

SHELL OIL COMPANY

723

DATE OCTOBER 13, 1972

REFINERY MANAGERS

ANACORTES ODESSA/CINIZA
HOUSTON WILMINGTON
MARTINEZ WOOD RIVER
NORCO

FROM: MANAGER MANUFACTURING ENGINEERING -
HEAD OFFICE

SUBJECT: OSHA ASBESTOS STANDARDS

Further to our memorandum of June 28, 1972, and the August 7, 1972, memorandum from General Manager Refining, concerning monitoring of airborne concentrations of asbestos fibers, sampling at Houston and Wood River Refineries under the general guidance of Head Office industrial hygienists has been completed. While these test results should be regarded as only a preliminary indication of typical exposure levels, there is sufficient data to summarize for the purpose of drawing some tentative conclusions pending additional sampling at other locations. This memorandum discusses the findings at Houston and Wood River and outlines specific action which is considered necessary to comply with the monitoring provisions of the OSHA Asbestos Standard 1910.93a issued June 7, 1972.

Employee exposure to airborne concentrations of asbestos fibers was checked at Houston for shop fabrication of insulation and at Wood River for demolition, installation, and cleanup of insulation. A detailed discussion of the operations and sample results are contained in Attachment I. Following is a summary tabulation of the typical jobs which were monitored with information on fiber counts.

FIBERS/CUBIC CENTIMETER*

<u>OPERATION</u>	<u>MEDIAN</u>	<u>PEAK</u>
Shop Fabrication	0.37	1.33
Demolition	0.93	1.76
Installation	1.24	1.98
Cleanup	1.54	4.52

PLAINTIFF'S EXHIBIT

SH-1367

The median fiber counts are especially noteworthy in that they provide general insight as to potential time weighted average (TWA) exposure levels for an employee who performed a specific operation with insulation containing asbestos for an entire shift. The values cited are significantly lower than the allowable eight-hour TWA of five fibers/cc as specified in the OSHA asbestos

*Includes only fibers longer than five microns.

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regulation. Actually, the TWA levels would frequently be lower than the fiber count listed above, since insulators often are engaged in work not utilizing asbestos containing materials. At Wood River, the TWA's which were calculated for the four employees involved in the monitoring program varied from a low of 0.21 to a high of 0.67 fibers/cc for all field operations sampled.

The peak values listed above are significantly higher than the actual fiber count reported by Shell Development for the samples taken during a specific operation. These numbers were calculated from the reported fiber count by reducing the total sample time to the actual time when asbestos was being handled. For example, if only 50 percent of the sampling period was spent working with asbestos insulation, the peak value calculated would be twice the fiber count reported by Shell Development. This approach was used in situations where exposure varied during the sampling period, as we believe it provides a realistic basis for evaluating whether exposure was below the peak concentration of ten fibers/cc specified in the standard.

If the surveys at other Shell facilities confirm the Houston and Wood River results that employee exposures to asbestos fibers are below the prescribed limits, significant changes in current work practices should not be required and there will be no need to provide special clothing. Although respirators would not be a mandatory requirement at the levels found, we would encourage their continued use where work results in the evolution of significant quantities of visible dust. Workmen should be encouraged to follow work practices which will minimize creation of any unnecessary dust when asbestos is handled. In this connection, some observations were made during the survey which may assist in reduction of dust. In this regard, wetting down of asbestos materials during demolition and cleanup operations should be done with a fine spray rather than a solid stream of water. The wetting time should be sufficiently long to assure good penetration. Care must be taken to insure that the wet materials are not allowed to accumulate on walking surfaces as the resultant slippery surfaces may be hazardous. To reduce dust during mortar mixing operations, water should be added to the dry material in the original container, where practical.

To permit operations involving potential exposure to asbestos to continue essentially as in the past, periodic monitoring will be required to demonstrate that exposure levels remain within the allowable range. The initial monitoring of employee exposure must be completed by December 7, 1972, to comply with Paragraph 1910.93a(f) of the OSHA standards as published in the Federal Register on June 7, 1972. Recommendations on frequency of follow-up monitoring will be issued after results of the initial sampling program have been reviewed. The following guidelines are provided to assist in the initial studies:

1. Identify typical jobs which involve potential for exposure to asbestos fibers. To obtain a representative cross section of the full spectrum of such activities will require consideration of such items as the types of material which contain asbestos, nature of the procedure (i.e., demolition, installation, etc.) and duration of the job. From a list of typical jobs, select a sufficient number of specific tasks for monitoring to provide documentation which would establish beyond any reasonable doubt

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1. continued

that subsequent monitoring on the same job performed under similar conditions by any employee would yield comparable results. It is recognized that this procedure will not result in obtaining a sample for every employee exposed to asbestos. However, we are confident if the monitoring is carefully performed and the details of the job are fully documented, that one or two samples for each typical job should be sufficient for the initial monitoring. Although the number of samples will vary between refineries, we would envision somewhere between 15 and 25 samples would suffice for the initial program. If, when results are analyzed, we find exposure to be close to or above the allowables, additional testing can be performed.

2. The basics of industrial hygiene air sampling were presented to refinery representatives at the short course in Houston on June 15-16, 1972, and each refinery was subsequently advised to acquire the necessary equipment for sampling asbestos fibers. However, since sampling of airborne concentrations of fibers is rather complex, we suggest that the regional industrial hygienists participate during the initial survey, insofar as practicable. They can also supply sampling equipment which will accelerate the monitoring program. -Manufacturing Engineering will be happy to assist when desired by the location in arrangements for services of an industrial hygienist.
3. The majority of initial samples should be taken with the sampling device worn by the employee performing the work to obtain a breathing zone sample. Samples should be run for at least 30 minutes, even though the entire period may not involve handling of asbestos. Samples need not be longer than 90 minutes, even if this does not cover the full span of the job, as that should be ample time to provide a representative fiber count. Samples can be taken on any employee who has occasion to work with asbestos, but in most cases we suggest the monitoring be done with insulators, since they are expected to have the greatest potential for exposure. At those refineries where supplemental contract maintenance personnel are involved in insulation work, we suggest personal samples should be obtained on these workmen. This appears to be the most practical method of obtaining data in regard to the maximum asbestos exposure to any Shell employees who might be in the immediate area when insulation is being handled. Generally, it can be assumed that area sampling to determine potential for exposure of other employees would yield lower results than that obtained from monitoring of workmen actually handling asbestos. Therefore, only a few area samples should be required to develop some documentation to provide a general correlation between personal samples and area samples.

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4. In conjunction with the sampling program, a survey form (see Attachment II) should be prepared to document the circumstances associated with the specific sample. This information is essential to evaluate actual employee exposure to asbestos, and the form should be completed, insofar as practical. A typical completed form (see Attachment III) is included for your information.
5. Samples should be forwarded to Shell Development Company, Bellaire Research Center, for a determination of the actual fiber count (send by first class mail to the attention of Mr. R. M. Curtis, Shell Development Company, P. O. Box 481, Houston, Texas 77001). Information should accompany each filter regarding the total volume of the air sample in liters. Unless the initial monitoring is completed in a relatively short period, we suggest samples be forwarded a few at a time to distribute evenly the work load at Bellaire Research Center between now and December 7.
6. Upon completion of sample analysis, Bellaire Research Center will advise the location submitting samples of the average fiber count and the concentration in fibers/ml air. Refineries will use this data to calculate the peak concentrations using the methods outlined above, and the eight-hour TWA, where applicable. Obviously, the latter need only be determined in situations where peak exposures exceed five fibers/cc since this is the permissible limit for eight-hour exposure (i.e., the latter could never exceed the peak). A brief report summarizing the results of the initial survey should be forwarded to Head Office - Manufacturing Engineering for our guidance in developing future monitoring frequencies.

Please advise us if there is any additional information or assistance required in conjunction with implementing the air monitoring program at your location.


B C. Bell

Attachments

cc - General Manager Refining
Ciniza Refinery - Superintendent
Shell Chemical Company - Engineering - Manager
Shell Development Company - Bellaire Research Center -
Dr. G. Edwards
Shell Engineering Council - Chairman
Occupational Safety and Health - Manager
Legal Department - Mr. J. A. Evans
Manufacturing Operations - Mr. R. H. Tubman

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SUMMARY OF JOBS FOR WHICH
EXPOSURE TO ASBESTOS WAS MONITORED

DEMOLITION

Demolition involved the removal of insulation along with the protective covering from furnace transfer piping, exchangers, and a pump case. For each of the three types of demolition jobs, there were two insulators assigned to the task, each wearing a sampling unit. In addition, a general area sample was obtained either by the observer or at a fixed sample point. Following is a general description of the jobs, plus information on sample times, measured asbestos fiber count⁽¹⁾ and fiber counts adjusted to reflect the time of actual exposure to asbestos.

1. The first job involved removal of "Firetard" covering, wet down of insulation, and stripping of "Unibestos" insulation from a distilling unit charge pump. The observers noted that considerable dust was generated during handling of the covering and the insulation. Apparently, the wet down operation, which lasted two minutes and used a solid stream was ineffective in controlling the visible dust. The asbestos fiber counts for the two insulators were 2.21 and 2.27 for a 15-minute sample period. Peak fiber counts of 2.55 and 2.62 are obtained by deducting the wet down time to determine the actual material handling exposure. There was little wind in this case. A general air sample obtained about six feet from the work area had a fiber count of only 0.07. This sample was taken over a 24-minute period, and actual work with asbestos was only in progress part of the time.
2. The second demolition job consisted of removal of "Firetard" covering, cutting wire, and taking dry "Unibestos" insulation off a distilling furnace transfer line located about fourteen feet above ground. The first samples were taken for a 25-minute period while the men were working downwind during removal of the covering material. Material handling consumed the entire period, and peak values would be equal to the reported fiber counts of 0.98 and 1.36.

During the next sample, the workers continued to remove the covering and insulation for ten minutes, and then spent 21 minutes preparing wire to replace the insulation. Therefore, the original fiber counts of 0.05 and 0.30 could be reported as peaks

(1) Values given for fiber count referred in all cases to number of fibers exceeding five (5) microns in length per cubic centimeter of air drawn through sampler.

2. continued

of 0.16 and 0.93. The general air sample taken ten feet downwind of the work area for a period of three hours and twelve minutes had a fiber count of 0.03.

3. The final demolition job involved stripping 85 percent magnesium block insulation from several exchangers with varying exposure of workmen resulting from wind effects and location of employee relative to insulation being removed (i.e., waist level, overhead, etc.). This work was divided into five sampling periods, for which details are provided below:

- A. Monitoring was first performed during dry removal of "Fire-tard" covering and block insulation from exchangers. Samples lasting 18 minutes were taken during which insulation was stripped from the exchanger head, scrap insulation was wet down, and waste material was placed into a closed container for disposal. The actual fiber counts of 0.27 and 0.82 can be adjusted to 0.54 and 1.64 for the nine minutes of actual material handling, which excludes the wet down period.
- B. The next sample period included removal of the "Firetard" covering and wet magnesium block from an exchanger which had a top elevation of about eight feet. The 20-minute sample had fiber counts of 0.55 and 0.66, but since seven minutes were used to wet down the insulation, values of 0.85 and 1.01 would be more representative of the peak exposure. The observer noted that dropping the insulation on the ground made visible dust clouds, but the downwind area air sample had a fiber count of only 0.31 for a 19-minute period.
- C. The third period included removal of wire bands and "Fire-tard" covering. Quite a bit of dust was noted, much of which was outside the breathing zone as the men were working on the upwind side of the exchanger. The two 24-minute samples had results of 0.19 and 0.81, but less than half of the time was spent in actual insulation handling and the peak exposures are 0.51 and 1.77. The large difference in fiber count between the two samples cannot be explained from available information.
- D. The next task consisted of stripping dry magnesium block off an exchanger, the top of which was about six feet above ground level. A knife was used to scrape the exchanger shell and insulation was thrown to the ground which caused visible dust. The fiber counts were 0.13 and 0.88 for 18-minute samples,

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D. continued

and peak counts of 0.26 and 1.76 for the actual handling time of nine minutes. Again, the difference between the fiber counts is unexplained, since both samplers were calibrated with a known standard before and after the survey. It is possible that one worker may have been working downwind. The effect of wind is illustrated by the general air sample which covered a period of 82 minutes and yielded a fiber count of 0.35.

- E. The final job involving exchangers included removal of the "Firetard", wet down of magnesium block, stripping the insulation at about waist level, and preparation of barrels for disposal of the scrap. It was observed that oil on the insulation reduced water absorption, and the insulators were working downwind about half the period with quite a bit of visible dust. The fiber counts were 0.40 and 0.64 for the 28-minute period, but only eleven minutes were spent in actual material handling resulting in peak counts of 1.02 and 1.63.

A 53-minute general air sample that was located about sixteen feet from the work area had 0.16. The results from a sampler worn by an observer for a period of three hours and eight minutes, primarily upwind of the work areas, was only 0.02.

REPLACEMENT

Replacement consisted of installing used "Unibestos" insulation and weather covering on the distilling furnace transfer lines. This would be similar to initial placement of new insulation, except that the aged material probably created more dust than would be expected for new material. The observer noted that trimming operations with hand tools or pounding on the insulation ~~created~~ additional dust.

The first sample period consisted of nineteen minutes while insulation was being wired in place, and the results were 0.45 and 1.50. The second sample was for thirty-seven minutes with fiber counts of 0.72 and 1.24. The last 79-minute sample included time for pre-cutting of wire bands, and then forty-six minutes during installation of the outside covering of "Firetard". Therefore, the fiber counts of 0.78 and 1.18 would yield peaks of 1.34 and 1.98. There appears to be good correlation between observers' comments on visible dust and the counts from samples taken at those times.

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CLEANUP

Cleanup was the final step in the insulation operation when scrap materials are policed from the immediate work area and placed in disposal containers. During the two-day survey, ten air samples were taken which were considered as typical of potential exposure to employees engaged in cleanup of dry materials containing asbestos in outside work areas at Wood River. The type material, length of sample period, fiber count, adjusted time for actual insulation handling, and the peak fiber counts are listed below.

<u>MATERIAL</u>	<u>LENGTH OF SAMPLE (MIN.)</u>	<u>FIBER COUNT</u>	<u>HANDLING TIME (MIN.:</u>	<u>PEAK FIBER COUNT</u>
Unibestos	20	0.45	2	4.50
Unibestos	81	0.13	7	1.50
Unibestos	28	0.49	5	2.74
Magnesium	55	0.11	6	1.01
Magnesium	20	1.39	17	1.64
Magnesium	47	0.24	35	0.32
Magnesium	22	1.43	22	1.43
Magnesium	22	1.36	22	1.36
Magnesium	20	3.39	15	4.53
Magnesium	47	1.03	31	1.56

A 23-minute general air sample taken during cleanup had a fiber count of 0.43.

FABRICATION

Fabrication encompassed work performed inside the insulation shop at Houston Refinery where "Thermobestos" (about six percent asbestos fibers) was being prepared for installation in the field. The insulation is removed from containers, cut, fabricated to special shapes by gluing, and then returned to the box for transportation to the jobsite. Two saws are located in a partially enclosed area within the large, air-conditioned engineering shop. A vacuum system picks up dust and small particles near the saw blade.

Following are the results from a sampler worn by the shop insulator during a two-day study while fabrication was in progress in the shop.

<u>SAMPLE TIME (MINUTES)</u>	<u>FIBERS PER CUBIC CENTIMETER</u>	<u>PEAK FIBER COUNT</u>
40	0.15	0.20
30	0.24	0.45
10	0.32	0.36
90	0.11	0.43
120	0.08	0.13
85	0.10	0.13
20	0.16	0.16

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A 60-minute sample taken during cleanup in the Houston insulation shop using vacuum equipment for dust pickup had a count of 0.12, which was adjusted to 1.03 for the actual material handling activities. A 17-minute sample taken during clean out of dust collecting equipment resulted in a concentration of 0.47.

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RECORD OF ASBESTOS SAMPLING

Attachment II

SAMPLE NO. _____

FILTER NO. _____

PLANT: _____ DATE: _____

EMPLOYEE (NAME AND NO.): _____ JOB _____
CLASSIFICATION: _____

AREA SAMPLED: _____

WIND CONDITIONS: _____

WORK LOCATION - TO GROUND: _____ TO EMPLOYEE: _____

MATERIAL TRADE NAME: _____ % ASBESTOS: _____

<u>TIME STARTED</u>	<u>WORK TASKS</u>	<u>TIME AT TASK</u>
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_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

TOTAL: _____

PUMP NO.: _____ CALIBRATION: (lpm) _____ (Date of Calibration) _____

TIME ON: _____ TIME OFF: _____ TOTAL VOLUME: _____ liters

COUNTING: LAB _____ BY _____ DATE COUNTED _____

AVE. NET COUNT ON FILTER _____

CONCENTRATION, FIBERS > 5 μ /ml air _____

REMARKS: _____

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RECORD OF ASBESTOS SAMPLING

Attachment III

FILE NO. WRR-01

FILTER NO. 10

PLANT: Wood River Refinery

DATE: 01/01/73

EMPLOYEE (NAME AND NO.): Joe Jones 9999

JOB

CLASSIFICATION: Insulator

AREA SAMPLED: Remove insulation from furnace transfer line, old, distillation unit

No. 2 - general area sample-fixed point - 15 foot from work area.

WIND CONDITIONS: No wind at start.

WORK LOCATION - TO GROUND: 15 foot scaffold

TO EMPLOYEE: waist high

MATERIAL TRADE NAME: JM thermobestos

% ASBESTOS: 6

<u>TIME STARTED</u>	<u>WORK TASKS</u>	<u>TIME AT TASK</u>
0830	Cut metal bands	5 minutes
0835	Remove outside "Firetard" covering	10 minutes
0845	Remove block "thermobestos" insulation	20 minutes
	Note: wind blowing 5 mph from northwest	
0905	Wet down scrap to minimize dust	5 minutes
	Note: used low-pressure spray to reduce dust	

TOTAL: 40 minutes

PUMP NO.: 216 CALIBRATION: (lpm) 2 (Date of Calibration) 01/01/73

TIME ON: 0830 TIME OFF: 0910 TOTAL VOLUME: 80 liters

COUNTING: LAB _____ BY _____ DATE COUNTED _____

AVE. NET COUNT ON FILTER _____

CONCENTRATION, FIBERS > 5 μ /ml air _____

REMARKS: _____

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