering and accountability system for all sources in addition to meeting the requirements of the AEC. (c) Samples for activity determination were prepared from the well water at the Radiation Facility in Building 722. The results were well within the limits established by the AEC.

Agriculture Chemicals:

Building 709 has a dusty operation using various insecticides. On one occasion three employees reported illness associated with the materials. The eight samples taken showed results from ten to several hundred times the MAC of 0.1 milligrams per cubic meter for a comparable compound. Full face, air supplied respirators were recommended. A new unit with good ventilation is planned for this operation in the near future.

Tolylene Diisocyanate:

Surveys were made in the following areas:

Building	Remarks
770-159	Periodic surveys were made. Twenty-five air samples were taken and the results indicated the concentrations were high. Corrections on equipment were made and resurveys showed results below the MAC of 0.02 ppm.
701-319	Periodic surveys are required due to changes in equipment design. This is scale model equipment assembled in a laboratory hood.
707	Samples were taken and analyzed for TDI, phosgene, dichlorobenzene and tolylene diamine. The trench behind unit 707 was the source of the irritant.

Mercury:

Surveys were made in several buildings for mercury vapors of the breathing level and on floors and work benches. The MAC is 0.1 milligrams of mercury per cubic meter of air for 8 hours exposure.

Building	Remarks
61-2	Additional cleaning of a spill was effective.
61-4	A survey was requested to determine effectiveness of clean-up of spill. Additional cleaning was needed and resurvey showed the area was free of mercury vapors.
421	Routine surveys are made to determine contamination level in this area resulting from spills and tracking mercury from spillage in building 422.
701	Surveyed after clean-up of a spill. Readings indicated that breathing level was free of mercury vapors and very few vapors were on the floor and work tables. This spill was cleaned by dry technique due to humidity control within the room.
740	A survey requested after clean-up of spill showed area was free of mercury vapors.
2244	Routine surveys are made as result of spillage in this building.

Rocket Fuel:

Attempts were made to identify the irritant or irritants that caused discomfort to personnel in building 775. No specific material was identified as being the causative agent. The difficulty was resolved by installing a filter system and providing additional ventilation.

Beryllium:

A limited amount of beryllium work was done in a drybox and hood in building 770. Investigations were made and the results showed this operation to be satisfactory.

Lead:

Compounds that contain lead were used in building 770. Procedures related to the analysis of lead in air, blood, and urine have been established for this material. Results were within the normal limits.

Carbon Monoxide:

The carbon monoxide analyzer located in building 2244 required checking and calibrating. This instrument has proven valuable to operating personnel in this area.

Nickel Carbonyl:

The MSA $Ni(CO)_4$ analyzer used in work associated with the acrylic acid unit was calibrated and kept in operating condition. Urine specimen were analyzed for nickel and the results were within normal limits.

Operation of this unit wos discontinued in March.

Miscellaneous:

Complaints of headache, lack of oxygen, heat, etc. were made by personnel working in building 720, rooms 15B and 16B. The investigation, on the following work day, showed an oxygen content greater than nineteen per cent and the heat was not excessive because ovens in which the materials are heated and cured were ventilated or hooded.

Very truly yours,

Fred Williams

Industrial Hygienist

F.Williams/ebc

UNION CARBIDE CHEMICALS COMPANY
South Charleston Plant

Industrial Hygiene and Sanitation Progress Report
January 1 - June 30, 1962

This is a brief summary of the essential activities in the Industrial Hygiene and Sanitation Program at the South Charleston Plant. The 104 projects were planned and scheduled: (1) to recognize potential health hazards in the plant operations; (2) to evaluate them; and (3) to control these hazards. The jobs listed as special denote requests from production supervision to evaluate recognized or suspected problems.

Number	Projects	Regularly Scheduled	Special Requests
13	Sound Studies	3	10
39	Sampling of Gases and Vapors in Air	9	30
5	Sampling of Dusts in Air	0	5
8	Promotional and Training Projects	0	8
4	Ventilation Problems	2	2
25	Radiological Health Studies	25	0
10	Sanitation Projects	4	6
104		43	61

SOUND STUDIES:

To evaluate the risk to the hearing of employees, 12 noise studies were undertaken. Of these 12 potential problems, shop orders have been issued to provide engineering control work in six of the locations. The status of these jobs is as follows:

SOUND STUDIES (continued):

Building and Location	Noise Problem	Status
Plant-wide Study Plant 514	To obtain sound level data for determining where protective measures are indicated.	Completed over-all sound level measurements - 336 plant buildings. Sound levels exceed 85 db. in 88 buildings.
402 - No. 3 Gas Separation	Isolate the fan noise from the unit heaters and to determine by octave band analysis if sound levels in operating control would be classified as detrimental to hearing.	Location was classified as not detrimental to hearing. Shop Order was cancelled.
319 - Maintenance Tank Car Shop	Evaluate the exposure of the Tank Car Repairmen during caulking operations inside and outside the tank car. Inside tank car - 114 db.; outside, 90-98 db.	Ear protection recommended.
400 - No. 3 Gas Furnaces	Reduce the noise exposure of the employees from present 91 db. to below 85 db.	Shop Order issued to enclose the control area with a sound and heat resistant structure.
12 - Mainland Steam Power Plant	Reduce the vibrating surface at the base of the turbo generator and to reduce the average low frequency sound level (75-150 cps) from present 109 db. to 90 db. or lower.	Shop Order issued to apply Tectum acoustical material to generator foundation.
152-2 - Resins Department	Isolate the noise from the Air Conditioner located in the office area. Annoyance problem - 70 db. to 61 db. or lower.	Shop Order issued. Under study.
152 - Suspension "Vifyl" Resin Unit	Suppress the sound around the two Raymond Mills and the Hydraulic Pump Area, and to reduce the high sound frequency (300-600 cps) of 97 db. to 85 db. or lower.	Shop Order issued to mount enclosures around the Mills and the pump.

SOUND STUDIES (continued):

Building and Location	Noise Problem	Status
145 - Ketene Furnace Room	Evaluate the noise levels around four gas furnaces. Exposure time limited to 110 and 3.5 minutes in zones with sound levels of 91 db. and 96 db.	Ear protection is recommended if maximum exposure time is exceeded.
151 - Island Power Plant, Coal Loading Area, Locomotive Shed	Evaluate the Car Loaders' exposure to 111 db. while the Coal Shaker is "on", and to evaluate the Operators' exposure to 99 db. in the boiler room of the Locomotive Shed.	Ear protection recommended if maximum exposure time of the Coal Loader exceeds 1 1/3 minutes and the Boiler Operator 18 minutes.
175 - Water Pumping System Unit	Evaluate the operators' exposure to sound levels in the range of 86 to 93 db.	Ear protection recommended if maximum exposure time exceeds 350 minutes in 86 db. zone and 74 minutes in 93 db. zone.
123 - Ethanol Acid Unit	Reduce the disturbance in the Karbate Strut Separator. Sound intensity at the source is predominate in the 600-1200 cps octave. Complaints received from community areas showed sound intensities of 62 db. in this octave.	Increased the strut area and reduced the velocity of air flow. No problem at present as complaints at the community level have ceased.
413, 414, 423, 428, and 429 - Polyethylene Unit	Evaluate the hearing risk to the employees where the average sound intensity in the critical bands (300-4800 cps) is 93 to 100 dbs.	Engineering control is not feasible at this time. The wearing of ear plugs is required in these areas.

The noise problems in Buildings 25, 41, 74, and 75, Gas Separation No. 2, are still being studied.

SAMPLING OF GASES AND VAPORS IN AIR:

Of the 39 air sampling studies undertaken, 30 were requested by production supervision. The investigations and the corrective action taken to prevent or control these hazards are outlined as follows:

Nickel Analyses of Air Samples and Urine Samples:

This work which began April 26, 1960, in support of the Research and Development Department's Acrylic Acid Pilot Plant was completed on March 15, 1962.

Mercury Vapor in the Atmosphere:

Air analyses were made for mercury vapor at 13 locations. In the Mercury Recovery Room, Building 180, where mercury is cleaned, the concentration at the breathing zone exceeded the "Threshold Limit Value" of 0.1 mg. Hg./M^3. Engineering control measures were recommended. In the other 12 locations tested, the average concentration of mercury vapor at bench-top and floor level was 0.4 to 0.6 mg. Hg./M^3. These concentrations were reduced to less than the threshold limit value through a concentrated good housekeeping program.

Perchloroethylene, Ethylene Dichloride, and Ethylamine Vapors and Ozone Gas and Welding Fume:

Shop Orders were issued to provide ventilation measures to control these vapors and gases in the working environment.

Building and Location	Gas, Vapor, and Fume Problem	Status
7 - Chlorohydrin Unit	Concentrations of ethylene dichloride vapor from the process system were greater than 370 ppm at breathing zone.	Shop Order issued to replace wooden floor above operating level with grating to afford better ventilation.
416-2 - Quality Control, Polyethylene Laboratory	Concentrations of ethylamine from extruder process were 30 ppm at breathing zone.	Shop Order issued to install gravity feed exhaust hood over the extruder.
137-B - Quality Control Microscopy Room	Concentrations of ozone gas from Xenon light source were reduced from 0.3 ppm to 0.03 ppm at breathing zone.	Shop Order issued to install local exhaust system. (Job completed)

Building and Location	Gas, Vapor, and Fume Problem	Status
307 - Maintenance Weld-Shop	Welding fume outside the welders' helmet showed mean concentrations of 134 mg./M^3	Shop Order issued to install ventilation system.
307 - Maintenance Electric Shop	Concentrations of perchloroethylene vapor from spraying motors and parts were reduced from 200 ppm to to 20 ppm at breathing zone. Lower toxicity levels at the breathing zone were obtained by using 1,1,1-Trichlorethane but this degreaser did not prove to be an effective cleaner.	Shop Order issued to install an additional wall type exhaust fan. (Job completed)

Ozone Gas in Air:

This study was made to determine the concentration of ozone gas in the Power Plants Precipitator Control Rooms, Buildings 47, 181, and 214. The concentration of ozone gas at breathing zone was in the range of 4.7 to 11.9 parts of gas per million parts of air, by volume. The "Threshold Limit Value" for ozone gas is 0.1 ppm. These data are being studied and a final report will be issued at a later date.

Oxygen Deficiency or Excess in Air:

Samples were obtained to determine the oxygen deficiency or excess in the Butadiene Fore Column, No. 2 Gas Separation, Building 41. The test results showed a safe working atmosphere for the Maintenance Department employees who were in the process of cleaning the Fore Column.

Hydrogen Cyanide Gas in Air:

A Tank Truck which had contained Lactonitrile was tested for hydrogen cyanide gas and the sampling results showed a concentration of 2 ppm. After the steaming and purging operations were completed, the samples showed concentrations to be less than 2 ppm, which was considered safe to release the tank truck to the transportation company.

Phosgene Gas in Air:

Samples were obtained to determine the phosgene gas concentration during a batch process run of methyl isopropyl phenyl carbamate (Insecticide 10854). All samples showed the phosgene gas concentration to be less than the "Threshold Limit Value" of 1 ppm. The facts that there were no complaints of $COCl_2$ gas by the employees during the run and that the Aromil Detector Crayon did not indicate the presence of $COCl_2$ gas show, from the health standpoint, safe working conditions.

Ethylene Oxide Vapor in Air:

As part of a plant-wide study now in progress to determine the ethylene oxide vapor concentration in the working environment, the exposure areas were continually evaluated. The concentrations of ethylene oxide detected in the breathing zone of the workers were 20 to 600 ppm. Of course, these exposures are of a short duration. A final report is to be issued.

Lead Fume in Air:

Nine air samples were taken to determine the concentration of lead fume at the breathing zone during three different lead burning operations. The study showed the concentration of lead fume to exceed the "Threshold Limit Value" of 0.2 mg/M^3, when lead burning operations were restricted to confined areas. It was emphasized that the ventilation unit be placed as near as possible to the work.

Acetic Anhydride Vapor in Air:

Samples were collected to determine the concentration of acetic anhydride vapor as the chemical was being pumped to a tank car. The breathing zone concentrations were in the range of 0.96 to 17.6 ppm. The "Threshold Limit Value" for acetic anhydride vapor is 5 ppm. The employees' exposure is of short duration.

Diethylamine Vapor in Air:

Diethylamine vapor was discovered in the valves being cleaned in the Safety Valve Shop, Building 61-2. The concentrations were slightly below and equal to the "Threshold Limit Value" of 25 ppm. Supervision instructed the repairmen relative to the precautions to be taken in case of a similar incident. Definite provisions are being made made for either outside cleaning facilities or forced, and adequate, ventilation, or perhaps both.

Methanol Vapor in Air:

Air samples obtained during the drumming of 50-gallon and 5-gallon containers of SD-3A-190 Proof denatured alcohol containing 10 per cent methanol showed concentrations of methanol vapor at breathing zone to be twice the "Threshold Limit Value" of 200 ppm. The leaks on the filter and valve of the drum filling line were repaired, after which the concentrations were found to be below the threshold limit value.

Industrial Hygiene and Sanitation Progress Report - 7

The following air sampling work has been completed and final reports will be issued:

Building and Location	Sampling Conditions	Concentrations [1]
220 - Utilities Department	Tank Car containing ethylenediamine being purged with steam.	40 - 50 *TLV - 10
156 - Fine Chemicals	Phosphorus oxychloride vapor from scrubber system.	< 20
80 - Shipping Department	Drumming propylene oxide.	<10 - 75 *TLV - 100
80 - Shipping Department	Drumming ethylene chlorohydrin.	<10 *TLV - 5
200 - Alkylamines Unit	Production of acetonitrile.	<20 *TLV - 40
82-B - Office Printing Room	Cleaning printing rolls with fluid containing perchloroethylene.	<20 - 85 *TLV - 200
107-B - Quality Control Foam Lab.	Production of urethane foam. (Toluene diisocyanate vapor)	< 0.01 *TLV - 0.01
111 - Refinery Unit	Pump room handling "Dripolene" products containing benzene.	<10 - 30 *TLV - 25
107-1 - Quality Control, Refinery Lab.	Analytical work with Refinery products containing benzene.	<10 - 20 *TLV - 25
Atlas and Rex Warehouses	Fork-Lift gasoline trucks. (Carbon monoxide vapor)	20 - 40 *TLV - 100

1 - Concentrations at breathing zone in parts per million
*TLV - Threshold limit value

SAMPLING OF DUSTS IN AIR

Community Air Pollution Studies:

In the continuing valley-wide study analyses were made of samples collected with the high-volume samplers at these control points: Blue Creek, Alloy, and the South Charleston City Fire Department.

In addition, analyses were made of the particle fallout samples from inside the plant and community areas surrounding the plant. The particle matter in the atmosphere ranged from 18 to 660 tons per square mile per month, which is comparable to that measured during this period in 1961.

"Vinylite" Resin Loss:

The "Vinylite" resin loss was measured from the discharge stream of the baghouses in Building 190. The Staplex Sampler now in use is considered to be satisfactory for collecting the resin dust, however, a cyclone type sampler was recommended to give a more representative isokinetic sampling condition.

PROMOTIONAL AND TRAINING PROJECTS

I attended meetings relating to management information and general Industrial Relations activities.

An instruction booklet on the Radiation Protection Program was prepared and issued to "users" of radiation sources in the plant, and will become a part of the standard job procedures for the operating personnel.

At the request of Dr. H. F. Smyth, Jr., Mellon Institute, a special report was prepared and issued covering the amount of "Sevin" Insecticide the men actually inhaled during the handling operations at the South Charleston Plant.

The Production Units requested and received Hygiene and Toxicity Data on the following compounds:

Navee-42 - Degreaser	Glycidyl acrylate
Diketene	Adipic acid
Isophthalic acid	Ethylene chlorohydrin
Hydrogen sulfide	Insecticide 10854
Insecticide 8305	Propionic acid
Valeric acid	Dichloroethyl ether
Ethyl acetate	Silver catalyst

Mr. N. H. Ketcham, Industrial Hygiene Consultant, requested a list of the industrial hygiene equipment available at the South Charleston Plant. This was done.

I completed three Home Study Extension Courses, two from Columbia University, "Radiation in Industry" and "Industrial Hygiene in Industry", and one from the U.S. Atomic Energy Commission, "Radiation Safety".

A one-day meeting on "General Sanitation" was attended as part of the annual West Virginia Public Health Association Meeting held June 8, 1962 at the Hotel Frederick, Huntington, West Virginia.

A one-day course, "Industrial Defense Preparedness" was attended at the Technical Center. This course was designed to teach the use of civilian defense equipment to qualified persons in the valley plants who would then be prepared to use the equipment and report results with it in the event of an atomic emergency.

A two-day session of the Eighth National Analysis Instrumentation Symposium was attended at the Daniel Boone Hotel, Charleston, West Virginia, on May 1 and 2, 1962. Papers were presented dealing with such subjects as Gas Chromatography, Instrumentation Needs in Biology and Medicine, Radiation and Laboratory Methods of Analysis.

At the request of the Research and Development Department, a list of 25 compounds was submitted to add to the 18th edition of the Tables of Physical Properties.

VENTILATION PROBLEMS

Ventilation Systems Installed and Evaluated:

Design consultation was provided for an additional drum-loading station at the Shipping Department, Building 303. This installation will provide a drum-filling booth for handling 50-gallon drums of toxic chemicals.

A gravity feed exhaust hood was installed on the flat extruder at the Polyethylene Quality Control Laboratory for handling ethylamine vapor.

A local exhaust system was installed on the Spectroscope Xenon light source which emits Ozone Gas.

Shop Orders were issued to the Works Engineering Department for improving the ventilation in the Welding Shop, Building 307, and in Building 82 Underpass.

The ventilation system at the Island Power House, Building 151, and Gas Separation No. 3 Furnace Rooms were evaluated and recommendations submitted for improvements of the system.

RADIOLOGICAL HEALTH STUDIES

There are 25 radiation sources in use and 11 in storage at the South Charleston Plant that are subject to the safety provisions stipulated in the AEC licenses. In addition, there are 14 radiation sources in use and 59 in stock that are not subject to AEC control. The following work essential to the legal and safe use of these devices is summarized as follows:

1. Fourteen radiation sources were inspected and tested in compliance with the AEC requirements applicable to the devices.

2. Nine pieces of equipment emitting radiation in use and 59 pieces in storage not controlled by the AEC were tested and inspected.

3. The required records and reports on the radiation sources, and the required records of personnel exposure have been issued for permanent filing.

4. The Hazardous Work Permit was revised and issued to include pertinent information on radioactive sources, toxic vapors, and ventilation.

5. The Storage Vault containing Strontium 90, Cesium 137, and Radium 226 sources was monitored.

The above radiation work was done in cooperation with Messrs. E. E. Burton and C. F. Koch, Works Engineering Department.

SANITATION PROJECTS

Promotional and Training:

Mr. C. G. Copley, Sanitarian in Training, attended the annual meeting of The West Virginia Public Health Association held June 7, at the Hotel Frederick, Huntington, West Virginia. Mr. Copley joined our staff May 1, 1962.

On request, copies of our Building Service Manual were issued to a number of chemical firms throughout the country.

Sanitation Standards:

To assist the Committee on Standardization of Purchased Commodities, our Sanitation Supply and Equipment Manual was issued. It was indicated that there may be some problems in the areas of Different Specifications on Like Commodities, and Unrealistically Rigid Specifications.

Camp Sanitation:

Health and Safety Recommendations and a Sanitary Check List for the camp operation were issued to Mr. C. H. Cubbon, Division Head for Special Activities, for distribution to the camp staff. The camps (Cliffside, Camelot, and Carlisle) are surveyed periodically.

Food Service:

The two food service establishments (Plant Cafeteria, Building 314-2, and the Snack Bar, Building 82-10) and the two food service trucks were evaluated monthly. The 68 vending machines (milk, candy, tobacco, hot and cold drinks) were evaluated quarterly relative to food sanitation in general. These findings, with recommendations, were discussed with the respective managers and emphasis placed on storage, handling, and serving of food.

On request, the Plant Cafeteria dishwashing operation was evaluated and recommendations for improvement were submitted.

Recommendations to remodel the Snack Bar, Building 82-10, were reviewed and submitted for further consideration.

Drinking Water Supply:

The Plant drinking water fountains were evaluated and samples collected for bacteriological examination at spot locations. In two instances, the drinking water at Buildings 412 and 321 was found to be contaminated. A general overhaul of the fountains and a flushing out of the water lines eliminated the contamination.

Insect and Rodent Control:

As a supplement to the good housekeeping program, Rodenticide (corn meal plus Warfarin) and technical grade "Sevin" were distributed throughout the plant to control these pests.

Sanitation Evaluations:

On request, a number of the units throughout the plant were evaluated relative to cleanliness, order, and general repair, and the findings discussed with the respective department heads. To maintain a desired sanitation level, emphasis was placed on improved order and general repair. These improvements have tended to raise the cleanliness level.

GWFM
HHR
RM
GF
zile

INDUSTRIAL HYGIENE SUMMARY REPORT

July 1 - December 31, 1961

COMPILED BY N. H. KETCHAM
INDUSTRIAL HYGIENE CONSULTANT

RESEARCH AND DEVELOPMENT DEPARTMENT
UNION CARBIDE CHEMICALS COMPANY

DE 005104

Particularly Pertinent

During this report period three noteworthy trends developed. Of greatest significance, the programs in the Technical Center, and the Institute and South Charleston Plants responded in a highly commendable manner to the almost overwhelming volume of requested work. The newest of these programs, under the supervision of the Technical Center Medical Department, filled a long-standing and acute need. One especially important accomplishment was to bring the Technical Center departments into compliance with their AEC licenses for the use of radioactive materials. A continuing program to maintain that status of compliance is now in effect. The smaller plants also responded capably to their less numerous but no less important problems.

Secondly, there was evidence of an expanding utilization of the knowledge and experience gained by these plant programs as a sales tool in the increasingly competitive market. This is most encouraging, as it has long appeared to the writer that we were not making this potential sales aid available as effectively as could be expected.

On a less encouraging note, lack of personnel made it necessary for the Research and Development Department to seriously curtail the technical support normally given the plant programs. This was the result of transferring one man to the Nuclear Company and loaning another man to the Technical Center Medical Department. Effort is now being made to correct this deficiency by procuring the required staff.

N. H. Ketcham

N. H. Ketcham
Industrial Hygiene Consultant

NHK/dww
3-16-62

CONTENTS

TECHNICAL CENTER

(Period August 1, 1961 to January 31, 1962)

An industrial hygiene service was initiated for the Technical Center beginning August 1, 1961. The work was done by Mr. J. D. Cavender, under the supervision of Dr. E. M. Best, Jr., Technical Center Medical Director. The highly impressive quality, volume, and variety of the work is indicated by the following information abstracted from a thirteen-page report prepared by Mr. Cavender and Dr. Best.

One especially noteworthy accomplishment is described. This involved bringing all of the Technical Center departments into compliance with their AEC licenses for the use of radioactive materials. A continuing program to maintain that status of compliance is now in effect.

TOLYLENE DIISOCYANATE

Studies of the concentration of TDI in the air were made at six different locations. Hazardous concentrations were found in two of these locations. Recommendations were made and corrective actions were taken. Periodic testing of the air is being continued at five of the locations.

Investigation of a more sensitive analytical method for TDI was required when the "Threshold Limit Value" was lowered from 0.1 to 0.02 parts per million, by volume in air. Three possible techniques were investigated. One of these was found suitable and was used for the above studies.

PHOSGENE

Studies of phosgene in air were made at three locations. Hazardous concentrations of phosgene were found at two of these locations and corrective measures were suggested. Additional periodic air sampling has been scheduled.

ROCKET FUELS

The presence of an unidentified highly irritant airborne contaminant in the vicinity of solid rocket fuel production was studied. Considerable methods application work had to be done in preparation. No positive identification of the irritant material was made. Two logical possibilities were ruled out.

Studies concerning three other rocket fuel components known to be unusually toxic have been initiated, and are continuing. For security reasons, reporting of this work will be limited. Considerable continuing methods application work will be required in order to provide the project with the needed air analyses.

MERCURY

Sixteen air sampling surveys were made at 14 locations. Several of these studies revealed high concentrations of mercury vapor which necessitated corrective action. As a result of these

findings, a routine air sampling program for the most hazardous areas has been established.

NICKEL CARBONYL

Operation of the Acrylic Acid Pilot Unit required daily selection for analysis of urine specimens contributed by the operating personnel. One hundred and twenty-eight specimens were sent to, and analyzed by, the Quality Control Laboratory for nickel content. Two of these analyses were on an emergency basis to support or disprove clinical impressions.

The MSA "Billionaire" Analyzer, which records and serves as an alarm for nickel carbonyl concentrations in the air at the Acrylic Acid Pilot Unit, continued to require minor servicing and periodic calibration.

As a further check on the atmospheric nickel carbonyl concentration, three to five-day air samples were taken with air scrubbers. Sixty-four of these air samples were collected and given to Plant 514 Quality Control Laboratory for nickel carbonyl determinations.

1-NAPHTHOL

Ten days were spent early in the Fall assisting in a special air sampling study at the Institute Plant, as requested by Dr. R. J. Sexton. This was before Mr. R. E. Peele had assumed responsibility for the work at that location.

COBALT CARBONYL

A brief investigation was made of a possible cobalt carbonyl exposure of a Research and Development Department employee working at the South Charleston Plant. This was done in cooperation with Mr. B. L. Murray.

DICHLOROBENZENE

Air analyses for dichlorobenzene were obtained in two locations. Both of these are scheduled for additional study. Methods application work was required in preparation for sampling.

RADIATION

There are twenty-six radiation sources now in the Technical Center that are subject to the safety provisions stipulated in the AEC licenses. In addition there are numerous devices which emit radiation but are not subject to AEC control. These include radium sources and electronic equipment utilizing X-radiation. The following work essential to the legal and safe use of these devices is summarized as follows:

1. Eighteen radiation sources were inspected and tested in compliance with the AEC requirements applicable to the devices.

2. Twenty radiation survey meter calibrations were made. This work is done for the South Charleston and Institute Plants, as well as for the Technical Center.

3. Monitoring was provided when 1000 curies of Cobalt^{60} were installed at the Radiation Laboratory, Research and Development Department.

4. Assistance was given in monitoring a Strontium^{90} source in a gas chromatograph while the instrument was being repaired.

5. Twelve pieces of equipment emitting radiation not controlled by the AEC were monitored.

6. The required records and reports on the radiation sources, and the required records of personnel exposure have been issued for permanent filing.

CARBON MONOXIDE

Continuous air analyzers were installed and used in two locations. In each location one alarm was given by the analyzer, indicating an excessive concentration of carbon monoxide. Recommendations were made and corrective action was taken.

"LEAKING" RADIUM SOURCES IN MSA "BILLIONAIRE" PHOSGENE AND NICKEL CARBONYL ANALYZERS

In connection with work done on both the phosgene and nickel carbonyl analyzers, it was found that the radium foil sources "leak" a potentially hazardous amount of radium and/or radon daughter products. These radium sources must be cleaned periodically to insure proper operation of the instruments. Instructions have been given to insure that this is done only by someone fully aware of the hazard and qualified to do it safely.

HYDROGEN CYANIDE

Several locations where hydrogen cyanide is used have been identified. Air sampling will be initiated at an early date.

AGRICULTURAL CHEMICALS

Special studies have been requested in locations where potentially hazardous insecticides, miticides, nematocides, etc. are being handled. Little progress has been made in starting this work.

PILOT PLANT OPERATIONS

A list of employees working with pilot-scale equipment and two or more of a group of ten potentially hazardous chemicals has been received. Air sampling should be done in several of the locations involved. Little progress has been made in starting this work.

SOUTH CHARLESTON PLANT

The following information was taken from a seven-page summary report written by Mr. B. L. Murray. The program at the South Charleston Plant continues to reflect an extremely large volume and variety of requests for industrial hygiene services. Laboratory work in support of the program is done by the Quality Control Laboratory. Increasingly valuable participation by the Works Engineering Department is being made in the areas of noise reduction, ventilation, and radiation instrumentation and protection.

During the period of this report, a formal definition and approval of the Plant's radioactivity protection program was accomplished. This included issuance of Plant Letter Number 390 in which specific responsibilities were defined. Also, during this period approval was granted for a revision of the Hazardous Work Permit to include pertinent information relating to radioactive sources, toxic vapors, and ventilation.

A total of 121 projects, as shown in the following table, were active. The column on the far right marked "Special" denotes requests from production supervisors for work in support of their responsibilities

Number	Projects	Regularly Scheduled	Special
11	Sound studies	4	7
38	Sampling of gases and vapors in air	8	30
8	Sampling of dusts in air	1	7
12	Promotional and training projects	1	11
2	Ventilation problems	1	1
17	Radiological health studies	7	10
33	Sanitation	23	10
121		45	76

NOISE

Eleven noise problems were evaluated or are in the process of being studied to evaluate the risk to the hearing of employees. Of these eleven potential problems, shop orders have been issued to provide corrective engineering work in seven of the locations. A brief description is given below:

Bldg.	Location	Problem and Objective	Status
12	Mainland Steam Power Plant	To reduce the vibrating surface at the base of turbo generator to reduce the average low frequency sound level (75-150 cps) from present 109 db to 90 db or lower.	Under study

Bldg.	Location	Problem and Objective	Status
149	Dual Anhydride Unit	To isolate disturbance in the nitrogen blow-off system to increase recommended exposure time from 110 minutes to 480 minutes. Noise was 91 db in high frequency band (1200-2400 cps).	Piping covered with Fiberglas which reduced sound level to 74 db in employee exposure zone
152	Suspension Vinyl Resin Unit	To suppress the sound at the spray precipitator, No. 1 dissolver mill, and hydraulic pump areas to reduce the 300-600 cps band from 97 to 85 db or lower.	Under study
190 193	Dispersion Resin Unit	To provide soundproof enclosure on NoVo Screen in fluidizing system, to reduce the 600-1200 cps band from 97 db to 85 db or lower. It is desired to increase the recommended exposure time in the grinding rooms which is now limited to 0.2-0.4 minutes/day (without ear protection).	The Production Department may reduce the amount of grinding done.
416	Polyethylene Blending Unit	To isolate disturbance in air conveyor system to reduce the 2400-4800 cps noise from 98 db to less than 85 db.	Piping covered with flexible polyurethane foam insulation, 1-5/8" to 2-1/4" thick. Reduced sound level to 82 db in employee exposure zone.
430	Polyethylene Hot Processing Unit	Replaced shaker screen with whizzer drier and decreased the recommended exposure time from 350 minutes to 52 minutes.	This increase in noise was unexpected.
430	Polyethylene Hot Processing Unit	Steam reducer may be contributing significantly to the noise.	Steam reducer will be moved to another location.

The other four possible problems - Acetic Anhydride Furnace (Building 145), Chlorohydrin (Building 7), Island Powerhouse (Building 151), and Crotonaldehyde (Building 136) are still being studied.

AIR SAMPLING STUDIES

Of the thirty-eight air sampling studies undertaken, thirty were requested by production supervision. The investigations and the corrective action taken to prevent or control these hazards are outlined as follows:

Acetic Acid, Propylene Dichloride, and Ethylene Oxide Vapors in the Air: Shop Orders were issued to provide ventilation measures to control these vapors in the working environment.

Bldg.	Location	Vapor Problem	Status
Yard Area N Bldg. 149	Exterior Drum Filling Station	Vapors produced when filling 50-gallon drums with acetic acid. Concentrations of 8,000 ppm downwind.	Installed ventilation system on drum-filling line.
82	Underpass for Employees	Propylene dichloride vapors from pump room in underpass. Concentrations of 200 ppm were recorded at breathing level.	Under study
43	Mainland Shipping	Ethylene oxide vapors when filling, purging, and cleaning drums and cylinders. Breathing level concentrations were in the range of 50 to 200 ppm.	Under study

Ethylene Dichloride, Propylene Chlorohydrin, and Propylene Dichloride Vapors in Tanks: Two of the three tanks tested for toxic vapors had contained ethylene dichloride, and after a thorough cleaning and purging with air the concentrations were reduced to a safe level. The third tank had contained propylene dichloride and propylene chlorohydrin. After a thorough cleaning and purging with air the concentration of vapors at breathing level were reduced from 400 ppm to less than 25 ppm.

Carbon Monoxide Vapors from Fork-Lift Gasoline Trucks and Power Sweeper: These trucks and the sweeper, operating inside the Rex and Atlas Warehouses, were studied to determine the concentration of carbon monoxide vapors in the working environment. The samples obtained showed concentrations in the range of 20 to 80 ppm at breathing level. Although the concentrations of carbon monoxide vapor did not exceed the "Threshold Limit Value" of 100 ppm, it was emphasized that if the trucks or power sweeper were allowed to operate in confined spaces, respiratory protection would be advisable.

Mercury Vapor in the Atmosphere: Air analyses were made for mercury vapor at 10 locations. At breathing level, there were no concentrations which exceeded the "Threshold Limit Value" of 0.1 mg Hg/M^3. In the 10 locations tested, the average concentration of mercury vapor at bench-top level and floor level was in the range of 0.2 to 0.6 mg Hg/M^3. These concentrations were reduced to less than the "Threshold Limit Value" through a good-housekeeping program.

Benzene Vapor in Air: As a part of a plant-wide study now in progress to determine the benzene vapor concentrations in the working environment, five areas were evaluated. These areas included the Refinery; Gas Separation No. 2 and No. 3; Quality Control Laboratory, Building 107; and the Acetic Esters Unit, Building 146. Forty breathing level concentrations were determined, and of this number only seven exceeded the "Threshold Limit Value" of 25 ppm. The Refinery Area showed the greatest need for corrective action with benzene concentrations at breathing level in the pump room at approximately 60 ppm. The effort expended in keeping the pumps from leaking, instructions for operators to avoid unnecessary breathing of vapors, and the limited time the operators spend in this area (2 hours per day) are important factors in limiting the exposure.

Welding Fume in Air: Samplings of welding fume were made to determine the welders' exposure at the Maintenance Shop, Building 307. The samples obtained with the electrostatic precipitator, which measures the concentration of metallurgical fume outside the welder's helmet, showed a mean of 134 mg/M^3. To obtain representative exposure data, a welder's hood was fitted with a one-inch diameter aluminum filter holder which placed the filter immediately in front of the nose and mouth. Samples obtained by this method showed a mean of 24 mg/M^3. In the general shop area the concentration of fume was 8 mg/M^3 and 15 mg/M^3 for the electrostatic precipitator and the filter paper samples, respectively. The filter samples were collected on Millipore and fiberglas paper.

Hydrogen Sulfide in Air at Sewer Outlet: Twenty air samples were taken to show the concentration of hydrogen sulfide at breathing level during repair of a broken sewer line. The majority of samples showed concentrations to be less than the "Threshold Limit Value" of 20 ppm. In one instance the hydrogen sulfide concentration exceeded 500 ppm. Evacuation procedures were immediately put into effect and the area rechecked before maintenance work was resumed.

Carbon Monoxide in Air: This study was made to determine the concentration of carbon monoxide when electricians of the Maintenance Department were installing an inter-communication line in the trenches and through the basement areas of the No. 3 Gas Separation Unit. Twenty-five per cent of the samples showed concentrations of carbon monoxide in the range of 200 ppm. The "Threshold Limit Value" for carbon monoxide is 100 ppm. The workers were evacuated during these periods and rechecks were made before the maintenance work was resumed.

Hydrocarbon Vapor in Air: Samples were obtained to determine the concentration of hydrocarbon vapor in air at the Mainland Dispensary as a result of pungent odors coming from the sewer and drainline openings inside the building. The concentration of benzene vapor at the breathing level was 25 to 30 ppm. Other hydrocarbons found at the breathing level were recorded in ppm as: butadiene, 1200; butene, 1600; vinyl acetylene, 1000; cyclopentadiene, 70; isoprene, 170; pentene, 100; and pentane, 60. The source of the contaminant from the sewer was corrected and the vapor concentration at the Dispensary rechecked and found to be at a safe level.

Methane and Ethane Vapor in Air: A utility tunnel near Building 107 was tested before the employees entered to do repair work. The concentration of methane was 500 ppm and ethane 200 ppm. The test for oxygen deficiency was reported "safe".

Diethylamine Vapor in Air: Samples were collected to determine the concentration of diethylamine vapor in the Safety and Fire Protection Valve Shop while the men were cleaning and repairing valves. The results showed concentrations equal to the "Threshold Limit Value" of 25 ppm. Ventilation control measures were recommended.

Nickel Analyses of Air Samples and Urine Samples: This work was continued in support of the Research and Development Department's Acrylic Acid Pilot Plant. Nickel analyses were run on 110 urine specimens and on 70 air samples. The air samples were found to be below the "Threshold Limit Value" of nickel carbonyl. The urine analyses resulted in figures considered to be within the range of normal excretion values for nickel.

Community Air Pollution Studies: Analyses were made of samples collected with the high-volume samplers located at Blue Creek, Alloy, and the South Charleston City Fire Department which are control points in a continuing valley-wide study.

In addition, analyses were made of particle fallout samples from inside the plant and community areas surrounding the plant. The monitoring stations located inside the plant fences continue to show the heaviest fallout.

VENTILATION

Ventilation System Evaluated: Design consultation was provided for an additional drum-loading station at the Shipping Department, Building 303. This installation will provide a drum-filling booth for handling 50-gallon drums of toxic chemicals.

Ventilation systems are now being designed by the Works Engineering Department for handling ethylene oxide vapors at the Mainland Shipping Department, and for improving ventilation of the Building 82 underpass. A ventilation system was installed on the drum-filling line at one of the shipping stations handling acetic acid.

RADIATION PROTECTION

(This work was done in cooperation with Mr. E. E. Buxton, Works Engineering Department)

Special radiation warning signs to identify radioactive sources throughout the plant were issued and posted. These signs comply with the AEC definition of "standard" signs but also provide additional instruction or information. Upon request, a supply of these signs was sent to the Texas City and Whiting Plants.

Plant Letter Number 390 on the Radioactivity Protection Program was issued on November 29, 1961, defining the responsibilities involved.

The AEC-3 form "Notice to Employees" has been posted in restricted areas in the plant in compliance with a recent change in regulations by the Atomic Energy Commission.

A revised form was issued for recording positive and negative personnel dosimeter readings. These data are reported to the Medical Department on a calendar quarterly basis.

Nineteen supervisory personnel completed an in-plant, 16-hour training course entitled "Survey of Nuclear Fundamentals and Radioisotope Applications in Industry". Our contribution to this course was an explanation of the "Leak Test Procedure" and a discussion of "Biological Effects of Radiation".

The Hazardous Work Permit was revised to include pertinent information on radioactive sources, toxic vapors, and ventilation. The revised permit should be issued early in 1962.

SANITATION

Mr. B. L. Murray served as co-chairman of the American Management Association Workshop Seminar on "Organization and Management of the Company's Industrial Sanitation Program" held from December 13 to 15, 1961, at the Hotel Astor in New York City. This Seminar was given to managers of sanitation programs with the objective of examining the function of industrial sanitation and its place in an industrial manufacturing operation; its component parts; its management requirements; the training, supervision, and scheduling of its labor; its tools and materials; its method of cost control; and its identification to top management and integration with other plant functions.

During this reporting period numerous sanitation projects were active. These included work related to drinking water supply, food service, insecticide and rodent control, specifications for new facilities, and building inspections.

INSTITUTE PLANT

(Period September 25, 1961 - February 1, 1962)

The following information is abstracted from a four-page report written by Mr. R. E. Peele. The highly commendable progress made since Mr. Peele started work at the Institite Plant in September, 1961 is noteworthy. As in the past, the laboratory work essential to the support of this plant program was done by the Institute Plant Works Laboratory.

Mr. Peele comes to us with experience in the field of industrial hygiene, and with a year of graduate study at the University of Michigan School of Public Health. He reports to Dr. R. J. Sexton, Plant Medical Director.

NOISE

An informal demonstration at the Maintenance Shop served to provide dramatic evidence of the effectiveness of Fiberglas blankets in the attenuation of excessive noise. These blankets were wrapped around heat exchangers as tube bundles were being driven out with pneumatic hammers. Noise level determinations were not made.

A complete evaluation of the noise problem at the new Linde Oxygen Plant was carried out. A report is soon to be released.

A noise survey was conducted in the High Pressure Hydrogenation Department as a result of complaints of excessive noise levels in evidence since the installation of a new acetylene blowdown stack. This report alsc will soon be released.

The Construction Welding and Steel Fabricating Shops were visited with Dr. Sexton and observations made of the suggested survey for noise problems. Noise determinations will be made at a later date.

Numerous complaints about the disturbing noise levels in evidence in the Plant Cafeteria during the several regular daily periods of heavy traffic resulted in a decision to evaluate the acoustical properties of the room. This information was obtained through the cooperative efforts of Mr. E. C. Harry and his staff of the Olefins Company Engineering Department. A complete evaluation of this data and recommendations are expected soon.

RADIATION

Each of the four sealed radiation sources purchased under this Plant's AEC license have been completely surveyed, recorded, and reported in accordance with both the AEC and Company requirements.

"SEVIN" INSECTICIDE PROCESS

Samples of SEVIN dust in air, expressed as mg/M^3, are still being taken at weekly intervals in the SEVIN Insecticide shipping area. An evaluation of this data is now under way.

Continuous reading CO alarm devices (MSA Hopcalite cell and MSA infrared "Lira" analyzers) were considered for use in the CO section of the Synthesis Gas Unit of the SEVIN Insecticide Plant.

A special visit with Mr. T. L. Collins, Synthesis Gas Department Head in SEVIN Insecticide Area, was made to the South Charleston Plant to determine the progress accomplished by the Special Instrumentation Division in their modifications of the MSA "Billionaire" phosgene detector.

A complete atmospheric survey of the 1-naphthol concentration in evidence in the south structure of the 1-Naphthol Area of the SEVIN Insecticide Plant was conducted by this department at the same time that complete medical and physiological investigations were being conducted by Dr. Sexton and his staff. This study yielded atmospheric results substantiating those reported in the first survey of this unit.

1-Naphthol concentrations in the Acetone Unit were evaluated by this department as a result of backache complaints submitted by various operators in the unit. This report pinpointed the apparent cause of the complaints and recommended corrections for consideration by the unit head. The Medical Department is continuing with their special laboratory procedures, and after the recommended corrections in the unit have been completed further air analyses for 1-naphthol in air will be conducted.

INSULATION DUST

A complete dust survey was conducted at the Construction Insulation Fabrication Shop as a result of complaints of excessive dust concentrations produced when insulating materials are cut with standard band saws. This survey included determinations of the atmospheric dust concentrations in evidence during the times of work, as well as particle size analyses and free crystalline silica determinations which were carried out on the materials being processed. Chemical determinations for free silica were conducted in accordance with a method developed by Mr. N. A. Talvitie of the U. S. Public Health Service. Copies of this simplified chemical method will soon be circulated to interested parties.

HYDROGEN CYANIDE UNIT

Drager detector tubes were used at regular monthly intervals in revealing an indication of the HCN concentrations present in the Hydrogen Cyanide Unit. These have replaced MSA tubes used before this time. It is desired that more comprehensive daily air sampling coverage be provided by this office.

PERIODIC AIR SAMPLING

Monthly air sampling for benzene was continued in the #1 and #2 Styrene and Gas Separation Units. Air samples were taken monthly in the Fiber T Unit for acetonitrile analyses. Fly ash fallout was collected and measured monthly in various sites in the plant and in nearby community areas.

BROWNSVILLE PLANT

Information about efforts to evaluate noise problems at the Brownsville Plant was supplied by Mr. W. E. Warren. This is the first report from the newest addition to the Company's production plants.

PLANT-WIDE NOISE EXPOSURE SURVEY

Prior to the start-up of the Brownsville Plant, it was recognized that a noise problem would be experienced. The basis of this knowledge was the experience reported by the prior owners of the plant. The Oxygen Plant was the prime suspect.

In order to determine how serious the problem might prove to be, and what corrective action should be taken, arrangements were made with the Company's Industrial Hygiene Consultant to conduct a plant-wide noise exposure survey.

The survey was conducted late in the year. A comprehensive study, including all areas of the plant, was made and has been reported. The data indicates, as suspected, that a special problem exists in the Oxygen Plant and certain other locations. A program of audiometric testing and policies requiring the wearing of ear protection are under consideration.

TORRANCE PLANT

The industrial hygiene activities of the Torrance Plant during this report period were summarized by Mr. H. T. Olson as follows:

DRIPOLENE

Considerable work has been done in the past six months in dripolene loading. These studies were prompted by two cases of dizziness which occurred to shipping attendants while unloading tank trucks of dripolene. Tests were conducted and we found that all results were well within the maximum allowable concentrations.

Annual blood tests are now being discreetly given to all men who work in this area.

A benzene chemical data sheet has been prepared and is now included in our Hazardous and Reactive Chemicals Manual.

The Gas Separation area has installed an improved dripolene separator on the clarifier which appears to have alleviated the problem of dripolene vapors.

FURNACE BUILDING

A potentially hazardous condition in the furnaces in the Gas area has been alleviated by a nitrogen purge system. This permits the individual cracking set to be purged with inert nitrogen before it is opened for burn-out. There have been no flashes since this system has been put into use.

An infrared automatic gas analyzer which has decreased the number of orsats being run by 80 per cent in the Oxide area has been installed. This has reduced the handling hazard of acids, etc. considerably.

The vent hoods have been rebuilt over the orsats in the Gas Separation area in order to reduce the vapors. These revisions have proven very successful.

ANTI-FREEZE

During the past six months, one severe case of dermatitis and two other cases where there were indications of possible future trouble were noted in our Anti-freeze shipping area. It was discovered that mercaptobenzolthiazol, a component in one of our private brand anti-freezes, was causing this dermatitis. Test samples have now been purchased in a dustless form (a granular material coated with diethylene glycol). Early results show that this should reduce materially the exposure to the sodium mercaptobenzolthiazol dust.

NOISE

Noise studies were continued from the first half of this year. Additional noise level measurements were made in a number of locations in the residential area across Hawthorne Blvd. from the plant after the Oxide Unit was back in operation. In general, the

NOISE (Cont'd)

level was found to be approximately twice that determined during the shutdown. Traffic noise from Hawthorne Blvd. and other distinctive sounds made reliable readings very difficult. Conclusive data will require additional measurements.

Ear protection was recommended for certain noisy locations within the plant and was also provided for others who requested it. The wearing of ear protection has also been made mandatory in the Vicker's room of the Polyethylene area for persons who are in there longer than 20 minutes.

DUSTS

A sheetmetal barricade has been erected to prevent dry chemicals, such as lime, borax, etc., which are being dumped into the anti-freeze mix system from blowing into the adjacent work area where shipping attendants are working.

The Polyethylene area has changed its method of charging "Superfloss" to the mixer in the manufacture of masterbatch. The material was formerly premixed in an attempt to wet it, but this merely fluffed it up and made the area more dusty. Now, "Superfloss" is added directly by screw conveyors which has much improved the dust problem. Masks are still worn, however.

CUTTING OIL

Two machinists claimed they were being poisoned by our cutting oil used on lathes in the Machine Shop. After medical tests were taken and sent to the Los Angeles Poison Control Center, all results were negative and final investigation resulted in these men claiming these aliments were based on a dislike of oil of wintergreen, which is added to the cutting oil.

OXIDE UNIT

One operator in the Oxide Unit also claimed poisoning which was showing up in a rather severe case of dermatitis. After due investigation by our Medical Department, the dermatitis turned out to be fungus of a non-occupational origin.

PHYSICAL STRESS

An improved delivery system by the Storeroom, which has reduced the lifting and handling done by production operators, has been devised. This system now delivers drums on pallets or on unloading racks, whichever suits the production unit most conveniently.

A drum unloader, which minimizes back strains and spillages, has been purchased by the Chemical Shipping Department. It features a hydraulic method of raising and tilting a filled drum in order to unload its contents.

A trackmobile has been purchased by the Shipping Departments to reduce physical exertion in the movement of railroad cars.

PERIODIC AIR SAMPLING - Mercury, carbon monoxide, aromatic hydrocarbons

Frequent aromatic hydrocarbon, carbon monoxide, and mercury vapor determinations have been made in several plant locations. Where mercury is used, emphasis has been placed on good housekeeping.

EDUCATIONAL

Topics of the Month- in September the plant-wide safety topic of the month was Noise and Ear Protection. October had as a topic Your Health, which was based on the theme "A Healty Man is a Safe Worker". Outlines of the subjects were given to the safety meeting chairmen.

WHITING PLANT

Information about the industrial hygiene activities at the Whiting Plant was submitted by Mr. G. J. Klebs, as follows:

NOISE

During 1954, prior to the building of the Polyethylene Unit, a noise survey of the plant was conducted. A consciousness to the possibilities of excessive noise and related potentials has resulted in continued efforts to control or maintain safe levels or to provide personal protection if needed. Among sizeable projects since then completed, or in process of completion, are the erection of a sound-conditioned control room at the Gas Cracking Furnace Unit, revised shaker equipment in the Polyethylene Unit, and the construction of an audio testing room.

In December, 1961, a new plant-wide noise exposure survey was made with the assistance of Mr. N. H. Ketcham. This study included octave-band frequency analyses and estimates of personnel exposure times in the varying noise conditions. A report of this work is now being written by Mr. Ketcham.

RADIATION

Review and discussion was held by Mr. N. H. Ketcham and Mr. C. A. Smith concerning Atomic Energy Commission license requirements for testing and reporting in connection with instrumentation utilizing radioactive materials.

MERCURY - DRIPOLENE

Review and exploratory discussion have been conducted on the subject of mercury vapors and the recycled water skimming basin in the Gas Department.

TEXAS CITY PLANT

The following information was supplied by Mr. W. L. Pegues.

MERCURY CONTAMINATION IN PLANT EFFLUENT

The Vinyl Chloride Unit and Plant effluentswere again analyzed for mercury contamination during catalyst change at the Vinyl Chloride Unit.

NOISE

Environmental noise levels were determined at several locations in the plant.

ETHYLENE OXIDE IN AIR

Additional sampling and analyses were made at several locations in the oxide units for ethylene oxide concentrations in air.

COMMUNITY AIR POLLUTION PROBLEM

Periodic determinations were made of SO_2 in fume that originates in a neighboring plant and blankets the southeast portion of our plant occasionally.

IPP CATALYST

The possibility of phosgene production during laboratory synthesis of isopropyl peroxydicarbonate was investigated.

REMOVAL OF H_2S AND BENZENE VAPOR FROM H_2S SCRUBBER

Several checks were made at the time of iron oxide-woodchip removal from H_2S scrubbers to show the effectiveness of an improved pre-entry treatment. Volatile compounds were removed satisfactorily.

COBALT ANALYSES OF URINE SPECIMENS

Analyses of specimens from 54 Oxo Unit employees were begun near the end of 1961 and completed after the first of 1962. Analyses were in duplicate.

SEADRIFT PLANT

The following information about the continuing noise reduction efforts at the Seadrift Plant was supplied by Mr. J. H. Hill.

NOISE

An evaluation of the revised air compressor muffler installations completed in September shows an average over-all reduction in sound pressure level of three decibels. A three decibel rise was noted in the 20-75 octave, and an average drop of 6.5 decibels in the next three octaves. The installation was considered successful.

Preliminary readings for evaluating inspirator mutes in the Olefins No. 1 Furnace Building have been completed.

DISTRIBUTION

Brownsville Plant

Mr. H. B. Coons
Mr. W. E. Warren

General Safety and Fire Protection Department

Mr. V. V. Tilton

Technical Service Laboratory

Dr. A. B. Steele

Institute Plant

Mr. F. D. Bess
Mr. G. H. Daniels
Mr. L. N. Dickinson
Mr. R. A. Huber
Mr. R. E. Peele (3)
Mr. E. W. Poinier, Jr.
Mr. G. J. Ratcliffe
Dr. R. J. Sexton

Mellon Institute

Dr. C. P. Carpenter
Dr. H. F. Smyth, Jr.

New York Offices

Dr. R. L. Bateman
Dr. C. U. Dernehl
Mr. J. S. Freeman
Mr. E. E. Fogle
Mr. P. W. McDaniel
Dr. T. R. Miller
Mr. A. P. Moss
Mr. K. H. Rowland
Mr. O. C. Thompson (Bldg. 82)

Niagara Falls Plant

Mr. A. T. Anderson

Seadrift Plant

Mr. R. P. Barry
Mr. A. E. Bransford
Mr. J. H. Hill
Mr. J. J. Walthall

Texas City Plant

Mr. H. E. Allspach
Mr. O. T. Carlisle
Dr. R. E. Joyner
Mr. W. L. Pegues
Mr. W. J. Suiter

Torrance Plant

Mr. W. E. Knight
Mr. H. T. Olson
Mr. C. N. Rucker

Whiting Plant

Mr. G. O. Bunch
Mr. J. M. Elliott
Mr. P. C. Kelly
Mr. G. J. Klebs
Mr. C. A. Smith

South Charleston Plant

Mr. M. A. Aitken
Mr. H. L. Babcock
Mr. E. E. Buxton
Mr. B. R. Harper
Mr. W. F. Hartling
Mr. R. C. Hieronymus
Dr. E. Q. Hull
Mr. R. J. Murphy
Mr. B. L. Murray (3)
Mr. L. A. Roebke
Mr. W. W. TenEyck

Technical Center

Mr. R. M. Berg
Dr. E. M. Best, Jr.
Mr. J. W. Biddle
Mr. J. D. Cavender
Mr. P. W. Gregory, Jr.
Mr. E. C. Harry
Dr. F. Johnston
Mr. W. A. Katholi
Dr. J. V. Murray
Mr. J. W. Perry
Mr. H. E. Persinger
Dr. B. Phillips
Mr. L. J. Rogers
Mr. S. H. Rose, Jr. (2)
Mr. H. T. Sessions
Mr. W. J. Skraba