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EVALUATION OF ASBESTOS EXPOSURES AT THE NORTH LOOP TURBINE NUMBER 1 FACILITY FROM MARCH 27 THROUGH APRIL 11, 1979

Prepared for

TUCSON ELECTRIC POWER COMPANY

by

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IN RE: ABRAMS November 1992

The recent activities at the North Loop No. 1 Gas Turbine have been evaluated for asbestos fiber exposure to workers performing various tasks. Their activities and tasks encompassed removing asbestos-containing baskets, pads and some block material in order to examine the baskets, turbine blades, etc. for possible defects and/or missing parts from the just-accomplished turbine overhaul. Sampling was performed to maximize subsequent data analysis to allow calculation of not only full shift exposure patterns but also to evaluate specific job tasks. All time-weighted average, full shift exposures as well as specific calculated job tasks did not exceed the OSHA asbestos standards, however, the concentrations observed are above the 0.1 fiber ec level suggested by OSHA for instituting medical monitoring. Specific recommendations are presented for future turbine overhauls and the monthly maintenance procedures with respect to handling asbestos-containing materials, particularly when such material is reaffixed as occurred in this study.

INTRODUCTION

In conjunction with Westinghouse health and safety representatives at both the corporate and divisional levels, an evaluation of asbestos exposure during activities at the North Loop No. 1 turbine was requested by Tucson Gas and Electric Company (now Tucson Electric Power Company). In addition, comments and recommendations were requested concerning the observed work practices by Westinghouse as well as those projected for Tucson Electric Power Company (TEPC) employees.

STUDY DESIGN

In order to maximize the sampling performed during this study, all monitoring data were acquired in as cost-effective a manner as possible. Time-weighted average employee exposures and area monitoring were calculated with several assumptions that are detailed in a latter section. Also, it was purposefully planned that each distinguishable task involving possible asbestos exposure be evaluated separately. This effort would also assist defining specific tasks for future investigation and sampling for the asbestos ceiling standard of 10 fibers per cubic centimeter.

Furthermore, two additional factors impinged directly on this study design. First, there was uncertainty at the beginning of sampling as to the extent of work to be performed on the turbine and second, the union employees were somewhat unfamiliar with the newly revised work practices.

ASBESTOS SAMPLING AND ANALYTICAL PROCEDURES

All samples were collected with calibrated personal sampling pumps operating at approximately 1 liter per minute. The pumps were calibrated on March 26, 1979 just before the study began and the calibration reconfirmed at the end of the study. A calibration quality control check was performed daily before and after each sampling period. Flow rates were also checked frequently during each sampling period and only very minor adjustments were made during the initial stage of sampling. This is a fairly common occurrence with all such battery-operated pumps. Asbestos fibers were collected open-faced on 37 mm Millipore AA 0.8 micron pore size filters in three-piece cassettes.

03117379

IN RE: ABRAMS November 1992

HUBB-0000363

A detailed procedure for collecting asbestos fibers is presented in Appendix 1 and this procedure was followed for the sampling performed in this study.

Most of the samples were analyzed at Utah Biomedical Test Laboratory in Salt Lake City, Utah. This laboratory is accredited by the American Industrial Hygiene Association. The remaining samples were analyzed here in Tucson at the University of Arizona Industrial Hygiene Laboratory. All samples were analyzed in accordance with OSHA and NIOSH recommended procedures. Here, the filters were examined under phase contrast microscopy at 400X, counting all fibers >5 mm with a 3:1 aspect ratio.

SAMPLING RESULTS

As stated previously, the results for this study have been calculated as both (1) the daily full shift time-weighted average (TWA) exposure levels for each employee and associated area samples and (2) the individual exposures as a function of the specific job task performed. Table I presents the daily TWA's as calculated from sampling data during exposure periods as well as estimated exposure based on both actual sampling data and personal observation of the particular job the employee was accomplishing. The details of these calculations are discussed in Appendix II.

The employee exposures were also determined as a function of their specific job tasks within the study period. Job tasks were identified as being routine monthly maintenance procedures, turbine overhaul preparation, stripping, cleanup, turbine overhaul and finally, refitting blankets. Table II summarizes the TWA's for these specific job tasks and the rational for the particular calculation is detailed in Appendix III.

The raw data concerning each sample collected during this study are presented in Appendix IV.

OBSERVATIONS

March 27, 1979: J. Gale and J. Sandoval began clipping blanket stays from the south burner cover. Both employees were wearing Edmont Wilson 55-510 coveralls, surgeons caps, paper booties and gloves. Also, they were using full-face piece air compressor-supplied respirators. Samples were collected on both workers and at an area monitoring station located about eight feet above the floor on the south wall just opposite the blanket removal site. Sampling began about 0902 and was completed around 1400 when Westinghouse was told to remove all the blankets. This sampling period may approximate the monthly turbine maintenance procedure although the levels may be somewhat higher as the burner blanket replacement was not included.

From about 1400 to 1500, the remaining blanket stays were clipped. J. Gale climbed on top of the turbine, clipping the top blankets, and during this activity, a few fibers were noticed by observation of particle scattering from the overhead light. Both employees stated it was difficult to wear the sampling equipment while clipping blankets underneath the turbine and at their request, the samplers were removed.

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IN RE: ABRAMS November 1992

WESCO-0000356

Future investigations should evaluate the ceiling exposure level of slipping blankets underneath the turbine to ensure that excessive exposures are not encountered in that situation.

Subsequently, the blankets were removed from the building for storage outside where they were wrapped in plastic and tape-sealed. Due caution should be exercised in handling the blankets inside the turbine building. Dust can be generated in this activity although the asbestos levels did not seem of concern.

March 28, 1979: Employees J. Gale and H. Millsap continued to wear protective clothing and air-supplied respirators as described for March 27th. Samples were again collected on both workers and at the area monitoring location. Morning activities centered on cleaning the turbine building as a result of the previous day's work. J. Gale and H. Millsap spent the majority of their time vacuuming the floor, pipes, and turbine surfaces that were dust-laden from the blanket removal efforts. No visible dust particles were generated or disturbed during this activity.

A Montgomery Ward, 12-gallon wet and dry vacuum cleaner was used for the clean-up. Mr. Jerry Truett, a Westinghouse employee, had modified the vacuum cleaner by adding a water trap at the exhaust-end of the vacuum. He also taped all hose connections. The exit-end of the 5-gallon can water trap was also covered with another vacuum cleaner bag. An aliquot of the water-cleaned vacuum exhaust was collected to determine whether asbestos fibers were being captured or not.

A fourth sampler was placed in the building housing turbine #4 and located in an area similar to the one sampled for turbine #1. This fourth sampler, in effect, was monitoring background asbestos concentrations within the turbine building.

Mr. Leonard Hove, a TG&E electrician was also sampled for 93 minutes during his work on turbine #1. He was supplied with a Comfo II to wear while in the turbine building.

During the afternoon, J. Gale and H. Millsap painted the surfaces of any other asbestos-containing material that was not being removed from the turbine. The white, rubber-based coating and the aluminum latex paint both seemed to accomplish their stated purpose and seal the various surfaces.

March 29, 1979: J. Gale and H. Millsap were wearing air-supplied respirators and protective clothing. The two personal samplers and the one area monitor were in place and collecting particulates from the workroom air.

Visual inspection of the surfaces painted on March 28th showed no continuous. Scraping with a screwdriver and slight indentations caused by hammering did not seem to distress or invade the painted surfaces. Thus it appears that painting of asbestos-containing surfaces is highly desirable.

In order to assess the immediate needs for continuation of the extensive personal protection procedures employed since the 27th, four filters were selected for analysis at the University of Arizona Industrial Hygiene Laboratory. Results from these samples were discussed with both TG&E personnel (G. Hihow and J. Kents)

03117381

IN RE: ABRAMS November 1992

and Westinghouse employees (R. Bergquist and J. Truitt). Mr. Bergquist agreed that the personal protection could be removed when the painting and any subsequent clean-up was completed. Also, he recommended that area sampling be continued for a few days and that sampling be performed during blanket replacement. I concurred in Mr. Bergquist's recommendations as did TG&E representatives.

March 30 and April 2, 1979: Area sampling continued for the day-shift hours at the same location as previously described.

April 11, 1979: Personal sampling and area sampling was performed during blanket replacement. J. Gale and R. Nesbitt began moving blankets into the turbine building about 1245. J. Gale then handed blankets up to R. Nesbitt who was replacing the top blankets while J. Gale worked on the side and end blankets. Dust particles were evident during this activity where the roof was closed and the ventilation was off. The blanket replacement was completed about 1535 and sampling was terminated.

CONCLUSION

A study has been performed on the asbestos exposure to working during the stripping and refitting of a gas turbine of asbestos-containing materials, principally blankets. Based on the sampling data and on-site observations, the following conclusions are presented:

1. Employees are exposed to asbestos fibers to the extent that medical monitoring is required as defined by the October 1978 OSHA Program Directive 300-16. This directive states that medical monitoring is to be instituted when employee exposure exceeds 0.1 fibers/cc.

2. While the OSHA 8-hour TWA permissible exposure limit of 2 fibers/cc was not exceeded in this study, a relaxation of the observed employee work practices could result in exposures exceeding the standard.

3. Likewise, the OSHA ceiling limit of 10 fibers/cc was not exceeded with any sample collected in this study, although careless handling of blankets and/or blocks could result in exposures above this ceiling value.

4. Surface painting of asbestos-containing materials appear to substantially reduce the possiblity of exposure.

5. Protective clothing and air-supplied respirators are not required at the levels of asbestos found in this study. Air purifying respirators are required if the 8-hour TWA permissible exposure (2 fibers/cc) or the ceiling or maximum (10 fibers/cc) level "are reasonably expected to exceed no more than 10 times these limits" according to 29 CFR 1910.1001. Similarly, special clothing, such as coveralls, head coverings, gloves etc. are not required unless ceiling levels are exceeded.

03117382

IN RE: ABRAMS November 1992

6. It is not necessary for security personnel to wear air-purifying respirators when making their evening rounds during turbine overhaul activities similar to those described in this report. Daytime rounds should also not require respiratory equipment unless work practices deteriorate or future air sampling results indicate the contrary.

RECOMMENDATIONS

Based on the findings of this study and as a result of discussions with Tucson Electric Power Company and Westinghouse employees, the following recommendations are offered:

1. Asbestos-containing materials such as blankets and blocks that are used as insulation on the gas turbines should be replaced with asbestos-free materials. Fiberglass is used as a replacement by both Westinghouse and Arizona Power for example. Unfortunately, fiberglass is not without some health hazard of its own. Attached as Appendix V is a recent review article on fiberglass that should give you some insight into current thinking on this material. Also, a section of the NIOSH Criteria Document on fiberglass is enclosed.

2. A medical monitoring program as described in 29 CFR 1910.1001 should be established. A copy of the OSHA regulation on asbestos is enclosed for your reference as Appendix VI.

3. An asbestos monitoring program should be instituted to ensure that employee work practices are equal to or hopefully exceed those observed in this study. It is encouraging that the TEPC Safety Department has just purchased three MSA Model S personal sampling pumps and this action certainly constitutes a commitment to begin the monitoring plan. Periodic personal sampling should emphasize the blanket stripping and refitting tasks as well as any removal of block material. Short-term exposure levels of approximately 15-minute duration collected at perhaps 2 lpm or greater, should be acquired also to ensure that asbestos ceiling value is not exceeded.

4. All blankets, blocks and any other asbestos-containing materials that are removed and to be refitted, should be painted as described earlier in this report. This activity, while time-consuming, appears to cut down dust generation.

5. An asbestos respiratory and protective clothing program should continue to be available to employees until such time as a sufficient data base and good work practices show that asbestos exposures are minimized.

6. Employee work practices must be re-evaluated in light of these findings. Specific stripping and removal procedures should be studied and bagging of materials, wet clean-up methods and any other effective dust suppression techniques implemented.

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