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INDUSTRIAL RELATIONS

INDUSTRIAL HYGIENE SUMMARY REPORT

Period July 1 - December 31, 1962

Brief descriptions of selected Company activities requiring or benefiting from industrial hygiene services are contained in this report. It is not a complete report of work done, as such a compilation would be impractically voluminous. By selectively summarizing the reported progress, an effort has been made to show the nature of the industrial hygiene services being provided, and to illustrate the role they play in today's diversified and competitive chemical production industry.

Successful pilot-scale production of a boron-containing rocket fuel and laboratory-scale work with a beryllium-containing propellant ---- need for a method of sampling air for a miticide of unusually great toxicity ---- completion of the monumental task of evaluating employee noise exposure in the entire South Charleston Plant ---- evaluation of the hazard to personnel and the potential public liability, and the community air pollution aspects of burning chemical residue at the South Charleston City Dump ---- these are subjects mentioned in the report.

A trend toward increased state control of certain environmental hazards is clearly evident. During this reporting period, the States of New York and Texas joined California in assuming responsibility for licensing and supervising the use of radioactive materials. New York State took over this responsibility from the Atomic Energy Commission on October 15, 1962. Texas and the AEC approved an agreement on December 27, 1962 to take effect March 1, 1963. California's legislation became effective September 1, 1962. State control is in some respects more stringent than AEC control. The states include radium and X-ray producing electronic equipment in their licensing and usage regulations, whereas the AEC did not. The states may be expected to inspect with greater frequency than the AEC is able to do.

A table identifying the encapsulated radiation sources in the possession of all Chemicals Company locations which are subject to AEC or state licensing and control is attached to this report. This is the first time a complete Company-wide compilation has been reported.

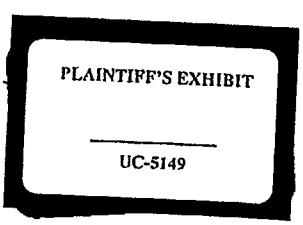
The State of California Department of Industrial Relations has completed plans to regulate noise levels in factories. If this is the start of a trend to be picked up by other states, some of our Chemicals Company locations will be vitally affected.

Submitted by:

N. H. Ketcham

N. H. Ketcham
Industrial Hygiene Consultant

NHK/dww
5-1-63



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CONTENTS

	Page
Technical Center	1-2
South Charleston Plant	3-4
Institute Plant	5-6
Texas City Plant	7
Niagara Falls Plant	8
Research and Development Department	
Technical Service Laboratory	9
Industrial Hygiene Laboratory, Technical Center	10-11
Publications and Professional Activities	12
Radiation Sources, All Locations	13-14-15

DE 005013

TECHNICAL CENTER

This information was taken from Summary Reports for the 3rd and 4th quarters of 1962, prepared by Mr Fred Williams, Technical Center Industrial Hygienist.

ROCKET PROPELLANTS Extensive efforts were required to cope with the potential health hazards associated with production of liquid rocket fuel. Contracted amounts of a propellant containing boron were produced without any serious exposure of personnel to boron hydride, a highly toxic by-product. Air sampling was done with Mine Safety Appliances Company hand-operated Boranes-in-Air Detectors.

Laboratory-scale production of another liquid fuel containing beryllium has been monitored closely. Equipment has been purchased for the extensive air sampling and surface inspections required to detect beryllium contamination when this work goes into larger-scale production in Building 709, early in 1963. Building 709 will undergo major rebuilding in preparation for housing the beryllium work.

Production of solid propellant has not been accompanied by any unusual health problems to date.

AGRICULTURAL CHEMICALS Occupancy of a new Agricultural Chemicals Laboratory, Building 728, has eliminated numerous hazards which resulted from inadequate space and facilities in the previous location, Building 709. Special precautionary efforts, including air sampling, were taken during the blending of methyl parathion. Careful advance planning is being made in anticipation of work with Compound 21149, an unusually toxic miticide.

Mr. Williams visited the Agricultural Research Station, Clayton, North Carolina, to become familiar with that part of the program and to initiate an industrial hygiene service for that location. Ventilation facilities and radiation protection were discussed specifically.

WASTE BURNING - SOUTH CHARLESTON CITY DUMP Intensive observations were made of the burning procedures required to dispose of chemical residues originating from Technical Center operations. This revealed serious hazards to Company personnel, potential public liability, and community air and water pollution problems threatening to result in legal actions. In cooperation with others, this problem was brought into focus and arrangements were made to have alternative methods of disposal evaluated.

RADIOACTIVE MATERIALS The use of radioactive materials continues to grow, thus requiring increasing effort to provide the relatively routine, but time-consuming, activity necessary for compliance with AEC requirements. At present, the Technical Center has 34 encapsulated sources licensed by the AEC and requiring periodic surveys. There are also 65 radium sources which must be kept under close supervision. In addition, during this report period Carbon^{14}, Tritium, and Gold^{189} were handled in unencapsulated form.

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TECHNICAL CENTER (Continued)

PERCHLORIC ACID EXPLOSIONS IN DURCO BLOWERS

Perchloric acid explosions have occurred in Durco Blowers resulting in injuries from the shrapnel-like parts of the fragmented blower. (This happened in AEC facilities.) For this reason, the Duriron Company has given us written notice that their blowers are not to be used in such service. A Duriron representative personally placed stickers with this warning on two hoods and blowers in Building 770 which had been designed for perchloric acid use.

HOT WATER MADE FROM STEAM WITH MIXING VALVES

Use of mixing valves to make hot water from steam and cold water has raised some questions about potential health problems. Additives in the steam, such as K-Gel, phosphates, soda ash, and Remox invariably preclude use of the resulting mixture for making hot drinks. The presence of some amine-type corrosion inhibitors in the steam could in some instances cause problems even when the hot water is used only for showers or lavoratories.

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ACL Doc 19639 · Page 4 of 18 asbestosclaims.law/library/19639/4

SOUTH CHARLESTON PLANT

This information was taken from a summary report for the 2nd half of 1962 by Mr. B.L. Murray, Plant Industrial Hygienist.

PLANT-WIDE NOISE SURVEY This monumental project of identifying plant locations that offer a potential hazard to hearing has been essentially completed except for formal reporting. In addition, in some locations where a hazard has been identified, further work needs to be done to reliably define the degree of risk. Two hundred and eighty-five units have been found to offer no noise hazard, and the responsible supervisors have been so advised. Work on this project has been in progress intermittently for five years.

During this six-month reporting period noise reduction engineering projects were completed at five locations, with gratifying results. The equipment and locations benefiting from this work were: Raymond Mills, Building 152-4; Air Conditioner, Building 152-2; B-4 Pump, Building 152; Micro Atomizers, Building 190; and Key Punch and Verifier Machines, Building 82-2.

Nine additional locations at which noise reduction is needed are now being given engineering study. Two of these are of special interest as they involve noise resulting from high-pressure water cleaning and from sandblasting.

PACKAGING AND LOADING STATIONS Drum filling, solids packaging, and car or truck filling operations are characteristically accompanied by health or discomfort problems. For this reason all such locations were surveyed and the health hazard or nuisance potential of the chemicals being handled were rated. The locations were: 13 tank car spots, 18 drumming stations, 1 canning station, 3 barge docks, and 4 cylinder filling locations.

COMPILATIONS OF TOXICITY AND SAFE HANDLING DATA Condensed information of this nature descriptive of seven products was supplied at the request of production supervisors. This is a service which is well received and is growing rapidly, as it seems to supply a real need on the part of production supervision. Assembling the information is in some instances quite time-consuming.

RESIDUE BURNING AT SOUTH CHARLESTON CITY DUMP The use by the Plant of the subject dump was observed on several occasions and air and water samples were taken. In cooperation with others, the need for improved disposal procedures was established. At the request of Mr. R. C. Hieronymus, representatives from the South Charleston and Institute Plants and the Technical Center have been given responsibility for further defining the problem and for evaluating alternative methods of residue disposal.

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SOUTH CHARLESTON PLANT (Continued)

VENTILATION OF WELDING SHOP Continued air sampling for welding fume has led to recognition of the need for increased ventilation as a means of improving employee comfort in the working environment. The ventilation engineering work is now in progress.

LEAD FUME Lead concentrations in air resulting from melting lead at the Maintenance Department Salvage Unit have been found to exceed the Threshold Limit Value at times. This study continues.

DE 005017

INSTITUTE PLANT

This information was taken from a summary report for the 2nd half of 1962, by Mr R E. Peele, Institute Plant Industrial Hygienist.

WASTE DISPOSAL AND SALVAGE OPERATIONS Complaints of respiratory irritation from smoke caused by burning residue from equipment in the salvage area were investigated. Problems associated with a number of other cleaning techniques used in the maintenance salvage area were also recognized.

The proposed use of the Fluorocarbons Unit limestone leaching pit for disposal of an HCl waste stream containing phosgene from the future Tolylenediisocyanate Unit was studied in cooperation with other interested persons. The proposed use was questioned as the break-through of phosgene to the air above the pit grating was demonstrated. Earlier studies had shown that normal operation of the leaching pit resulted in potentially hazardous concentrations of carbon monoxide within a few inches of the grating.

Undesirable working conditions resulting from removing slag from the floor of the aqueous waste incinerator were observed.

COMMUNITY AIR POLLUTION Numerous complaints of eye irritation (resembling that associated with Los Angeles smog) were investigated during a 7-day period in which temperature inversions and little or no winds were present for major portions of the day and night.

A complaint from the Ordnance Park Area of St. Albans about excessive fallout of flyash was studied. The flyash was submitted to chemical, X-ray spectrographic, and emission spectrographis analysis for identification purposes. Fallout data collected by the plant during the past three years was evaluated and the results submitted to the Plant Manager.

Although the Institute Plant does not now burn residue at the South Charleston City Dump, closely related problems do exist. Accordingly, considerable effort was made to evaluate these problems in the light of increasing public awareness of air pollution caused by open-pit and other inadequate methods of burning wastes and residues.

"SEVIN" UNIT BULK STORAGE AND CO SYNTHESIS Several illnesses resulted from efforts to manually unload bulk storage hoppers containing SEVIN. Air samples were taken for ethylene oxide, toluene, and SEVIN dust as part of the Medical Department's effort to identify the specific cause of the illnesses.

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ACL Doc 19639 · Page 7 of 18 asbestosclaims.law/library/19639/7

A comparison of the effectiveness of two types of respiratory protective devices as protection from inhalation of SEVIN dust was made in cooperation with the Research and Development Department's Industrial Hygiene Laboratory

A potentially serious exposure to carbon monoxide occurred at the SEVIN Unit synthesis gas area. The cause was found to have resulted from escape of carbon monoxide from a compressor being repaired. Ventilation was inadequate and is being corrected. Efforts to facilitate prompt installation of a MSA continuous CO analyzer are being made.

INTERFERENCE IN CO ANALYSES USING NBS DETECTOR TUBES — Experience at the Gas Separation Unit showed that ethylene and propylene interfere in the analysis of carbon monoxide with detector tubes containing National Bureau of Standards indicator (palladous sulfate and ammonium molybdate). Ethylene and propylene result in an erroneously high reading which cannot be distinguished from that due to carbon monoxide. Selection of a more suitable type of tube is in progress.

NOISE REDUCTION — Corrective actions have been taken to reduce the noise hazard in several locations. These include installation of mufflers on the converter exhaust stacks at the Acetone Unit, use of quieter inspirators on one burner at the #1 Dowtherm Unit, relocation outdoors of welding machines at the Welding Shop, installation of noise reduction devices on the Wulff Furnace in the Gas Separation Area, and reduction of noise exposure of personnel operating IBM equipment. Much of this successful noise reduction work was done with the assistance of the Vibration and Acoustics Group of the Special Instrumentation Department.

LIGHTING — A thorough survey of the lighting conditions in the Maintenance Welding Shop was made and recommendations were submitted.

INSULATION DUST — Studies of the amount of airborne dust resulting from fabrication (mainly sawing) of competitive insulating materials continued. Considerable interest in this work has been shown by Johns-Manville, one of the suppliers.

RADIATION PROTECTION — Study of an X-ray spectrograph located in the Works Laboratory showed need for additional shielding, which was installed.

INDUSTRIAL HYGIENE AND TOXICOLOGY INDOCTRINATION FOR NEW EMPLOYEES — A formal presentation for new technical employees was given with R. J Sexton, M. D., Plant Medical Director, to acquaint the personnel with these subjects.

DE 005019

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ACL Doc 19639 · Page 8 of 18 asbestosclaims.law/library/19639/8

TEXAS CITY PLANT

This information was taken from a letter report prepared by R. E. Joyner, M. D., Plant Medical Director

COBALT - OXO AREA Evidence of possibly excessive cobalt absorption by laborers cleaning filter presses used in the Oxo Area was observed. Approximately 35 urinary cobalt determinations were performed as part of the monitoring procedures in effect. . The exact source of the cobalt or route of entry into the body has not as yet been definitely established.

ETHYLENE OXIDE STUDY A study of exposure to ethylene oxid. has been concluded successfully. Clinical information and the measurements of ethylene oxide concentrations in the air in working environments are being evaluated. This work is a valuable contribution to the medical knowledge of low-level chronic exposure to ethylene oxide and is being prepared for publication.

ENTRY TO BARGE COMPARTMENTS The Plant Laboratories reported the use of Kitagawa Detector Tubes (No. 128b) for checking the acrylonitrile content of the air in barge compartments prior to entry during the latter stages of the cleaning process. The test is judged to be suitable for the purpose and is much cheaper and faster than traditional chemical tests.

TRACING PIPELINES WITH RADIUM Radium sources were used successfully to trace pipelines, using a technique initially explored by the Nucleonics Group of the Special Instrumentation Department, Olefins Company.

MERCURY VAPOR A Beckman Mercury Vapor Meter, Model 23, has been purchased and is being used successfully in identifying locations with comparatively high concentrations of airborne mercury. The exposure of personnel does not appear to be excessive, but continued observation is indicated.

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ACL Doc 19639 · Page 9 of 18 asbestosclaims.law/library/19639/9

NIAGARA FALLS PLANT

This information was taken from a letter from Mr. D M Rupert.

HYDROXYETHYL CELLULOSE PLANT Two especially noteworthy improvements were made in the working conditions at the hydroxyethyl cellulose plant. Exhaust ventilation equipment was installed to capture and remove large amounts of isopropanol vapor escaping into the operating area from nominally "vapor-tight" equipment. Efforts to stop the leakage had been unsuccessful

Installation of an exhaust system and bag collector resulted in substantial savings from the recovery of hydroxyethyl cellulose from a dumping operation. In addition, an unpleasant working condition and an explosion hazard were eliminated.

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ACL Doc 19639 · Page 10 of 18 asbestosclaims.law/library/19639/10

RESEARCH AND DEVELOPMENT DEPARTMENT
TECHNICAL SERVICE LABORATORY, TARRYTOWN, NEW YORK

This information was taken from a letter report from Mr. W. B. Leighton.

CUSTOMER SERVICES — Toxicology Studies Sheets prepared by the UCC Industrial Medicine and Toxicology Department are included regularly with standard storage facility specification and design reports supplied in response to customer requests.

Reports on the determination of low concentrations of ethylene oxide and ethyl acrylate in air were prepared for release to customers. The reports and procedures were based on work done by the Industrial Hygiene Laboratory of the Research and Development Department.

TOLYLENE DIISOCYANATE — Successful control of TDI vapor from foaming operations to meet the stringent Threshold Limit Value of 0.02 ppm was reported. Air sampling was done with a Mine Safety Appliances Company TDI Detector with the results verified by comparison with another colorimetric method.

The local exhaust hooding of the foam machine has been found adequate to meet the 0.02 ppm limit. Extreme care to avoid even minor spillage, and closed transfer of TDI from drums to feed vessels, has been found necessary. An Oberdorfer gear pump is used with negligible TDI leakage at 20-30 psig. The stuffing box is extra deep with the inner half occupied by a carbon sleeve bearing and the outer half containing conventional graphited asbestos packing.

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RESEARCH AND DEVELOPMENT DEPARTMENT
INDUSTRIAL HYGIENE LABORATORY, TECHNICAL CENTER

Mr N H. Ketcham

Work done in support of Plant and Technical Center programs included the following projects.

"SEVIN" DUST IN AIR Investigated methods for removing SEVIN dust from air, for air sampling purposes and for evaluation of respiratory protective devices. Evaluated the effect of the partial pressure of SEVIN vapor on the collection efficiency of cloth or paper filters, at the suggestion of the Chemical Hygiene Fellowship. Vapor was found to be a negligible factor.

METHYL "CELLOSOLVE" IN AIR Investigated the suitability of commercial combustible gas indicators (Davis M-6 and MSA Model 2) for detecting combustible concentrations of methyl CELLOSOLVE in air. Done for Bryton Chemical Company at the request of the Technical Service Laboratory. Report 92E-F26.

1-NAPHTHOL IN AIR Determined the collection efficiency of the method of sampling in use at the Institute Plant.

HYDROQUINONE IN AIR Evaluated a published procedure and recommended it for use at the Institute Plant.

RADIATION MEASUREMENTS Radiation counting of leak test swabs, calibration of survey instruments, water monitoring, and other procedures to comply with AEC and State requirements were done as requested in support of the Technical Center and the plant radiation safety programs.

ETHYL ACRYLATE IN AIR Screened available candidates and selected a commercially-available detector tube suitable for the semi-quantitative estimation of ethyl acrylate in air. Prepared a calibration curve for use of the test, at the request of the New Chemicals Marketing Department. Report 92E-F25.

PHOSGENE IN AIR Assisted Dr. R. L. Meeker's Group in preparation of known concentrations of phosgene in air for their investigation of the use of electron capture gas chromatography for trace analysis of phosgene in air.

BERYLLIUM ANALYSIS Evaluated and recommended a published microcolorimetric procedure for use at the Technical Center. Ran analyses of samples collected by Mr. Fred Williams.

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ACL Doc 19639 · Page 12 of 18 asbestosclaims.law/library/19639/12

METHYL PARATHION IN AIR Evaluated and recommended a published procedure for use in the Technical Center Analyses were run on air samples collected by Mr Fred Williams.

OZONE IN AIR Evaluated and recommended a published procedure for use at the Technical Center. Ran analyses on air samples collected by Mr. Fred Williams.

TOLYLENE DIISOCYANATE IN AIR Evaluated and recommended a published procedure for use at the Technical Center. Ran analyses on air samples collected by Mr. Fred Williams.

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PUBLICATIONS AND PROFESSIONAL ACTIVITIES

Publications

Best, E. M., and Murray, B. L., Observations on Workers Exposed to SEVIN Insecticide: A Preliminary Report, J. Occ. Med., 4, p. 507-517, October, 1962.

Bolton, N. E., Cavender, J. D., and Stack, V. T., Determination of Manganese in Biological Specimens, Am. Ind. Hyg. Assoc. J., 23, p. 319-326, July-August, 1962.

Other

N. H. Ketcham spoke on the subject "Noise Criteria" at the Tennessee Valley Industrial Hygiene Conference, Gatlinburg, Tennessee, October 12-13, 1962.

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ACL Doc 19639 · Page 14 of 18 asbestosclaims.law/library/19639/14

TABLE 1

LICENSED ENCAPSULATED RADIATION SOURCES
Inventory as of December 31, 1962 (not including radium)

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
BROWNSVILLE PLANT						
Ohmart HM-8	Cs 137	1	750	750	6 mos	Texas
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	Sr 90	1	1000	1000	6 mos	AEC
Ind. Nucleonics BB-0041	Cs 137	1	200	200	3 yrs.	AEC
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
SOUTH CHARLESTON PLANT						
Ohmart SHRM	Cs 137	11	100	1100	3 yrs	AEC
Ohmart SHRM	Cs 137	2	50	100	3 yrs.	AEC
Ind. Nucleonics LS-101	Cs 137	1	25	25	6 mos.	AEC
Jordan Meter	Sr 90	1	0.003	0 003	6 mos	AEC

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Union Carbide trial exhibit UC-5149: N. H. Ketcham, Industrial Hygiene Summary Report for July 1 - December 31...
ACL Doc 19639 · Page 15 of 18
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asbestosclaims.law/library/19639/15

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			
Ohmart SHRH	Cs 137	2	200	400	3 yrs	AEC
Ohmart SHRM	Cs 137	1	20	20	3 yrs	AEC
Ohmart SHRM	Cs 137	5	150	750	3 yrs.	AEC
Ohmart SHRM	Cs 137	2	200	400	3 yrs	AEC
Ohmart SHRM-A	Cs 137	3	1000	3000	3 yrs.	AEC
Ohmart SHRM-P	Cs 137	4	20	80	3 yrs	AEC
Ohmart SHRM-P	Cs 137	3	50	150	3 yrs	AEC
Ohmart SHRM-P	Cs 137	1	100	100	3 yrs	AEC
Ohmart HM-8	Cs 137	1	500	500	6 mos	AEC
Ohmart ASR-3	Cs 137	1	500	500	6 mos	AEC
Nuclear Chicago Model 506	Cs 137	1	1750	1750	6 mos	AEC
Ohmart SHRD (2 gauge)	Cs 137	1	500	500	6 mos	AEC
Ohmart ASR-3	Cs 137	1	450	450	6 mos.	AEC
AECL KCP-1 and C-129	Co 60	1	39 pencils up to 250 curies ea	Approx. 1600 curies	6 mos (water)	AEC
Tracerlab R-31	Co 60	1	1.1	1.1	6 mos.	AEC
Jordan Meter	Sr 90	1	0.003	0.003	6 mos	AEC
Ind. Nucleonics C-5	Sr 90	1	20	20	6 mos.	AEC
Ind. Nucleonics DH-3	Sr 90	1	500	500	6 mos	AEC
Chromatograph Det.	Sr 90	1	10	10	6 mos	AEC
Chromatograph Det.	Sr 90	2	20	40	6 mos.	AEC

NOTE: Tritium foil sources held by the Technical Center are not included in this table.

DE 005027

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Union Carbide trial exhibit UC-5149: N. H. Ketcham, Industrial Hygiene Summary Report for July 1 - December 31...
ACL Doc 19639 · Page 16 of 18
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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
			TORRANCE PLANT			
Ohmart SHRM	Cs 137	12	50	600	6 mos.	California
			WHITING PLANT			
Ohmart SHRM	Cs 137	1	80	80	3 yrs.	AEC
Ohmart SHRM	Cs 137	1	100	100	3 yrs	AEC
Ohmart SHRM	Cs 137	2	50	100	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
Grand Total Number of Sources		105				

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

NOTE: All of the above encapsulated sources were purchased originally under license agreements with the AEC. Radium sources have not been subject to licensing by the AEC but are included in the new State regulations. Information on approximately 80 radium sources in the Company's possession will be given in a future Summary Report.

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ACL Doc 19639 · Page 17 of 18
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DE 005029