# WALK-THROUGH SURVEY REPORT

## AMERICAN ENKA COMPANY
Lowland, Tennessee 37778

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| DATE OF SURVEY: | June 1-2, 1977 |
| PERSON(S) CONDUCTING SURVEY: | Sherry G. Selevan, Epidemiologist<br>James H. Jones, Industrial Hygienist |
| DATE OF REPORT: | July 10, 1977 |
| PERSON(S) PREPARING REPORT: | Sherry G. Selevan<br>James H. Jones |
| PURPOSE OF SURVEY: | To evaluate the plant for possible inclusion of the cross sectional medical and reproductive study of $CS_2$. The study is being conducted because of reports in the Soviet Union and Eastern European literature of reproductive hazards of $CS_2$. |
| SUMMARY OF SURVEY FINDINGS: | This plant appears to contain an excellent worker population for the $CS_2$ study. |
| CONTACTS AT PLANT: | American Enka<br>John Rich, Plant Manager<br>W. W. Abbott, Manager, Tenn. Operations<br>J. T. Garrett, Manager, Safety & Health<br>James Hickman, M.D., Plant Physician<br>United Textile Workers of Americal Local No. 815<br>J. B. Bruce, Business Manager<br>J. D. Moore, President |
| DESCRIPTION OF FACILITY: | The site is owned by American Enka Co., a part of Akzona, Inc., and includes approximately 860 acres with about 85 acres under roof. A plant was started in 1948 to produce rayon filament yarn. In 1956 rayon staple fiber production was added. Also nylon filament production was added in 1963 and polyester filament production was started in the same plant in 1966. A Nylon-Polyester Staple Plant was placed into operation in 1967. Rayon filament |

production ended in 1974. Products currently produced at this site are rayon staple, nylon staple, polyester staple, nylon filament, polyester filament and sodium sulfate, a by-product from rayon staple fiber production.

## DESCRIPTION OF WORKFORCE AND PERSONNEL RECORD SYSTEM

The site has a total workforce of 3397; of these, approximately 900 are salaried. 900 are in maintenance and the remainder (1665, April 24, 1977) are production workers. Of these 296 are in the viscose area. There are women employed on the site but not in areas with $CS_2$ exposure.

The number of hourly personnel in rayon production changed periodically with changes in production capacity and demands. Increases occurred in 1959-60, 1963-4, and the late 1960's.

Job changes occur in two ways: (1) workers bid within departments; and (2) workers can transfer from other departments. Changes in departments do occur, but not frequently.

The average age of the workers in the rayon staple plant is somewhat older than in other plants and areas, and the workforce is fairly stable. There is a turnover of approximately 0.6%/month (7%/year).

When the rayon filament plant was closed, the employees were transferred all over the site.

The following records are maintained on each worker. The old personnel file form contains the social security number, age, date of birth, sex, race, and information on the person's father, mother, and spouse. At some time in the past, births of children of workers were recorded but these records are probably not complete and the updating has not continued.

The new application form has the social security number, telephone number, date of birth, address. After employment, an application supplement is filled out with information concerning sex, marital status, number of children, date of birth, social security number, and persons to be notified in an emergency.

The new employees are hired on a probationary basis for the first four months; the temporary appointment form with department and job title is completed. After six months there is a "change in status" (service wage increase) with a form by the same name filled out (date, sex, department, and job title). This format has remained unchanged since the building of the facility.

The rate structure for the union contract has a complete list of job titles. There has been no change in job titles.

The insurance plan, Blue Cross, covers maternity benefits, and copies of claim forms are maintained in the office.

There is one exposure other than $CS_2$ that might cause reproductive effects: lead. This would be noted on the personnel records, allowing for elimination of pregnancies associated with this exposure.

## DESCRIPTION OF SAFETY, INDUSTRIAL HYGIENE AND MEDICAL PROGRAMS

The Safety and Health program at the site is under the direction of a qualified industrial hygienist. Each plant (rayon staple, nylon and polyester staple, nylon and polyester filament) has a safety and health coordinator who is responsible for the program at that plant. $CS_2$ and $H_2S$ area samples are collected routinely using a gas absorption bottle train and spectrophotometric analysis. Area samples have been collected since the plant started up. Typical current levels of $CS_2$ in the spinning area are about 15 ppm and 5 ppm in the churn house. Personal samples for $CS_2$ using charcoal tubes have been collected for the past 2 to 3 years. A monitor for $CS_2$ has recently been purchased and is currently undergoing testing. A continuous monitor alarm system for $H_2S$ is in operation. Occasional samples for lead and asbestos are collected when maintenance work involves handling these substances.

There is a full time physician, Dr. James Hickman, Jr., at the site. A licensed nurse is on duty each shift with two nurses on the day shift. In addition, at least two other employees per shift have had formal first aid training. A required preemployment physical includes a physical exam, chest x-ray, audiometric tests, blood profiles, visual tests, and urine tests. Periodic medical exams are given to employees with certain jobs depending on their work place exposures (asbestos, lead, etc.). For the past three years periodic iodine azide urine tests have been given to workers exposed to $CS_2$.

There is a formal safety program at this site, with five people devoted full time to it. Protective equipment required in various areas of the site are safety shoes, protective clothing, goggles, and respirators. There are shower and clothes changing facilities in some areas of the site. The company supplies safety and health manuals detailing safety and health hazards and precautions to workers. Periodic safety meetings are held to emphasize existing precautions and introduce new safety topics.

## DESCRIPTION OF PROCESS

Raw materials used in the production of rayon staple fibers are wood pulp, carbon disulfide, sulfuric acid, caustic soda, zinc oxide, oleic acid and in some cases titanium dioxide. Hydrogen sulfide, carbon disulfide, zinc sulfate and sodium sulfate appear as byproducts in part of the process.

The process begins with the steeping of sheets of wood pulp in caustic soda to form alkali cellulose. This mass is pressed to give a controlled ratio of alkali to cellulose and then shredded to increase surface area. The alkali cellulose is then "aged" by holding it in closed containers to allow oxygen in the air to depolymerize the cellulose to the desired extent. The alkali cellulose is then reacted with carbon disulfide to form soluble sodium cellulose xanthate. This xanthated cellulose is dissolved in dilute sodium hydroxide to form "viscose" which is then filtered, deaerated and aged. The viscose solution is extruded through a spinneret into a spin-bath consisting of sulfuric acid,

zinc sulfate, sodium sulfate and surfactants. The extruded viscose streams coagulate into individual filaments, which are stretched prior to complete regeneration to cellulose by continuing action of the acid component of the bath.

The wet filaments from a number of spinnerets are combined into a large bundle of fibers called a "tow". This tow is then cut into short lengths after which the fibers undergo desulfurizing, bleaching, washing, application of lubricants and drying. After drying the fibers are baled in approximately 500 pound bales.

## SURVEY OBSERVATIONS

Potential health hazards at the Rayon Staple Plant include carbon disulfide, hydrogen sulfide, lead, asbestos, chlorine, noise, sodium hydroxide and sulfuric acid.

Housekeeping at this plant was good. Ventilation appeared to be adequate in most areas even though the design of the system was inefficient.