

PLAINTIFF'S EXHIBIT

AL-2412

INDUSTRIAL HYGIENE MEETING

JUNE 22, 1955

ROCKDALE WORKS

411082 0400

AGENDA FOR INDUSTRIAL HYGIENE MEETING OF JUNE 22

1. Introductory Remarks - J. D. Harper
2. Effect of Fluorides on Humans - Dr. D. A. Irwin
3. Effect of Fluorides on Domestic Animals - Dr. L. V. Cralley
4. Effect of Fluorides on Vegetation - Dr. L. V. Cralley
5. Rockdale's Preventive Program - J. E. Yates
6. Scrubber Efficiency Tests - S. A. Jones
7. Vegetation Surveys - H. A. Semken
8. Aims and Purposes of a Plant Industrial Hygiene Program -
Dr. L. V. Cralley
9. Other Smelting Plant Industrial Hygiene Items - R. R. Sugg
10. Tour of Smelting Works
11. Lunch
12. Tour of Mining and Power Production Facilities
13. Questions Regarding Tours
14. Industrial Hygiene Problems in Connection with Power Production -
S. A. Jones
15. Rockdale's Medical Program - Dr. J. T. Richards
16. Rockdale's Safety Program - W. G. Martin
17. Discussion
18. Dinner at Taylor Country Club

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ROCKDALE INDUSTRIAL HYGIENE MEETING OF JUNE 22

On June 22, an industrial hygiene meeting was held at Rockdale Works. The meeting was the first of the newly formed Rockdale Industrial Hygiene Committee and was held primarily to acquaint members of the Texas State Department of Health with the industrial hygiene problems in connection with the aluminum smelting operations and the steps which had been taken or were planned at Rockdale to solve these problems. The meeting began at approximately 9:30 a. m. with the following present:

State of Texas - Department of Health - Austin

Henry A. Holle - Commissioner of Health
Martin C. Wukasz - Sr. Engineer (Industrial Hygiene)
G. R. Herzik, Jr. - Chief Engineer
J. V. Irons - Director of Laboratories
David F. Smallhorst - Engineer (Stream Pollution)
Harris Bell - Legal Consultant

State of Texas - Department of Health - Houston

Otto Paganini - Engineer

Milam County Health Unit - Cameron

John B. Bryson - Director
D. S. Wimberly - Sanitation Engineer

Pittsburgh Office

Dr. D. A. Irwin
Dr. L. V. Cralley

Point Comfort Works

B. H. Sloane
B. R. Hood

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Houston

D. T. Searls

Rockdale Works

J. D. Harper
R. R. Sugg
H. A. Semken
J. E. Yates
H. D. Franklin
S. A. Jones
W. G. Martin
P. L. Hartsock
J. H. Johnston
W. H. Shepard
J. T. Richards
R. C. Wybourn (consulting radiologist)

Introductory Remarks - J. D. Harper

Mr. Harper opened the meeting by welcoming the guests. He continued with remarks on the formation of Rockdale's Industrial Hygiene Committee and a discussion of aluminum plant operations. In discussing aluminum plant operations a flip chart was used to show plant layout, design of pots, and the process of producing aluminum. He called on Mr. Sloane to discuss smelting operations at Point Comfort Works. Mr. Sloane explained the main differences between the Rockdale and Point Comfort processes for producing aluminum and invited the State Health Department group to visit Point Comfort Works at some future date. Mr. Harper then described briefly how the increased fluoride emanations, associated with the large increase of aluminum production during World War II, resulted in a recognizable industrial hygiene problem.

Effect of Fluorides on Humans - Dr. D. A. Irwin

In the Hall process for smelting aluminum, aluminum oxide is dissolved in molten cryolite and decomposed electrolytically to metallic aluminum and oxygen. In the process, the molten cryolite also decomposes to a slight extent giving off gaseous hydrogen fluoride and some fluoride as fume. This fluoride release should be recognized as an inherent part of the operation that can be controlled by engineering methods so that working environments are safe, and plant effluents cause no damage to domestic animals or crops in the vicinity of a plant.

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The Company's experience with excessive fluoride in drinking water is of historic interest. At the bauxite mining operations in Arkansas, deep wells had been drilled to supply water for plant and domestic use. Years later it was observed that the permanent teeth of children who had drunk the water during their lifetime showed "mottling". Such "mottling" is now known to be due to excessive fluoride intake in early childhood. Analysis of the water showed the usual concentrations of minerals other than fluoride, which was present to the extent of 14 ppm. Mr. H. V. Churchill, Chief of the Analytical Division of Aluminum Research Laboratories, announced these results in 1931 and pointed out for the first time the probability of a relationship between fluoride intake and tooth "mottling".

In 1937, Roholm published his book on the potential effects of excessive fluoride absorption by industrial workmen. This study reported on clinical findings in workmen exposed to dust concentrations of 22 to 48 mgs per cubic meter, having a cryolite content of 94-99% and a particle size of 50% below 5 microns. This is far beyond exposures present in aluminum smelting operations.

We made a study of the possible untoward effects of fluoride absorption. This study, which included clinical and industrial hygiene investigations, was made with respect to fluoride exposures of ten years ago, and prior to the introduction of remedial engineering. The exposure in smelting plants was found to consist of approximately equal parts of gas and dust. The studies evaluated the fluoride exposure in terms of

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atmospheric concentrations and urinary elimination of fluoride in spot and 24-hour samples. X-ray films of the chest and pelvis on a routine basis gave information about bone density. No evidence of disability due to chronic fluorosis was found. Similar results were published by Agate following a clinical evaluation of British potroom workers.

Marked improvement in the ventilation of potrooms has taken place over the years, as can be seen from these figures showing fluoride concentrations in the potrooms before and after the improvement in ventilation was made. The Rockdale Plant embodies the advances that have come from the Company's experience of over fifty years in smelting aluminum. Pot enclosures, fume removal systems, and excellent ventilation have made fluoride exposure no problem. The working areas are practically free from fluoride exposure, and it is known that urinary fluoride is within normal limits.

The local fluoride situation, however, has influenced the medical program at Rockdale Works. Drinking water with high fluoride content is known to exist in districts close to Rockdale. A recent U. S. P. H. S. study, published by Dr. Leone and his group, compares a clinical evaluation of the residents of Cameron, where the fluoride content of the water is low, with those of Bartlett, where the water is high in fluoride. Some Bartlett residents were found to have increased bony density of no clinical significance. Since the beginning of plant operations the preplacement physicals have included X-ray films of both chest and lower back. This procedure which was introduced to record the bone density at the time of employment, could

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obviate claims that plant exposure has caused increased bone density, actually due to the drinking of water rich in fluoride.

Effect of Fluorides on Domestic Animals - Dr. L. V. Cralley

The question of the effect of fluorides on domestic animals in the area around the Rockdale plant is parallel to that of typhoid fever in public health. With proper methods of public health engineering, typhoid fever ceases to be a public health problem. Likewise, the control measures installed at the Rockdale plant to prevent the atmospheric pollution will effectively prevent fluorosis in domestic animals in the area. However, poor farming and animal husbandry practices may result in "off condition" among both animals and vegetation. In some instances, these conditions may be blamed on fluorosis by association of the nearness to industrial operations. A proper diagnosis can be made by use of the following data:

1. Total intake of fluoride in the forage, mineral supplement, water, etc.
2. Urine fluoride excretion tests.
3. Analysis of bone for fluorides.
4. Examination of the animal by experienced veterinarians.

Effect of Fluorides on Vegetation - Dr. L. V. Cralley

The exposure of vegetation to gaseous fluoride below the threshold concentration of tolerance will cause no injury even though the fluoride content of the tissue rises considerably. The physical

appearance of vegetation injured by fluoride is not sufficiently characteristic to be used diagnostically. Other causative agents, such as poor water balance, diseases, food deficiencies, climatic conditions, etc., may give rise to appearances resembling those resulting from fumigation to industrial gases. Again, the diagnosis of fluoride injury to vegetation requires the skill of experienced pathologists and physiologists who are acquainted with both the fluoride resistant and the fluoride sensitive species of vegetation. A close study of these species, coupled with the meteorological data permit a conclusion to be reached. Chemical analyses may be useful as an adjunct to the above but are of little value by themselves in making a diagnosis.

Rockdale's Preventive Program - J. E. Yates

No fluoride problem was recognized prior to World War II. This was probably due to the comparatively small size of plants prior to that time, as well as the fact that climatic conditions and agricultural activities in locations of plants were such that the wrong set of circumstances did not exist; also, it is possible that border-line problems may have existed that were not recognized. A fluoride problem was first recognized at West Coast plants during World War II.

A Company-wide corrective program was undertaken as soon as the problem was recognized. This program was participated in by all the smelting plants, the engineering staff of the Pittsburgh Office, and our research organization at New Kensington. The Company also

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engaged the assistance of outside engineers and research concerns, as well as the manufacturers of specialized equipment. The program resulted in corrective results, tailored to the specific needs of each plant, being installed at the old plants. Corrective facilities were considered an integrated part of the design of the Point Comfort, Wenatchee, and Rockdale plants which have been built since that time.

Corrective facilities at Alcoa Plants are common in that the fluorides are collected at their source by hooding the electrolytic cells, draft is maintained on these cells by connections through duct work to exhaust fans, adequate exhaust being maintained on each cell to assure complete collection of fluorides, and the fluorides are removed from the air stream before it is exhausted to the atmosphere. Facilities at plants vary in detail as required by differences in plant design and layout. Rockdale's system is the result of 8 to 10 years of development work. The Rockdale cells are hooded by means of portable aluminum covers, draft is maintained by exhausting 2000 to 2500 CFM per cell, the cells being connected through duct work to exhaust fans located between the potroom buildings. Particulate material consisting of alumina, carbon, and fluorides is collected in multiclones and electrostatic precipitators. Gaseous fluorides are removed from the air stream by treatment in washing towers. Material collected by the multiclones and precipitators is redistributed to the electrolytic cells. Fluorides collected in the washers are converted to calcium fluoride by the addition of lime to the wash water. This non-useable material is drawn out of the system as sludge for disposal.

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Rockdale's Preventive Program-Scrubber Efficiency Tests -S. A. Jones

Periodic tests are run on our fume collection system. These tests determine the operating efficiency of the system and also establish the fluoride loss from the system.

The dust collectors, which consist of multiclones and precipitators, are tested by using paper thimbles in the ducts following the collectors using standard dust collecting systems. In sampling, the ducts are traversed for an 8-hour period to establish particulate loss from the unit.

The scrubbers are tested by using caustic charged impingers to determine the fluoride content of the gases going to the scrubbers, and a similar arrangement to determine the amount lost to the atmosphere. The scrubbers operate with a normal fluoride removal efficiency of 90 - 92%.

Rockdale's Preventive Program - Vegetation Surveys - H. A. Semken

As a further check on the efficiency of our fluoride collection system, a monthly survey is made of the fluoride content of vegetation in the vicinity of the plant. These monthly surveys were begun 6 months before the start of operations in order to establish a normal for the fluoride content of the various types of vegetation in the plant area. The surveys have been continued on a monthly basis since that time.

On the slide now being shown are plotted the fifty-six locations at which vegetation is presently being sampled. The greatest number of sampling stations are to the north of the plant in the direction of the prevailing wind, with the next largest number to the south of the plant in the direction of the next most prevailing wind. Samples are taken as far as 6-1/2 miles from the plant.

This slide lists a comparison of the fluoride content of the various types of vegetation before the start of operations with their contents in 1953 and 1954. Results thus far in 1955 indicate practically no change from the same period in 1954.

This slide shows the average fluoride content of vegetation, at increasing distances from the plant in 1 mile increments, for the years of 1953 and 1954.

Dr. Holle asked if the results shown indicated a safe level of concentrations. He was told that the results were well within what was considered to be safe.

Aims and Purposes of a Plant Industrial Program - Dr. L. V. Cralley

The industrial hygiene problems of a new plant are naturally few in number since adequate controls have already been installed to handle hazardous materials. However, there are changes from time to time in both materials and equipment. The function of the industrial hygiene program is that of a watchdog to see that controls are maintained in good operating condition and new materials or equipment do not introduce new health hazards.

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Other Smelting Plant Industrial Hygiene Items - R. R. Sugg

In the operation of the Smelting Plant, there are many other items of industrial hygiene interest. Among these are dust, noise, and heat.

Dust occurs from the handling of various materials. The materials handled in the greatest volume are alumina, coal and coke. These are relatively inert materials, and dust from them presents mainly a housekeeping problem. Fluoride bearing materials are handled in small volume and are of such a physical nature that dust is a minor problem. Dust is controlled by the use of collectors and precipitators as well as by using stockings and swing-spouts.

Noise comes from ball mills, tumbling barrels and jolting machines. It is controlled by the proper location and design of the equipment as well as by the use of linings in some instances.

Heat, which adds to the discomfort of the personnel, is found in several departments. It is combatted by instruction in health habits and personal hygiene; by the use of proper clothing; by the use of protective equipment; and by tool and equipment engineering.

Among other items of industrial hygiene interest are our potable water system, sewage disposal plant and shower room facilities.

Potable water is supplied from drilled wells and receives treatment which brings it well within State Health Department requirements. The system is under the direct supervision of a chief operator who holds a Texas class B license in well and surface water control.

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The sewage disposal plant is a package type, mechanical aeration, activated sludge system. The oxygenated sludge decomposes and the clear liquid is chlorinated and pumped into the Power Plant Lake. Daily checks are made on the chlorine content of the effluent.

Shower room facilities are well in excess of the minimum recommended by the American Standards Association. All restrooms are supplied with hot and cold water, powdered or liquid soap and paper towels. Lunch rooms are located at convenient places throughout the plant and are provided with water coolers, refrigerated bottle or lunch coolers, and hot plates.

Plant Tours

Shortly after 11 o'clock, the group left the conference room for a tour of the Smelting Plant. The route followed covered our carbon production, potlining, rodding, aluminum smelting, metal service, shower rooms, and machine shop. The visitors were very interested in all phases of the work and were particularly impressed with our fume collection systems. Along the tour, they frequently expressed surprise at the cleanliness of our plant and at the apparent good working conditions. The comments of all members of the group were very complimentary.

After lunch, a tour was made of the fuel area and power plant. Here again, the comments were mostly about the size of the operations and the good working conditions. After the power plant tour, the group reconvened in the conference room of Building 80.

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Industrial Hygiene Problems in Connection with Power Production
S. A. Jones

Early in our operations it became apparent that large quantities of dust and water vapor were being lost to the atmosphere from lignite drying operations. Tests indicated that the condensed vapors were very acid and contained some lignite dust and ash. The sulfur content of the gases was relatively low as indicated by recording SO₂ equipment located approximately one mile from the plant. The tests indicated that the dryer problem was primarily a visual one, but that good housekeeping practices necessitated their clean-up.

Three pilot scrubbers were installed to check cleaning efficiency. As a result, a clean-up system for dryer stack discharge is in the design stage.

In connection with lignite carbonization and tar production, large quantities of phenol-bearing, contaminated water is produced. The most effective system for cleaning up this contaminated water is one which combines the clean-up of the dryer exhaust stack and the contaminated water. In this procedure, the wastes from the lignite dryer and tar production are brought together and thoroughly mixed. The two waste materials compliment each other very well for disposal. The acid water from the dryers is partially neutralized by the alkaline water from the tar string, and the phenols in the contaminated water from the tar string are absorbed by the lignite slurry from the dryers.

Rockdale's Medical Program - Dr. J. T. Richards

Our medical program is three-fold in nature. Of greatest importance is the preplacement physical examination conducted on prospective employees. This examination includes X rays of the chest and lumbo sacral areas. It is amplified by urinalysis, serology, hemoglobin, Rh factor and blood type. Prospective employees are told of minor defects for which they should go to their dentist or physician for correction. Of next greatest importance is the annual physical examination of employees. Laboratory work and chest X rays are repeated. Again the employee is told of defects so that he can obtain corrective treatment. Our third major concern is treatment of injuries and the application of preventive medicine, which is on a day-to-day basis.

A registered nurse and laboratory technician are in attendance on the day shift. First aid men are in attendance during the afternoon and night shifts. Injuries requiring detailed or prolonged treatment are referred to hospitals having the necessary facilities and/or specialists for care. Employees are given tetanus toxoid upon employment and at the time of their yearly physical.

Equipment at the plant is adequate. The X-ray equipment is excellent and the laboratory is well equipped to perform the tests required. A satisfactory stock of ordinary medications is kept on hand for the treatment of minor illnesses. A small amount of plasma and infusion material is available for the very occasional case which might

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require this type of therapy prior to their arrival at a hospital. All X rays are examined by a consulting radiologist.

Rockdale's Safety Program - W. G. Martin

Our safety program has three objectives. First, to prevent injury to the employee with the accompanying suffering and loss of earning capacity. Second, to prevent damage to equipment which frequently happens when there is a personal injury accident. Third, to prevent loss of production which occurs when an employee is not on a job and his portion of production remains unaccomplished.

In helping to accomplish these objectives, safety engineering is of great importance. When a new piece of equipment is designed, safety features are designed into it as much as is possible. The employee is protected from open gears, belts, pulleys, etc. by adequate guards, and is furnished personal protective equipment if hazards exist which cannot be corrected by safeguards built into the equipment. Regular equipment inspection and preventive maintenance are considered a part of the program.

Statistics are gathered and reports made and circulated on each accident that occurs in our plant. In analyzing our accident statistics, we find that approximately 85 percent of all accidents are caused by the action of the employee himself; about 10 percent by mechanical failure; and the remaining 5 percent by acts of God. If accidents are to be eliminated, it is obvious that the employee himself is the one on which the greatest effort must be put forth.

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Another means of promoting safety is our safety meetings. Regular meetings, which generally include a movie on some safety subject, are held for all departments. Safety contests, including awards for the winners, are also occasionally held. Plant publication and posters are also utilized to promote safety.

Training of the employee is a most important phase of our safety program. This begins in the indoctrination meetings which each new employee attends and at which safety is stressed. When an employee is assigned to a job, the supervisor makes every effort to see that he is thoroughly trained, understands how the job should be done, and recognizes the hazards involved. Safety is considered the responsibility of many persons besides the safety director.

Our program includes inspections such as mechanical, electrical, housekeeping, and fire prevention. Practically every type of personal protective equipment is made available to the employee. Danger tags and locks are used and extra instructions and examinations are given operators of specialized equipment.

Summarizing the entire program, we find that to obtain results, we must work directly with the employee. If we make the employee fully familiar with the hazards of his job, the cause of accident, the knowledge of how to prevent these accidents, and can instill in him the desire to work safely, we can feel that we have an effective safety program.

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Discussion

During the tour of the plant and during the discussion period which followed the planned program, there were several comments by the visitors. Some of the comments, which were all very favorable, were as follows:

Mr. Wukasch stated that the State group was very pleased to have the opportunity of sitting in on our meeting. He said that they were all impressed with the open and above-board manner with which we had discussed our industrial hygiene problems with them, and with the progressive attitude of the Company in taking steps to eliminate the problems. He said that the knowledge they had gained of our operations and of our processes for preventing air pollution would be very helpful to them in discrediting wild tales about our operations, and would allow them to talk more intelligently with anyone making a complaint. He said that shortly after Alcoa began operations in Texas, they had received a letter from someone from the Northwest relative to the danger to livestock and crops from aluminum smelting fumes and suggesting that steps be taken to prevent such occurrence here. He offered the assistance of the department in connection with any problems which might develop, and felt that they were now in a much better position to be of help in solving them.

Dr. Holle expressed appreciation that the Company had recognized its problems and was accepting its responsibility with respect to industrial hygiene. He said that it is regrettable the less

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responsible industry might force tough legislation which would be bad for industry in general. He gave credit to Alcoa for having representatives at public health conferences and for voluntarily taking the lead in industrial hygiene matters in a community which had had little knowledge of industry. Dr. Holle said it was obvious that we were taking care of our employees on the job but wondered what means we had taken to interest them in safety at home. Mr. Harper told him of our program for dispensing literature regarding safe practices at home.

Judge Bell was also impressed with our approach to our problems. He stated that many companies withheld information from them, and working with them was therefore difficult. He said that his group took the position that industry should make every effort to clean up objectionable emanations within the scope of economic operations and that all concerned would have to be satisfied with less than perfect elimination of the objectionable emanations.

Dinner

Dinner was had at the Taylor Country Club. Here again the visitors comments were most favorable. The meeting broke up about 7:30 p. m.

Conclusions

It seems to be a rather general conclusion that the meeting was a success. The people from the State Health Department were

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greatly impressed with the steps we had taken to solve our industrial hygiene problems, and felt that the knowledge they had gained would allow them to be helpful to us. For our part, we believe that we have obviously gained the good will of the State people and believe that they will cooperate with us in every way possible.

August 5, 1955

H. A. Semken

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