Monsanto

FROM (NAME—LOCATION—PHONE) Dept. of Medicine & Environmental Health T.L. Leet, G2WE, 4-8845

DATE : December 6, 1984 cc. M.E. Strauss - G2WE

SUBJECT : Columbia Plant Trip Report

REFERENCE :

TO : W.R. Gaffey - G2WE

On November 6, 1984 Drs. Spraul, Hryhorczuk and I visited the Columbia, Tennessee plant to discuss the details of the Northwestern medical study with plant management and to determine the likelihood of using active and retired Columbia plant employees as external controls.

Employee Participation

We met with David Haines (plant manager), John Kaminski (personnel manager), and Ollie Whitehead (industrial hygiene/ safety supervisor). All three men were very responsive to the idea of using the Columbia plant population as part of the Northwestern medical study, and thought that employee participation would be very high. They thought that most of the active employees would cooperate, since over 95% of the employees participate in the METU medical program. They also thought that a fair number of retirees would participate, especially if we offered some incentive, e.g. dinner for two at one of the local restaurants. The plant does not have any formal contact with the approximately 160 retirees, although the retirees are invited each year to the service banquet.

Plant History

Construction of the plant began in 1932, and the plant began refining phosphorus in 1936. The plant extracts elemental phosphorus from phosphate ore using the electric furnace method, and then transports the elemental phosphorus to other Monsanto plants where it is converted into phosphate compounds.

As illustrated in Attachment I, phosphate ore is obtained by surface mining and transported to the plant by trucks and railroad cars. Until 1973, the ore was mined by Monsanto employees, but now the ore is mined within a 30- to 50-mile radius of the plant by other companies. At the plant, the ore is washed to remove any clay, drained to remove the water, and mixed with recycled dust from the nodulizing department. The upgraded ore, or concentrate, is blended with previous concentrates to provide an uniform feed for the nodulizing kilns, and the tailings are dumped into a disposal pond. The

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concentrate is fed to the nodulizing kilns to remove moisture, organic compounds, and gaseous calcination products. The concentrate becomes very sticky from the heat in the nodulizing kilns and is rolled into nodules.

The nodules and coke (a reducing agent from the Decatur plant) are screened, crushed, and stored in bins along with silica gravel (flux). The raw materials are weighed in stoichometric proportions and fed into the electric furnaces where the raw materials melt and react to produce gaseous elemental phosphorus. Byproducts of the chemical process are carbon monoxide, ferro- phosphorus, and slag. The gaseous elemental phosphorus is condensed to a liquid in spray towers, the carbon monoxide is recycled to the nodulizing kilns where it is used as fuel, and the ferro-phosphorus and slag are cooled and solidified. Then, the elemental phosphorus is collected in tanks and purified by cycloning and settling. Finally, it is loaded into water-filled railroad cars and 55 gallons drums, since elemental phosphorus is combustible if exposed to oxygen, and shipped to other Monsanto plants.

Major Process and Industrial Hygiene Improvements

The Columbia plant has undergone several major process and industrial hygiene improvements since the plant began production in 1936. The improvements are as follows:

1941 - fourth electric furnace built
1948 - fifth electric furnace built
1950 - sixth electric furnace built
1856 - sinter plant replaced by nodulizing kilns
1964 - dust collector installed in the screen plant
1966 - automatic furnace stocking system and water recycling system installed
1969 - dust collectors replaced on nodulizing kilns
1971 - industrial hygiene monitoring program initiated
1973 - bag-type dust collectors installed in furnace stocking system
1975 - new method of tapping furnaces introduced to reduce emissions
1976 - wet slag beds eliminated
1977 - fume collectors installed on furnaces
1978 - furnace burdening system computerized
1980 - improved dust collectors installed on nodulizing kilns

As part of the industrial hygiene program, the plant has been monitoring the concentrations of compounds to which

the employees may be exposed. The compounds include phosphorus, carbon monoxide, sulfur dioxide, fluoride, arsenic, silica dust, coke dust, nuisance dust, and noise.

Other Possible Exposures Many of the employees are involved in farming, and some may have worked for other companies in the area. Other large employers include Union Carbide (carbon electrodes), Stauffer (phosphorus), and Hooker (phosphorus).

Medical and Dental Programs

The plant participates in the company's medical surveillance program and has been visited three times by the METU team. The plant also retains a part-time physician (two days per week), whereas the full-time nurse who recently retired has not been replaced at this time. The plant has had a dental program in effect since 1936, and some of the employees are examined as often as every three months. Furthermore, no cases of phosphorus necrosis of the jaw, or "phossy" jaw, have ever been seen among the Columbia employees.

Work Histories

Presently, there are approximately 422 employees at the Columbia plant, of which 327 are hourly and 95 are salary. The employees work an eight-hour shift and rotate each week. Since there are three shifts, an employee will return to the day shift the fourth week.

The plant has been capturing employee work histories since 1980, and it appears that the plant is keeping the system evergreen. The plant has employment records for all active and terminated employees, which includes an employee name, employee number, hire date, start date, department and job codes. The plant has approximately ten departments and the job codes are based on a ten- level pay scale. Furthermore, it appears that the plant is using the same department and job codes in the MEHI system as are recorded on the employment records. (An example of a Columbia employment record is in Attachment II). Incidentally, I asked Mr. Kaminski if we could computerize the retrospective employee work histories if the study was approved. He agreed, and I told him I would contact him when we were ready to initiate the project.

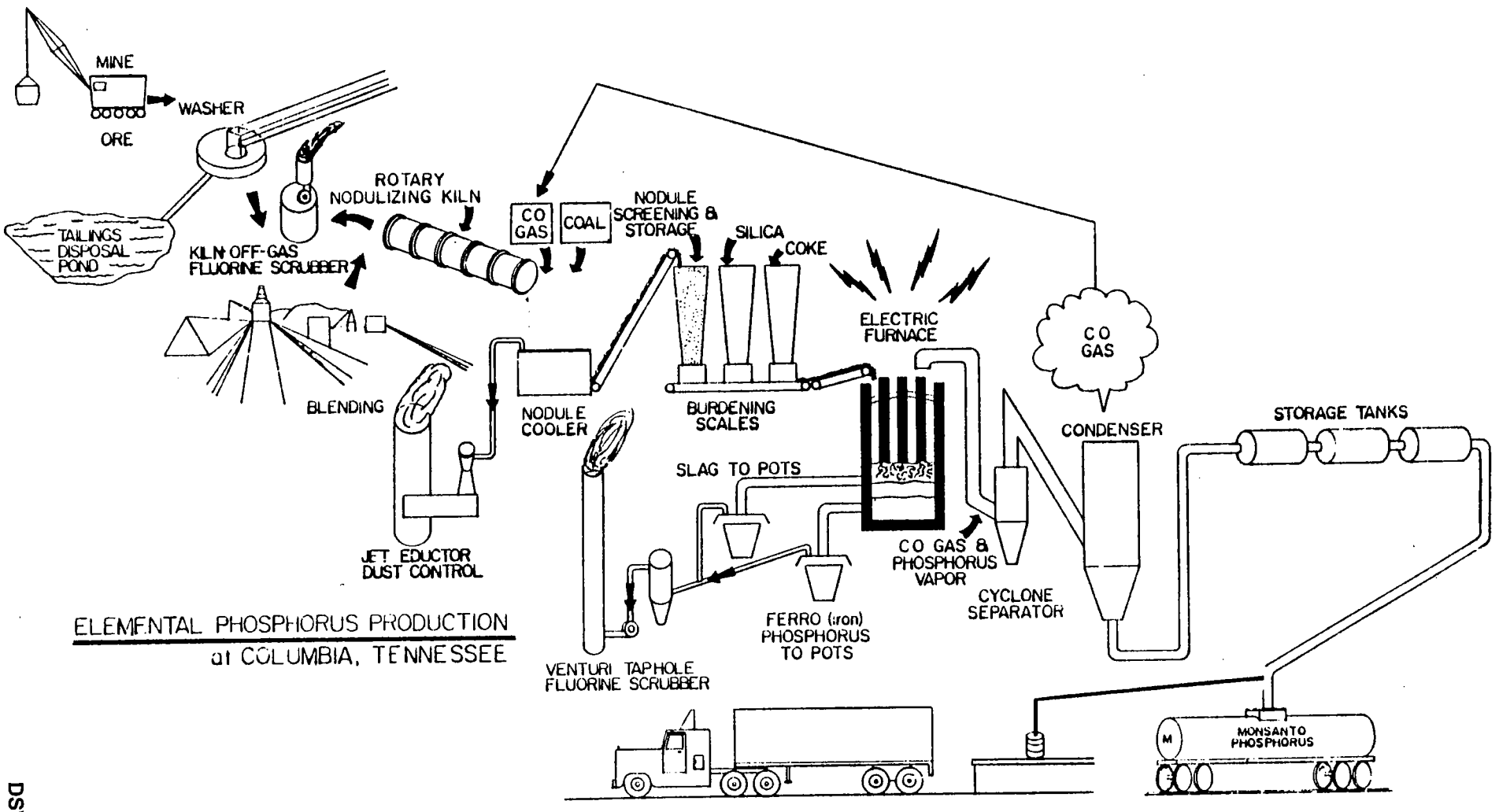
Summary

After reviewing the MEHI occupational exposure and industrial hygiene data and discussing the proposed medical study with Columbia plant management, I have concluded that the Columbia plant population could serve as an adequate set of external controls for the study. The Columbia plant population (active and retirees) have similar demographic characteristics as the "exposed" group from the Krummrich plant. Furthermore, it appears that most of the employees would participate, if the study is marketed appropriately and if employees are given an incentive for participating.

Terry L. Leet

Attachments

ATTACHMENT I



ELEMENTAL PHOSPHORUS PRODUCTION
at COLUMBIA, TENNESSEE

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ATTACHMENT II

SSN: 413-34-7551

CLOCK # NAME SENIORITY: 4-19-71

6

DATES	JOB CLASSIFICATION
4-19-71 - 9-17-73	Plant Relief - 157
9-17-73 - 4-1-74	(BID) Washer Helper (2-I) WASHER
4-1-74 - 5-27-74	(BID) Coke and Screening Auxiliary Helper (2-C) COKE/SCREENING (Has 90 days)
5-27-74 - 6-3-74	(BID) Porter (2-H) PORTER SERVICE
6-3-74 - 6-17-74	TO UTILITY (159) due to refusal to report to Porter job.
6-17-74 - 1-27-75	(BID) Coke and Screening Auxiliary Helper (2-C) COKE/SCREENING
1-27-75 OK 1-12-76	(BID) Railroad Switchman (3X-B) TRAFFIC/SHIPPING

CLOCK NO.	NAME	PLANT SENIORITY
6		4-19-71

JOB HISTORY

DATES	
1-12-76 - 2-2-76	UTILITY (159) due to reduction in force - To retain Group 3X-B pay for 24 months. Seniority in Traffic/Shipping still accruing.
2-2-76 5-3-76	RECALLED FROM UTILITY - Railroad Switchman (3X-B) TRAFFIC/SHIPPING
5-3-76 - 1-17-77	Slag Shovel Helper (2-A) (Has 90 days)
1-17-77 - 5-16-77	Metal Processing Helper (3-M) (Has 90 days) (Qualified 2-28-77)
5-16-77 - 9-19-77	Railroad Switchman (3X-B)
9-19-77 - 12-5-77	Metal Processing Helper (3-M) Bumped to this job due to dept. reduction of jobs - To retain Group 3X-B pay for 24 months.

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CLOCK NO.	NAME	SENIORITY DATE
6		4-19-71

DATES	JOB HISTORY
2/16/81 - 6-8-81	Railroad Repairman (3-N) Group 5 pay retention 24 mos. Reduction in Force.
6-8-81 - 12-8-81	Road Equipment Operator (5M) Has met all required qualifications. Was on pay retention This puts him back to his original job.
12-8-81 - 1-31-83	Railroad Track Leadperson (9-Q) Has met all required qualifications BURDEN/FACILITIES - 2-1-82
1-31-83	Labor (1-J) Reduction in force. To retain group 9-Q pay for 24 months (1-31-85)

CLOCK NO.	NAME	PLANT SENIORITY
6		4-19-71

DATES	JOB HISTORY
12-5-77 - 1-15-79	Metal Breaking Facility Operator (3-A) (Has 90 days) Is still on Group 3X-B pay retention until 9-19-79. Qualified on 3-A job 1-9-78.
1-15-79 - 1-7-80	Railroad Repairman (3-N) Still on Group 3X-B pay until 9-19-79. 24 months up on Group 3X-B pay retention - Rate changed to Group 3 9/24/79.
1-7-80 - 3-17-80	Road Equipment Operator (5-M)
3-17-80 - 12-29-80	Railroad Repairman (3-N) -- Bumped to this job due to reduction in force - ~~To retain Group 5 pay for 24 months~~
12-29-80 -	Road Equipment Operator (5-M). Back to original job.

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