

HEALTH HAZARD EVALUATION REPORT 72-1-14
HAZARD EVALUATION SERVICES BRANCH
DIVISION OF TECHNICAL SERVICES

Establishment: Ex-Cello Corporation
Lima, Ohio

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U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH
CINCINNATI, OHIO 45202

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EX-CELLO CORPORATION
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SUMMARY DETERMINATION

Section 20(a)(6) of the Occupational Safety and Health Act of 1970, 29 U.S.C. 669(a)(6), authorizes the Secretary of Health, Education, and Welfare, following a written request by any employer or authorized representative of employees to determine whether any substance normally found in the place of employment has potentially toxic effects in such concentrations as used or found.

The National Institute for Occupational Safety and Health (NIOSH) received such a request from an authorized representative of employees regarding exposure to a coolant, Cutting Oil H-106, used in the Hammond Polisher machines at the Ex-Cello Corporation, Buckeye Road, Lima, Ohio. "Skin irritations and sinus problems" were mentioned in the hazard evaluation request as the symptoms of exposure to the coolant.

During a visit to the plant on March 25, 1972 workers indicated that respiratory symptoms occurred after the coolant was changed. Exposure to oil mist and volatile components from the coolant and/or Stoddard solvent used to clean the polishers were considered potential air contaminants. Bulk and environmental samples were obtained on March 25 and May 8. Samples were analyzed by the Division of Laboratories and Criteria Development, NIOSH, Cincinnati, Ohio. This laboratory determined:

(1) The only volatile component of concern in bulk samples of the coolant used at the present time and the coolant used about two years ago was stoddard solvent. The stoddard solvent primarily occurred in the coolant as a contaminant resulting from the use of Stoddard solvent to clean the Hammond polishers.

(2) No stoddard solvent was detectable in breathing zone samples collected on March 25, 1972. The coolant had been used for several days before the samples were collected.

(3) Less than 20 parts per million (ppm) stoddard solvent was found in breathing zone samples collected on May 8, 1972. These samples were collected immediately after the old coolant was removed, the polishers flushed with stoddard solvent, and new coolant added. The U.S. Department of Labor standard for stoddard solvent is 200 ppm. (Federal Register, Part II, §1910.93, Table G-1)

(4) Oil mist concentration levels on March 25, 1972 determined in the breathing zone of the operators of several Hammond Polisher machines were well below the U.S. Department of Labor standard of 5 mg/M³ (Federal Register, Part II, §1910.93, Table G-1).

The occurrence of dermatitis in the plant is an individual problem and can be controlled through proper preventive measures. The role of Stoddard solvent in causation of symptomatology the day after the oil was changed is a real one which can be obviated by procedural change.

Recommendations have been made to management concerning the use of solvents to alleviate potential health hazards to the ten affected employees.

Copies of this Summary Determination as well as the Full Report of the evaluation are available from the Hazard Evaluation Services Branch, NIOSH, Cincinnati, Ohio 45202. Copies of both have been sent to:

- a) Ex-Cello Corporation
- b) Authorized Representative of Employees
- c) U.S. Department of Labor - Region V

For purposes of informing "affected employees", the employer will promptly either (1) "post" the Summary Determination in a prominent place near where affected employees work for a period of 30 days or (2) provide a copy of the determination to each affected employee.

I. INTRODUCTION

Section 20(a)(6) of the Occupational Safety and Health Act of 1970, 29 U.S.C. 669(a)(6), authorizes the Secretary of Health, Education, and Welfare, following a written request by any employer or authorized representative of employees to determine whether any substance normally found in the place of employment has potentially toxic effects in such concentrations as used or found.

The National Institute for Occupational Safety and Health (NIOSH) received such a request from an authorized representative of employees of the Ex-Cello Corporation, Buckeye Road, Lima, Ohio.

The hazard evaluation request concerned the Hammond Polishing Area and referred to a coolant, Cutting Oil H-106, used in the hammond polishing machines. There are approximately ten people that operate the hammond polishers. The hazard evaluation request alleged that there was no warning label on the coolant drum and that use of the coolant caused skin irritation and sinus problems.

Aircraft engine blades are polished in the hammond automatic buffer equipment to improve the micro finish on the blades. There are a total of nine hammond polishing machines. Five machines polish small blades with a 2" belt, and four machines polish the larger blades with a 3" belt. Aluminum oxide and silicon carbide polishing belts are used.

The hammond polisher has six heads and five polishing stations. The blades pass automatically from one polishing station to the next. An operator is located at the sixth head to remove the polished blade and add another. Polishing is automatic. The only purpose of the operator is to change blades. About 300-500 large blades are changed each day, a greater number of the small blades are polished.

Coolant oil is fed automatically in a small stream on the top and bottom of the blades. No visible mist is produced. If the blades are adequately cooled no visible "smoke" is produced.

II. BACKGROUND HAZARD INFORMATION

The Occupational Health standards as promulgated by the U.S. Department of Labor (Federal Register, Part II, §1910.93, Table G-1) applicable to substances of this evaluation are as follows:

Oil Mist Particulate	5.0 mg/M ³ *
Stoddard Solvent	200 ppm *

III. HEALTH HAZARD EVALUATION

A. Initial Visit - Observational Survey

A hazard evaluation survey of the Ex-Cello Corporation was made on March 25, 1972 by NIOSH representatives Mr. Lee B. Larsen and Edward Shmunes, M.D. The function of the National Institute for Occupational Safety and Health as it relates to Section 20(a)(6) of the Occupational Safety and Health Act of 1970 was explained to Mr. , Plant Manager; Mr. , Plant Superintendent; and Mr. , Safety Officer. The National Surveillance Network Part I questionnaire was then completed.

Mr. , employee representative was then asked to accompany us for an observation of the hammond polishing area.

Dr. Shmunes interviewed a number of employees. This medical information is contained in the Medical Evaluation section of this report.

The potential health hazards from exposure to airborne contaminants are described in the following paragraphs.

Oil Mists

Prolonged exposure to inhalation of oil mists may cause mucous membrane irritation. If the concentration of the mist is very heavy, lipoid pneumonitis could develop from inhalation and subsequent contact with lung tissue.

A more likely illness is from contact with the oil which may result in contact dermatitis.

* Units of measurements are:

- mg/M³ - milligrams of particulate per cubic meter of air
- ppm - parts of gas per million parts of contaminated air by volume at 25°C and 760 mm Hg pressure.

Stoddard Solvent

Stoddard solvent is widely used as a cleaning solvent in garages, dry cleaning establishments, and many other types of businesses. Extensive research has not been conducted on the toxicity of stoddard solvent. However, based on the projected toxicities of its major aliphatic components and the limited data on aromatic components present in the amount of fifteen percent a standard of 200 parts per million has been set to prevent narcotic and irritant responses.

B. Environmental Survey

On March 25, 1972 samples were collected for the determination of oil mist. These samples were collected on 37 mm vinyl metrical filters and submitted to the Western Area Occupational Health Laboratory, NIOSH, Salt Lake City for the determination of oil mist by a fluorescence procedure. The air concentration of oil mist was determined to be well below the U.S. Department of Labor standard of 5.0 mg/M³. (Federal Register, Part II, §1910.93, Table G-1) Refer to Table I.

The Ex-Cello employees indicated that since the Ex-Cello Corporation had changed to a different brand of coolant oil about two years ago they felt there was more in the way of illness symptoms. Therefore, samples were obtained of the coolant oil being used, coolant oil freshly drawn from a drum, and a sample of the coolant used two years ago. These samples were submitted to the Division of Laboratories and Criteria Development, NIOSH, Cincinnati, Ohio for analysis. The laboratory reported that the "New" oil and the "Old" oil were essentially the same. No components were detected which were volatile at room temperature except for stoddard solvent (Refer to Table II and V). Stoddard solvent is used to clean the machines about once a week and was present as a contaminant. Therefore, unless the stoddard solvent is thoroughly removed from the machines after cleaning, stoddard solvent in air concentrations could be a potential health problem.

Samples were collected on March 25, 1972 of any solvent vapors existing in the air in the breathing zone of the hammond polisher operators. Machines had been in use for several days. No stoddard solvent was detectable. (Refer to Table III)

On May 8, 1972 Mr. David J. Burton of the National Institute for Occupational Safety and Health collected samples on charcoal tubes immediately after the machines had been cleaned with stoddard solvent and placed back in operation. Air concentration levels of less than one-tenth of the U.S. Department of Labor standard for stoddard solvent of 200 ppm were reported by the Division of Laboratories and Criteria Development, NIOSH, Cincinnati, Ohio (Federal Register, Part II, §1910.93, Table G-1). Refer to Table IV.

C. Medical Evaluation

The alleged hazard concerned a machine cutting oil which was labeled H-106. The material did not bear a warning label. The area of the plant in question was the hammond polisher areas and involved approximately ten people. The contact with the oil was through skin contact and breathing of the fine mist. The symptoms which were outlined on the health hazard evaluation form concerned skin irritation and sinus problems.

Historical Information

The company had kept a running list of dermatitis cases prior to August of 1970. During the time period between February 1969 and August of 1970, there were 25 dermatitis cases treated at the dispensary from all over the plant, not just from the hammond polishing area. Of these, 13 improved on a regimen which the nurse automatically gives to anyone (as outlined by the plant physician) who comes in with dermatitis. Three had to be referred out to a dermatologist in the city. The remainder were lost to follow-up. At present the nurse felt she probably was seeing approximately two hand dermatitis complaints per month from the whole plant. The nurse had frequent employee complaints from time to time, of headache, and eyes, nose irritation. She was unaware of nosebleeds. The nurse was aware of only one active case of dermatitis in the plant at present which happened to be in an individual assigned to the area to which we are concerned. This individual was not present at the time we made our visit but the nurse mentioned she had an eczematous dermatitis and was currently being referred to a dermatologist in town. This particular employee had a problem prior to coming to the polishing area.

Nine people who worked in the hammond polishing area were present on the first shift and were interviewed for symptomatology and examined. It was of interest that the majority of the people interviewed

stated that since they had changed to a new oil during the past year or two, they felt there was more symptomatology in the plant. Two individuals complained of headaches occurring a day or two after the new cutting fluid had been put in the polishing machines. These individuals also detected a definite smell of a solvent or "thinner" which would be smelled during the first day or two after the oil had been changed. One person felt she had her nose irritated on a Monday following an oil change on the preceding day to the point of getting a nosebleed from the irritating vapors. Two employees had experienced irritation of the nose and eyes only after fresh oil was in the system. The above complaints would diminish after several days using the new oil. One individual complained of nausea the day after fresh oil was added to the system. Two individuals felt that their sinus problems were aware of a stronger smell the day after the new oil had been installed in the machines, however, they did not feel the smell caused any personal complaints. Several people had had rashes in the past which seem to clear on their own.

Examination

With respect to existing dermatitis on the day of our visit, there was one female employee who had a mild dermatitis on both hands which showed drying and fissuring on the fingertips. She also had a papular erythematous eruption on the flexor aspects of her forearms. This was of recent onset and very pruritic. She contended that she was not aware that protective creams were available and was currently seeing a dermatologist in Columbus, Ohio. This woman operated a hammond polisher and wore gloves though occasionally the oil would spill onto her forearms. She also admitted that on occasion, she did not put the gloves on for very minor adjustment to a blade. One male employee was seen who had a mild folliculitis on the anterior thighs which he felt was secondary to getting the front of his trousers soaked in oil during the working day. He did not wear any aprons or other protective gear. One gentleman had had a severe dermatitis but solved his problem when he stopped using a waterless hand cleaner which was available in the plant.

The working arrangement and the actual physical structure of the hammond polisher prevents a large open-faced machine with a small amount of coolant all over it which certainly could, in the first few days after oil is changed give off some volatile components if these components were part of the ingredients. The fact that in the process of cleaning out of the machine the entire system is flushed with

stoddard solvent raised the possibility that on the first day of operation stoddard solvent could be in the machine system in varying concentrations in the initial runthroughs of the oil.

The ingredients of the H-106 oil were determined and the manufacturers of this specific ingredient contacted. None of the manufacturers of the ingredients felt that any of their components were of sufficient volatility to cause problems in the air under the use in this factory. Analysis of the cutting fluid in our laboratory "indicated that all of the components were of very low volatility, making it unlikely that any significant amount could accumulate in the air."

The problem of stoddard solvent being in the system on the day after the machines were cleaned was approached by making collections on the morning after the oil had been changed. Charcoal tube samples taken on a scheduled day following the changing of oil showed stoddard solvent present in all area samples. The failure to detect volatile components on the first unscheduled visit (more than one week after the changing of the oil) lends credence to an association between symptoms and the changing of coolant. Though the amount of stoddard solvent present in the areas and personal samples were less than one tenth the current standard for stoddard solvent it is entirely possible that on many occasions when less than complete flushing has occurred, more concentrated amounts of stoddard solvent could be in the first passages of the oil through the machine. It is thus conceivable that on occasion, the day after the cleansing of the machines enough stoddard solvent would be present in the oil on the first passages to volatilize and cause some of the symptomatology which hydrocarbon mixtures of the nature of stoddard solvent are capable of causing. These effects include irritation of the eyes, nose and throat; though headache and nausea have been occasionally reported.

Conclusion

The occurrence of dermatitis in this plant is an individual problem and can be controlled through proper preventive measures. The role of Stoddard solvent in causation of symptomatology the day after the oil was changed is a real one which can be obviated by procedural change.

IV. RECOMMENDATIONS

1. Stoddard solvent vapors may on occasion exist at higher concentrations than those determined during the survey unless the stoddard solvent is thoroughly removed from the system after cleaning. Therefore, it is recommended that the stoddard solvent be thoroughly flushed from the equipment and removed after each cleaning.
2. Improved communication between both the safety director and dispensary with the employees. The safety director, at the time of the visit, was contending that this was the first time he had ever heard complaints relevant to burning of the eyes and headache and nose irritation subsequent to the changing of the coolant. Also, none of the employees with dermatitis at the time of the visit had gone to the dispensary. One affected employee was unaware of the availability of protective creams.
3. The use of stockinette on the forearms of the hammond polishing machine workers would prevent those who have been prone to develop dermatitis in this area. Also the rubber gloves can be folded back upon themselves to avoid dipping oil onto the forearm at the end of the cuff. The gloves must be consistently worn.
4. The use of rubber aprons or plastic aprons to protect the abdomens and thighs of workers who have enough contact with cutting oils to impregnate their trousers or skirts.
5. Proper placement of the individuals on the basis of their history prior to employment. At present the current questionnaire does not ask for a history of sinus problems although a history of dermatitis and asthma are elicited.

TABLE I

OIL MIST DETERMINATIONS

March 25, 1972

<u>Laboratory Number</u>	<u>Description</u>	<u>Oil Mist Concentration</u> <u>mg/M³</u>
8171	Personal Sample - Operator Polishing JT9 Blade	0.55
8172	Area Sample Near Operator Polishing T56 Blade	0.50
8173	Personal Sample - Operator Polishing T56 Blade	0.37
8174	Personal Sample - Operator Polishing JT12 Blade	0.54
8175	Blank	None Detectable
8176	Blank	None Detectable

TABLE II
ANALYSIS OF BULK SAMPLES
March 25, 1972

<u>Laboratory Number</u>	<u>Description</u>
59257	Bulk sample from beneath grill spent oil
59258	Fresh oil from drum CPD H106
59259	Oil in use being recirculated

Chemists Comments:

"The analytical work on the bulk coolant oil samples and the charcoal tube samples you submitted has been completed. The approach taken in the analysis of these samples is outlined here.

Charcoal tube samples were taken over the bulk oil samples for the purpose of trapping and identifying any volatile materials in the bulks. Analysis of these samples indicated that all of the components were of very low volatility, making it unlikely that any significant amount could accumulate in the air. It was also noted that there was no apparent difference between the bulks.

Since the symptoms seemed greatest after the oil was changed and since stoddard solvent was used in this process, a small amount of stoddard solvent was mixed with the oil and a charcoal tube sample taken over this to determine whether a reaction were occurring which was producing a volatile contaminant. Analysis of the sample did not indicate the presence of any components not present in either the oil or the stoddard solvent. The bulk sample of stoddard solvent from Ex-Cello Corporation did not differ significantly from that used in this test."

TABLE III
STODDARD SOLVENT DETERMINATIONS
March 25, 1972

<u>Laboratory Number</u>	<u>Description</u>	<u>Stoddard Solvent Concentration</u> <u>ppm</u>
59260	Area sample above metal floor grill	None Detectable
59261	Personal Sample - Operator Polishing JT9 Blade	None Detectable
59262	Personal Sample - Operator Polishing T56 Blade	None Detectable
59263	Personal Sample - Operator Polishing JT9 Blade	None Detectable
59264	Personal Sample - Polishing JT9 Blade	None Detectable

(Coolant in use for several days)

TABLE IV
STODDARD SOLVENT DETERMINATION
May 8, 1972

<u>Laboratory Number</u>	<u>Description</u>	<u>Concentration</u> <u>Stoddard Solvent</u> <u>ppm</u>
59568	Area Samples - 10' from Polisher - 4' from Floor	<20
59569	" " " " " " " " "	<20
59570	" " " " " " " " "	<20
59571	" " " " " " " " "	<20
59572	" " " " " " " " "	<20
59573	Personal Samples - Operator of Hammond Polisher	<20
59574	" " " " " " " " "	<20
59575	" " " " " " " " "	<20
59576	" " " " " " " " "	<20
59577	" " " " " " " " "	<20
59578	Area Samples - 2' North of Operator - 5' from Floor	<20
59579	" " " " " " " " "	<20
59580	" " " " " " " " "	<20
59581	" " " " " " " " "	<20
60943	Blank	None Detectable

(Samples collected after changing coolant and starting operation)

TABLE V

BULK COOLANT OIL SAMPLES

May 8, 1972

<u>Laboratory Number</u>	<u>Description</u>
59582	Taken from polisher just before start up at 7:00 a.m.
59583	Taken from solvent bin used to clean polisher over weekend
59584	Coolant used in polishing machine from drum H106
59585	Same as 59582 except taken at 9:00 a.m.

Chemists Statement:

"Bulk oil samples were analyzed for the presence of stoddard solvent. Charcoal tube samples were collected over the open bulk samples; these were analyzed by G.C. and compared to the stoddard solvent chromatogram. All of the bulk oil samples had similar but small amount of stoddard solvent present."