INDUSTRIAL HYGIENE SURVEY

The Harshaw Chemical Company
Cleveland, Ohio

SURVEY DATE

October 12-13, 1976

SURVEY CONDUCTED BY

Harry Donaldson
Frances Stephenson
Terry Boyle
Rick Culross

REPORT PREPARED BY

Harry Donaldson

Department of Health, Education and Welfare
Center for Disease Control
Division of Surveillance, Hazard Evaluations, and Field Studies
National Institute for Occupational Safety and Health
Cincinnati, Ohio

PLACE VISITED:	The Harshaw Chemical Company 1000 Harvard Avenue Cleveland, Ohio 44109 Telephone: (216) 721-8300, ext-831 (A division of the Kewanee Oil Co.)
COMPANY PEOPLE CONTACTED:	Charles J. Slany, Plant Manager Joseph D. Berish, Corp. Envir. Control David A. Wilson, Supervisor Envir. Control Mike Durilla, Production Supervisor
UNION:	ICWU Local #10 John Bogdan, President
PURPOSE OF VISIT:	To conduct an industrial hygiene survey of the nickel operations, including the collection of personal samples to determine the potential exposure to nickel.

INTRODUCTION AND GENERAL COMMENTS

A literature search for information on the exposure of industrial populations to various forms of airborne nickel revealed that no data on the exposure of those populations to water soluble nickel salts were documented. In order to obtain data of this type a survey was conducted at the Harshaw Chemical Company.

This company, located on the Cugahoga River in the heart of Cleveland's industrial district, has been manufacturing inorganic chemicals since the early 1900's. Beside various nickel salts which are used principally in the plating industry, it manufactures salts of colbalt, zinc, manganese, and cadmium. Though all these chemicals are made at this site, their major effort involves the manufacture of hydrofluoric acid and various fluoride salts. During World War II the company was engaged in the manufacture of uranium fluoride for use by the Atomic Energy Commission.

The plant located on approximately 20 acres, consists of about twenty brick buildings and has approximately 250 employees. Thirty to forty of these are engaged in the nickel production areas. This does not include maintenance people who work in all areas of the plant.

Besides having corporate industrial hygiene personnel the plant has a safety director, a full time nurse, a part-time doctor, and a rather extensive medical program. Biological samples are routinely collected on employees who work in fluoride areas and on those who do lead burning.

PLANT PROCESS

The processing of nickel salts consists essentially of reacting nickel metal or oxide in various acids (H_2SO_4, HCL, HNO_3 and HAC) with subsequent cooling of the salt solution, and the crystallization of the salts. The salts are usually centrifuged, and either packaged at this point, or dried and then classified for uniform crystal size prior to packaging. This process applies in general to the manufacture of all the nickel salts.

Nickel carbonate is produced by the addition of sodium carbonate to a nickel sulfate solution. The precipitated nickel carbonate is filtered and washed on a rotary filter, then dried, crushed, screened and bagged. Though the bagging operation was not operating at the time of our visit. This was obviously a dusty operation judging from the condition of the equipment, walls and floors of the area in which bagging was done.

In addition to nickel salt crystals, nickel solutions are also made. These are marketed to the plating industry. Some of these contain additives which are manufactured by a reaction of propane sultone with other organic chemicals.

POTENTIAL HAZARDS

Besides nickel dermatitis from the soluble nickel salts, other acute potential health problems involve exposure to hydrofluoric acid, mineral acids, and lead fumes from lead burning operations. The use of propane sultone, a potent carcinogen, used in the manufacture of an additive which is used in nickel plating operations is another potential health hazard.

AIR SAMPLING METHOD, RESULTS AND DISCUSSION

Monitoring of 29 employees out of approximately 33 employees working in the soluble nickel operation was accomplished by the collection of air samples on 0.8 µm pore size 37mm Millipore AA filters by drawing air through the filter at the rate of 2.0 lpm. The flow rate is maintained by a pump worn on the workers belt and the filter is held in place by a clamp on the worker collar.

These filters were analyzed for nickel, cobalt, manganese and zinc, and showed significant exposure only to nickel. Information on the 29 samples collected and their relationship to current standards is tabulated below:

Total Number of Samples Collected	29	
Samples exceeding current OSHA Std. - 1Mg/m^3	1	(3.5%)
Samples exceeding 1976 ACGIH - TLV - 0.1 Mg/m^3	14	(45%)
Samples exceeding proposed - Nickel Criteria Document Proposed Standard - 0.005 Mg/m^3	29	(100%)

Complete details of monitoring and analytical data are shown in Table I, II and III, attached.

CONCLUSION

The results of the survey of the Harshaw Chemical Plant, excluding the nickel carbonate operation that was not in operation at the time of the survey, show that with minor exception the plant meets the current standard of 1 Mg/m^3 for exposure of employees to airborne nickel.

This plant with some modifications, which would include more enclosure of processes, improved bagging facilities and more adequate ventilation, could be upgraded to meet the ACGIH - TLV of 0.1 Mg/m^3 for exposure of airborne nickel.

TABLE I

Personal Monitoring Data - October, 1976
Harshaw Chemical Company
Nickel Sulfite Operation

Job Classification	Shift	Sample No.	Air Volume Meters	Nickel Mg/sample	Nickel Mg/m^3	Cobalt Mg/m^3	Manganese Mg/m^3	Zinc Mg/m^3
Process helper	1	2289	0.866	0.025	0.029	<0.001	<0.001	<0.005
Process operator	1	2242	0.852	0.015	0.018	0.006	<0.001	<0.005
Chief operator	1	2288	0.858	0.034	0.040	<0.001	<0.001	<0.005
Process helper	1	2038	0.836	0.094	0.113	<0.001	<0.001	<0.005
Lead man	1	2218	0.858	0.025	0.029	<0.001	<0.001	<0.005
Chief operator	2	2257	0.870	0.008	0.009	<0.001	<0.001	<0.005
Process operator	2	2237	0.886	0.008	0.009	0.002	<0.001	<0.005
Process operator (cleaning tanks)	1	2361	0.866	0.079	0.091	0.002	<0.001	<0.005
Process operator (cleaning tanks)	1	2342	0.842	0.113	0.134	<0.001	<0.001	<0.005
Bagger	2	2308	0.864	0.510	0.590	0.006	<0.001	<0.005
Process helper (scraping screens)	2	2220	0.858	0.124	0.145	<0.001	<0.001	<0.005
Operator (Mixes Ni & H_2SO_4)	2	2197	0.852	0.169	0.198	<0.001	<0.001	<0.005
Limit of Detection - Mg					0.003	0.001	0.001	0.005
OSHA Standard - Mg/m^3					1.0	0.1	5.0	5.0
Proposed Standard Preliminary Draft Nickel Criteria Document - Mg/m^3					0.005	-	-	-
ACGIH Threshold Limit Value - 1976 - Mg/m^3					0.1	0.1	5.0	5.0

TABLE II

Personal Monitoring Data - October, 1976
Harshaw Chemical Company
Nickel Chloride Operation

Job Classification	Shift	Sample No.	Air Volume Meters	Nickel Mg/sample	Nickel Mg/m^3	Cobalt Mg/m^3	Manganese Mg/m^3	Zinc Mg/m^3
Process helper	1	2222	0.848	0.068	0.080	<0.001	<0.001	<0.005
Process helper	1	2306	0.844	0.058	0.079	<0.001	<0.001	<0.005
Process operator	1	2123	0.840	0.017	0.020	<0.001	<0.001	<0.005
Process operator	1	2198	0.840	0.120	0.143	<0.001	<0.001	<0.005
Process operator	2	2082	0.862	2.400	2.780	0.012	<0.001	<0.005
Process operator - Busts out pans	2	2235	0.856	0.410	0.470	0.005	<0.001	<0.005
Process operator - (Makes batches)	2	2315	0.854	0.046	0.054	<0.001	<0.001	<0.005
Process helper	1	2015	0.840	0.041	0.049	<0.001	<0.001	<0.005
Process operator (operates drier)	1	2313	0.846	0.041	0.485	<0.001	<0.001	<0.005
Process helper	2	2269	0.862	0.370	0.430	0.005	<0.001	<0.005
Process helper	2	2333	0.856	0.131	0.153	0.002	<0.001	<0.005
Limit of Detection - Mg					0.003	0.001	0.001	0.005
OSHA Standard - Mg/m^3					1.0	0.1	5.0	5.0
Proposed Standard Preliminary Draft Nickel Criteria Document - Mg/m^3					0.005	-	-	-
ACGIH Threshold Limit Value - 1976 - Mg/m^3					0.1	0.1	5.0	5.0

TABLE III

Personal Monitoring Data - October, 1976
Harshaw Chemical Company
Nickel Acetate and Nitrate Operation

Job Classification	Shift	Sample No.	Air Volume Meters	Nickel Mg/sample	Nickel Mg/m^3	Cobalt Mg/m^3	Manganese Mg/m^3	Zinc Mg/m^3
Process operator	1	2332	0.840	0.440	0.525	<.001	0.004	<0.005
Process operator	1	2283	0.820	0.060	0.073	<.001	0.001	<0.005
Process operator	2	2309	0.848	0.052	0.061	<.001	0.003	<0.005
Process trainee	1	2258	0.834	0.051	0.061	<.001	0.002	<0.005
Operator - centrifuge	2	2130	0.852	0.147	0.173	<.001	0.096	<0.005
Process operator	1	2338	0.818	0.031	0.038	<.001	0.003	<0.005
Blank	-	2192	--	<0.003	--	<.001	<0.001	<0.005
Limit of Detection - Mg					0.003	0.001	0.001	0.005
OSHA Standard - Mg/m^3					1.0	0.1	5.0	5.0
Proposed Standard Preliminary Draft Nickel Criteria Document - Mg/m^3					0.005	--	--	--
ACGIH Threshold Limit Value - 1976 - Mg/m^3					0.1	0.1	5.0	5.0