



REYNOLDS METALS COMPANY
ENERGY, ENVIRONMENT, SAFETY,
INDUSTRIAL HYGIENE & TOXICOLOGY DEPARTMENT

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TO: FRANK NEWCHURCH - SHERWIN PLANT

FROM: Carl Stumpe

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SUBJECT: INDUSTRIAL HYGIENE STUDY

EXECUTIVE SUMMARY

On July 7 to 15, 1993 an Industrial Hygiene Study was conducted at the Sherwin Plant to determine employee exposures to airborne contaminants. Samples were collected in the Slurry Control, Clarification, Filtration, Precipitation, Calcination, Raw Materials and Maintenance departments. Exposures to total and respirable particulate, metals, lime, crystalline silica, carbon monoxide, ammonia, and sodium hydroxide were measured. The results of the study are as follows:

- Exposure to total particulate was above Reynolds permissible exposure limit (PEL) for one of three samples collected on maintenance mechanic unloaders during the unloading of a bauxite ship.
- Exposure to total particulate was above the PEL for one of three samples on a laborer loading an alumina ship.
- Exposure to respirable particulate was above the PEL for the unloading equipment attendant working in the tunnels during the loading of an alumina ship.
- Exposure to respirable particulate was above the PEL for the raw materials attendants operating the tripper.

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- Exposure to lead was above the Reynolds action level for a maintenance mechanic working in calcination.

Recommendations

Unloading equipment attendants must be required to wear appropriate respiratory protection when working in the tunnels. These employees must be included in the plant's respiratory protection program. Additional monitoring should be conducted to better characterize this exposure.

Raw materials attendants must be required to wear appropriate respiratory protection when operating the tripper. This job should be evaluated to determine if airborne dust levels can be reduced or the employee's work practices can be modified to minimize the time spent in dusty areas. These employees must be included in the plant's respiratory protection program.

Additional exposure monitoring should be conducted on maintenance mechanic unloaders, when unloading bauxite ships, and laborers, when loading alumina ships, to determine the source of the elevated exposures.

Additional exposure monitoring should be conducted on maintenance mechanics to better characterize exposures. Initial medical surveillance and training related to lead exposure must be made available to the employee.

The results of this study, a review of the plant's chemical inventory, and an audit of the use of chemicals in the plant have identified the need for additional exposure assessments to be conducted. These follow-up studies are listed in a scope of work in Appendix A of this report. This future monitoring can be accomplished by plant personnel, with my assistance, or with the help of an outside consultant. I will be happy to review any consultant proposals and work with them to assure that appropriate sampling and analytical procedures are used.

The results of this study must be discussed with all employees involved.

DISCUSSION

1. TOTAL PARTICULATE AND METALS

Full shift personal samples were collected on employees during routine work in Slurry Control, Clarification, Calcination, Raw Materials and Maintenance areas. The samples were analyzed for total particulate, copper, nickel, lead, zinc oxide, cadmium and manganese. Maximum possible ceiling values were calculated for cadmium and manganese. See the attached table. All exposures in Slurry Control, Clarification, and Calcination were below the applicable PEL.

In Raw Materials, additional monitoring should be conducted on maintenance mechanic unloaders when unloading bauxite ships and laborers when loading alumina ships, to better characterize total particulate exposure.

A maintenance mechanic, H. Harris, working in the Calcination area was found to be exposed to lead below the PEL but above the Reynolds action level of 0.03 micrograms per cubic meter. The employee has indicated that he worked on a bearing on a Dorrco filter and that there was a lot of metal powder around the bearing. A bulk sample of similar material has been collected and analyzed for metal content. The material contains 2% lead, 1% zinc, 30% copper and 10% iron. Additional exposure monitoring should be conducted on this job to better characterize exposures. The employee has been informed of his lead exposure, the potential hazards of lead exposure, the nature of the operations that could result in exposure to lead above the action level, the purpose, proper selection, and use of respiratory protection, the purpose of the medical surveillance, and steps that can be taken to reduce the lead exposure. In addition, initial medical surveillance in the form of blood sampling and analysis for lead and zinc protoporphyrin have been made available to the employee.

2. RESPIRABLE PARTICULATE

Full shift personal samples for respirable particulate were collected during routine work in the Slurry Control, Calcination and Raw Materials areas. All exposures in Slurry Control and Calcination were found to be below the Reynolds PEL. In Raw Materials, elevated exposures to respirable particulate were found on unloading equipment attendants when working in alumina tunnels and raw materials attendants when operating the tripper. These employees must wear respiratory protection to reduce exposures to below the PEL. These jobs should be evaluated to determine if airborne dust levels can be reduced or the employee's work practices modified to minimize the time spent in dusty areas.

3. TOTAL PARTICULATE AND CALCIUM OXIDE (LIME)

A full shift personal sample for total particulate and calcium oxide was collected on a slurry control helper in the lime unload and storage area. Exposures were well below Reynolds PEL.

4. CRYSTALLINE SILICA

Full shift personal samples for respirable crystalline silica were collected during routine work in the Slurry Control and Raw Materials areas. Exposures to crystalline quartz and crystalline cristobalite were below the Reynolds PEL. However, exposures to H. Wade and C. Price, when operating the Tripper, were greater than 50% of the PEL. Based on the Reynolds exposure assessment strategy, these exposures should be resampled within one year.

5. CARBON MONOXIDE

A partial shift personal sample for carbon monoxide was collected on a laborer during the cleaning of a bauxite conveyor tunnel using a Bobcat front end loader. Time-weighted average and ceiling exposures were found to be well below the Reynolds PEL.

6. SODIUM HYDROXIDE

Fifteen minute personal samples for sodium hydroxide were collected on Filtration Operator Helpers in the red mud filtration building during the cleaning of filters. All ceiling exposures were below the Reynolds PEL. One sample on J. Gonzalez was greater than 50% of the PEL. Based on the Reynolds exposure assessment strategy, these exposures should be resampled within one year. A sample was also collected on a scaler rinsing down a concrete pad with liquor. Sodium hydroxide was not detected.

Fifteen minute area samples for sodium hydroxide were collected in the highest mist areas on top of the red mud settlers and washers and the precipitators. Sodium hydroxide concentrations were found to be less than the Reynolds PEL.

Although excessive levels of sodium hydroxide were not found in these areas, significant eye, nose and throat irritation was noted. I will coordinate additional studies to determine the cause of the irritation. In the interim, this irritation can be prevented with half-mask respirators and chemical goggles or full facepiece respiratory protection. The respirators should be approved by NIOSH for protection against dusts and mists.

7. AMMONIA

Spot measurements for ammonia were made at the point of strongest odor at floor level and on top of each open-top tank in the flocculant building. All results were well below the Reynolds PEL.

SUMMARY

All employees required to wear respirators must be fitted and fit tested with a respirator approved by the National Institute for Occupational Safety and Health for protection against dusts and mists. Employees must be trained in the use and care of respiratory protection and provided medical surveillance to assure that the employee is capable of working in a respirator.

As part of your ongoing exposure assessment program, the plant should take the following steps:

- Conduct follow-up monitoring as outlined in the attached scope of work (Appendix A).
- Reassess exposures whenever there is a change in process or equipment that could result in a change in employee exposures or whenever there has been an employee complaint.

Please assure that these results are discussed with all employees involved. Bar charts, which compare the average exposures for each job with the Reynolds Permissible Exposure Limit, are provided to assist with employee information and training.

As a result of this study the following action items have been identified:

Action Item	Responsibility	Completion
1. Implement mandatory use of respiratory protection for all jobs with exposures > PEL • unload equipment attendants working in alumina tunnels • raw material attendants operating tripper	Plant	30 days
2. Conduct follow-up monitoring as outlined in Appendix A	Plant	1 year
3. Inform all affected employees of the results of this study	Plant	60 days

If you have any question concerning this report, please contact me.


Carl Stumpe