



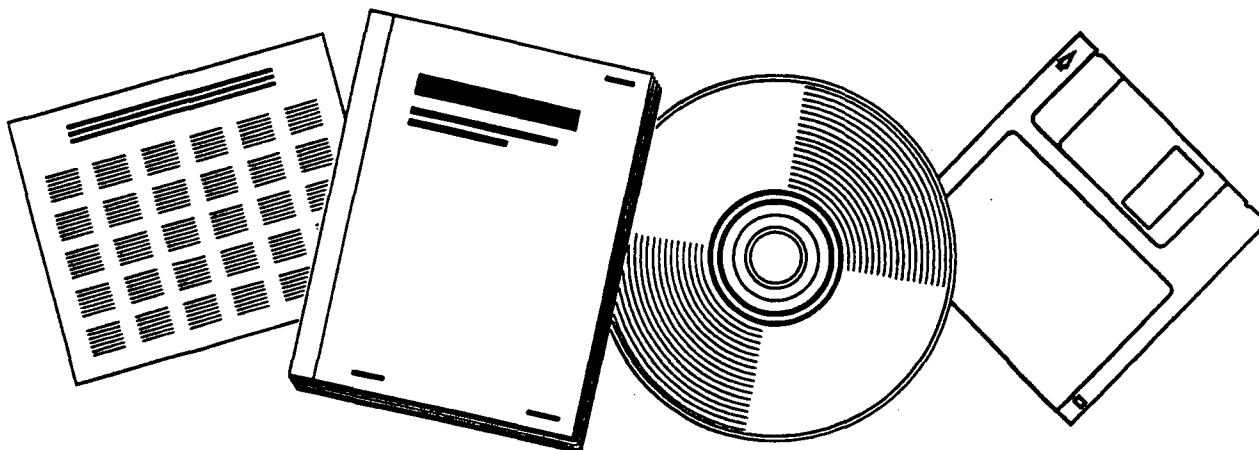
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NATIONAL OCCUPATIONAL HEALTH SURVEY OF MINING, METAL ORES, NEC REPORT

(U.S.) NATIONAL INST. FOR OCCUPATIONAL SAFETY AND HEALTH
MORGANTOWN, WV

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National Technical Information Service



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NATIONAL OCCUPATIONAL HEALTH SURVEY OF MINING

METAL ORES, NEC REPORT

April 30, 1990

COMMENTS SHOULD BE DIRECTED TO:

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16. Abstract (Limit: 200 words) This report provided National Occupational Health Survey of Mining (NOHSM) information for the Metal Ores, NEC commodity. Two sample sites were selected for study. Both of the sites were surveyed between August and September of 1984. The gathered data included occupational health programs and policy information, an inventory of all reported health related substances found on mine property, and a series of worksite observations which detailed potential exposure to chemical and physical agents. Surveyors traveled to each mine site. The data gathered were intended to be used in part to set regulatory priorities and write improved health standards, to improve compliance with existing standards, and to identify and determine research needs and priorities. Potential exposures were identified and associated numbers of workers, the occupations of those workers, and the locations of the mine property were each identified. The data were presented in seven tables: four concerning chemical agents; one concerning musculoskeletal overload conditions; one concerning physical exposure conditions; and one concerning welding processes.			
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b. Identifiers/Open-Ended Terms NIOSH-Publication, Mine-safety, Occupational-health, Miners, Mining, Mineral-dusts, Occupational-exposure, Metallic-minerals			
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INTRODUCTION

This is one of a series of reports on the National Occupational Health Survey of Mining (NOHSM), which has been carried out by the National Institute for Occupational Safety and Health (NIOSH). The NOHSM began in May, 1984, as an effort by NIOSH to obtain representative data related to occupational health from the mining industry. This particular report provides NOHSM data for the Metal Ores, NEC commodity. Two (2) sample sites were selected from the Metal Ores, NEC population of active mining facilities. Both of these sites were surveyed between August and September, 1984. The data collected were similar to the information previously obtained in non-mining studies. Specifically, NOHSM data include:

- a. Occupational health program and policy information;
- b. An inventory of all health-related substances found on mine property; and
- c. A series of worksite observations which detail potential exposure to chemical and physical agents.

These data were collected by surveyors who traveled to each mine site. The survey sites were chosen so as to provide a statistically valid representation of each commodity at the time of the NOHSM sample selection. With this representative sample, NIOSH can project survey data to the entire mining industry.

The NOHSM is being carried out primarily as a service to the Mine Safety and Health Administration (MSHA), and secondarily as a source of information for NIOSH investigators and other interested parties. MSHA plans to use the data for three purposes:

1. To set regulatory priorities and write improved health standards;
2. To improve compliance with existing standards; and
3. To identify and determine research needs and priorities.

This transfer of information to MSHA is mandated by Section 201 of the 1977 Federal Mine Safety and Health Amendments Act.

This report identifies potential exposures and provides the associated numbers of workers, the occupations of those workers, and the locations on the mine property where the potential exposures were observed. This information is categorized into seven tables: four concerning chemical agents; one concerning musculoskeletal overload conditions; one concerning physical exposure conditions; and one concerning welding processes. Estimated annual usage information is provided for chemical substances, both generic and trade names.

This report lists the survey findings in a number of individual tables representing the different products and conditions to which workers in the commodity were found to be potentially exposed. The following is a breakdown of these tables, including the number of agents associated with each table, for the Metal Ores, NEC commodity:

Table 1 -- 12 MSHA-regulated chemicals.

Table 2 -- 2 Chemicals that have a NIOSH recommended exposure limit but are not MSHA-regulated.

Table 3 -- 17 Chemicals that have no NIOSH recommended exposure limit and are not MSHA-regulated.

Table 4 -- 33 Trade name products.

Table 5 -- 3 Physical agent conditions.

Table 6 -- 3 Musculoskeletal overload conditions.

Table 7 -- 1 Welding process.

It is extremely important that the limitations of the reported data be recognized. The data do not in any way document exposures or exposure levels. The data only indicate potential exposures. The term "potential exposure" means the agent was observed to be present at one or more worksites in such a way that there was a possibility of workers being exposed to the agent.

Likewise, the usage data presented in some of the tables are only a guide to the projected magnitude of usage and should not be taken as precise information. The usage data are based on estimates provided by mine management. It is expected that these estimates have widely varying accuracy. Occasionally, an item may be represented as having an annual usage of zero with workers observed to be potentially exposed. This may occur because annual usage estimates are generally based on purchases of the 12 months immediately preceding a survey. Therefore, items purchased prior to that 12 month period may be represented as having a zero annual usage rate even though potential exposures were observed during the survey. Other zero annual usage occurrences could involve recyclable items such as some catalysts and desiccants, items such as paints and coatings which are applied prior to the 12 month period but which are present in the workplace in such a way as to present a potential exposure, and obsolete items which are no longer actively used on the property but to which employees could still be potentially exposed in the course of their work. Furthermore, all the estimates were rounded to the nearest whole number, with all quantities between 0 and 1 being reported as 1. Thus, extremely small usage levels may actually be lower than estimated. With this possible exception, NIOSH believes the relative magnitude to be appropriately represented.

Another limitation to be observed is the terminology associated with the commodity, occupation, and location. These terms were adapted directly from MSHA information and applied by NIOSH. NIOSH recognizes that other parties may prefer other commodity, occupation, or location terminology. The MSHA terms were used because of MSHA's close interest in the data.

A separate report will be prepared for each commodity surveyed as a part of the NOHSM. During each segment of the NOHSM, approximately 120 mining operations were surveyed as the sample from a number of selected commodities. A different set of commodities was surveyed during each segment. NIOSH plans for use of these data in the future include:

- a. Encourage MSHA use of the data, as outlined above;
- b. Determine the ranges of exposure to various agents, as required by Section 201 of the 1977 Federal Mine Safety and Health Amendments Act;
- c. Assist in setting priorities for mine-related occupational health research; and
- d. Respond to questions from other parties regarding occupational health aspects of the mining industry.

Information beyond that presented in this report has been collected during the NOHSM. All of the information not protected by trade secret claims is available to the public upon detailed written request. Other categories of available information include:

- a. Management policies related to occupational health;
- b. Duration of potential exposures;
- c. Operations associated with potential exposures;
- d. Controls employed with potential exposures; and
- e. Results of bulk dust analyses for silica, metals, and fibers.

Interested parties should direct their requests to:

Project Officer
National Occupational Health Survey of Mining
NIOSH
Division of Respiratory Disease Studies
944 Chestnut Ridge Road, Room 140
Morgantown, WV 26505-2888

TABLE DEFINITIONS

AGENT NAME	(1) # WORKERS POTENTIALLY EXPOSED (OBSERVED)	(2) # WORKERS POTENTIALLY EXPOSED (PREDICTED)	(3) % WORKERS POTENTIALLY EXPOSED (PREDICTED)	(4) PREDICTED ANNUAL USAGE	(5) OCCUPATIONS	(6) LOCATIONS

Column (1) represents the total number of workers in occupations within this commodity in which a potential exposure to an agent was observed or identified through questioning of mine management or workers. This number only includes workers from the NOHSM sample sites. A "potential exposure" means the agent was observed to be present at the worksite in such a way that there was a possibility of workers being exposed to the agent. The potential exposures do not imply any exposure level, nor do they imply the absence or presence of controls.

Column (2) represents the number of workers within this commodity predicted to be potentially exposed to each agent. This number reflects a projection to this entire commodity, based on data obtained at NOHSM sample sites.

Column (3) represents the percentage of workers within this commodity predicted to be potentially exposed to each agent. Column (3) is obtained by dividing column (2) by the projected total population of workers in the commodity.

Column (4) represents the number of gallons (GAL) or the number of pounds (LBS) of each chemical that NIOSH has estimated to be used per year. This number is obtained from projections based on estimates of usage provided by mine management, and should only be used in determining the order of magnitude of usage. It should not be used as a precise figure. This number reflects a projection to this entire commodity, based on data obtained at NOHSM sample sites. In some cases, where usage data was unavailable, a "*" appears in this column.

Column (5) contains the occupations observed to have a potential for exposure to this agent. In each occupation, the percentage of workers with a potential for exposure to the agent is given in parentheses. This number only includes data obtained at NOHSM sample sites.

Column (6) contains the locations where workers were observed to have a potential for exposure to this agent at the NOHSM sample sites. The percentage of workers in each listed location with a potential exposure to the agent is given in parentheses. This number only includes data obtained at NOHSM sample sites.

RUN DATE: 04/30/90

TABLE 1, PAGE 1 NOTE: THIS TABLE DOES NOT CONTAIN TRADE SECRET DATA.

MSHA REGULATED CHEMICALS FOUND ON MINE PROPERTY

COMMODITY NAME: METAL ORES, NEC

CHEMICAL NAME	(1) #WORKERS POTENTIALLY EXPOSED (OBSERVED)	(2) #WORKERS POTENTIALLY EXPOSED (PREDICTED)	(3) %WORKERS POTENTIALLY EXPOSED (PREDICTED)	(4) PREDICTED ANNUAL USAGE
AMMONIUM CHLORIDE	1	1	3	12,000 LBS.
(5) OCCUPATIONS			(6) LOCATIONS	
673 LEACHING OPERATIONS WORKER (100%)			010 SURFACE MILL (8%)	
LEAD NITRATE	1	1	3	20,278 LBS.
(5) OCCUPATIONS			(6) LOCATIONS	
673 LEACHING OPERATIONS WORKER (100%)			010 SURFACE MILL (8%)	
LEAD OXIDE	2	2	6	2,500 LBS.
(5) OCCUPATIONS			(6) LOCATIONS	
514 LABORATORY TECHNICIAN (50%)			009 SURFACE MISC (33%)	
MERCURIC CHLORIDE	1	1	3	1 LBS.
(5) OCCUPATIONS			(6) LOCATIONS	
514 LABORATORY TECHNICIAN (25%)			009 SURFACE MISC (17%)	

MSHA REGULATED CHEMICALS FOUND ON MINE PROPERTY

COMMODITY NAME: METAL ORES, NEC

CHEMICAL NAME	(1) #WORKERS POTENTIALLY EXPOSED (OBSERVED)	(2) #WORKERS POTENTIALLY EXPOSED (PREDICTED)	(3) %WORKERS POTENTIALLY EXPOSED (PREDICTED)	(4) PREDICTED ANNUAL USAGE
MERCURY	1	1	3	760 LBS.
(5) OCCUPATIONS			(6) LOCATIONS	
673 LEACHING OPERATIONS WORKER (100%)			010 SURFACE MILL (8%)	
NITRIC ACID	3	3	9	336 LBS.
(5) OCCUPATIONS			(6) LOCATIONS	
514 LABORATORY TECHNICIAN (75%)			009 SURFACE MISC (50%)	
PYRIDINE	1	1	3	1 GALS.
(5) OCCUPATIONS			(6) LOCATIONS	
514 LABORATORY TECHNICIAN (25%)			009 SURFACE MISC (17%)	
SILICA SAND	2	2	6	500 LBS.
(5) OCCUPATIONS			(6) LOCATIONS	
514 LABORATORY TECHNICIAN (50%)			009 SURFACE MISC (33%)	

MSHA REGULATED CHEMICALS FOUND ON MINE PROPERTY

COMMODITY NAME: METAL ORES, NEC

CHEMICAL NAME	(1) #WORKERS POTENTIALLY EXPOSED (OBSERVED)		(2) #WORKERS POTENTIALLY EXPOSED (PREDICTED)		(3) %WORKERS POTENTIALLY EXPOSED (PREDICTED)		(4) PREDICTED ANNUAL USAGE	
	14		14		40		8,801 LBS.	
SODIUM CYANIDE								
(5)								
OCCUPATIONS								
179 BALL, ROD, PEBBLE MILL OPTR (100%)			456 ENGINEER; TECHNICAL SERVICES (100%)				007 SURFACE GRINDING (100%)	
514 LABORATORY TECHNICIAN (50%)			602 ELECTRICIAN (100%)				009 SURFACE MISC (17%)	
649 ADMN, SUPERVISORY, MGT PERSNL (50%)			679 FLOTATION/CONCTR OPTR (100%)				005 SURFACE SHOP (14%)	
							010 SURFACE MILL (38%)	
							008 SURFACE FLTN, RGTS (100%)	
SODIUM HYDROXIDE								
(5)								
OCCUPATIONS								
514 LABORATORY TECHNICIAN (25%)			673 LEACHING OPERATIONS WORKER (100%)				009 SURFACE MISC (17%)	
							010 SURFACE MILL (8%)	
SULFURIC ACID								
(5)								
OCCUPATIONS								
514 LABORATORY TECHNICIAN (25%)								

RUN DATE: 04/30/90

TABLE 1, PAGE 4 NOTE: THIS TABLE DOES NOT CONTAIN TRADE SECRET DATA.

MSHA REGULATED CHEMICALS FOUND ON MINE PROPERTY

COMMODITY NAME: METAL ORES, NEC

CHEMICAL NAME	(1) #WORKERS POTENTIALLY EXPOSED (OBSERVED)	(2) #WORKERS POTENTIALLY EXPOSED (PREDICTED)	(3) %WORKERS POTENTIALLY EXPOSED (PREDICTED)	(4) PREDICTED ANNUAL USAGE
TRICHLOROETHYLENE	4	4	11	10 GALS.
(5) OCCUPATIONS	(6) LOCATIONS			
604 MECHANIC (67%)	005 SURFACE SHOP (57%)			

RUN DATE: 04/30/90

TABLE 2, PAGE 1 NOTE: THIS TABLE DOES NOT CONTAIN TRADE SECRET DATA.

CHEMICALS FOUND ON MINE PROPERTY THAT HAVE A NIOSH RECOMMENDED EXPOSURE LIMIT BUT ARE NOT REGULATED BY MSHA

COMMODITY NAME: METAL ORES, NEC

CHEMICAL NAME	(1) #WORKERS POTENTIALLY EXPOSED (OBSERVED)	(2) #WORKERS POTENTIALLY EXPOSED (PREDICTED)	(3) %WORKERS POTENTIALLY EXPOSED (PREDICTED)	(4) PREDICTED ANNUAL USAGE
DIESEL FUEL NO. 1	9	9	26	6,000 GALS.
(5) OCCUPATIONS			(6) LOCATIONS	
079 CRUSHER OPTR (100%)				006 SURFACE CRUSHING (100%)
613 CLEANUP MAN (100%)				005 SURFACE SHOP (29%)
				010 SURFACE MILL (23%)
DIESEL FUEL NO. 2	2	2	6	300 GALS.
(5) OCCUPATIONS			(6) LOCATIONS	
649 ADMN, SUPERVISORY, MGT PERSNL (33%)				001 UNDERGROUND MINE (67%)

RUN DATE: 04/30/90

TABLE 3, PAGE 1 NOTE: THIS TABLE DOES NOT CONTAIN TRADE SECRET DATA.

CHEMICALS FOUND ON MINE PROPERTY THAT HAVE NO NIOSH RECOMMENDATION OR MSHA EXPOSURE LIMIT

COMMODITY NAME: METAL ORES, NEC

CHEMICAL NAME	(1) #WORKERS POTENTIALLY EXPOSED (OBSERVED)	(2) #WORKERS POTENTIALLY EXPOSED (PREDICTED)	(3) %WORKERS POTENTIALLY EXPOSED (PREDICTED)	(4) PREDICTED ANNUAL USAGE
BONE ASH	2	2	6	1,000 LBS.
(5) OCCUPATIONS			(6) LOCATIONS	
514 LABORATORY TECHNICIAN (50%)			009 SURFACE MISC (33%)	
BORAX	2	2	6	600 LBS.
(5) OCCUPATIONS			(6) LOCATIONS	
514 LABORATORY TECHNICIAN (50%)			009 SURFACE MISC (33%)	
CALCIUM HYDROXIDE	11	11	31	328,800 LBS.
(5) OCCUPATIONS			(6) LOCATIONS	
456 ENGINEER; TECHNICAL SERVICES (100%)			005 SURFACE SHOP (14%)	
602 ELECTRICIAN (100%)			010 SURFACE MILL (46%)	
673 LEACHING OPERATIONS WORKER (100%)			008 SURFACE FLTN, RGTS (100%)	
CALCIUM HYPOCHLORITE	10	10	29	285,000 LBS.
(5) OCCUPATIONS			(6) LOCATIONS	
456 ENGINEER; TECHNICAL SERVICES (100%)			005 SURFACE SHOP (14%)	
602 ELECTRICIAN (100%)			010 SURFACE MILL (38%)	

(CONTINUED NEXT PAGE)

RUN DATE: 04/30/90

TABLE 3, PAGE 2

NOTE: THIS TABLE DOES NOT CONTAIN TRADE SECRET DATA.

CHEMICALS FOUND ON MINE PROPERTY THAT HAVE NO NIOSH RECOMMENDATION OR MSHA EXPOSURE LIMIT

COMMODITY NAME: METAL ORES, NEC				
CHEMICAL NAME	(1) #WORKERS POTENTIALLY EXPOSED (OBSERVED)	(2) #WORKERS POTENTIALLY EXPOSED (PREDICTED)	(3) %WORKERS POTENTIALLY EXPOSED (PREDICTED)	(4) PREDICTED ANNUAL USAGE
CALCIUM HYPOCHLORITE (CONTINUED)	10	10	29	285,000 LBS.
(5) OCCUPATIONS			(6) LOCATIONS	
679 FLOTATION/CONCTR OPTR (100%)			008 SURFACE FLTN, RGTS (100%)	
CARBONIC ACID DISODIUM SALT (8CI) (9CI)	2	2	6	900 LBS.
(5) OCCUPATIONS			(6) LOCATIONS	
514 LABORATORY TECHNICIAN (50%)			009 SURFACE MISC (33%)	
CARBONIC ACID, DITHIO, O-PENTYL ESTER, POTASSIUM SALT	10	10	29	8,400 LBS.
(5) OCCUPATIONS			(6) LOCATIONS	
456 ENGINEER; TECHNICAL SERVICES (100%)			005 SURFACE SHOP (14%)	
602 ELECTRICIAN (100%)			010 SURFACE MILL (38%)	
679 FLOTATION/CONCTR OPTR (100%)			008 SURFACE FLTN, RGTS (100%)	
FLOUR, NEC	2	2	6	30 LBS.
(5) OCCUPATIONS			(6) LOCATIONS	
514 LABORATORY TECHNICIAN (50%)			009 SURFACE MISC (33%)	

RUN DATE: 04/30/90

TABLE 3, PAGE 3 NOTE: THIS TABLE DOES NOT CONTAIN TRADE SECRET DATA.

CHEMICALS FOUND ON MINE PROPERTY THAT HAVE NO NIOSH RECOMMENDATION OR MSHA EXPOSURE LIMIT

COMMODITY NAME: METAL ORES, NEC

CHEMICAL NAME	(1) #WORKERS POTENTIALLY EXPOSED (OBSERVED)	(2) #WORKERS POTENTIALLY EXPOSED (PREDICTED)	(3) %WORKERS POTENTIALLY EXPOSED (PREDICTED)	(4) PREDICTED ANNUAL USAGE
GASOLINE-LEADED	2	2	6	200 GALS.
(5) OCCUPATIONS			(6) LOCATIONS	
604 MECHANIC (33%)			005 SURFACE SHOP (29%)	
MAGNESIUM CHLORIDE	1	1	3	1 LBS.
(5) OCCUPATIONS			(6) LOCATIONS	
514 LABORATORY TECHNICIAN (25%)			009 SURFACE MISC (17%)	
NITRIC ACID SODIUM SALT	3	3	9	60 LBS.
(5) OCCUPATIONS			(6) LOCATIONS	
514 LABORATORY TECHNICIAN (50%)		673 LEACHING OPERATIONS WORKER (100%)	009 SURFACE MISC (33%) 010 SURFACE MILL (8%)	
POLYPROPYLENE GLYCOL, METHYL ESTER	10	10	29	15,300 LBS.
(5) OCCUPATIONS			(6) LOCATIONS	
456 ENGINEER; TECHNICAL SERVICES (100%) 602 ELECTRICIAN (100%) 679 FLOTATION/CONCTR OPTR (100%)		514 LABORATORY TECHNICIAN (25%) 649 ADMN, SUPERVISORY, MGT PERSNL (50%)	005 SURFACE SHOP (14%) 010 SURFACE MILL (38%) 008 SURFACE FLTN, RGTS (100%)	

RUN DATE: 04/30/90

TABLE 3, PAGE 4 NOTE: THIS TABLE DOES NOT CONTAIN TRADE SECRET DATA.

CHEMICALS FOUND ON MINE PROPERTY THAT HAVE NO NIOSH RECOMMENDATION OR MSHA EXPOSURE LIMIT

COMMODITY NAME: METAL ORES, NEC

CHEMICAL NAME	(1) #WORKERS POTENTIALLY EXPOSED (OBSERVED)	(2) #WORKERS POTENTIALLY EXPOSED (PREDICTED)	(3) %WORKERS POTENTIALLY EXPOSED (PREDICTED)	(4) PREDICTED ANNUAL USAGE
POTASSIUM PERMANGANATE	1	1	3	1 LBS.
(5) OCCUPATIONS			(6) LOCATIONS	
514 LABORATORY TECHNICIAN (25%)			009 SURFACE MISC (17%)	
SODIUM ETHYL XANTHATE	10	10	29	12,800 LBS.
(5) OCCUPATIONS			(6) LOCATIONS	
456 ENGINEER; TECHNICAL SERVICES (100%)			005 SURFACE SHOP (14%)	
602 ELECTRICIAN (100%)			010 SURFACE MILL (38%)	
679 FLOTATION/CONCTR OPTR (100%)			008 SURFACE FLTN, RGTS (100%)	
SODIUM GLUCONATE	1	1	3	10,000 LBS.
(5) OCCUPATIONS			(6) LOCATIONS	
673 LEACHING OPERATIONS WORKER (100%)			010 SURFACE MILL (8%)	
SODIUM PARA-TOLUENESULFONCHLORAMIDE	1	1	3	1 LBS.
(5) OCCUPATIONS			(6) LOCATIONS	
514 LABORATORY TECHNICIAN (25%)			009 SURFACE MISC (17%)	

RUN DATE: 04/30/90

TABLE 3, PAGE 5

NOTE: THIS TABLE DOES NOT CONTAIN TRADE SECRET DATA.

CHEMICALS FOUND ON MINE PROPERTY THAT HAVE NO NIOSH RECOMMENDATION OR MSHA EXPOSURE LIMIT

COMMODITY NAME: METAL ORES, NEC

CHEMICAL NAME	(1) #WORKERS POTENTIALLY EXPOSED (OBSERVED)	(2) #WORKERS POTENTIALLY EXPOSED (PREDICTED)	(3) %WORKERS POTENTIALLY EXPOSED (PREDICTED)	(4) PREDICTED ANNUAL USAGE
SULFURIC ACID COPPER(2+) SALT (1:1)	10	10	29	140,400 LBS.
OCCUPATIONS	(6) LOCATIONS			
456 ENGINEER: TECHNICAL SERVICES (100%)	514 LABORATORY TECHNICIAN (25%)			
602 ELECTRICIAN (100%)	649 ADMN, SUPERVISORY, MGT PERSONL (50%)			
679 FLOTATION/CONCTR OPTR (100%)	005 SURFACE SHOP (14%)			
	010 SURFACE MILL (38%)			
	008 SURFACE FLTN, RGTS (100%)			
ZINC SULFATE	13	13	37	146,600 LBS.
OCCUPATIONS	(6) LOCATIONS			
179 BALL, ROD, PEBBLE MILL OPTR (100%)	456 ENGINEER; TECHNICAL SERVICES (100%)			
514 LABORATORY TECHNICIAN (25%)	602 ELECTRICIAN (100%)			
649 ADMN, SUPERVISORY, MGT PERSONL (50%)	679 FLOTATION/CONCTR OPTR (100%)			
	007 SURFACE GRINDING (100%)			
	005 SURFACE SHOP (14%)			
	010 SURFACE MILL (38%)			
	008 SURFACE FLTN, RGTS (100%)			

RUN DATE: 04/30/90

TABLE 4, PAGE 1

NOTE: THIS TABLE DOES NOT CONTAIN TRADE SECRET DATA.

TRADENAME PRODUCTS FOUND ON MINE PROPERTY

COMMODITY NAME: METAL ORES, NEC

MANUFACTURER'S NAME AND TRADENAME PRODUCTS	(1) #WORKERS POTENTIALLY EXPOSED (OBSERVED)	(2) #WORKERS POTENTIALLY EXPOSED (PREDICTED)	(3) %WORKERS POTENTIALLY EXPOSED (PREDICTED)	(4) PREDICTED ANNUAL USAGE
AERVOE-PACIFIC CO.				
COR-ON ENGINE ENAMEL, CHEVY MOLYORANGE	2	2	6	20 LBS.
(5)				
OCCUPATIONS	(6) LOCATIONS			
604 MECHANIC (33%)	005 SURFACE SHOP (29%)			
AMERICAN CYANAMID				
AERO PROMOTER #404	13	13	37	10,500 LBS.
(5)				
OCCUPATIONS	(6) LOCATIONS			
179 BALL, ROD, PEBBLE MILL OPTR (100%)	007 SURFACE GRINDING (100%)			
514 LABORATORY TECHNICIAN (25%)	005 SURFACE SHOP (14%)			
649 ADMN, SUPERVISORY, MGT PERSNL (50%)	010 SURFACE MILL (38%)			
	008 SURFACE FLTN, RGTS (100%)			
AMERICAN PARTS CO., INC.				
BIG A SERVICE LINE UNIVERSAL BLACK 14-203, AEROSOL	4	4	11	5 LBS.
(5)				
OCCUPATIONS	(6) LOCATIONS			
604 MECHANIC (67%)	005 SURFACE SHOP (57%)			

RUN DATE: 04/30/90

TABLE 4, PAGE 2 NOTE: THIS TABLE DOES NOT CONTAIN TRADE SECRET DATA.

TRADENAME PRODUCTS FOUND ON MINE PROPERTY

COMMODITY NAME: METAL ORES, NEC

MANUFACTURER'S NAME AND TRADENAME PRODUCTS	(1) #WORKERS POTENTIALLY EXPOSED (OBSERVED)	(2) #WORKERS POTENTIALLY EXPOSED (PREDICTED)	(3) %WORKERS POTENTIALLY EXPOSED (PREDICTED)	(4) PREDICTED ANNUAL USAGE
CERAMICS				
CEMENT-PORTLAND TYPE	2	2	6	200 LBS.
(5) OCCUPATIONS			(6) LOCATIONS	
514 LABORATORY TECHNICIAN (50%)			009 SURFACE MISC (33%)	
CHEVRON OIL				
CHEVRON OIL CO. TURBINE OIL 100	4	4	11	30 GALS.
(5) OCCUPATIONS			(6) LOCATIONS	
604 MECHANIC (67%)			010 SURFACE MILL (31%)	
CHEVRON PINION GREASE, 100 GB	6	6	17	150 GALS.
(5) OCCUPATIONS			(6) LOCATIONS	
604 MECHANIC (100%)			005 SURFACE SHOP (29%) 010 SURFACE MILL (31%)	

RUN DATE: 04/30/90

TABLE 4, PAGE 3 NOTE: THIS TABLE DOES NOT CONTAIN TRADE SECRET DATA.

TRADENAME PRODUCTS FOUND ON MINE PROPERTY

COMMODITY NAME: METAL ORES, NEC

MANUFACTURER'S NAME AND TRADENAME PRODUCTS	(1) #WORKERS POTENTIALLY EXPOSED (OBSERVED)	(2) #WORKERS POTENTIALLY EXPOSED (PREDICTED)	(3) %WORKERS POTENTIALLY EXPOSED (PREDICTED)	(4) PREDICTED ANNUAL USAGE
CRC CHEMICALS				
CRC 3-36, AEROSOL	4	4	11	7 LBS.
(5) OCCUPATIONS			(6) LOCATIONS	
604 MECHANIC (67%)			005 SURFACE SHOP (57%)	
DEVCON CORP.				
SILICON SEALANT	2	2	6	82 LBS.
(5) OCCUPATIONS			(6) LOCATIONS	
604 MECHANIC (33%)			005 SURFACE SHOP (29%)	
EAGLE PICHER IND., INC				
EAGLE PICHER FLOOR DRY 85	6	6	17	2,640 LBS.
(5) OCCUPATIONS			(6) LOCATIONS	
604 MECHANIC (100%)			005 SURFACE SHOP (86%)	

TRADENAME PRODUCTS FOUND ON MINE PROPERTY

COMMODITY NAME: METAL ORES, NEC

MANUFACTURER'S NAME AND TRADENAME PRODUCTS	(1) #WORKERS POTENTIALLY EXPOSED (OBSERVED)	(2) #WORKERS POTENTIALLY EXPOSED (PREDICTED)	(3) %WORKERS POTENTIALLY EXPOSED (PREDICTED)	(4) PREDICTED ANNUAL USAGE
FISKE BROTHERS REFINING CO.				
LUBRIPLATE/GEAR LUBE	2	2	6	240 LBS.
(5) OCCUPATIONS			(6) LOCATIONS	
604 MECHANIC (33%)			005 SURFACE SHOP (29%)	
LINCOLN ELECTRIC CO.				
LINCOLN 6013	4	4	11	100 LBS.
(5) OCCUPATIONS			(6) LOCATIONS	
604 MECHANIC (67%)			005 SURFACE SHOP (57%)	
LINCOLN 7018	4	4	11	350 LBS.
(5) OCCUPATIONS			(6) LOCATIONS	
604 MECHANIC (67%)			005 SURFACE SHOP (57%)	

TRADENAME PRODUCTS FOUND ON MINE PROPERTY

COMMODITY NAME: METAL ORES, NEC

MANUFACTURER'S NAME AND TRADENAME PRODUCTS	(1) #WORKERS POTENTIALLY EXPOSED (OBSERVED)	(2) #WORKERS POTENTIALLY EXPOSED (PREDICTED)	(3) %WORKERS POTENTIALLY EXPOSED (PREDICTED)	(4) PREDICTED ANNUAL USAGE
-----	-----	-----	-----	-----

MCKEESON CHEMICAL CO.

TERGITOL 15-5-3

20,780 LBS.

(5)

OCCUPATIONS

456 ENGINEER; TECHNICAL SERVICES (100%)	514 LABORATORY TECHNICIAN (25%)	005 SURFACE SHOP (14%)
602 ELECTRICIAN (100%)	649 ADMN, SUPERVISORY, MGT PERSNL (50%)	010 SURFACE MILL (46%)
673 LEACHING OPERATIONS WORKER (100%)	679 FLOTATION/CONCTR OPTR (100%)	008 SURFACE FLTN, RGTS (100%)

(6)

LOCATIONS

NALCO/FIELD SYSTEMS DEPARTMENT

NALCO 7852

6,000 LBS.

(5)

OCCUPATIONS

456 ENGINEER; TECHNICAL SERVICES (100%)	514 LABORATORY TECHNICIAN (25%)	005 SURFACE SHOP (14%)
602 ELECTRICIAN (100%)	649 ADMN, SUPERVISORY, MGT PERSNL (50%)	010 SURFACE MILL (38%)
679 FLOTATION/CONCTR OPTR (100%)		008 SURFACE FLTN, RGTS (100%)

(6)

LOCATIONS

NALCO 7872

2,000 LBS.

(5)

OCCUPATIONS

456 ENGINEER; TECHNICAL SERVICES (100%)	514 LABORATORY TECHNICIAN (25%)	005 SURFACE SHOP (14%)
602 ELECTRICIAN (100%)	649 ADMN, SUPERVISORY, MGT PERSNL (50%)	010 SURFACE MILL (38%)
679 FLOTATION/CONCTR OPTR (100%)		008 SURFACE FLTN, RGTS (100%)

(6)

LOCATIONS

RUN DATE: 04/30/90

TABLE 4, PAGE 6

NOTE: THIS TABLE DOES NOT CONTAIN TRADE SECRET DATA.

TRADENAME PRODUCTS FOUND ON MINE PROPERTY

COMMODITY NAME: METAL ORES, NEC

MANUFACTURER'S NAME AND TRADENAME PRODUCTS	(1) #WORKERS POTENTIALLY EXPOSED (OBSERVED)	(2) #WORKERS POTENTIALLY EXPOSED (PREDICTED)	(3) %WORKERS POTENTIALLY EXPOSED (PREDICTED)	(4) PREDICTED ANNUAL USAGE
PERMATHEX INDUSTRIAL DIVISION				
PERMATHEX ENGINE STARTING FLUID	4	4	11	17 LBS.
(5) OCCUPATIONS			(6) LOCATIONS	
604 MECHANIC (33%)		782 FRONT-END LOADER OPTR (100%)		005 SURFACE SHOP (29%) 010 SURFACE MILL (15%)
PERMATHEX INDUSTRIAL BELT DRESSING	4	4	11	120 LBS.
(5) OCCUPATIONS			(6) LOCATIONS	
604 MECHANIC (67%)				010 SURFACE MILL (31%)
RUST-OLEUM CORP.				
RUST-OLEUM HARD HAT INDUSTRIAL COATING METAL PRIMER, AEROSOL	4	4	11	90 LBS.
(5) OCCUPATIONS			(6) LOCATIONS	
604 MECHANIC (67%)				005 SURFACE SHOP (57%)

RUN DATE: 04/30/90

TABLE 4, PAGE 7 NOTE: THIS TABLE DOES NOT CONTAIN TRADE SECRET DATA.

TRADENAME PRODUCTS FOUND ON MINE PROPERTY

COMMODITY NAME: METAL ORES, NEC

MANUFACTURER'S NAME AND TRADENAME PRODUCTS	(1) #WORKERS POTENTIALLY EXPOSED (OBSERVED)	(2) #WORKERS POTENTIALLY EXPOSED (PREDICTED)	(3) %WORKERS POTENTIALLY EXPOSED (PREDICTED)	(4) PREDICTED ANNUAL USAGE
TEXACO, INC.				
TEXACO HYTEX GREASE #6	4	4	11	200 LBS.
(5) OCCUPATIONS			(6) LOCATIONS	
604 MECHANIC (67%)			010 SURFACE MILL (31%)	
THE WHITMORE MFG. CO.				
WIRE ROPE LUBRICANT	2	2	6	458 LBS.
(5) OCCUPATIONS			(6) LOCATIONS	
649 ADMN, SUPERVISORY, MGT PERSNL (33%)			001 UNDERGROUND MINE (67%)	
UNION OIL CO. OF CALIFORNIA				
EXTRA HEAVY DUTY NL GEAR LUBE, EP S	4	4	11	110 GALS.
(5) OCCUPATIONS			(6) LOCATIONS	
604 MECHANIC (67%)			010 SURFACE MILL (31%)	

RUN DATE: 04/30/90

TABLE 4, PAGE 8 NOTE: THIS TABLE DOES NOT CONTAIN TRADE SECRET DATA.

TRADENAME PRODUCTS FOUND ON MINE PROPERTY

COMMODITY NAME: METAL ORES, NEC

MANUFACTURER'S NAME AND TRADENAME PRODUCTS	(1) #WORKERS POTENTIALLY EXPOSED (OBSERVED)	(2) #WORKERS POTENTIALLY EXPOSED (PREDICTED)	(3) %WORKERS POTENTIALLY EXPOSED (PREDICTED)	(4) PREDICTED ANNUAL USAGE
UNION OIL CO. OF CALIFORNIA				
EXTRA HEAVY DUTY NL GEAR LUBE, EP 2	4	4	11	300 GALS.
(5) OCCUPATIONS			(6) LOCATIONS	
604 MECHANIC (67%)			010 SURFACE MILL (31%)	
EXTRA HEAVY DUTY NL GEAR LUBE, EP 4	4	4	11	110 GALS.
(5) OCCUPATIONS			(6) LOCATIONS	
604 MECHANIC (67%)			010 SURFACE MILL (31%)	
UNION MOLY HD-2	4	4	11	25 LBS.
(5) OCCUPATIONS			(6) LOCATIONS	
604 MECHANIC (67%)			010 SURFACE MILL (31%)	
UNION 10W MOTOR OIL	6	6	17	55 GALS.
(5) OCCUPATIONS			(6) LOCATIONS	
604 MECHANIC (67%)			010 SURFACE MILL (46%)	
782 FRONT-END LOADER OPTR (100%)				

RUN DATE: 04/30/90

TABLE 4, PAGE 9 NOTE: THIS TABLE DOES NOT CONTAIN TRADE SECRET DATA.

TRADENAME PRODUCTS FOUND ON MINE PROPERTY

COMMODITY NAME: METAL ORES, NEC

MANUFACTURER'S NAME AND TRADENAME PRODUCTS	(1) #WORKERS POTENTIALLY EXPOSED (OBSERVED)	(2) #WORKERS POTENTIALLY EXPOSED (PREDICTED)	(3) %WORKERS POTENTIALLY EXPOSED (PREDICTED)	(4) PREDICTED ANNUAL USAGE
UNION OIL CO. OF CALIFORNIA				
UNION 76 MPGEAR LUBE LS, SAE 80W-90	2	2	6	360 LBS.
(5) OCCUPATIONS			(6) LOCATIONS	
604 MECHANIC (33%)			005 SURFACE SHOP (29%)	
UNOBA LD-2 GREASE	4	4	11	360 LBS.
(5) OCCUPATIONS			(6) LOCATIONS	
604 MECHANIC (67%)			010 SURFACE MILL (31%)	
UNOBA MOLY HD-GREASE	4	4	11	480 LBS.
(5) OCCUPATIONS			(6) LOCATIONS	
604 MECHANIC (67%)			010 SURFACE MILL (31%)	
15W/40 GUARDOL MOTOR OIL	6	6	17	650 GALS.
(5) OCCUPATIONS			(6) LOCATIONS	
604 MECHANIC (100%)			005 SURFACE SHOP (29%) 010 SURFACE MILL (31%)	

RUN DATE: 04/30/90

TABLE 4, PAGE 10 NOTE: THIS TABLE DOES NOT CONTAIN TRADE SECRET DATA.

TRADENAME PRODUCTS FOUND ON MINE PROPERTY

COMMODITY NAME: METAL ORES, NEC

MANUFACTURER'S NAME AND TRADENAME PRODUCTS	(1) #WORKERS POTENTIALLY EXPOSED (OBSERVED)	(2) #WORKERS POTENTIALLY EXPOSED (PREDICTED)	(3) %WORKERS POTENTIALLY EXPOSED (PREDICTED)	(4) PREDICTED ANNUAL USAGE
UNION OIL CO. OF CALIFORNIA				
90W OIL	6	6	17	50 GALS.
(5) OCCUPATIONS			(6) LOCATIONS	
604 MECHANIC (100%)			005 SURFACE SHOP (29%) 010 SURFACE MILL (31%)	
WAGNER ELECTRIC CO.				
WAGNER BRAKE FLUID 21-B, SUPER HEAVY DUTY	2	2	6	10 GALS.
(5) OCCUPATIONS			(6) LOCATIONS	
604 MECHANIC (33%)			005 SURFACE SHOP (29%)	
WOODHILL/PERMATEX				
PERMATEX DISC BRAKE QUIET, PART #127MA, AEROSOL	2	2	6	60 GALS.
(5) OCCUPATIONS			(6) LOCATIONS	
604 MECHANIC (33%)			005 SURFACE SHOP (29%)	

RUN DATE: 04/30/90

TABLE 4, PAGE 11 NOTE: THIS TABLE DOES NOT CONTAIN TRADE SECRET DATA.

TRADENAME PRODUCTS FOUND ON MINE PROPERTY

COMMODITY NAME: METAL ORES, NEC

MANUFACTURER'S NAME AND TRADENAME PRODUCTS	(1) #WORKERS POTENTIALLY EXPOSED (OBSERVED)	(2) #WORKERS POTENTIALLY EXPOSED (PREDICTED)	(3) %WORKERS POTENTIALLY EXPOSED (PREDICTED)	(4) PREDICTED ANNUAL USAGE
ZEP MANUFACTURING CO.				
ZEP BATTERY CLEANER	3	3	9	24 GALS.
(5) OCCUPATIONS			(6) LOCATIONS	
602 ELECTRICIAN (100%)				
604 MECHANIC (33%)				
				005 SURFACE SHOP (43%)

RUN DATE: 04/30/90

TABLE 5, PAGE 1 NOTE: THIS TABLE DOES NOT CONTAIN TRADE SECRET DATA.

PHYSICAL AGENT CONDITIONS IDENTIFIED ON MINE PROPERTY

COMMODITY NAME: METAL ORES, NEC

PHYSICAL AGENT CONDITION	(1) #WORKERS POTENTIALLY EXPOSED (OBSERVED)	(2) #WORKERS POTENTIALLY EXPOSED (PREDICTED)	(3) %WORKERS POTENTIALLY EXPOSED (PREDICTED)
--------------------------	---	--	--

NOISE

19

19

54

(5)

OCCUPATIONS

079 CRUSHER OPTR (100%)
456 ENGINEER; TECHNICAL SERVICES (100%)
602 ELECTRICIAN (100%)
649 ADMN, SUPERVISORY, MGT PERSNL (50%)
782 FRONT-END LOADER OPTR (100%)

179 BALL, ROD, PEBBLE MILL OPTR (100%)
514 LABORATORY TECHNICIAN (75%)
613 CLEANUP MAN (100%)
673 LEACHING OPERATIONS WORKER (100%)

(6)

LOCATIONS

006 SURFACE CRUSHING (100%)
007 SURFACE GRINDING (100%)
009 SURFACE MISC (33%)
005 SURFACE SHOP (14%)
001 UNDERGROUND MINE (100%)
010 SURFACE MILL (46%)

TEMPERATURE (PROCESS RELATED)

3

3

9

(5)

OCCUPATIONS

514 LABORATORY TECHNICIAN (75%)

(6)

LOCATIONS

009 SURFACE MISC (33%)
010 SURFACE MILL (8%)

WHOLE BODY VIBRATION

9

9

26

(5)

OCCUPATIONS

079 CRUSHER OPTR (100%)
673 LEACHING OPERATIONS WORKER (100%)

(6)

LOCATIONS

006 SURFACE CRUSHING (100%)
009 SURFACE MISC (33%)
010 SURFACE MILL (23%)

RUN DATE: 04/30/90

TABLE 6, PAGE 1 NOTE: THIS TABLE DOES NOT CONTAIN TRADE SECRET DATA.

MUSCULOSKELETAL OVERLOAD CONDITIONS IDENTIFIED ON MINE PROPERTY

COMMODITY NAME: METAL ORES, NEC

MUSCULOSKELETAL CONDITION	(1) #WORKERS POTENTIALLY EXPOSED (OBSERVED)	(2) #WORKERS POTENTIALLY EXPOSED (PREDICTED)	(3) %WORKERS POTENTIALLY EXPOSED (PREDICTED)
DIMINISHED LIGHT	3	3	9
(5) OCCUPATIONS			(6) LOCATIONS
649 ADMN, SUPERVISORY, MGT PERSNL (50%)			001 UNDERGROUND MINE (100%)
LOWER LIMB	3	3	9
(5) OCCUPATIONS			(6) LOCATIONS
649 ADMN, SUPERVISORY, MGT PERSNL (50%)			001 UNDERGROUND MINE (100%)
NECK AND/OR BACK	3	3	9
(5) OCCUPATIONS			(6) LOCATIONS
649 ADMN, SUPERVISORY, MGT PERSNL (50%)			001 UNDERGROUND MINE (100%)

RUN DATE: 04/30/90

TABLE 7, PAGE 1 NOTE: THIS TABLE DOES NOT CONTAIN TRADE SECRET DATA.

WELDING POTENTIAL EXPOSURE

COMMODITY NAME: METAL ORES, NEC

WELDING PROCESS	(1) #WORKERS POTENTIALLY EXPOSED (OBSERVED)	(2) #WORKERS POTENTIALLY EXPOSED (PREDICTED)	(3) %WORKERS POTENTIALLY EXPOSED (PREDICTED)
-----------------	---	--	--

OXYACETYLENE WELDING

4

4

11

(5)

OCCUPATIONS

(6)

LOCATIONS

604 MECHANIC (67%)

005 SURFACE SHOP (57%)

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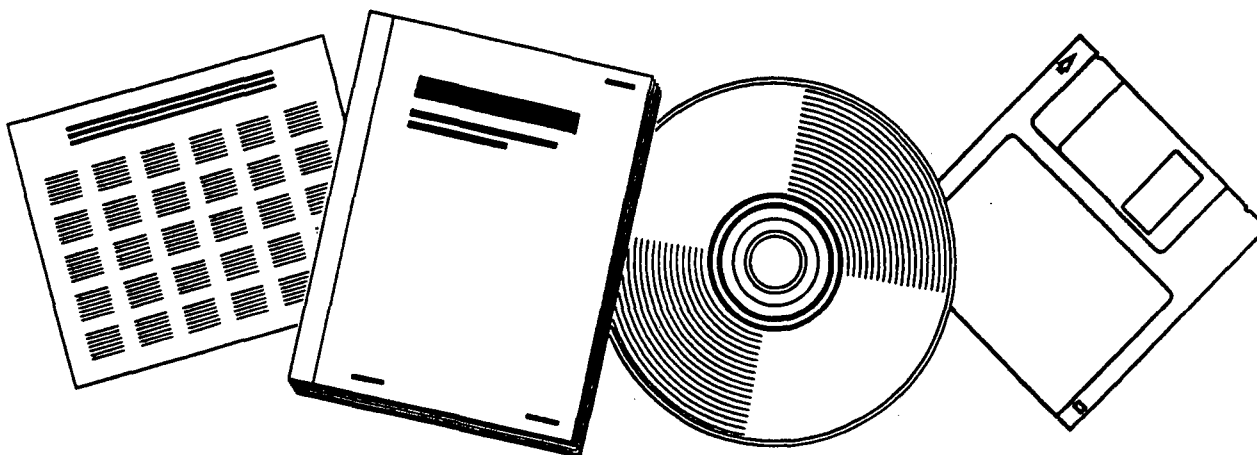
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NATIONAL OCCUPATIONAL HEALTH SURVEY OF MINING, METAL ORES, NEC REPORT

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MORGANTOWN, WV

30 APR 90



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PB97-187561

NATIONAL OCCUPATIONAL HEALTH SURVEY OF MINING

METAL ORES, NEC REPORT

April 30, 1990

COMMENTS SHOULD BE DIRECTED TO:

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NATIONAL OCCUPATIONAL HEALTH SURVEY OF MINING
NIOSH
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16. Abstract (Limit: 200 words) This report provided National Occupational Health Survey of Mining (NOHSM) information for the Metal Ores, NEC commodity. Two sample sites were selected for study. Both of the sites were surveyed between August and September of 1984. The gathered data included occupational health programs and policy information, an inventory of all reported health related substances found on mine property, and a series of worksite observations which detailed potential exposure to chemical and physical agents. Surveyors traveled to each mine site. The data gathered were intended to be used in part to set regulatory priorities and write improved health standards, to improve compliance with existing standards, and to identify and determine research needs and priorities. Potential exposures were identified and associated numbers of workers, the occupations of those workers, and the locations of the mine property were each identified. The data were presented in seven tables: four concerning chemical agents; one concerning musculoskeletal overload conditions; one concerning physical exposure conditions; and one concerning welding processes.			
17. Document Analysis a. Descriptors b. Identifiers/Open-Ended Terms NIOSH-Publication, Mine-safety, Occupational-health, Miners, Mining, Mineral-dusts, Occupational-exposure, Metallic-minerals c. COSATI Field/Group			
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		22. Security Class (This Page)	22. Price

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INTRODUCTION

This is one of a series of reports on the National Occupational Health Survey of Mining (NOHSM), which has been carried out by the National Institute for Occupational Safety and Health (NIOSH). The NOHSM began in May, 1984, as an effort by NIOSH to obtain representative data related to occupational health from the mining industry. This particular report provides NOHSM data for the Metal Ores, NEC commodity. Two (2) sample sites were selected from the Metal Ores, NEC population of active mining facilities. Both of these sites were surveyed between August and September, 1984. The data collected were similar to the information previously obtained in non-mining studies. Specifically, NOHSM data include:

- a. Occupational health program and policy information;
- b. An inventory of all health-related substances found on mine property; and
- c. A series of worksite observations which detail potential exposure to chemical and physical agents.

These data were collected by surveyors who traveled to each mine site. The survey sites were chosen so as to provide a statistically valid representation of each commodity at the time of the NOHSM sample selection. With this representative sample, NIOSH can project survey data to the entire mining industry.

The NOHSM is being carried out primarily as a service to the Mine Safety and Health Administration (MSHA), and secondarily as a source of information for NIOSH investigators and other interested parties. MSHA plans to use the data for three purposes:

1. To set regulatory priorities and write improved health standards;
2. To improve compliance with existing standards; and
3. To identify and determine research needs and priorities.

This transfer of information to MSHA is mandated by Section 201 of the 1977 Federal Mine Safety and Health Amendments Act.

This report identifies potential exposures and provides the associated numbers of workers, the occupations of those workers, and the locations on the mine property where the potential exposures were observed. This information is categorized into seven tables: four concerning chemical agents; one concerning musculoskeletal overload conditions; one concerning physical exposure conditions; and one concerning welding processes. Estimated annual usage information is provided for chemical substances, both generic and trade names.

This report lists the survey findings in a number of individual tables representing the different products and conditions to which workers in the commodity were found to be potentially exposed. The following is a breakdown of these tables, including the number of agents associated with each table, for the Metal Ores, NEC commodity:

Table 1 -- 12 MSHA-regulated chemicals.

Table 2 -- 2 Chemicals that have a NIOSH recommended exposure limit but are not MSHA-regulated.

Table 3 -- 17 Chemicals that have no NIOSH recommended exposure limit and are not MSHA-regulated.

Table 4 -- 33 Trade name products.

Table 5 -- 3 Physical agent conditions.

Table 6 -- 3 Musculoskeletal overload conditions.

Table 7 -- 1 Welding process.

It is extremely important that the limitations of the reported data be recognized. The data do not in any way document exposures or exposure levels. The data only indicate potential exposures. The term "potential exposure" means the agent was observed to be present at one or more worksites in such a way that there was a possibility of workers being exposed to the agent.

Likewise, the usage data presented in some of the tables are only a guide to the projected magnitude of usage and should not be taken as precise information. The usage data are based on estimates provided by mine management. It is expected that these estimates have widely varying accuracy. Occasionally, an item may be represented as having an annual usage of zero with workers observed to be potentially exposed. This may occur because annual usage estimates are generally based on purchases of the 12 months immediately preceding a survey. Therefore, items purchased prior to that 12 month period may be represented as having a zero annual usage rate even though potential exposures were observed during the survey. Other zero annual usage occurrences could involve recyclable items such as some catalysts and desiccants, items such as paints and coatings which are applied prior to the 12 month period but which are present in the workplace in such a way as to present a potential exposure, and obsolete items which are no longer actively used on the property but to which employees could still be potentially exposed in the course of their work. Furthermore, all the estimates were rounded to the nearest whole number, with all quantities between 0 and 1 being reported as 1. Thus, extremely small usage levels may actually be lower than estimated. With this possible exception, NIOSH believes the relative magnitude to be appropriately represented.

Another limitation to be observed is the terminology associated with the commodity, occupation, and location. These terms were adapted directly from MSHA information and applied by NIOSH. NIOSH recognizes that other parties may prefer other commodity, occupation, or location terminology. The MSHA terms were used because of MSHA's close interest in the data.

A separate report will be prepared for each commodity surveyed as a part of the NOHSM. During each segment of the NOHSM, approximately 120 mining operations were surveyed as the sample from a number of selected commodities. A different set of commodities was surveyed during each segment. NIOSH plans for use of these data in the future include:

- a. Encourage MSHA use of the data, as outlined above;
- b. Determine the ranges of exposure to various agents, as required by Section 201 of the 1977 Federal Mine Safety and Health Amendments Act;
- c. Assist in setting priorities for mine-related occupational health research; and
- d. Respond to questions from other parties regarding occupational health aspects of the mining industry.

Information beyond that presented in this report has been collected during the NOHSM. All of the information not protected by trade secret claims is available to the public upon detailed written request. Other categories of available information include:

- a. Management policies related to occupational health;
- b. Duration of potential exposures;
- c. Operations associated with potential exposures;
- d. Controls employed with potential exposures; and
- e. Results of bulk dust analyses for silica, metals, and fibers.

Interested parties should direct their requests to:

Project Officer
National Occupational Health Survey of Mining
NIOSH
Division of Respiratory Disease Studies
944 Chestnut Ridge Road, Room 140
Morgantown, WV 26505-2888

TABLE DEFINITIONS

AGENT NAME	(1) # WORKERS POTENTIALLY EXPOSED (OBSERVED)	(2) # WORKERS POTENTIALLY EXPOSED (PREDICTED)	(3) % WORKERS POTENTIALLY EXPOSED (PREDICTED)	(4) PREDICTED ANNUAL USAGE	(5) OCCUPATIONS	(6) LOCATIONS

Column (1) represents the total number of workers in occupations within this commodity in which a potential exposure to an agent was observed or identified through questioning of mine management or workers. This number only includes workers from the NOHSM sample sites. A "potential exposure" means the agent was observed to be present at the worksite in such a way that there was a possibility of workers being exposed to the agent. The potential exposures do not imply any exposure level, nor do they imply the absence or presence of controls.

Column (2) represents the number of workers within this commodity predicted to be potentially exposed to each agent. This number reflects a projection to this entire commodity, based on data obtained at NOHSM sample sites.

Column (3) represents the percentage of workers within this commodity predicted to be potentially exposed to each agent. Column (3) is obtained by dividing column (2) by the projected total population of workers in the commodity.

Column (4) represents the number of gallons (GAL) or the number of pounds (LBS) of each chemical that NIOSH has estimated to be used per year. This number is obtained from projections based on estimates of usage provided by mine management, and should only be used in determining the order of magnitude of usage. It should not be used as a precise figure. This number reflects a projection to this entire commodity, based on data obtained at NOHSM sample sites. In some cases, where usage data was unavailable, a "*" appears in this column.

Column (5) contains the occupations observed to have a potential for exposure to this agent. In each occupation, the percentage of workers with a potential for exposure to the agent is given in parentheses. This number only includes data obtained at NOHSM sample sites.

Column (6) contains the locations where workers were observed to have a potential for exposure to this agent at the NOHSM sample sites. The percentage of workers in each listed location with a potential exposure to the agent is given in parentheses. This number only includes data obtained at NOHSM sample sites.

RUN DATE: 04/30/90

TABLE 1, PAGE 1 NOTE: THIS TABLE DOES NOT CONTAIN TRADE SECRET DATA.

MSHA REGULATED CHEMICALS FOUND ON MINE PROPERTY

COMMODITY NAME: METAL ORES, NEC

CHEMICAL NAME	(1) #WORKERS POTENTIALLY EXPOSED (OBSERVED)	(2) #WORKERS POTENTIALLY EXPOSED (PREDICTED)	(3) %WORKERS POTENTIALLY EXPOSED (PREDICTED)	(4) PREDICTED ANNUAL USAGE
AMMONIUM CHLORIDE	1	1	3	12,000 LBS.
(5) OCCUPATIONS			(6) LOCATIONS	
673 LEACHING OPERATIONS WORKER (100%)			010 SURFACE MILL (8%)	
LEAD NITRATE	1	1	3	20,278 LBS.
(5) OCCUPATIONS			(6) LOCATIONS	
673 LEACHING OPERATIONS WORKER (100%)			010 SURFACE MILL (8%)	
LEAD OXIDE	2	2	6	2,500 LBS.
(5) OCCUPATIONS			(6) LOCATIONS	
514 LABORATORY TECHNICIAN (50%)			009 SURFACE MISC (33%)	
MERCURIC CHLORIDE	1	1	3	1 LBS.
(5) OCCUPATIONS			(6) LOCATIONS	
514 LABORATORY TECHNICIAN (25%)			009 SURFACE MISC (17%)	

MSHA REGULATED CHEMICALS FOUND ON MINE PROPERTY

COMMODITY NAME: METAL ORES, NEC

CHEMICAL NAME	(1) #WORKERS POTENTIALLY EXPOSED (OBSERVED)	(2) #WORKERS POTENTIALLY EXPOSED (PREDICTED)	(3) %WORKERS POTENTIALLY EXPOSED (PREDICTED)	(4) PREDICTED ANNUAL USAGE
MERCURY	1	1	3	760 LBS.
(5) OCCUPATIONS			(6) LOCATIONS	
673 LEACHING OPERATIONS WORKER (100%)			010 SURFACE MILL (8%)	
NITRIC ACID	3	3	9	336 LBS.
(5) OCCUPATIONS			(6) LOCATIONS	
514 LABORATORY TECHNICIAN (75%)			009 SURFACE MISC (50%)	
PYRIDINE	1	1	3	1 GALS.
(5) OCCUPATIONS			(6) LOCATIONS	
514 LABORATORY TECHNICIAN (25%)			009 SURFACE MISC (17%)	
SILICA SAND	2	2	6	500 LBS.
(5) OCCUPATIONS			(6) LOCATIONS	
514 LABORATORY TECHNICIAN (50%)			009 SURFACE MISC (33%)	

RUN DATE: 04/30/90

TABLE 1, PAGE 3 NOTE: THIS TABLE DOES NOT CONTAIN TRADE SECRET DATA.

MSHA REGULATED CHEMICALS FOUND ON MINE PROPERTY

COMMODITY NAME: METAL ORES, NEC

CHEMICAL NAME	(1) #WORKERS POTENTIALLY EXPOSED (OBSERVED)	(2) #WORKERS POTENTIALLY EXPOSED (PREDICTED)	(3) %WORKERS POTENTIALLY EXPOSED (PREDICTED)	(4) PREDICTED ANNUAL USAGE
SODIUM CYANIDE	14	14	40	8,801 LBS.
(5) OCCUPATIONS			(6) LOCATIONS	
179 BALL, ROD, PEBBLE MILL OPTR (100%)	456 ENGINEER; TECHNICAL SERVICES (100%)		007 SURFACE GRINDING (100%)	
514 LABORATORY TECHNICIAN (50%)	602 ELECTRICIAN (100%)		009 SURFACE MISC (17%)	
649 ADMN, SUPERVISORY, MGT PERSNL (50%)	679 FLOTATION/CONCTR OPTR (100%)		005 SURFACE SHOP (14%)	
			010 SURFACE MILL (38%)	
			008 SURFACE FLTN, RGTS (100%)	
SODIUM HYDROXIDE	2	2	6	23,600 LBS.
(5) OCCUPATIONS			(6) LOCATIONS	
514 LABORATORY TECHNICIAN (25%)	673 LEACHING OPERATIONS WORKER (100%)		009 SURFACE MISC (17%)	
			010 SURFACE MILL (8%)	
SULFURIC ACID	1	1	3	7 GALS.
(5) OCCUPATIONS			(6) LOCATIONS	
514 LABORATORY TECHNICIAN (25%)			009 SURFACE MISC (17%)	

RUN DATE: 04/30/90

TABLE 1, PAGE 4 NOTE: THIS TABLE DOES NOT CONTAIN TRADE SECRET DATA.

MSHA REGULATED CHEMICALS FOUND ON MINE PROPERTY

COMMODITY NAME: METAL ORES, NEC

CHEMICAL NAME	(1) #WORKERS POTENTIALLY EXPOSED (OBSERVED)	(2) #WORKERS POTENTIALLY EXPOSED (PREDICTED)	(3) %WORKERS POTENTIALLY EXPOSED (PREDICTED)	(4) PREDICTED ANNUAL USAGE
TRICHLOROETHYLENE	4	4	11	10 GALS.
(5) OCCUPATIONS	(6) LOCATIONS			
604 MECHANIC (67%)	005 SURFACE SHOP (57%)			

RUN DATE: 04/30/90

TABLE 2, PAGE 1 NOTE: THIS TABLE DOES NOT CONTAIN TRADE SECRET DATA.

CHEMICALS FOUND ON MINE PROPERTY THAT HAVE A NIOSH RECOMMENDED EXPOSURE LIMIT BUT ARE NOT REGULATED BY MSHA

COMMODITY NAME: METAL ORES, NEC

CHEMICAL NAME	(1) #WORKERS POTENTIALLY EXPOSED (OBSERVED)	(2) #WORKERS POTENTIALLY EXPOSED (PREDICTED)	(3) %WORKERS POTENTIALLY EXPOSED (PREDICTED)	(4) PREDICTED ANNUAL USAGE
DIESEL FUEL NO. 1	9	9	26	6,000 GALS.
(5) OCCUPATIONS			(6) LOCATIONS	
079 CRUSHER OPTR (100%)				006 SURFACE CRUSHING (100%)
613 CLEANUP MAN (100%)				005 SURFACE SHOP (29%)
				010 SURFACE MILL (23%)
DIESEL FUEL NO. 2	2	2	6	300 GALS.
(5) OCCUPATIONS			(6) LOCATIONS	
649 ADMN, SUPERVISORY, MGT PERSNL (33%)				001 UNDERGROUND MINE (67%)

RUN DATE: 04/30/90

TABLE 3, PAGE 1 NOTE: THIS TABLE DOES NOT CONTAIN TRADE SECRET DATA.

CHEMICALS FOUND ON MINE PROPERTY THAT HAVE NO NIOSH RECOMMENDATION OR MSHA EXPOSURE LIMIT

COMMODITY NAME: METAL ORES, NEC

CHEMICAL NAME	(1) #WORKERS POTENTIALLY EXPOSED (OBSERVED)	(2) #WORKERS POTENTIALLY EXPOSED (PREDICTED)	(3) %WORKERS POTENTIALLY EXPOSED (PREDICTED)	(4) PREDICTED ANNUAL USAGE
BONE ASH	2	2	6	1,000 LBS.
(5) OCCUPATIONS			(6) LOCATIONS	
514 LABORATORY TECHNICIAN (50%)			009 SURFACE MISC (33%)	
BORAX	2	2	6	600 LBS.
(5) OCCUPATIONS			(6) LOCATIONS	
514 LABORATORY TECHNICIAN (50%)			009 SURFACE MISC (33%)	
CALCIUM HYDROXIDE	11	11	31	328,800 LBS.
(5) OCCUPATIONS			(6) LOCATIONS	
456 ENGINEER; TECHNICAL SERVICES (100%)			005 SURFACE SHOP (14%)	
602 ELECTRICIAN (100%)			010 SURFACE MILL (46%)	
673 LEACHING OPERATIONS WORKER (100%)			008 SURFACE FLTN, RGTS (100%)	
CALCIUM HYPOCHLORITE	10	10	29	285,000 LBS.
(5) OCCUPATIONS			(6) LOCATIONS	
456 ENGINEER; TECHNICAL SERVICES (100%)			005 SURFACE SHOP (14%)	
602 ELECTRICIAN (100%)			010 SURFACE MILL (38%)	

(CONTINUED NEXT PAGE)

RUN DATE: 04/30/90

TABLE 3, PAGE 2

NOTE: THIS TABLE DOES NOT CONTAIN TRADE SECRET DATA.

CHEMICALS FOUND ON MINE PROPERTY THAT HAVE NO NIOSH RECOMMENDATION OR MSHA EXPOSURE LIMIT

COMMODITY NAME: METAL ORES, NEC				
CHEMICAL NAME	(1) #WORKERS POTENTIALLY EXPOSED (OBSERVED)	(2) #WORKERS POTENTIALLY EXPOSED (PREDICTED)	(3) %WORKERS POTENTIALLY EXPOSED (PREDICTED)	(4) PREDICTED ANNUAL USAGE
CALCIUM HYPOCHLORITE (CONTINUED)	10	10	29	285,000 LBS.
(5) OCCUPATIONS				
(6) LOCATIONS				
679 FLOTATION/CONCTR OPTR (100%)				008 SURFACE FLTN, RGTS (100%)
CARBONIC ACID DISODIUM SALT (8CI) (9CI)	2	2	6	900 LBS.
(5) OCCUPATIONS				
(6) LOCATIONS				
514 LABORATORY TECHNICIAN (50%)				009 SURFACE MISC (33%)
CARBONIC ACID, DITHIO, 0-PENTYL ESTER, POTASSIUM SALT	10	10	29	8,400 LBS.
(5) OCCUPATIONS				
(6) LOCATIONS				
456 ENGINEER; TECHNICAL SERVICES (100%)				005 SURFACE SHOP (14%)
602 ELECTRICIAN (100%)				010 SURFACE MILL (38%)
679 FLOTATION/CONCTR OPTR (100%)				008 SURFACE FLTN, RGTS (100%)
FLOUR, NEC	2	2	6	30 LBS.
(5) OCCUPATIONS				
(6) LOCATIONS				
514 LABORATORY TECHNICIAN (50%)				009 SURFACE MISC (33%)

RUN DATE: 04/30/90

TABLE 3, PAGE 3 NOTE: THIS TABLE DOES NOT CONTAIN TRADE SECRET DATA.

CHEMICALS FOUND ON MINE PROPERTY THAT HAVE NO NIOSH RECOMMENDATION OR MSHA EXPOSURE LIMIT

COMMODITY NAME: METAL ORES, NEC

CHEMICAL NAME	(1) #WORKERS POTENTIALLY EXPOSED (OBSERVED)	(2) #WORKERS POTENTIALLY EXPOSED (PREDICTED)	(3) %WORKERS POTENTIALLY EXPOSED (PREDICTED)	(4) PREDICTED ANNUAL USAGE
GASOLINE-LEADED	2	2	6	200 GALS.
(5) OCCUPATIONS			(6) LOCATIONS	
604 MECHANIC (33%)			005 SURFACE SHOP (29%)	
MAGNESIUM CHLORIDE	1	1	3	1 LBS.
(5) OCCUPATIONS			(6) LOCATIONS	
514 LABORATORY TECHNICIAN (25%)			009 SURFACE MISC (17%)	
NITRIC ACID SODIUM SALT	3	3	9	60 LBS.
(5) OCCUPATIONS			(6) LOCATIONS	
514 LABORATORY TECHNICIAN (50%)		673 LEACHING OPERATIONS WORKER (100%)	009 SURFACE MISC (33%) 010 SURFACE MILL (8%)	
POLYPROPYLENE GLYCOL, METHYL ESTER	10	10	29	15,300 LBS.
(5) OCCUPATIONS			(6) LOCATIONS	
456 ENGINEER; TECHNICAL SERVICES (100%) 602 ELECTRICIAN (100%) 679 FLOTATION/CONCTR OPTR (100%)		514 LABORATORY TECHNICIAN (25%) 649 ADMN, SUPERVISORY, MGT PERSNL (50%)	005 SURFACE SHOP (14%) 010 SURFACE MILL (38%) 008 SURFACE FLTN, RGTS (100%)	

RUN DATE: 04/30/90

TABLE 3, PAGE 4 NOTE: THIS TABLE DOES NOT CONTAIN TRADE SECRET DATA.

CHEMICALS FOUND ON MINE PROPERTY THAT HAVE NO NIOSH RECOMMENDATION OR MSHA EXPOSURE LIMIT

COMMODITY NAME: METAL ORES, NEC

CHEMICAL NAME	(1) #WORKERS POTENTIALLY EXPOSED (OBSERVED)	(2) #WORKERS POTENTIALLY EXPOSED (PREDICTED)	(3) %WORKERS POTENTIALLY EXPOSED (PREDICTED)	(4) PREDICTED ANNUAL USAGE
POTASSIUM PERMANGANATE	1	1	3	1 LBS.
(5) OCCUPATIONS			(6) LOCATIONS	
514 LABORATORY TECHNICIAN (25%)			009 SURFACE MISC (17%)	
SODIUM ETHYL XANTHATE	10	10	29	12,800 LBS.
(5) OCCUPATIONS			(6) LOCATIONS	
456 ENGINEER; TECHNICAL SERVICES (100%)			005 SURFACE SHOP (14%)	
602 ELECTRICIAN (100%)			010 SURFACE MILL (38%)	
679 FLOTATION/CONCTR OPTR (100%)			008 SURFACE FLTN, RGTS (100%)	
SODIUM GLUCONATE	1	1	3	10,000 LBS.
(5) OCCUPATIONS			(6) LOCATIONS	
673 LEACHING OPERATIONS WORKER (100%)			010 SURFACE MILL (8%)	
SODIUM PARA-TOLUENESULFONCHLORAMIDE	1	1	3	1 LBS.
(5) OCCUPATIONS			(6) LOCATIONS	
514 LABORATORY TECHNICIAN (25%)			009 SURFACE MISC (17%)	

RUN DATE: 04/30/90

TABLE 3, PAGE 5

NOTE: THIS TABLE DOES NOT CONTAIN TRADE SECRET DATA.

CHEMICALS FOUND ON MINE PROPERTY THAT HAVE NO NIOSH RECOMMENDATION OR MSHA EXPOSURE LIMIT

COMMODITY NAME: METAL ORES, NEC

CHEMICAL NAME	(1) #WORKERS POTENTIALLY EXPOSED (OBSERVED)	(2) #WORKERS POTENTIALLY EXPOSED (PREDICTED)	(3) %WORKERS POTENTIALLY EXPOSED (PREDICTED)	(4) PREDICTED ANNUAL USAGE
SULFURIC ACID COPPER(2+) SALT (1:1)	10	10	29	140,400 LBS.
(5) OCCUPATIONS			(6) LOCATIONS	
456 ENGINEER; TECHNICAL SERVICES (100%)	514 LABORATORY TECHNICIAN (25%)		005 SURFACE SHOP (14%)	
602 ELECTRICIAN (100%)	649 ADMN, SUPERVISORY, MGT PERSONL (50%)		010 SURFACE MILL (38%)	
679 FLOTATION/CONCTR OPTR (100%)			008 SURFACE FLTN, RGTS (100%)	
ZINC SULFATE	13	13	37	146,600 LBS.
(5) OCCUPATIONS			(6) LOCATIONS	
179 BALL, ROD, PEBBLE MILL OPTR (100%)	456 ENGINEER; TECHNICAL SERVICES (100%)		007 SURFACE GRINDING (100%)	
514 LABORATORY TECHNICIAN (25%)	602 ELECTRICIAN (100%)		005 SURFACE SHOP (14%)	
649 ADMN, SUPERVISORY, MGT PERSONL (50%)	679 FLOTATION/CONCTR OPTR (100%)		010 SURFACE MILL (38%)	
			008 SURFACE FLTN, RGTS (100%)	

RUN DATE: 04/30/90

TABLE 4, PAGE 1

NOTE: THIS TABLE DOES NOT CONTAIN TRADE SECRET DATA.

TRADENAME PRODUCTS FOUND ON MINE PROPERTY

COMMODITY NAME: METAL ORES, NEC

MANUFACTURER'S NAME AND TRADENAME PRODUCTS	(1) #WORKERS POTENTIALLY EXPOSED (OBSERVED)	(2) #WORKERS POTENTIALLY EXPOSED (PREDICTED)	(3) %WORKERS POTENTIALLY EXPOSED (PREDICTED)	(4) PREDICTED ANNUAL USAGE
AERVOE-PACIFIC CO.				
COR-ON ENGINE ENAMEL, CHEVY MOLYORANGE	2	2	6	20 LBS.
(5)				
OCCUPATIONS	(6) LOCATIONS			
604 MECHANIC (33%)	005 SURFACE SHOP (29%)			
AMERICAN CYANAMID				
AERO PROMOTER #404	13	13	37	10,500 LBS.
(5)				
OCCUPATIONS	(6) LOCATIONS			
179 BALL, ROD, PEBBLE MILL OPTR (100%)	007 SURFACE GRINDING (100%)			
514 LABORATORY TECHNICIAN (25%)	005 SURFACE SHOP (14%)			
649 ADMN, SUPERVISORY, MGT PERSNL (50%)	010 SURFACE MILL (38%)			
	008 SURFACE FLTN, RGTS (100%)			
AMERICAN PARTS CO., INC.				
BIG A SERVICE LINE UNIVERSAL BLACK 14-203, AEROSOL	4	4	11	5 LBS.
(5)				
OCCUPATIONS	(6) LOCATIONS			
604 MECHANIC (67%)	005 SURFACE SHOP (57%)			

RUN DATE: 04/30/90

TABLE 4, PAGE 2 NOTE: THIS TABLE DOES NOT CONTAIN TRADE SECRET DATA.

TRADENAME PRODUCTS FOUND ON MINE PROPERTY

COMMODITY NAME: METAL ORES, NEC

MANUFACTURER'S NAME AND TRADENAME PRODUCTS	(1) #WORKERS POTENTIALLY EXPOSED (OBSERVED)	(2) #WORKERS POTENTIALLY EXPOSED (PREDICTED)	(3) %WORKERS POTENTIALLY EXPOSED (PREDICTED)	(4) PREDICTED ANNUAL USAGE
CERAMICS				
CEMENT-PORTLAND TYPE	2	2	6	200 LBS.
(5) OCCUPATIONS			(6) LOCATIONS	
514 LABORATORY TECHNICIAN (50%)			009 SURFACE MISC (33%)	
CHEVRON OIL				
CHEVRON OIL CO. TURBINE OIL 100	4	4	11	30 GALS.
(5) OCCUPATIONS			(6) LOCATIONS	
604 MECHANIC (67%)			010 SURFACE MILL (31%)	
CHEVRON PINION GREASE, 100 GB	6	6	17	150 GALS.
(5) OCCUPATIONS			(6) LOCATIONS	
604 MECHANIC (100%)			005 SURFACE SHOP (29%) 010 SURFACE MILL (31%)	

RUN DATE: 04/30/90

TABLE 4, PAGE 3 NOTE: THIS TABLE DOES NOT CONTAIN TRADE SECRET DATA.

TRADENAME PRODUCTS FOUND ON MINE PROPERTY

COMMODITY NAME: METAL ORES, NEC

MANUFACTURER'S NAME AND TRADENAME PRODUCTS	(1) #WORKERS POTENTIALLY EXPOSED (OBSERVED)	(2) #WORKERS POTENTIALLY EXPOSED (PREDICTED)	(3) %WORKERS POTENTIALLY EXPOSED (PREDICTED)	(4) PREDICTED ANNUAL USAGE
CRC CHEMICALS				
CRC 3-36, AEROSOL	4	4	11	7 LBS.
(5) OCCUPATIONS			(6) LOCATIONS	
604 MECHANIC (67%)			005 SURFACE SHOP (57%)	
DEVCON CORP.				
SILICON SEALANT	2	2	6	82 LBS.
(5) OCCUPATIONS			(6) LOCATIONS	
604 MECHANIC (33%)			005 SURFACE SHOP (29%)	
EAGLE PICHER IND., INC				
EAGLE PICHER FLOOR DRY 85	6	6	17	2,640 LBS.
(5) OCCUPATIONS			(6) LOCATIONS	
604 MECHANIC (100%)			005 SURFACE SHOP (86%)	

RUN DATE: 04/30/90

TABLE 4, PAGE 4 NOTE: THIS TABLE DOES NOT CONTAIN TRADE SECRET DATA.

TRADENAME PRODUCTS FOUND ON MINE PROPERTY

COMMODITY NAME: METAL ORES, NEC

MANUFACTURER'S NAME AND TRADENAME PRODUCTS	(1) #WORKERS POTENTIALLY EXPOSED (OBSERVED)	(2) #WORKERS POTENTIALLY EXPOSED (PREDICTED)	(3) %WORKERS POTENTIALLY EXPOSED (PREDICTED)	(4) PREDICTED ANNUAL USAGE
FISKE BROTHERS REFINING CO.				
LUBRIPLATE/GEAR LUBE	2	2	6	240 LBS.
(5) OCCUPATIONS			(6) LOCATIONS	
604 MECHANIC (33%)			005 SURFACE SHOP (29%)	
LINCOLN ELECTRIC CO.				
LINCOLN 6013	4	4	11	100 LBS.
(5) OCCUPATIONS			(6) LOCATIONS	
604 MECHANIC (67%)			005 SURFACE SHOP (57%)	
LINCOLN 7018	4	4	11	350 LBS.
(5) OCCUPATIONS			(6) LOCATIONS	
604 MECHANIC (67%)			005 SURFACE SHOP (57%)	

TRADENAME PRODUCTS FOUND ON MINE PROPERTY

COMMODITY NAME: METAL ORES, NEC

MANUFACTURER'S NAME AND TRADENAME PRODUCTS	(1) #WORKERS POTENTIALLY EXPOSED (OBSERVED)	(2) #WORKERS POTENTIALLY EXPOSED (PREDICTED)	(3) %WORKERS POTENTIALLY EXPOSED (PREDICTED)	(4) PREDICTED ANNUAL USAGE
-----	-----	-----	-----	-----

MCKEESON CHEMICAL CO.

TERGITOL 15-5-3

20,780 LBS.

(5)

OCCUPATIONS

456 ENGINEER; TECHNICAL SERVICES (100%)	514 LABORATORY TECHNICIAN (25%)	11	31	20,780 LBS.
602 ELECTRICIAN (100%)	649 ADMN, SUPERVISORY, MGT PERSONL (50%)			
673 LEACHING OPERATIONS WORKER (100%)	679 FLOTATION/CONCTR OPTR (100%)			

(6)

LOCATIONS

005 SURFACE SHOP (14%)	29	6,000 LBS.
010 SURFACE MILL (46%)		
008 SURFACE FLTN, RGTS (100%)		

NALCO/FIELD SYSTEMS DEPARTMENT

NALCO 7852

10

6,000 LBS.

(5)

OCCUPATIONS

456 ENGINEER; TECHNICAL SERVICES (100%)	514 LABORATORY TECHNICIAN (25%)	10	10	2,000 LBS.
602 ELECTRICIAN (100%)	649 ADMN, SUPERVISORY, MGT PERSONL (50%)			
679 FLOTATION/CONCTR OPTR (100%)				

(6)

LOCATIONS

005 SURFACE SHOP (14%)	29	2,000 LBS.
010 SURFACE MILL (38%)		
008 SURFACE FLTN, RGTS (100%)		

NALCO 7872

10

2,000 LBS.

(5)

OCCUPATIONS

456 ENGINEER; TECHNICAL SERVICES (100%)	514 LABORATORY TECHNICIAN (25%)	10	10	2,000 LBS.
602 ELECTRICIAN (100%)	649 ADMN, SUPERVISORY, MGT PERSONL (50%)			
679 FLOTATION/CONCTR OPTR (100%)				

(6)

LOCATIONS

005 SURFACE SHOP (14%)	29	2,000 LBS.
010 SURFACE MILL (38%)		
008 SURFACE FLTN, RGTS (100%)		

RUN DATE: 04/30/90

TABLE 4, PAGE 6 NOTE: THIS TABLE DOES NOT CONTAIN TRADE SECRET DATA.

TRADENAME PRODUCTS FOUND ON MINE PROPERTY

COMMODITY NAME: METAL ORES, NEC

MANUFACTURER'S NAME AND TRADENAME PRODUCTS	(1) #WORKERS POTENTIALLY EXPOSED (OBSERVED)	(2) #WORKERS POTENTIALLY EXPOSED (PREDICTED)	(3) %WORKERS POTENTIALLY EXPOSED (PREDICTED)	(4) PREDICTED ANNUAL USAGE
PERMATEX INDUSTRIAL DIVISION				
PERMATEX ENGINE STARTING FLUID	4	4	11	17 LBS.
(5) OCCUPATIONS			(6) LOCATIONS	
604 MECHANIC (33%)		782 FRONT-END LOADER OPTR (100%)	005 SURFACE SHOP (29%) 010 SURFACE MILL (15%)	
PERMATEX INDUSTRIAL BELT DRESSING	4	4	11	120 LBS.
(5) OCCUPATIONS			(6) LOCATIONS	
604 MECHANIC (67%)			010 SURFACE MILL (31%)	
RUST-OLEUM CORP.				
RUST-OLEUM HARD HAT INDUSTRIAL COATING METAL PRIMER, AEROSOL	4	4	11	90 LBS.
(5) OCCUPATIONS			(6) LOCATIONS	
604 MECHANIC (67%)			005 SURFACE SHOP (57%)	

RUN DATE: 04/30/90

TABLE 4, PAGE 7 NOTE: THIS TABLE DOES NOT CONTAIN TRADE SECRET DATA.

TRADENAME PRODUCTS FOUND ON MINE PROPERTY

COMMODITY NAME: METAL ORES, NEC

MANUFACTURER'S NAME AND TRADENAME PRODUCTS	(1) #WORKERS POTENTIALLY EXPOSED (OBSERVED)	(2) #WORKERS POTENTIALLY EXPOSED (PREDICTED)	(3) %WORKERS POTENTIALLY EXPOSED (PREDICTED)	(4) PREDICTED ANNUAL USAGE
TEXACO, INC.				
TEXACO HYTEX GREASE #6	4	4	11	200 LBS.
(5) OCCUPATIONS			(6) LOCATIONS	
604 MECHANIC (67%)			010 SURFACE MILL (31%)	
THE WHITMORE MFG. CO.				
WIRE ROPE LUBRICANT	2	2	6	458 LBS.
(5) OCCUPATIONS			(6) LOCATIONS	
649 ADMN, SUPERVISORY, MGT PERSNL (33%)			001 UNDERGROUND MINE (67%)	
UNION OIL CO. OF CALIFORNIA				
EXTRA HEAVY DUTY NL GEAR LUBE, EP S	4	4	11	110 GALS.
(5) OCCUPATIONS			(6) LOCATIONS	
604 MECHANIC (67%)			010 SURFACE MILL (31%)	

RUN DATE: 04/30/90

TABLE 4, PAGE 8 NOTE: THIS TABLE DOES NOT CONTAIN TRADE SECRET DATA.

TRADENAME PRODUCTS FOUND ON MINE PROPERTY

COMMODITY NAME: METAL ORES, NEC

MANUFACTURER'S NAME AND TRADENAME PRODUCTS	(1) #WORKERS POTENTIALLY EXPOSED (OBSERVED)	(2) #WORKERS POTENTIALLY EXPOSED (PREDICTED)	(3) %WORKERS POTENTIALLY EXPOSED (PREDICTED)	(4) PREDICTED ANNUAL USAGE
UNION OIL CO. OF CALIFORNIA				
EXTRA HEAVY DUTY NL GEAR LUBE, EP 2	4	4	11	300 GALS.
(5) OCCUPATIONS			(6) LOCATIONS	
604 MECHANIC (67%)			010 SURFACE MILL (31%)	
EXTRA HEAVY DUTY NL GEAR LUBE, EP 4				
(5) OCCUPATIONS	4	4	11	110 GALS.
604 MECHANIC (67%)			(6) LOCATIONS	
			010 SURFACE MILL (31%)	
UNION MOLY HD-2				
(5) OCCUPATIONS	4	4	11	25 LBS.
604 MECHANIC (67%)			(6) LOCATIONS	
			010 SURFACE MILL (31%)	
UNION 10W MOTOR OIL				
(5) OCCUPATIONS	6	6	17	55 GALS.
604 MECHANIC (67%)			(6) LOCATIONS	
			010 SURFACE MILL (46%)	
782 FRONT-END LOADER OPTR (100%)				
(5) OCCUPATIONS			(6) LOCATIONS	
604 MECHANIC (67%)			010 SURFACE MILL (46%)	

RUN DATE: 04/30/90

TABLE 4, PAGE 9 NOTE: THIS TABLE DOES NOT CONTAIN TRADE SECRET DATA.

TRADENAME PRODUCTS FOUND ON MINE PROPERTY

COMMODITY NAME: METAL ORES, NEC

MANUFACTURER'S NAME AND TRADENAME PRODUCTS	(1) #WORKERS POTENTIALLY EXPOSED (OBSERVED)	(2) #WORKERS POTENTIALLY EXPOSED (PREDICTED)	(3) %WORKERS POTENTIALLY EXPOSED (PREDICTED)	(4) PREDICTED ANNUAL USAGE
UNION OIL CO. OF CALIFORNIA				
UNION 76 MPGGEAR LUBE LS, SAE 80W-90	2	2	6	360 LBS.
(5) OCCUPATIONS			(6) LOCATIONS	
604 MECHANIC (33%)			005 SURFACE SHOP (29%)	
UNOBA LD-2 GREASE				
(5) OCCUPATIONS	4	4	11	360 LBS.
604 MECHANIC (67%)			(6) LOCATIONS	
			010 SURFACE MILL (31%)	
UNOBA MOLY HD-GREASE				
(5) OCCUPATIONS	4	4	11	480 LBS.
604 MECHANIC (67%)			(6) LOCATIONS	
			010 SURFACE MILL (31%)	
15W/40 GUARDOL MOTOR OIL				
(5) OCCUPATIONS	6	6	17	650 GALS.
604 MECHANIC (100%)			(6) LOCATIONS	
			005 SURFACE SHOP (29%)	
			010 SURFACE MILL (31%)	

RUN DATE: 04/30/90

TABLE 4, PAGE 10 NOTE: THIS TABLE DOES NOT CONTAIN TRADE SECRET DATA.

TRADENAME PRODUCTS FOUND ON MINE PROPERTY

COMMODITY NAME: METAL ORES, NEC

MANUFACTURER'S NAME AND TRADENAME PRODUCTS	(1) #WORKERS POTENTIALLY EXPOSED (OBSERVED)	(2) #WORKERS POTENTIALLY EXPOSED (PREDICTED)	(3) %WORKERS POTENTIALLY EXPOSED (PREDICTED)	(4) PREDICTED ANNUAL USAGE
UNION OIL CO. OF CALIFORNIA				
90W OIL	6	6	17	50 GALS.
(5) OCCUPATIONS			(6) LOCATIONS	
604 MECHANIC (100%)			005 SURFACE SHOP (29%) 010 SURFACE MILL (31%)	
WAGNER ELECTRIC CO.				
WAGNER BRAKE FLUID 21-B, SUPER HEAVY DUTY	2	2	6	10 GALS.
(5) OCCUPATIONS			(6) LOCATIONS	
604 MECHANIC (33%)			005 SURFACE SHOP (29%)	
WOODHILL/PERMATEX				
PERMATEX DISC BRAKE QUIET, PART #127MA, AEROSOL	2	2	6	60 GALS.
(5) OCCUPATIONS			(6) LOCATIONS	
604 MECHANIC (33%)			005 SURFACE SHOP (29%)	

RUN DATE: 04/30/90

TABLE 4, PAGE 11 NOTE: THIS TABLE DOES NOT CONTAIN TRADE SECRET DATA.

TRADENAME PRODUCTS FOUND ON MINE PROPERTY

COMMODITY NAME: METAL ORES, NEC

MANUFACTURER'S NAME AND TRADENAME PRODUCTS	(1) #WORKERS POTENTIALLY EXPOSED (OBSERVED)	(2) #WORKERS POTENTIALLY EXPOSED (PREDICTED)	(3) %WORKERS POTENTIALLY EXPOSED (PREDICTED)	(4) PREDICTED ANNUAL USAGE
ZEP MANUFACTURING CO.				
ZEP BATTERY CLEANER	3	3	9	24 GALS.
(5) OCCUPATIONS			(6) LOCATIONS	
602 ELECTRICIAN (100%)				
604 MECHANIC (33%)				
				005 SURFACE SHOP (43%)

RUN DATE: 04/30/90

TABLE 5, PAGE 1 NOTE: THIS TABLE DOES NOT CONTAIN TRADE SECRET DATA.

PHYSICAL AGENT CONDITIONS IDENTIFIED ON MINE PROPERTY

COMMODITY NAME: METAL ORES, NEC

PHYSICAL AGENT CONDITION	(1) #WORKERS POTENTIALLY EXPOSED (OBSERVED)	(2) #WORKERS POTENTIALLY EXPOSED (PREDICTED)	(3) %WORKERS POTENTIALLY EXPOSED (PREDICTED)
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NOISE

19

19

54

(5)

OCCUPATIONS

079 CRUSHER OPTR (100%)
456 ENGINEER; TECHNICAL SERVICES (100%)
602 ELECTRICIAN (100%)
649 ADMN, SUPERVISORY, MGT PERSNL (50%)
782 FRONT-END LOADER OPTR (100%)

179 BALL, ROD, PEBBLE MILL OPTR (100%)
514 LABORATORY TECHNICIAN (75%)
613 CLEANUP MAN (100%)
673 LEACHING OPERATIONS WORKER (100%)

(6)

LOCATIONS

006 SURFACE CRUSHING (100%)
007 SURFACE GRINDING (100%)
009 SURFACE MISC (33%)
005 SURFACE SHOP (14%)
001 UNDERGROUND MINE (100%)
010 SURFACE MILL (46%)

TEMPERATURE (PROCESS RELATED)

3

3

9

(5)

OCCUPATIONS

514 LABORATORY TECHNICIAN (75%)

(6)

LOCATIONS

009 SURFACE MISC (33%)
010 SURFACE MILL (8%)

WHOLE BODY VIBRATION

9

9

26

(5)

OCCUPATIONS

079 CRUSHER OPTR (100%)
673 LEACHING OPERATIONS WORKER (100%)

(6)

LOCATIONS

006 SURFACE CRUSHING (100%)
009 SURFACE MISC (33%)
010 SURFACE MILL (23%)

RUN DATE: 04/30/90

TABLE 6, PAGE 1 NOTE: THIS TABLE DOES NOT CONTAIN TRADE SECRET DATA.

MUSCULOSKELETAL OVERLOAD CONDITIONS IDENTIFIED ON MINE PROPERTY

COMMODITY NAME: METAL ORES, NEC

MUSCULOSKELETAL CONDITION	(1) #WORKERS POTENTIALLY EXPOSED (OBSERVED)	(2) #WORKERS POTENTIALLY EXPOSED (PREDICTED)	(3) %WORKERS POTENTIALLY EXPOSED (PREDICTED)
DIMINISHED LIGHT	3	3	9
(5) OCCUPATIONS			(6) LOCATIONS
649 ADMN, SUPERVISORY, MGT PERSNL (50%)			001 UNDERGROUND MINE (100%)
LOWER LIMB	3	3	9
(5) OCCUPATIONS			(6) LOCATIONS
649 ADMN, SUPERVISORY, MGT PERSNL (50%)			001 UNDERGROUND MINE (100%)
NECK AND/OR BACK	3	3	9
(5) OCCUPATIONS			(6) LOCATIONS
649 ADMN, SUPERVISORY, MGT PERSNL (50%)			001 UNDERGROUND MINE (100%)

RUN DATE: 04/30/90

TABLE 7, PAGE 1 NOTE: THIS TABLE DOES NOT CONTAIN TRADE SECRET DATA.

WELDING POTENTIAL EXPOSURE

COMMODITY NAME: METAL ORES, NEC

WELDING PROCESS	(1) #WORKERS POTENTIALLY EXPOSED (OBSERVED)	(2) #WORKERS POTENTIALLY EXPOSED (PREDICTED)	(3) %WORKERS POTENTIALLY EXPOSED (PREDICTED)
	-----	-----	-----

OXYACETYLENE WELDING

4

4

11

(5)

OCCUPATIONS

(6)

LOCATIONS

604 MECHANIC (67%)

005 SURFACE SHOP (57%)

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