Occupational Health
Clinics for Ontario Workers
(Toronto) Inc.

Centre de sante
des travailleurs (ses)
de l'Ontario (Toronto) Inc.

970 Lawrence Avenue West,
Suite 110
Toronto, Ontario M6A 3B6
Tel: (416) 449-0009
Fax: (416) 449-7772
1-888-596-3800

# DEPARTMENT WIDE RETROSPECTIVE EXPOSURE PROFILE

# WIRE AND CABLE DEPARTMENTS: #26, #24, #22

## *OHCOW FILE # G732*

| | |
|---|---|
| ***SUBMITTED TO:*** | ***LESLIE PIEKARZ- OHCOW EXECUTIVE DIRECTOR*** |
| | ***NICK DECARLO – CANADIAN AUTOWORKERS UNION*** |
| | ***DR. P. JUGNUNDAN - OHCOW PHYSICIAN*** |
| | ***DR. NOEL KERIN - OHCOW PHYSICIAN*** |
| | ***DR. ROLAND WONG -OHCOW PHYSICIAN*** |
| ***PREPARED BY:*** | ***SONIA LAL – MSC. OCCUPATIONAL HYGIENIST/HEALTH AND SAFETY SPECIALIST*** |
| ***DATE :*** | ***MARCH 24, 2005 – FINAL REPORT*** |

# TABLE OF CONTENTS

## 1. ACKNOWLEDGEMENTS

The writer wishes to thank the CAW retirees/members for their patience, support, and guidance throughout the course of this project and report. I commend their commitment and diligence in sharing the work experience and processes that they were involved in throughout the years. I would also like to thank John Ball and Don McConnell for their continued support and patience in assisting the writer with formulating this report. The former GE employees played an integral role in data collection, meetings, and description of the workplace. The meetings involved hours of layout formulations, process descriptions, chemical analysis, and personal/group testimonies. Without their enthusiastic support, the contents and compilation of vital sections of this report would not have been possible. Some of the employees of the Wire and Cable Department and some Nuclear Department Welders devoted up to 36 hours of their time for the completion of this report. I commend them on their commitment to occupational disease prevention, health and safety, to the success of this Intake Process and Retrospective Study, and to their support and hope for one another.

I would also like to thank OHCOW Occupational Hygienist Barry Lam who assisted with the Asbestos Carding research and submitted a report for the applicable section in Section Six of this report. Mr. Lam's research and knowledge on the subject matter was most helpful in the completion of this Retrospective Exposure Profile.

## 2. DISCLAIMER

It should be noted here that all processes described in Section 5. of this report were compiled by former and present General Electric Employees, and not by the OHCOW Staff. The OHCOW Hygienist recorded the processes and facilitated the discussion with regards to flow of material in and out of the department, layouts and display of processes, and description of processes from the flow of raw material to the end product. Some applied hygiene questions were posed to get further understanding of the processes where there was a need, such as the following:

- hazards identified in the areas of work
- key process specifications such as, temperature of ovens and solvents, hygiene controls, air flow
- general working conditions
- use of personal protective equipment
- fumes, odours, types of smells identified
- dimensions of the equipment and machinery described

All the questions were posed to properly access exposures in the various buildings and related processes. Furthermore, some documents have also been referenced and copied herein to further provide evidence of the details given by the employees as well as evidence with regards to poor working conditions in the buildings, employee accidents, individual testimonies and general unsafe conditions and use of products in the GE Peterborough Facility.

Finally it should be noted here that the statements made by the employees and the processes described are validated in the Ministry of Labour Filed Visit Reports that are cited in Section 8 of this report which validate, confirm and provide solid evidence of the testimonies given by the employees, description of the workplace and work conditions, and thus further provide evidence that exposures were more than likely to have been contributed if not fully incurred by working at this area at the General Electric Plant.

## 3. LETTER TO THE ADDRESSEES

Please note due to the vast amount of evidence, group testimonies, literature review and hygiene analysis presented herein, an executive summary of the findings would not do justice to the detail that is vital to comprehend the working conditions, chemical distribution and contaminant flow within this workplace. The sections in this Retrospective Exposure Profile are not stand alone in nature and all depend on one another to fully comprehend the complex exposure review for the General Electric Employees.

In order to justly comprehend the vast nature of the exposure profiling, this report must be read in its entirely as every component is vital to the comprehension of the contents herein.

## WIRE AND CABLE DEPARTMENT

## DEPARTMENT WIDE RETROSPECTIVE EXPOSURE PROFILE

## 4. INTRODUCTION

Occupational Health Clinics for Ontario Workers (Toronto) was contacted by the CAW to conduct an Intake Clinic and a Facility Wide Retrospective Exposure Profile in order to accompany claims that may be submitted to the Workplace Safety and Insurance Board. The following Retrospective Exposure Profile is prepared from information gathered at the Intake Clinic and meetings held with workers and Union representatives as well as Document Reviews of Ministry of Labour Reports/Orders, Accident Reports, Union Letters and other General Electric Documents that are relevant to this report.

The OHCOW Hygienist met with former Wire and Cable employees on September 13th, 20th and December 7th 2004, for collection of information on the processes and materials used and work conditions in the Wire and Cable department. The OHCOW Hygienist and other members of the CAW and GE Management went on a Tour of the location where Wire and Cable was situated in the past as well as the Armature Building, on December 8th, 2004. The buildings were divided according to their processes and will be described in this manner. The OHCOW Hygienist met with workers weekly to characterize the following:

- processes, as per product flow and employee work card tasks
- exposure identification
- individual and group testimonies
- accidents and incidents

The facility in Peterborough has been in existence for over 100 years. It covers approximately 21 acres. Over 3000 chemicals were utilized in the plant. April 20, 1891, the grand official opening of the plant was held. By the end of 1950, the local payroll numbered 4770 with an all time peak of 4980 in 1974 (McLaren, S. ed., 1991).

## 5. WORK HISTORY AND PROCESS DESCRIPTION

This document has been organized according to the various equipment and processes that were in existence in this department. The Layout and names of equipment/processes are defined as per the layout in Appendix A – Plant Layout and B - Wire and Cable Equipment and Process Layout.

As per the compilation put together by GE, Standard of the Highest (McLaren, S. ed., 1991).

.

> **"…Wire and Cable had it's own smell…aroma of rubber and talc and exotic compounds used in insulation….the olfactory sensations remain in memory as the smell of ink remains to a printer…there were machines to wind, twist, braid, wrap, extrude and mix…(McLaren, S. ed., 1991)"**

The wire and cable department built conductors capable of carrying heavier currents at increased voltages. Formex, a magnet wire, was also built to support insulated wire for the windings of motors and numerous outside clients. In early 1980's the Wire and Cable Department was closed. The Formex process left this area in 1984.

The period in which the following processes will be covered is from 1945 –1982. It is imperative to note that during the period of 1957 to 1960, many employees from armature department who would be laid off, would be transferred to the Wire and Cable department until more production demands were made for Armature. The same is true for the Wire and Cable department as well.

The floors in the departments discussed here were made of brick size wooden blocks. Cement floors were first in place and were replaced, due to ergonomic strain cement floors had on the bodies. The blocks were 3x3 in size. The bricks were laid down and then tarred to secure them in place. The material used was coal tar pitch. About 90% of the plant was covered with the bricks and tar. Some of the floor even today has the brick floors tarred as well. The blocks were saturated with creosol, then tarred and painted with Glyptol paint. Steel plates were put in place for support, near heavy machinery. The Glyptol paint was utilized to keep dust levels down and secure. Each block was saturated in creosol and then tarred. Maintenance employees worked on the plant floor blocks.

Glyptol paint was utilized in 1975 onward. Due to its properties, it was dangerous to paint this Glyptol near any heat sources, as it would catch on fire. Only 20 % of areas with the blocks would be painted with Glyptol paint. The bricks were usually dipped in creosol and then delivered to the GE plant.

Different employees from the maintenance department would be involved in this process. This process would have to be completed over and over again, if there were floods or other types of damage caused by equipment or incidents in the plant.

The employees involved in this job wore safety glasses on this job only after the 70's. They did not wear respirators or any breathing protection. The employees working on these blocks used their bare hands when handling the blocks. The employees' eyes would water when in contact with the creosol covered bricks, Glyptol paint and tar, as there would be black smears over their cheeks near their eyes, and water marks on the cheeks indicated tearing.

One of the former employees stated that a co-worker developed non-Hodgkin's lymphoma due to exposure to the Tar. Furthermore, approximately 30 Wire and Cable employees had been known to be off work due to heart related difficulties, as per the former employees.

## *Department 26 – Wire Drawing:*

Department 26 was approximately 150 feet wide and 800 feet long. It consisted of twenty-five employees over 3-4 shifts (the department schedule was based on a three sometimes four period shift rotation, with shifts overlapping). No women worked in the Wire and Cable department due to the heavy equipment and reels that were being handled at the time. There were 3 employees assigned to each shave mill. The employees were involved in welding operations as well.

Copper coil was the raw material used for the process being described. Thirty copper coils where located behind shave mills. The shave mills were located at the southeast corner of department 26. There were 2 shave mills, mill #131 and mill # 132. Employees would walk beside the shave mills and take reels on and off the machinery. The function of the mills was to shave impurities off the copper wire. Everything that required to be enameled had to be prepared by shaving off the impurities. The overhead crane operator would help deliver and pick up completed reels in this area. The crane operator also drove liftrucks. There were 2 in total. The crane operator moved pallets of powder dyes, lead ingots reels, copper wire etc. In building 22, the crane traveled only over ½ the building length on the east side, up to the rubber rolling mills. In building 26 the crane traveled the entire length and width of the building. In building 22, the cranes ran up to the Rubber mills area and traveled south from there. Depending on the process requirements and the jobs that required crane assistance, the crane drivers would either man the cranes or drive the forklifts.

The copper wire was drawn through the shave mills by wire drawing solution, which consisted of Royalene and soap. This solution was white in colour. Refer to Appendix E for some recent GE MSDS sheets on this material.

- Royalene was a trade name for Trichloroethylene
- The Royalene solution was described as being toxic as employees would react to the heavy odours it emitted
- It looked like coal oil
- Without the addition of the liquid soap, the royalene solution would burn the fingers upon contact (stinging sensation). The addition of the soap solution seemed to have diluted the toxic properties of royalene and made it more tolerable to work with.
- When pouring this solution into pails, the employees would react to the odours the royalene emitted
- The royalene and soap were recycled in this process as the solution was captured in dip trays and pumped back into the system.

There were tanks underneath the shaving mills to capture the copper dust as well. During summer shutdown. Tanks of 45 gallon drums would be emptied, which contained barrels of copper dust.

The solution was flooded onto the dies as well as the copper wire, before the shaving process and while the copper wire ran through the process, in the large wide open shave mills. The main complaint of the employees in this area was copper dust that would be in their workspace and breathing space. The copper dust and scrap pieces of wire were either swept or air hosed during housekeeping procedures. It was stated by employees in the group discussion that in the early evening as the light would start to dim, copper dust would sparkle in the work area. The overhead crane operator would also be exposed to the copper dust, as he would assist in delivering and collecting the coils from the mills, to the winding areas and other processes within the wire and cable. The employees stated that there would be approximately 2 inches thick deposits of copper dust on the frame and cabin of the crane. This is indicative of the fact that the copper dust was fine and traveled through the area and circulated in many areas of the department as well as reaching high levels, exposing the crane operator as well. Due to the fact that the crane operator traveled north and south in this building, it is possible that the accumulated copper dust also contaminated other areas of the building as the movement of the crane would disturb the settled copper dust and cause it to fall into other areas.

In terms of personal protective equipment, cotton gloves were used for handling of the copper wire. Safety Boots and glasses were in place for this operation from the early 50's through the 60's as per the former GE Supervisor. The employees state that they would be given a GE work card, similar to job instructions, but would not be told what type of chemicals they were working with and how their health may be affected or what personal protective equipment may be required with the chemicals they interfaced with. The employees state that rashes were the main problem in this area. Because street clothes were worn on the job, it can be stated that the contaminants were taken home as well. After the dawn of the Occupational Health and Safety Act in 1978, aprons were enforced on this job. In terms of exposure, the supervisor states that greening of the skin was more noticeable in the summer months. Copper dust particles could be seen on the employee's faces. Their hands would be green in colour. If aprons or other cloths were let to sit for a day, the cloth would turn green the next day. Employees ate in this area at picnic benches.

The next step to the process involved a portable Butt Welder. The welder functioned at 250 volts. The main function was to spot weld the copper wire on the reels, so as to continue the flow of copper wire on the reels. When a reel would be full, the copper wire on the reel would be spot welded, and the reel would be taken off. Smoke was generated during this process, as per the employees. The butt welding operation used an electrical injection, with no solder, just heat. The machines would run on their own and the employees would monitor the functioning of the machines during the other parts of their shift. Due to the fact that the machines would run the copper wire continuously and the employees had little time for lunch breaks, they ate at their workstations, at the end of the shave mills. The cafeteria was too far for the employees to walk to; hence they often ate on the job. The end product formulated was reels in the size ranges of 60, 600, or 3000 pounds, most of which would be lifted via cranes.

***Tin Pot Operation*:**

Further north of the shaving mills, was the tin pot operation. There were 3 tin pots in total. The function of this operation was to coat tin on the copper (if the wire was to be used in rubber applications).

- The tin pot was heated so that the tin was molten hot.
- There were 6 copper reels on each side of the tin pot

The wire was run through a room temperature Muriatic Acid bath and wiped thereafter. The wire then ran through a tin pot, a die and then through a water bath. This process ran at 300 feet/minute as per the supervisor of the department. An exhaust system was in place; however it was shut down most of the time in order to ensure efficient tinning application on the copper wire. Some employees would deliberately shut off the exhaust as this would allow for more efficient tinning on the wire. When the exhaust system was on, this was not possible.

Hence more fumes were emitted from this operation. The wire was then wound onto a reel and was then ready to be shipped to Department #22, to have rubber applied to it. As per a Former GE supervisor of this area, no respiratory protection was available or offered to employees working in this area. The supervisor mentions that there were numerous employees that complained or were diagnosed of lung related complications while at this job.

It is important to note, the exhaust fumes from the molten tin were taken up through vents to the roof top. The supervisor explains that the trees facing the exhaust system outside, along side the street and other areas would cause the leaves to start to change color and fall off in the early August months. The other side of the trees, not directly facing the exhaust system, would be normal and had green leaves which came off during the regular Fall season. Whether this detrimental effect on the trees was due to the tin exhaust alone or a combination of all other contaminants from the department is not known.

***Tar Pots:***

Coal Tar Pitch:
In this area, there was usually one employee assigned to this job per shift. The materials that would come into this area were for the preparation of mining cables. The cable would already arrive prepared to this operation.

First BX armour (steel interlocked wrap)was wrapped onto the cable and then interlocked. Then Jute/Burlap was applied to the cable. Burlap was a type of tar like material. The final step was to tar the cable to ensure it had waterproofing properties. There were 5 molten tar pots in this area located adjacent to one another. The tar pots had exhausts over them; however, the exhaust had to be shut off for process and quality purposes. In order for the tar to efficiently be applied over top the cables, the temperature had to be maintained and the tar pots were to be left undisturbed by any ventilation fluctuations. The cable would be run through a BX machine. The machine would run the drawing operation. The cable would be 4-5 inches in diameter and then would be taken to the Electrical Test area. The test area was caged to prevent employees from entering the area, which was approximately 150 feet long and 30 feet wide. In total approximately 10, 000 feet of reeled tarred cooper wire was produced per year as per the former Supervisor.

The employees wore their own street clothes for this operation. Due to lack of exhaust ventilation, there was a heavy accumulation of odours in this area as well as other areas of this department. ***See section 9 – Analysis of Data – Hygiene Perspective Conclusions: Air Circulation in the Plant.***

***Test Area (Mercury)***

Testing of the Formex wire involved 4-5 operators per shift. This test area was located in the south east end of building 26.The employees did not rotate. This process was in place from the 1930's to the end of the era for the Wire and Cable Department. Only a select few cables would go through the mercury test. Rectangular shaped formex wire was drawn through a mercury bath. The mercury was in place in an open square trough at room temperature. The trough was about one foot in length, 10 inches wide and 1 and a half inches deep. The hot wire was drawn through this trough.

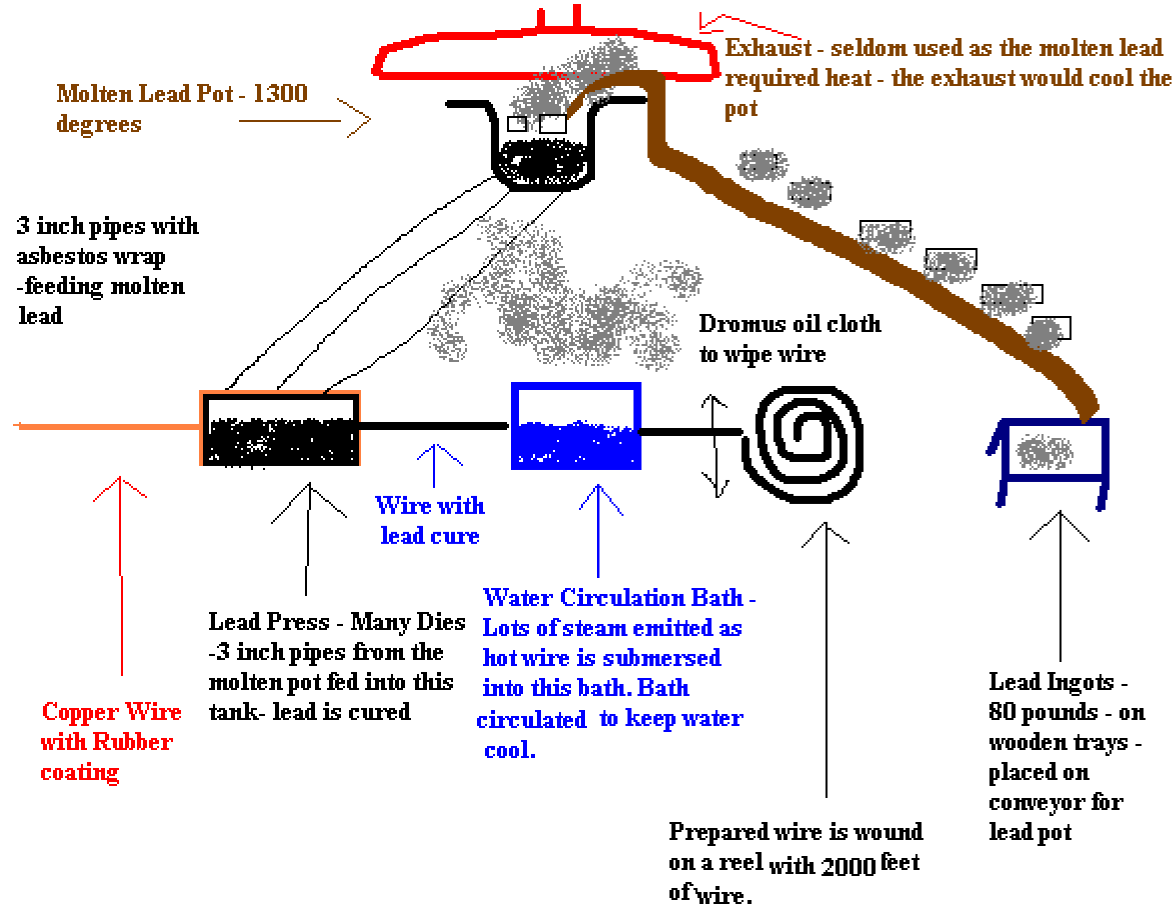
Employees would dip their hands and forearms into the mercury bath to facilitate the drawing of the wire. They were meant to use pliers to thread the wires out from the machine, however at times it was easier to hand pull the wires and trouble shoot with their hands versus the tools. The employees did not wear protective gloves. Some exposed employees had incurred neurological symptoms such as aggressive behaviors, thickened fingernails, and other psychological problems. One employee mentioned by the former supervisor had excess swelling of the nails due to his exposure to mercury.

**The former GE Supervisor did state that the company sent out some employees for mercury testing in the blood. Some employees were transferred to other departments. Nothing was communicated with regards to results of the testing or why employees were being transferred to other departments. All in all, nothing came out of this testing procedure**.

***Five-Inch Lead Press:***

Some mining cables were required to be coated with lead as well as rubber. This press ran 5-inch wide cable, which was coated with rubber. This operation was run at five feet per minute. The lead that was utilized was recycled lead. Refer to Diagram #1 for further details on this process.

**DIAGRAM #1.:**




As per the diagram above, the molten lead pot was located 20 feet off the plant floor. The molten lead was heated at approximately 1300 degrees. One employee worked as the press operator while another employee worked as the winder. As per a retired supervisor account, this area was often quite heavy with smoke. The molten lead pot did have an exhaust canopy over it; however, due to the fact that the lead pot required to be heavily heated, the exhaust would not be used due to the cooling effect on the molten lead. The copper wire coated with rubber, would run through the equipment and into a lead press. The lead press had numerous dies in it and as the wire ran through the press, the lead cured onto rubber coated copper wire. The lead press was fed with molten lead via pipes that were connected to the molten lead pot and the lead press. The pipes were 3 inches in width and were wrapped with asbestos, as they were handling molten lead.

The wire was coated with approximately ½ inches of lead. The wire then passed through a circulation water bath. The bath is kept in circulation to keep the water cool as the hot wire passes through it. Due to the differentiation in temperatures, as the heated wire passed through the cool water bath, steam/misting was emitted from this flux in temperatures. Finally the wire was wound onto the reel. The winder at the end of this process wore asbestos insulated gloves to protect from the hot wire and hot lead strips. The winder stripped off the lead from the wire and cut it off the process from the reel. Oil was applied by a cloth. Dromus oil was utilized and its purpose was to keep the cable from sticking. The completely wound reel was then transported to the next department.

Adjacent to the reel, there was a station for the cold lead ingots to be prepared for the conveyor. The lead ingots were supplied to the operator, on wooden pallets, via forklift. These ingots were 80 pounds each in weight. The employees picked up these ingots by hand, and placed them onto the conveyor, which fed into the molten lead pot (see Diagram 1). The employees did not wear any gloves. Moreover, some of the wire coming from the lead press had the lead stripped off by the operator. The strips of lead would be recycled and placed on the conveyor to be resent to the molten lead pot. When the lead strips would enter the lead pot, the Dromus oil and the molten lead would react and emit heavy fumes, as per the employees. The purpose of the Dromus oil was to keep the cable from sticking.

The retired supervisor also stated that employees used to eat their lunch and dinner right under the molten lead pot, where they were exposed to lead mists, dust, fumes and mists from the water circulation bath etc. Because the employees ate at their station, they most likely did not wash their hands before ingestion of their food. The retired supervisor also noted that most employees died before they were able to retire.

***Hansel Polyvinyl Chloride Mixer (PVC):***

This operation came to the department in 1975, as the company desired to fabricate their own PVC. The function of this process was to fabricate color pellets. This equipment was capable of making nine different colours. There were different mixes for the different colours that required to be produced. The ingredients would be specific to the type of properties and strengths desired.

The PVC and the oil were added to the mixer by valve/gauges. The PVC was heated to molten temperature as the PVC would freeze up if left alone. The fumes from the PVC were not tolerable, as per the employees. The mixes took either 18 minutes or 30 minutes depending on the properties within the mix. The end product would be a 10 inch wide strip of colored dye which would then be chipped into pellet sized pieces. The strips would pass through a water bath for cooling and then through a dicer, and the pellets were collected in barrels/bags

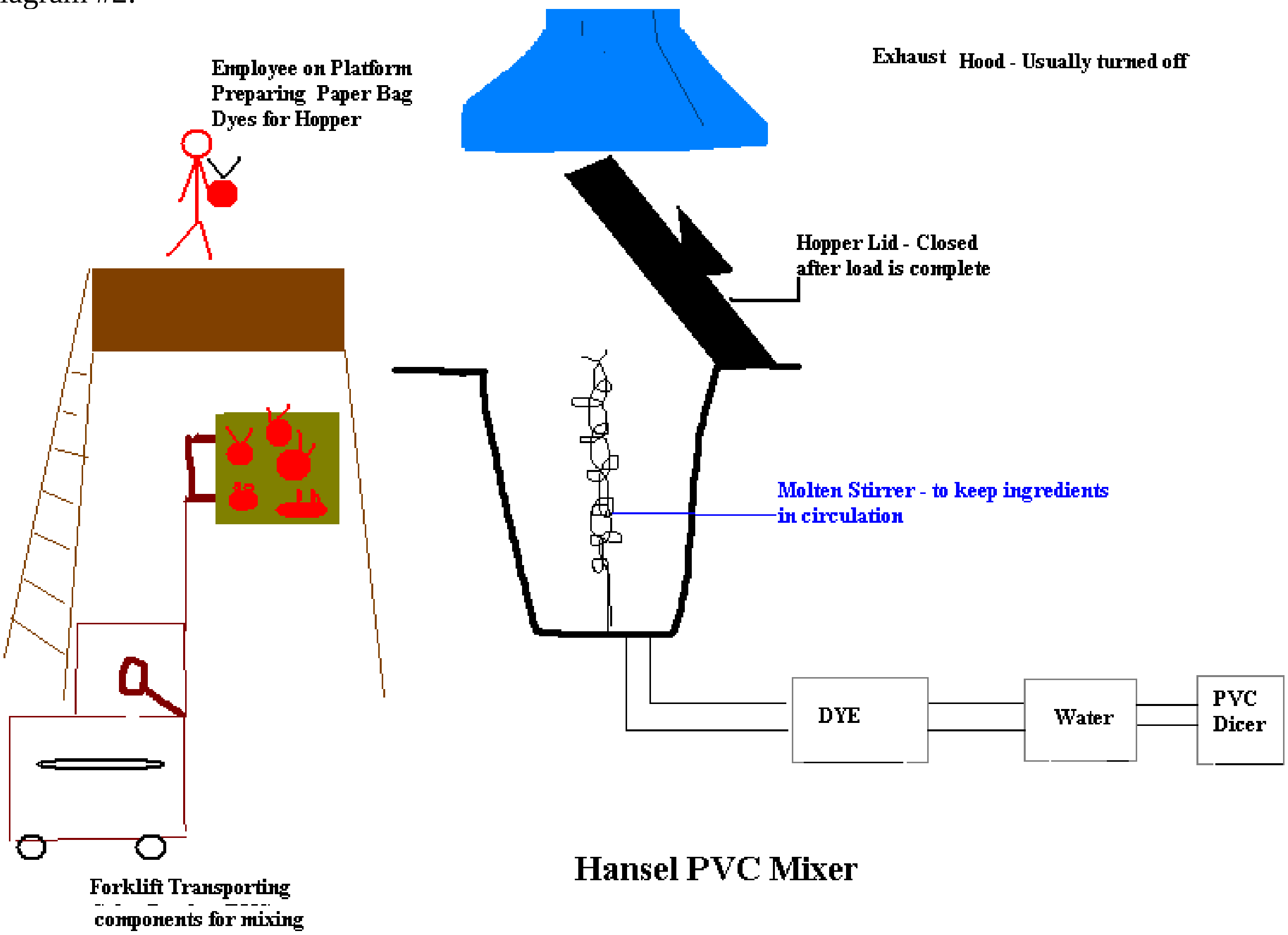
- A PVC dicer was one of the components of this equipment. The function of the dicer was to chip the pellets into smaller and smaller pieces. This was a very loud operation. The employees state the operation reached 120 decibels at times.
- The hopper was 4 feet Wide and 5 Feet High.
- While loading the hopper this process would create a lot of dust and it would rush into the operator's face and breathing zone due to their proximity to the hopper and raw materials.

Moreover there were vapours being emitted from the hopper as well. The employees stated that this process was quite hard on the nasal cavity.

- The hopper had a lid which would come down and lock up before the mixing process. The mixing rodwould rotate at 200 times/minute
- There would be heavy fumes in this area. The employees state that the fumes would be absorbed through the clothing and would stay absorbed for days.
- In terms of work practice, employees state that they would eat at their workstations, as there were no lunchrooms or cafeterias in this department area.
- A sweeper would be assigned to clean the area as the powder would have accumulated in various areas surrounding the equipment. Employees would utilize air hoses to blow off any powder that may have accumulated on their street clothes or skin.

Please refer to Diagram #2 below:

Diagram #2:




Employees would be located at the platform as indicated by the diagram above. At this location they would open the paper bags, which were delivered via forklifts, on pallets. The paper bags consisted of the various ingredients required for the blend and the associated dyes for the type of colour desired. At times, the employees indicated that due to handling or mishandling, the paper bags would be torn or punctured by the forks of the forklift or other means and would cause the ingredients to disperse, thus causing for a very dusty environment. The employee handled the bags by hand. The employees did not wear gloves or safety glasses during this process.

- There was an exhaust hood present above the hopper. But as per the employees, the exhaust was often turned off.
- A large spindle was located in the center of the hopper. It acted as a stirrer to keep the ingredients in constant circulation
- The hopper did have a lid that would be placed over top the hopper once all ingredients were emptied into the hopper.

- The PVC was transferred to the hopper via pipes which were heated with a steam emitted from piped traveled alongside the PVC pipes.
- A pipe was connected from the hopper to the Die equipment. The die equipment transformed the molten materials into 12 inch PVC Sheets.
- Water was the next processing step for the PVC sheets to be transferred to
- Finally the PVC Chipper diced the 12-inch PVC sheets into small pellets ready for use.
- Oil was also added into the hopper via valves, and dyes and clays were added by the employees via bags etc.

## *Department 24 – Formex:*

Formex operation was taken out in 1984, after which the process was moved to Guelph, Ontario. Formex refers to enamel coated on the copper wire. F Wire, which was used for washing machines for example, referred to a lightly coated copper wire, HF Wire had slightly heavier coated enamel; QF was one of the heavier coated wires for large motors.

This building was 400 feet long and 100 feet wide. There were approximately 12- 20 people working on the machinery per shift. The end product of this process was a formex wire with varnish coating. Material Safety Data Sheets were not available for this product as it was company formulated and patented. One type of the epoxy varnish consisted of Straight Formex enamel; another type consisted of Alkenex, the trade name for an epoxy varnish, which was considered by the Supervisor and former employees to be the worst in the department. Finally a newer version known as the ML varnish was also utilized. The only information the employees were able to tell the writer was that the varnishes were supplied through Davenport. Other types of varnishes that were utilized consisted of Formes, MLR, Formes Al. and HML. The varnishes cost about $1000 per 5 gallon pail as per the former employees and Supervisor.

The varnish would arrive to the department in 45 gallon drums. If the varnish was too thick to utilize, toluene or methyl ethyl ketone (MEK) were added to act as thinners. There were 26 machines in this department, and each machine had 16 reels. The machinery was about 30 feet in height. The wires were drawn through the equipment as well as die and went through an annealing process with carbon monoxide gas. The wires would then be dipped in the varnish after this process and would go through a series of dies. Each die would make the varnish coated copper wire a percentage thinner, as it would travel through the entire machinery. See Diagram #3 below. The machinery worked at 30 feet per minute, 60 feet per minute or 100 feet per minute on some of the smaller machines.

The Formex Process:

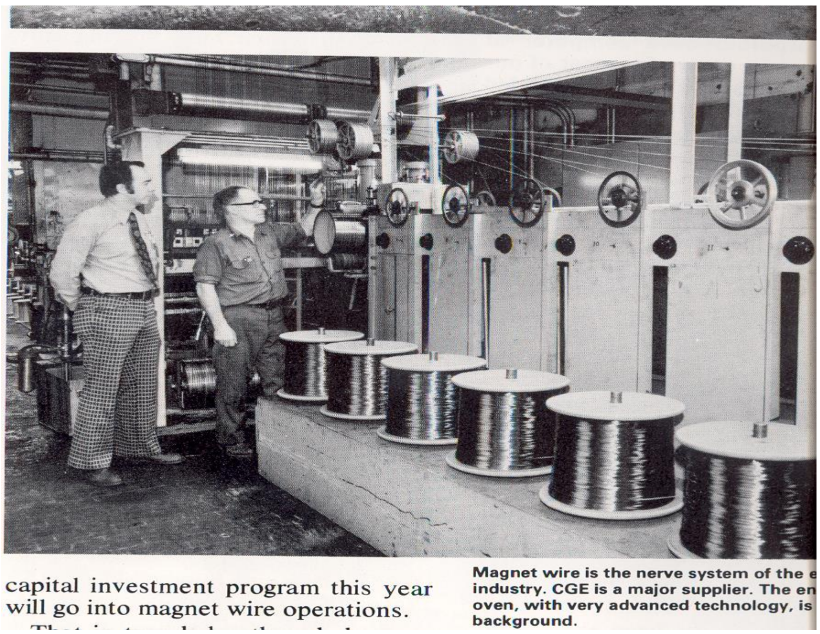
- There were 26 formex machines and 4 M machines (also Formex machines) in this area.
- The first step to this equipment consisted of a gas converter. This equipment took raw gas and burnt it. Copper wire would be drawn through this burnt gas. This process cleaned off impurities on the wire. The next step was the annealing process where the wire was

softened before it was sent for enameling. The annealer caused the wire to be red hot and malleable and then the wire was cooled off in a water bath.

- The function of the annealer was to soften the wire for coating purposes. The annealer itself at one point had a water shield exhaust system in place. This exhaust was vented to the roof. The supervisor stated that this system seemed to have deadened the fumes but was not as efficient to protect employees from the gases coming off the annealer. This system was in place for approximately 25 years. In early 70's, catalytic converters were put in place to alleviate the fumes. With the water exhaust system, the fumes that were emitted to the outside would cause the people living in the neighborhood to complain as the fumes would travel to their homes. With the catalytic converters, there were fewer complaints from the outdoor neighbours.
- The former GE Supervisor stated that when the water exhaust system was in place, the windows on the ceiling and adjacent areas, were covered with a thick brown film. Even after cleaning the windows, within 6 months the windows were heavily coated with this thick brown film. When the catalytic converters had come into play, there was less film on the windows.
- The varnish that was loaded into the applicator pipe was heated. The applicator pipe was a long pipe that traveled horizontally through the oven and had holes in it, through which the varnish was applied to the wires. There was a drip tray located beneath the pipe to capture any excess varnish. The varnish was heated to approximately 30 degrees Fahrenheit. There was a pump on the 45 gallon drum, which transferred the heated varnish to the applicator pipe. Depending on the type of varnish, some varnishes were heated at higher temperatures versus others. The ML varnish could be boiled and there would not be much fumes. However, the alkenex varnish was burned at higher temperatures and emitted lots of fumes.
- The oven was vertical with vertical elements. The wires traveled alongside the elements as they were varnished and passed through the dies. There were 3 temperature gauges at the top of the oven, where the catwalk /platform was located. Refer to Diagram #3. Depending on the size of the wire, (i.e. heavy coated wire would require more heat versus thinly enameled wires), the gauges were usually set at 150 degrees Fahrenheit, 175 and 200 degrees Fahrenheit. The oven opening was 8 inches in width. There were plates to cover or close off the oven to keep the heat in, and the plates had holes in them to allow the wire to travel through the oven, up to the sheaves and back down the oven. There would still be a 3 inch wide gap or opening even with the plates down. Hence fumes would be emitted from the heated varnish and copper wire.
- The wires traveled through all areas, from the annealer, through the ovens, up over top the sheaves, through the dies and through more dies until the proper thickness of enamel was achieved.
- The height of the equipment, with the oven included, was approximately, 38 feet. The shorter equipment was 24 feet high.
- A platform/catwalk was located over top the equipment and ovens. The employees would climb up ladders to get to the platform. They would work on the platform for troubleshooting purposes, cleaning of the sheaves and other processes. During set up

processes, the employees may go to the platform, 10-12 times per shift, as per the former GE Wire and Cable Supervisor. The sheaves would be cleaned with brushes on the catwalk, for troubleshooting purposes. The sheaves would be cleaned with varsol or acetone. When the acetone would drip down in the oven, the possibility of fire was apparent and this happened on several occasions.

There was an exhaust hood over top the equipment that would be operative as opposed to the other processes discussed. The exhaust was in the form of a water coolant system where the fumes would be captured and fanned off to a Water fall type exhaust absorber. Over top the machinery was a catwalk where employees would monitor/trouble shoot the equipment. The operators would often access the catwalk to perform any repairs that may have been required for the equipment. The operators would often have to access the catwalk anywhere from 1 – 3 times per hour. They did not wear any protection. As already stated in 1970-1972 a government grant was issued to GE and Catalytic burners were purchased for the exhaust system on the equipment.



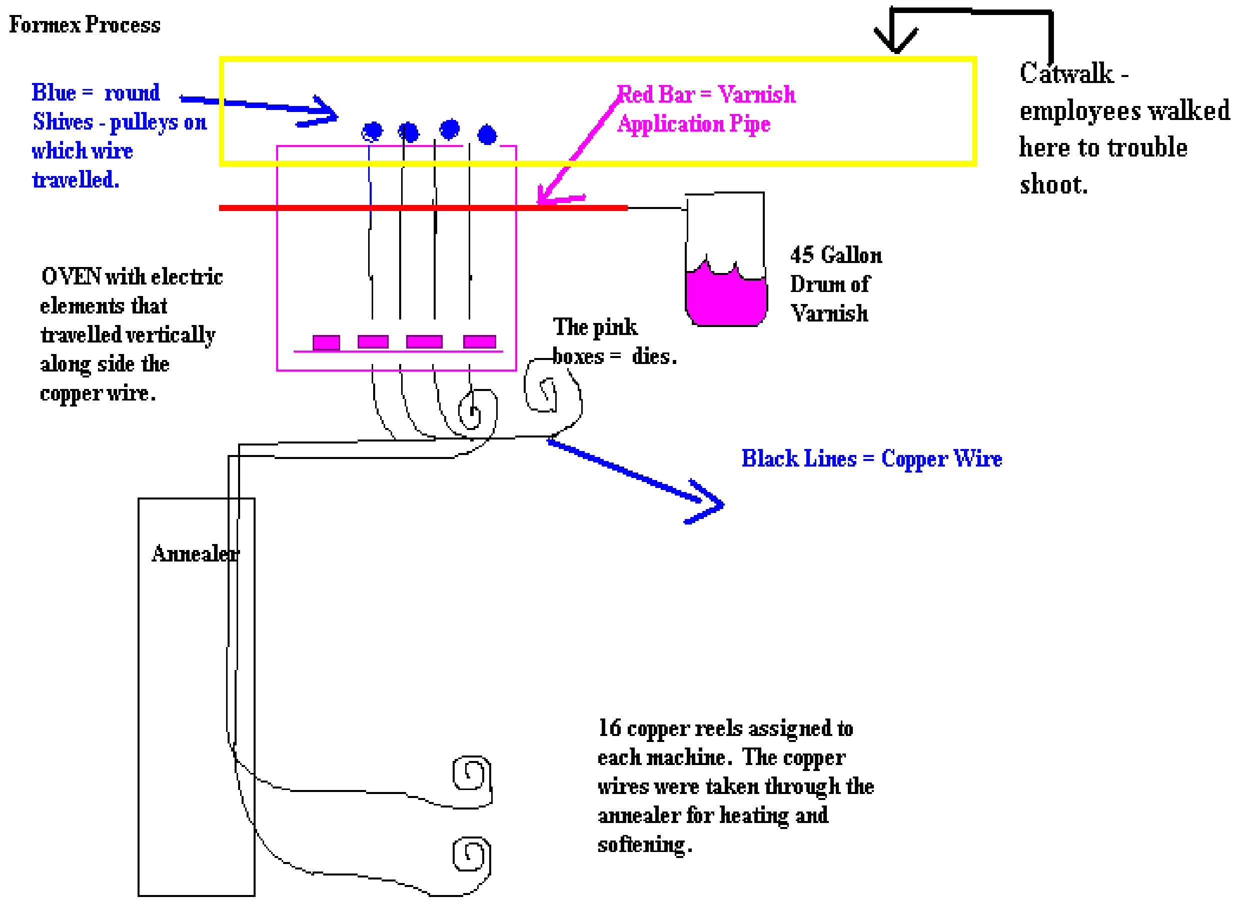

Picture #1 – Formex Process

The varnishes were supplied to the equipment via barrels. The barrels were placed in the tanks and the varnish was pumped out of the tank to the various sections of the equipment. No one has record of what the actual varnish was made of other than it was made in Toronto, by Davenport. The types are: Alkenex, MLR, Formes, HML, and Formex Al.

As per the former Wire and Cable supervisor, some of the employees were overcome by the heavy fumes coming off the front end of the annealer. The supervisor remembers one employee to be overcome to the point where he had incurred a heart attack. Another employee incurred burns. The supervisor stated that the employees that worked in this area died before their retirement and died at an unusually early age.

The retired supervisor stated that neither he nor the employees knew what the ingredients were in the varnishes. They were not sure what was mixed in with the varnishes. There was a patent on the mixture and thus no Material Safety Data Sheets were available at this time. MEK or Toluene was often added to the varnish to change the viscosity of the varnish so that it would travel better through the dyes. However the supervisor and employees did not know, what other ingredients were added to the varnish to establish the properties it had.

Diagram #3:


Formex Process
Blue = round Shives - pulleys on which wire travelled.
Red Bar = Varnish Application Pipe
Catwalk - employees walked here to trouble shoot.
45 Gallon Drum of Varnish
OVEN with electric elements that travelled vertically along side the copper wire.
The pink boxes = dies.
Black Lines = Copper Wire
Annealer
16 copper reels assigned to each machine. The copper wires were taken through the annealer for heating and softening.

***Cleaning of sheaves:***

The sheaves were like reels or pulleys on which the wire traveled through the ovens. In order to clean the sheaves thoroughly, as they would accumulate layers and layers of varnish, they would be dipped in an acid bath. The tank was 6 x 5 feet in size. The bath was located in the north end of building 24. During troubleshooting purposes, varsol and brushes were utilized to clean the sheaves during regular process operations. The operators would go on the catwalk and attempt to troubleshoot and unclog the accumulation of the varnish. In 1977-78 the acid tank was introduced and the sheaves were allowed to sit in the tank for 5 -6 hours at a time. The tank consisted of cold acid. After the dipping process, the sheaves were pulled up via crane and allowed to drip dry for several hours thereafter. This process would emit heavy vapours off the sheaves as the acid bath was allowed to remain uncovered during this time.

The supervisor states there was a no smoking sign in this area, as there were heavy vapours in this area and the acid was highly flammable. The employees stated that the vapours from the acid hurt their eyes. The employees wore rubber gloves and a dusk mask during this operation. It is not clear what type of acid was utilized to clean the sheaves in the dip tank.

***Banbury Mixer:***

Not only did GE fabricate their own PVC pellets, but they also fabricated their own rubber.

The Banbury Mixer was located at the North West corner of Department 22. This building was 800 feet long and 300 feet wide. The Banbury mixer was involved in rubber mixing operations, for external coating of the copper wire. Three employees were involved in the Banbury Operations. South of the Banbury Equipment were three Rubber Mills. Two employees worked on the rubber mills on each shift. There were select few service workers that worked on each shift as well. (See Diagram #4)

The Banbury mixer was set up to make rubber with clay, silica, lamb black, fatty acid, red lead, DiCup and approximately 80 other chemicals that were utilized at various times. The GE Chemist was responsible for assigning the various chemicals that were required to be mixed. As per a former Supervisor, 22 of the dyes had toxic ratings. Red lead caused several employees to react with itchiness. As per the employees, all the formulas were on a work card, with the ingredients and amounts required listed. The temperature maintained for the mixer was at 400 degrees Celsius. This mix took about 20-30 minutes to complete. (A list of ingredients (and toxic ratings) utilized for the blends for the Banbury operations is available upon request from OHCOW. Due to the vast amount of information, it has not been appendixed herein for practicality reasons.)

The dyes, clays and other materials were added by employees who were located on a platform. The materials were delivered in bags on pallets via forklift to the employees on the platform. The employees would open the bags with a knife and pour the ingredients into a hopper. The weight of the bags would range from 75-80 pounds through to 100 pounds (maximum). An exhaust canopy was located above the opening of the hopper for the additives and the dyes. However the exhaust was not turned on most of the time as confirmed by the former supervisor. The mixture consisted of raw rubber, clay and powder colour. After the mixing was completed, the liquid was then transferred to the rolling mills. The rolling mills then produced 3-inch sheets of rubber. The rubber sheets were cut off here by the operators, when the rubber was cured enough and ready to be cut. The cycles took about 20 -30 minutes to complete. The end product would be a 3-inch thick rubber sheet. There were three rolling mills adjacent to the rubber mill, where the sheets were further thinned to ½ inch thickness or 1/8 inch thickness. The temperature of contents in the mixer was molten hot. When the liquid was transferred to the rollers, it would clumps up like grapes and be flattened to sheets.

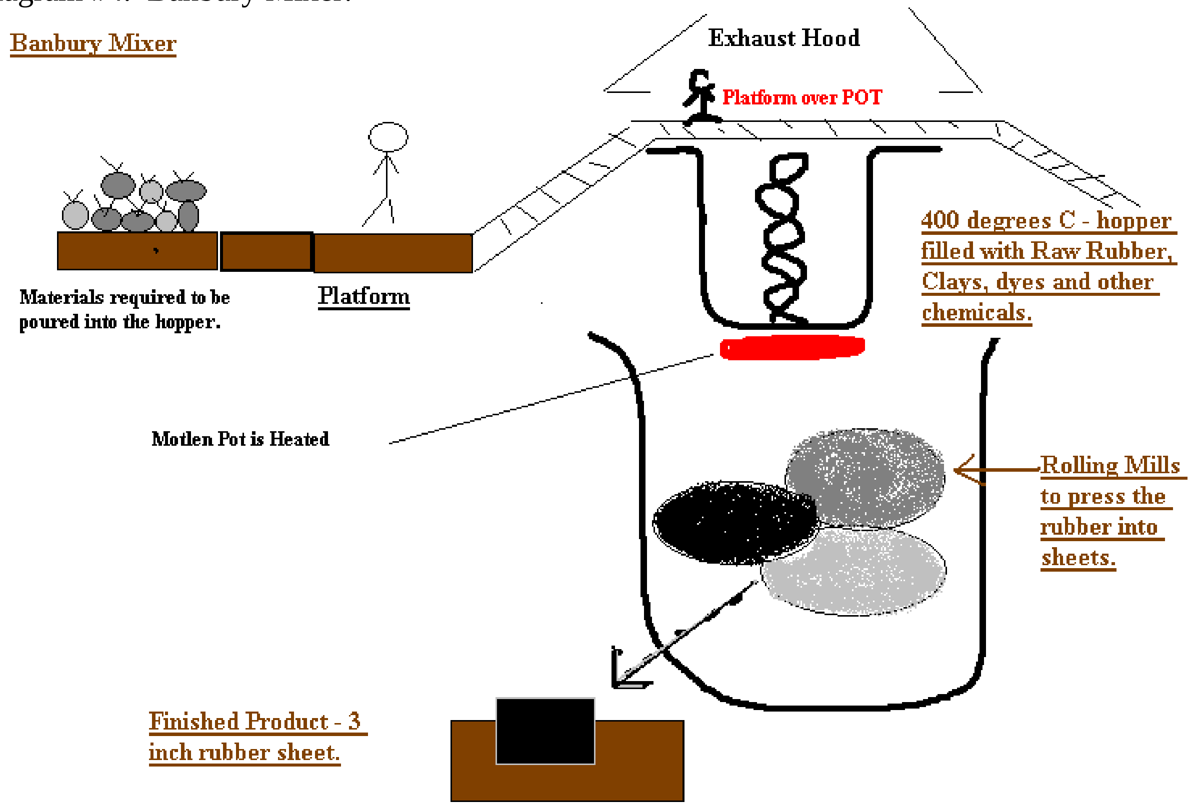
The smell from the rubber mills was not tolerable as per the employees. Many people who worked in this area died of heart attacks, lung trouble and some employees died of cancer as per the testimony of the former Wire and Cable Supervisor. One of the employees died before retirement.

**The former GE Supervisor states that ten employees died after 4 – 5 years of service in this area alone.**

The fumes from Department 22 operations would travel from north to south and vice versa as there was no exhaust ventilation in the various areas, taking contaminated air out and bringing in new fresh air supply. Furthermore the only form of protection that the employees wore was gloves.

There were windows approximately at 30 feet in height at the north side of the building. However, due to the fact that the cafeteria was situated across from the building, the employees from the cafeteria complained and ensured that the windows from building 22 remained closed so as to refrain from contaminating other areas. Hence the fumes and vapours were trapped inside the building and traveled throughout the building and adjacent areas.

Diagram #4. Banbury Mixer:




Due to the rubber making process, and all the chemicals, this was a very dusty process as well as heavy in fumes. There were windows present in this area, however, as there was a cafeteria across from the north end of building 22, the GE employees did not allow the banbury mixer employees to open the windows, in fear of being contaminated by the fumes and dust. Hence, there was no fresh air allowed into this area and no where for the contaminated air to be exhausted. The exhaust was not used on a regular basis, as the cooling effect from the exhaust would cause the mixer to work less efficiently.

Fresh air circulation was next to nil as, the opening of windows was not permitted as employees requested the Banbury Operators to keep the windows closed so as to refrain from contaminating the outside air ( air would travel to the nearby cafeteria).

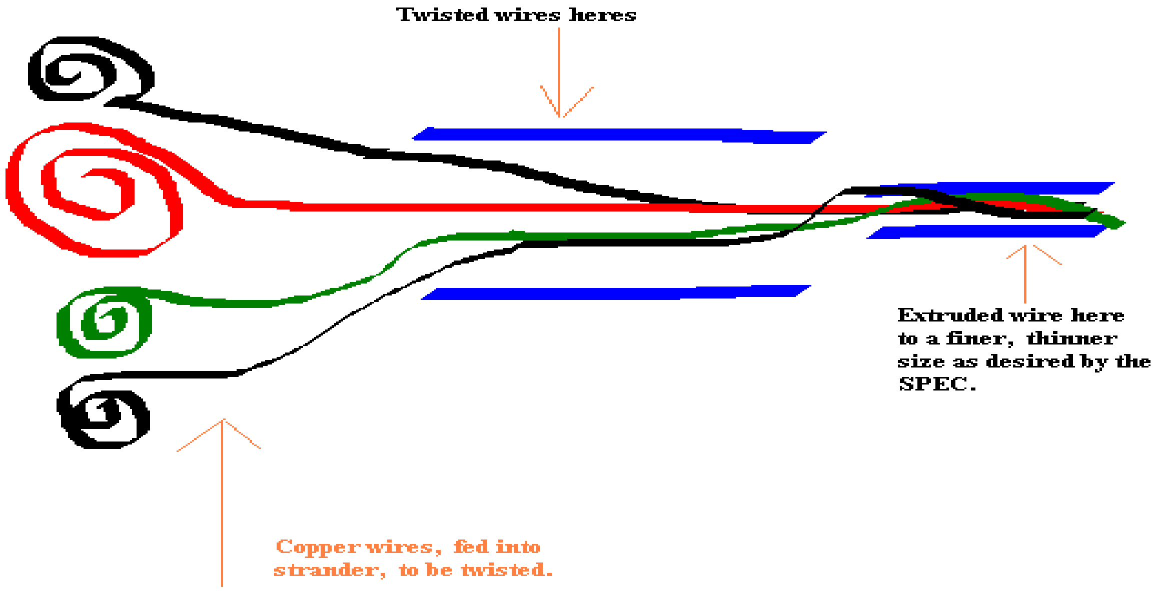
***Tubers:***

The tubers acted as extruders. The purpose of the extruders was to insulate the wire and cables. There were 2 types of tubers, PVC and Rubber. The PVC extruders had exhaust systems in place however the rubber extruders did not. As per the GE Supervisor and former employees, the exhaust on the PVC extruder was usually turned off by employees as the cooling effect of the exhaust would slow down the “piece work.” The process involved drawing copper wire through the extruder as it was coated with rubber, as it traveled through the process. The tubed copper wire then traveled through 20 foot water bath, and was wiped by a cloth to absorb the water and wrapped onto a reel.

The rubber tuber were located on the west side of the aisle way and the PVC extruders were located on the east side of the aisle way. (See layout in Appendix B)

Three colored wires were wound and covered with black rubber. Twelve employees worked on the stranding machinery. 40 people in total worked in this area of the department. At first fiberglass was utilized in the late 50’s then asbestos till the 60’s. Finally jut fillers (tar) or okum were utilized. There were 7 PVC extruders at this location. After the wires were extruded, they were stranded and then twisted. Fibreglass was utilized to strand the copper wires and then they were braided. The reels of copper wire would be tested and then transported to the stranding machines. Twelve, six wires or seven wires would be stranded (or more), spooled onto a reel, and then sent to the 3 inch lead press for binding of the stranded wires. The employees state that vinyl chloride insulation was also utilized for cable, known as Vulkene.

Diagram #5:



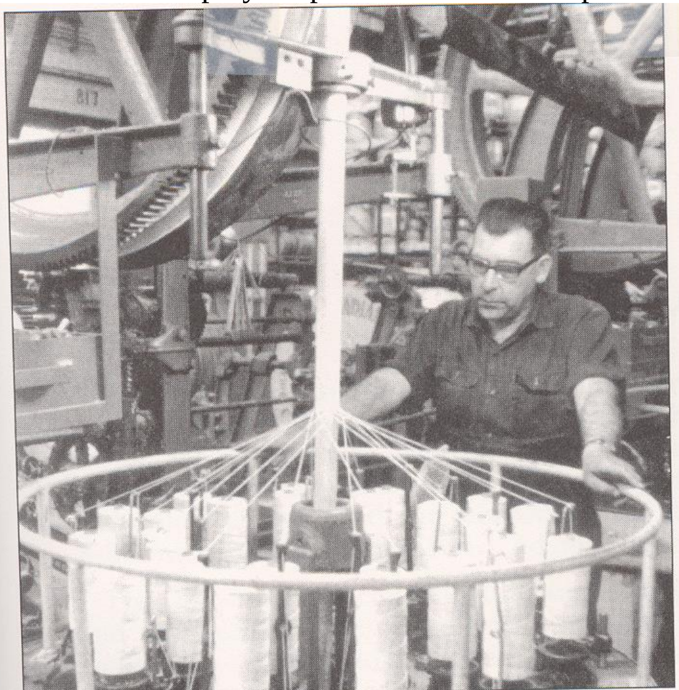

***Three- Inch Lead Press***

This process was located alongside the tubing area. Please refer to previous section labeled 5" Lead Press as the process is the same. The only difference is that here the equipment produced a 3 inch cable versus a 5 inch cable

***Cotton Braiders:***

*Picture #2 - Braiding Machine:*

There were ten employees per shift on 3 shift operations.



*The Wire and Cable product line boasted thousands of different types and sizes of wire and cable. Insulated wire was one of the original products manufactured at Peterborough Plant. The braiders were a common sight along the main aisle in Building 22. When the business was discontinued in the early 1980s, the braiders were sold to a firm in Montreal, reportedly for making shoelaces.*

Eighty Cotton Braiders and eighteen asbestos braiders were located in this area. This department was very dusty, noisy and fibrous as asbestos was a raw material utilized, machined and handled in this area of Department 22. As per the former GE supervisor, no protection was offered or deemed required for the employees in this area. One Employee was assigned to Twenty six braidex reels. The function of the braiders was to spindle a braid of cotton or asbestos over top of the copper wire, or rubber coated wire or PVC. Sixteen spindles put a braid on top of the wire. The asbestos was first dipped in isopropyl alcohol before it was braided onto the wire so that it would facilitate the travel through the machinery. The employees had a 5-gallon pail they would utilize to dip the asbestos in. After the asbestos was braided it would be rolled onto the reel and then taken to the wax pot for coating. The wax was applied hot and it's purpose was to prevent any fraying of the asbestos braid. The employees would blow the asbestos off the equipment, workbenches and their own clothing and skin via air hoses. This indeed would cause the fibres to disperse into various locations, and cause them to become airborne and contaminate other areas of the plant. The fact that the employees had to blow off their clothes and equipment with the air hose indicates that the processes caused fibres to disperse into various areas and thus caused exposures to many employees in and around the areas. With the use of air hoses, the fibres were dispersed even more, or became re-suspended in the air and could cuase more exposures. In terms of housekeeping, the employees would sweep the asbestos fibres and dust off the floor. This also caused the fibres to become airborne.

***Lacquer Towers:***

The towers were located south of the braiding operations. The towers utilized different types of lacquers. The wire was braided and was driven through a 30-foot oven. Twelve wires could run in the oven at a time. The wire was then air-cooled. When the wire was drawn through the dies, the lacquer was applied and then taken through an oven. The lacquer towers emitted heavy fumes from the paint. The air cool-down process took place as the wire was wound onto a reel.

Varsol and toluene were utilized to thin the paint that was applied to the wires. The purpose of the oven was to bake the paint onto the wires. Rubber dies were utilized in this operation, versus the Formex operation. The wires that would travel through the oven were braided with cotton; hence the steel dies would have caused the braid to tear. There were approximately 1.5 inches between the wires and the heated elements in the lacquer towers. The exhaust system was used at all times, as the exhaust actually helped the process run smoother, as paint was being baked onto the wires.

***Saturating Tank:***

The tank was a cold tank (not heated) without any exhaust system in place. It consisted of a cresol mix. The purpose of this tank was to soak cotton. The cotton would be allowed to sit in the tank for 1 hour. The cotton was utilized for the braiding operations. After the cotton was soaked it was pulled out of the tank and allowed to drip dry over the tank. This is where there were heavy fumes coming off the soaked cotton and the open tank, as per the employee testimonies.

***Tar pots:***

The 4 tar pots were exhausted out to the yard. There was one employee assigned to each tar pot. The cotton wire, braidex, was dipped in the hot tar, run through a die, sprayed with wax and then rolled onto a reel. Varsol was added to the tar to thin it out.

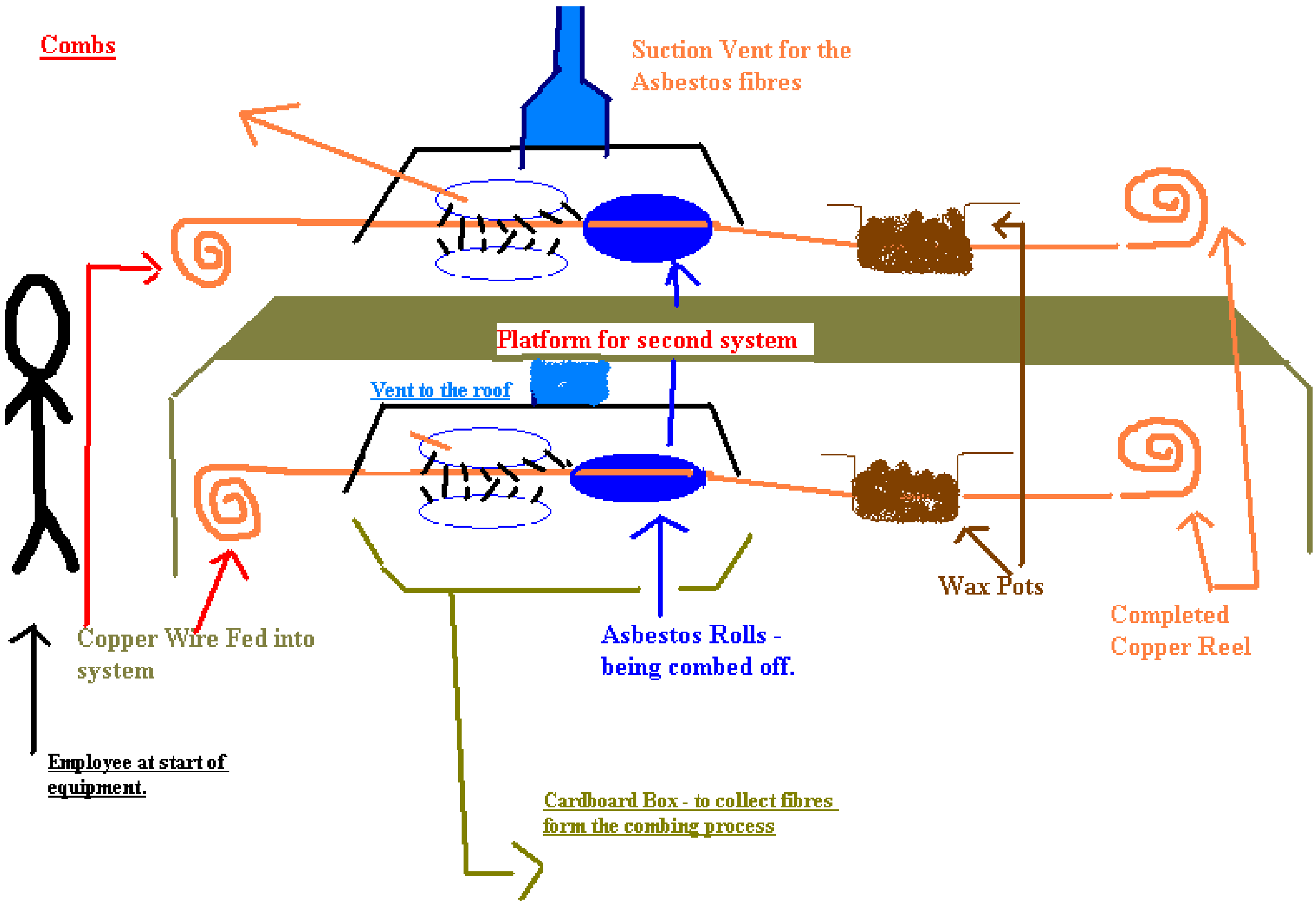
The tar pots were located next to the saturating tank. The tar pots were heated and exhausted out to the yard, through the roof top. The tar was heated to molten temperatures. The purpose of the tar pots was to coat the braidex wires with tar.

- The braidex wire goes around a wheel in the tar pot
- Through a rubber die, where the excess tar was pulled off
- Through a wax bath, heated to molten temperatures, where the wire was coated (the wax pot heated 16 by 10 inch sheets of clear wax)
- Through a 3 foot water tank
- Rolled onto a reel.

***31 and 32 Carders***

This operation was located south west of the saturating tanks and tar pots. The process was in place from 1945 till approximately 1979. Three people worked in the area and one employee was assigned to the four carding machines. Reel to reel the machines were twenty-five feet in length. The machines were about 5 feet apart. The speed of the wire traveling through was 30-40 feet per minute. The maximum speed was 40 feet per minute. The process was set at different speeds for different types of wire. It is important to note, that the 31 Carding systems were set up like a "bunk bed system" where there were two similar processes running in line with one another, where one of the carders was located on top of the other. As per the Diagram #6 below, the top deck system was set at approximately 6 feet off the floor with the bottom deck system set at 2 feet off the floor. There was a lid that went over top the asbestos roll and combing process, however it was open from the bottom areas; it was not a fully enclosed lid, it acted as a guide for the combing process. With this combing process, the employees state there were a lot of asbestos fibres in the areas, being dispersed by the activities of the carding process, and the general activities in the area (body movement, liftruck activities, pedestrian activities, overhead crane operations, windows opening, pedestal fans etc). The rolls of asbestos would be 5, 8 or 10 inches depending on the amount of insulation required on the wire. A cardboard box was placed beneath the combing process to collect all the fibres. **As the boxes were filled, they were either sold to employees or packaged and sent to the salvage areas, as per the former GE supervisor and employee testimonies.**

See Diagram #6: Carders




The wax pot was a heated pot. It did not have any exhaust over top of the pot.

The wire was taken off the reel and run through the ball of asbestos. The asbestos was 6 feet in length and was 8 inches wide. Combs run across the balls of asbestos and spread the fibres over top the traveling wire. There was approximately 6 feet of combing required. This part of the carding equipment was exhausted by pipes to the roof into collector bins. The wire was then run through a wax pot and reeled. The wax pot consisted of melted Para film wax sheets. The pipes were exhausted out to the roof into the collector bins. The bin had a divider in the center so as to alleviate the packing of asbestos fibres. There were doors on each side of the bin, so employees could enter and empty the bin.

As the wire traveled through the combing process, a black and purple GE marker thread was wrapped onto the wires and fibres, to secure the fibres on the wire.

Approximately 4 reels were completed off the 31 carder. A reel was completed off each head every 2 hours, depending on the size of the wire. A roll of 10 inch asbestos covered 600 feet of wire approximately.

***32 Carders System:***

This system, located near the 31 carders system, used 10- 12-inch balls of asbestos. It was located 12 feet away from the other system. This system was also exhausted out the roof. This system produced 2-3 rolls by the end of the shift. There was no bunk bed system in place with the 32 Carders process. The 32 carder system was a dry process, in that it did not have the wax component in it. The fibres were secured to the copper wire with the GE black and purple marker thread only. The final product was a twisted wire wound on a reel. There were two, 32 carder machines; however, the majority of the time, only one was utilized. After the wire was twisted it was sent to the braiding machines. Three conductors were put together with the red and white braid on it. The asbestos was supplied from the John's Manville company in Quebec.

The collector bins, located at the top of the roof, were 8x8 feet in size. They were often plugged due to the vast amount of fibres that would be collected over time and would eventually be filled beyond capacity. This would cause more fibres to disperse at the process level, as the exhaust was incapable of operating. As per the former GE supervisor, the bins were only emptied every 3- 4 weeks. Hence the system was not always fully functional. Fifteen percent of the fibres would go up to the exhaust and 85% would be dispersed on to the wire.

The bins were manually cleaned by 4-6 employees, usually on weekends. The employees would be required to go on the roof top and enter the 8x8 foot bins. This process would take a full shift to complete. The asbestos was handled by hand, without any protection, and stuffed into bags or refrigerator sized boxes.

**A Former GE Supervisor states, 'employees would be covered with asbestos from head to toe during the bin cleaning operations. They looked like snowmen as their arms and hands and bodies were covered with the fibers…..the asbestos was so soft that the employees would roll little balls of asbestos and shoot asbestos snowballs at each other. Often times, the fibres would lump onto the copper wire, which would be an indication that the exhaust system was failing. There were 7 four inch steel pipes that fed into the exhaust bins. The pipes were 30 foot long and 8 foot wide. A suction fan was located at the top of the bins.**

**A Former GE Supervisors states, ' employees would handle the accumulated asbestos with their bare hands. The fibres were compounded into the collector bin and would become very difficult to dislodge. The employees would have to aggressively remove the asbestos and then place the fibres in either bags or oversize boxes. Some of these bags were sold to GE employees for 50 cents a piece in order to insulate their homes. Some sold refrigerator size boxes filled with this scrap asbestos. Whatever scrap asbestos remained, was sent to the dump.**
**..Employees who worked in this area or on this job are all dead to date."**

There were no showers available to employees who worked in the carding area or for the maintenance crew who worked on the roof top, emptying the bins. Thus it is likely that the employees took the asbestos home, into their cars and into the other areas of the plant, in which they traveled.

The machinery was located adjacent to the aisle way. Hence any movement, whether it be pedestrian or forklift traffic, would further disperse the settled or free floating asbestos fibres and would contaminate other areas and employees in the department.

The speed of the machinery was different according to the size of the wire. A roll of 10-inch asbestos would cover 6000 feet. The sheets that were produced were 10 inch wire and a quarter inch thick; 25-50 heads would be completed per shift. There were about 5-7 stranders on each carder. There were 4 heads on the 31 carder.

The employees wore cotton gloves to protect against the waxes on the 31 carders. This was a continuous operation; therefore the employees ate lunch at the carding machines.

The employees were given 3 minutes at the end of each shift for sweeping and clean up activities.

***AWE Carders***

The AWE carding machine, otherwise known as the Asbestos Water and Enamel Carding Machine, was located on the southwest corner of the Department. This was a slower operation that was not run as often as the other 2 carders. Rectangular wire was fed into the asbestos carders. This carder was also exhausted up to the bins mentioned previously. The wire was fed through the carders, then to a varnish pot. The varnish pot was heated to a temperature that allowed the varnish to flow. After the wire traveled through the oven, powered by hydraulics and set at 80 degrees Fahrenheit, it was drawn through a water pot, wound onto a reel and shipped. One employee worked on this machine when required. When the Alkenex and ML varnish were utilized, there was no longer any use for the AWE machine. The AWE machine was too expensive as per the former Supervisors in this area.

All carders were vented to the roof. The venting pipes were joined, met near the roof top and were then vented out through one vent pipe and out to the bins on the rooftop. All in all there were 6 pipes which joined and then were vented to the roof and joined to the big bin. The bins were 20 feet long and 8 feet high.

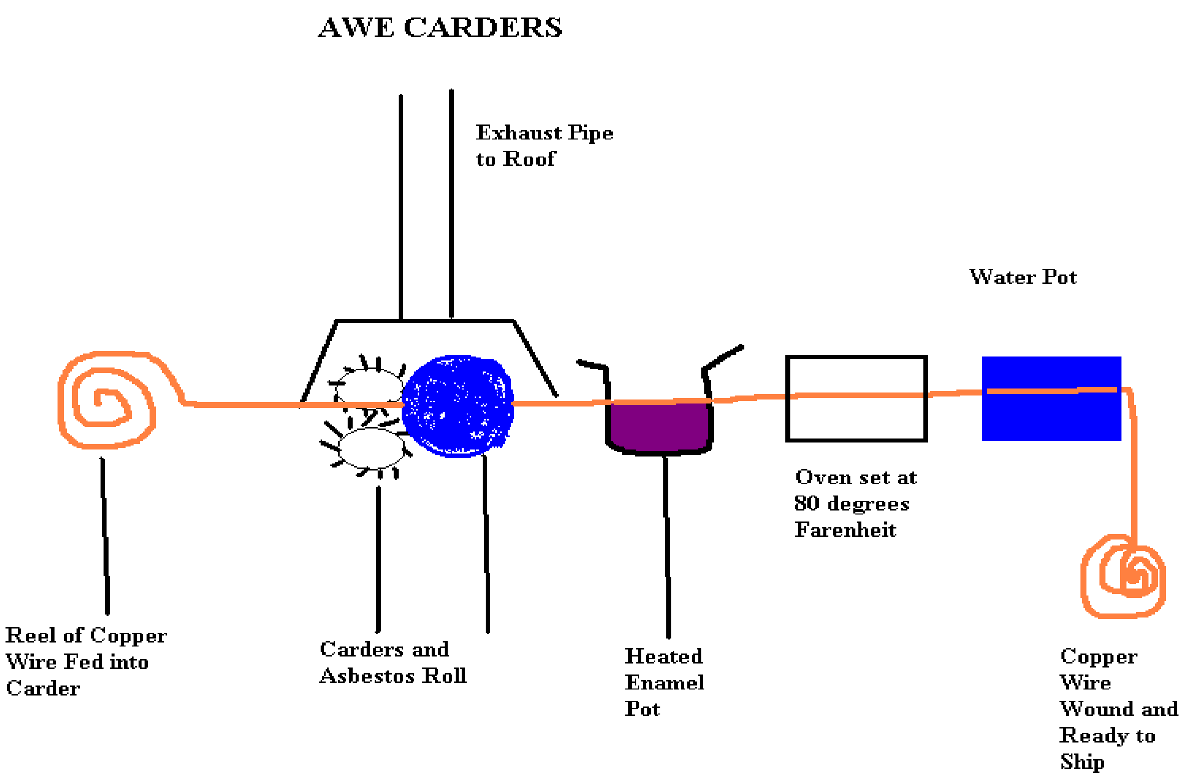



**Diagram #7 – AWE Carders (above)**

This was a continuous process; hence the employee ate at this workstation. The employees wore their street clothes for this process and did not wear any protection in the form of respiratory or glove protection.

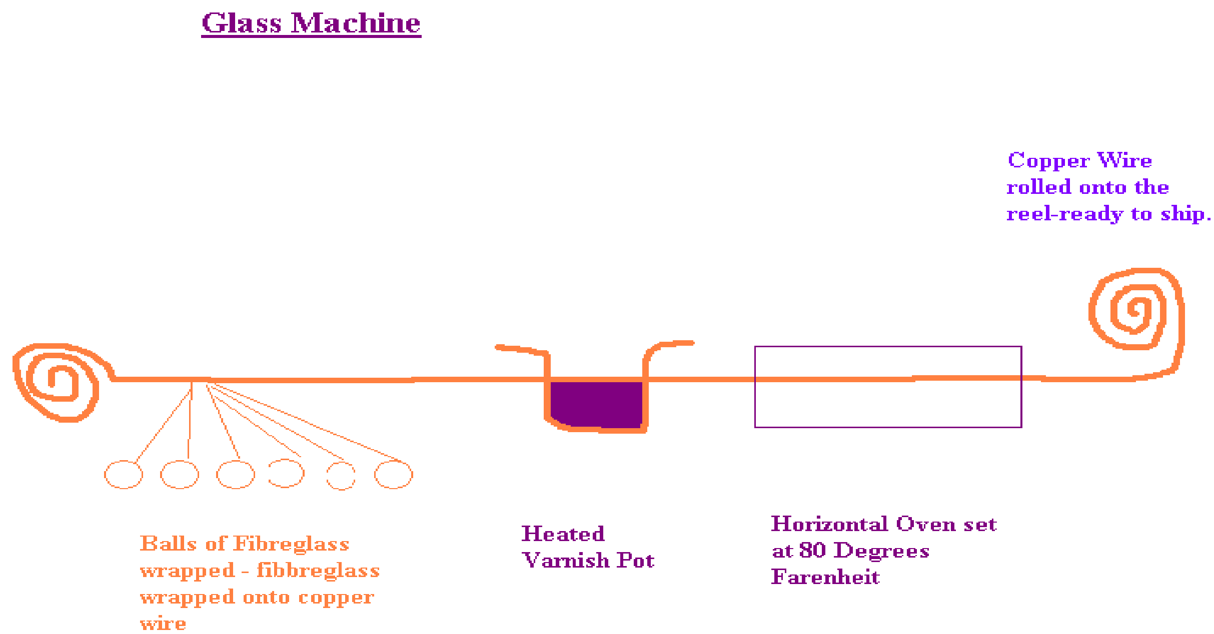
***Glass Machine:***

The glass machine was a twisting machine. The varnish treated fiberglass was wrapped onto the copper wires, treated through a heated varnish pot, traveled through an oven set at 80 degrees Fahrenheit and reeled. Fibreglass, ¼ inch wide was wrapped over top copper wire. This wire was utilized for generators, which would be subject to ample amounts of heat. The process was set up as follows.

All in all, there were 7 carding heads. As per the employees and supervisor, the air would be white in the surrounding areas as the glass fibres would accumulate and disperse.

Employees utilized air hoses to blow machinery off to clean up the areas. The fibres would thus be dispersed in all areas. All employees in the area would sweep asbestos as well and shoveled it into barrels after clean up. The barrels were then dumped into landfills. See Diagram #8 Below.

Diagram #8: Glass Machine




***Winding Area:***

This area was located at the south end of Department 22. 26 people worked on the day shift, 15 on the afternoons and 15 on night shift. In the summer, open doors would cause the contaminants in these areas as well as all other areas to disperse and contaminate different parts of the building. There were 26 winders in total. The function of the winders was to wind the tested copper wires, onto reels, in sizes that the clients had demanded. Example, 250 feet worth of wire on a reel versus 400 feet of wire on a reel. It is pertinent to note that the winder employees were located across from the asbestos carding area.

***Welding and the Nuclear Fuel Handling Process:***

Between the 1970 – 80's Department 26 and 22 changed its layout and processes. At the north end of Department 26, welders from the nuclear department took over 3-4 bays. The employees built equipment parts for Nuclear Fuel Handling equipment. The first Calandria was built here with a 30 foot diameter and 30 foot length. The welders first started in building 26 then moved to the north end of building 22. The welders were involved in mobile welding, without ventilation, no exhaust and no windows. They built pipes, pumps, tubes, and tools for reactors. A paint booth was also located at the north end, with a 10-foot railway track to maneuver and transport large parts. There were ample welding jobs taking place in this area. No respiratory equipment was worn, expect for confined space jobs. They welded stainless steel, inconel, mild steel, aluminum and zinc alloy. They did not use exhaust ventilation or fans for the welding jobs, as gases were being utilized. If doors were opened then contaminants would be drawn into the welding areas. Fans could not be used as heat was required for an optimal weld.

In 1980, changes were made to the wire and cable activities. A VPI tank was brought in to this area. Fumes would then traverse the various areas and go into the weld shop as well. Employees would then be cross contaminating with the various fumes.

In 22 building, in 1980, when welding processes had moved in this location, acetone was utilized to clean parts before welding. Employees' hands would be dipped in buckets of acetone with rags. No personal protection was worn. The VPI tank was brought here to the welding area at this time. There were heavy VPI fumes as well.

One employee recounts: an employee was shaking to death, as they were working in a confined space, with no oxygen – they were welding an interior of a fuel handling tank. Mobile welding was utilized hence no ventilation, no exhaust and no windows. Generally, due to the nature of the products being fabricated, welding was frequently done in confined spaces.

The welders were also exposed to large amounts of acetone as they would dip their hands and a rag into acetone pails to clean parts they were to weld.

## 6.0 CHEMICAL ANALYSIS AND LITERATURE REVIEW

As the focus of this Department Wide Retrospective Exposure Profile is for Cancer and other Occupational Diseases in the Wire and Cable Department at GE, a number of chemicals utilized at GE over the years in question, have been researched and analyzed through the literature review as to their degree of hazard based on their utilization in the department and lack of protection in the form of the three major Industrial Hygiene Controls, i.e. Personal Protection, Engineering Controls and Administrative Controls. Without these controls, the exposure to chemicals and their impact on human health is studied herein. Due to the fact that there are a number of dated processes, there were a number of chemicals that were utilized which have been discontinued today. Moreover a vast amount of research was required to be conducted from a historical as well as scientific perspective to analyze the use of chemicals over time such as benzene. Please note, the chemicals utilized in the GE plant over the decades did indeed contain harmful components (PVC, Banbury mixes, trichloroethylene etc) that are not present today due to vast amounts of research conducted by regulatory bodies over the years (e.g. American Congress of Governmental Industrial Hygienists).

Although a fully compiled database of Material Safety Data Sheets required for review of all the processes described by the employees was not available to OHCOW, there are several well known chemicals that are found commonly in various processes such as Polyvinyl Chloride Mixers, Banbury Mixers and Rolling Mills. Due to the vast amount of research available for these processes, the processes are studied rather than studying the chemicals individually and this is a common practice followed by major governmental bodies such as IARC and ACGIH. The benefit of studying the processes as a whole is that the research that is available enables one to study the synergistic, interactive effects of the chemicals as a whole process versus individual effect. This gives a more true or realistic value to the actual exposure in the department being studied.

MURIATIC ACID:

| Trade Name | Manufacturer | ➢ Hazardous Ingredients. | Routes of Entry |
|---|---|---|---|
| **Muriatic Acid- synonym- Hydrochloric acid** | BASF Corporation Polymers Division (Year, 1993) | ➢ HCL, 31.5% | Inhalation, skin, eyes, ingestions |

Although the information from the MSDS provided above is from 1993, and has water as a primary ingredient at 65-69%, the hazardous effects remain the same. See Appendix C for a copy of the generic MSDS for Muriatic Acid.

Acute and Chronic Effects:
**Inhalation of gas or mists may result in the following:**

- Coughing and choking sensation due to irritation of the upper respiratory tract,
- Severe overexposure may result in laryngeal spasm
- Edema, pulmonary edema (skin) corrosive body tissue.
- Burns and permanent eye injury may occur
- Dermatitis
- Changes in pulmonary function, chronic bronchitis, conjunctivitis

Recommended Controls:

- Generally speaking, a NIOSH approved respirator for protection against acid gases is recommended if the Permissible Exposure Level is exceeded.
- Local Exhaust Ventilation is recommended to control vapors and mists
- Rubber gloves and safety goggles are also recommended for protection.

Muriatic Acid is another name for Hydrochloric Acid (HCL). The NIOSH REL is 5 ppm and the OSHA PEL is 5 ppm. At per the NIOSH, this chemical is incompatible with copper, since violent reactions may occur. **However this acid was utilized on the copper wire as per the processes described by the former GE employees and Supervisor.** HCL has an irritating, pungent odor with an odor threshold of about 7 mg/m3 (EPA, 2004).

Exposure Routes:

- Inhalation
- Ingestion
- Skin
- Eyes

Symptoms of exposure:

- Nose irritation, throat, larynx, cough, choking, dermatitis, skin burns

This present day information indicates that numerous precautions are required to work with this hazardous chemical. During the period in question in the Wire and Cable Department, a majority of these precautions/safety measures were not in place and hence exposure was more than likely to have occurred. The same statement applies to carcinogens that were present in the workplace. Precautions were necessary then as they are now. Due to the information we have now, we know that precautions were not in place (MOL reports and employee testimonies indicate this) in the time period in question and thus exposure is more than likely due to lack of PPE, lack of proper engineering controls, lack of proper administrative controls, and lack of proper safety/hygiene behaviour as well as a lack of efficient safety management.

As per the National Safety Council, 2004, exposure to HCL can cause circulatory collapse which may lead to death, inflammation and ulceration of the respiratory tract, rhinitis, laryngitis, tracheitis, convulsions, shock, chills.

It is important to note, as per the MSDS prepared by BASF, that pre-existing disease of the skin, asthma or other respiratory disorders may have increased susceptibility to excessive exposures. With this in mind, the vast amounts of chemicals used in the various departments, the lack of proper exhaust ventilation in the various areas, and the lack of fresh air into the department, will have contributed to the effects of exposure to HCL and other substances. Their uptake into the body, the synergistic effects, detrimental effects to the body's defenses would thus disarm the body, making the body more vulnerable to harmful chemicals and their effects.

HCL is also corrosive to mucous membranes. Acute short-term inhalation exposure may cause: eye, nose, and respiratory tract irritation, inflammation and pulmonary edema in humans. Dermal Contact may produce severe burns, ulceration and scarring in humans. Chronic long-term occupational exposure to hydrochloric acid has been reported to cause gastric difficulties, chronic bronchitis, dermatitis, and photosensitatization in workers (EPA, 2004):

- Pulmonary irritation, lesions of the upper respiratory tract, and laryngeal and pulmonary edema have been reported in rodents actually exposed by inhalation.
- Acute animal tests in rats, mice and rabbits have demonstrated HCL to have moderate to high acute toxicity from inhalation and moderate acute toxicity from oral exposure

Without proper PPE, engineering controls or administrative controls, exposure can be deemed likely in this department.

Chronic Effects:

- Chronic occupational exposure causes gastritis, chronic bronchitis, dermatitis
- Chronic inhalation exposure caused hyperplasia of the nasal mucosa, larynx and trachea and lesions in the nasal cavity in rats.

PARA FILM WAX:

There were numerous wax pots that were utilized for the various processes in this department. Due to the fact that the pots were heated, fumes were indeed emitted. The following OSHA, 1989 documents reveal the following:

- Paraffin is considered nontoxic in its sold state
- Fume generated in its molten state may cause discomfort and nausea, where effects of discomfort are noted above levels of 2 mg/m3.

COPPER:

Copper was a main component of the wire and cable department. It was shaved, extruded, wound and wires were braided, coated with PVC's, lead and rubber. With all these different types of processes, copper was seen in its many different forms throughout the department. The National Safety Council states the following:

- Copper is insoluble in hot and cold water, soluble in nitric acid and hot sulfuric acid, very slightly soluble in hydrochloric acid and ammonium hydroxide (NSC, 2004).
- It is very slowly attacked by cold hydrochloric acid
- Health effects: irritation to the nasal mucous membranes, pharynx and eyes, chest pains, vomiting, nasal perforations and dermatitis
- Copper fumes and dust can irritate the upper respiratory tract, congestions of nasal mucous membranes, ulceration and perforation of the nasal septum, discoloration of the skin and pharyngeal congestion
- Fumes from the heating of metallic copper can cause upper respiratory irritation, chills, aching muscles, nausea, gastric pain and diarrhea. Acute poisoning from inhalation of copper containing dust has carried symptoms of heavy metal poisoning. Chronic exposure to copper can cause anemia.
- Occupational exposure to copper dust commonly reported reactions including metallic or sweet, upper respiratory tract irritation and nausea, (Whitman, 1962).
- The sweet taste experienced by workers is consistent with the onset of symptoms of metal fume fever. Factory workers exposed to copper dust and several other copper salts reported symptoms of eye, nose, throat irritation, anorexia and nausea (Askergren and Mellgren, 1975).
- Inhalation exposure to copper fumes, usually from welding or smelting operations, may results in metal fume fever. This condition results in headache, dryness of the mouth and throat, chills, fever and muscle aches (ATSDR, 1990; Seaton and Morgan, 1984).
- An unpublished letter regarding occupational exposure to copper fumes reported that levels of 0.02-0.4 mg/m3 copper did not cause complaints while exposure to 1.0-3.0 mg/m3 copper for shorter periods of time resulted in a sweet taste in the mouth but no nausea (Whitman, 1957).

MERCURY:

The employees were exposed to mercury in the form of both skin exposure as well as respiratory exposure. Due to the fact the employees had no respiratory protection or hand protection; they were inevitably exposed to elemental mercury via its vapors and dermal uptake. Elemental mercury, gives off vapour at room temperature (NJSDH, 2004). Acute health effects to mercury vapour can include, cough, chest tightness, upset stomach. In fatal conditions this can lead to pneumonia. In terms of chronic exposure the following symptoms are common: gum problems, mood and mental changes as well as nervous system effects which include, fine tremors of the hand, in the tongue and eyelids. This can eventually affect balance and walking. Other symptoms mentioned by the NJSDH, 2004 are skin allergies, discoloration of the lens in the eyes.

The Agency for Toxic Substances and Disease (1999) State the following:

- At room temperature, some of the metallic mercury will evaporate and form mercury vapors, which are colorless and odorless
- In terms of the fate of mercury in the body, ATSDR states the following: 80% of mercury vapors that are breathed in, enter the bloodstream directly from the lungs, and then rapidly to other parts of the body, including the brain and kidneys. When metallic mercury enters the brain, it is readily converted to an inorganic form and is trapped in the brain for a long time.
- Due to the fact that the mercury vapours affect the brain, different areas of the brain are affected and thus realized in a variety of impairments: personality changes, tremors, changes in vision, deafness, lack of muscle in coordination, loss of sensation and difficulties with memory
- Short term exposure to high levels of metallic mercury vapor in the air can damage the lining of the mouth and irritate the lung airways, causing tightness of the chest, burning sensation in the lungs and coughing, nausea, vomiting, abdominal pain, diarrhea, weakness, confusion, shortness of breath, bronchitis, and pneumonia and kidney damage.
- Long term exposure is more dangerous, and the nervous system is the main target of toxicity. Neurological symptoms include: tremors, headaches, short term memory loss, loss of appetite, numbness and tingling in the hands and feet, insomnia and excessive sweating (CPCS, 2002).
- Family members of workers who have been exposed to mercury may also be exposed to mercury if the worker's clothes are contaminated with mercury particles or liquid. Increased exposure to mercury has been reported in children of workers who are exposed to mercury at work, and increased levels of mercury were measured in places where work clothes were stored and in some washing machines.

All in all the employees were not only exposed to the mercury vapours, but were also exposed to the mercury through dermal exposure as well, as per the processes they have described herein.

EPOXY RESINS, ENAMELING, VARNISH POTS/HEATED ENAMEL POTS

- As per IARC , **VOL.**: 47 (1989) (p. 329) occupational exposure grouping for a painter is listed under *Group 1: The agent (mixture) is carcinogenic to humans. The exposure circumstance entails exposures that are carcinogenic to humans.*

Due to the fact that the employees in the wire and cable department worked with enamels, lacquers and varnishes, the following data and pertinent information indicates herein is applicable to the workers in the wire and cable department. The information is taken directly from the document cited:

- Thousands of chemical compounds are used in paint products as pigments, extenders, binders, solvents and additives
- Painters are commonly exposed via inhalation to solvents and other volatile paint components,
- Dermal contact is the other major source of exposure
- Painters may be exposed to the chemical agents that they or their coworkers use.
- Painters are commonly exposed to solvents, petroleum solvents, toluene, xylene, ketones, alcohols, esters and glycol ethers.
- **Benzene was used as a paint solvent in the past but is currently found only in small amounts in some petroleum solvent based paints**.
- IARC indicated that of 3 large cohort studies of painters and collections of national statistics, 20% of all cancers were above the national average and lung cancers were at 40% above the national average.
- The available evidence on the prevalence of smoking in painters indicated that an excess risk for lung cancer of this magnitude cannot be explained by smoking alone.
- There were also small excesses of oesophagoeus, stomach and bladder cancer as well as leukemia and cancers of the buccal cavity and larynx.

As per the Department of Health Services (DHS California), the following is stated with regards to Epoxy Resin Systems:

- Common effects of overexposure to the chemicals used in epoxy resins systems are eye, nose and skin irritation, skin allergies and asthma.
- Finished or hardened epoxy products are practically non-toxic unless they are cut, sanded or burned
- The systems are made of epoxy resin and curing agents
- It is exposure to the uncured resin components that can be harmful
- The epoxy resins utilized at GE were of the Class A and B type where the resin and curing agent had to be mixed prior to application. Single component systems are stated to be safer as per DHS, as the hazardous chemicals are already partly combined into less toxic polymers (DHS, 2005).
- Epichlorohydrin was a primary component of epoxy resins at least 68% as per NSC, (epichlorohydrin chemical backgrounder) 2005.

- There are numerous additives that can affect human health in epoxy resins such as curing agents, aliphatic and aromatic amines, dilutants, organic solvents and fillers.

At GE the exposure to epoxy resins would have occurred though inhalation, skin contact, misting, due to the methods in which they were handled, oven fumes and uncured components from the ovens as well.

Lung: vapors and spray mists can irritate lungs
Some people can become allergic to curing agents, even dust from sanding or grinding the hardened plastics

Skin: epoxy resins can cause skin irritation as well as sensitization

Eyes/Nose/throat: most epoxy resin system chemicals and their vapours can irritate
eyes, nose and throat. Some individuals can develop headaches and thus irritation (all taken from Department of Health Services, California DHS, 2005)

Nervous System: solvents inhaled or absorbed through the skin can affect the brain as well. Overexposure can lead to nausea, dizziness, slurred speech, confusion and loss of consciousness.

CANCER: As per DHS, 2005, older epoxy resins caused skin cancer in laboratory animals. Epichlorohydrin is the contaminant that is stated to have been the probable cause, as it is a probable human carcinogen. Most new epoxy resins today contain less epichlorohydrin. Furthermore, Diaminodiphenyl sulfone (DDS) a curing agent in some epoxy resins, is carcinogenic in laboratory animals. Most other components of epoxy resin systems have not been adequately tested to determine if they cause cancer.

In terms of Reproductive Effects, DHS states that the various diluents and solvents in epoxy systems may affect reproduction. Two solvents found in epoxy resin systems such as 2-ethoxyethanol and 2-methoxyethanol cause birth defects in laboratory animals and reduced sperm counts in men.

Finally it is imperative to note that heating epoxies during curing or any other process can cause chemicals to evaporate, with higher temperatures releasing more gases (DHS, 2005).
As per Solvay Chemical, 2004:

- Epichlorohydrin is a chemical intermediate used primarily in the manufacture of epoxy resins and synthetic glycerol. It is also used in the production of Epichlorohydrin elastomers, polyamide-Epichlorohydrin resins, water treatment chemicals, and a variety of glycidyl derivatives.

Spectrum Laboratories state the following pertinent information on their MSDS, 2005:

- Marked nose & eye irritation occur only above 100 ppm.
- Epichlorohydrin effects on the skin, eyes, and respiratory tract may be delayed for several hours.

- Epichlorohydrin causes dermatitis.
- Inhalation of Epichlorohydrin causes irritation of the eyes and throat.
- Epichlorohydrin may be released to the atmosphere and in wastewater during its production and use in epoxy resins, glycerin manufacture, as a chemical intermediate in the manufacture of other chemicals, and other uses

Borgstedt, H. and Hine, H describe the following chemistry related aspects of epoxies that are pertinent to mention here to comprehend the toxicity of epoxies and their properties during the various processes in which the employees at GE had to manage the use of the epoxies. (See Appendix J for reference material provided by Borgstedt and Hine). Taken directly from the reference:

- The toxicity and the irritancy of the curing mixture depend on the degree to which curing has progressed
- The toxicity and irritancy of the initial uncured mixture are comparable to those of the individual components, where the fully cured resin is less toxic. However, if the cured resin is subject to dust producing operations, like filing, sanding or drilling, irritation and sensitization may be realized by the operators, especially to the upper respiratory tract.
- **Adequate ventilation is required for the safe handing of the materials during processing**
- The authors quote that there was an "incidence of severe respiratory irritation and mild nephrotoxicity in six laborers who had removed epoxy resin concrete with air hammers." Although the specific offending agent could not be identified, xylene was strongly implicated here.
- The authors quote another study where seborrheic dermatitis was observed in 14 female workers in an electrical equipment plant. The resin was handled repeatedly without protective measures, and the resin –coated assemblies were heated. The cases mostly occurred within a radius of about 10 yards of the work stations where the resins were heat-cured without ventilation and problems also occurred in workers who did not directly handle the materials. Hence it was concluded here that the exposure occurred through vapor exposures. The authors also note that the workers with the seborrheic skin changes were particularly prone to develop pathological skin changes as well.

Furthermore, clinical examinations of 50 workers exposed to varnishes through spray painting operations showed that 70% had ocular pains, 20% had signs of chronic bronchitis and 30 % had moderately positive colloidal seraloability proofs (Spagna et al, 1972). The authors concluded that the high percentage of acetate in the mixtures caused the worker's complaints.

Rosenstock et al, in 1986 found the following with regards to exposures to epoxy resins and other additives.

- Epoxy resins appear in high performance paints, adhesives, and coating
- The hardeners used are potent skin and respiratory tract sensitizers leading to contact dermatitis, hay fever and asthma.
- Neutral and synthetic rubber exposures are associated with cancer, skin disease and chemical intoxications resulting from organic sulfur compounds and lead exposure.

Cragle et al, in 1992 investigated the relationship between bladder cancer and other illnesses and epoxy resins.

- The exposed workers studied had experience working with benzene, chromium, radiation trichloroethylene and other chemicals as opposed to the references.
- Statistically significant increases in dizziness, insomnia, numbness or tingling in limbs, rashes and bladder cancer were seen among the exposed workers.
- All of the workers with bladder cancer were current or former smokers and had exposure to epoxy resins.

In another study conducted in 1963, (anonymous authors), it is clearly stated that exposure to wet or uncured resins and the chemicals used to thin, strengthen or harden the epoxy mixture may be particularly hazardous to health.

Without proper personal protective equipment, proper management of the systems utilizing these agents, i.e. the ovens, exhausts etc., the employees would have been exposed to the wet and uncured products of the resins and thus would incur the exposures to their by-products as well as the byproducts of the thinners and additives that formed the mixture as a whole.

EPICHLOROHYDRIN:

Epichlorohydrin is used in the production of various synthetic materials, including epoxy resins, wet strength resins for the paper industry and water treatment resins. There is widespread use of Epichlorohydrin as a stabilizer (National Sciences Library, 2005)

- About 90% of commercial epoxy resins are prepared by reacting epichlorydrin with 4,4 isopropylidenedipehenol to obtain a molecule of a desired chain length and molecular weight, (Mathias, C., 1981).
- Epichlorohydrin is classified as a substance that may reasonably be anticipated to be a carcinogen according to US Department of Health and Human Service.
- It is also classified as a carcinogen by the EPA's Toxic Release Inventory (TRI).
- It can produce temporary sterility
- Acute poisoning may lead to respiratory paralysis
- Chronic poisoning may lead to kidney damage

IARC, 1999 has reviewed the carcinogenicity of Epichlorohydrin both in humans and in experimental animals:

Animal Studies:

In rats, papillomas and carcinomas of the fore stomach were induced following oral administration of epichlorohydrin. In an inhalation study, papillomas and carcinomas of the nasal cavity were found. IARC defines epichlorohydrin as the following:Group 2A: The agent (mixture) is probably carcinogenic to humans. The exposure circumstance entails exposures that are probably carcinogenic to humans.

The exposure standards working group is of the view that there is strong evidence from the appropriate animal studies to prove a strong presumption that human exposure to Epichlorohydrin may result in the development of cancer. Epichlorohydrin is classified as a Category 2 Carcinogen, by the Australian Government, NOHSC, 2005).

NIOSH CURRENT INTELLIGENCE BULLETIN 30 OCT. 1978 STATES THE FOLLOWING;

- The National Institute for Occupational Safety and Health (NIOSH) recommends Epichlorohydrin be handled in the workplace as if it were a human carcinogen.
- This recommendation is based primarily on two recent studies: a long term epidemiologic study showing significant increase in respiratory cancer deaths of exposed workers, and an inhalation study showing an increase in nasal carcinomas in rats. In addition, cytogenic studies of human peripheral lymphocytes have shown a highly significant increase in chromosome abnormalities in exposed workers.
- A statistically significant ($p<.05$) increase in deaths due to respiratory cancer

has been observed in a long-term epidemiologic study conducted on workers exposed to Epichlorohydrin at two facilities of the Shell Chemical Company. There were 864 workers identified as having been occupationally exposed to Epichlorohydrin for 6 months or more

- For men estimated to have had moderate to heavy exposure who were followed for 15 years or more, observed deaths were also greater than those expected for the categories of all cancers, leukemia, and suicide, although those differences were not statistically significant. Information was not available for most workers on smoking history, or the extent of exposure to other chemicals.
- In ongoing inhalation studies, rats exposed to Epichlorohydrin have shown a statistically significant increase in nasal cancer ($p < .05$).
- Pending further evaluation of its carcinogenic potential NIOSH believes it would be prudent to minimize occupational exposure to Epichlorohydrin.

The Environmental Protection Agency states the following with regards to the classification and health effects of Epichlorohydrin (EPA, 2004):

- EPA has classified epichlorohydrin as a Group B2 probable human carcinogen.
- An increased incidence of tumors of the nasal cavity has been observed in rats exposed to epichlorohydrin by inhalation (EPA, 1985).

***A list of the various chemicals that were utilized in the Banbury operations in the Wire and Cable Department can be obtained by the OHCOW Clinic Toronto. The compilation of Banbury chemicals has not been appendixed herein for practicality reasons only. The compilation of ingredients for the Banbury mixes indicate that there were over 80 chemicals for which 50 were identified to have toxic ratings. Appendix K – includes #13 – list given to MOL with regards to Banbury Chemcials***

**BANBURY OPERATIONS AND THE ROLLING MILLS:**

There were 2 main processes that the employees were involved in with regards to rubber processing at GE.

1) Banbury Operations
2) Rolling Mills

In both of these processes, employees are involved in raw materials handling, milling, blending the rubber and chemicals, extruding, where the re-heated rubber is shaped into sheets, strips or pellets, inspection and storage (CANOSH, 1998). During these processes, workers exposed to many chemicals, including experimental mutagens or carcinogens of several types: mineral oils, carbon black (extracts), curing fumes, some monomers, solvents, nitroso compounds and aromatic amines, thiurmas, hydrogen peroxide, polycyclic aromatic hydrocarbons, nitrosamines and halogenated hydrocarbons (International Agency for Research on Cancer, 1982).
A 1982 Rubbers Worker's Guide to Occupational Health formulated by the Waterloo Public Interest Group, lists and describes the various hazards that are associated in the rubber industry and means to

protect against those hazards. The following WPIRG's findings are listed here to demonstrate the various hazards and emissions of hazards during various processes. The information provided here is taken directly from the Guide. A compilation of components added to the Banbury Mixing operations at GE is available upon request. This data has been given to OHCOW by the former GE health and safety committee representative and former GE employees. (The compilation has not been appendixed herein for practicality reasons).

- The highest levels of dust particles are usually found in the **compounding and mixing** areas of the rubber plant. The handling of dry rubber chemicals, including antioxidants. Accelerators, sulphur and carbon black, chemicals can leak or spill creating airborne dust.
- As per WPIRG the various chemicals in Banbury operations involve the following general groups of chemicals, which were present at GE: The health and safety representatives did have some concerns over some of the chemicals that were utilized as is evident in a letter presented to the business agent in 1979 Appendix F. This letter clearly indicates concerns over some toxic chemicals that were being used for the Banbury Mixing operations and some precautions against those chemicals were being recommended by the health and safety representative at that time, June 1979. (refer to Appendix F)
    - Accelerators:
        - amines
        - guanidines
        - thiazoles
        - dithiocarbamates
        - thiurams
    - Antioxidants:
        - Phenyl alpha-naphthylamine or PAN
        - 4.4-diaminidiphenylmethane
    - Activators
        - Zinc Oxide
        - Magnesium oxide
        - **Lead oxide: As per IARC this is a Group 2B- probable human carcinogen, which is clearly indicated in the List of chemicals added to the Banbury as per the documents presented to OHCOW. See Appendix K - #13**
        - Calcium oxide
    - Antitack Agents
        - **Talc: One form of talc utilized at GE was Mistron Vapour Talc, which possibly contained asbestos, as per the documentation presented to OHCOW (APPENDIX, F)**
        - Zinc stearate

As per WPIRG, inhalation of large quantities of zinc stearate dusts has in a few cases given rise to pneumoconiosis.

- Bonding Agents

- Aldehydes
- Resorcinol

➢ Filler

- Carbon black

As per CCOHS, 1997, the following has been researched with regards to carbon black. The following data is taken directly from CCOHS information.

- Short Term Effects: general effects that would be expected with any fine dust (high concentrations can cause coughing and mild, temporary irritation).
- Long Term Effects: potentially serious respiratory effects following long- term inhalation. Symptoms may include coughing, increased phlegm production, and shortness of breath. A number of studies have shown x-ray changes, reduced lung function, emphysema and/or chronic bronchitis in some carbon black workers. In other studies, no respiratory effects were seen. A few studies have shown evidence of fibrosis (scarring of the lungs) in the area surrounding carbon black deposits in the lungs.
- In one case, these effects were seen in workers exposed to airborne concentrations of up to 0.45 mg/m3 respirible dust and up to 1.60 mg/m3 total dust.
- Limited animal and human evidence suggests that significant and potentially irreversible lung effects may occur with exposures to high airborne concentrations (10-100 mg/m3).
- The International Agency for Research on Cancer (IARC) has based its conclusions on four studies conducted to evaluate lung cancer risk among carbon black-exposed workers. IARC has concluded that there is inadequate evidence for the carcinogenicity of carbon black to humans and that there is sufficient evidence that carbon black is carcinogenic to experimental animals. Overall IARC evaluation of carcinogenic risk: Group 2B (possibly carcinogenic to humans).
- At present these is no information available with regards to the synergistic effects of carbon black with other chemicals and contaminants.

As per WPIRG:

➢ Retarders

- **Nitrosamines: These chemicals are potent carcinogens. This substance can combine with other rubber chemicals to form other nitrosamines such as n-nitrosomorpholne, which is linked with liver and respiratory cancer and kidney tumors (WPIRG, 1982). Milling and extruding processes are the areas in which these contaminants are released.**

➢ Solvents

➢ Aliphatic Hydrocarbons

- Pentane
- Hexane
- heptane

➢ Aromatic hydrocarbons

- Benzene
- Xylene
- toluene

It was stated by the employees and former Supervisor that although an exhaust hood was present over top the Banbury equipment, it was rarely used, Due to this, it is inevitable that the air was contaminated with these chemicals, that were handled by hand, by the employees who loaded the Banbury as well as other operators who worked in the area i.e. Crane drivers, shippers, employees located adjacent to this operation as well, who would have been directly impacted.

- Skin exposure to the dust can cause dermatitis
- Andjelkovic, D et al., 1977 found that workers in the compounding and mixing processes were at a higher risk of developing disease in comparison to other rubber plant workers due to the fact that the employees often work directly over the source of the chemical dust, near the hopper. Due to the exposure to fine dusts, that are inhaled or ingested, workers in these areas are more likely to develop stomach cancer as quoted by WPIRG from, Andelkovic, D et al., 1977 and McMichael, AJ., 1971. Lung Cancer is also associated with these processes in several studies as found by the following authors, McMichael et al, 1976). The possible causes listed are carbon black and nitrosamines and talc particles which possibly contained asbestos, which also contribute to this higher risk for stomach cancer amongst these workers (Blum et al., 1979).
- Prostate cancer is often linked to cadmium compounds used as rubber accelerators or colouring pigments or heavy metal oxides such as lead, zinc or chromium (WPIRG, 1982). Bladder cancer has also been linked to rubber workers (McMichael, et al, 1976; Goldsmith, D., 1980).

As already stated, rather than look at the chemicals on an individual basis, it has been common amongst the epidemiological studies to look at the processes as a whole rather than the compounds individually. The combination of chemical exposures that occurs in the rubber industry is probably more relevant to the cancer pattern observed than are single compounds or groups of compounds (IARC, 1982).

- Excess malignancies of the lymphatic and haematopoietic systems particularly lymphatic leukemia, have been associated with jobs entailing exposure to solvents. Benzene considered to be a human carcinogen was once used as a solvent within the rubber industry and may still be present as a contaminant in other organic solvents.
- Stomach cancer has been found to be elevated in US and British rubber workers, and is associated with jobs early in the production line, including compounding and mixing, milling and extrusion.
- Lung cancer is positively related to a variety of jobs within the rubber industry. Attribution to specific factors in the workers' environment cannot be made (taken directly from the report, IARC, 1982).
- Mortality from prostatic cancer was found to be moderately elevated in several studies and some association was found with compounding and mixing jobs. In general the etiology of prostatic cancer is not understood. The only occupational risk factor suggested to date is cadmium and it's compounds which are usually included in a rubber batch.

- IARC indicates that there is sufficient evidence for excess occurrences of bladder cancer and leukemia in rubber workers and for causal association with occupational exposures, due to the exposure to aromatic amines and solvents.

**Workers who have been employed in the rubber industry will remain at risk for occupational bladder cancer, as the latency period for exposure to aromatic amines can be as long as 48 years (Goldblatt, 1947). About 25,000 people were employees in the Canadian rubber industry in 1985, over half of them in Ontario. The size of the industry is on the decline, but the effects of exposure would persist for as long as 40 years (CANOSH, 1998).**

***Banbury Operations:***

<u>IARC Monographs 1987:</u>

A large number of studies have been conducted on rubber industries in Canada, China, Finland, Norway, Sweden, Switzerland, the UK and the USA.

- Workers employed in the industry before 1950 have a high risk of bladder cancer, associated with exposure to aromatic amines.
- Leukemias have been associated with exposure to solvent and with employment in tire curing, synthetic rubber production and vulcanization
- Excess occurrence soft lymphomas have been noted among workers exposed to solvents in such departments as footwear and tire plants.
- Lung, renal tract, stomach, pancreas, oesphageous, liver, skin, colon, larynx, and brain cancers have been reported as occurring in excess in workers in various product areas and departments; however no consistent excess of any of these cancers is seen across the various studies.
- Increased incidence soft respiratory and digestive carcinomas were found in rats maintained for 2 years at Banbury locations, when compared with control rats.
- Mutagenic activity was observed in the urine of workers involved in weighing and mixing rubber components and in the urine of some vulcanizers.

<u>Fracasso, Me et al. 1999:</u>

Epidemiological studies conducted in the 1980's revealed that people working in the rubber manufacturing industry had an increased risk in cancer. The writers state that workers currently exposed to rubber processing are still at risk despite hygiene measures adopted to improve their working conditions.

- The purpose of this study was to evaluate the presence of genotoxic risk in the rubber industry and to determine the most dangerous position on the rubber working process
- High levels of mutagenic activity in ambient and personal samples indicate the presence of substances with high genotoxic potency
- No substantial differences were seen among several rubber processing operations.

Fishbein, L. 1991:

Chemicals used in the rubber industry and their toxicological implications were reviewed

- Eye and skin irritation, and skin sensitization are caused by every class of rubber chemical and neurotoxic effects induced by exposure to acrylonitrile, styrene, and butadiene.
- Reference to other studies with regards to aromatic amines, solvents, and other rubber chemicals are associated with increased risks of bladder, stomach, lung and skin cancer and leukemia.

Li et Yu, 2000:

- Data of nine cases of esophageal cancer deaths among workers at a rubber plant during 1973-1995 and 36 controls are studied
- Odds ratios for esophageal cancer were found to be 2.67 for compounding workers and 1.4 for assembly workers
- Significant association between risk for esophageal cancer and specific exposure or processes within the rubber plant were not found
- A change in the compounding department resulted in a slight excess risk for esophageal cancer in the rubber plant, but was attributed to exposure to dusts and solvents.

As stated in Section 5 of this report, the employees and former supervisor stated that there were Banbury Operations as well as 3 rolling mills. As stated in terms of process, the following findings by WPIRG confirm the processes stated by the employees and further establish how the contaminants were utilized or further produced by the heating and handling or the compounds. Most of the ingredients mentioned here by the reference cited, are similar if not identical to the ingredients stated by the employees. Although a complete list was not available to OHCOW, some documents were presented to the Clinic, which confirm the presence of oxides and other contaminants mentioned here.

- Leukemia is often associated with exposure to benzene, which was a widely used solvent in the rubber industry and currently is found as an impurity in other solvent mixtures such as varsol and naphtha (WPIRG, 1982).

Another process the employees were involved in after the Banbury operations was the rolling mills, where the rubber sheets were further thinned or pressed into thickness required by the various specifications. The following findings are stated in the report by WPIRG:

- When the rubber comes into contact with the hot rollers, fumes and vapours are released
- These may include condensed droplets of oils and detackifiers such as talc, various reaction products and mixtures of combined chemicals.
- Nitrosamines are a group of chemicals that are released in this area that have been shown to cause cancer in experimental animals.

- Studies in the rubber industry have shown that workers in the milling area have an increased risk of developing stomach cancer, which may be a result of the airborne particles being inhaled and trapped in the nasal passages or ingested (McMichael, AJ., 1976, two different references in this year; Kalnas, JJ., 1977).
- Other diseases with regards to this process include chronic bronchitis, lung cancer, talcosis and bronchitis. Heart disease and diabetes are also related to cutting and milling operations (McMichael, AJ., 1976; Andjelkovic, D., 1977). The materials that are utilized to dust the rubber include talc, soapstone, clay, mica, and fine silicas (McMichael, AJ., 1976; Andjelkovic, D., 1977).

Hi Sil 233 Silica was utilized in the Banbury Mixing Operations: This is a trademark for a group of hydrated amorphous silica used as reinforcing pigments in elastomers as fillers and brightening agents in paper and paints and as a flow conditioner. At present further studies need to be implemented to investigate the effects of amorphous silica on human health. There are no studies that allow the classification of amorphous silica with regard to carcinogenicity in humans. (Merget, 2002).

The tubing and extruding processes described by the employees involved driving the copper wire and the rubber tubing through a die to have it formed into size and specifications desired by the wire, or cable coating. WPIRG state the following in their report:

- Studies in many plants indicate the processes contain nitrosamines, which are potent animal carcinogens and suspected human carcinogens (Van Alphen, J., 1977)
- Exposure to fumes from that extrusion process will be highest for those working close to the heated rubber (WPIRG, 1982).Emphysema, asthma and lung cancer are common amongst workers involved in these processes (McMichael, AJ, 1976).
- Cure fumes are also a heavy source of respiratory disease.

The employees stated with regards to the tubing process, that the rubber was heated to molten temperatures for the tubing process. After the copper wire was coated with the rubber, it then traveled through a water bath. At this point, the wires would emit steam, due to the difference in temperatures.

- Leukemia is associated with this process as well, due to the various solvents used (WPIRG, 1982).
- Increased risk of stomach and colon cancer was also linked to extrusion workers, which may be attributed to exposure to fibrous talc in the extrusion area (WPIRG, 1982).
- In studies researched by the WPIRG, 1982 report, it was stated that workers in this area have more heart disease, lymphatic leukemia and diabetes than expected)McMichael, AJ., 1976; Andjelkovic, D., 1977)

- Excess rates of stomach cancer and respiratory disease have also been found in this area. The inhalation and ingestion of rubber dust and solvent fumes are stated to be causative agents (McMichael, AJ., 1976).

Maintenance Workers:

Maintenance workers are called upon to conduct their regular day-to-day duties or troubleshooting that may require them to work on equipment for an hour or days. With this in mind, it is pertinent to note that their exposure can be acute or chronic with regards to the contaminants in any given area, heavily concentrated or negligible. With regards to the rubber industry, the WPIRG Report states the following:

- Maintenance and general service workers were at an increased risk of prostate cancer. Attributable causes mentioned for this risk, stated by researchers are, oxides of lead, zinc, cadmium, and chromium. Leukemia has also been found to be in excess for workers in this area. Exposure to solvent fumes is attributed to leukemia. (McMichael, AJ., 1976; Goldsmith, D., 1980; McMichael, AJ., 1975)

Receiving and Shipping Operations:

In the receiving operation, the raw material used in the production of rubber products is delivered to the plant. The shippers pick up the stored packages and deliver them to the various processes in the plant. The employees of GE and the retired supervisor stated that at times the paper bags would tear or be punctured during shipping or delivery by the forklifts, as the forks would puncture the bags, causing the dust and contaminants to disperse. The employees would have more proximate exposure when loading the wooden pallets with the stock for the Banbury Operations

- Studies of the rubber industry have shown that people who have worked in these job categories have a slightly increased incidence of leukemia, bladder cancer, stomach cancer, and lung cancer ( McMichael, AJ., 1976 (2 different articles – same year; Andjelkovic, D., 1977; Monson, R., 1976).

Health effects and Epidemiological Evidence:

The evidence in favor of an increased risk of bladder cancer among rubber workers comes from a large number of epidemiological studies, both cohort studies and case-control studies, including some in Canada. There is some evidence that the risks of bladder cancer from smoking and working in high risk occupations is multiplicative, so that the attributable fraction among smokers in the industry might be higher. (CANOSH, 1998).
It is pertinent to note that other than occupational exposures, the only risk factors for which a causal relationship can be deemed definitively established, are ionizing radiation and tobacco (CANOSH, 1998).Among the occupational risk factors, in addition to chemicals, gas and rubber workers, the

evidence for aluminum workers is now definitive, based on Canadian studies (Theriault et al., 1981; Rockette and Arena, 1983: Theriault et al., 1984; Gibbs, 1985).

Rubber workers are exposed to a multitude of chemicals, some of which are carcinogenic. Epidemiological evidence shows that there is increased risk of cancer at various sites, including stomach, large intestine, lung and leukemia, as well as bladder cancer (CANOSH, 1998).

IARC summarized the following findings with regards to the health impacts of the occupations in the Rubber Industry, 1982:

- Stomach cancer, consistently elevated in studies of the USA and British rubber workers, appears to be associated with processes involved in the production line, including compounding and mixing, milling and extrusion
- Lung cancer is positively related to a variety of jobs within the rubber industry. IARC states that attribution to specific factors in the workers' environment cannot be made
- Mortality from prostate cancer was found to be moderately elevated in several studies and some association was found with compounding and mixing jobs. The only occupational risk factor suggested to date is cadmium (compounds of cadmium are occasionally included in a rubber batch).
- There is a lack of consistent association between specific jobs, and cancer of the large intestine does not permit a causal relationship to be inferred.
- The IARC Working group concluded with the following epidemiological evidence and research:
    - There is sufficient evidence as per IARC for excess occurrence in rubber workers and for causal association with occupational exposures with aromatic amines and solvents, to cause bladder cancer and leukemia
    - There is sufficient evidence for excess occurrence in rubber workers: and limited for causal association with occupational exposure with regards to compounding, mixing and milling for causing stomach and lung cancer

Kogevinas, M. et al., 1998:

- The authors studied the epidemiological evidence on cancer risk among workers in the rubber industry
- Excess risks of bladder cancer, lung cancer, and leukemia were found in most studies. A moderate excess risk for laryngeal cancer was consistent amongst the studies reviewed.
- Excess risks were found in a few studies for cancer of the oesophagus, stomach, colon, liver, pancreas, skin, prostate, kidney, brain and thyroid, and malignant lymphoma and multiple myeloma however the results were not consistent overall, for these neoplasms.
- The authors concluded that although the observed risks varied considerably between the studies, the studies overall indicate the presence of a widespread moderate increased cancer risk among the rubber workers, with bladder, laryngeal, lung cancer and leukemia being the most consistent.

**Stomach Cancer in Ontario Gold Miners and findings by the Occupational Disease Panel, August 1996.**

Some generalized conclusions that were made by the Occupational Disease Panel are as follows (taken directly from the report):

- Numerous studies show statistically significant association between a variety of occupations and stomach cancer.
- Dusty work environments are known to be associated with elevated risk of stomach cancer. The action of dust particles may be on of mechanical irritation or disruption to the mucosal lining, permitting acid/mechanical damage or cellular contact with carcinogens.
- There is strong experimental evidence to show and association between certain nitroso compounds and stomach cancer.

TAR POTS

As stated by the former GE employees and Supervisor, there were five molten tar pots which did have exhausts located above them but the exhausts were not in use. Although measurements in terms of hygiene sampling from this department are not available, like industries and processes have been researched and the following was found to be relevant and pertinent to this Report.

As per Kurtz, Verma, Sahai 2003, the following was found with regards to exposure to tar: Coal Tar Pitch Volatiles and PAH's in Joint Making Operations. The following findings are taken directly from the report:

- Coal tar is a viscous black or dark brown material consisting of high molecular weight hydrocarbons and benzene, toluene, phenol, styrene, cresol, naphthalene, and numerous polycyclic aromatic hydrocarbons (PAHs), which can become airborne when heated (Brubacher et. Al., 1997; Chong et. Al, 1989).

As stated by the employees, there were 5 molten tar pots, each of which had exhausts but were seldom used. With this, the employees were inevitably exposed to the fumes and their relative contaminants.

- The International Agency for Research on Cancer (IARC) has classified the coal tar pitch volatiles as a Group 1 carcinogen.(IARC, 1987) Most studies report acute effects, primarily on the skin and eyes. Coal tar, pitch creosote, coke oven emissions, and asphalt exposure can result in the formation of skin tumors and/or lung tumors in animals.
- A recent proportionate mortality study among roofers and waterproofers found workers to have a significant increased mortality for lung and bladder cancers (Stern et. Al, 2000). This group is known to have exposure to asphalt and bitumen products. Boffetta et al., 1997 concluded that heavy exposure to PAHs from coal tar products correlated to a substantial risk of lung, skin, and bladder cancers.

- Due to the potential health effects attributed to coal tar usage, this material has largely been replaced in the Ontario construction industry with asphalt-based materials for road, roofing, and waterproofing work.
- Asphalt has often been confused with coal tar because the two are similar in appearance. However, even limited chemical analysis shows the two substances to be quite different, especially in the proportion of PAHs and known carcinogenic chemical (Chong et. al, 1989)
- Coal tar–based material is known to result in a far greater exposure to PAHs than asphalt-based material (Finkelstein, et al., 2002).

ATSDR, 2004 states the following with regards to PAHs their release during occupational use, and health impacts:

- PAHs are a group of chemicals of which there are 100 different kinds and can be found in substances such as crude oil, coal, coal tar pitch, creosote, and roofing tar.
- The rate at which PAHs enter your body by eating, drinking, or through the skin can be influenced by the presence of other compounds that you may be exposed to at the same time with PAHs. PAHs can enter all the tissues of your body that contain fat. They tend to be stored mostly in your kidneys, liver, and fat.
- Studies of people show that individuals exposed by breathing or skin contact for long periods to mixtures that contain PAHs and other compounds can develop cancer.
- IARC has determined the following: benz[a]anthracene and benzo[a]pyrene are probably carcinogenic to humans; benzo[b]fluoranthene, benzo[j]fluoranthene, benzo[k]fluoranthene, and indeno[1,2,3-c,d]pyrene are possibly carcinogenic to humans.
- EPA has determined that benz[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[k]fluoranthene, chrysene, dibenz[a,h]anthracene, and indeno[1,2,3-c,d]pyrene are probable human carcinogens and that acenaphthylene, anthracene, benzo[g,h,i]perylene, fluoranthene, fluorene, phenanthrene, and pyrene are not classifiable as to human carcinogenicity. Acenaphthene has not been classified for carcinogenic effects by the DHHS, IARC, or EPA.

Polyvinyl Chloride Mixer:

The process described by the employees is best described as a compounding process where the following steps are taken to develop the end product. PVC requires the addition of a number of additives to increase its flexibility, ease of processing, resistance to degradation etc. These additives include: plasticizers, heat stabilizers, lubricants, fillers, impact modifiers and pigments/dyes, which all make the PVC either flexible or rigid. The concentration of additives in the compounding operation can vary from 3% to over 100% based on the weight of the resin (Nelsen, L. et al, 1975). The information provided in this section is taken directly from, European Vinyls Corporation, 2004 and Nelsen, L. et al., 1975.) All information has been added here to confirm the process information given by the employees.

- Hot compounding is used when larger amounts of plasticizer are added to the polymer.

- The PVC resin blend is fed to melt processing or extrusion equipment to produce a homogenous melt
- The melt is cooled and diced into pellets or granules

Polyvinyl Chloride is a chlorinated hydrocarbon polymer and is produced from vinyl chloride, which is used in the form of a gas. Vinyl Chloride Monomer is produced from the raw materials of ethylene and chlorine. Most PVC resins are homopolymers made from vinyl chloride alone. About 15% of the vinyl chloride polymers are copolymers containing vinyl chloride and other monomers with vinyl acetate being the most common comonomer (Nelsen, L. et al., 1975). Vinyl Chloride Monomer is used almost exclusively in the manufacture of various types of polyvinyl chloride resins at polyvinyl chloride resin plants, for the polymerization process. Since this process never consumes all of the available vinyl chloride monomer (VCM), varying amounts of VCM remain trapped in every form of the PVC resin and in every finished product fabricated from the PVC resins. Due to this fact, it is very pertinent to note that the resin that was fed into the molten pot was PVC resin that was heated by pipes which traveled parallel to the PVC resin pipe. Because it is known that PVC resin can contain VCM, it can be stated that the monomer existed in this location of the building, and thus employees were likely exposed to it. Baggett et al. state the following in their 2001 report:

- The residual VCM is present in varying quantities in all raw PVC resin and in all finished PVC products until it is liberated into the atmosphere by "off-gassing" or migrates into food, drink, or other substances stored in containers made of PVC (Baggett et al, 2001)
- There is significant exposure of workers to vinyl chloride in the course of product fabrication, (which includes the pellets that were formulated by the Hansel PVC Mixer at GE.)
- Baggett et al, 2001 also state "even the limited studies that have been conducted demonstrate a clear occupational health hazard for these downstream vinyl workers involved in melting, molding, extruding, and calendaring PVC into thousands of useful finished PVC products."

Nelsen, L. et al. 1975 studied the vinyl chloride monomer emission points from flexible compounding operations that assist in realizing that vinyl chloride monomer are inevitably released when working with PVC resin and fabricating PVC products.

Experiments by resin and compound manufacturers appear to show that upon addition of the plasticizer and additives, most of the residual monomer is released.

- Minor amounts of VCM are emitted at later points of the compounding operation, notably in the processing of the melt and after the melt mixers
- The author gives a rough bulk estimate of VCM release as the following:
- Taking as a very rough average a net emission from the entire coating operation of 300 parts of VCM per part of resin processed in 1974, the

emissions from a 1000 lb per hour extrusion line would be 0.3 lbs per hour of VCM or 3.3 kg/day or 7.2 pounds/day.

Health Effects:

It is also important to note, that there were a select few employees who "manned" the PVC Mixer at GE. With this in mind, there were few employees that were directly involved but more that were indirectly involved, as there were poor engineering controls and thus contaminated air in the areas that the employees worked in, including the crane drivers.

- The most commonly recognized vinyl chloride related cancers include primary non-angiosarcoma liver cancer, primary brain cancer, lung cancer, lymphoma, and cancers of the blood and blood forming organs.
- **It is pertinent to note that the most commonly unappreciated adverse health effect associated with vinyl chloride exposure do not involve cancer…these non-malignant diseases are probably often obscured by their non-specific nature such as, autoimmune disease, arthritis, dermatitis, idiopathic sclerosis and even carpal tunnel syndrome (the authors also mention the following in this 2001 report: raynaud's syndrome, scleroderma, acroosteolysis). These findings are supported by Lewis R., 1999, as well. Halama, J et al., 1985 add the following to this list of health effects: neurological and psychiatric disease and chromosome abnormalities as well as abnormal liver metabolism and haematological findings.**

**The ATSDR, 2004 list the following health effects related to exposure to vinyl chloride monomer:**

- People exposed to vinyl chloride for several years have changes in the structure of their livers and nerve damage
- The lowest levels that produce liver changes, nerve damage and immune reaction in people are not known
- Animal studies have shown that long-term exposure to vinyl chloride can damage sperm and testes.
- Increased risk of liver, brain, lung cancer and cancer of the blood
- OSHA has set an occupational exposure limit to this carcinogen at 1 part vinyl chloride per 1 million parts of air.

An Italian Study by Gennaro et al, 2003 found the following:

- The authors used other blue collar workers as the internal reference group, rather than compare PVC workers to members of the general public

- The authors found among PVC workers significantly increased mortality from all causes of death, all tumors, lung cancer, lymphomas, leukemia's and liver cirrhosis.

In 2002, Wong et al. found that polyvinyl chloride workers may experience a higher risk of developing liver cancer particularly heptocellular carcinoma.

Wong et al., 2003 – performed a study in Taiwan workers:

- Workers without a history of chemical exposure but who were infected with Hepatitis B had a four fold increase in angiosarcoma
- Workers free of the virus but with vinyl chloride exposure experienced a 26 fold increase in angiosarcoma
- The highest risk was found among workers both exposed to the virus and to vinyl chloride. The risk of the workers for liver cancer was elevated by a factor of 396 where smoking, alcohol consumption and medical history were all accounted for
- This study shows that vinyl chloride is a more powerful liver carcinogen than hepatitis B, which is a well-known cause of cancer (Steingraber, S. 2004).

Pirastu et al., 1990 studied the possible association in humans between nonangiosarcoma primary liver tumors, namely hepatocellular carcinoma and exposure to vinyl chloride monomer

The authors found that the association (mentioned above) is supported by both experimental and human data

- The article presents a review of information from 7 VCM/PVC manufacturing plants and one extruding plant
- Retrieval of clinical and pathological data in addition to the information from death certificates is refereed to as BEST EVIDENCE (BE). BE was carried out for 63 deaths. A total of 14 primary liver cancers were detected where 7 were angiosarcoma and 2 of the remaining seven were hepatocellulat carcinoma.
- There was no significant difference between the 2 types of diseases in terms of length of exposure and latency
- There was no noticeable difference in job titles as well
- The authors conclude that Vinyl Chloride Monomer may have a broader carcinogenicity action on the liver and that exposure to lower than that occurring in autoclave cleaning can cause primary liver cancer both angiosarcoma and non angiosarcoma.

Falk, H. in 1987 states the following about the Louisville, Kentucky plant in the USA:

- Falk states that upon further investigating, the relative risk for Hepatic angiosarcoma (HAS) at this plant appeared to be approximately 5000 – strongly indicating a casual relationship with working in the plant
- Epidemiological studies at this and other PVC polymerization plants identified Vinyl Chloride Monomer as the causative agent
- Experimental studies in 1974 confirmed that VCM is a hepatic carcinogen capable of producing HAS and other tumors.
- Follow up epidemiological studies reveal that HAS is the end stage of a progressive liver disease consisting of hepatocytic and sinusoidal cell hyperplasia, sinusoidal dilatation, and hepatic fibrosis

The U.S. Department of Health and Human Services, National Toxicology Program-2001 reports the following health effects of exposure to Vinyl Chloride Monomer:

- When inhaled VC can induce pulmonary adenomas, adenocarcinomas, mammary adenocarcinomas, liver angiosarcomas, and angiosarcomas and adenocarconomas at other sites in mice of both sexes
- Inhalation of VC induced Zymbal gland carcinomas, nephroblastomas and liver angiosarcomas in rats of both sexes and mammary tumors and hepatocellular carcinomas in female rats

Hardell et al. research occupational exposure to PVCs as a risk factor for Testicular Cancer, 1997

- Occupational exposures were assessed in a case-control study on testicular cancer using self-administered questionnaires. In total answers were obtained for 148 cases and 315 controls. 101 had seminoma and 47 had embryonal testicular cancer
- An increased odds ration was found for exposure to PVC with and OR of 6.6(95% confidence interval 1.4-32).
- The median latency times was 22 years
- The authors state that this case control study of testicular cancer yielded a high risk for exposure to PVC plastics
- The results for this study are stated by the authors to be regarded as hypothesis generating and warrant further studies

In 2000 Ohlson and Hardell continue to study Testicular cancer and exposure to PVC's with the focus on xenoestrogens in PVC plastics:

- The agents tested for oestrogenic properties are phthalates, bisphenol A and nonylphenols. The phthalates found to have strong oestrogenic potencies are butyl benzyl phthalate (BBP) and di-n-buty phthalate
- DEHP (di-(2ethylhexyl)phthalate was found to have weak, if any oestogenic effects
- Bisphenol A was found to have oestrogenic potency higher than that of phthalates

The potential for exposure to vinyl chloride monomer is high during the process of polymerization to form PVC resins or other materials, because vinyl chloride monomer may escape into the air (NCI, 1978). The national Occupational Exposure survey, 1981-1983 – estimated that 81,314 workers potentially were exposed to vinyl chloride (United States) (ATSDR, 1997).

ASBESTOS CARDING – this section on Asbestos provided by Barry Lam of OHCOW.

Asbestos is a commercial term given to a group of six different, naturally occurring, fibrous minerals: amosite (brown), chrysotile (white), crocidolite (blue), and the fibrous varieties of tremolite, actinolite, and anthophyllite (gray). The latter three are also found in nonfibrous forms. Under pressure, the fiber bundles tend to split longitudinally forming long thin fibers with high length-to-width aspect ratios. These minerals have been used extensively in the past because of their high tensile strength, flexibility, chemical and physical durability and fire resistant properties.

In North America only amosite, chrysotile and crocidolite have industrial uses. Chrysotile makes up at least 95% of all natural fibers used in Canada. Crocidolite and amosite, which is imported from South Africa, make up the remaining 5%. Anthophyllite is used and mined in Finland only.

It is well established that occupational exposure to asbestos is associated with asbestosis (pulmonary fibrosis), increased risk of lung cancer, mesotheliomas of both pleural and peritoneal tissues, and pleural plaques. Several studies also showed an excess of gastrointestinal and laryngeal cancer in shipyard workers.

Despite the known health risks associated with workers in mines, from 1964 to 1973 world production of asbestos reached 4.8 million tonnes – Canada accounting for approximately 30% of that total. However, there does appear to be a steady decrease in production from 1979 to 1983. Asbestos was used for various industrial applications such as electrical and thermal insulation, brake linings, gaskets, and clutch facings; and as filler material in various consumer products like paper, paint, cement, and asphalt.

There are few studies that monitor the occupational exposure levels to asbestos. It is clear that past and present occupational exposure will have greatly changed over the years. This is a likely result of several factors such as improved engineering controls, sample collection, and sample analysis. As expected, workplace concentrations were very high before monitoring was first implemented around the 1930s. After recognizing the high dust concentrations, engineering controls were being implemented to reduce dust levels. However, not until after the 1970s, was there recognition and emphasis placed on the health risks associated with asbestos exposure. This is reflected in regulations adopted and the decline of asbestos production in some countries.

Activities resulting in occupational asbestos exposure can be divided into two broad categories. This first involves the production of asbestos through mining and milling. The second is the inclusion of industries that develop and manufacture asbestos containing products. The latter category can be further divided into: asbestos textile manufacturing, asbestos cement production, automotive parts manufacturing, construction and others.

Textile manufacturing is the dustiest of all the asbestos manufacturing processes. Chrysotile asbestos is almost used exclusively in the textile industry since they produce the longest fibers. Fiber preparation involves debagging, fiberizing, and blending. Opening bags of asbestos can be either manual or automatic. The dust emanating from these processes are difficult and costly to control. Asbestos fibers are then passed through a kollergang followed by a creighton opener or willow to further open and fluff the fibers. Once the fibers have been opened, blending the various types and grades of fibers is necessary to make the sheets more uniform. Depending on the process, organic fibers (e.g. rayon and cotton) may be added in the blending stage.

The blended fiber is then fed (either manually or blown) to the card for further processing. The carding process separates fiber bundles and aligns the fibers to produce uniform sheets or laps. The card operates by working, stripping, and brushing the asbestos fibers - similar to the processes in the wool industry. Mote knives and grid bars located underneath the card removes impurities and dusts. The carding process, along with asbestos preparation, generates the most dust into the working environment. To control asbestos exposure the carding process would have to be completely enclosed. Complete enclosures are costly and were likely not fully enclosed because of the need to continuously feed the card with asbestos from the hopper to make rovings (loosely formed yarn) that is later sent for further spinning and twisting to strengthen the yarn.

Nine textile plants in the USA were studied from 1964 to 1965 (Table 1). The sample collection method was on membrane filter.

Table 1. Mean dust concentrations by plant and operation in nine textile plants in the United States during 1964 to 1965 (Lynch & Ayer, 1966)

| Operation | **Fibers (f/cc)** | **Textile Plant** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** |
| Fiber preparation | A | 38.1 | 12.3 | 23.3 | 34.0 | - | 8.1 | 7.6 | 35.5 | 11.8 |
| | B | 15.0 | 10.0 | 13.3 | 18.3 | - | 3.0 | 4.5 | 17.0 | 2.6 |
| Carding | A | 18.1 | 13.6 | 20.6 | 32.9 | - | 6.0 | 17.2 | 28.2 | 8.3 |
| | B | 10.2 | 9.21 | 3.3 | 15.2 | - | 3.5 | 8.1 | 13.4 | 2.0 |
| Spinning | A | 9.6 | 4.1 | 20.2 | 29.8 | - | 5.1 | 24.8 | 20.8 | 7.4 |
| | B | 6.6 | 3.2 | 18.9 | 15.7 | - | 3.5 | 10.8 | 10.5 | 1.8 |
| Twisting | A | 9.3 | 6.9 | 15.8 | 51.4 | - | 4.8 | 25.9 | 16.7 | 3.1 |
| | B | 6.4 | 5.2 | 7.5 | 22.4 | - | 3.3 | 12.9 | 7.2 | 1.1 |
| Winding | A | 11.7 | 4.4 | 9.6 | 28.6 | - | 4.5 | 25.7 | 7.9 | 3.6 |
| | B | 7.5 | 3.9 | 8.9 | 17.5 | - | 3.2 | 11.7 | 2.7 | 1.3 |
| Weaving | A | 7.7 | 7.0 | 2.9 | 33.8 | 4.5 | 2.9 | 9.5 | 8.1 | 2.9 |
| | B | 4.8 | 3.1 | 2.3 | 17.8 | 3.9 | 2.2 | 5.7 | 3.0 | 1.5 |

Note: A = total fibers
B = fibers longer than 5 µm

In a different study (Dement et al., 1983), a chrysotile textile manufacturing plant in South Carolina was part of a retrospective cohort looking at mortality rates. From 1930 to 1975 this plant was under extensive study of dust control measures and occupational exposures by the U.S. Public Health Services. The authors state that the plant was progressive in the application of modern dust control measures that remained almost unchanged from 1940 to 1975. The study provides a detailed history of when and what engineering controls were implemented. Although the sampling technique was through an impinger, measuring fibers by millions of particles per cubic foot of air (mppcf), the authors have adjusted the values to reflect fibers per volume of air. Table 2 was adapted from the journal article.

Table 2. Range of exposure estimates for a chrysotile textile plant from 1930 to 1975

| **Operation** | **Without controls** fibers > 5 μm/cc | **With controls** fibers > 5 μm/cc |
|---|---|---|
| Fiber preparation | 26.2 – 78.0 | 5.8 – 17.2 |
| Carding | 10.8 – 22.1 | 4.3 – 9.0 |
| Spinning | 4.8 – 8.2 | 4.8 – 6.7 |
| Twisting | 24.6 – 36.0 | 5.4 – 7.9 |
| Winding | 4.1 – 20.9 | 4.1 – 8.4 |
| Weaving | 5.3 – 30.6 | 1.4 – 8.2 |

A follow up study to the one conducted in South Carolina demonstrates an overall lung cancer for white males with at least 15 years of latency to have a SMR of 1.97 and an overall non-malignant respiratory disease of 3.11. The risk of lung cancer was found to increase in relation to cumulative exposure to chrysotile asbestos. For the entire cohort there was a risk of 2-3% for each fiber/cc-year. The authors recognize that mortality rates are not the ideal method of tracking non-malignant diseases.

1. IARC [1977]. IARC monographs on the evaluation of carcinogenic risk of chemicals to man: asbestos. Volume 14. International Agency for Research on Cancer. World Health Organization, Lyon.
2. International Programme on Chemical Safety: Asbestos and other natural mineral fibres. Environmental Health Criteria 53. IPCS, World Health Organization, Geneva [1986]
3. International Programme on Chemical Safety: Chrysotile asbestos. Environmental Health Criteria 203. IPCS, World Health Organization, Geneva [1998]
4. ACGIH [2001]. Asbestos, all forms. Documentation of the threshold limit values for chemical substances 7th Edition: Asbestos. American Conference for Governmental Industrial Hygienists. Cincinnati, OH.
5. ATSDR [2001]. Toxicological profile for asbestos. U.S. Department of Health and Human Services. Public Health Services. Agency for Toxic Substances and Disease Registry. Atlanta, GA.
6. Goldfield J. Asbestos manufacturing. Chapter 10. Cralley LV., Cralley LJ. In-plant practices for job related health hazards control. Volume 1. Production processes. John Wiley & Sons. New York [1989]. pp. 123-148
7. Lynch JR., Ayer HE. Measurement of dust exposures in the asbestos textile industry. AIHAJ. 1966; 27: 431-437

8. Dement JM., Harris RL., Symons MJ., et al. Estimates of dose-response for respiratory cancer among chrysotile asbestos textile workers. Ann occp hyg. 1982; 26: 869-887
9. Dement JM., Harris RL., Symons MJ., et al. Exposures and mortality among chrysotile asbestos workers. Part 1: Exposure estimates. Am J Ind Med. 1983; 4: 399-419
10. Dement JM., Harris RL., Symons MJ., et al. Exposures and mortality among chrysotile asbestos workers. Part 2: Mortality. Am J Ind Med. 1983; 4: 421-433
11. Dement JM., Brown DP., Okun A. Follow-up study of chrysotile asbestos textile workers: cohort mortality and case-control analyses. Am J Ind Med. 1994; 26: 431-447
12. McDonald AD., Fry JS., McDonald JC. Dust exposure and mortality in an American factory using chrysotile, amosite, and crocidolite in mainly textile manufacture. Br J Ind Med. 1982; 39: 368-374

LEAD PRESS:

- Lead had been tentatively linked with cancers of the lung, brain, stomach and kidneys. (Cocco, 1998; Hayes, 1997; Lundstrum, 1997)
- Carcinogenicity: None of the substances in this product are confirmed as human carcinogens at this time by NTP, IARC, or OSHA. IARC classifies lead and some lead compounds as 2B carcinogens to humans. ACGIH lists as lead as A "A3", (animal carcinogen with unknown relevance to humans).
- Most of the evidence on the relationship between lead exposure and cancer comes from 8 studies of workers with high levels of occupational exposure to inorganic lead. All 8 studies of highly exposed workers reported results for lung cancer, with 2 showing increased risks at least 50% higher than people not exposed. However, the results were highly dependent on one study where a 3-fold excess risk of lung cancer was found. Workers in the highest risk study had been possibly exposed to arsenic as well as lead in the early years of plant operation. Since arsenic is known to cause lung cancer, it is not clear whether the observed increase in lung cancer is due to lead, arsenic, or the combination of the two. More studies are being done to find out if lead or arsenic is responsible for the increase. Without the one highest risk study, all studies combined estimate the risk of workers exposed to lead at about 14% higher than unexposed persons. And, these studies could not determine whether this increase was due to lead exposure or occurred because the lead-exposed workers tended to smoke more than the comparison groups (Steenland and Boffetta, 2000).
- Eating, drinking, and smoking should not be permitted in areas where solids or liquids containing lead compounds are handled, processed, or stored.
- Lead harms the peripheral nerves causing weakness and sensory disturbances
- Wrist weakness is a common symptom among persons with sever lead poisoning.
- Kidney damage, bone marrow damage, reproductive toxicity gastrointestinal difficulties and bone and joint pain are all related to exposure to lead and it's health effects as per the American Cancer Society: Lead;, 2005)

In terms of the emissions from the lead press, the following findings from OSHA demonstrate the various emission points, from which lead can be released in the workplace thus induce employee exposure: www.osha.gov

- Lead particulate may become airborne due to updrafts created by thermal rise from the surface of the refining kettle during preheating and cleaning.
- Lead fumes or particulate may be emitted from the surface of the molten lead during the transfer of lead to the kettle and from the kettle during melting, adding refining agents, and stirring of molten alloy. Lead emissions may occur while drossing lead kettles.

ROYALENE

Royalene was the trade name utilized for trichloroethylene (TCE), throughout the plant at GE. In the wire and cable department royalene was utilized within the wire shaving process. The royalene (TCE) was described as being very toxic by the employees and the vapours were unbearable. (see Appendix E).

Generally speaking, Trichloroethylene is utilized as a metal degreaser, as a raw material to make other chemicals, as a cleaner in electronics manufacturing and for all sorts of general solvent purposes such as in paints, paint strippers and adhesives (HESIS, 1997). The TCE was utilized in the shaving operations, as a coolant. It was mixed with a soap detergent (information not available) and as per the employees was made more "workable" when mixed with the soap detergent with regards to odor. The TCE would have splashed and misted with the shaving operations, so the employees exposure would have been incurred via, dermal uptake and inhalation.

As per the HESIS, 1997 review:

- TCE enters your body when you breathe it's vapours in the air
- Absorption can occur through the skin, lengthy skin contact, or if skin is cut or cracked
- Overexposure to TCE effects the central nervous system
- TCE causes cancer in mice and there is some evidence that it may also be a weak carcinogen in rats.
- HESIS states that TCE should be treated as a likely cause of human cancer.
- HESIS also states that one should not rely upon your sense of smell as a warning indicator that TCE is present. One's sense of smell becomes dulled after being around TCE for a short period of time. Measuring the amount of solvent in the air is the only reliable way to determine the exposure level.
- Due to the fact that TCE vapours are heavier than air, they can settle into pockets and depressions (such as open Vats) and reach very dangerous concentrations.

With this in mind, it is pertinent to note that the royalene and soap solution were captured in drip trays, fed into a system which was then pumped back to be used for the shaving processes. There may have been build up of trichloroethylene vapours in the process as well as the processes of handling the trichloroethylene during mixing processes. (Appendix, E).

Moreover, the employees did not wear an personal protective equipment to protect from exposure to the vapors or misting. With the shaving operations, there would have been ample misting, due to the nature of these operations in general, and thus dermal and respiratory uptake of this contaminant cannot be overlooked.

SOLVENTS AND SOLVENT MIXTURES:

There were a multitude of solvents utilized in the various processes as already described, as well as thinning agents and cleaners. The following documents reflect on the use of solvents as mixtures and the inherent health effects associated with their use.

Maier, H. et al., found the following in their 1997 report:

- A Case control study was reviewed which enrolled 369 patients with carcinomas of the upper aero digestive tract and 1476 randomized control subjects, the relative risk of head and neck cancer in patients exposed to paint, lacquer and varnish was analyzed.
- The relative risk (RR) of squamous cell cancer (after adjustment for possible alcohol and tobacco effects) was significantly increased for the larynx (RR = 2.3) and the oral cavity (RR = 3.6).
- The risk was not increased for the pharynx.
- The authors state that there is evidence that chronic exposure to paint, varnish and lacquer is a definite risk factor for cancer of the upper aero digestive tract. Further studies are required to confirm these findings, and to identify more precisely toxic substances encountered in the workplace.

Lynge et al. 1997 found the following with regards to exposures to solvents:

There is evidence for increased risks of cancer following exposure to: trichloroethylene (for the liver and biliary tract and for non-Hodgkin's lymphomas); tetrachloroethylene (for the esophagus and cervix--although confounding by smoking, alcohol, and sexual habits cannot be excluded--and non-Hodgkin's lymphoma); and carbon tetrachloride (lymphohematopoietic malignancies).

A causal association between exposure to benzene and an increased risk of leukemia is well-established, as well as a suggested risk of lung and nasopharynx cancer in a Chinese cohort.

Occupation as a painter has consistently been associated with a 40 percent increased risk of lung cancer. (With the mixed exposures, however, it is not possible to identify the specific causative agent[s].)

Park et al., 1988 state the following:

- Deaths of 200 men and 75 women at an electronics fabrication facility were studied.
- Exposures at this facility included halogenated solvents, epoxy resins, and a variety of polymerizing systems.
- Excesses of pancreatic cancer were identified in both men and women. For the women, excesses of colon and ovarian cancer were also noted.

With regards to solvents and solvent mixtures, it is pertinent to note that benzene has often been cited to be present in trace amounts in petroleum and aromatic solvents, e.g. toluene. With this in mind, solvents such as toluene or xylene that were utilized as thinning agents in various processes, as well as cleaning agents, for hands and forearms, (as stated by the employees), could have also contained trace amounts of benzene, as the literature indicates. As per OHCOW's fact sheet on Xylene exposure, any future epidemiological observations of cancer risks associated with xylene or toluene would have to take account of suspected effects of benzene impurities (see Appendix H – Fact Sheet on Xylene).

BENZENE EXPOSURE:

Benzene is a designated substance in Ontario. It is known to cause the following health impairments due to chronic exposure such as (taken from OHCOW fact sheet of Benzene, See Appendix I – Fact Sheet on Benzene)

- Leukemia
- Anemia
- Lymphoma
- Thrombocytopenia
- Leukopenia
- Chronically exposed workers have a 5-10 fold increase in developing leukemia which develops after a latent period of 10-15 years.

Though Benzene exposure limits were established by various regulatory agencies, trace amounts can be found in various solvent mixtures such as toluene, (see appendix I). It has been stated repeatedly that employees dipped their hands in MEK, toluene, xylene 5 gallon pails to wipe their hands of workplace contaminants as well as cleaning equipment. Furthermore, many of the epoxies and other components in the department were also thinned with various solvents which may have contained trace amount of benzene, such as varsol. Hence exposure to benzene may have been in the form of dermal as well as respiratory exposure. Furthermore, due to the fact that employees ate at their workstations, ingestion is another form of exposure that cannot be ruled out.

***Methyl Ethyl Ketone (MEK):***

Methyl Ethyl Ketone was utilized on a regular basis by employees. It was stated repeatedly that employees would dip their hands into the MEK buckets so they could remove any paints or other chemicals from their hands as well as to remove nail polish for leisure purposes. MEK was also utilized to clean parts and equipment. Employees would dip rags into the buckets and thus be exposed to MEK via dermal uptake.

Alternkirch et al in 1979 studied the neurotoxicity of inhalation exposure to MEK. Rats were exposed for 15 weeks to vapor concentration of 10000 pp MEK and other solvents such as n-hexane and MEK. The authors found and concluded that the addition of a small amount of MEK to n-hexane in a ratio of 1 to 9 parts, produced marked neurotoxicities, with a short onset time for morphological and clinical signs.

Welch et al. in 1991 studied a case of chronic neuropsychological and neurological impairment following acute exposure to a mixture of toluene and MEK. A 38 year old male laborer had spray painted a truck on

2 separate occasions in an enclosed unventilated 30 by 20 foot space. The paint contained toluene and MEK. Total exposure time was 24 hours. The painter wore only a thin fibre mask that covered his mouth and nose, experienced, nausea, headache, dizziness, wheezing and cough after each exposure. It was found that 2 years later, the motor memory and emotional deficits still persisted but stabilized. The authors concluded that the patient suffers from toxic encephalopathy with dementia and cerebellar ataxia resulting from acute exposure to toluene and MEK.

Effects of Methyl Ethyl Ketone, is a significant contributor to CNS Damage. As per the Canadian Centre for Occupational Health and Safety, 3-5 minute exposure to methyl ethyl ketone (MEK) vapours produced slight nose and throat irritation at 100 ppm and definite nose and throat irritation at 350 ppm. Higher exposures are expected to cause central nervous system depression with symptoms such as headache, nausea, dizziness, drowsiness, and confusion. In terms of skin effects repeated or prolonged exposure can cause dermatitis and whitening of the skin (CCOHS: Methyl Ethyl Ketone, Dec, 1997)
Numerous case reports indicate that neurological effects resulting from high exposure to MEK in combination with other solvents is evident. Animal studies have confirmed synergism between MEK and various other solvents. Principle target organs include, the central nervous system, liver and lungs (CCOHS: Health Effects of Methyl Ethyl Ketone, Dec.1997.

## 7. DOCUMENT REVIEW

**Date: 1980, October 20, 21**
**Subject: Report on Industrial Hygiene Survey Conducted at CGE Peterborough**
**Addressed To: Mr. Lorne Read, Peterborough**

This report, although an Armature Department Document, is inserted herein to demonstrate that benzene was present in this facility, as per the Hygiene Sampling. This report was conducted to measure the quantity of materials emitted from Oven #2 during curing of epoxy resins on a large stator in the ARMATURE Department. This evidence is utilized herein to demonstrate the fact the findings in the Hygiene Report indicate that benzene, toluene and other major chemicals were found upon laboratory analysis. Samples were taken to review the exposures from Oven #2 in the armature department with regards to epoxy resin exposures. The results indicate that benzene was found.

Furthermore, this report however is not considered valid in it's entirety as it is not clear where the samples have been taken, what the variables were at the time of sampling, were there any safety members present during sampling or even employees to indicate where the actual complaints were coming from, was the sampling time, time of day appropriate to capture the worst case scenario of the contaminants, how long had the ovens been running prior to the time samples were taken etc. Without this information it can be stated that the benzene, toluene levels and levels for the other contaminants could have been much higher in concentration even exceeding occupational exposure limits to say the least at this time. (APPENDIX G)

**Date: 1978, January 24**
**Subject: PVC Mixing Equipment, Building 26, Bay 1129**
**From: R.F Hurrie, Supervisor, Facilities Engineering**

This letter identifies the following concerns with regards to the PVC mixing operations:

- significant amounts of PVC powder are released to the general building air when mixing PVC
- it is necessary to provide remedial action, so that area employees are not subjected to this PVC dust
- Nuclear products, concerned about the welfare of their employees are also concerned about the dust in the welding area, as undesirable chlorine will be generated in the welds.

The document above clearly indicates that excess dust was generated from the PVC mixer and mixing activities. Not only were the employees working around the PVC mixer affected, the welding operators were also being affected, as the document above lists. Please note the document is dated 1978, hence it can be stated that conditions may have been worse prior to the advent of the health and safety act and prior to this period. If conditions were such that dust was released into the air during PVC mixing, it is justified to state that the conditions prior to this would have been much worse.

**Date: 1979, February 2**
**Subject: Accident/Fire**
**From: Various Witnesses statements to the Fire/Accident**

The following information is provided with regards to a fire which occurred in 1979 at top of the enameling ovens in wire and cable. An employee was caught on fire on the catwalk. The employee was either troubleshooting or cleaning one of the sheaves with a solvent such as varsol, which may have ignited the elements in the oven and thus caused the fire to occur.

- "Machine 3-I was to be changed from heavy wire to light wire and had to be overhauled before we ran the fine wire which includes cleaning and checking all the sheaves so they will properly process the wire"
- Fire at the 3-I enameling oven

**Employee testimonies:**

**"I could see the fire shooting across the upper sheaves and someone yelling"**
**"The electric oven is never shut off even for vacation time…."**
**"I went to go help the employees…R.Farley's pants were still smoldering…"**

**Date: 1978, September 5**
**Subject: Dust Control at the Banbury**
**From: AK Faggetter, Specialist, Safety, Employees and Community Relations**

This document is provided as evidence indicated that the Banbury operations emitted excess dusts. The engineering controls were not working efficiently and thus employee exposure to the contaminants can be stated to have been "likely to have been incurred" during this period as well as periods prior to this event.

- …I have reviewed the dust control at the banbury and found conditions ranging from excellent to completely unacceptable
- ….of the 6 dust generating points, two were excellent; banbury rolls and loading and two were inadequate; platform weigh up and main floor weigh up and two were unacceptable with reverse flow of air; bag disposal and main floor hood
- .."until proper dust control is obtained will you please immediately close the hole in the wall which is used for bag disposal.

As already discussed in previous sections of this report, epidemiological studies and general research have shown that without proper controls, dust is generated at Banbury and Rolling mills. Even in the event of proper controls, without proper maintenance of these controls, and proper monitoring of them, contaminants can still be generated and the employees exposed. With the evidence given above, it is clear that dust was generated at the Banbury operations. Moreover it should be noted that the paperwork generated here is in 1978, and conditions may have similar if not worse, prior to this letter.

**Date: 1979, May 8**

**Subject: Banbury Dust Control**
**From: AK Faggetter, Specialist, Safety, Employee and Community Relations**

- ….the dust control at the Banbury has been a long standing problem
- ..The problem was identified in 5th September, 1978.

**Date: 1979, May 16**
**Subject: Banbury Dust Control**
**From: AK Faggetter, Safety Specialist**

- …the observed condition of the operator, who was covered in dust as a result of working at this floor weigh-up station, indicated the immediate need for improved dust control at this station

The fact that there was clear evidence of an employee, as per the above statement, being completely covered in dust, indicated how poor the dust control was at the banbury, and helps quantify the amount of dust possibly inhaled and ingested by the employees. This is a snapshot of conditions of 1979, however, conditions are presumed to have been worse prior to the Act and safety consciousness in the plant.

## 8. MINISTRY OF LABOUR EVIDENCE FIELD REPORTS

**The following are some key documents that provide further evidence to the information given herein with regards to conditions in the workplace and findings therein. The documents confirm the presence of certain substances, the poor safety/hygiene conditions in the workplace, hygiene reports that confirm high levels of asbestos fibres for example or other contaminants approaching the TLV or exceeding them, and thus confirm that the workplace was a source of exposure for the illnesses incurred by the workers over the years. It is pertinent to note the date of the reports cited here. If problems related to engineering controls, or the use of toxic products was made evident in the 1970's for example, one can stipulate that conditions would have been worse years prior. This statement is made by many of the inspectors in the documents that are provided herein for your review and proven by the documents presented here from the late 1940's through to the later 1960's as well. All information provided here is taken directly from the reports. The reports are also available for full review in Appendix K. For purposes of ease of referencing, each document is given a numerical value so that they can be found easily in Appendix K. All documents provided herein are of value and clear concrete evidence of non-conformances and confirmation of exposures. In light of the length of this report, all relevant data required to be highlighted is not provided in the body of this document. Please refer to appendix K to read the reports in full.**

***Appendix K – Document #1***
***Ontario Department of Health: Environmental Health Branch***
***Plant Visit Report: September 15, 1966***
***From: Mr. H.M. Nelson***
***GE Contact: Mr. F. Heilenbrummer, Plant Engineering***
***Mr. T. Lister, Specialist Safety***
***MR. L. Foord, Manager of Manufacturing Engineering et al.***

The evidence in this report confirms the following ( taken directly from the report):

- **asbestos is applied to special wire for application in stoves, heaters etc**
- **the asbestos is carded to a very fine fibrous stage and then rolled or twisted on to the wire**
- **the local exhaust rate is very low to prevent drawing the fibres into the system – as a result fibres escape and settle on machines, floor etc.**
- **at the time of the visit, there were indications that housekeeping needed drastic improvement, and that improved control measures be applied**
- **THE OPERATION WAS NOT GOING AT THE TIME OF THIS VISIT**
- **Recommendation at this time, housekeeping shall be improved in the asbestos carding and insulating area**

Due to the fact that the inspector did not observe the process in operation, comments on the lack of exhaust or poor engineering controls or poor operator practice could not be made accurately at this time. However, with the evidence of the vast amount of fibres present in the area and on the machinery, the process speaks for itself, in that the engineering control were not providing a safe work environment with regards to the fibres being captured.

***Appendix K Document #2***
***Ontario Department of Health: Environmental Health Services Branch***
***Field Visit Report: July 26, 1971***
***From Mr. H.M. Nelson***
***GE Contact: Mr. D Able***

In this report, Mr. M Nelson refers to a report completed by Mr. Gyan Rajhans that was completed in January 1971. This report is a thorough analysis of the products used and the processes in which they are used. The report is discussed in Document #9 below. However, Mr. H. M Nelson appears to have made an error in quoting Mr. Rajhans, P.Eng of the Ontario Department of Health, in the area discussing the HiSil, Talfil and Pyrax. There is a discrepancy noted here which is repeated throughout the years with regards to Talfil. In January 1971, Rajhans indicated that Talfil is very toxic and has properties similar to asbestos, with a free silica content of 66.9%. However, over the months/years as indicated in this July 26th report in 1971, that fact does not come out clear in the report, and talfil is labeled as mildly toxic? There is ample confusion in the documents with regards to this. However, a laboratory report indicated the free silica content of Talfil (indicated in January 1971 (#9 – Appendix K) is 66.9% Please note in red font below.:

The evidence in this report (July 26, 1971) confirms the following – taken directly from the report:

- Heavy duty and other special wires are made in Wire and Cable Department for insulation including cotton, PVC, rubber, asbestos
- Much of the applications depend on the extrusion of PVC or other resins or rubbers
- It is difficult to determine types of powder used at any given operation.
- It is known at least five powders are used and it is probable that several others are used – what is used seems to depend on the operations to a certain extent
- Fours samples were obtained from original bags located in the stores and the following was found:
- HiSil and Pyrax A have high crystalline silica content and must be considered as toxic
- Talfil 325 is fibrous type of talc and therefore exhibits toxic properties similar to asbestos. (Mr. Nelson might have misquotes Mr. Rajhans here as in January 1971, Mr. Rajhans indicated that Talfil contains about 66.9% free silica. And Pyrax contains about 65.8 %free silica. **So in fact there appears to be 3 highly toxic ingredients here. (the lab results showed Talfil contained 66.9% free silica- Document #9)**
- Air sampling in April show no very high concentration of dust, but suggested further sample be taken when all operations were going. Then sampling in June showed some high dust counts. **It is important to note here, from a hygiene point of view, without being given any information on the conditions at the time of sampling or letting the reader know if all machines were in operation or not, it is safe to say that the results in April could have indeed been high if all machinery was in operation. It is difficult to determine this without any of that information.**
- With regards to Braiding Machines: there were 6 braiding machines for putting a cotton braid on the twisted wires. These machines have no local exhaust
- Recommendations and comments at this time:
- In terms of housekeeping, there are still a large amount of settled fibres on the machine and to a small extent on the floor, especially at the braiding machines and #31 machine
- fibres are difficult to control, because if too high an air velocity is used some of the material is lost to the exhaust systems. A balance must be maintained though between adequate control for health reason and too much velocity. Too little control was applied at the carding on #32 and #130. At the twisting operations, a turbine effect is created tending to blow air away from the exhaust hoods.
- At the large carding operations #32, the wire was carried over pulleys and around corners with each contact some fibres were given off. An attempt had been made to control the fibres by 2 new hoods. There still appears to be considerable escape. Air samples at this machine in June showed up to 10 fibres/cc one of the highest counts recorded by the laboratory recently.

- In summary equipment is inadequate. More adequate enclosure is needed for all machines with perhaps moderate increases in exhaust rates. Housekeeping requires improving and respirators at present should be worn by employees.

***Appendix K Document #3***
***Ontario Department of Health: Environmental Health Services Branch***
***Field Visit Report: September 28, 1971***
***From: Mr. H.M. Nelson, P.Eng.***
***GE Contact: Mr. D Able, Safety Specialist***
***MR. G. Hansen, Safety Analyst***
***MR. L.J. Foord, Manager, Manufacturing et al.***

The evidence in this report confirms the following:

- the wire and cable department had a variety of powders that are used on rubber and plastic wire to prevent sticking
- zinc stearate, talfil 325, mica, HiSiL and Pyrax confirmed to be used in these operations
- HiSil and Pyrax considered to be highly toxic due to their silica content
- Suggested to discontinue use of the 2 highly toxic ingredients (this report does not mention Talfil again….therein lies some confusion – for such a highly toxic product – Refer to January 1971 report by Rajhans – Document #9 in appendix K.
- Recommendations for PPE and engineering controls were made here. In terms of compliance to those recommendations there is no evidence here

There were more discussions with regards to the carding operations and asbestos. The field officer noted the following:

- This is a dust producing operation with the rotating brush acting as a small blower to blow dust away from the local exhaust hood.
- The carding operations are high speed dust produces that are difficult to control. The present hoods which would be adequate for most dusts, do not efficiently remove the asbestos fibres
- More complete enclosures are recommended to be built for the various carding and twisting machines

All in all it should be noted that this field visit took place in 1971. Prior to this visit, the report cited herein was 1966. No changes were made that indicates that the conditions were ameliorated in the Asbestos carding area from the 1966 visit through to the 1971 visit. The Wire and Cable department was in operation from 1945-1982. With this information, it is clear that if conditions were questionable in 1971, conditions must have been worse in the years prior to this date. This is confirmed by the 1966 visit report, and thus one can also stipulate that the conditions would have been worse years prior. This reports clearly confirmed the use of asbestos as well.

***Appendix K Document #4***
***Ontario Department of Health Environment Health Branch***
***Field Visit Report: May 7, 1968***
***By: H.M. Nelson***
***GE Contact: Mr. D. Able, Mr. C. Durant, Mr. E Gregson***

Hazard: Lead

- Housekeeping in this area is poor. Thick layers of dust were noted on the control cabinet and lead plates were strewn around the floor

- On the pot operating platform there were 3 overfilled dross buckets
- Several paper cups were noted in the area and remains of food such as orange skins were seen in the scrap drums (**confirming that people at ate the job locations**)
- It was recommended at this time that local exhaust be applied to the drossing operations.

### *Appendix K Document #5*

Refer to Appendix K for the following document: Document labeled Report # 13175, Dated May 31, 1968 from Mr. M Polny There is no mention of the conditions during sampling, i.e. whether the processes were in full operation, if ventilation systems were operable or not, were employees present during sampling, where exactly were the samples taken and was the equipment calibrated and how?. Without this information, the data presented herein is questionable. As per the document cited above, i.e. .#4 – on May 7 1968 - there were layers of dust noted on the controls cabinets, poor housekeeping, there was a recommendation for local exhaust etc. With this information, one would expect that lead would indeed be detected via sampling if the housekeeping conditions were poor, and the lead settled dust was evident in the various areas.

The following document is of critical concern as there are marked discrepancies and thus under reporting of exposures with regards to the following items:

### *Appendix K Document #6*
### *Ontario Department of Health: Occupational Health Laboratories*
### *Report # 14436, Date April 27, 1971*
### *From C. Rhodes*
### *GE Contact: Mr. D Able*
### *Mr. G. Hanson*

**FIRSTLY THE WRITER MENTIONED THAT TALFIL WAS NOT SAMPLED FOR AS IT WAS " NO LONGER USED BY THE COMPANY" However this information is erroneous as when the Officers of the Department of Health visited the plant on July 7, 1971 ( report dated July 26, 1971) it was clearly stated and documented that the following materials were definitely used in the plant:**

**MICA**
**HISIL**
**PYRAX A**
**TALFIL 325**
**ZINC STEARATE**

**Moreover again in September 1971, when the Officers of the Department of Health visited the plant once again, they indicate that " ……TALFIL 325 would be difficult to control ( in terms of exhaust) and that the operator is suggested to wear an approved respirator.:"**

**With this information, it is clear that the author/hygienist of the April 27, 1971 report was either given erroneous information or documented erroneous information in this report and thus miscalculated the degree of exposure to toxic substances within the department at the time of sampling.**

Air samples were taken in various location of the plant. Of the samples taken, the following are brought to the reader's attention:

MICA DUST: no samples as the process was shut off during the time of the visit – hence the degree of exposure to this dust could not be assessed at this time

PYRAX A: there were 2 machines using Pyrax A, one of which was in operation at the time of our visit. **The location of the sample is mentioned by the author and it was found that 3.6 mppcf of air was detected. As per the report in July 1971, the author found that the air sampled at that time contained 66.8% free SiO2 from the Pyrax A and 97.7 % Free SiO2 from the Hisil Material. With this finding the authors indicates "HiSil and Pyrax A have high crystalline silica content and must be considered as toxic. To express a TLV for the I would suggest 4.5-5.0 mppcf for the hisil and 3.0-3.5 mppcf for the pyrax A. Talfil 325 is a fibrous type of talc and therefore exhibits toxic properties similar to asbestos."**

With this information it is clear that with only one machine running that utilized the Pyrax A at the time of sampling, with a result of 3.6 mppcf with 66.3 % of free silica, the results indicate toxic levels of silica as per the above excerpt. Moreover, the TLV for this product is 3.0-3.5 mppcf. With a result in the April 1971 report of 3.6 mppcf with a free silica percentage of 66.3% how could the author deem that the threshold limit for the dust was in the neighborhood of the TLV when the condition in the workplace were not representative of a normal workday, i.e**. the second machine was not in operation at the time of sampling. Furthermore, the sample results were "slightly above the** TLV" and would be much higher if the second machine was in operation!

Furthermore, the author took more samples with regards to clay and lead phthalate. There is no mention of the conditions in the workplace during sampling, whether all machines were in operation at the time of sampling, what other observations were noted during sampling etc. Without this information, the sampling results come very close to the TLV's at that time. Such as 0.17 mg/m3 of lead found with a TLV of 0.2 mg/m3 for lead. Without the conditions of the workplace at the time of sampling described herein, it is safe to say that the sampling results come very close to the TLV at that time and indeed, without the condition of the workplace mentioned herein, it is also safe to stay that it is quite possible that the condition could have indeed exceeded the TLV if all operations were in well working order the day of sampling.

Often times, the operator's indicated that the exhaust systems were not always operable or put in operation to avoid adding variables to the processes in terms of temperature fluctuations etc. This is no mention here about the ventilation at the time of sampling and this could have greatly affect the results obtained herein.

The author made suggestions that an approved respirator be supplied to the operators at the vulcanized rubber weigh station as well. The operator at the time of sampling was mixing lamp black with catalpo clay at the time. As per the July 26, 1971 report, it was mentioned that…"**exposures can be variable and intermittent. Much depends on the individual operator……powders are used interchangeably in the mixes…..THIS IS WHY A SAMPLE FROM A WORK STATION DOES NOT GIVE A TRUE PICTURE OF THE MATERIAL USED…:"** or the exposures incurred.

Tumbling operation: In this operation an air sample for dust was taken directly beside the tumble mill during the charging and operation. 3.8 million particles per cubic foot were detected. The author states " ….assuming the sand is 100% free silica, the TLV for this dust would be 2.4 million particles per cubic foot of air" The author mentions that the employee was wearing a respirator at the time of sampling and that the employees only work there for a few minutes per day. With this information and taking human nature into account (which must not be overlooked in this argument), as for the respirators, the OHCOW writer was told were not worn by employees. Moreover, the question of why the operator waswearing a respirator for a 5 minute job does not fit the profile of safety behavior in the plant. Could it be that due to the sampling being conducted by the Department of health,. ***Conditions in the plant were ameliorated that day, including safety behaviours? This is not a statement of truth, but a logical question that must be asked by all parties reading this Retrospective Exposure Profile, given the testimonies and accounts with regards to the Safety behaviours of the employee and the employees.***

Samples for asbestos fibres were taken beside the carding machines, near the feed end and one sample at the twister machine. However, the author indicates that a large car machine located in the same area was shut down for repairs during sampling. With this information and the information we know from the processes and testimonies given by the former GE employees and supervisor, the results obtained for the asbestos samples are considered, not applicable as they are not representative of a typical work day in this department. The reason this is stated here is that that author of the hygiene report indicates that the air samples detected no fibres. This is hard to believe given the lack of proper controls and given the conditions that the employees worked in and given the reports of January 1971, of how the company had no proper awareness of the degree of hazard and toxicity that asbestos has on human health. Without proper engineering controls, that were not present in this year, this made evident by the reports, it is very difficult to believe the results presented here, as the conditions were always so poor. Unless not all machines were in operation at the time? With 500 pounds of asbestos used per day, how could one not find any asbestos fibres detectable upon sampling? If you continue to read the documents presented herein you will note that there has been a constant concern by the ministry inspections with regards to the engineering controls, and lack of proper capturing of fibres all the way to 1973!!!! See Appendix L for a freehand look at all the MOL documents reviewed herein on a Timeline.

***Appendix K Document #7***
***Report from – L. J. Foord, Manager - GE Manufacturing Engineer for Wire and Cable***
***To: H. Nelson et al.***

***This document acknowledges the recommendation made by the officers of the Department of Health to GE management with regards to condition and changes required in the Wire and Cagle Department. The Author of the document stipulates to try to meet those recommendation by mid December 1971.***

***This document is mentioned herein to alert the reader that GE management was aware of asbestos related concerns, high asbestos fibres levels, poor housekeeping, toxins and their use in the department etc. However there remains the discrepancy with regards to Talfil in this report as well.***

***Appendix K Document #8***
***From: Safety Engineer at Canadian General Electric Co***
***To: C.H Wilson, M.D. Clinician Division of Industrial Hygiene***
***Date: January 29, 1947***

This letter is an indication that medical surveillance was not followed on a regular basis. The medical surveillance in question here is with regards to lead exposure. However, regardless, the company's response to the MOL clearly indicates that they were unaware that medical surveillance was a requirement to be conducted on a regular and pres-assumed periodic basis, and that it wasn't to be conducted only upon request. The letter is self explanatory…..here is quote taken directly from the letter:

> " we (GE) regret our failure to have these workmen examined periodically as we were under the impression that the tests were only necessary when requested by your Department.."

***Appendix K Document #9***
***Field Visit Report***
***From: G.S. Rajhans, P.Eng***
***Date of Report: January 18, 1971.***
***Contact: Safety Engineer at GE, Mr. D. Able***

The report is thorough and indicates the locations of the various dust producing areas. It also indicates the various non-conformances that have already been mentioned by the employee testimonies. This report is evidence alone of the workplace conditions in Wire and Cable, and the poor ventilation in the various buildings servicing Wire and Cable activities. Please refer to Appendix K. Confirmation of products mentioned in this REP, by the former employees and supervisor and work conditions are made in this document. Here are some key facts as written out by Mr. Rajhans:

- ***There are 8 places where powders containing varying percentages of silica are used***
- ***Free silica content in the powders ranged from 5-66% free silica.***
- ***The report finds many nonconformance's with regards to lack of engineering controls in the form of exhaust and ventilation, lack of proper PPE, or evidence of lack of education for the employees with regards to PPE use as some respirators were found hanging in dusty areas and thus were contaminated.***
- ***…..again asbestos carding was mentioned here and the area was noted to be in poor condition. All three asbestos carding machines were found to be covered with asbestos fibres. The floor near the carding machines and the twisting machine was also covered with asbestos dust. Dry sweeping is practiced to clean the floor near the machines.***
- ***A considerable amount of asbestos fibres were found to be accumulated on the floor which suggested that the floor had not been cleaned for days. About 500 pounds of asbestos are used in a day …….***
- ***Mica dust was considered to be more toxic than dust, as it has more than 5% free silica and it's TLV was at 20 mppcf.***
- ***With regards to MICA dust, it was noted that a considerable amount of mica is spilled on the floor during process. The settled dust on the floor makes the housekeeping very poor and also creates the possibility of getting some of the dust airborne by the movement of men or machines. There is no ventilation on the mica dust operation. The mica dust contains 5% of free silica.***
- ***The writer also indicated that the employees working in the near vicinity of the carding processes are being unnecessarily exposed to the fibres as well. The carding operations were suggested to be enclosed.***
- ***With regards to the use of Zinc Stearate, although a nuisance dust with less than 5% free silica, it was noted by the writer that the employee worked with this product was "found covered with the white powder.."***
- ***Pyrax "a" – writer confirmed:***
    - ***that it contained 65.8% free silica***

- ***TLV determined to be 3.5 mppcf – hence this is a toxic material requiring extensive dust control***
- ***Extensive dust controls measures required for this toxic product***
- ***The use of this product is in the 2 locations***
- ***Used to coat the trays holding uncured rubber and coating for cables to prevent sticking***
- ***"Powder was noted to be very fine and could create considerable amount of dust"***

➢ ***Talfil – this product is similar to Pyrax A as per the Mr. GH Rajhans***
- ***The material is received in 50 pound bags from the Canadian Talc Industries.***
- ***"The free silica content is 66.9% in this product"***
- ***no care in management of this product – it was noted to be spilled in various locations – and spilled material is dry swept, collected and reused***

➢ There is much information given with regards to the poor work conditions and asbestos related controls in this department – please refer to Appendix K #9 for more information.

➢ For the purpose of this report, here are some pertinent recommendations that were made to GE by Mr. Rajhans …some direct quotes from the document read as follows:

- ***" ….celite contains a small percentage of free silica and hence should be considered hazardous if inhaled in large concentrations over a period of time….the employees working in the area could be adequately protected using an approved respirator…..in any case the respirator should never be stored in the working area, (see text)"***
- ***mica dust exposure can be minimized by enclosing the entire process of the dust coating***
- ***"zinc stearate is a nuisance dust…however any nuisance dust could become hazardous if inhaled in large concentrations over a long period of time.."***
- ***"Pyrax A and Talfil are two very toxic powders being used by the company. My suggestions will be to reduce these powders with relatively less toxic powders."***
- ***"Asbestos handling areas were considered to be the worst in the entire plant. It was realized during this visit that the company was not fully aware of the hazards associated with the inhalation of asbestos dust……these are some employees working in the north and south areas of Building #22 and these workers are unnecessarily exposed to asbestos fibres in this area…"***
- ***" I was told during the visit that dry sweeping is practiced to clean the floor and machine in this area. It should be realized that dry sweeping stirs up the settled fibres in the air – and could cause more exposure as fibres are re-suspended in the air.***
- ***"Local exhausts at the carding machines were not considered adequate…"***
- ***"local exhaust should also be provided at the end of each twister…"***

It should be noted that these are the conditions of the workplace in 1971. It is safe to say that condition must have been worse years prior to this date. Mr. Rajhans clearly states that the company was not fully aware of the detrimental health effects of asbestos. If in 1971 the company was not aware of the detrimental effects then how did they possible protect their employees the years prior. This statement and question is fair and is validated by the evidence provided herein.

***Appendix K Document #10***
***Ontario Department of Health – Industrial Hygiene Laboratories***
***From: H.Wall***
***Date of Report: June 9th,1966***
***GE Contact: R.G. Elson, Mr. D.E. More, Dr. Sutherland***

***This report indicates that in 1966 when the free silica content in products used was evaluated, the following was found by laboratory analysis:***

***Hisil 233 – Free Silica Content was 85.5% free silica***
***Cab-o-sil: Free Silica Content was 97.8 %***
***Asbestos was used at this time as well and provided by Rayasbesots.***

This evidence further confirms the statements being made in this section of the report, with regards to conditions being worse in years prior. This report is dated 1966 and the previous report by Mr. Rajhans was dated 1971. Within this span of years, the silica content in high sil was 85.5% in 1966 and other products used such as Pyrax, contained 65.8 % free silica. This percentage of free silica was considered toxic in 1971 and thus hard evidence that conditions were worse, and they were and are proven here, as the free silica content in 2 studied products alone were near 100%.....i.e. 85.5% and 97.8 % for Hisil and Cab- o-sil respectively.

***Appendix K Document #11***
***Field Visit Report***
***From: J. Toth, P.Eng***
***Date of Report: June 29, 1977.***
***Contact: Safety Specialist et al., Mr. K Faggetter et al.***

This document confirms that employees ate at their work stations. Furthemore, with regards to the Formex Department, the evidence in this document indicates that indeed vapours would be release at the top of the furnaces during regular operation. This was already mentioned by the former GE employees and former Supervisor.

In the recommendations section and Directions issued section the following was stated:... "the employers should instruct the workers in the Banbury areas about the dangers of exposure to lead, antimony etc. Furthermore, it was also stated and recommended that, " employees should be encouraged to practice good personal hygiene. This should include washing before eating, drinking, smoking or uing washroom facilities."

Also it was mentioned that no dry sweeping shall be permitted in the Banbury and PVC mixer areas.

It these were the conditions and requirements in 1977, then it can be stated that the conditions were worse in the years prior.

***Appendix K Document #12***
***Department of Health – Division of Industrial Hygiene- Plant Visit Report***
***From: F.M.R. Bulmer, M.B.***
***Date of Report: November 10th, 1947***
***GE Contact: Dr. J.G. Cunningham, Director***

***This document is evidence which is related to the use of mercury at GE, how it was handled with bare hands, and little protection.***

***Appendix K Document #13***
***Wire and Cable Engineering Data Book***
***From: Mr. J. Toth Occupational Health Engineering Service***
***Date Given to the Ministry of Labour – June 14, 1977***
***From Ge Contact: R.E. Fowler***

Appendix K Document #13 is a list of chemicals utilized by GE for the Banbury operations. The list was presented to the Ministry of Labour by GE.

***Appendix K Document #14***
***Field Visit Report***
***From: Dr. J.G. Budlovsky, M.D.***
***Date of Report: May 10, 1977***
***GE Contact: MR. K. Faggetter, P.Eng and Safety Specialist***

There are two documents presented here: Part 1 and Part 2. These documents were put together after a consultation with a patient (employee of GE and a Doctor's visit to the GE Facility. The patient in question worked in the Wire and Cable Department from 1940-1965. The document indicates that the employee worked for a short period as a carding operator. The doctors state that it was impossible to compare dust conditions from 1940 through to 1965 and indicates that the conditions may have been worse than at the time of his visit in 1977. The doctor further comments " it would be interesting to know whether the chest radiogram shows any signs of asbestos influence like thickened pleura and or fibrosing of the lungs and whether any fibrotic changes in the lung tissue were found at biopsy."

***With all the information collected thus far, there was sufficient information available from the MOL and the company and employees therein directly, to affirm that the carding machines were not properly enclosed, the fibres were not controlled, there was no proper protection for the employees with regards to fibres exposure and the sweeping operations would have caused further exposures. All this information was available at this date, May 4, 1977 as is made EVIDENT BY THE DOCUMENTS PROVIDED IN THIS SECTION OF THE REPORT. In fact the one report from Mr. GH Rajhans is vital evidence that the conditions in the asbestos carding areas were not sufficient at that time. And this could be stated that they were much worse years prior, as the employers was not fully aware of the extent of harm asbestos has on human health. The patient, and many other patients, could have been misdiagnosed and denied their claims as the information retrieval system and steps taken to gather evidence were very weak. The MOL reports given herein would have sufficed to give evidence of a questionable and unhealthy workplace.!***

***Appendix K Document #15***
***Field Visit Report***
***From: G.S. Rajhans, P.Eng***
***Date of Report: October 4, 1972***
***GE Contact: MR. K. Faggetter, Engineer***

This report clearly explains that although carding machines were provided enclosures at this time, they were not providing enough protection even at this time. Fibres were seen on the floor and machine tops etc. some of the excerpts read as follows:

"***non of the powder containers are provided with adequate local exhausts….though the company appears to have discontinued the use of most toxic dusts, like Pyrax A and Hisil, the company still is using a variety of powders which add to the confusion as far as the requirement of dust control is considered out of out of six samples taken for asbestos fibre counts approached or were at the TLV for asbestos at that time. ….the highest count was found at the small braiding machine near bay 815. HOWEVER THE LARGE CARDING MACHINE WAS NOT IN OPERATION AT THE TIME OF SAMPLING WHICH WOULD ALTER THE SAMPLE RESULTS AND THUS PROVE TO BE HIGHER THAN THOSE REPORTED….. There is no enclosure or exhaust provided for this machine which is also contaminating the neighboring areas. ….Direction and recommendations were ordered and offered in this report, respectively….there is mention of no exhaust on the wax pot as well and there was indication of a need for this.***

***Appendix K Document #16***
***Occupational Health Laboratories***
***From: C. Rhodes***
***Date of Report: February 6, 1973***
***GE Contact: Mr. D. Able, Safety Specialist***

This report is a clear indication and evidence that the lead concentration at the lead press was above the TLV for lead and thus employees were exposed to lead from the workplace. The following was noted and mentioned in the report:

> ***….drossing and charging platform for armor coat lead pot: lead at 0.78 mg/m3 of air background extruder area, 0.23 mg/m3 of lead in air***

***The TLV at this time was 0.15 mg/m3 for lead in air….hence at the time of sampling the levels were above the TLV.***

***Comments made by the inspector are as follows:***

- ***housekeeping in the lead handling area was poor and dross buckets were not covered***
- ***the employees working in this area do not wear masks***
- ***evidence of eating and smoking was noted in this area i.e. extinguished cigarettes on the floor and also empty milk cartons and lunch wrappers***

***Appendix K Document #17***
***Field Visit Report***
***From: G.S. Rajhans, P.Eng***
***Date of Report: MARCH 1, 1973***
***GE Contact: Mr. G. Hansen, Safety Specialist and Mr. A K Faggetter, Engineer***

The inspector first makes reference to the report of October 4, 1972 and stated that, " a total of 4 directions to control the asbestos and other dust exposure in the Wire and Cable Building….it is clear that……none of the directions have been fully complied with."

**Mr. Rajhans continues and makes reference to the lead handling area, "the recent air sampling has shown high results (of lead). The lead handling area can only be described as "hopeless". Directions are suggested to improve the conditions.**

**"…..the existing local exhaust at the furnace is totally ineffective due to a big leak near the fan outlet…..this leak is adding a considerable dynamic loss to the system with consequent reduction in fan performance…..furthermore due to the lead, the exhausted air is virtually being recirculated……..this should not be permitted in the case of fumes as toxic as lead. It is my opinion that the lead has been in existence there for quite some time, and no attempt has ever been made to repair it. This shows that the Company has a very poor maintenance program….moreover the men handling the dross are exposed to a considerable amount of lead fumes as the dross is usually hot and fuming. This is also evident from the sampling results as shown in the Lab report No, 15275 dated February 6, 1973. The lead concentration is about 5 times the TLV. Thus there is an urgent need for providing adequate respiratory protections to the employees working at the charging**

**platform."…continue reading the report as per Appendix K….the inspector continues with stating that housekeeping was poor in the lead handling area, there was no lead card, and most of the employees were found not wearing any gloves…..10 directions were issued at this time and the directions from the precious report that were not compiled with to date, were reapplied to the company.**

As stated earlier and will be reiterated again, if the conditions were this poor and toxic in March of 1973, how can one deny that the conditions were worse years prior to this date? If the company was not educated on the toxic effects of lead, asbestos or other products used within this facility and were exposing their workers to ill conditions as of 1973, how could they have been possibly better year's before? The answer is, they were not better, the conditions were worse, exposures were higher and several nonconformances would have been present. This statement can be made due to the MOL reports presented here!

***Appendix K Document #18***
***Environmental Health Services Branch – Field Visit Report***
***From: L.Bithel, P.Eng***
***Date of Report: June 22, 1973***
***GE Contact: Mr. D. Able, Safety Specialist et al.***

This report confirms the presence of mercury in the wire and cable department as well as the lack of controls in collecting mercury spills or vapours within the various processes and locations that utilize mercury.

The MOL inspector indicates that there does appear to be a significant mercury exposure in the wire and cable division particularly in F room, as the threshold limit value for mercury is approached or exceeded. Some directions and recommendations were ordered and offered at this time respectively. The mercury TLV was exceeded as per sampling conducted here.

***Appendix K Document #19***
***Occupational Health Services Branch***
***From: Mr. F. Watts***
***Date of Report: August 8, 1975***

This report confirms that approximately 7 people were noted to have died in the years in question, and all worked in the north end of the wire and cable department where the PVC process was located.

***Appendix K Document #20***
***Occupational Health Services –Ministry of Health***
***From: F.E.Watts***
***Date of Report: September 4, 1975***
***GE Contact:***

**This report indicates the use of asbestos in 6 locations within this department and the fact that the officer did not feel that the exhaust systems used to capture the asbestos are not working at the required efficiency. And the officer continues to state that mercury is used at 6 machines in the re-wind department and that all areas, (6 machines) are heavily contaminated with spilled mercury.**

*Appendix K Document #21*
*Field Visit Report*
*From: Dr. M. Cohen, P.Eng and F.E. Watts*
*Date of Report: November 20, 1975*
*GE Contact: Mr. D. Able, Safety Specialist*

**The visit to the plant on this date was to address the mercury and asbestos concerns. It is indicated by the officers that at this date, the mercury concentrations were above the TLV levels and the recent asbestos air sampling indicated that the asbestos counts were close to the TLV level in one location. Housekeeping at the asbestos area was poor. It is indicated herein in that …some of the directions previously given by the MOL have NOT been complied with and are suggested for re-issuing with a time limit of 3 months.**

**This indicates that the company was not addressing all issues in likely time or ever at all. The MOL has visited the GE plant on several occasions, noted nonconformances and these nonconformances have been repeated time and time again over the years. This poor management of safety issues and lack of action on recommendations and direct orders given by the MOL is a clear indication of lack of commitment to safety and health of the employees on the part of the employer, thus continue to expose workers to the contaminants.**

**Even at this time and date, asbestos fibres were noticed on the floor, on equipment and on the braiding and carding machines. Furthermore with regards to the areas around the mercury baths around the testing machines, the MOL inspectors report that a considerable amount of mercury droplets on the testing machines and on the floor surface were noted.**

**The MOL inspectors make the same comments similar if not identical comments as presented in the June 1973 report prepared by Mr. Bithel.**

**Again there is mention here that employees should not be eating drinking or smoking in the mercury handling area as well as the asbestos area. Coveralls should be provided to workers in the asbestos handling area as well.**

**THE SAME RECOMMENDATION AND DIRECTIONS WERE GIVEN TO THE EMPLOYER IN 1973 AND PRIOR TO THAT IN THE OTHER REPORTS. IF THE EMPLOYER WAS GIVEN THESE ORDERS OR RECOMMENDATIONS AND NOT COMPLYING, THERE IS NO QUESTION, THAT THE EXPOSURES WOULD HAVE CONTINUED, THE**

**NONCONFORMANCE'S WOULD HAVE CONTINUED AND THUS ILLNESS CONTINUED TO BE INCURRED OR WORSEN.**

**ALTHOUGH THE MINISTRY OF LABOUR CAME IN AND OFFERED DIRECT ORDERS OR RECOMMENDATIONS, THEY DID NOT ENFORCE THEIR ORDERS OR FOLLOW UP WITH THEIR RECOMMENDATIONS TO ENSURE THAT THE EMPLOYER WAS COMPLYING IN A TIMELY MANNER.**

***Appendix K Document #22***
***Field Visit Report***
***From: W.R. Waddell, M.D.***
***Date of Report: August 26, 1980***
***GE Contact: Mr. K. Faggetter, Safety Manager***

**This document further confirms the presence of lead in various departments, with the focus for this report, being the lead press in Building #22 and the PVC compounding Section in Building #26. Housekeeping was deemed as poor in the PVC Compounding area, with lead stearate seen on the floor and fixtures. The workers were once again instructed to maintain a good standard of personal hygiene, food, drink and tobacco are not supposed to be kept or consumed in the lead handling areas.**

***Appendix K Document #23***
***Field Visit Report***
***From: WR Waddell, MD***
***Date of Report: April 27, 1981***
***GE Contact: Mr.E. Hatherly, Machining Section Foreman***

**This documentation clearly indicates that trichloroethylene, the degreasing agent, was commonly called Royalene. See Comments #1 in the report.(Appendix K)**

***Appendix K Document #24***
***Field Visit Report***
***From: R. Fliegl, B.A. Sc.***
***Date of Report: September 4, 1973***
***GE Contact: Mr. Dan Abel – Safety Specialist et al.***

This report covers mercury and asbestos exposure in the Wire and Cable department. The following observations and findings are important to note:

- out of 8 samples taken, 6 were found to be at or above the TLV for mercury.
- A visual inspection of area below the mercury baths revealed a considerable quantity of mercury droplets on the testing machines, and on nearby floor surfaces.

- The comments made by the inspector were the following:

- * air sampling and visual inspections demonstrate that a significant exposure to mercury in air concentrations at the wire testing machines still exists…as is well known, any mercury spillage produces many tiny globules and they can easily become lodged in the cracks and crevices of the rough floor, or they may adhere to the metallic surfaces of the testing machines.

- * …these particles remain exposed to atmosphere and will slowly release mercury vapour into the workroom air for extended time periods…

- * the enclosure at the right lower side of twisting machine No. 46 does not seem to be adequate for the control of asbestos. The asbestos particles found at the base of the machine suggest that the enclosure should be extended.

## 9. ANALYSIS OF DATA – HYGIENE PERSPECTIVE CONCLUSIONS

***Air Circulation in the plant ( refer to Appendix A and B as well as Diagram #9 Below)***

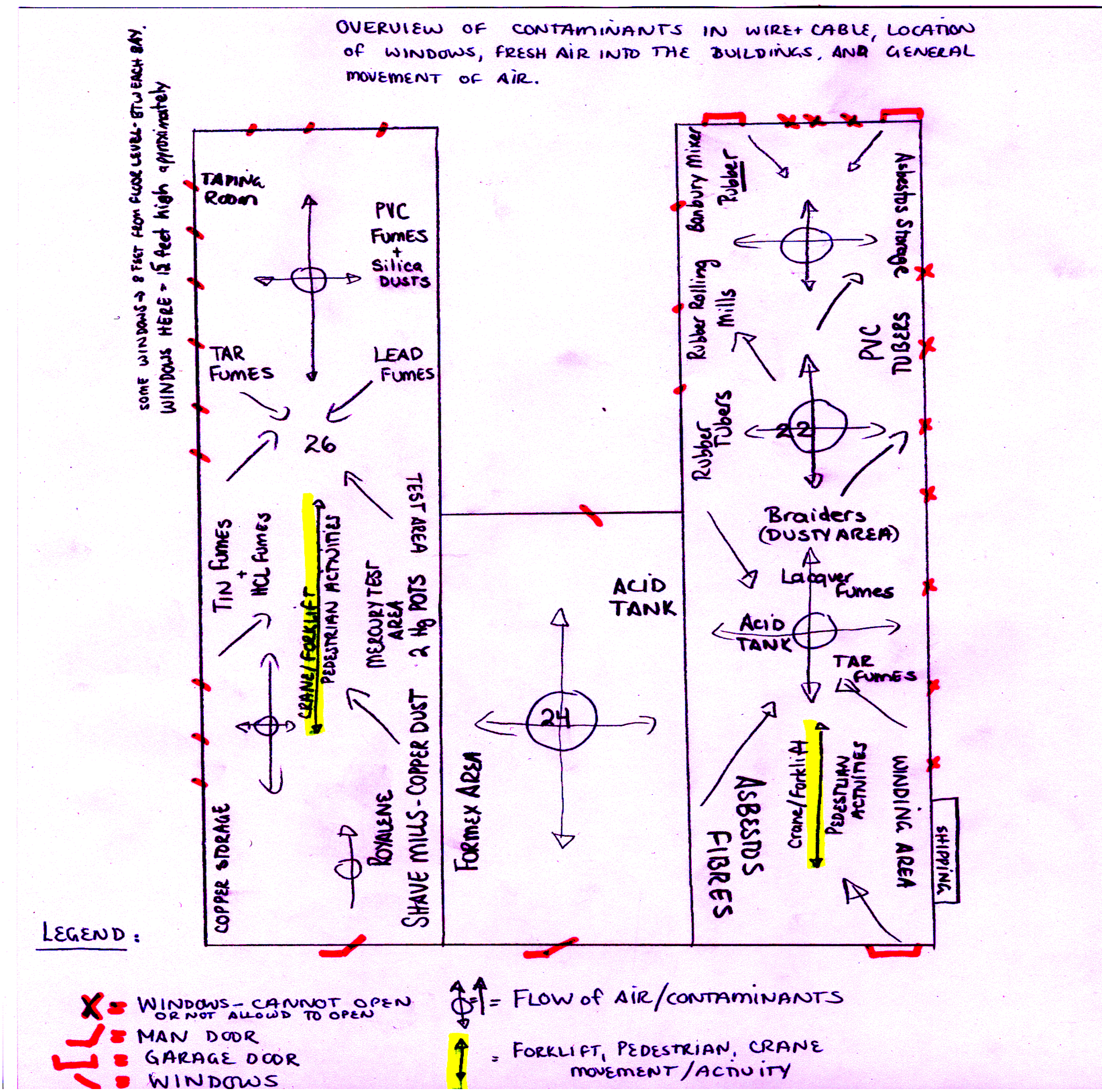
As per Diagram #9 below, it is clear that the contaminants were allowed to accumulate within each building and disperse. The buildings were generally in a negative pressure environment, creating a vacuum type environment, where the contaminants were formulated within each building, some were exhausted out of the plant, and others were not. The fumes and contaminants had nowhere to be released other than within the building. There were few windows that were available to be opened in some of the buildings; however, most were only for purposes of allowing daylight to enter the building. Most windows were not present for the purposes of air flow or natural ventilation. In building 22 for example, there are plenty of windows, at the height of the building, and some skylight type windows on the ceiling, however, most are in place for "lighting" purposes. This was confirmed by the Writer at the December 7th, 2004 Plant Tour, with GE management representatives and GE Union representatives. There is a garage door at the south end of the building and 2 on the north end as well. As stated earlier, on the north end of the building, there were windows, located near the ceiling of the building. However, employees were not allowed to open these windows, as the cafeteria was located across from the north end of building 22 and GE employees did not want to have their lunch environment be contaminated with the fumes from the Banbury Operations. Thus the fumes from this operation were virtually trapped in this building and very few were allowed to leave the building through the garage doors and other windows, located on the west side of the building. Some of the equipment, such as the PVC tubers, or the Lacquer towers, did have exhaust systems in place that were utilized from time to time. With the exhaust in operation, and no fresh air intakes within the plant, this created a slightly negative pressure environment, and basically without any fresh air to dilute the fumes and other contaminants, the air was heavily polluted. The set up of the tubers included the PVC tubers on the east side and the Rubber tubers on the west side of the aisle way in building 22, whose width was 300 feet. The exhaust on the PVC tuber was utilized from time to time. If and when the exhaust would be turned on, the exhaust would then draw any contaminants from the rubber tubers across the aisle toward the PVC area, thus contaminating the air in the vicinity. See appendix B for Layout.

The asbestos carding machines located at the south end of the building dispersed fibres as the exhaust system would get overcome with fibrous accumulations as the collector bins were emptied only after a month's time. The combing operations took place, without proper shielding or guarding. This operation generated a lot of fibre dispersal. With this in mind, the liftruck, crane and pedestrian activities would naturally disperse the fibres into other areas of the plant and aisle ways as they would disperse the fibres from the contaminated combing operations, into other areas adjacent to this process and the main aisle way of the plant running east to west. This can also be stated to have occurred with the fumes, vapours and dusts in various other processes not only in building 22 but also, 24 and 26. Because there was no set up of make up air, or fresh air into the buildings, and no proper exhaust of general air out of the plant, it can be stated that all contaminants were trapped in the building, and thus the employees were subject to these fumes. Diagram #9 indicates the possible travel of the contaminants and it well defines, that the contaminants really had no where to disperse. The air flow would have been blocked by the walls and

would be forced to accumulate in the various areas located in and around the machinery, and hover over the areas where the fumes were created and thus expose the workers' breathing zones.
The main walk way which cut across the entire facility from east to west, allows one to walk from the east end of the plant, i.e. building 26 through till the west end of the plant till, Building #8, without going outdoors. Due to the fact that there was no proper ventilation in this plant as a whole, this aisle way acted as a major ARTERY transporting the various contaminants, fumes, dust, vapours, asbestos fibers to the other buildings from wire and cable and vice versa. Hence contaminants from building 16 would travel to building 26 and vice versa. The aisle way acted as a tunnel in which these contaminants traveled. When pedestrians or forklift traffic or crane movements would cause the air in the plant to be moved or disturbed, it would cause this air to move in and out of this main aisle way.

**An employee stated the following with regards to the main plant aisle way, "the main aisle way was like a vacuum….the activities from asbestos carding for example would cloud the main aisle way and transport the fibres to the various areas of the plant at GE and I worked in BUILDING 16, which is not close to that activity at all. When I had to travel through the aisle way just looking down the aisle way it appeared as if a snowstorm was coming through, all the fibres accumulated in that tunnel and were distributed in the various entrances to the other buildings, as the doorways to those buildings acted as receiving grounds for these contaminants!"**

The crane activities in building 22 and 26 would have caused some of the contaminants to move or flow from one area to another, North and South, thus moving the body of air/fumes from one area to another, north to south and vice versa. However, without any proper ventilation, make up air or fresh air, perhaps more in the summer months versus the winter, the contaminants would just accumulates and the employees would be subject to them. **Winter exposures could potentially be higher as natural ventilation supplied by open doors and windows is decreased.**


OVERVIEW OF CONTAMINANTS IN WIRE+ CABLE, LOCATION OF WINDOWS, FRESH AIR INTO THE BUILDINGS, AND GENERAL MOVEMENT OF AIR.
SOME WINDOWS → 8 FEET FROM FLOOR LEVEL - BTW EACH BAY.
WINDOWS HERE → 15 feet high approximately
TAPING Room
PVC Fumes + Silica DUSTS
TAR Fumes
LEAD Fumes
26
TIN Fumes + HCL Fumes
CRANE/FORKLIFT PEDESTRIAN ACTIVITIES
MERCURY TEST AREA
TEST AREA
2 Hg POTS
COPPER STORAGE
ROYALENE
SHAVE MILLS-COPPER DUST
Formex AREA
ACID TANK
24
Banbury Mixer
Rubber
Asbestos Storage
Rubber Rolling Mills
PVC TUBERS
Rubber Tubers
22
Braiders (DUSTY AREA)
Lacquer Fumes
ACID TANK
TAR FUMES
ASBESTOS FIBRES
Crane/Forklift
PEDESTRIAN ACTIVITIES
WINDING AREA
SHIPPING
LEGEND:
= WINDOWS - CANNOT OPEN OR NOT ALLOWED TO OPEN
= MAN DOOR
= GARAGE DOOR
= WINDOWS
= FLOW of AIR/CONTAMINANTS
= FORKLIFT, PEDESTRIAN, CRANE MOVEMENT/ACTIVITY

*Crane and Forklift Drivers:*

It should be noted that the crane operators had forklift duties as well. Henceforth not only did they have exposure to the contaminants and fumes that were emitted from the various processes but they also had hands on exposure to the contaminants as they had to place contents on pallets for delivery, and worked in close proximity to the various processes and incurred exposure to those processes at the floor level as well. The employees stated that often times mishandling of packages such as bags containing contents for the PVC mixers and Banbury mixers would often be ruptured by the forks of forklifts during lifting and transport and thus employees, who wore no protection on this job, would be subject to instantaneous high levels of exposure to dusts generated by the puncturing of bags containing the toxic contents. The crane operators would also be exposed to the fumes and vapours emitted by the various processes as those fumes and vapours would rise and bounce off the ceiling and travel with no where to escape. Without any protection or ventilation in the crane cabin, the operators would be exposed to those fumes and vapours in the plant air.

*Document Review/ Ministry of Labour Evidence:*

The review of some documents that were presented to OHCOW clearly indicates that due to the many defects in the engineering controls, there were exposures that were being incurred by the employees at that time during the period in question. With this in mind, if conditions were poor at this time, one should consider how severe and unsafe they would have been several years before this date and time. **The ministry of Labour reports are evidence enough of the poor work conditions in this facility and further validate that indeed exposure were incurred as the housekeeping was poor, the engineering controls were poor if not non existent in some areas, and not operable in others, as well as TLV's being exceeded on many occasions etc. As per the time line of documents presented in Appendix L – from 1947 all the way through till 1973 – there is enough evidence documented and mentioned herein to ascertain and prove that the conditions were poor, TLV's were exceeded, the company had poor maintenance practices, the company had poor awareness with regards to asbestos and it's toxicity to human health etc. These are all statements that come directly from the synopsis of information gathered from the MOL reports. Refer to Appendix K and L as well as Section 8 of this report. Noncompliance to directions and recommendations given by the ministry is evident in the review of these reports and not only is there a fault of the GE Management but also of the MOL for not following up on their orders or directives given to the GE management. For example recommendations given in October 1972 were noted in September 1973 that they were not complied with. IT should NOT have taken a year to follow up. Within that time period, the employees were continuously exposed. Refer to Appendix L for more examples of repeated non conformances.**

**Examples with regards to Mercury**

> **October 1947 – MOL observes mercury handling is poor, employees should not be eating on the job**
>
> **November 1975 – still problems with employees eating on the job and mercury levels still high at this date**

**Examples with regards to Asbestos:**

**September, 1966 – poor asbestos conditions noted at carding area – very poor to nil exhaust , need improved control of fibres and better housekeeping in this area**
**January 1971 – poor asbestos conditions – company not aware of asbestos hazards and human health, more than 500 pounds of asbestos used per day**
**September 1971 – poor asbestos conditions continue, high asbestos counts found**
**October 1972 – poor asbestos controls and housekeeping**
**March 1973 – poor asbestos controls – no exhaust at one of the highest fibre producing machine – the Braider**
**September 1973 – no conformance to directions issued in October 1972 with regards to asbestos, Etc.**

***DOCUMENT PREPARED BY THE UNITED ELECTRICAL, RADIO AND MACHINE WORKERS OF AMERICA – PRESENTED TO THE ONTARIO NEW DEMOCRATIC PARTY CAUCUS TASK FORCE ON OCTOBER 5, 1982 – THIS DOCUMENT PROVIDES EVIDENCE WITH REGARDS TO EMPLOYEES CONCERNS AND WORK CONDITIONS, WHICH WERE BROUGHT FORTH TO THE GOVERNING BODIES. Please refer to Appendix M.***

***Literature Review and All Evidence Provided Herein:***

With the evidence from the epidemiological studies and medical reviews presented herein, it is clear that most of the conditions in this work place would have resulted in the onset of disease for a majority of the workers in the Wire and Cable Department at General Electric. This is further compounded by evidence not only from the employees themselves but from a Supervisor who worked during the period in question and offered their testimonies as recorded herein, as well as direct and factual data presented by the Ministry of Labour, indicating non-conformances with the law and poor engineering controls. The medical research and epidemiological studies link many of the cancers and other life impairing illnesses in the workplace to those realized by the General Electric Employees and continue to be confirmed to date. The process information is further supported by the literature reviews provided herein, namely the rubber industry and PVC industry information from IARC and other governing agencies, as evidence of exposure based on handling of the solvents, being exposed to the these contaminants in their various states, either room temperature or molten temperatures and synergistic effects with other mixes, and their other general use in the Wire and Cable Departments.

***Asbestos:***

It is indisputable that exposure to asbestos has been incurred. The MOL reports alone give ample evidence that indeed exposure to asbestos was evident as the engineering controls were never able to correctly manage the fibres, no matter how many changes were made to enclosures if any etc. Dry sweeping continues in this department even after the MOL directed management to have that stopped. Employees continued to eat in this area as well, even after the ministry has documented several times, that this should stop. All in all, the fibres were never properly managed as is evident from the MOL reports. Refer to section 8, appendix K and L. Moreover, and Inspector in the January 1971 report indicated clearly that he ( Mr. Rajhans) felt that the company really was not aware of the hazards to human health that are incurred by asbestos exposure. If an inspector can outright make this statement, then it is clear that in January 1971, the company is not aware of the hazards, then years from to this date ( as there is ample evidence) they were not protecting their employees from the hazards presented by this substance and several others for that matter, such as lead, mercury and the various powders in the PVC and Rubber mill operations for example.

The process of carding, was a source of asbestos exposure. Furthermore, the intricate use of asbestos in several wire braiding operations and other processes and maintenance operations also lend to exposure to asbestos at different levels. Housekeeping evidence, in terms of sweeping and use of air hoses, testimonies provided by the employees and supervisor, and the literature review provided here are all evidence enough of the over exposure to asbestos that the employees were subject to. If the employees were sweeping asbestos fibres off the floor and using air hoses to blow off fibres from the machinery, their clothes and skin, it is inevitable that the exhaust systems in place were not working efficiently or being emptied on a more consistent basis to allow for maximum efficiency of exhaust.

All carders were vented to the roof. The venting pipes were joined, met near the roof top and were then vented out through one vent pipe and out to the bins on the rooftop. All in all there were 6 pipes which joined and then were vented to the roof and joined to the big bin. The bins were 20 feet long and 8 feet high, but were only emptied at the end of the month. The manner in which the asbestos was handled by the maintenance employees alone is evidence enough that those employees were heavily exposed to asbestos fibres, especially without any personal protective equipment.

Moreover, the carding operation described in the Process section of this report, clearly indicated that the exposure would have been more than double the estimated exposure, as the set up was a bunk bed type set up where the employees were being exposed to fibres coming off the upper level carding machine as well as the lower level carding machine.

***Rubber Mills, PVC Mixers:***

If you refer to Appendix K, L and Section 8 of this report, the many times that the MOL inspectors have mentioned that no eating and drinking be allowed on the job as well as proper Hygiene practices should be implemented herein at the various location in Wire and Cable, will alert the reader that this unsafe practice was never addressed properly or managed, and continued for several years. This practice would have been an essential contributed to disease in the workplace as well as all the other variable mentioned in this report. Furthermore, there was never any proper dust control with these operations as is evident form the reports and the levels of free silica in these areas would have also caused ample exposures to be incurred and the onset of disease to commence.

Free silica and other dusts and toxic products in the workplace cannot be ruled out as significant contributors to the onset of disease in the GE workplace.

Furthermore, the fact that most products were delivered in bags, handling of the products would have also induced exposure to the dusts, as there would be a release of dust during handling/mishandling/tearing of paper bags with the powder products that had to be inserted into hoppers etc.

General Electric's idea of being self sufficient and innovative in having company processed rubber and color pellets for dyeing of GE specific copper wires is excellent business sense. However by taking this decision, General Electric also adopted the contaminants and hazards associated with the Rubber Industry and PVC mixing processes etc. As stated already, IARC classified the Rubber Industry as Group 1, under sufficient evidence of carcinogenicty in Humans. Although GE was not a Rubber industry per say, their processes were the same, chemical makeup of products are similar as are the hazards and toxins and related health effects. The same can be stated for the PVC mixing operations. The engineering controls provided were not sufficiently utilized to effectively protect the workers. The controls were neglected in order to enhance the process requirements with regards to required temperatures etc. The lack of proper administrative controls also contributed to the employees' exposure.

As per the supervisor who stated that there were a high number of heart attacks associated with employees that worked with the banbury operations, this could be associated with:

- the chemicals,
- or the heat,
- Or the synergistic effects of both contaminants on the body as well as the multitude of other chemicals and fumes being used and lurking in the plant air.
- Lack of PPE
- Lack of proper engineering controls
- Lack of proper safety management

**The Supervisor stated "10 employees died after 4-5 years of service on the Banbury Operations."**

Fumes from the banbury operations would travel north and south in this building. There was no fresh air into the plant at any regulated level. Employees state this area of the plant was very dusty and hot and there was no fresh air circulation. Other plant employees would not allow the banbury operators to open windows as the air traveling outdoors, at the north end of this building, would be contaminated as they walked to and ate in the cafeteria, which was located across from building 22.

***Health and Safety at GE and the Right to Know:***

With the initiation of the Occupational Health and Safety Act, awareness of health and safety issues and hazards was slowly increasing. However prior to the Act and years after the Act as well, there were numerous chemicals that the employees worked with as well as the Supervisors, for which the employees did not know what the contents of the chemicals were, how to protect themselves from disease and illness or even know what type of precautions to take with regards to handling the chemicals and engineering controls etc. As has been demonstrated in this report, there have been numerous chemicals that have been utilized over the years, without protection, without proper engineering controls, that would indeed render disease and illness to be apparent (especially due to the manner in which the chemicals were being utilized, i.e. hand dipping, washing hands with solvents, heating of solvents to molten temperatures without proper exhaust systems , asbestos fibres, using air hoses to clean off clothing and body parts etc). Employees were given work cards on process requirement for the various operations they had to operate, however there was no indication of the hazards on the job, how to protect themselves from the hazards, let alone Material safety Data sheets for various chemicals that were utilized. The employees and supervisors were often told, due to the fact that "this product is a GE formulated product, and it is patented, no data sheet is available for these chemicals" being used. This was stated before the ACT and the Act.

It is important to stress that even after the initiation of the Occupational Health and Safety Act; things did not change immediately within the workplace. The evidence is further solidified by the Ministry of Labour reports, the dates of those reports and the October 1982 reports presented by the United Electrical, Radio and Machine Workers of America Union to the Ontario New Democratic Party Caucus Task Force (appendix M). The results of those reports, in the form of replies from Dr. Cohen for example, indicate a lack of education or awareness of occupational health hazards and disease producing agents in the workplace. Dr. Cohen, the company doctor, indicates that he was not aware of epoxies or solvents causing nerve damage, this is a clear indication that the Doctor was not "aware" of Occupational Health hazards in the workplace, and thus the employees were not only misguided but misrepresented and misdiagnosed. Education of workers and management awareness of safety hazards would have taken ample time before serious changes were made to the conditions in the workplace. Regardless of the Threshold Limit values, the levels have changed for various suspect and confirmed carcinogens over the years. Levels that may have been considered safe years ago, have now been discovered to be unsafe and thus limits brought down even more. Exposures were inevitably incurred during the start of the GE plant and during the initiation of the Occupational Health and Safety Act as well and thereafter based on all of the testimonies, literature reviews, and other evidence provided herein.

From a Due Diligence perspective, the employer had failed in complying with Section 25 2(d) of the Act which clearly states that the employer shall acquaint a worker or person in authority over workers with any hazard in the workplace and in the handling, storage, use, disposal and transport of any article, device, equipment or a biological, chemical, or physical agent. This further illustrates that conditions must have been far more detrimental in the previous years of the company's existence, i.e. prior to the Act. The fact that Material Safety Data sheets or information with regards to contents of chemicals in the various products being used was unavailable, leads to the fact that employees were working with chemicals that were harmful to their health and they were not being kept informed of the harmful effects of those chemicals and how to protect themselves against those effects.

***Engineering Controls:***

Although some of the processes had exhaust systems integrated into the equipment, it was stated numerous times by the former employees and supervisor, that the exhaust systems would often not be utilized. With this it is inevitable that the employees were subject to fumes from the various contaminants in the plant including the Banbury operations, the PVC operations, the tar pots, 5 inch and 3 inch lead presses and other processes.

Moreover, the employees stated that the Formex machines as well as the enameling ovens did not have proper covers on the ovens that would retain the fumes coming off the heating enamel or lacquer coated copper wires. With this in mind, the fumes from the wires were indeed escaping into the environment and thus the plant air and operators' work stations. (Refer to Appendix K – Document # 11

If the engineering controls are put in place to capture fumes or vapours but they are not being utilized, then the employees would most likely be exposed to those contaminants, their by-products and their vapours/fumes/dusts etc. Furthermore, without any personal protective equipment, the employees would then also be increasing their chances of uptake of the chemicals in their bodies as well. Heat Exhaustion is another factor that must not be overlooked when incorporating all the contaminants that the employees were exposed to in this workplace.

***Building Ventilation:***

Due to the fact that the ventilation was poor, the exposure to solvents, fumes and other contaminants developed due to the mixture of the vapours and fumes would also be inevitable as proven by the research referenced herein. The fact that there was a lack of an exhaust system in place for some major processes and some exhaust systems in place for process such as the lacquer towers and some PVC tubers, lend the already compromised ventilation in the building to a more negative pressure environment. With this type of environment, there is lack of manual input of fresh make-up air and any air that is in the building may be taken out by these few processes, leaving a majority of the contaminants trapped within the building. The summer months would lend more fresh air into the plant versus the winter months in general.

Some employees used personal fans to alleviate their exposure to heat or fumes. But without proper building ventilation and exhaust systems, the fans would not only disperse the contaminants into other employees' work zones, but any settled asbestos fibres or other fine dusts and fumes would be re-dispersed into the environment. The air that the fan would be circulating would be the same polluted air and would not provide any benefit to the employees.

***Personal Protection Equipment:***

The employees were not given respiratory equipment that would protect them from the fumes or other solvent vapours that were emitted from the processes which would also deem their exposure to contaminants inevitable.

Employees handled toxic chemicals with their bare hands and were subject to fumes and vapours. Employees wore their street clothes to and from work and thus exposed their home environment, their automobiles and their families as well with regards to fumes, vapours, fibres, dusts etc.

***Eating on the Job:***

The employees ate on the job as was stated by all employees and the former supervisor. Some ate right beneath molten lead pots, the tar pots, near the shave mills with the trichloroethylene vapours and mists floating in the air and the copper dusts settling on table tops and equipment, near the carding machines, the banbury mixer etc. Some employees heated their food by resting their containers on top of exhaust vents, near molten pots etc. It is inevitable and not debatable that employees were not only subject to contaminants via inhalation and dermal uptake but also through ingestion due to these activities. Furthermore, as smoking was permitted within the workplace, ingestion of contaminants also took place via this activity as well. The former supervisor also stated that it was highly unlikely that employees would have washed their hands prior to eating.

Due to the nature of their work, several machines required constant operation and supervision, as the operations were not such that they could be shut down for breaks etc. Due to this process, the employees were less inclined to take lunches in the cafeteria that was far from their work station to begin with and the employees were also less inclined to eat anywhere other than their workstation amongst all the contaminants, also the employees were less inclined to wash their hands prior to eating for these same reasons.

Furthermore as the processes have been already described, the employees worked initially with the various wiring operations, whether they were the shave mills or the tubing and braiding operations. Due to this intricate work involved, the employees were more closely exposed to the asbestos fibres and solvents that were involved in the various processes. Hence the nature of the actual work processes and the lack of engineering controls or the lack of their use and the lack of proper personal protective equipment all lend to an increased risk for exposure.

***Heat:***

Heat is a major contaminant that causes health impairment that should not be overlooked with regards to exposures incurred by the GE employees through the years. Without proper ventilation, without proper use of exhaust systems and without proper safety precautions, the employees were heat exerted based on the recorded heat temperatures discussed herein. In addition, the heavy equipment and parts that had to be handled ( the copper reels which had to be placed on and off equipment required much physical exertion on the part of the employees - thus the reason why the writer was told that women were not hired for many position in the Wire and Cable Department).

***Air Hoses and Housekeeping:***

Not only did the employees eat on the job, but their method of clean up would have also disturbed the settled contaminants thus causing them to be exposed to settled contaminants that were present in their workspace. Air hoses were utilized to clean off machinery, work stations and body parts, (the latter is a practice that should never occur).

Often times it was mentioned that the employees would sweep their work stations after the shift was over. In areas such as the braiding operations or the carding operation, sweeping would redisperse the settled fibres into the air and cause the fibres to become airborne, and thus allow for more chances of exposures.

The fact that fibres and dust had to be blown off clothes and skin is an indication that exhaust systems were not working efficiently or that the work environment was contaminated. Engineering controls were either malfunctioning or non-existent. This practice occurred throughout the department namely the braiding operations, stranding operations, banbury, PVC mixers and tubing operations. This is another indication that it was inevitable that employees were exposed to these contaminants.

Due to the speed and intensity with which parts were produced and handled, there was not much time for change of gloves or respiratory equipment, cleansing of hands etc. It was stated at several meetings and at the intake clinic that lunch bags, boxes were located at benches close to the works stations and some employees even ate in the near vicinity of their work areas versus the cafeteria. There is ample evidence available in Section 8 of this report as well as Appendix K – where the MOL clearly states that this practice should be disallowed.

All eating areas and washing areas should be clean and separate from all work areas as well as changing areas, in order to keep those areas contaminant free. Before smoking or eating hand washing must be diligently conducted.

***Cancer Causing and Central Nervous System Damaging Agents:***

Exposure to PAH's, PVC's Vinyl Chloride, Coal Tar fumes, trichloroethylene, the various carcinogens that were ingredients added to the Banbury Mixer and the Heated Epoxy Resins, Mercury, MEK, Xylene, Benzene, Toluene, TCE, Lead, all contributed to the toxic chemical chamber in which the GE employees worked. The chamber analogy is used here as there was no make up or fresh air into the plant, and sufficient exhaust of these pollutants out of the plant.

In terms of exposure to the thinning agents or agents that were used to clean hands and other body parts, benzene was an impurity in these agents that would have also contributed to poor health of the employees:

*BENZENE*

- ***Leukemia is often associated with exposure to benzene, which was a widely used solvent in the rubber industry and currently is found as an impurity in other solvent mixtures such as varsol and naphtha (WPIRG, 1982).***

Not only is the literature evidence enough with regards to having benzene as an ingredient in some of the thinning agents, degreasers, and other solvents, the Hygiene report of October 1980, mentioned in section 7 of this report, indicates that benzene was found in the environment.

***Transfer of employees from Armature to Wire and Cable.***

It is pertinent to note that between 1957 to 1960 many employees from armature were transferred to wire and cable and vice versa during the lay off periods to cover the various duties in both departments. Hence exposures to both departments and their solvents and other contaminants therein have to be taken into account as well when considering exposures and diseases incurred. Those employees have to be closely studied from a medical and hygiene perspectives as their exposure would be obvious in their health records, testimonies and current health status.

***Heart Related Conditions:***

In terms of heart related complications that arose in the Wire and Cable Department, the following has been found that may further explain the heart disease and attacks that were realized by some of the employees in this department:

- AS per NIOSH, 2004, the following toxins and physical conditions may contribute to the risks for coronary heart disease: carbon disulfide, nitroglycerin, and carbon monoxide.
- Tobacco smoke, extreme heat and extreme cold are also risk factors for cardiovascular disease in the occupational setting.

The employees in the wire and cable department were exposed to carbon monoxide through the various degradation products during the various process operations. Due to the fact that exhaust systems whether they were in place or not, were usually turned off to enhance the quality of the work, this would cause for by-products and contaminants in the pure form and uncured form to be released to the environment indoors and outside and thus the employees would incur exposures therein. Moreover, the issue with regards to exposure to heat is inevitable as again the exhaust systems that were not always in use would not alleviate any heat, vapours and contaminants from the processes, and this radiant heat would also be a factor in contributing as a risk to heart disease or heart attacks.
Carbon disulfide is utilized as a component in the mixture with regards to the rubber processing. This may have contributed as a risk to the employees exposed to the various chemical mixtures present in this department as well.

***Welding Stainless Steel and no exhaust:***

The welding operation that took place when changes were made to the wire and cable department also contributed to the exposures to the wire and cable employees as well as the employees that were working for the nuclear department. Welding of stainless steel, aluminum and other agents in confined environments without proper ventilation would have also caused employees to incur ill health and diseases.

***Acid Bath***

There was mention of an acid bath that was utilized as a dip tank to clean sheaves from the annealing operations. This acid bath was located in Department 24. All the information with regards to the type of acid in the bath is not available other than it had to be a strong degreasing agent that was utilized that was strong enough to clean the enamel covered sheaves. The employees mention that the sheaves were submersed in the acid bath and were then allowed to drip dry over the bath. As the acid would have evaporated in the employees' work space, it is inevitable that they would have been exposed to the heavy odors and contaminants evaporating in the environment, as the employees indicated that the vapours were "heavy and unbearable."

***Nature of the work process and close proximity to the contaminants.***

To further bombard the exposures that the employees incurred, the actual work practices, whether they be in the form of general operating procedures or the intricate nature of the proximity of the worker to the source of the contaminants, is also a great means by which employees exposure was enhanced and add to the formula of the detrimental factors that have led to health impairment. Several examples include, working in close proximity to the molten lead pots, the asbestos carding machines, the maintenance workers on the roof tops working directly with the accumulated asbestos in the bins without any protection, workers on the catwalk above the formex oven, during trouble shooting or general observation tanks, being directly exposed to the seeping fumes and vapours from the heated enamel or lacquer coated wires, and wires with asbestos insulation.

**CONCLUSIONS:**

If in 1971 the company was not aware of the detrimental effects of asbestos, as observed by the Ministry of Labour inspector, then how did they protect their employees the years prior? This statement and question is fair and is validated by the evidence provided herein.

The MOL documents are evidence enough to confirm that the carding machines were not properly enclosed, the fibres were not controlled, there was no proper protection for the employees with regards to fibres exposure, the sweeping operations would have caused further exposures and although recommended and directed many times, the MOL continued to tell GE management to ensure that employees would not eat on the job, not only in the carding area, but all other areas of Wire and Cable as well. If one reviews the time line provided in Appendix L, with the few MOL documents reviewed and available to OHCOW, the same nonconformance's were repeated year after year and no stringent measures were taken to have the employer take action and comply with the recommendations and directives given by the MOL.

Mr. GH Rajhans's vital evidence given in several documents especially in January, 1971, with regards to the poor asbestos carding conditions and other areas in Wire and Cable, indicate that. It can be stated that the conditions were much worse years prior, as the employer was not fully aware of the extent of harm asbestos has on human health (taken directly from the MOL report – see Appendix K). Many patients, could have been misdiagnosed and denied their claims as the information retrieval system and steps taken to gather evidence were very weak. The MOL reports given herein would have sufficed in given evidence of a questionable and unhealthy workplace.

The company was not addressing all issues in likely time or over at all. The MOL has visited the GE plant on several occasions, noted nonconformances and these nonconformances have been repeated time and time again over the years. This poor management of safety issues and lack of action on recommendations and direct orders given by the MOL is a clear indication of lack of commitment to safety and health of the employees on the part of the employer.

Finally it should be noted here that the statements made by the employees and the processes described are validated in the Ministry of Labour Field Visit Reports that are cited in Section 8 of this report which validate, confirm and provide solid evidence of the testimonies given by the employees, description of the workplace and work conditions, and thus further provide evidence that exposures were more than likely to have contributed if not fully incurred by working at this area at the General Electric Plant.

In all evidence provided in the form of the medical and scientific literature reviews and the company's records:

- Due Diligence was not a priority in all aspects of management processes and health and safety at this workplace. Knowing what the hazards are in the workplace and allowing infractions to continue is a clear indication that health and safety was not taken as seriously as it should have been. Numerous accidents and incidents, employees becoming ill, expiring early in age, or being hospitalized, should have alerted the employer much sooner in the history of this facility that something needed to be done before illness and disease became prevalent There were serious problems with the ways in which health and safety was managed in the workplace and how employees were being affected. All the documents and testimonies presented here as evidence demonstrated that the employer did not properly train the employees on the use and care of personal protective equipment, did not disclose information on the products the employees were utilizing or how to protect themselves against those products did not provide suitable ventilation within the plants or suitable engineering controls for the various equipment that was present in the plant etc. **These facts cannot be ruled out as significant contributors to the exposures, onset of impairment of health, and occupational disease in this workplace.**

- **The Officers of the Occupational Health Branch were diligent in giving some thorough reviews of the workplace, however they were not strict or stringent enough on the directions that were given to the employer and following up on the recommendations/directions that were ordered. The company was repeatedly found to be non conformant on similar items over the years.**

- With regards to the Industrial Hygiene Air quality report (Appendix G), the data presented in the report is questionable as there is lack of information with regards to how samples were taken, what processes were occurring at the time, what time of day they were being conducted as indicated earlier in this report. With that, even with the results presented in this report, it is clear that benzene was a contaminant that was found in the samples, although minimal. Due to the questionable data presented and hygiene testing conducted, this amount of benzene and other chemicals in the samples tested, could have been actually higher than indicated by the testing, or lack thereof. The report, although debatable, proves the point that benzene was indeed present in the atmosphere in which the samples were taken. All in all it is clear there does not appear to be any further sampling, or communication of such results or postage of such documentation within the workplace. As per the Occupational Health and Safety Act, it is the right of the employee to know the hazards of the workplace as well as to have access to reports such as Industrial Hygiene reports from Management (***Section 26 (1) d of the Occupational Health and Safety Act – also refer to Appendix E where management concurs with the fact that they are not diligent in addressing health and safety issues as well as an MOL report that casually refers to this notion as well).***

- As per the critical analysis of the processes, literature review and background information on the various solvents that were utilized at General Electric, it is clear that employees were most likely exposed to these contaminants, to their by products and to the reactive products that are formulated when these products are mixed together or their reactions to heat and simultaneous exposure to other products etc. Furthermore, due to the lack of suitable personal protective equipment and engineering controls and lack of proper health and safety management with regards to administrative controls, eating at the work station, air hose usage, poor housekeeping practices, lack of proper washing instructions, usage of equipment in the absence of proper engineering controls, the nature of the ventilation in the plant, and the fact that there was a significant amount of cancer causing agents plant wide and their careless use, there is enough evidence to link the work relatedness of the employees' debilitating diseases to the unsafe work environment, materials, processes and procedures they were a part of.

- Poor ventilation in the plant, the lack of windows that were able to be opened was not suitable to release plant air to the outside environment, the main aisle way acting as a transporter of contaminants throughout the GE plant all contribute to the health impairments that have been and are being incurred by the former and current GE employees to date.

- Chemicals that were present in the patented formulas of GE cannot be ruled out as causative agents in the development of illness and disease in the employees of the Wire and Cable department at

GE. The MSDSs were not available for review in totality by OHCOW as they were never available to employees or union members alike.

- From the weight of the evidence illustrated and provided, it is clear that there was a lack of rigorous action taken by the employer and its management to make the employees aware of the detrimental health effects that could be incurred by the exposures and levels of contaminants present at the workplace. Moreover, the Ministry of Labour, although they provided directives and recommendations repeatedly, their method of verification of compliance to those directives or timely corrective action on the part of the employer was not enforced. The Occupational Health and Safety Act clearly indicates the precautions and regulations shall be followed when working with cancer causing chemicals or other chemicals as well as letting the employer and employees know how they are obliged to act in a safe manner and ensure that their health and safety is not being compromised. The Act clearly states, that it is the employer's duty to ensure to take EVERY PRECAUTION REASONABLE in the HEALTH AND SAFETY OF THE WORKER. The employer did not work diligently to find the resolve to the problems that were being realized by the employees and their health and how the processes were impacting the workers.

The lack of due diligence on the part of the employer with regards to the issues and evidence provided in this report and failure to ensure that the employer has ***taken every reasonable precaution in the circumstances in the protection of the worker***, cannot be ruled out as another causative agent in the development of occupational illnesses at General Electric.

On behalf of Occupational Health Clinics for Ontario Workers,

***Sonia Lal –MSc.***
***Occupational Hygienist/Health and Safety Specialist***

## 10. REFERENCES

Agency for Toxic Substances and Disease Registry. ATSDR. Toxilogical profile for copper. Prepared by Syracuse Research Corporation under Subcontract No. ATSDR-88-0608-02. US Public Health Service, 1990.

Agency for Toxic Substances and Disease Registry. ATSDR. Public Health Statement for PAH's. URL: http://www.atsdr.cdc.gov

Agency for Toxic Substances and Disease Registry. ATSDR. Public Health Statement for Mercury. URL: http://www.atsdr.cdc.gov/toxprofiles/phs46.html. March , 1999.

Agency for Toxic Substances and Disease Registry. ToxFAQs for Vinyl Chloride. Cas # 75-01-4. URL: http://www.atsdr.cdc.gov/tfacts20.html. November 22, 2004.

Agency for Toxic Substances and Disease Registry. Nitrogen Oxides. URL: http://www.atsdr.cdc.gov/tfacts175.pdf. April 2002.

Agency for Toxic Substances and Disease Registry. 1997. Toxilogical Profile for Vinyl Chloride. Update.(Final Report). NTIS Accession No. PB(*-101132. Atlanta, GA: Agency for Toxic Substances and Disease Registry. 274 pp.

Alternkirch, H et al. Experimental Data on the Neurotoxicity of Methyl-Ethyl-Ketone ( MEK). Experientia. Vol.35. No. 4. 1979.

American Cancer Society. Prevention and Early Detection. Lead. URL: http://www.cancer.org/docroot/PED/content/PED/content

Andjelkovic, D. et al. 1977. Mortality of Rubber Workers with Reference to Work Experience. J. of Occupational Medicine. 19(6): 397-405

Andjelkovic, D. et al. Epidemiologic Studies of Chronic Disease in the Rubber Industry, Rubber Division of American Chemical Society, Cleveland, Ohio, October 4-8, 1977.

Anonymous. Epoxy Resin Hazards Yield to Control Measures. Safety Standards, Vol. 12, No. 3. pp 14-16. 1963

Askergren,A., et al., 1975. Changes in the nasal mucosa after exposure to copper salt dust. Scand. J. Work Enviro. Health. 1:45-49.

Baggett et. al., 2001. Chemistry. URL: http://www.vinylchlroide.com/chemcistry.htm.

Bickis, U. 1994. Investigation of dermally induced airway hyper reactivity to toluene diisocyanate in guinea pigs (dissertation). Kingston, Ontario, Canada: Queens University, Department of Pharmacology and Toxicology.

Blum, S. et al. Stomach Cancer among Rubber Workers: An Epidemiological Investigation,From Dusts and Disease, Pathatox Publishers, 1979.

Brubacher, J.R.: Roofers and Roadbuilders. In: Occupational, Industrial, and Environmental Toxicology, M.I. Greenberg, ed. Mosby-Year Book, Inc., St. Louis, MO (1997).

Boffetta, P.; Jourenkova, N.; Gustavsson, P.: Cancer Risk from Occupational and Environmental Exposure to Polycyclic Aromatic Hydrocarbons. Cancer Causes Control 8:444–472 (1997).

California Poison Control System. CPCS. Mercury and Its Many Forms.
URL: http://www.calpoison.org/public/mercury.html. January, 2002.

Canadian Occupational Safety and Health Website. CANOSH. Feb.9, 1998. URL:http:www.canoshweb.org/odp/html/rp4.htm.

Canadian Center for Occupational Health and Safety: Chemical Profiles: Health Effects of methyl ethyl ketone. URL:http://www.ccohs.ca/oshanswers/chemicals/chem_profiles/mek/health_mek.html?print. [Dec, 1997].

CCOHS: Canadian C of Occupational Health and Safety. Carbon Black. 1997. www.ccohs.ca.

Chong, J.P.; Haines, A.T.; Verma, D.K.: A Pragmatic Approach to Standard Setting—The Example of Coal Tar Products and Asphalt. Ann Occup Hyg 33:197–208 (1989).

Cocco,P. et al. Brain Cancer and Occupational Exposure to lead. 1998. (taken from ACS: URL: www.cancer.org)

Cragle, D.L. et al., 1992. An occupational Morbidity Study of a Populatiion Potentially Exposed to Epoxy Resins, Hardneres, and Solvents. Applied Occupational and Environmental Hygiene, Vol. 7. No. 12., pp. 826-834.

Department of Health Services. Health Evaluation System and information Service. Epoxy Resin Systems. California. URL:http://www.dhs.ca.gov/ohb/HESIS/epoxy.htm.

Environmental Protection Agency (USA). Hydrochloric Acid (Hydrogen Chloride). URL: http://www.epa.gov/ttn/atw/hlthef/hydrochl.html. Nov. 2004.

Environmental Protection Agency (USA). Epichlorohydrin. URL: www.epa.gov/ttn/atw/hlthef/epichlor.html. Nov. 2004.

Environmental Protection Agency. *Health and Environmental Effects Profile for Epichlorohydrin*. EPA/600/x-85/400. Environmental Criteria and Assessment Office, Office of Health and Environmental Assessment, Office of Research and Development, Cincinnati, OH. 1985.

EVC. European Vinyls Corporation. URL: //http:www.evc-int.com/worldofpvc/manufact/htm. 2004.

Falk, H. 1987. Vinyl Chloride induced hepatic angiosarcoma. Princess Takamatsu Symposium. 18:39-46.

Finkelstein, M.M.; Verma, D.; Kurtz, L.A. et al.: Mortality, Cancer Incidence andWorkplace Exposures Among Ontario Construction Workers: Part I: Occupational Exposures. A Research Report for Workplace Safety and Insurance Board of Ontario, Toronto, ON (2002).

Fishbein, L. Chemicals used in the Rubber Industry. Science of the Total Environment. 1991. 101: 33-43.

Fracasso, ME et al. Exposure to mutagenic airborne particulate in a rubber manufacturing plant. Mutat. Res. 1999. 441(1): 43-51.

Gennaro, V et al. 2003. Reanalysis of Mortality in a Petrochemical Plant Producing Vinyl Chloride and Polyvinyl Chloride. Epidemiol Prev. 27:221-225 (in Italian).

Gibbs, GW. Mortality of aluminum reduction plant workers. 1950 through 1957. J. Occup.Med.27:761-770. 1985.

Goldblatt, MW. 1947. Occupational cancer of the bladder. Br.Med.Bull.4:405-417.

Goldsmith, D. et al. 1980. A case- control study of prostate cancer within a cohort of rubber and tire workers. J. of Occ. Medicine. 22(8):533-541.

Halama, J., Becker-Stone, S., Halama, JM. 1985. Hemangiosarcoma of the liver in workers of the PVC industry and other VC-induced diseases with angiologic-dermatologic, hepatologic, radiologic and neurologic symptoms. Radiologe. Jan; 25(1): 22-9.

Hardell, L et al. 1997. Occupational Exposure to Polyvinyl Chloride as a Risk Factor for Testicular Cancer Evaluated in a Case Control Study. International Journal of Cancer. 73: 828-830.

Hayes, RB. The carcinogenicity of metals in humans, Cancer Causes & Controls. 1997;8:371-385

Health Evaluation System and Information Service. Trichloroethylene (TCE). December, 1997.

International Agency for Research on Cancer, IARC. Epichlorohydrin. Group 2a. Vol. 71.1999.p.603.

International Agency for Research on Cancer IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Humans. **VOL.**: 23 (1980) (p. 325)

International Agency for Research on Cancer IARC Monographs on the evaluation of the carcinogenic risk of chemicals to humans. The rubber industry (Group 1). 1987. 332-334.

International Agency for Research on Cancer. IARC Monographs on the Evaluation of Carcinogenic Risk Of Carcinogens to Humans, v28: The Rubber Industry. Geneva: World Health Organization, 1982.

International Agency for Research on Cancer (IARC): IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemical to Humans, Supplement 7, p. 174(1987).

International Agency or Research on Cancer (IARC): Occupational Exposure in Paint Manufacture and Painting. Vol. 47 (1989).

International Agency for Research on Cancer (IARC): Coal Tars and Derived Products, IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemical to Humans. Polynuclear Aromatic Hydrocarbons. Part 4. Bitumens, Coal Tar and Derived Products,
Shale-Oils and Soots, vol. 35, pp. 83–159, IARC, Lyon, France, (1985/1987).

International Program on Chemical Safety. IPCS INCHEM. N-Methyl-2-Pyrrolidone. URL:http://www.inchem.org/documents/icsc/icsc/eics0513.htm. 2001.

Jonsson, BA et al. Human Experimental Exposure to N-methyl-2-pyrrolidone (NMP): toxicokinetics of NMP, 5-hydroxy-N-methyl-2-pyrrolidone, N-methylsuccinimide and 2-hydroxy-N-methylsuccinimide (2-HMSI), and biological monitoring using 2 HMSI as biomarker. Int. Arch. Occup. Environmental Health. 2003 May; 76(4): 267-4.

Kalnas, JJ. et al., 1977. The Rubber Industry: Chemicals, Processors and Cancer, unpublished Paper, Harvard School of Public Health.

Kogevinas, M. et al. 1998. Cancer risk in the rubber industry: a review of the recent epidemiological evidence. Occupational Environmental Medicine. 55(1): 1-12.

Kronoveter, KJ. HETA Report No. TA-77-68, McDaniel Art Studio, Cincinnati, Ohio. 1978

Kurtz, LA., Verma, DK., &Sahai, D. 2003. Coal Tar Pitch volatiles and Polycyclic Aromatic Hydrocarbons Exposure in expansion Joint-Making Operations on a Construction Site: A Case Study. Applied Occupational and environmental Hygiene, (18): 545-552.

Leira, HL et al. Irritant Cutaneous reactions to N-methyl-2-pyrrolidone (NMP). Contact Dermatitis. 1992. September 27 (3): 148-150.

Lewis, R. 1999.Vinyl Chloride and Polyvinyl Chloride. ***Occupational Medicine***. Oct-Dec; 14(4): 719-42.

Li, K. and Yu, S. Esophageal cancer and occupational exposure to rubber: A nested case-control study. Annals of Occupational Hygiene. 2000. 44(5): 355-359.

Lundstrom, N-G. et al. 1997. Cumulative lead exposure in relation to mortality and ling cancer morbidity in a cohort of primary smelter workers. Scandinavian J. Work Environ. Health. 23:24-30.

Lynge, E. et. al., 1997. Organic solvents and cancer. Cancer Causes Control. May;8(3):406-19.

Maier, H. et al., 1997. (article in German). Occupational exposure to paint, lacquer and solvents and cancer risk. HNO. Nov. 45(11) 905-8.

Mathias, C. 1981. Penetrating Effects of Epoxy Resin Systems. Occupational Health and Safety. 50(5): 42-44.

McLaren, S. ed. 1991. Standard of the Highest – from Edison to GE Canada Peterborough 1891-1991. Centennial Committee, GE Canada, Peterborough, Ontario

McMichael, AJ. et al., 1976. Mortality among Rubber Workers: Relationship to Specific Jobs. J. Of Occ. Med. 18(3):17 &185.

McMichael, AJ et al. 1976. Chronic Respiratory Symptoms and Job type within the Rubber Industry. J of Occ. Medicine. 18(9): 611-617

McMichael. AJ. et al. 1976. Cancer Mortality Among Rubber Workers: An epidemiological Study. Annals Of the New York Academy of Sciences, 271: 125-137.

McMichael, AJ., et al. 1975. Solvent Exposure and Leukemia Among Rubber Workers: An Epidemiological Study. J. of Occ. Med.17(4): 234-239

Merget, R. et al. 2002. Health hazards due to the inhalation of amorphous silica. Archives of Toxicology. Vol 75, No. 11-12. p.625-634.

Monson, R. et al. 1976. Mortality Among Rubber Workers. American Journal of Epidemiology. 10:284-295

National Institute of Occupational Safety and Health. NIOSH Pocket Guide t Chemical Hazards. URL: http://www.cdc.gov/niosh/npg/npgd0332.html.

National Safety Council. Hydrochloric Acid Chemical Backgrounder. URL: http://www.nsc.org/library/chemcial/Hydrochl.htm.

National Safety Council. NSC. Copper Chemical Backgrounder. URL://http://www.nsc.org/library/chemcial/copper/htm

National Sciences Library. Epichlorohydrin Chemical Backgrounder. URL:http://www.nsc.org/library/chemcial/Epichlor.htm

National Occupational Health and Safety Commission. Australian Government. Exposure Standards. Epichlorhydirn. URL: http://www.nohsc.gov.au/OHSInformation/Databases/Exposurestandards/az/epichlorhydrin.htm.

National Institute for Occupational Safety and Health. Occupational Heart Disease. URL: http://www.cdc.gov/niosh/topics/heartdisease/. 2005.

National Safety Council. Hydrochloric Acid Chemical Backgrounder. URL: http://www.nsc.org/library/chemcial/Hydrochl.htm.

National Institute of Occupational Safety and Health. NIOSH Pocket Guide t Chemical Hazards. URL: http://www.cdc.gov/niosh/npg/npgd0332.html.

National Institute of Occupational Safety and Health. Current Intelligence Bulletin 30. Epichlorohydrin. October 1978. No. 79-105. URL: http://www.cdc.gov/niosh/79105_30.html.

Naval Facilities Engineering Service Center. N-Methyl Pyrrolidone Based Cleaners and Strippers. URL: http://p2library.nfesc.navy.mil/P2_Opportunity_Handbook/5_10.html. August, 2003.

NCI. 1978.Vinyl Chloride: An information resource. DHEW. (NIH) Publication No. 79-1599.Bethesda.MD: National Institutes of Health.

Nelsen, L. et al. 1975. Vinyl Chloride Monomer Emissions from Polyvinyl Chloride Processing Industries. Report To: United States Environmental Protection Agency, Research Triangle Park, North Carolina

New Jersey State Department of Health. NJSDH. He Health Effects of Mercury. URL:http://www.pp.okstate.edu/ehs/training/mercury.htm.

Occupational Disease Panel. Report to the Worker's Compensation Board in Stomach cancer in Ontario Gold Miners August, 1996. OCP Report # 16. Toronto, Ontario. URL:www.canoshweb.org/odp/html/rpt16.htm.

Occupational Safety and Health Administration. Lead> Secondary Lead Smelter eTool. URL: http://www.osha.gov/SLTC/etools/leadsmelter/refiningcasting/refining.html.

Occupational Safety and Health Administration. Paraffin Wax Fume. URL:http://file://D:\nioshdbs\tox\8002-74.htm. 1989.

Ohlson, CG., Hardell, L. 2000. Testicular cancer and occupational exposures with a focus on xenoestrogens in polyvinyl chloride plastics. Chemosphere. May-Jun. 40(9-11): 1277-82.

Park, R. et al., Mortality Analyses Using United Auto Workers' Cohorts. NIOSH 1988: 205-222.

Pirastu et al.1990. Mortality from liver disease among Italian vinyl chloride monomer/polyvinyl chloride manufacturers. American Journal of Industrial Medicine.17(2):155-61.

Resene Paints Limited. URL: http://www.resene.ca.nz/comn/safety/lacquers.htm. 2004.

Rockette, HE.et al. 1983. Mortality studies of aluminum reduction plant workers. Potroom and carbon department. Journal of Occupational Medicine. 25:549-557.

Rosenstock, L. et al. 1986. Organic Compounds in Rubbers, Plastics and Synthetic Textiles. Clinical Occupational Medicine; Philadelphia, Pennsylvania. W.B Saunders Company, pp. 230-236.

Seaton, A., Morgan, WKC. 1984. Toxic gases and fumes. In: Morgan WKC, Seaton, A, editors. Occupational lung diseases. Philadelphia: WB Sanders Co.; p. 609-642.

Seaton, A. Silicates and Disease. Occupational Lung Diseases, Second Edition, W.K.C. Morgan, A. Seaton, Editors; Philadelphia, Pennsylvania, W.B. Saunders Company, pages 295-322. 1984.

Solomon, GM et al. Stillbirth after occupational exposure to N-Methyl-2-Pyrrolidone. A case report and review of the literature. Journal of Occupational and environmental Medicine. 1996. Jul;38(7):705-13.

Solvay Chemicals - Products: Epichlorohydrin Connected, Nov. 2004. URL: http://www.solvaychemicals.com/product/description/0,0,-_EN-1000027,00.html.

Spagna, C. et al., Spray Varnishing: Occupational Hazard and Prevention Standards. Folia Medica, (Naples) Vol. 55, N0 9-10, pp. 343-352. 1972.

Spectrum Laboratories : Chemical Fact Sheet - Cas # 106898, 2004

Steenland, K. and Boffetta, P. 2000. Lead and Cancer in Human: Where are we now? American Journal of Industrial Medicine. 38: 295-299.

Steingraber, S. Update on the Environmental Health Impacts of Polyvinyl Chloride( PVC as a building Material: Evidence from 200-2004. A commentary for the U.S. Green Building Council on behalf of the Healthy Building Network. April 2, 2004.

Stern, F.B.; Ruder, A.M.; Chen, G.: Proportionate Mortality Among Unionized Roofers and Waterproofers. Am J Indus Med 37:478–492 (2000).

Theriault, G. et al. 1981. Reducing Aluminum: An occupation possibly associated with bladder cancer. Can. Med. Ass. Journal. 124: 419-425.

Theriault, G. et al. 1984. Bladder Cancer in the aluminum industry. Lancet.1:947-950.

Toxicity and Safe Handling of Rubber Chemicals: BRMA Code of Practice, British Rubber Manufacturers Association, Birmingham, 1978.

U.S. Environmental Protection Agency. Epichlorohydrin Health Advisory. Office of Water, Washington DC. 1987.

U.S. Department of Health and Human Services, Public Health Service, National Toxicology Program. Vinyl Chloride CAS No.75-01-4. First Listed in the First Annual Report on Carcinogens. 9th Report on Carcinogens Revised January 2001 http://www.mindfully.org/Plastic/Vinyl-Chloride-Carcinogen-EHIS.htm

Van Alphen, J. et al. 1977. Rubber Chemicals. Plastics and Rubber Research Institute, Holland.

Waterloo Public Interest Research Group. 1982. "A Rubber Worker's Guide to Occupational Health." By: P.Weller,C.Mockler, A.McGarvey and the WPIRG.

Welch, L. et al. Chronic Neuropsychological and Neurological Impairment following Acute Exposure to a Solvent Mixture of Toluene and Methyl Ethyl Ketone ( MEK). Clinical Toxicology. Vol 24. No. 4. pp. 435-445. 1991.

Whitman, NE. Letter to TLV Committee from Industrial Health Engineering, Bethlehem (PA): Bethlehem Steel Col; 1957 (March 12, 1957).

Whitman, NE. Letter to TLV Committee from Industrial Health Engineering. Bethlehem (PA): Bethlehem Steel Co; 1962 ( April 24, 1962).

Wong et al. 2002. An increased standardized mortality ratio for liver cancer among polyvinyl chloride workers in Taiwan. Occupational and Environmental Medicine. 59:45-409.

Wong, RH et al. 2003. Interaction of Vinyl Chloride Monomer Exposure and Hepatitis B Viral Infection on Liver Cancer. Journal of Occupational and Environmental Medicine.April;45(4): 379-83.

Workplace Safety and Insurance Appeals Tribunal. Asthma and the Workplace. URL:http://www.wsiat.on.ca/english/mlo/asthma_screen.htm. November 1996.

## 11. APPENDIX

- A -PLANT WIDE LAYOUT
- B -WIRE AND CABLE EQUIPMENT AND PROCESS LAYOUT
- C –MURIATIC ACID – GENERIC MSDS
- D- DOCUMENTS FROM GENERAL ELECTRIC
- E- GE MATERIAL SAFETY DATA SHEET FOR ROYALENE
- F- DOCUMENT FROM GE – JUNE 1979 – ADDRESSED TO PETE HOW – BUSINESS AGENT
- G- REPORT ON INDUSTRIAL HYGIENE SURVEY CONDUCTED AT CGE PETERBOROUGH OCTOBER 1980
- H-XYLENE OHCOW FACT SHEET
- I-BENZENE OHCOW FACT SHEET
- J-LITERATURE REFERENCE BY BORGSTEDT, H. ET AL.
- K- MINISTRY OF LABOUR REPORTS
- L - TIMELINE OF OBSERVATIONS MADE IN THE MOL REPORTS
- M- DOCUMENT FROM THE UNITED ELECTRICAL, RADIO AND MACHINE WORKERS OF AMERICA – PRESENTED TO THE ONTARIO NEW DEMOCRATIC PARTY CAUCUS TASK FORCE ON OCTOBER 5, 1982

# APPENDIX A -PLANT WIDE LAYOUT

# APPENDIX B -WIRE AND CABLE EQUIPMENT AND PROCESS LAYOUT

## APPENDIX C –MURIATIC ACID – GENERIC MSDS

# APPENDIX D- DOCUMENTS FROM GENERAL ELECTRIC

## APPENDIX E- GE MATERIAL SAFETY DATA SHEET FOR ROYALENE

# APPENDIX F- DOCUMENT FROM GE
# JUNE 1979 – ADDRESSED TO PETE HOW – BUSINESS AGENT

# APPENDIX G- REPORT ON INDUSTRIAL HYGIENE SURVEY CONDUCTED AT CGE PETERBOROUGH OCTOBER 1980

# APPENDIX H-XYLENE OHCOW FACT SHEET

# APPENDIX I-BENZENE OHCOW FACT SHEET

# APPENDIX J-LITERATURE REFERENCE BY BORGSTEDT, H. ET AL.

# APPENDIX K – MINISTRY OF LABOUR REPORTS

# APPENDIX L – TIMELINE OF OBSERVATIONS MADE IN THE MOL REPORTS

# APPENDIX M:

# DOCUMENT FROM THE UNITED ELECTRICAL, RADIO AND MACHINE WORKERS OF AMERICA – PRESENTED TO THE ONTARIO NEW DEMOCRATIC PARTY CAUCUS TASK FORCE ON OCTOBER 5, 1982

# APPENDIX J-LITERATURE REFERENCE BY BORGSTEDT, H. ET AL.

EPOXY (E)

301

Reference Date:

Chapter 12

# TOXICITY, HAZARDS, AND SAFE HANDLING

Harold H. Borgstedt
University of Rochester
School of Medicine and Dentistry
Rochester, New York
and
Charles H. Hine
University of California
San Francisco Medical Center
San Francisco, California

low irritating and sensitizing potential of the latter.

## D. Toxicity of the Curing Mixture

During the curing process of the working mixture the reactive groups of the resins and the hardeners are progressively consumed. Hence the toxicity and irritancy of the curing mixture depend on the degree to which curing has progressed. The toxicity and irritancy of the initial uncured mixture are comparable to those of the individual components, whereas the almost fully cured resin will be much less toxic. No cases of systemic intoxication after percutaneous exposure to cured resin have been reported.

The curing process is often exothermic which may lead to considerable self-heating of the curing mixture. This may cause thermal burns or combined thermal-chemical burns, especially if the mixture contained highly caustic liquid-amine hardeners. Self-heating or external heating may also lead to the generation of vapors of volatile low-molecular-weight epoxy resins, especially of the reactive diluents, or volatile amines. Both of these may show the toxicity and irritancy discussed under the individual components. Accordingly adequate ventilation is a necessary prerequisite to the safe handling of these materials during processing.

## E. Toxicity of the Fully Cured Resins

The fully cured resins are practically inert substances with no significant degree of toxicity if no unreacted components are present. Bourne et al. [1] showed that heat treatment markedly reduced surface pH and the number of bubbles in the finished product. This is an indication of lowered residual amine content and hence reduced irritancy. Mixtures allowed to cold-cure under conditions of high atmospheric humidity gave the highest pH values.

The fully cured resins may contain up to 1% of unreacted amine hardeners [1]. This amount is insufficient to cause systemic toxicity but may lead to irritation and sensitization, especially of the respiratory tract, when finished epoxy resins are subjected to dust-producing operations like filing, sanding, or drilling. Joyner and Pegues [45] reported the incidence of severe respiratory irritation and mild nephrotoxicity in six laborers who had removed epoxy resin-concrete with air hammers. Although they could not positively identify the offending agent, xylene, a known thermodecomposition product of epoxy resins, was strongly implicated. This hypothesis seems highly unlikely, however. It is hard to accept that the concrete-breaking operation supplied sufficient energy to decompose the resin and more particularly to give toxic levels of xylene. Dust may have been the carrier of the irritating agent because there were no further problems when the workers used dust respirators.

Skin irritation may also occur when devices manufactured from epoxy resins are left in contact with the skin for long periods of time. A case of severe dermatitis in an amputation stump has been reported [1] after contact with a prosthesis patched with an epoxy resin. The prosthesis caused no further problems after the patch was recured at 80°C for 3 days, which presumably removed traces of unreacted hardener by further chemical reaction.

By thermodecomposition of a cured bisphenol A type of resin, Leong and McFarland [46] produced vapors that were fairly toxic to rats on inhalation. The predominant cause of death was pulmonary edema. The authors stated that pyrolysis products may be a potential hazard to workers in industry. The combustion products of epoxy resins, on the other hand, were found to be nontoxic. Thrune [47], concerned with the possibility of toxic vapors arising from smoldering combustion of halogenated epoxy formulations, found only the easily noticed halogens and hydrogen halides but no phosgene or other unusual or highly toxic substances.

## III. INDUSTRIAL HAZARDS

Recorded industrial experiences with epoxy resins during the last 3 decades have delineated which of the toxic effects of these compounds are likely to lead to significant health problems and which are not. The most important problems are the following:

1. The irritation of surface tissues by components of the uncured resin system.

2. The sensitization of surface tissues. It must be emphasized here that the pathological reactions of the skin are not an expression of systemic toxicity, but a local response, caused by local contact with irritating agents.

3. Depression of the blood-forming organs (bone marrow). ✓

4. Central-nervous-system depression.

5. Carcinogenicity ✓

NOTE

Although effects 3 through 5 are of much less widespread occurrence, they are potentially so dangerous that they must be taken into account.

Only the uncured epoxy resins appear to possess the potential to cause the latter three effects; evidence of systemic intoxication caused by amine hardeners has been sporadic and insignificant. The fully cured resins have virtually no systemic toxicity.

## A. Skin Irritation

### 1. Incidence

Pathological skin disorders (dermatoses) have been observed in many industries. In electrical, electronic, and metal-bonding operations the incidence of dermatoses has been rather high [48. 49] whereas in lacquer and paint factories it has been much less common, presumably because the operators were more accustomed to handling and protecting themselves from hazardous chemicals [50]. The epoxy resins are not unusual in this respect; the introduction of almost every new plastic has initially lead to outbreaks of skin problems in the affected industrial workers [51]. Early experiences with these materials probably give the best estimate of the inherent hazards because protective measures had not matured to the present level. The first problems were reported only a short time after large-scale industrial production of the epoxy-resin system components had begun in about 1947.

Dernehl [32] saw 14 cases of dermatitis among 46 exposed workers (an incidence of 34%) in a plant manufacturing ethylenediamine. The cases varied in severity; three workers had to be transferred, others were able to continue work at the amines unit. The cases requiring transfer occurred after 1 year or less, but of five workers exposed for over 3 years, four developed skin changes. Dernehl quotes from the first recorded incidence of skin irritation and blistering by ethylenediamine [52]. The incidence of dermatoses among the workers during the hot months (in Texas) was twice that during the cool months.

Welcker [53] observed development of seborrheic dermatitis in 14 female workers in an electrical equipment plant. The resin mixture was handled repeatedly without protective measures, and the resin-coated assemblies were heated. Since the cases mostly occurred within a radius of about 10 yards of the work stations where the resins were heat-cured without ventilation and problems also occurred in workers who did not directly handle the materials, Welcker concluded that most of the irritations were due to vapor exposures. He observed that workers with seborrheic skin were particularly prone to develop pathological skin changes. In this study the incidence was markedly higher in winter, probably because of lack of ventilation.

Pletscher et al. [54] studied 20 workers exposed to both resins and hardeners. The workers were pouring, dispensing, and spraying the materials without any protection. Pletscher et al. divided them into three groups: six workers never exhibited skin changes; eight workers showed intermittent mild or moderate skin changes without loss of time; six workers showed severe skin changes leading to loss of time or transfer to other jobs. The severity of the skin changes did not depend on the duration of exposure so much as on what Pletscher calls "endogenous factors": a proneness to develop allergic reactions of the skin. Most of the workers sensitive to epoxy resins and hardeners were also sensitive to such materials as formalin and floor wax. Improvement of handling techniques reduced or prevented the occurrence of skin symptoms, even in a number of previously sensitized individuals.

In 1957 Grandjean [55, 56] investigated the incidence of dermatoses in 11 factories manufacturing electrical equipment. The operations were mixing of the resins, manual or mechanical pouring, casting and removal of excess uncured resin from work pieces by wiping or later, when hardened, by tooled removal. The workbenches as well as the tools, clothes, and hands of the operators were found to be contaminated. Organic solvents were employed for removing materials from the skin. Under these circumstances the incidence of dermatoses classified as "slight" was 21% and of "severe" dermatoses 22%, for a total incidence of 43%. Contact with liquid resins or their components was responsible for this incidence. Amine vapors were sampled at the work stations and invariably found to be below the limits of measurement (0.15 μg/l of air).

Malten [57], in 1956, observed an incidence of about 10% among workers in an aircraft factory. Bourne et al. [1] inspected numerous factories in Great Britain and found the rates of incidence to vary from 20 to 100%. They relate a personal communication by Reynard, who estimated the incidence of signs of dermatitis in workers in an automobile-body plant to be near 100%. Similar rates of incidence in various industries have been reported by Bourne et al. [1, 58-60] and numerous other workers [48, 54, 61-70]. In most cases it is not clear which components of the resin systems caused the trouble.

These rather high rates of incidence reflect early industrial experiences, not, generally, present ones. Two factors mainly contributed to the decrease: much better technical safety precautions of the kind to be discussed later and the development of much safer hardeners, such as the alkanolamines, amine salts, and amine adducts.

## 2. Symptomatology

Because the symptoms of surface-tissue irritation caused by epoxy compounds, hardeners, and the curing mixture are very similar, they can be considered together. Furthermore, in the usual industrial exposures, it is generally not possible to separate the effects of the individual components because all of them are handled at the same time by most workers.

Contact with liquid materials leads to the rapid development of more or less sharply localized lesions in the affected areas, mostly over the hands and the arms. The severity of the l sions depends on the nature of the material, the duration of exposure, the means employed to remove the materials, and endogenous factors.

The mildest cases of contact dermatitis show erythema, swelling, and often pruritus, which may be intolerable. In more severe cases there is early vesiculation, weeping of the moist lesions, and, later, crusting and scaling, punctate erythema, and folliculitis. Scratching of pruritic areas often leads to excoriations. In the most severe cases there may even be outright, more or less deep, necrosis and exfoliative dermatitis. The nail beds are particular danger zones because complete removal of the offending agents may be difficult or impossible. Serious paronychias have been observed [1]. Bourne et al. [1, 59] described two cases in males where resin material was transferred, while urinating, from the barrier cream-protected hands to the, of course unprotected, genitals with "unfortunate results."

THREE WOW CIUS

Direct splashes of liquid materials in the eyes cause, depending on the material and the amount involved, conjunctivitis and pain, and in severe cases corneal damage. The "halo effect" and the inability to focus described by some affected persons is due to corneal edema, usually caused by amine hardeners.

Grandjean [56] distinguishes two stages of irritation. The initial stage, which may last from a few days to several months, is characterized by erythematous itching patches, located predominantly on the face and the upper extremities. Recovery takes 2 to 3 weeks and is accompanied by scaling. Cessation of work is usually not necessary. The sites of eruptions in the second stage, which follows the first if contact is continued or resumed, are the same. The lesions are papulovesicular and severely pruritic. This leads to scratching, breakdown of the vesicles, excoriations--in short, a wet eczema. Work must be discontinued if this stage is reached. Healing occurs over several weeks, with scaling. Patch tests show sensitivity to resins, amines, or both in so many cases that the secondary lesions should mostly be considered as sensitivity reactions rather than signs of primary irritation.

Individual differences in the sensitivity of the skin have been described [1]. Some workers tolerated resin or amine splashes on the skin without ill effects; others showed minimal reactions on the first few contacts and were then able to tolerate further exposures without ill effects. It is not clear whether this is due to immunological processes or to mechanical toughening of the skin. This effect, however, appears to be less common with the components of epoxy-resin systems than with other industrial chemicals. It was noted very early [53] that it is often difficult or impossible to separate the skin changes caused by primary irritation from those caused by sensitization. Sometimes the time course of the occurence of the dermatoses after exposure will provide the necessary clues, but often the superimposition of direct irritation on sensitivity reactions or vice versa makes a clear-cut diagnosis impossible.

If heat is evolved or applied during the curing process, exposure to vapors leads to harmful effects on the skin and the respiratory tract. The amines are generally considered to be the worst offenders, but, since heat is generated by or applied to the complete resin mix only, the epoxy compounds, especially the monomeric reactive diluents, may also cause or at least contribute to irritation. Welcker [53] already observed that although hands, arms, and the neck may be involved, the face is most consistently and most severely affected. In Morris' experience [44, 71] the central third of the face (nose, adjacent portions of the cheeks, upper lids, and, especially, the eyelids) was most commonly affected. Savitt [70] also emphasized the particular sensitivity of the eyelids. In more severe exposures the eyes themselves may be affected, and conjunctivitis may develop.

Care must be taken in the diagnosis of the dermatoses to exclude those caused by other factors, such as other chemicals used in manufacturing, cleaning agents (including certain soaps containing phenol [7]), and fungal infections.

Aromatic amine hardeners or liquid mixtures containing them may stain the skin yellow or brown.

Some of the solid organic acids or anhydride-type hardeners may sublime from the curing mixture when heat is applied. The vapors may permeate nonprotective clothing, and the materials may sublime and persist, thereby occasionally causing dermatitis of unexposed (i.e., clothed) body areas [44, 72].

Neoplastic skin changes have not been observed in humans, but the results of the animal experiments discussed earlier should be remembered because of the potential seriousness of this hazard.

# APPENDIX I-BENZENE OHCOW FACT SHEET

Occupational Health Clinics for Ontario Workers Inc.
Centres de santé des travailleurs (ses) de l'Ontario Inc.

**Toronto Clinic**
970 Lawrence Ave. W. Suite #110
Toronto, ON M6A 3B6
Tel: 416-449-0009 or 1-888-596-3800
Fax: 416-449-7772
E-mail: toronto@ohcow.on.ca
www.ohcow.on.ca

# BENZENE

## What is benzene?

- a hydrocarbon which appears as a clear, colourless liquid
- highly flammable, giving off flammable vapours that are almost 3 times heavier than air
- may exist as a liquid or vapour at normal temperatures and pressures
- occurs naturally in the environment mainly as a result of automobile exhaust and cigarette smoke, so everyone is exposed to some degree

## What are the uses of benzene?

- used as a solvent in the synthetic rubber industry and in the processing of paints
- use in industry has declined considerably but often present in trace quantities in petroleum and aromatic solvents (eg. toluene)
- minor component (less than 2.5%) of gasoline sold in Canada

## How is benzene absorbed into the body?

- main route of exposure occurs through breathing vapours and mists
- liquid benzene is absorbed by swallowing or absorption through skin
- will also attack fatty layer of skin and continuous contact will lead to dermatitis
- minor ingestion may occur through contamination of food, drink, chewing gum or cigarettes brought into the work area or eating with contaminated hands
- absorbed benzene tends to move to fatty tissues and builds up in the bone marrow and central nervous system
- persons under 18 should be protected from exposure since they have a lower resistance to bone marrow poisons
- pregnant women and nursing mothers should not be exposed and special precautions are necessary where women of childbearing age are exposed

## What are the health effects of benzene?

Benzene is a designated substance in Ontario and if it is suspected to be used in the workplace, an assessment must be carried out to determine the need for a control program.

- the Ontario benzene regulation requires that a worker's time-weighted average exposure (TWA) be reduced to the lowest practical level with the objective of a TWA concentration of no more than 1 ppm (3.2 mg/m$^3$)

- the Ontario benzene regulation states that the TWA concentration in the workplace shall not exceed 15 ppm or 48 mg/m$^3$

- the United States Occupational Safety & Health Administration (OSHA) recommends an 8-hour TWA of 1 ppm and a short-term limit (STEL) of 5 ppm; an action level of 0.5 ppm was established to encourage lower exposures for employees

- the American Conference of Governmental Industrial Hygienists has recommended lowering the TWA to 0.1 ppm (0.3 mg/m$^3$)

**What should you do if you are exposed to benzene in the workplace?**

- contact the worker representative on the joint health and safety committee

- determine whether or not a workplace assessment has been conducted and whether or not there is a control program for benzene in place

- If you are concerned about your exposure to benzene see a doctor

- call the Occupational Health Clinic for Ontario Workers in your area for assistance with hygiene and medical evaluations

# APPENDIX H-XYLENE OHCOW FACT SHEET

Occupational Health Clinics for Ontario Workers Inc.
Centres de santé des travailleurs (ses) de l'Ontario Inc.

**Toronto Clinic**
970 Lawrence Ave. W. Suite #110
Toronto, ON M6A 3B6
Tel: 416-449-0009 or 1-888-596-3800
Fax: 416-449-7772
E-mail: toronto@ohcow.on.ca
www.ohcow.on.ca

# XYLENE

## Identification

Xylene is also known as dimethylbenzene. Xylene is a common name for any combination of the following:

| | | |
|---|---|---|
| * 1,2-dimethylbenzene | (ortho-xylene, o-xylene) | CAS #: 95-47-6 |
| * 1,3-dimethylbenzene | (meta-xylene, m-xylene) | CAS #: 108-38-3 |
| * 1,4-dimethylbenzene | (para-xylene, p-xylene) | CAS #: 106-42-3 |

The general CAS # for the xylene family (that is, a mixture of the above) is 1330-20-7.

The share of m-xylene generally makes up about 40% to 60% of all xylene and o-xylene and p-xylene comprise about 10% to 20% each.

Xylene is a clear, sweet-smelling liquid. It is used as a solvent in paints, varnishes, glues and printing inks, in the formulation of pesticides, in the rubber and leather industries as well as in histological (hospital) laboratories.

The odour threshold for xylene is 200 parts per million (ppm).

## Hazard Summary

The major hazards encountered in the use and handling of xylene stem from its toxicologic properties and flammability.

Occupational exposure to xylene is probably most significant in the manufacture and application of xylene containing chemicals, for example: paints and varnishes, and when handling pure xylene for cleaning purposes and in histology. Because manual work is frequently involved exposure is both by inhalational (breathing) and dermal (skin).

Xylene is ignitable by heat, sparks and flame (flash point: 29 degrees C) and may do so explosively in an enclosed area. Also, vapour may travel a considerable distance to a source of ignition and flash back. The heat of a fire may cause containers to explode and/or cause thermal breakdown of xylene, producing irritating or poisonous gases.

## Acute Health Effects

Exposure to xylene by inhalation, skin contact or ingestion can cause irritation of the eyes, nose and throat at levels above 200 ppm. Xylene is a central nervous system depressant that produces headaches, nausea and vomiting, tiredness and stomach upset at levels informed of the exposure hazards to xylenes;

* on skin contact with xylenes, immediately wash or shower to remove the chemicals; at the end of the workshift, wash any areas of the body that may have had contact with xylenes, whether or not known skin contact has occurred;

* Do not eat, smoke or drink where xylenes are handled, processed or stored, since the chemical can be swallowed; wash hands before eating and smoking.

**Personal Protective Equipment (PPE)**

Workplace controls are more appropriate than personal protective equipment. However, for some jobs (such as work outdoors, confined space entry, jobs done occasionally or jobs done while workplace controls are being installed), ppe may be necessary.

The following guidelines are recommended but they may not apply to every situation:

*To avoid skin contact with xylenes, wear protective gloves. A suitable material is polyvinyl alcohol (PVA). Have a safety shower/eyewash fountain readily available in the immediate work area;

*To avoid eye contact wear chemical-splash goggles. A face shield may also be necessary depending on the particular situation;

*Where the vapour concentration is unknown or excessive, wear an approved full facepiece respirator with an organic vapour cartridge. A full facepiece powered air purifying respirator will provide increased protection;

*Where the potential for high exposures exists, use a NIOSH approved supplied-air respirator with a full facepiece operated in the positive pressure mode or with a full facepiece, hood or helmet in the continuous flow mode;

*If while wearing a filter, cartridge or canister respirator, xylenes can be detected (that is, by smell or by taste), leave the area immediately. The face seal should be checked to ensure that it is still good and if it is, replace the filter, cartridge or canister. If the seal is no longer good, a new respirator may be required;

*Depending on the exposures in the workplace, a combination of filters, pre-filters, cartridges or canisters may be required to protect against different forms of the chemical (vapour and mist) or against a mixture of chemicals.

If respirators are a necessity in a particular workplace, a respirator program must be instituted by the employer and should include: respirator fit testing, requirements for worker training and medical examinations.

**Occupational Exposure Limits**

For measuring xylene in air, the standards used in Ontario right now (Regulation 654/86 - Regulation respecting Control of Exposure to Biological or Chemical Agents) are based on

# APPENDIX G- REPORT ON INDUSTRIAL HYGIENE SURVEY CONDUCTED AT CGE PETERBOROUGH OCTOBER 1980

John EPOXY (F)

Canadian General Electric

SUBJECT: Report on Industrial Hygiene Survey
Conducted at C.G.E. Peterborough
October 20/21, 1980.

COPIES: HR Hosein
B Bergey
L Chun
K Faggetter
F MacDonald
R Osborne
F McMullen

To: Mr. Lorne Read, Peterborough.

Health, Safety and Environment Section
Corporate Human Resources Operation
December 17, 1980.

A survey was conducted at C.G.E. Peterborough to determine the composition and quantity of materials emitted from oven #2 during the curing of the epoxy resin on a large stator. Several complaints have arisen from those within building #7 as well as many outside who have had to walk through a "courtyard" contaminated with smoke and an irritating odour which occured as a result of downdraft air currents carrying the emissions from the smokestack (of the oven) into this area.

## RESULTS

Table 1 - Contaminant Concentrations

21 chemicals

| Possible Structure | Tube Number | Quantity in Tube (µg) | Volume Sampled (l) | Volume Sampled ($m^3$) | Concentration ($mg/m^3$) | TLV (mg |
|---|---|---|---|---|---|---|
| 1 Benzene | 1 | 0.7 | 20.4 | 0.020 | 0.035 | 3 |
| 2 Toluene | 1 | 0.5 | 20.4 | 0.020 | 0.025 | 37 |
| Benzene | 2 | 6.6 | 23.1 | 0.023 | 0.287 | 3 |
| Toluene | 2 | 6.0 | 23.1 | 0.023 | 0.261 | 37 |
| 3 Ethane | 3 | 5.0 | 23.0 | 0.023 | 0.217 | Simpl Asphy |
| Benzene | 3 | 0.4 | 23.0 | 0.023 | 0.017 | 3 |
| 4 Xylene | 3 | 0.1 | 23.0 | 0.023 | 0.004 | 43 |
| 5 Cresol | 3 | 0.1 | 23.0 | 0.023 | 0.004 | 2 |
| 6 Trimethyl benzene | 3 | 0.1 | 23.0 | 0.023 | 0.004 | 1[illegible] |
| 7 [illegible]etylene | 4 | 30 | 26.5 | 0.027 | 1.11 | Simpl Asphy |

able 1 Cont.d

| Possible Structure | Tube Number | Quantity in Tube (µg) | Volume Sampled (1) | Volume Sampled ($m^3$) | Concentration ($mg/m^3$) | TLV-' (mg/ |
|---|---|---|---|---|---|---|
| Carbon dioxide (grouped together as possible anylite) | 4 | 100 | 26.5 | 0.027 | 3.70 | 900 |
| Propane | 4 | | | | | Simple Asph |
| Formaldehyde | 4 | | | | | 3. |
| Vinyl Alcohol | 4 | | | | | – |
| Toluene | 4 | 80 | 26.5 | 0.027 | 2.96 | 37 |
| Phenol | 4 | 54 | 26.5 | 0.027 | 2.00 | 1 |
| Heptane (grouped together as possible anylite) | 4 | 30 | 26.5 | 0.027 | 1.11 | 160 |
| 4-Pentenoic Acid | 4 | | | | | – |
| Hexaldehyde | 4 | | | | | – |
| Cyclohexanol | 4 | | | | | 20 |
| Dimethyl Phenol (Cresol) | 4 | 20 | 26.5 | 0.027 | 0.741 | 2 |
| ylene | 6 | 14 | 45 | 0.045 | 0.31 | Simple Asphyxi |
| Propionaldehyde | 6 | 200 | 45 | 0.045 | 4.44 | – |
| Toluene | 6 | 74 | 45 | 0.045 | 1.64 | 37 |
| Dihydroxy Phenol (hydroquinone) | 6 | 27 | 45 | 0.045 | 0.60 | |
| Carbon Dioxide | 8 | 150 | 45 | 0.045 | 3.33 | 90 |
| Propane | 8 | | | | | Simple Asphyxi |
| Acetyaldehyde | 8 | | | | | 1 |
| Toluene | 8 | 85 | 45 | 0.045 | 1.89 | 3 |
| Xylene | 8 | 20 | 45 | 0.045 | 0.44 | 4 |

NOTE: 1) Only those materials indicating a measureable "quantity in tube" are indicated above (as per Peninsula Tables (Appendix 1) ).

2) Tenax tubes 6 and 8 were obtained October 8, 1980 to determine the feasibility of using Tenax tubes as an adsorbing medium.

3) See Appendix 2 for position of samplers.

NOTE: 4) Tube 4 has two groups of 4 chemicals where each group may be a possible anylite. Tube 8 has one group of 3 chemicals which may also be a possible anylite. Due to the inability of the mass spectrometer to differentiate which of these chemicals is the actual anylite, it is difficult to allow comparisons between them and the TLV to be made.

The six Tenax tubes submitted to Peninsula Chemical Analysis Limited (tubes 1-4 taken at a 100 ml/min flow rate the night of October 20/21, 1980, and the tubes 6-8 taken at a 1.5 l/min flow rate October 8, 1980) were analyzed using a mass spectrometer. Tubes 6 and 8 were taken primarily to determine the feasibility of using Tenax as an adsorbing medium for the unknown contaminants being released during the curing of the resin (M6860) of stators (October 20/21, 1980, stator 505-1054). Tubes 1-4 should be looked at most closely since the lowe flow rate allows a greater time period for the tenax to adsorb the contaminants.

According to Dr. R.J. Smythe (Director of Peninsula Chemical Analysis Limit the mass spectrometer technique is a qualitative rather than a quantitative technique thereby indicating that the concentrations of contaiminants are approximate only. As can be seen in the results section, the contaminant concentrations are much less than the TLV-TWA. These concentrations exist within the oven during the cure and indicate that concentrations outside of the oven (i.e. within building 7) are significantly less since minimal release through the oven occurs. It is therefore possible to indicate that contaminants eminating fro the curing resin are of such low cencentration outside the oven in the work environment of building 7 as to not pose a hazard to health.

The mass spectrometer data indicates that thermal decomposition is probabl not a major problem in this study since a large proportion of the recognizable or present appear to be stable aromatic compounds and low molecular weight species, according to Dr. R.J. Smythe.

Since the smell is bothersome to those walking outside in the courtyard, changes to the system should be made to remove this problem.

To determine the concentration of the contaminant being emitted into the outside environment, calculations based on the concentrations shown (i.e. within the oven) and the exhaust system flow rate are required. Based on the very low levels within the oven, it is hardly likely that emissions from the stack will be outside of the regulated limits.

The irritating odour reported by those within the building and those walking through the courtyard may be due to the cresol, formaldehyde, hexaldehyde acetaldehyde, propionaldehyde and phenol. These chemicals are known irritants to the eyes and respiratory tract, but the levels expected outside the oven and in t courtyard will not pose a health risk. The other chemicals are central nervous system depressants, but the levels are too low to be of toxicologic significance.

The many other chemicals detected in the air sample were too low to quantify, but the toxicologic properties will be primarily central nervous system depression and irritation of the eyes and respiratory tract.

RECOMMENDATIONS

1. Maintain a slight negative pressure within the ovens to minimize the leakage within the plant.

2. Check frequently the integrity of the gaskets, door jams and seams and replace these as necessary to minimize leakage.

3. Check frequently the fan blades, motors and belts to ensure they are in proper working order.

4. If possible, increase the capacity of the exhaust fan to dissipate the emis higher above the building roofs. This can be done in concert with the use of higher stacks.

P.A. Gray:ll.

Tube One

| m/e | Possible Structure | Approximate quantity in tub |
|---|---|---|
| 50 | Aromatic fragment | |
| 51 | " " | |
| 52 | " " | |
| 63 | " " | |
| 65 | " " | |
| 67 | Dienes | |
| 69 | Thiophenes or alkene/cycloalkene fragment | |
| 77 | Benzene fragment | |
| 78 | Benzene | 0.7 micrograms |
| 79 | Aromatic fragment | |
| 80 | $C_n H_{2n-4}$ ie. $C_6H_8$ | |
| 81 | Diene fragment | |
| 91 | Toluene fragment | |
| 92 | Toluene | 0.5 micrograms |
| 115 | Trimethyl Substituted Benzene fragment | |

Tube Two

| m/e | Possible Structure | Approximate quantity in |
|---|---|---|
| 26 | acetylene or aromatic fragment | |
| 27 | $C_2H_3$ | |
| 29 | $C_2H_5$ or CHO | |
| 37 | Unknown $C_3H$ | |
| 38 | Aromatic fragment | |
| 39 | Aromatic, $C_3H_3$ | |
| 41 | $C_3H_5$ | |
| 42 | $CH_2CO$ unsaturated acetates diketones and cyclic ketones | |
| 50 | Aromatic fragment | |
| 51 | " " | |
| 52 | " " | |
| 54 | Aromatic fragment | |
| 56 | $CnH_2nCO$ (as m/e =42) | |
| 63 | Aromatic fragment | |
| 65 | " " | |
| 66 | Aromatic fragment or $CnH_2n-4$ | |
| 67 | Dienes, alkynes, cycloalkenes $CnH_2n-3$ | |
| 68 | Aromatic fragment | |
| 69 | $CnH_2n-4$ or thiophenes | |
| 77 | Benzene fragment | |
| 78 | Benzene | 6.6 microgra |
| 79 | Aromatic fragment | |
| 80 | $CnH_2n-4$ | |
| 81 | $CnH_2n-3$, $CnH_2n-10$ | |
| 91 | Toluene fragment | |
| 92 | Toluene | 6 microgram |
| 95 | see m/e 81, furylalkyl, polyunsaturated alcohols, cyclic alcohols and others | |

Tube Three

| m/e | Possible Structure | Approximate quantity in |
|---|---|---|
| 26 | acetylene or aromatic fragment | |
| 27 | $C_nH_{2n-1}$ | |
| 30 | Ethane | 5 micrograms |
| 36 | Unknown orgin | |
| 37 | Unknown $C_3H$ | |
| 38 | Aromatic fragment | |
| 39 | Aromatic, $C_3H_3$ | |
| 40 | $C_3H_4$ | |
| 41 | $C_nH_{2n-1}$, ie $C_3H_5$ | |
| 42 | $C_nH_{2n}CO$, unsaturated acetates, diketones and cyclic keytones | |
| 50 | Aromatic fragment | |
| 51 | " " | |
| 53 | " " | |
| 55 | $C_4H_7$ or $CH_2CHCO$ | |
| 63 | Aromatic fragment | |
| 65 | " " | |
| 67 | Dienes, Alkynes and cycloalkenes, $C_nH_{2n-3}$ | |
| 77 | Benzene fragment | |
| 78 | Benzene | 0.4 micrograms |
| 79 | Aromatic fragment | |
| 81 | $C_nH_{2n-3}$, $C_nH_2$-10 fragment | |
| 91 | Toluene - xylene fragment | |
| 95 | See m/e 81, Furylalkyl, polyunsaturated alcohols and ethers | |
| 106 | Xylene | 0.1 micrograms |
| 108 | Cresol | 0.1 micrograms |
| 116 | Trimethyl benzene | 0.1 micrograms |

Tube Four

| m/e | Possible structure | Approximate quantity in 30 micrograms |
|---|---|---|
| 26 | acetylene | |
| 27 | $C_2H_3$ ie. $C_nH_{2n-1}$ | |
| 37 | unknown $C_3H$ | |
| 38 | $C_3H_2$ from aromatic fragmentation | |
| 39 | $C_3H_3$ " " " | |
| 41 | $C_nH_{2n-1}$ fragment | |
| 42 | $C_nH_{2n}CO$ unsaturated acetates, diketones and cyclic ketones | |
| 43 | $C_nH_{2n-1}$ fragment | |
| 44 | $CO_2$, $C_3H_8$, $CH_3$-CHO, vinyl alcohol | 100 micrograms |
| 53 | $C_4H_5$ | |
| 55 | $C_4H_7$, $CH_2$=CHC=O | |
| 57 | $C_nH_{2n-1}$ | |
| 58 | $CH_3$-$CH_2$-CHO | |
| 67 | $C_5H_7$ | |
| 69 | $C_5H_9$, $CH_3$CH=CHC=O | |
| 77 | Benzene fragment $C_6H_5$ | |
| 79 | Aromatic fragment | |
| 80 | $C_nH_{2n-4}$ ie. $C_6H_8$ | |
| 81 | furylalkyl fragment, polyunsaturated alcohol etc. | |
| 82 | $C_4H_2O_2$, $C_5H_6O$ or $C_6H_{10}$ | |
| 83 | $C_nH_{2n-1}$ from alkenes and cycloalkenes | |
| 85 | $C_nH_{2n-1}$ or $C_nH_{2n+1}$ CO | |
| 91 | Toluene fragment | |
| 92 | Toluene | 80 micrograms |
| 94 | Phenol | 54 " |
| 95 | see m/e =81 | |
| 97 | $C_7H_{13}$ ie. $C_nH_{2n-1}$ | |
| 100 | $C_7H_{16}$, $C_5H_8O_2$, $C_6H_{12}O$ , cyclohexanol | 30 micrograms |
| 1[illegible] | Dimethyl phenol (cresol) | 20 " |

Tube Six

| m/e | Possible structure | Approximate quantity in tube |
|---|---|---|
| 26 | acetylene | 14 micrograms |
| 27 | $Cn-H_2n-1$ | |
| 37 | unknown $C_3H$ | |
| 38 | aromatic fragment | |
| 39 | $C_3H_3$ aromatic fragment | |
| 41 | $CnH_2n-1$ | |
| 42 | $C_2H_2CO$ from unsaturated acetates, diketones etc. | |
| 53 | $C_4H_5$ | |
| 55 | $C_4H_7$ or $CH_2=CH_2C=O$ | |
| 57 | $CnH_2n-1$ | |
| 58 | $CH_3-CH_2-CHO$ propionaldehyde | 200 micrograms |
| 59 | $CnH_2n+1$ O, $CnH_2n-1$ $O_2$ | |
| 67 | $C_5H_7$ | |
| 69 | $C_5H_9$, $CH_3CH=CHC=O$ | |
| 77 | Benzene fragment | |
| 79 | Aromatic fragment | |
| 80 | $CnH_2n-4$ ie $C_6H_8$ | |
| 81 | furylalkyl fragment, polyunsaturated alcohol | |
| 91 | toluene fragment | |
| 92 | toluene | 74 micrograms |
| 110 | dihydroxyphenol (hydroquinone) | 27 " |

Tube Eight

| m/e | Possible structure | Approximate quantity in tube |
|---|---|---|
| 39 | $C_3H_3$ aromatic fragment | |
| 40 | $C_4H_4$ " " | |
| 44 | $CO_2$ propane acetyaldehyde | 150 micrograms |
| 91 | toluene fragment | |
| 92 | toluene | 85 micrograms |
| 105 | xylene fragment | |
| 106 | xylene | 20 micrograms |

# APPENDIX 2

Position of Samplers (i.e., when facing oven #2)

Tube #1 - left front port

Tube #2 - right front port

Tube #3 - right rear port (samples directly the effluent going out of chimney)

Tube #4 - left rear port

Wire + Cable

(E)

PVC

CANADIAN GENERAL ELECTRIC

SUBJECT: PVC Mixing Equipment
Building 26, Bay 1129

COPIES: A.K. Faggetter - Safety
W.J. Olmstead - X64
K. Koyanagi - X63

1978 January 24

Mr. J.D. Pritchard, Manager,
Manufacturing Engineering.

When mixing PVC in building 26 of the Wire and Cable Section, significant amounts of PVC powder are released to the general building air.

Today the Peterborough Plant Safety personnel were called to the PVC mixer to view the process and equipment. It is necessary to provide remedial action, so that area employees are not subjected to this PVC dust.

Nuclear Products, as well as being concerned for the welfare of our personnel in the welding shop, cannot tolerate this dust in the welding shortly to be undertaken in this welding shop, as undesireable chlorine will be generated in the welds.

Mr. Faggetter advises he will meet with Mr. Foord of Wire and Cable to resolve this problem and at that time will advise both J. Olmstead and myself of the corrective actions taken.

R.F. Hurrle, Supervisor,
Facilities Engineering.

RFH/sh

Rick Farley and Joe Ronco WIRE + CABLE
Fire
P

Peterborough, February 2, 1979.

Statement of: M. Drumm
545 Hillside Street
Peterborough, Ontario

Truck Driver

I was sitting on my lift truck about 50 ft. away from the enamelling oven 3-I. I noticed the cardboards on the floor beneath the oven and the lower sheaves on fire. I looked up to the platform and saw no one or anything wrong. I was getting off the lift truck for an extinguisher then I noticed fire on the platform and in my position I could see the fire shooting across the upper sheaves and someone yelling.

I then saw someone on fire moving across the platform to the wall. I saw Joe Ronco, who I knew, rushing across the platform to the other man. He was swatting at the fire on the man's clothes and ripped the clothes off. I ran to the foot of the machine and Joe Ronco was coming down the ladder and yelled at me to get Bob. I ran to the office and the Foreman, E. Ayrheart, was coming through the door from the next building. I went on to get an extinguisher. I came back and put out the cardboard burning on the floor. Someone else was up on the platform.

Signed: M T Drumm

Witnessed: D. Harris

Taken by: R. Dickey
I.S.O.

/bn

Peterborough, February 2, 1979.

Statement of: D. Nice
R.R. #2
Indian River, Ontario

Enamelling Machine Operator

I was the operator of enamelling oven 3-I. It was shut down at about 11:00 a.m., January 31/79 for an overhaul. To do this we stop the machine movement and strip off all the wire. The electric oven is still left on. It is never shut down even for vacation time. I then went to the other machine I was working on and continued my job.

At about 2:15 p.m. I was sitting in the lunch room with E. Hewitt and some other fellows. We did hear a strange noise and then the Foreman, Ed Ayrheart, came by and beckoned us to come and yelled fire. I grabbed a fire extingisher and went up the ladder behind E. Hewitt and handed it to him. I went over to R. Farley who was standing near Oven 2-I platform. The bottom of his pants were still smoldering. The fire was out and I assisted Rick Farley to the ladder.

Signed: D. J. Nice

Witnessed: B. Harris

Taken by: R. Dickey
I.S.O.

/bn

Peterborough, February 2, 1979.

Statement of: Edward A. Ayrheart
859 Gilburt Street
Peterborough, Ontario

Foreman - Magnet Wire

The machine 3-I was to be changed from heavy wire to light wire and had to be overhauled before we ran the fine wire which includes cleaning and checking all the sheaves so they will properly process the wire.

I told Dave Nice to shut down the unit for overhaul when his run was completed.

I told J. Ronco verbally in the morning that the overhaul would be required and I sent a memo to his Foreman, R. Keay, with this request listed on it.

I was just coming back from another section of the department when Irvin Clifford approached me and told me a man and a machine was on fire. I yelled to some men in the lunch room and went to the machine and I then followed two men up the ladder but was sprayed by the fire extinguisher and then turned and came down and stayed there until the injured man was brought down the ladder. I then went and called the plant hospital.

Signed: E. A. Ayrheart

Witnessed: B. Harris

Taken by: R. Dickey
I.S.O.

/bn

Peterborough, February 2, 1979.

Statement of: E. Hewitt
R.R. #11
Peterborough, Ontario

Enamelling Machine Operator

I was in the lunch room for coffee at about 2:15 p.m., January 31/79.

I heard a loud bang, and stood up and looked out but saw nothing out of the ordinary. Then Ed Ayrheart ran by the window and motioned for us to come out and yelled fire. Someone said a person was up on the platform on 3-I and I went up the ladder and saw Rick Farley standing near 2-I and saw some clothes on fire laying on the platform. I went to Rick and tried to get him to move but he would not and said put the fire out. I turned and Dave Nice handed me the fire extinguisher from his position on the ladder and I put the fires out. I went down the ladder ahead of Rick Farley.

Signed: Ed. Hewitt

Witnessed: B. Harris

Taken by: R. Dickey
I.S.O.

/bn

Peterborough, February 2, 1979.

Statement of: Robert Keay
R.R. #11
Peterborough, Ontario

Foreman - Machine Engineering Service & Maintenance

All maintenance men in Wire and Cable are under my authority. The two men involved in the fire look after the maintenance in that area and receive their scheduling instructions from the Foreman in that area. Mr. Ronco is the area mechanic assigned to that area with Mr. Farley as his helper.

To the best of my knowledge, alcohol is the normal cleaning agent. I was informed of the fire and injury soon after the incident.

Signed: B Keay

Witnessed: B. Harris

Taken by: R. Dickey
I.S.O.

/bn

Peterborough, February 2, 1979.

Statement of: Irvin Clifford
General Delivery
Omemee, Ontario

Formex Die Maker

I was at my bench in my work room, approximately 60 ft. away from 3-I oven.

I heard an explosion, stood up and looked out the window. I could see a fire on 3-I platform with the flames shooting up approximately 8 ft. I could hear a man yelling and a second later saw a man on fire away from the main fire on the platform near the second unit. I have a bad leg and went as fast as I could for help.

Signed: I. R. Clifford

Witnessed: B. Harris

Taken by: R. Dickey
I.S.O.

/bn

SUBJECT: Dust Control at the Banbury

PETERBOROUGH, 5 September 1978

L.J. Foord
Manager - Manufacturing
Support & Projects
Wire & Cable

I have reviewed the dust control at the banbury and found conditions ranging from excellent to completely unacceptable.

Of the 6 dust generating points two were excellent (banbury rolls and loading), two were inadequate (platform weight up and main floor weight up), and two were unacceptable with a reverse flow of air (bag disposal and main floor hood).

Will you please provide the UE-CGE Safety Committee with a schedule to correct these inadequacies. We would appreciate having the schedule by Thursday, 7 September.

Until proper dust control is obtained will you please immediately close the hole in the wall which is used for bag disposal.

By copy to Ed Rowe, I would ask that operating routines insure that masks are worn by the operators at all times that dust is being generated.

Thank you.

A.K. Faggetter
Specialist - Safety
Employee & Community Relations

:am

cc: UE-CGE Safety Committee
EJ Rowe
WG King
BH Martin

WIRE + CABLE (P)

CANADIAN GENERAL ELECTRIC COMPANY LIMITED

# SAFETY UNIT

SUBJECT: Banbury Dust Control

PETERBOROUGH, 8 May 1979

R.J. Dyck
Manufacturing Engineering
Wire & Cable

As you know the dust control at the Banbury has been a long-standing problem.

The problem was identified by letter (attached) on 5 September 1978 and it has been the understanding of the UE-CGE Safety Committee that permanent corrective action by management was scheduled for the July 1979 shutdown.

This schedule information was given to the Ministry of Labour inspector, by the Safety Committee, when the problem was brought to his attention by Wire & Cable operators. Based on this he decided no action was required by him.

If your plans have been changed will you please advise immediately. I am duty-bound to communicate this to the Ministry of Labour to update the understanding they now have from the Safety Committee.

K. Faggetter

A.K. Faggetter
Specialist - Safety
Employee & Community Relations

:am

attach.

cc: WL Furst, WG King, RC Bergey, BH Martin
UE-CGE Safety Committee

PW 1034 (10-61)

WIRE + CABLE

CANADIAN GENERAL ELECTRIC

SUBJECT: Banbury Dust Control

COPIES: WL Furst
WG King
NA McDonald
UE-CGE Safety Committee
BH Martin

16 May 1979

R. Dyck
Wire and Cable

This will confirm our conversation held at the Banbury late Monday afternoon re the need for dust control.

The observed condition of the operator, who was covered in dust as a result of working at this floor weigh-up station, indicated the immediate need for improved dust control at this station.

Action agreed to:-

1. Upgrade the dust control at the floor weigh-up as follows:
   a) disconnect the piping from the old main duct and tie into the new fan system
   b) shorten the flexible hose to a minimum length required to operate the work station
   c) extend the sides and top of the work station to enclose the bucket which is receiving the dust generating ingredients. This will direct all the exhausted air a) over the operator from back to front and then b) over the bucket.

   Action for a) b) and c) -- Ray Dyck

2. Take air samples on the personal dosimeter during Tuesday and Wednesday

   Action -- K. Faggetter

3. Provide a list of chemicals handled at the weigh-up station.

   Action -- Ray Dyck

A.K. Faggetter
Specialist - Safety

/bc

# APPENDIX F- DOCUMENT FROM GE
# JUNE 1979 – ADDRESSED TO PETE HOW – BUSINESS AGENT

**United Electrical, Radio and Machine Workers of America**
Affiliated to the Canadian Labour Congress

10 CODECO COURT, DON MILLS, ONTARIO M3A 1A2 / 447-5196

**Ouvriers Unis de l'Electricité, Radio et de la Machinerie d'Amérique**
Affilié au Congrès des Travailleurs du Canada

C. S JACKSON, President • WM. WOODBECK, Vice-President • OSVALDO NUNEZ, Vice-President for Quebec
VAL BJARNASON, Secretary-Treasurer • ART JENKYN, Director of Organization

June 1, 1979

Mr. Pete How, Business Agent,
UE Local 524
203 Reid Street
Peterborough, Ontario
K9J 3P7

Dear Pete:

Please find enclosed chemical information requested by your safety committee.

Item #1 and 2 were referred to at the safety and health meeting, and #3, 4 and 5 are from the list given to me on May 31, 1979.

The Industrial Safety Act, 1971 Sections 79 to 83, outlines the precautions necessary when workers are exposed to toxic substances.

Further, I have underlined the fact that when the physical state of toxic substances is changed, especially when heated or in grinding operations etc., they become much more hazardous.

A thorough and complete air monitoring test, where we tell the Health Protection Branch inspectors what to test for, in what area and at what time of the work day, could be a useful procedure to follow.

Again I can only repeat myself when I say that we have to name every chemical we work with; identify each and every hazardous process in your shop; then research the facts properly and come to some recommendation for action which can be substitution, isolation, etc., of these substances.

It is a monumental job but one that has to be done.

For your safety committee's information, I have finished my first attempt at identifying the 80 or so substances used in the wire and cable department of your plant. So far I have some information on approximately 50 of the 80, and of those 50, 22 have TOXIC ratings.

I am in the process of having separate sheets typed for each substance and will send those to you for your committee's use as soon as possible.

FILED IN W+C CHEM.

However, I believe immediate further information is required on the following:

Mistron Vapour Talc -- possibly contains asbestos

Hi Sel 233 -- contains silicas

Kenflex A -- need further information to investigate further

Lead Litharge'-- need more information, possibly a highly TOXIC substance with a tolerance level of .15 milligrams per cubic meter of air

Cyan Green -- need more information

Vinyle Silane -- need more information

Dicup T -- see enclosed data sheet on this one and the results of my investigation are typed in.

Please feel free to call me at the National office for any further information regarding the enclosed research.

Also, I am prepared to visit your local to discuss this report or any other questions your committee has in regards to the health and safety program.

Fraternally,

Ed Hunt

Ed Hunt
UE Health & Safety Rep.

EH-js
encls.

c.c. - Wm. Woodbeck.

UE LOCAL 524, PETERBOROUGH

(Wire & Cable Department Chemical Research)

MISTRON VAPOUR TALC -- is the trademark for ULTRA-FINE PARTICLE SIZE MAGNESIUM SILICATES available in a variety of grades. Also known as TALC, which is a natural magnesium silicate (Magnesium silicate is a fine white powder, insoluble in water. An absorbent, non combustible; MAY BE TOXIC by inhalation. Used as a rubber filler. N.B. Asbestos is a group of impure magnesium silicate minerals which occur in fibrous form. Therefore this MISTRON VAPOUR TALC should be further investigated immediately.) It has a moderate hazard rating by inhalation and a tolerance level of twenty (20) parts per million per cubic foot in air. Used as a filler in rubber, also as electrical insulation.

• United Electrical, Radio and Machine Workers of America
Affiliated to the Canadian Labour Congress

10 CODECO COURT, DON MILLS, ONTARIO M3A 1A2 / 447-5196

• Ouvriers Unis de l'Electricité, Radio et de la Machinerie d'Amérique
Affilié au Congrès des Travailleurs du Canada

C. S JACKSON, President • WM. WOODBECK, Vice-President • OSVALDO NUNEZ, Vice-President for Quebec
VAL BJARNASON, Secretary-Treasurer • ART JENKYN, Director of Organization

June 1, 1979

Mr. Pete How, Business Agent,
UE Local 524
203 Reid Street
Peterborough, Ontario
K9J 3P7

Dear Pete:

Please find enclosed chemical information requested by your safety committee.

Item #1 and 2 were referred to at the safety and health meeting, and #3, 4 and 5 are from the list given to me on May 31, 1979.

The Industrial Safety Act, 1971 Sections 79 to 83, outlines the precautions necessary when workers are exposed to toxic substances.

Further, I have underlined the fact that when the physical state of toxic substances is changed, especially when heated or in grinding operations etc., they become much more hazardous.

A thorough and complete air monitoring test, where we tell the Health Protection Branch inspectors what to test for, in what area and at what time of the work day, could be a useful procedure to follow.

Again I can only repeat myself when I say that we have to name every chemical we work with; identify each and every hazardous process in your shop; then research the facts properly and come to some recommendation for action which can be substitution, isolation, etc., of these substances.

It is a monumental job but one that has to be done.

For your safety committee's information, I have finished my first attempt at identifying the 80 or so substances used in the wire and cable department of your plant. So far I have some information on approximately 50 of the 80, and of those 50, 22 have TOXIC ratings.

I am in the process of having separate sheets typed for each substance and will send those to you for your committee's use as soon as possible.

FILED IN W+C CHEM.

However, I believe immediate further information is required on the following:

Mistron Vapour Talc -- possibly contains asbestos

Hi Sel 233 -- contains silicas

Kenflex A -- need further information to investigate further

Lead Litharge'-- need more information, possibly a highly TOXIC substance with a tolerance level of .15 milligrams per cubic meter of air

Cyan Green -- need more information

Vinyle Silane -- need more information

Dicup T -- see enclosed data sheet on this one and the results of my investigation are typed in.

Please feel free to call me at the National office for any further information regarding the enclosed research.

Also, I am prepared to visit your local to discuss this report or any other questions your committee has in regards to the health and safety program.

Fraternally,

Ed Hunt

Ed Hunt
UE Health & Safety Rep.

EH-js
encls.

c.c. - Wm. Woodbeck.

UE LOCAL 524, PETERBOROUGH

(Wire & Cable Department Chemical Research)

MISTRON VAPOUR TALC -- is the trademark for ULTRA-FINE PARTICLE SIZE MAGNESIUM SILICATES available in a variety of grades. Also known as TALC, which is a natural magnesium silicate (Magnesium silicate is a fine white powder, insoluble in water. An absorbent, non combustible; MAY BE TOXIC by inhalation. Used as a rubber filler. N.B. Asbestos is a group of impure magnesium silicate minerals which occur in fibrous form. Therefore this MISTRON VAPOUR TALC should be further investigated immediately.) It has a moderate hazard rating by inhalation and a tolerance level of twenty (20) parts per million per cubic foot in air. Used as a filler in rubber, also as electrical insulation.

# APPENDIX E- GE MATERIAL SAFETY DATA SHEET FOR ROYALENE

VAN WATERS & ROGERS LTD. 9800 VAN HORNE WAY RICHMOND, B.C. V6X 1W5

SALES ORDER:

VAN WATERS & ROGERS PRODUCT:

MSDS NUMBER: L1398 VERSION: 1

DATE PRINTED: 03/05/95

GENERAL ELECTRIC
ATTN: SHANE MACLEOD
FAX# (705) 748-7045
REQUESTED BY CHRIS MILLER

WHMIS CODES: D.1B D.2B

## EMERGENCY ASSISTANCE

For Emergency Assistance Involving Chemicals
Call CHEMTREC (800) 424-9300

## PRODUCT INFORMATION

Product Name: TRICHLORCETHYLENE VW&R Code: L1398

Common Name/Synonym: Neu-Tri Solvent
CAS Registry Number: 79-01-6
Chemical Name: N/D
Chemical Family: N/D
Formula: N/D
Molecular Weight: N/D
Product Use: N/D

## PREPARATION INFORMATION

Date Issued: 08/93
Supercedes: 08/90 (P1240)
Prepared By: MSDS Coordinator. Contact during business hours,
Pacific Time (604)-273-1441.

## HAZARDOUS INGREDIENTS

| Component(s)/CAS No. | %wt. | Exposure Limits, ppm OSHA PEL | ACGIH TLV | AIHA WEEL |
|---|---|---|---|---|
| Trichloroethylene (79-01-6) | 99.4 | 50 TWA 200 STEL | 50 TWA 200 STEL | |
| 1,2-Butylene Oxide (106-88-7) | 0.5 | N/D | N/D | 2 |
| Stabilizers (N/D) | 0.1 | N/D | N/D | |

Local regulated limits may vary.

## PHYSICAL PROPERTIES

Boiling Point: 87 C (189 F)
Melting Point: N/D
Freezing Point: N/D
Specific Gravity (Water=1): 1.46 at 25/25 C
Vapour Pressure: 60 mm Hg at 20 C
Vapour Density: 4.53
pH: N/D
Solubility in Water: 0.1 g/100 g at 25 C
% Volatile: N/D
Evaporation Rate (Butyl Acetate=1): N/D
Odour Threshold: N/D

Coefficient of Water/Oil Distribution: N/D
Appearance and Odour: Colourless liquid. Irritating odour at high concentrations.
Physical State: Liquid.

---------------------FIRE AND EXPLOSION INFORMATION---------------------

Flash Point/Method: None (TCC)
Lower Flammable Limit: 8.0% at 100 C; 8.0% at 25 C
Upper Flammable Limit: 44.8% at 100 C
Autoignition Temperature: 420 C (788 F)

Extinguishing Media: Water fog.

Special Fire Fighting Procedures: Wear a positive pressure self-contained breathing apparatus.

Unusual Fire and Explosion Hazards: Strong unpleasant odour.

Hazardous Combustion Products: N/D
Explosion Data
Sensitivity to Mechanical Impact: N/D
Sensitivity to Static Discharge: N/D
Conditions of Flammability: N/D

--------------------------HAZARDOUS REACTIVITY--------------------------

Stability: Stable.

Hazardous Polymerization: Will not occur.

Conditions to Avoid: Avoid open flames, welding arcs, or other high temperature sources which induce thermal decomposition to irritating an corrosive HCl from solvent vapour. High energy sources such as welding arcs can cause degradation generating chlorine, hydrogen chloride and possibly phosgene, and should be avoided.

Materials to Avoid: Strong bases: caustic soda, caustic potash. Metallic aluminum and zinc powders should be avoided.

Hazardous Decomposition Products: Involvement in fire or high temperatures forms hydrogen chloride and very small amounts of phosgene and chlorine. Solvent decomposition occurs when catalyzed by metal chlorides which can be produced by reaction of HCl and metals in the system. In the presence of aluminum and excessive water the decomposition can proceed rapidly with production of large amounts of heat and HCl fumes. Contamination of solvent with small amounts of 1,1,1-trichloroethane can affect stabilizers and shorten solvent life.

Conditions of Reactivity: N/D

---------------------------FIRST AID MEASURES---------------------------

If Inhaled: Remove to fresh air. If not breathing, give mouth-to-mouth resuscitation. If breathing is difficult, give oxygen. Call a physician.

In Case of Eye Contact: Irrigate immediately with water for at least 15 minutes.

In Case of Skin Contact: Wash off in flowing water or shower. Remove contaminated clothing and air thoroughly before reuse.

If Ingested: Do not induce vomiting. Call a physician and/or transport to emergency facility immediately.

Notes to Physician: Because rapid absorption may occur through lungs if aspirated and cause systemic effects, the decision of whether to induce vomiting or not should be made by a physician. If lavage is performed, suggest endotracheal and/or esophageal control. Danger from lung aspiration must be weighed against toxicity when considering emptying the stomach. Exposure may increase "myocardial irritability". Do not administer sympathomimetic drugs unless absolutely necessary. No specific antidote. Supportive care. Treatment based on judgment of the physician in response to reactions of the patient.

## HEALTH HAZARD INFORMATION

Primary Routes of Exposure: Inhalation, skin and eye contact, skin absorption, ingestion.

Signs, Symptoms and Effects of Exposure
Inhalation: In confined or poorly ventilated areas, vapours can readily accumulate and can cause unconsciousness and death. Excessive exposure may cause irritation to upper respiratory tract. Excessive exposure may increase sensitivity to epinephrine and increase myocardial irritability (irregular heart-beats). May cause alcohol intolerance often manifested by temporary reddening of the skin called "degreaser's flush". Minimal anesthetic or irritant effects may be seen around 200-400 ppm. Levels in the range of 1000-2000 ppm may rapidly cause dizziness or drunkenness. Progressively higher levels or longer exposure may cause unconsciousness and death and may be immediately hazardous to life.

Eye Contact: May cause pain and slight eye irritation. Corneal injury is unlikely. Vapours may irritate eyes.

Skin Contact: Prolonged or repeated exposure may cause skin irritation. May cause drying or flaking of skin. May cause more severe response if confined to skin.

Skin Absorption: A single prolonged exposure is not likely to result in the material being absorbed through skin in harmful amounts. Trichloroethylene may be absorbed through skin to some degree increasing blood concentrations or causing numbness of fingers when they are immersed in it.

Ingestion: Single dose oral toxicity is low. If aspirated (liquid enters the lung), may be rapidly absorbed through the lungs and result in injury to other body systems. Amounts ingested incidental to industrial handling are not likely to cause injury; however ingestion of larger amounts could cause serious injury, even death.

Chronic Effects of Exposure: Repeated exposure may cause central or possibly even peripheral nervous system effects; high levels have caused liver or kidney effects in laboratory animals.

Medical Conditions Aggravated by Exposure: N/D

Additional Information: Alcohol consumed before or after exposure may increase adverse effects.

## TOXICITY DATA

LD50 Oral (rat): 4920 mg/k
LD50 Dermal (rabbit): approx. 10,000 mg/kg
LC50 (rat): 12,500 ppm/4H

Carcinogenicity: A positive carcinogenic response has occurred only in mice given large doses of trichloroethylene. Data suggest a nonmutagenic mechanism for tumour formation implying that nontoxic doses of trichloroethylene should pose little or no carcinogenic hazard for man. Butylene oxide has been shown to produce benign and malignant tumors in rats but not mice. These tumors occurred only following high exposure levels which first produced chronic upper respiratory tract irritation. Butylene oxide is not believed to pose a carcinogenic risk to man when handled as recommended.

Sensitization: N/D
Irritancy: N/D

Reproductive Effects: Animal data on butylene oxide and trichloroethylene do not suggest any reproductive hazard from exposure.

Teratogenicity: Birth defects are unlikely. Exposures having no effect on the mother should have no effect on the fetus. Did not cause birth defects in animals; other effects were seen in the fetus only at doses which caused toxic effects to the mother.

Mutagenicity: Pure trichloroethylene (without additives), lacks mutagenic potential in most tests. Using formulations (with additives) in vitro tests and tests in animals have been inconclusive. Results with Butylene oxide have been positive in in vitro studies, but negative in animals.

Toxicologically Synergistic Products: N/D
Other Data: N/D
Environmental Effects: N/D

---PREVENTATIVE MEASURES---

Ventilation (Engineering Controls): Control airborne concentrations below the exposure guidelines. Use only with adequate ventilation. Local exhaust ventilation may be necessary for some operations. Lethal concentrations may exist in areas with poor ventilation.

Personal Protective Equipment
Respiratory: Atmospheric levels should be maintained below the exposure guideline. When respiratory protection is required for certain operations, use an approved air-purifying respirator. For emergency and other conditions where the exposure guideline may be greatly exceeded, use an approved positive-pressure self-contained breathing apparatus. In confined or poorly ventilated areas, use an approved positive-pressure self-contained breathing apparatus.

Eye: Use safety glasses.

Clothing: For brief contact, no precautions other than clean, body covering clothing should be needed. When prolonged or frequently repeated contact could occur, use protective clothing impervious to this material. Selection of specific items such as gloves, boots, apron, or full-body suit will depend on operation.

Footwear: N/D
Hands: N/D
Other Protective Measures: N/D

Action to Take for Spills or Leaks: Small spills - mop up, wipe up or soak up immediately. Remove to out of doors. Large spills - evacuate area. Contain liquid; transfer to closed metal containers. Keep out of water supply.

Waste Disposal Method: When disposing of the unused contents, the preferred options are to send to licensed reclaimers, or to permitted incinerators. Any disposal practice must be in compliance with federal, provincial, and local laws and regulations. Do not dump into sewers, on the ground or into any body of water.

Storage and Handling Precautions and Equipment: Handle with reasonable care. Avoid breathing vapours. Store in cool place. Concentrated vapours of this product are heavier than air and will collect in low area such as pits, degreasers, storage tanks and other confined areas. Do not enter these areas where vapours of this product are suspected unless special breathing apparatus is used and an observer is present for assistance.

Special Shipping Information: N/D
Other Precautions: N/D

---REGULATORY INFORMATION---

TDG Classification

Shipping Name: Trichloroethylene
UN: 1710
Class: 6.1 (9.2)
PKG: III

WHMIS Classification: D 1B; D.2B

Listed on the Domestic Substances List (DSL): Yes

---------------------FOR PRODUCT AND SALES INFORMATION------------------

Contact Your Local Van Waters & Rogers Ltd. Branch Office.

-------------------------------NOTICE----------------------------------

**VAN WATERS & ROGERS LTD. EXPRESSLY DISCLAIMS ALL EXPRESSED OR IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE PRODUCT PROVIDED.**

----------------------------REVISION INFORMATION------------------------

08/93: 3-year review. Reconstruction P1240.

Legend: N/AP - Not Applicable. N/D - No Data Available.

END OF MSDS

~~4387~~ OK

[redacted] INC.

# Trichloroethylene Chemical Safety Data Sheet

1731

## Section I. • Identification of Product

| | |
|---|---|
| Trade Name and Synonyms<br>Triluxe (Royalene DX) | Chemical Name and Synonyms<br>Trichloroethylene, Ethylene Trichloride, Trichloroethene. |
| Chemical and Physical State<br>Chlorinated hydrocarbon; liquid | Molecular Formula<br>$CHCl = CCl_2$ |

**Emergency Tel. No.** Montreal, Que. (514) 861-1211
Toronto, Ont. (416) 226-6117

## Section II. • Physical Properties

Appearance and Odour: Stable, colourless, volatile, liquid with a mild ethereal odour.

| | |
|---|---|
| Boiling Point (°C)<br>87.1 (188.8°F) | Melting Point (°C) — Freezing Point (°C)<br>-73 (-99.9°F) -86.8 (124.2°F) |
| Vapour Pressure (mm Hg)<br>58.6 at 20°C(68°F) | Specific Gravity (Water = 1 at 4°C)<br>1.46 at 25°C(77°F) |
| Bulk Density<br>---- | Vapour Density (Air = 1)<br>4.54 |
| Solubility in water<br>0.09 g/100 ml $H_2O$ at 20°C (68°F) | Other Solvents Alcohol, chloroform, ether and most organic solvents. |

## Section III. • Fire and Explosion Hazard Data

| | | |
|---|---|---|
| Flash Point (°C) Method<br>None | Autoignition Temperature (°C)<br>410 (770°F) | |
| Flammable Limits (% by Vol. in Air) | Lower<br>12.5 | Upper<br>90 |
| Would any material saturated with this product be subject to spontaneous combustion? ____ Yes X No | Materials: | |

Fire Extinguishing Data

~~Not applicable. Use agent suitable for surrounding fire.~~

Special Fire Fighting Procedures

Self-contained breathing equipment should be used by firemen in building where trichloroethylene is stored. Keep containers cool.

Unusual Fire and Explosion Hazards

Trichloroethylene is nonflammable at ordinary temperatures and moderately flammable at elevated temperatures. Its vapours can be ignited by high energy ignition source. On contact with fire or red-hot surfaces, it decomposes to acidic gases and other toxic vapours.

| Stability | | | Conditions to Avoid |
|---|---|---|---|
| | Unstable | | Contact of the vapours with open flames, hot surfaces and welding arcs. |
| | Stable | X | |

**Incompatibility (Materials to Avoid)**

Strong alkalies (forms explosive mixtures e.g. dichloroacetylene).

**Hazardous Decomposition Products**

Hydrogen chloride, phosgene and other toxic substances.

| Hazardous Polymerization | | | Conditions to Avoid |
|---|---|---|---|
| | May Occur | | |
| | Will Not Occur | X | |

## Section V. • Health Hazard Data

| Threshold Limit Value (TLV - TWA) | $LC_{50}$ |
|---|---|
| 100 ppm - 535 $mg/m^3$ | N.A.; $LD_{50}$ oral-rat: 4920 mg/kg |

**Effects of Overexposure when:**

**Inhaled —** High concentrations causes narcosis and anesthesia. Prolonged exposure at moderate concentrations causes headache and drowsiness.

**In contact with eyes —** Irritation, burning and reddening of the eyes. May cause ulceration. Severe eye damage may occur.

**In contact with skin —** Irritation, skin inflammation. Absorption through the skin may occur. May cause dermatitis.

**Ingested —** Burning sensation and ulceration of mucous digestive membranes. Causes drowsiness, headache, convulsions and anesthesia.

**Emergency and First Aid Procedures:**

**Inhalation —** Remove to fresh air. If not breathing, give artificial respiration. Give oxygen by qualified personnel if breathing is difficult. Never administer adrenalin . Get medical help promptly.

**Eyes —** Hold eyelids open and wash thoroughly with clean water for at least 15 minutes. Use eye irrigation fountain if available. Get medical help promptly.

**Skin —** Remove contaminated clothing immediately and wash affected areas thoroughly with warm water and soap. Get medical help promptly.

**Ingestion —** Get medical help immediately. Induce vomiting by placing fingers or spoon at back of patient's throat.

## Section VI. • Special Protection Information

**Ventilation Requirements**

Adequate to maintain vapours below TLV. Since trichloroethylene vapour is 4.54 times heavier than air, ventilation inlet should be at floor level.

**Respiratory Protection**

Canister-type respirators approved by the U.S. Bureau of Mines, fitted with the proper canister for absorbing trichloroethylene vapours for conc. not exceeding 1% by vol. Self-contained breathing apparatus must be worn when conc. are high.

| Protective Gloves | Eye Protection |
|---|---|
| Poly vinyl alcohol gloves. | Tight-fitting chemical goggles. |

**Other Protective Equipment**

Poly vinyl alcohol boots and apron depending on exposure.

## Section VII. • Special Requirements

| | |
|---|---|
| Precautions in Handling and Storing | Store in well-ventilated, cool locations away from sunlight. Avoid breathing vapours and contact with skin by wearing protective clothing. |
| Other Precautions | Avoid contact with water vapour or steam as these agents promote corrosion. No smoking in presence of vapours. |

## Section VIII. • Spill or Leak Procedures

| | |
|---|---|
| Steps to be taken in event of Spill or Release | Do not allow chemical to enter sewers or waterways. With large spills, evacuate area and dyke for later disposal or recovery. With minor spills, evacuate area, ventilate, and clean-up area by mopping or using absorbent material. Clothing, rags or mops should not be used until dry and free of odour of trichloroethylene. |
| Environmental Effects | May be dangerous if it enters water intakes. Notify nearest pollution control authority promptly. |
| Neutralizing Chemicals | N.A. |
| Waste Disposal | Consult local pollution control agency. The most desirable treatment for any waste trichloroethylene is to recover the solvent in a properly designed and operated still. |

## Section IX. • References


(1) CIL Technical Manual Data Sheet "Trichloroethylene".
(2) MCA SD-14.
(3) Sax N.I., "Dangerous Properties of Industrial Materials" 4th ed. (1975)
(4) The Merck Index 9th Ed. 1976.
(5) CRC Handbook of Laboratory Safety 2nd Ed. 1976.
(6) American Conference of Governmental Industrial Hygienists. 1978


*This product information is believed to be accurate but by its issuance Canadian Industries Limited assumes no responsibility nor does it guarantee any results. Before any product is use* ... ed

HANSON INC.
45 VANSCO RD., TORONTO M8Z 5J7, CANADA
TEL: (416) 255-1371, telex 06-984521
CABLE: BRUCINE, TORONTO, CANADA

638

12/01/97

# MATERIAL SAFETY DATA SHEET

## SECTION I – PRODUCT INFORMATION

| | |
|---|---|
| Product Name: Croma Tap #1 (revised) | Chemical Formula: Not Available |
| Chemical Name: not applic. | Molecular Weight: not applicable |
| Chemical Family: blend of chlorinated solvent & lubricity additives | Trade names & Synonyms: CT, CT-1, Cromatap. |
| Manufacturer and Supplier: Cromac Chemical Co. Ltd., 80 Summerlea Rd, Brampton, Ont L6T 4X3 | |
| Emergency Telephone Number: (905)458-1999 | Product Use: lubricant |

## SECTION II – HAZARDOUS INGREDIENTS

| Identity | Approximate Concentration % | CAS Number | Additional Information |
|---|---|---|---|
| Trichloroethylene | 60 - 100 | 79-01-6 | ACGIH TLV -TWA 50 ppm |

This product contains no other hazardous ingredients.

## SECTION III – PHYSICAL DATA

| | | |
|---|---|---|
| Physical State: Liquid | Specific Gravity: 1.44-1.46 @ 20°C<br>Bulk Density: | Odour Threshold: 21 ppm |
| pH: not applicable | Vapour pressure (mm): 100 mmHg at 32°F | Vapour Density (air=1): 4.55 |
| Evaporation Rate 0.28 (Ethyl Ether = 1) | Boiling Point (°C): 71 - 81 | Freezing point (°C): -86.8 |
| Coefficient Of Water/oil Distribution: <1 Oil Soluble | Odour and Appearance: Clear yellow liquid, cinnamon odour | |

## SECTION IV – FIRE OR EXPLOSION HAZARD

| | |
|---|---|
| Flammability: no | If Yes, Under Which Conditions? |

Hazardous Combustion Products: CO, $CO_2$, Hydrogen choride, or traces of phosgene can be produced from decomposition or burning

| | |
|---|---|
| Lower Flammable Limit (% By Volume): not avail. | Upper Flammable Limit (% By Volume): not avail. |
| Flash Point (°C) And Method: none under normal test conditions | Autoignition Temperature (°C): 537 °C |
| Explosion Data-Sensitivity To Mechanical Impact: not available | Explosion Data – Sensitivity To Static Discharge: not available |
| Means Of Extinction: | Special Procedures: |

## SECTION V – REACTIVITY DATA

| | |
|---|---|
| Chemical Stability: stable | Conditions To Avoid: open flames, hot glowing surfaces, electric arcs |
| Incompatibility To Other Substances: yes | Materials To Avoid: sodium, potassium, barium. Avoid mixing with caustic soda, caustic potash or oxidizing materials. |

Conditions Of Reactivity: elevated temperatures (above boiling point), electric arcs.

Hazardous Decomposition Products: CO, CO2 or hydrogen chloride or traces of phosgene can be produced from decomposition or burning.

## SECTION VI – TOXICOLOGICAL PROPERTIES OF PRODUCT

Route Of Entry:

Skin contact✓ Skin Absorption✓ Eye contact✓ Inhalation✓ Ingestion✓

Effects Of Acute and Chronic Exposure To Product: Inhaled: vapours are irritating to eyes, nose, throat and respiratory tract. May cause central nervous system depression and cardiac arrhythmia. Skin: prolonged and repeated contact may lead to dermatitis. May be absorbed through intact skin causing central nervous system depression and cardiac arrhythmia. Eyes: May cause irritation, redness and pain. Ingestion: May cause irritation and burning of the mouth and throat, abdominal pain and central nervous system depression and cardiac arrhythmia.

| | |
|---|---|
| Exposure limits: Not Available | Irritancy Of Product: Eyes |
| Toxicological Synergistic Products: | Sensitization To product: Skin |

LD50 & LC 50 Of Product (Species & Route): ORL-LD50(estim.) – 10,000 kg/mg. INH-RAT LC50 (est.) = 18000 ppm/4h.

Carcinogenicity, Reproductive Effects, Teratogenicity, Mutagenicity: The ingredients of this product are not listed as carcinogens by NTP (National Toxicology Program), not regulated as carcinogens by OSHA (Occupational Safety and Health Administration) and have not been evaluated by IARC (International Agency for Research on Cancer) or ACGIH (American Conference of Governmental Industrial Hygienists). Reproductive Effects, Mutagenicity Data, Teratogenicity Data: No information is available and no adverse effects are anticipated.

## SECTION VII - FIRST AID MEASURES

Inhalation: Move victim to fresh air. Give artificial respiration only if breathing has stopped. Give CPR if there is no breathing and no pulse. Obtain medical attention immediately.

Eyes: Immediately flush eyes with running water for a minimum of 20 minutes. Hold eyelids open during flushing. If irritation persists, repeat flushing. Obtain medical attention immediately.

Skin: Flush skin with running water and wash affected areas thoroughly with soap and water. If contact area is large, get medical attention.

Ingestion: If victim alert and not convulsing, rinse out mouth and give 1/2 to 1 glass of water to dilute material. DO NOT induce vomiting. If spontaneous vomiting occurs, have victim lean forward with head down to avoid breathing in of vomitus, rinse mouth and administer more water.

## SECTION VIII - PREVENTIVE MEASURES

Personal Protective Equipment To Be Used:

Gloves - Viton

Respirator - a NIOSH/MSHA approved air purifying respirator equipped with organic vapour cartridges for concentrations of 300 - 1000 ppm (as 1,1,1-Trichloroethane). An air-supplied respirator if concentrations are higher or unknown.

Eyes - use chemical safety goggles where there is potential for eye contact

Specific Engineering Controls To Be Used: local exhaust ventilation required

Procedures To Be Followed In Case Of Leak Or Spill: Small leaks: mop up, wipe up or soak up immediately. Remove to out of doors. Large spills: Evacuate area. Contain liquid. Keep out of water ways.

Waste Disposal: Consult disposal agency. Dispose in accordance with local, provincial and federal regulations.

Precautions To Be Taken in Handling & Storing: Store in cool, well ventilated area. Do not expose containers to temperatures above 50°C. Keep away from heat, sparks and flame. Keep containers closed.

Special Shipping Requirements:

## SECTION IX - PREPARATION INFORMATION

Prepared By: Cromac Chemical Co. Ltd. Effective Date: Dec 1, 1997 Replaces: all previous

## SECTION X TRANSPORTATION DATA AND PRECAUTIONARY LABELLING

PIN # 1710
Class 6.1, (9.2)
Packing Group III
Trichloroethylene Solution

## SECTION XII - ADDITIONAL NOTES OR REFERENCES

WHMIS CLASSIFICATION: CLASS D, DIVISION 2, SUB-DIVISION B

VAN WATERS & ROGERS LTD. 9800 VAN HORNE WAY RICHMOND, B.C. V6X 1W5

SALES ORDER:

VAN WATERS & ROGERS PRODUCT:

MSDS NUMBER: L1398 VERSION: 1

DATE PRINTED: 03/05/95

GENERAL ELECTRIC
ATTN: SHANE MACLEOD
FAX# (705) 748-7045
REQUESTED BY CHRIS MILLER

WHMIS CODES: D.1B D.2B

-----EMERGENCY ASSISTANCE-----

For Emergency Assistance Involving Chemicals
Call CHEMTREC (800) 424-9300

-----PRODUCT INFORMATION-----

Product Name: TRICHLORCETHYLENE VW&R Code: L1398

Common Name/Synonym: Neu-Tri Solvent
CAS Registry Number: 79-01-6
Chemical Name: N/D
Chemical Family: N/D
Formula: N/D
Molecular Weight: N/D
Product Use: N/D

-----PREPARATION INFORMATION-----

Date Issued: 08/93
Supercedes: 08/90 (P1240)
Prepared By: MSDS Coordinator. Contact during business hours, Pacific Time (604)-273-1441.

-----HAZARDOUS INGREDIENTS-----

| Component(s)/CAS No. | %wt. | Exposure Limits, ppm OSHA PEL | ACGIH TLV | AIHA WEEL |
|---|---|---|---|---|
| Trichloroethylene (79-01-6) | 99.4 | 50 TWA 200 STEL | 50 TWA 200 STEL | |
| 1,2-Butylene Oxide (106-88-7) | 0.5 | N/D | N/D | 2 |
| Stabilizers (N/D) | 0.1 | N/D | N/D | |

Local regulated limits may vary.

-----PHYSICAL PROPERTIES-----

Boiling Point: 87 C (189 F)
Melting Point: N/D
Freezing Point: N/D
Specific Gravity (Water=1): 1.46 at 25/25 C
Vapour Pressure: 60 mm Hg at 20 C
Vapour Density: 4.53
pH: N/D
Solubility in Water: 0.1 g/100 g at 25 C
% Volatile: N/D
Evaporation Rate (Butyl Acetate=1): N/D
Odour Threshold: N/D

Coefficient of Water/Oil Distribution: N/D
Appearance and Odour: Colourless liquid. Irritating odour at high concentrations.
Physical State: Liquid.

---FIRE AND EXPLOSION INFORMATION---

Flash Point/Method: None (TCC)
Lower Flammable Limit: 8.0% at 100 C; 8.0% at 25 C
Upper Flammable Limit: 44.8% at 100 C
Autoignition Temperature: 420 C (788 F)

Extinguishing Media: Water fog.

Special Fire Fighting Procedures: Wear a positive pressure self-contained breathing apparatus.

Unusual Fire and Explosion Hazards: Strong unpleasant odour.

Hazardous Combustion Products: N/D
Explosion Data
Sensitivity to Mechanical Impact: N/D
Sensitivity to Static Discharge: N/D
Conditions of Flammability: N/D

---HAZARDOUS REACTIVITY---

Stability: Stable.

Hazardous Polymerization: Will not occur.

Conditions to Avoid: Avoid open flames, welding arcs, or other high temperature sources which induce thermal decomposition to irritating an corrosive HCl from solvent vapour. High energy sources such as welding arcs can cause degradation generating chlorine, hydrogen chloride and possibly phosgene, and should be avoided.

Materials to Avoid: Strong bases: caustic soda, caustic potash. Metallic aluminum and zinc powders should be avoided.

Hazardous Decomposition Products: Involvement in fire or high temperatures forms hydrogen chloride and very small amounts of phosgene and chlorine. Solvent decomposition occurs when catalyzed by metal chlorides which can be produced by reaction of HCl and metals in the system. In the presence of aluminum and excessive water the decomposition can proceed rapidly with production of large amounts of heat and HCl fumes. Contamination of solvent with small amounts of 1,1,1-trichloroethane can affect stabilizers and shorten solvent life.

Conditions of Reactivity: N/D

---FIRST AID MEASURES---

If Inhaled: Remove to fresh air. If not breathing, give mouth-to-mouth resuscitation. If breathing is difficult, give oxygen. Call a physician.

In Case of Eye Contact: Irrigate immediately with water for at least 15 minutes.

In Case of Skin Contact: Wash off in flowing water or shower. Remove contaminated clothing and air thoroughly before reuse.

If Ingested: Do not induce vomiting. Call a physician and/or transport to emergency facility immediately.

Notes to Physician: Because rapid absorption may occur through lungs if aspirated and cause systemic effects, the decision of whether to induce vomiting or not should be made by a physician. If lavage is performed, suggest endotracheal and/or esophageal control. Danger from lung aspiration must be weighed against toxicity when considering emptying the stomach. Exposure may increase "myocardial irritability". Do not administer sympathomimetic drugs unless absolutely necessary. No specific antidote. Supportive care. Treatment based on judgment of the physician in response to reactions of the patient.

## HEALTH HAZARD INFORMATION

Primary Routes of Exposure: Inhalation, skin and eye contact, skin absorption, ingestion.

Signs, Symptoms and Effects of Exposure
Inhalation: In confined or poorly ventilated areas, vapours can readily accumulate and can cause unconsciousness and death. Excessive exposure may cause irritation to upper respiratory tract. Excessive exposure may increase sensitivity to epinephrine and increase myocardial irritability (irregular heart-beats) May cause alcohol intolerance often manifested by temporary reddening of the skin called "degreaser's flush". Minimal anesthetic or irritant effects may be seen around 200-400 ppm. Levels in the range of 1000-2000 ppm may rapidly cause dizziness or drunkenness. Progressively higher levels or longer exposure may cause unconsciousness and death and may be immediately hazardous to life.

Eye Contact: May cause pain and slight eye irritation. Corneal injury is unlikely. Vapours may irritate eyes.

Skin Contact: Prolonged or repeated exposure may cause skin irritation. May cause drying or flaking of skin. May cause more severe response if confined to skin.

Skin Absorption: A single prolonged exposure is not likely to result in the material being absorbed through skin in harmful amounts. Trichloroethylene may be absorbed through skin to some degree increasing blood concentrations or causing numbness of fingers when they are immersed in it.

Ingestion: Single dose oral toxicity is low. If aspirated (liquid enters the lung), may be rapidly absorbed through the lungs and result in injury to other body systems. Amounts ingested incidental to industrial handling are not likely to cause injury; however ingestion of larger amounts could cause serious injury, even death.

Chronic Effects of Exposure: Repeated exposure may cause central or possibly even peripheral nervous system effects; high levels have caused liver or kidney effects in laboratory animals.

Medical Conditions Aggravated by Exposure: N/D

Additional Information: Alcohol consumed before or after exposure may increase adverse effects.

## TOXICITY DATA

LD50 Oral (rat): 4920 mg/k
LD50 Dermal (rabbit): approx. 10,000 mg/kg
LC50 (rat): 12,500 ppm/4H

Carcinogenicity: A positive carcinogenic response has occurred only in mice given large doses of trichloroethylene. Data suggest a nonmutagenic mechanism for tumour formation implying that nontoxic doses of trichloroethylene should pose little or no carcinogenic hazard for man. Butylene oxide has been shown to produce benign and malignant tumors in rats but not mice. These tumors occurred only following high exposure levels which first produced chronic upper respiratory tract irritation. Butylene oxide is not believed to pose a carcinogenic risk to man when handled as recommended.

Sensitization: N/D
Irritancy: N/D

Reproductive Effects: Animal data on butylene oxide and trichloroethylene do not suggest any reproductive hazard from exposure.

Teratogenicity: Birth defects are unlikely. Exposures having no effect on the mother should have no effect on the fetus. Did not cause birth defects in animals; other effects were seen in the fetus only at doses which caused toxic effects to the mother.

Mutagenicity: Pure trichloroethylene (without additives), lacks mutagenic potential in most tests. Using formulations (with additives) in vitro tests and tests in animals have been inconclusive. Results with Butylene oxide have been positive in in vitro studies, but negative in animals.

Toxicologically Synergistic Products: N/D
Other Data: N/D
Environmental Effects: N/D

## PREVENTATIVE MEASURES

Ventilation (Engineering Controls): Control airborne concentrations below the exposure guidelines. Use only with adequate ventilation. Local exhaust ventilation may be necessary for some operations. Lethal concentrations may exist in areas with poor ventilation.

Personal Protective Equipment
Respiratory: Atmospheric levels should be maintained below the exposure guideline. When respiratory protection is required for certain operations, use an approved air-purifying respirator. For emergency and other conditions where the exposure guideline may be greatly exceeded, use an approved positive-pressure self-contained breathing apparatus. In confined or poorly ventilated areas, use an approved positive-pressure self-contained breathing apparatus.

Eye: Use safety glasses.

Clothing: For brief contact, no precautions other than clean, body covering clothing should be needed. When prolonged or frequently repeated contact could occur, use protective clothing impervious to this material. Selection of specific items such as gloves, boots, apron, or full-body suit will depend on operation.

Footwear: N/D
Hands: N/D
Other Protective Measures: N/D

Action to Take for Spills or Leaks: Small spills - mop up, wipe up or soak up immediately. Remove to out of doors. Large spills - evacuate area. Contain liquid; transfer to closed metal containers. Keep out of water supply.

Waste Disposal Method: When disposing of the unused contents, the preferred options are to send to licensed reclaimers, or to permitted incinerators. Any disposal practice must be in compliance with federal, provincial, and local laws and regulations. Do not dump into sewers, on the ground or into any body of water.

Storage and Handling Precautions and Equipment: Handle with reasonable care. Avoid breathing vapours. Store in cool place. Concentrated vapours of this product are heavier than air and will collect in low area such as pits, degreasers, storage tanks and other confined areas. Do not enter these areas where vapours of this product are suspected unless special breathing apparatus is used and an observer is present for assistance.

Special Shipping Information: N/D
Other Precautions: N/D

## REGULATORY INFORMATION

TDG Classification
Shipping Name: Trichloroethylene
UN: 1710
Class: 6.1 (9.2)
PKG: III

WHMIS Classification: D 1B; D.2B

Listed on the Domestic Substances List (DSL): Yes

----------FOR PRODUCT AND SALES INFORMATION----------

Contact Your Local Van Waters & Rogers Ltd. Branch Office.

----------NOTICE----------

**VAN WATERS & ROGERS LTD. EXPRESSLY DISCLAIMS ALL EXPRESSED OR IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE PRODUCT PROVIDED.**

----------REVISION INFORMATION----------

08/93: 3-year review. Reconstruction P1240.

Legend: N/AP - Not Applicable. N/D - No Data Available.

END OF MSDS

[redacted] INC.

# Trichloroethylene Chemical Safety Data Sheet

~~4387~~ OK

1731

## Section I. • Identification of Product

| | |
|---|---|
| Trade Name and Synonyms<br>Triluxe (Royalene DX) | Chemical Name and Synonyms<br>Trichloroethylene, Ethylene Trichloride, Trichloroethene. |
| Chemical and Physical State<br>Chlorinated hydrocarbon; liquid | Molecular Formula<br>$CHCl = CCl_2$ |

**Emergency Tel. No.** Montreal, Que. (514) 861-1211
Toronto, Ont. (416) 226-6117

## Section II. • Physical Properties

Appearance and Odour
Stable, colourless, volatile, liquid with a mild ethereal odour.

| | |
|---|---|
| Boiling Point (°C)<br>87.1 (188.8°F) | Melting Point (°C) — Freezing Point (°C)<br>-73 (-99.9°F) -86.8 (124.2°F) |
| Vapour Pressure (mm Hg)<br>58.6 at 20°C(68°F) | Specific Gravity (Water = 1 at 4°C)<br>1.46 at 25°C(77°F) |
| Bulk Density<br>---- | Vapour Density (Air = 1)<br>4.54 |
| Solubility in water<br>0.09 g/100 ml $H_2O$ at 20°C (68°F) | Other Solvents Alcohol, chloroform, ether and most organic solvents. |

## Section III. • Fire and Explosion Hazard Data

| | |
|---|---|
| Flash Point (°C) Method<br>None | Autoignition Temperature (°C)<br>410 (770°F) |
| Flammable Limits (% by Vol. in Air) | Lower 12.5 Upper 90 |
| Would any material saturated with this product be subject to spontaneous combustion?<br>____ Yes X No | Materials: |

Fire Extinguishing Data
~~Not applicable. Use agent suitable for surrounding fire.~~

Special Fire Fighting Procedures
Self-contained breathing equipment should be used by firemen in building where trichloroethylene is stored. Keep containers cool.

Unusual Fire and Explosion Hazards
Trichloroethylene is nonflammable at ordinary temperatures and moderately flammable at elevated temperatures.. Its vapours can be ignited by high energy ignition source. On contact with fire or red-hot surfaces, it decomposes to acidic gases and other toxic vapours.

| Stability | Unstable | | Conditions to Avoid Contact of the vapours with open flames, hot surfaces and welding arcs. |
|---|---|---|---|
| | Stable | X | |

Incompatibility (Materials to Avoid)

Strong alkalies (forms explosive mixtures e.g. dichloroacetylene).

Hazardous Decomposition Products

Hydrogen chloride, phosgene and other toxic substances.

| Hazardous Polymerization | May Occur | | Conditions to Avoid |
|---|---|---|---|
| | Will Not Occur | X | .. |

## Section V. • Health Hazard Data

| Threshold Limit Value (TLV - TWA) | $LC_{50}$ |
|---|---|
| 100 ppm - 535 mg/$m^3$ | N.A.: $LD_{50}$ oral-rat: 4920 mg/kg |

Effects of Overexposure when:

Inhaled — High concentrations causes narcosis and anesthesia. Prolonged exposure at moderate concentrations causes headache and drowsiness.

In contact with eyes — Irritation, burning and reddening of the eyes. May cause ulceration. Severe eye damage may occur.

In contact with skin — Irritation, skin inflammation. Absorption through the skin may occur. May cause dermatitis.

Ingested — Burning sensation and ulceration of mucous digestive membranes. Causes drowsiness, headache, convulsions and anesthesia.

Emergency and First Aid Procedures:

Inhalation — Remove to fresh air. If not breathing, give artificial respiration. Give oxygen by qualified personnel if breathing is difficult. Never administer adrenalin . Get medical help promptly.

Eyes — Hold eyelids open and wash thoroughly with clean water for at least 15 minutes. Use eye irrigation fountain if available. Get medical help promptly.

Skin — Remove contaminated clothing immediately and wash affected areas thoroughly with warm water and soap. Get medical help promptly.

Ingestion — Get medical help immediately. Induce vomiting by placing fingers or spoon at back of patient's throat.

## Section VI. • Special Protection Information

Ventilation Requirements

Adequate to maintain vapours below TLV. Since trichloroethylene vapour is 4.54 times heavier than air, ventilation inlet should be at floor level.

Respiratory Protection

Canister-type respirators approved by the U.S. Bureau of Mines, fitted with the proper canister for absorbing trichloroethylene vapours for conc. not exceeding 1% by vol. Self-contained breathing apparatus must be worn when conc. are high.

| Protective Gloves | Eye Protection |
|---|---|
| Poly vinyl alcohol gloves. | Tight-fitting chemical goggles. |

Other Protective Equipment

Poly vinyl alcohol boots and apron depending on exposure.

## Section VII. • Special Requirements

| | |
|---|---|
| Precautions in Handling and Storing | Store in well-ventilated, cool locations away from sunlight. Avoid breathing vapours and contact with skin by wearing protective clothing. |
| Other Precautions | Avoid contact with water vapour or steam as these agents promote corrosion. No smoking in presence of vapours. |

## Section VIII. • Spill or Leak Procedures

| | |
|---|---|
| Steps to be taken in event of Spill or Release | Do not allow chemical to enter sewers or waterways. With large spills, evacuate area and dyke for later disposal or recovery. With minor spills, evacuate area, ventilate, and clean-up area by mopping or using absorbent material. Clothing, rags or mops should not be used until dry and free of odour of trichloroethylene. |
| Environmental Effects | May be dangerous if it enters water intakes. Notify nearest pollution control authority promptly. |
| Neutralizing Chemicals | N.A. |
| Waste Disposal | Consult local pollution control agency. The most desirable treatment for any waste trichloroethylene is to recover the solvent in a properly designed and operated still. |

## Section IX. • References


(1) CIL Technical Manual Data Sheet "Trichloroethylene".
(2) MCA SD-14.
(3) Sax N.I., "Dangerous Properties of Industrial Materials" 4th ed. (1975)
(4) The Merck Index 9th Ed. 1976.
(5) CRC Handbook of Laboratory Safety 2nd Ed. 1976.
(6) American Conference of Governmental Industrial Hygienists. 1978




Hanson INC.
45 VANSCO RD., TORONTO M8Z 5J7, CANADA
TEL: (416) 255-1371, telex 06-984521
CABLE: BRUCINE, TORONTO, CANADA

ed

638

12/01/97

# MATERIAL SAFETY DATA SHEET

## SECTION I – PRODUCT INFORMATION

| | |
|---|---|
| Product Name: Croma Tap #1 (revised) | Chemical Formula: Not Available |
| Chemical Name: not applic. | Molecular Weight: not applicable |
| Chemical Family: blend of chlorinated solvent & lubricity additives | Trade names & Synonyms: CT, CT-1, Cromatap. |
| Manufacturer and Supplier: Cromac Chemical Co. Ltd., 80 Summerlea Rd, Brampton, Ont L6T 4X3 | |
| Emergency Telephone Number: (905)458-1999 | Product Use: lubricant |

## SECTION II – HAZARDOUS INGREDIENTS

| Identity | Approximate Concentration % | CAS Number | Additional Information |
|---|---|---|---|
| Trichloroethylene | 60 - 100 | 79-01-6 | ACGIH TLV -TWA 50 ppm |

This product contains no other hazardous ingredients.

## SECTION III – PHYSICAL DATA

| | | |
|---|---|---|
| Physical State: Liquid | Specific Gravity: 1.44-1.46 @ 20°C<br>Bulk Density: | Odour Threshold: 21 ppm |
| pH: not applicable | Vapour pressure (mm): 100 mmHg at 32°F | Vapour Density (air=1): 4.55 |
| Evaporation Rate 0.28 (Ethyl Ether = 1) | Boiling Point (°C): 71 - 81 | Freezing point (°C): -86.8 |
| Coefficient Of Water/oil Distribution: < 1 Oil Soluble | Odour and Appearance: Clear yellow liquid, cinnamon odour | |

## SECTION IV – FIRE OR EXPLOSION HAZARD

| | |
|---|---|
| Flammability: no | If Yes, Under Which Conditions? |

Hazardous Combustion Products: CO, $CO_2$, Hydrogen choride, or traces of phosgene can be produced from decomposition or burning

| | |
|---|---|
| Lower Flammable Limit (% By Volume): not avail. | Upper Flammable Limit (% By Volume): not avail. |
| Flash Point (°C) And Method: none under normal test condition. | Autoignition Temperature (°C): 537 °C |
| Explosion Data-Sensitivity To Mechanical Impact: not available | Explosion Data – Sensitivity To Static Discharge: not available |
| Means Of Extinction: | Special Procedures: |

## SECTION V – REACTIVITY DATA

| | |
|---|---|
| Chemical Stability: stable | Conditions To Avoid: open flames, hot glowing surfaces, electric arcs |
| Incompatibility To Other Substances: yes | Materials To Avoid: sodium, potassium, barium. Avoid mixing with caustic soda, caustic potash or oxidizing materials. |

Conditions Of Reactivity: elevated temperatures (above boiling point), electric arcs.

Hazardous Decomposition Products: CO, CO2 or hydrogen chloride or traces of phosgene can be produced from decomposition or burning.

## SECTION VI – TOXICOLOGICAL PROPERTIES OF PRODUCT

Route Of Entry:

Skin contact✓ Skin Absorption✓ Eye contact✓ Inhalation✓ Ingestion✓

Effects Of Acute and Chronic Exposure To Product: Inhaled: vapours are irritating to eyes, nose, throat and respiratory tract. May cause central nervous system depression and cardiac arrythmia. Skin: prolonged and repeated contact may lead to dermatitis. May be absorbed through intact skin causing central nervous system depression and cardiac arrythmia. Eyes: May cause irritation, redness and pain. Ingestion: May cause irritation and burning of the mouth and throat, abdominal pain and central nervous system depression and cardiac arrythmia.

| | |
|---|---|
| Exposure limits: Not Available | Irritancy Of Product: Eyes |
| Toxicological Synergistic Products: | Sensitization To product: Skin |

LD50 & LC 50 Of Product (Species & Route): ORL-LD50(estim.) – 10,000 kg/mg, INH-RAT LC50 (est.)= 18000 ppm/4h.

Carcinogenicity, Reproductive Effects, Teratogenicity, Mutagenicity: The ingredients of this product are not listed as carcinogens by NTP (National Toxicology Program), not regulated as carcinogens by OSHA (Occupational Safety and Health Administration) and have not been evaluated by IARC (International Agency for Research on Cancer) or ACGIH (American Conference of Governmental Industrial Hygienists). Reproductive Effects, Mutagenicity Data, Teratogenicity Data: No information is available and no adverse effects are anticipated.

## SECTION VII - FIRST AID MEASURES

Inhalation: Move victim to fresh air. Give artificial respiration only if breathing has stopped. Give CPR if there is no breathing and no pulse. Obtain medical attention immediately.
Eyes: Immediately flush eyes with running water for a minimum of 20 minutes. Hold eyelids open during flushing. If irritation persists, repeat flushing. Obtain medical attention immediately.
Skin: Flush skin with running water and wash affected areas thoroughly with soap and water. If contact area is large, get medical attention.
Ingestion: If victim alert and not convulsing, rinse out mouth and give 1/2 to 1 glass of water to dilute material. DO NOT induce vomiting. If spontaneous vomiting occurs, have victim lean forward with head down to avoid breathing in of vomitus, rinse mouth and administer more water.

## SECTION VIII - PREVENTIVE MEASURES

**Personal Protective Equipment To Be Used:**
Gloves - Viton
Respirator - a NIOSH/MSHA approved air purifying respirator equipped with organic vapour cartridges for concentrations of 300 - 1000 ppm (as 1,1,1-Trichloroethane). An air-supplied respirator if concentrations are higher or unknown.
Eyes - use chemical safety goggles where there is potential for eye contact

**Specific Engineering Controls To Be Used:** local exhaust ventilation required

**Procedures To Be Followed In Case Of Leak Or Spill:** Small leaks: mop up, wipe up or soak up immediately. Remove to out of doors. Large spills: Evacuate area. Contain liquid. Keep out of water ways.

**Waste Disposal:** Consult disposal agency. Dispose in accordance with local, provincial and federal regulations.

**Precautions To Be Taken in Handling & Storing:** Store in cool, well ventilated area. Do not expose containers to temperatures above 50°C. Keep away from heat, sparks and flame. Keep containers closed.

**Special Shipping Requirements:**

## SECTION IX – PREPARATION INFORMATION

**Prepared By:** Cromac Chemical Co. Ltd. **Effective Date:** Dec 1, 1997 **Replaces:** all previous

## SECTION X TRANSPORTATION DATA AND PRECAUTIONARY LABELLING

PIN # 1710
Class 6.1, (9.2)
Packing Group III
Trichloroethylene Solution

## SECTION XII – ADDITIONAL NOTES OR REFERENCES

WHMIS CLASSIFICATION: CLASS D, DIVISION 2, SUB-DIVISION B

# APPENDIX D- DOCUMENTS FROM GENERAL ELECTRIC

John EPOXY F

Canadian General Electric

SUBJECT: Report on Industrial Hygiene Survey Conducted at C.G.E. Peterborough October 20/21, 1980.

To: Mr. Lorne Read, Peterborough.

COPIES: HR Hosein
B Bergey
L Chun
K Faggetter
F MacDonald
R Osborne
F McMullen

Health, Safety and Environment Section
Corporate Human Resources Operation
December 17, 1980.

A survey was conducted at C.G.E. Peterborough to determine the composition and quantity of materials emitted from oven #2 during the curing of the epoxy resin on a large stator. Several complaints have arisen from those within building #7 as well as many outside who have had to walk through a "courtyard" contaminated with smoke and an irritating odour which occured as a result of downdraft air currents carrying the emissions from the smokestack (of the oven) into this area.

## RESULTS

Table 1 - Contaminant Concentrations

21 chemicals

| | Possible Structure | Tube Number | Quantity in Tube (µg) | Volume Sampled (l) | Volume Sampled ($m^3$) | Concentration ($mg/m^3$) | TLV (mg |
|---|---|---|---|---|---|---|---|
| 1 | Benzene | 1 | 0.7 | 20.4 | 0.020 | 0.035 | 3 |
| 2 | Toluene | 1 | 0.5 | 20.4 | 0.020 | 0.025 | 37 |
| | Benzene | 2 | 6.6 | 23.1 | 0.023 | 0.287 | 3 |
| | Toluene | 2 | 6.0 | 23.1 | 0.023 | 0.261 | 37 |
| 3 | Ethane | 3 | 5.0 | 23.0 | 0.023 | 0.217 | Simpl Asphy |
| | Benzene | 3 | 0.4 | 23.0 | 0.023 | 0.017 | 3 |
| 4 | Xylene | 3 | 0.1 | 23.0 | 0.023 | 0.004 | 43 |
| 5 | Cresol | 3 | 0.1 | 23.0 | 0.023 | 0.004 | 2 |
| 6 | Trimethyl benzene | 3 | 0.1 | 23.0 | 0.023 | 0.004 | 12 |
| 7 | etylene | 4 | 30 | 26.5 | 0.027 | 1.11 | Simpl Asphy |

able 1 Cont.d

| Possible Structure | Tube Number | Quantity in Tube (µg) | Volume Sampled (l) | Volume Sampled ($m^3$) | Concentration ($mg/m^3$) | TLV–? (mg/? |
|---|---|---|---|---|---|---|
| Carbon dioxide (grouped together as possible anylite) | 4 | 100 | 26.5 | 0.027 | 3.70 | 900 |
| Propane | 4 | | | | | Simple Asph |
| Formaldehyde | 4 | | | | | 3. |
| Vinyl Alcohol | 4 | | | | | – |
| Toluene | 4 | 80 | 26.5 | 0.027 | 2.96 | 37 |
| Phenol | 4 | 54 | 26.5 | 0.027 | 2.00 | 1 |
| Heptane (grouped together as possible anylite) | 4 | 30 | 26.5 | 0.027 | 1.11 | 160 |
| 4-Pentenoic Acid | 4 | | | | | – |
| Hexaldehyde | 4 | | | | | – |
| Cyclohexanol | 4 | | | | | 20 |
| Dimethyl Phenol (Cresol) | 4 | 20 | 26.5 | 0.027 | 0.741 | 2 |
| Xylene | 6 | 14 | 45 | 0.045 | 0.31 | Simple Asphyxi |
| Propionaldehyde | 6 | 200 | 45 | 0.045 | 4.44 | – |
| Toluene | 6 | 74 | 45 | 0.045 | 1.64 | 37 |
| Dihydroxy Phenol (hydroquinone) | 6 | 27 | 45 | 0.045 | 0.60 | |
| Carbon Dioxide | 8 | 150 | 45 | 0.045 | 3.33 | 90 |
| Propane | 8 | | | | | Simple Asphyxi |
| Acetyaldehyde | 8 | | | | | 18 |
| Toluene | 8 | 85 | 45 | 0.045 | 1.89 | 37 |
| Xylene | 8 | 20 | 45 | 0.045 | 0.44 | 4 |

NOTE: 1) Only those materials indicating a measureable "quantity in tube" are indicated above (as per Peninsula Tables (Appendix 1) ).

2) Tenax tubes 6 and 8 were obtained October 8, 1980 to determine the feasibility of using Tenax tubes as an adsorbing medium.

3) See Appendix 2 for position of samplers.

NOTE: 4) Tube 4 has two groups of 4 chemicals where each group may be a possible anylite. Tube 8 has one group of 3 chemicals which may also be a possible anylite. Due to the inability of the mass spectrometer to differentiate which of these chemicals is the actual anylite, it is difficult to allow comparisons between them and the TLV to be made.

The six Tenax tubes submitted to Peninsula Chemical Analysis Limited (tubes 1-4 taken at a 100 ml/min flow rate the night of October 20/21, 1980, and the tubes 6-8 taken at a 1.5 l/min flow rate October 8, 1980) were analyzed using a mass spectrometer. Tubes 6 and 8 were taken primarily to determine the feasibility of using Tenax as an adsorbing medium for the unknown contaminants being released during the curing of the resin (M6860) of stators (October 20/21, 1980, stator 505-1054). Tubes 1-4 should be looked at most closely since the lowe flow rate allows a greater time period for the tenax to adsorb the contaminants.

According to Dr. R.J. Smythe (Director of Peninsula Chemical Analysis Limit the mass spectrometer technique is a qualitative rather than a quantitative technique thereby indicating that the concentrations of contaiminants are approximate only. As can be seen in the results section, the contaminant concentrations are much less than the TLV-TWA. These concentrations exist within the oven during the cure and indicate that concentrations outside of the oven (i.e. within building 7) are significantly less since minimal release through the oven occurs. It is therefore possible to indicate that contaminants emfnating fro the curing resin are of such low cencentration outside the oven in the work environment of building 7 as to not pose a hazard to health.

The mass spectrometer data indicates that thermal decomposition is probabl not a major problem in this study since a large proportion of the recognizable or present appear to be stable aromatic compounds and low molecular weight species, according to Dr. R.J. Smythe.

Since the smell is bothersome to those walking outside in the courtyard, changes to the system should be made to remove this problem.

To determine the concentration of the contaminant being emitted into the outside environment, calculations based on the concentrations shown (i.e. within the oven) and the exhaust system flow rate are required. Based on the very low levels within the oven, it is hardly likely that emissions from the stack will be outside of the regulated limits.

The irritating odour reported by those within the building and those walking through the courtyard may be due to the cresol, formaldehyde, hexaldehyde acetaldehyde, propionaldehyde and phenol. These chemicals are known irritants to the eyes and respiratory tract, but the levels expected outside the oven and in t courtyard will not pose a health risk. The other chemicals are central nervous system depressants, but the levels are too low to be of toxicologic significance.

The many other chemicals detected in the air sample were too low to quantify, but the toxicologic properties will be primarily central nervous system depression and irritation of the eyes and respiratory tract.

RECOMMENDATIONS

1. Maintain a slight negative pressure within the ovens to minimize the leakage within the plant.

2. Check frequently the integrity of the gaskets, door jams and seams and replace these as necessary to minimize leakage.

3. Check frequently the fan blades, motors and belts to ensure they are in proper working order.

4. If possible, increase the capacity of the exhaust fan to dissipate the emis higher above the building roofs. This can be done in concert with the use of higher stacks.

P.A. Gray:11.

Tube One

| m/e | Possible Structure | Approximate quantity in tub |
|---|---|---|
| 50 | Aromatic fragment | |
| 51 | " " | |
| 52 | " " | |
| 63 | " " | |
| 65 | " " | |
| 67 | Dienes | |
| 69 | Thiophenes or alkene/cycloalkene fragment | |
| 77 | Benzene fragment | |
| 78 | Benzene | 0.7 micrograms |
| 79 | Aromatic fragment | |
| 80 | Cn $H_2n-4$ ie. $C_6H_8$ | |
| 81 | Diene fragment | |
| 91 | Toluene fragment | |
| 92 | Toluene | 0.5 micrograms |
| 115 | Trimethyl Substituted Benzene fragment | |

Tube Two

| m/e | Possible Structure | Approximate quantity in |
|---|---|---|
| 26 | acetylene or aromatic fragment | |
| 27 | $C_2H_3$ | |
| 29 | $C_2H_5$ or CHO | |
| 37 | Unknown $C_3H$ | |
| 38 | Aromatic fragment | |
| 39 | Aromatic, $C_3H_3$ | |
| 41 | $C_3H_5$ | |
| 42 | $CH_2CO$ unsaturated acetates diketones and cyclic ketones | |
| 50 | Aromatic fragment | |
| 51 | " " | |
| 52 | " " | |
| 54 | Aromatic fragment | |
| 56 | $C_nH_{2n}CO$ (as m/e =42) | |
| 63 | Aromatic fragment | |
| 65 | " " | |
| 66 | Aromatic fragment or $C_nH_{2n-4}$ | |
| 67 | Dienes, alkynes, cycloalkenes $C_nH_{2n-3}$ | |
| 68 | Aromatic fragment | |
| 69 | $C_nH_{2n-4}$ or thiophenes | |
| 77 | Benzene fragment | |
| 78 | Benzene | 6.6 microgra |
| 79 | Aromatic fragment | |
| 80 | $C_nH_{2n-4}$ | |
| 81 | $C_nH_{2n-3}$, $C_nH_{2n-10}$ | |
| 91 | Toluene fragment | |
| 92 | Toluene | 6 microgram |
| 95 | see m/e 81, furylalkyl, polyunsaturated alcohols, cyclic alcohols and others | |

Tube Three

| m/e | Possible Structure | Approximate quantity ir |
|---|---|---|
| 26 | acetylene or aromatic fragment | |
| 27 | $C_nH_{2n-1}$ | |
| 30 | Ethane | 5 micrograms |
| 36 | Unknown orgin | |
| 37 | Unknown $C_3H$ | |
| 38 | Aromatic fragment | |
| 39 | Aromatic, $C_3H_3$ | |
| 40 | $C_3H_4$ | |
| 41 | $C_nH_{2n-1}$, ie $C_3H_5$ | |
| 42 | $C_nH_{2n}CO$, unsaturated acetates, diketones and cyclic keytones | |
| 50 | Aromatic fragment | |
| 51 | " " | |
| 53 | " " | |
| 55 | $C_4H_7$ or $CH_2CHCO$ | |
| 63 | Aromatic fragment | |
| 65 | " " | |
| 67 | Dienes, Alkynes and cycloalkenes, $C_nH_{2n-3}$ | |
| 77 | Benzene fragment | |
| 78 | Benzene | 0.4 micrograms |
| 79 | Aromatic fragment | |
| 81 | $C_nH_{2n-3}$, $C_nH_2$-10 fragment | |
| 91 | Toluene - xylene fragment | |
| 95 | See m/e 81, Furylalkyl, polyunsaturated alcohols and ethers | |
| 106 | Xylene | 0.1 micrograms |
| 108 | Cresol | 0.1 micrograms |
| 116 | Trimethyl benzene | 0.1 micrograms |

Tube Four

| m/e | Possible structure | Approximate quantity in |
|---|---|---|
| 26 | acetylene | 30 micrograms |
| 27 | $C_2H_3$ ie. $C_nH_{2n-1}$ | |
| 37 | unknown $C_3H$ | |
| 38 | $C_3H_2$ from aromatic fragmentation | |
| 39 | $C_3H_3$ " " " | |
| 41 | $C_nH_{2n-1}$ fragment | |
| 42 | $C_nH_{2n}CO$ unsaturated acetates, diketones and cyclic ketones | |
| 43 | $C_nH_{2n-1}$ fragment | |
| 44 | $CO_2$, $C_3H_8$, $CH_3$-CHO, vinyl alcohol | 100 micrograms |
| 53 | $C_4H_5$ | |
| 55 | $C_4H_7$, $CH_2$=CHC=O | |
| 57 | $C_nH_{2n-1}$ | |
| 58 | $CH_3$-$CH_2$-CHO | |
| 67 | $C_5H_7$ | |
| 69 | $C_5H_9$, $CH_3$CH=CHC=O | |
| 77 | Benzene fragment $C_6H_5$ | |
| 79 | Aromatic fragment | |
| 80 | $C_nH_{2n-4}$ ie. $C_6H_8$ | |
| 81 | furylalkyl fragment, polyunsaturated alcohol etc. | |
| 82 | $C_4H_2O_2$, $C_5H_6O$ or $C_6H_{10}$ | |
| 83 | $C_nH_{2n-1}$ from alkenes and cycloalkenes | |
| 85 | $C_nH_{2n-1}$ or $C_nH_{2n+1}$ CO | |
| 91 | Toluene fragment | |
| 92 | Toluene | 80 micrograms |
| 94 | Phenol | 54 " |
| 95 | see m/e =81 | |
| 97 | $C_7H_{13}$ ie. $C_nH_{2n-1}$ | |
| 100 | $C_7H_{16}$, $C_5H_8O_2$, $C_6H_{12}O$ , cyclohenanol | 30 micrograms |
| [illegible] | Dimethyl phenol (cresol) | 20 " |

Tube Six

| m/e | Possible structure | Approximate quantity in tube |
|---|---|---|
| 26 | acetylene | 14 micrograms |
| 27 | $Cn-H_2n-1$ | |
| 37 | unknown $C_3H$ | |
| 38 | aromatic fragment | |
| 39 | $C_3H_3$ aromatic fragment | |
| 41 | $CnH_2n-1$ | |
| 42 | $C_2H_2CO$ from unsaturated acetates, diketones etc. | |
| 53 | $C_4H_5$ | |
| 55 | $C_4H_7$ or $CH_2{=}CH_2C{=}O$ | |
| 57 | $CnH_2n-1$ | |
| 58 | $CH_3-CH_2-CHO$ propionaldehyde | 200 micrograms |
| 59 | $CnH_2n+1$ O, $CnH_2n-1$ $O_2$ | |
| 67 | $C_5H_7$ | |
| 69 | $C_5H_9$, $CH_3CH{=}CHC{=}O$ | |
| 77 | Benzene fragment | |
| 79 | Aromatic fragment | |
| 80 | $CnH_2n-4$ ie $C_6H_8$ | |
| 81 | furylalkyl fragment, polyunsaturated alcohol | |
| 91 | toluene fragment | |
| 92 | toluene | 74 micrograms |
| 110 | dihydroxyphenol (hydroquinone) | 27 " |

Tube Eight

| m/e | Possible structure | Approximate quantity in tube |
|---|---|---|
| 39 | $C_3H_3$ aromatic fragment | |
| 40 | $C_3H_4$ " " | |
| 44 | $CO_2$ propane acetyaldehyde | 150 micrograms |
| 91 | toluene fragment | |
| 92 | toluene | 85 micrograms |
| 105 | xylene fragment | |
| 106 | xylene | 20 micrograms |

# APPENDIX 2

Position of Samplers (i.e., when facing oven #2)

Tube #1 - left front port

Tube #2 - right front port

Tube #3 - right rear port (samples directly the effluent going out of chimney)

Tube #4 - left rear port

WIRE & CABLE

(E)

PVC

CANADIAN GENERAL ELECTRIC

SUBJECT: PVC Mixing Equipment
Building 26, Bay 1129

COPIES: A.K. Faggetter - Safety
W.J. Olmstead - X64
K. Koyanagi - X63

1978 January 24

Mr. J.D. Pritchard, Manager,
Manufacturing Engineering.

When mixing PVC in building 26 of the Wire and Cable Section, significant amounts of PVC powder are released to the general building air.

Today the Peterborough Plant Safety personnel were called to the PVC mixer to view the process and equipment. It is necessary to provide remedial action, so that area employees are not subjected to this PVC dust.

Nuclear Products, as well as being concerned for the welfare of our personnel in the welding shop, cannot tolerate this dust in the welding shortly to be undertaken in this welding shop, as undesireable chlorine will be generated in the welds.

Mr. Faggetter advises he will meet with Mr. Foord of Wire and Cable to resolve this problem and at that time will advise both J. Olmstead and myself of the corrective actions taken.

R.F. Hurrle, Supervisor,
Facilities Engineering.

RFH/sh

Rick Farley and Joe Ronco WIRE & CABLE

Fire

(P)

Peterborough, February 2, 1979.

Statement of: M. Drumm
545 Hillside Street
Peterborough, Ontario

Truck Driver

I was sitting on my lift truck about 50 ft. away from the enamelling oven 3-I. I noticed the cardboards on the floor beneath the oven and the lower sheaves on fire. I looked up to the platform and saw no one or anything wrong. I was getting off the lift truck for an extinguisher then I noticed fire on the platform and in my position I could see the fire shooting across the upper sheaves and someone yelling.

I then saw someone on fire moving across the platform to the wall. I saw Joe Ronco, who I knew, rushing across the platform to the other man. He was swatting at the fire on the man's clothes and ripped the clothes off. I ran to the foot of the machine and Joe Ronco was coming down the ladder and yelled at me to get Bob. I ran to the office and the Foreman, E. Ayrheart, was coming through the door from the next building. I went on to get an extinguisher. I came back and put out the cardboard burning on the floor. Someone else was up on the platform.

Signed: M J Drumm

Witnessed: D. Harris

Taken by: R. Dickey
I.S.O.

/bn

Peterborough, February 2, 1979.

Statement of: D. Nice
R.R. #2
Indian River, Ontario

Enamelling Machine Operator

I was the operator of enamelling oven 3-I. It was shut down at about 11:00 a.m., January 31/79 for an overhaul. To do this we stop the machine movement and strip off all the wire. The electric oven is still left on. It is never shut down even for vacation time. I then went to the other machine I was working on and continued my job.

At about 2:15 p.m. I was sitting in the lunch room with E. Hewitt and some other fellows. We did hear a strange noise and then the Foreman, Ed Ayrheart, came by and beckoned us to come and yelled fire. I grabbed a fire extingisher and went up the ladder behind E. Hewitt and handed it to him. I went over to R. Farley who was standing near Oven 2-I platform. The bottom of his pants were still smoldering. The fire was out and I assisted Rick Farley to the ladder.

Signed: D. J. Nice

Witnessed: B. Harris

Taken by: R. Dickey
I.S.O.

/bn

Peterborough, February 2, 1979.

Statement of: Edward A. Ayrheart
859 Gilburt Street
Peterborough, Ontario

Foreman - Magnet Wire

The machine 3-I was to be changed from heavy wire to light wire and had to be overhauled before we ran the fine wire which includes cleaning and checking all the sheaves so they will properly process the wire.

I told Dave Nice to shut down the unit for overhaul when his run was completed.

I told J. Ronco verbally in the morning that the overhaul would be required and I sent a memo to his Foreman, R. Keay, with this request listed on it.

I was just coming back from another section of the department when Irvin Clifford approached me and told me a man and a machine was on fire. I yelled to some men in the lunch room and went to the machine and I then followed two men up the ladder but was sprayed by the fire extinguisher and then turned and came down and stayed there until the injured man was brought down the ladder. I then went and called the plant hospital.

Signed: E A Ayrheart

Witnessed: B. Harris

Taken by: R. Dickey
I.S.O.

/bn

Peterborough, February 2, 1979.

Statement of: E. Hewitt
R.R. #11
Peterborough, Ontario

Enamelling Machine Operator

I was in the lunch room for coffee at about 2:15 p.m., January 31/79.

I heard a loud bang, and stood up and looked out but saw nothing out of the ordinary. Then Ed Ayrheart ran by the window and motioned for us to come out and yelled fire. Someone said a person was up on the platform on 3-I and I went up the ladder and saw Rick Farley standing near 2-I and saw some clothes on fire laying on the platform. I went to Rick and tried to get him to move but he would not and said put the fire out. I turned and Dave Nice handed me the fire extinguisher from his position on the ladder and I put the fires out. I went down the ladder ahead of Rick Farley.

Signed: Ed. Hewitt

Witnessed: B. Harris

Taken by: R. Dickey
I.S.O.

/bn

Peterborough, February 2, 1979.

Statement of: Robert Keay
R.R. #11
Peterborough, Ontario

Foreman - Machine Engineering Service & Maintenance

All maintenance men in Wire and Cable are under my authority. The two men involved in the fire look after the maintenance in that area and receive their scheduling instructions from the Foreman in that area. Mr. Ronco is the area mechanic assigned to that area with Mr. Farley as his helper.

To the best of my knowledge, alcohol is the normal cleaning agent. I was informed of the fire and injury soon after the incident.

Signed: R Keay

Witnessed: B. Harris

Taken by: R. Dickey
I.S.O.

/bn

Peterborough, February 2, 1979.

Statement of: Irvin Clifford
General Delivery
Omemee, Ontario

Formex Die Maker

I was at my bench in my work room, approximately 60 ft. away from 3-I oven.

I heard an explosion, stood up and looked out the window. I could see a fire on 3-I platform with the flames shooting up approximately 8 ft. I could hear a man yelling and a second later saw a man on fire away from the main fire on the platform near the second unit. I have a bad leg and went as fast as I could for help.

Signed: I. R. Clifford

Witnessed: B. Harris

Taken by: R. Dickey
I.S.O.

/bn

SUBJECT: Dust Control at the Banbury

PETERBOROUGH, 5 September 1978

L.J. Foord
Manager - Manufacturing
Support & Projects
Wire & Cable

I have reviewed the dust control at the banbury and found conditions ranging from excellent to completely unacceptable.

Of the 6 dust generating points two were excellent (banbury rolls and loading), two were inadequate (platform weight up and main floor weight up), and two were unacceptable with a reverse flow of air (bag disposal and main floor hood).

Will you please provide the UE-CGE Safety Committee with a schedule to correct these inadequacies. We would appreciate having the schedule by Thursday, 7 September.

Until proper dust control is obtained will you please immediately close the hole in the wall which is used for bag disposal.

By copy to Ed Rowe, I would ask that operating routines insure that masks are worn by the operators at all times that dust is being generated.

Thank you.

A.K. Faggetter
Specialist - Safety
Employee & Community Relations

:am

cc: UE-CGE Safety Committee
EJ Rowe
WG King
BH Martin

WIRE + CABLE ⓟ

# CANADIAN GENERAL ELECTRIC COMPANY LIMITED

## SAFETY UNIT

SUBJECT: Banbury Dust Control

PETERBOROUGH, 8 May 1979

R.J. Dyck
Manufacturing Engineering
Wire & Cable.

As you know the dust control at the Banbury has been a long-standing problem.

The problem was identified by letter (attached) on 5 September 1978 and it has been the understanding of the UE-CGE Safety Committee that permanent corrective action by management was scheduled for the July 1979 shutdown.

This schedule information was given to the Ministry of Labour inspector, by the Safety Committee, when the problem was brought to his attention by Wire & Cable operators. Based on this he decided no action was required by him.

If your plans have been changed will you please advise immediately. I am duty-bound to communicate this to the Ministry of Labour to update the understanding they now have from the Safety Committee.

K. Faggetter

A.K. Faggetter
Specialist - Safety
Employee & Community Relations

:am

attach.

cc: WL Furst, WG King, RC Bergey, BH Martin
UE-CGE Safety Committee

PW 1034 (10-61)

WIRE + CABLE (P)

CANADIAN GENERAL ELECTRIC

SUBJECT: Banbury Dust Control

COPIES: WL Furst
WG King
NA McDonald
UE-CGE Safety Committee
BH Martin

16 May 1979

R. Dyck
Wire and Cable

This will confirm our conversation held at the Banbury late Monday afternoon re the need for dust control:

The observed condition of the operator, who was covered in dust as a result of working at this floor weigh-up station, indicated the immediate need for improved dust control at this station.

Action agreed to:-

1. Upgrade the dust control at the floor weigh-up as follows:
   a) disconnect the piping from the old main duct and tie into the new fan system
   b) shorten the flexible hose to a minimum length required to operate the work station
   c) extend the sides and top of the work station to enclose the bucket which is receiving the dust generating ingredients. This will direct all the exhausted air a) over the operator from back to front and then b) over the bucket.

   Action for a) b) and c) -- Ray Dyck

2. Take air samples on the personal dosimeter during Tuesday and Wednesday

   Action -- K. Faggetter

3. Provide a list of chemicals handled at the weigh-up station.

   Action -- Ray Dyck

A.K. Faggetter
Specialist - Safety

/bc

John EPOXY (F)

Canadian General Electric

SUBJECT: Report on Industrial Hygiene Survey
Conducted at C.G.E. Peterborough
October 20/21, 1980.

COPIES: HR Hosein
B Bergey
L. Chun
K Faggetter
F MacDonald
R Osborne
F McMullen

To: Mr. Lorne Read, Peterborough.

Health, Safety and Environment Section
Corporate Human Resources Operation
December 17, 1980.

A survey was conducted at C.G.E. Peterborough to determine the composition and quantity of materials emitted from oven #2 during the curing of the epoxy resin on a large stator. Several complaints have arisen from those within building #7 as well as many outside who have had to walk through a "courtyard" contaminated with smoke and an irritating odour which occured as a result of downdraft air currents carrying the emissions from the smokestack (of the oven) into this area.

## RESULTS

Table 1 - Contaminant Concentrations

21 chemicals

| Possible Structure | Tube Number | Quantity in Tube (μg) | Volume Sampled (l) | Volume Sampled ($m^3$) | Concentration ($mg/m^3$) | TLV-(mg/ |
|---|---|---|---|---|---|---|
| Benzene | 1 | 0.7 | 20.4 | 0.020 | 0.035 | 30 |
| Toluene | 1 | 0.5 | 20.4 | 0.020 | 0.025 | 375 |
| Benzene | 2 | 6.6 | 23.1 | 0.023 | 0.287 | 30 |
| Toluene | 2 | 6.0 | 23.1 | 0.023 | 0.261 | 375 |
| Ethane | 3 | 5.0 | 23.0 | 0.023 | 0.217 | Simple Asphyx |
| Benzene | 3 | 0.4 | 23.0 | 0.023 | 0.017 | 30 |
| Xylene | 3 | 0.1 | 23.0 | 0.023 | 0.004 | 435 |
| Cresol | 3 | 0.1 | 23.0 | 0.023 | 0.004 | 22 |
| Trimethyl benzene | 3 | 0.1 | 23.0 | 0.023 | 0.004 | 125 |
| ·etylene | 4 | 30 | 26.5 | 0.027 | 1.11 | Simple Asphyx |

able 1 Cont.d

| Possible Structure | | Tube Number | Quantity in Tube (µg) | Volume Sampled (1) | Volume Sampled ($m^3$) | Concentration ($mg/m^3$) | TLV-T (mg/m |
|---|---|---|---|---|---|---|---|
| Carbon dioxide | grouped together as possible anylite | 4 | 100 | 26.5 | 0.027 | 3.70 | 9000 |
| Propane | | 4 | | | | | Simple Asphy |
| Formaldehyde | | 4 | | | | | 3.0 |
| Vinyl Alcohol | | 4 | | | | | – |
| Toluene | | 4 | 80 | 26.5 | 0.027 | 2.96 | 375 |
| Phenol | | 4 | 54 | 26.5 | 0.027 | 2.00 | 19 |
| Heptane | grouped together as possible anylite | 4 | 30 | 26.5 | 0.027 | 1.11 | 1600 |
| 4-Pentenoic Acid | | 4 | | | | | – |
| Hexaldehyde | | 4 | | | | | – |
| Cyclohexanol | | 4 | | | | | 200 |
| Dimethyl Phenol (Cresol) | | 4 | 20 | 26.5 | 0.027 | 0.741 | 22 |
| tylene | | 6 | 14 | 45 | 0.045 | 0.31 | Simple Asphyxia |
| Propionaldehyde | | 6 | 200 | 45 | 0.045 | 4.44 | – |
| Toluene | | 6 | 74 | 45 | 0.045 | 1.64 | 375 |
| Dihydroxy Phenol (hydroquinone) | | 6 | 27 | 45 | 0.045 | 0.60 | [illegible] |
| Carbon Dioxide | | 8 | 150 | 45 | 0.045 | 3.33 | 9000 |
| Propane | | 8 | | | | | Simple Asphyxia |
| Acetyaldehyde | | 8 | | | | | 180 |
| Toluene | | 8 | 85 | 45 | 0.045 | 1.89 | 375 |
| Xylene | | 8 | 20 | 45 | 0.045 | 0.44 | 435 |

NOTE: 1) Only those materials indicating a measureable "quantity in tube" are indicated above (as per Peninsula Tables (Appendix 1) ).

2) Tenax tubes 6 and 8 were obtained October 8, 1980 to determine the feasibility of using Tenax tubes as an adsorbing medium.

3) See Appendix 2 for position of samplers.

NOTE: 4) Tube 4 has two groups of 4 chemicals where each group may be a possible anylite. Tube 8 has one group of 3 chemicals which may also be a possible anylite. Due to the inability of the mass spectrometer to differentiate which of these chemicals is the actual anylite, it is difficult to allow comparisons between them and the TLV to be made.

The six Tenax tubes submitted to Peninsula Chemical Analysis Limited (tubes 1-4 taken at a 100 ml/min flow rate the night of October 20/21, 1980, and the tubes 6-8 taken at a 1.5 l/min flow rate October 8, 1980) were analyzed using a mass spectrometer. Tubes 6 and 8 were taken primarily to determine the feasibility of using Tenax as an adsorbing medium for the unknown contaminants being released during the curing of the resin (M6860) of stators (October 20/21, 1980, stator 505-1054). Tubes 1-4 should be looked at most closely since the lower flow rate allows a greater time period for the tenax to adsorb the contaminants.

According to Dr. R.J. Smythe (Director of Peninsula Chemical Analysis Limite the mass spectrometer technique is a qualitative rather than a quantitative technique thereby indicating that the concentrations of contaiminants are approximate only. As can be seen in the results section, the contaminant concentrations are much less than the TLV-TWA. These concentrations exist within the oven during the cure and indicate that concentrations outside of the oven (i.e. within building 7) are significantly less since minimal release through the oven occurs. It is therefore possible to indicate that contaminants emfnating from the curing resin are of such low cencentration outside the oven in the work environment of building 7 as to not pose a hazard to health.

The mass spectrometer data indicates that thermal decomposition is probably not a major problem in this study since a large proportion of the recognizable org present appear to be stable aromatic compounds and low molecular weight species, according to Dr. R.J. Smythe.

Since the smell is bothersome to those walking outside in the courtyard, changes to the system should be made to remove this problem.

To determine the concentration of the contaminant being emitted into the outside environment, calculations based on the concentrations shown (i.e. within the oven) and the exhaust system flow rate are required. Based on the very low levels within the oven, it is hardly likely that emissions from the stack will be outside of the regulated limits.

The irritating odour reported by those within the building and those walking through the courtyard may be due to the cresol, formaldehyde, hexaldehyde, acetaldehyde, propionaldehyde and phenol. These chemicals are known irritants to the eyes and respiratory tract, but the levels expected outside the oven and in th courtyard will not pose a health risk. The other chemicals are central nervous system depressants, but the levels are too low to be of toxicologic significance.

The many other chemicals detected in the air sample were too low to quantify, but the toxicologic properties will be primarily central nervous system depression and irritation of the eyes and respiratory tract.

RECOMMENDATIONS

1. Maintain a slight negative pressure within the ovens to minimize the leakage within the plant.

2. Check frequently the integrity of the gaskets, door jams and seams and replace these as necessary to minimize leakage.

3. Check frequently the fan blades, motors and belts to ensure they are in proper working order.

4. If possible, increase the capacity of the exhaust fan to dissipate the emiss higher above the building roofs. This can be done in concert with the use of higher stacks.

P.A. Gray:11.

Tube One

| m/e | Possible Structure | Approximate quantity in tube |
|---|---|---|
| 50 | Aromatic fragment | |
| 51 | " " | |
| 52 | " " | |
| 63 | " " | |
| 65 | " " | |
| 67 | Dienes | |
| 69 | Thiophenes or alkene/cycloalkene fragment | |
| 77 | Benzene fragment | |
| 78 | Benzene | 0.7 micrograms |
| 79 | Aromatic fragment | |
| 80 | Cn $H_2n-4$ ie. $C_6H_8$ | |
| 81 | Diene fragment | |
| 91 | Toluene fragment | |
| 92 | Toluene | 0.5 micrograms |
| 115 | Trimethyl Substituted Benzene fragment | |

Tube Two

| m/e | Possible Structure | Approximate quantity in |
|---|---|---|
| 26 | acetylene or aromatic fragment | |
| 27 | $C_2H_3$ | |
| 29 | $C_2H_5$ or CHO | |
| 37 | Unknown $C_3H$ | |
| 38 | Aromatic fragment | |
| 39 | Aromatic, $C_3H_3$ | |
| 41 | $C_3H_5$ | |
| 42 | $CH_2CO$ unsaturated acetates diketones and cyclic ketones | |
| 50 | Aromatic fragment | |
| 51 | " " | |
| 52 | " " | |
| 54 | Aromatic fragment | |
| 56 | $CnH_2nCO$ (as m/e =42) | |
| 63 | Aromatic fragment | |
| 65 | " " | |
| 66 | Aromatic fragment or $CnH_2n-4$ | |
| 67 | Dienes, alkynes, cycloalkenes $CnH_2n-3$ | |
| 68 | Aromatic fragment | |
| 69 | $CnH_2n-4$ or thiophenes | |
| 77 | Benzene fragment | |
| 78 | Benzene | 6.6 microgra |
| 79 | Aromatic fragment | |
| 80 | $CnH_2n-4$ | |
| 81 | $CnH_2n-3$, $CnH_2n-10$ | |
| 91 | Toluene fragment | |
| 92 | Toluene | 6 micrograms |
| 95 | see m/e 81, furylalkyl, polyunsaturated alcohols, cyclic alcohols and others | |

Tube Three

| m/e | Possible Structure | Approximate quantity in |
|---|---|---|
| 26 | acetylene or aromatic fragment | |
| 27 | $C_nH_{2n-1}$ | |
| 30 | Ethane | 5 micrograms |
| 36 | Unknown orgin | |
| 37 | Unknown $C_3H$ | |
| 38 | Aromatic fragment | |
| 39 | Aromatic, $C_3H_3$ | |
| 40 | $C_3H_4$ | |
| 41 | $C_nH_{2n-1}$, ie $C_3H_5$ | |
| 42 | $C_nH_{2n}CO$, unsaturated acetates, diketones and cyclic keytones | |
| 50 | Aromatic fragment | |
| 51 | " " | |
| 53 | " " | |
| 55 | $C_4H_7$ or $CH_2CHCO$ | |
| 63 | Aromatic fragment | |
| 65 | " " | |
| 67 | Dienes, Alkynes and cycloalkenes, $C_nH_{2n-3}$ | |
| 77 | Benzene fragment | |
| 78 | Benzene | 0.4 micrograms |
| 79 | Aromatic fragment | |
| 81 | $C_nH_{2n-3}$, $C_nH_2$-10 fragment | |
| 91 | Toluene - xylene fragment | |
| 95 | See m/e 81, Furylalkyl, polyunsaturated alcohols and ethers | |
| 106 | Xylene | 0.1 micrograms |
| 108 | Cresol | 0.1 micrograms |
| 116 | Trimethyl benzene | 0.1 micrograms |

Tube Four

| m/e | Possible structure | Approximate quantity in |
|---|---|---|
| 26 | acetylene | 30 micrograms |
| 27 | $C_2H_3$ ie. $C_nH_{2n-1}$ | |
| 37 | unknown $C_3H$ | |
| 38 | $C_3H_2$ from aromatic fragmentation | |
| 39 | $C_3H_3$ " " " | |
| 41 | $C_nH_{2n-1}$ fragment | |
| 42 | $C_nH_{2n}CO$ unsaturated acetates, diketones and cyclic ketones | |
| 43 | $C_nH_{2n-1}$ fragment | |
| 44 | $CO_2$, $C_3H_8$, $CH_3$-CHO, vinyl alcohol | 100 micrograms |
| 53 | $C_4H_5$ | |
| 55 | $C_4H_7$, $CH_2$=CHC=O | |
| 57 | $C_nH_{2n-1}$ | |
| 58 | $CH_3$-$CH_2$-CHO | |
| 67 | $C_5H_7$ | |
| 69 | $C_5H_9$, $CH_3$CH=CHC=O | |
| 77 | Benzene fragment $C_6H_5$ | |
| 79 | Aromatic fragment | |
| 80 | $C_nH_{2n-4}$ ie. $C_6H_8$ | |
| 81 | furylalkyl fragment, polyunsaturated alcohol etc. | |
| 82 | $C_4H_2O_2$, $C_5H_6O$ or $C_6H_{10}$ | |
| 83 | $C_nH_{2n-1}$ from alkenes and cycloalkenes | |
| 85 | $C_nH_{2n-1}$ or $C_nH_{2n+1}$ CO | |
| 91 | Toluene fragment | |
| 92 | Toluene | 80 micrograms |
| 94 | Phenol | 54 " |
| 95 | see m/e =81 | |
| 97 | $C_7H_{13}$ ie. $C_nH_{2n-1}$ | |
| 100 | $C_7H_{16}$, $C_5H_8O_2$, $C_6H_{12}O$ , cyclohexanol | 30 micrograms |
| 118 | Dimethyl phenol (cresol) | 20 " |

Tube Six

| m/e | Possible structure | Approximate quantity in tube |
|---|---|---|
| 26 | acetylene | 14 micrograms |
| 27 | $C_n$-$H_{2n-1}$ | |
| 37 | unknown $C_3H$ | |
| 38 | aromatic fragment | |
| 39 | $C_3H_3$ aromatic fragment | |
| 41 | $C_nH_{2n-1}$ | |
| 42 | $C_2H_2CO$ from unsaturated acetates, diketones etc. | |
| 53 | $C_4H_5$ | |
| 55 | $C_4H_7$ or $CH_2$=$CH_2C$=O | |
| 57 | $C_nH_{2n-1}$ | |
| 58 | $CH_3$-$CH_2$-CHO propionaldehyde | 200 micrograms |
| 59 | $C_nH_{2n+1}$ O, $C_nH_{2n-1}$ $O_2$ | |
| 67 | $C_5H_7$ | |
| 69 | $C_5H_9$, $CH_3$CH=CHC=O | |
| 77 | Benzene fragment | |
| 79 | Aromatic fragment | |
| 80 | $C_nH_{2n-4}$ ie $C_6H_8$ | |
| 81 | furylalkyl fragment, polyunsaturated alcohol | |
| 91 | toluene fragment | |
| 92 | toluene | 74 micrograms |
| 110 | dihydroxyphenol (hydroquinone) | 27 " |

Tube Eight

| m/e | Possible structure | Approximate quantity in tube |
|---|---|---|
| 39 | $C_3H_3$ aromatic fragment | |
| 40 | $C_3H_4$ " " | |
| 44 | $CO_2$ propane acetyaldehyde | 150 micrograms |
| 91 | toluene fragment | |
| 92 | toluene | 85 micrograms |
| 105 | xylene fragment | |
| 106 | xylene | 20 micrograms |

## APPENDIX 2

Position of Samplers (i.e., when facing oven #2)

Tube #1 - left front port

Tube #2 - right front port

Tube #3 - right rear port (samples directly the effluent going out of chimney)

Tube #4 - left rear port

Appendix

WIRE + CABLE

(E)

PVC

CANADIAN GENERAL ELECTRIC

SUBJECT: PVC Mixing Equipment
Building 26, Bay 1129

COPIES: A.K. Faggetter - Safety
W.J. Olmstead - X64
K. Koyanagi - X63

1978 January 24

Mr. J.D. Pritchard, Manager,
Manufacturing Engineering.

When mixing PVC in building 26 of the Wire and Cable Section, significant amounts of PVC powder are released to the general building air.

Today the Peterborough Plant Safety personnel were called to the PVC mixer to view the process and equipment. It is necessary to provide remedial action, so that area employees are not subjected to this PVC dust.

Nuclear Products, as well as being concerned for the welfare of our personnel in the welding shop, cannot tolerate this dust in the welding shortly to be undertaken in this welding shop, as undesireable chlorine will be generated in the welds.

Mr. Faggetter advises he will meet with Mr. Foord of Wire and Cable to resolve this problem and at that time will advise both J. Olmstead and myself of the corrective actions taken.

R.F. Hurrle, Supervisor,
Facilities Engineering.

RFH/sh

430

Rick Farley and Joe Ronco WIRE + CABLE
Fire
(P)

Peterborough, February 2, 1979.

Statement of: M. Drumm
545 Hillside Street
Peterborough, Ontario

Truck Driver

I was sitting on my lift truck about 50 ft. away from the enamelling oven 3-I. I noticed the cardboards on the floor beneath the oven and the lower sheaves on fire. I looked up to the platform and saw no one or anything wrong. I was getting off the lift truck for an extinguisher then I noticed fire on the platform and in my position I could see the fire shooting across the upper sheaves and someone yelling.

I then saw someone on fire moving across the platform to the wall. I saw Joe Ronco, who I knew, rushing across the platform to the other man. He was swatting at the fire on the man's clothes and ripped the clothes off. I ran to the foot of the machine and Joe Ronco was coming down the ladder and yelled at me to get Bob. I ran to the office and the Foreman, E. Ayrheart, was coming through the door from the next building. I went on to get an extinguisher. I came back and put out the cardboard burning on the floor. Someone else was up on the platform.

Signed: M T Drumm

Witnessed: D. Harris

Taken by: R. Dickey
I.S.O.

/bn

Peterborough, February 2, 1979.

Statement of: D. Nice
R.R. #2
Indian River, Ontario

Enamelling Machine Operator

I was the operator of enamelling oven 3-I. It was shut down at about 11:00 a.m., January 31/79 for an overhaul. To do this we stop the machine movement and strip off all the wire. The electric oven is still left on. It is never shut down even for vacation time. I then went to the other machine I was working on and continued my job.

At about 2:15 p.m. I was sitting in the lunch room with E. Hewitt and some other fellows. We did hear a strange noise and then the Foreman, Ed Ayrheart, came by and beckoned us to come and yelled fire. I grabbed a fire extingisher and went up the ladder behind E. Hewitt and handed it to him. I went over to R. Farley who was standing near Oven 2-I platform. The bottom of his pants were still smoldering. The fire was out and I assisted Rick Farley to the ladder.

Signed: D. J. Nice.

Witnessed: B. Harris

Taken by: R. Dickey
I.S.O.

/bn

Peterborough, February 2, 1979.

Statement of: Edward A. Ayrheart
859 Gilburt Street
Peterborough, Ontario

Foreman - Magnet Wire

The machine 3-I was to be changed from heavy wire to light wire and had to be overhauled before we ran the fine wire which includes cleaning and checking all the sheaves so they will properly process the wire.

I told Dave Nice to shut down the unit for overhaul when his run was completed.

I told J. Ronco verbally in the morning that the overhaul would be required and I sent a memo to his Foreman, R. Keay, with this request listed on it.

I was just coming back from another section of the department when Irvin Clifford approached me and told me a man and a machine was on fire. I yelled to some men in the lunch room and went to the machine and I then followed two men up the ladder but was sprayed by the fire extinguisher and then turned and came down and stayed there until the injured man was brought down the ladder. I then went and called the plant hospital.

Signed: E A Ayrheart

Witnessed: B. Harris

Taken by: R. Dickey
I.S.O.

/bn

Peterborough, February 2, 1979.

Statement of: E. Hewitt
R.R. #11
Peterborough, Ontario

Enamelling Machine Operator

I was in the lunch room for coffee at about 2:15 p.m., January 31/79.

I heard a loud bang, and stood up and looked out but saw nothing out of the ordinary. Then Ed Ayrheart ran by the window and motioned for us to come out and yelled fire. Someone said a person was up on the platform on 3-I and I went up the ladder and saw Rick Farley standing near 2-I and saw some clothes on fire laying on the platform. I went to Rick and tried to get him to move but he would not and said put the fire out. I turned and Dave Nice handed me the fire extinguisher from his position on the ladder and I put the fires out. I went down the ladder ahead of Rick Farley.

Signed: Ed. Hewitt

Witnessed: B. Harris

Taken by: R. Dickey
I.S.O.

/bn

Peterborough, February 2, 1979.

Statement of: Robert Keay
R.R. #11
Peterborough, Ontario

Foreman - Machine Engineering Service & Maintenance

All maintenance men in Wire and Cable are under my authority. The two men involved in the fire look after the maintenance in that area and receive their scheduling instructions from the Foreman in that area. Mr. Ronco is the area mechanic assigned to that area with Mr. Farley as his helper.

To the best of my knowledge, alcohol is the normal cleaning agent. I was informed of the fire and injury soon after the incident.

Signed: R. Keay

Witnessed: B. Harris

Taken by: R. Dickey
I.S.O.

/bn

Peterborough, February 2, 1979.

Statement of: Irvin Clifford
General Delivery
Omemee, Ontario

Formex Die Maker

I was at my bench in my work room, approximately 60 ft. away from 3-I oven.

I heard an explosion, stood up and looked out the window. I could see a fire on 3-I platform with the flames shooting up approximately 8 ft. I could hear a man yelling and a second later saw a man on fire away from the main fire on the platform near the second unit. I have a bad leg and went as fast as I could for help.

Signed: I. R. Clifford

Witnessed: B. Harris

Taken by: R. Dickey
I.S.O.

/bn

SUBJECT: Dust Control at the Banbury

PETERBOROUGH, 5 September 1978

L.J. Foord
Manager - Manufacturing
Support & Projects
Wire & Cable

I have reviewed the dust control at the banbury and found conditions ranging from excellent to completely unacceptable.

Of the 6 dust generating points two were excellent (banbury rolls and loading), two were inadequate (platform weight up and main floor weight up), and two were unacceptable with a reverse flow of air (bag disposal and main floor hood).

Will you please provide the UE-CGE Safety Committee with a schedule to correct these inadequacies. We would appreciate having the schedule by Thursday, 7 September.

Until proper dust control is obtained will you please immediately close the hole in the wall which is used for bag disposal.

By copy to Ed Rowe, I would ask that operating routines insure that masks are worn by the operators at all times that dust is being generated.

Thank you.

A.K. Faggetter
Specialist - Safety
Employee & Community Relations

:am

cc: UE-CGE Safety Committee
EJ Rowe
WG King
BH Martin

WIRE + CABLE (P)

CANADIAN GENERAL ELECTRIC COMPANY LIMITED

# SAFETY UNIT

SUBJECT: Banbury Dust Control

PETERBOROUGH, 8 May 1979

R.J. Dyck
Manufacturing Engineering
Wire & Cable

As you know the dust control at the Banbury has been a long-standing problem.

The problem was identified by letter (attached) on 5 September 1978 and it has been the understanding of the UE-CGE Safety Committee that permanent corrective action by management was scheduled for the July 1979 shutdown.

This schedule information was given to the Ministry of Labour inspector, by the Safety Committee, when the problem was brought to his attention by Wire & Cable operators. Based on this he decided no action was required by him.

If your plans have been changed will you please advise immediately. I am duty-bound to communicate this to the Ministry of Labour to update the understanding they now have from the Safety Committee.

K. Faggetter

A.K. Faggetter
Specialist - Safety
Employee & Community Relations

:am

attach.

cc: WL Furst, WG King, RC Bergey, BH Martin
UE-CGE Safety Committee

PW 1034 (10-61)

WIRE + CABLE (P)

CANADIAN GENERAL ELECTRIC

SUBJECT: Banbury Dust Control

COPIES: WL Furst
WG King
NA McDonald
UE-CGE Safety Committee
BH Martin

16 May 1979

R. Dyck
Wire and Cable

This will confirm our conversation held at the Banbury late Monday afternoon re the need for dust control.

The observed condition of the operator, who was covered in dust as a result of working at this floor weigh-up station, indicated the immediate need for improved dust control at this station.

Action agreed to:-

1. Upgrade the dust control at the floor weigh-up as follows:

   a) disconnect the piping from the old main duct and tie into the new fan system

   b) shorten the flexible hose to a minimum length required to operate the work station

   c) extend the sides and top of the work station to enclose the bucket which is receiving the dust generating ingredients. This will direct all the exhausted air a) over the operator from back to front and then b) over the bucket.

   Action for a) b) and c) -- Ray Dyck

2. Take air samples on the personal dosimeter during Tuesday and Wednesday

   Action -- K. Faggetter

3. Provide a list of chemicals handled at the weigh-up station.

   Action -- Ray Dyck

A.K. Faggetter
Specialist - Safety

/bc

# APPENDIX C –MURIATIC ACID – GENERIC MSDS

# Material Safety Data Sheet



## SECTION I - Material Identity

| | |
|---|---|
| Item Name | |
| Part Number/Trade Name | NPU 588220 MURIATIC ACID, TECH 20BE |
| National Stock Number | 8010PNPU588220 |
| CAGE Code | 05961 |
| Part Number Indicator | A |
| MSDS Number | 187840 |
| HAZ Code | B |

## SECTION II - Manufacturer's Information

| | |
|---|---|
| Manufacturer Name | BASF CORPORATION POLYMERS DIVISION |
| Street | 1609 BIDDLE AVENUE |
| City | WYANDOTTE |
| State | MI |
| Country | US |
| Zip Code | 48192 |
| Emergency Phone | 800-424-9300 CHEMTREC |
| Information Phone | 313-246-5241 |

## MSDS Preparer's Information

| | |
|---|---|
| Date MSDS Prepared/Revised | 30NOV93 |

| | |
|---|---|
| Active Indicator | N |

## Alternate Vendors

## SECTION III - Physical/Chemical Characteristics

| | |
|---|---|
| Appearance/Odor | WATER WHITE TO STRAW YELLOW LIQUID STRONG PUNGENT ODOR |
| Boiling Point | 70 - 84 |
| Vapor Pressure | 16-70 |
| Specific Gravity | 1 |
| Solubility in Water | COMPLETE |
| Chemical pH | 1 |
| Container Type | R |
| Container Pressure Code | 1 |
| Temperature Code | 4 |
| Product State Code | L |

## SECTION IV - Fire and Explosion Hazard Data

| | |
|---|---|
| Flash Point Method | NA |
| Lower Explosion Limit | NA |
| Upper Explosion Limit | NA |
| Extinguishing Media | NON-FLAMMABLE. THE PRESENCE OF HCl WILL NOT LIMIT THE CHOICE OF EXTINGUISHING MEDIA |
| Special Fire Fighting Procedures | FIREFIGHTERS SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS AND TURN-OUT GEAR. WATER FOG WILL BE MOST EFFECTIVE FOR CONTROLLING HCl VAPORS |
| Unusual Fire/Explosion Hazards | HYDROCHLORIC ACID DOES NOT DECOMPOSE AT TEMPERATURES BELOW 1500 DEGREES C. IT IS NON-FLAMMABLE; HOWEVER, FLAMMABLE AND POTENTIALLY EXPLOSIVE HYDROGEN GAS IS GENERATED FROM REACTION WITH MOST METALS |

## SECTION V - Reactivity Data

| | |
|---|---|
| Stability | YES |
| Stability Conditions to Avoid | TO PREVENT IGNITION OF HYDROGEN GAS GENERATED BY MURIATIC ACID, CONTACT WITH MOST METALS; SMOKING, FLAMES AND SPARKS |
| Materials to Avoid | FIRE AND EXPLOSION. ALKALIES, METALLIC OXIDES, AMINES, ESTERS, AND CERTAIN OTHER |

| | |
|---|---|
| | ORGANICS CAUSE EXOTHERMIC REACTIONS. POSSIBLY VIOLENT. CARBONATES, CYANIDES, SULFIDES YIELD TOXIC GASES. WATER REACTIVE MATERIALS SUCH AS SULFURIC ACID, OLEUM, AND ACETIC ANHYDRIDE CAUSE EXOTHERMIC REACTION |
| Hazardous Decomposition Products | DOES NOT DECOMPOSE |
| Hazardous Polymerization | NO |
| Polymerization Conditions to Avoid | WILL NOT OCCUR |

## SECTION VI - Health Hazard Data

| | |
|---|---|
| Route of Entry: Skin | YES |
| Route of Entry: Ingestion | YES |
| Route of Entry: Inhalation | YES |
| Health Hazards - Acute and Chronic | [INHAL] GAS OR MISTS MAY RESULT IN COUGHING AND CHOKING SENSATION DUE TO IRRITATION OF THE UPPER RESPIRATORY TRACT. SEVERE OVEREXPOSURE MAY RESULT IN LARYNGEAL SPASM.EDEMA, PULMONARY EDEMA [SKIN] CORROSIVE TO BODY TISSUES. BURNS AND PERMANENT EYE INJURY MAY OCCUR. SKIN CONTACT MAY RESULT IN DERMATITIS AND DEEP BURNS. [CHRONIC] CHANGES IN PULMONARY FUNCTION, CHRONIC BRONCHITIS, DERMATITIS, EROSION OF TOOTH ENAMEL, CONJUNCTIVITIS AND UPPER RESPIRATORY TRACT IRRITATION |
| Carcinogenity: NTP | NO |
| Carcinogenity: IARC | NO |
| Carcinogenity: OSHA | NO |
| Explanation of Carcinogenity | NONE |
| Symptoms of Overexposure | SEE ABOVE |
| Medical Cond. Aggrevated by Exposure | PRE-EXISTING DISEASES OF THE SKIN, ASTHMA, OR OTHER RESPIRATORY DISORDERS MAY HAVE INCREASED SUSCEPTIBILITY TO EXCESSIVE EXPOSURES |
| Emergency/First Aid Procedures | [SKIN] WASH WITH SOAP/WATER. LAUNDER CONTAMINATED CLOTHING BEFORE REUSE [EYES] IMMEDIATELY RINNSE WITH RUNNING WATER FOR 15 MIN. GET IMMEDIATE MED ATTEN [INGEST] DILUTE WITH WATER. DO NOT INDUCE VOMITING. NEVER GIVE FLUIDS OR INDUCE VOMITING IF THE VICTIM IS UNCONSCIOUS/CONVULSIONS. GET IMMEDIATE MED ATTEN |

## SECTION VII - Precautions for Safe Handling and Use

| | |
|---|---|
| Steps if Material Released/Spilled | SPILLS SHOULD BE CONTAINED, DILUTED CAUTIOUSLY WITH WATER AND NEUTRALIZED WITH SODA ASH OR LIME |
| Neutralizing Agent | NR |
| Waste Disposal Method | NEUTRALIZED WASTE UST BE DISPOSED OF IN ACCORDANCE WITH LOCAL, STATE AND FEDERAL REGULATIONS |
| Handling and Storage Precautions | STORAGE FACILITIES MUST BE PROPERLY DESIGNED AND DIKE TO CONTAIN ANY SPILLAGE. DRUM STORAGE SHOULD BE MAINTAINED BELOW 120 F |
| Other Precautions | UNUSED MATERIAL AND EMPTY CONTINERS MYST BE DISPOSED OF IN ACCORDANCE WITH LOCAL, STATE AND FEDERAL REGULATIONS |

## SECTION VIII - Control Measures

| | |
|---|---|
| Respiratory Protection | IF PEL IS EXCEEDED WEAR A NIOSH APPROVED RESPIRATOR FOR ACID GASES |
| Ventilation | USE LOCAL EXHAUST TO CONTROL VAPORS/MISTS |
| Protective Gloves | RUBBER GLOVES |
| Eye Protection | FITTED CHEM GOGGLES OR FACE SHIELD AND SAFETY GLASSES |
| Other Protective Equipment | EYEWASH FOUNTAINS AND SAFETY SHOWERS |
| Work Hygenic Practices | NR |

## SECTION IX - Label Data

| | |
|---|---|
| Protect Eye | YES |
| Protect Skin | YES |
| Protect Respiratory | YES |
| Chronic Indicator | YES |
| Contact Code | MODERATE |
| Fire Code | UNKNOWN |
| Health Code | UNKNOWN |
| React Code | UNKNOWN |
| Specific Hazard and Precaution | TARGET ORGANS: PULMONARY SYSTEM,SKIN, TEETH, RESPIRATORY SYSTEM |

## SECTION X - Transportation Data

## SECTION XI - Site Specific/Reporting Information

| | |
|---|---|
| Volatile Organic Compounds (P/G) | 0 |
| Volatile Organic Compounds (G/L) | 0 |

## SECTION XII - Ingredients/Identity Information

| | |
|---|---|
| Ingredient # | 01 |
| Ingredient Name | HYDROCHLORIC ACID |
| CAS Number | 7647010 |
| Proprietary | NO |
| Percent | 31.5 |
| Ingredient # | 02 |
| Ingredient Name | WATER (65-69%) |
| CAS Number | 7732185 |
| Proprietary | NO |
| Percent | 69 |
| OSHA PEL | NR |
| ACGIH TLV | NR |

MSDS Number: **H3883** * * * * * *Effective Date: 05/07/03* * * * * * *Supercedes: 11/02/01*

**MSDS** Material Safety Data Sheet

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

Mallinckrodt CHEMICALS J.T.Baker

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

# HYDROCHLORIC ACID (LESS THAN 10%)

## 1. Product Identification

**Synonyms:** Muriatic acid solution; 10:1 Dilute Hydrochloric acid; Hydrochloric acid volumetric solutions (0.2 - 2.0 N)
**CAS No.:** 7647-01-0
**Molecular Weight:** 36.46
**Chemical Formula:** HCl in water
**Product Codes:**
J.T. Baker: 0325, 0335, 0336, 4655, 5612, 5616, 5620, 5622
Mallinckrodt: 6388, H162, H163, H959, V028, V043

## 2. Composition/Information on Ingredients

| Ingredient | CAS No | Percent | Hazardous |
|---|---|---|---|
| Hydrogen Chloride | 7647-01-0 | 0.7 - 8% | Yes |
| Water | 7732-18-5 | 92 - 99% | No |

## 3. Hazards Identification

**Emergency Overview**

---

**DANGER! CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED OR INHALED.**

**J.T. Baker SAF-T-DATA(tm)** Ratings (Provided here for your convenience)

---

Health Rating: 3 - Severe (Poison)
Flammability Rating: 0 - None
Reactivity Rating: 2 - Moderate
Contact Rating: 3 - Severe (Corrosive)
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES
Storage Color Code: White (Corrosive)

---

**Potential Health Effects**

---

Health hazards given on this data sheet apply to concentrated solutions of hydrochloric acid. Hazards of dilute solutions may be reduced, depending upon the concentration. Degree of hazard for these reduced concentrations is not currently addressed in the available literature.

**Inhalation:**
Corrosive! Inhalation of vapors can cause coughing, choking, inflammation of the nose, throat, and upper respiratory tract, and in severe cases, pulmonary edema, circulatory failure, and death.
**Ingestion:**
Corrosive! Swallowing hydrochloric acid can cause immediate pain and burns of the mouth, throat, esophagus and gastrointestinal tract. May cause nausea, vomiting, and diarrhea, and in severe cases, death.
**Skin Contact:**
Corrosive! Can cause redness, pain, and severe skin burns. Concentrated solutions cause deep ulcers and discolor skin.
**Eye Contact:**
Corrosive! Vapors are irritating and may cause damage to the eyes. Contact may cause severe burns and permanent eye damage.
**Chronic Exposure:**
Long-term exposure to concentrated vapors may cause erosion of teeth. Long term exposures seldom occur due to the corrosive properties of the acid.
**Aggravation of Pre-existing Conditions:**
Persons with pre-existing skin disorders or eye problems or impaired respiratory function may be more susceptible to the effects of the substance.

---

# 4. First Aid Measures

First aid procedures given apply to concentrated solutions. Exposures to dilute solutions may not require these extensive first aid procedures.

**Inhalation:**

Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.

**Ingestion:**

If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. Get medical attention immediately.

**Skin Contact:**

Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention immediately. Wash clothing before reuse. Thoroughly clean shoes before reuse.

**Eye Contact:**

Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

---

# 5. Fire Fighting Measures

**Fire:**

Not considered to be a fire hazard. May react with metals or heat to release flammable hydrogen gas.

**Explosion:**

Not considered to be an explosion hazard.

**Fire Extinguishing Media:**

Water or water spray. Neutralize with soda ash or slaked lime.

**Special Information:**

In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Structural firefighter's protective clothing is ineffective for fires involving hydrochloric acid. Stay away from ends of tanks. Cool tanks with water spray until well after fire is out.

---

# 6. Accidental Release Measures

Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Neutralize with alkaline material (soda ash, lime), then absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

J. T. Baker NEUTRASORB® or TEAM® 'Low Na+' acid neutralizers are recommended for spills of this product.

## 7. Handling and Storage

Store in a cool, dry, ventilated storage area with acid resistant floors and good drainage. Protect from physical damage. Keep out of direct sunlight and away from heat and incompatible materials. Do not wash out container and use it for other purposes. When diluting, always add the acid to water; never add water to the acid. When opening metal containers, use non-sparking tools because of the possibility of hydrogen gas being present. Protect from freezing. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

## 8. Exposure Controls/Personal Protection

**Airborne Exposure Limits:**
For Hydrochloric acid:
- OSHA Permissible Exposure Limit (PEL):
5 ppm (Ceiling)
- ACGIH Threshold Limit Value (TLV):
2 ppm (Ceiling), A4 Not classifiable as a human carcinogen

**Ventilation System:**
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

**Personal Respirators (NIOSH Approved):**
If the exposure limit is exceeded and engineering controls are not feasible, a full facepiece respirator with an acid gas cartridge may be worn up to 50 times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator. WARNING: Air purifying respirators do not protect workers in oxygen-deficient atmospheres.

**Skin Protection:**
Rubber or neoprene gloves and additional protection including impervious boots, apron, or coveralls, as needed in areas of unusual exposure to prevent skin contact.

**Eye Protection:**
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

## 9. Physical and Chemical Properties

**Appearance:**
Clear, colorless solution.

**Odor:**
Pungent, hydrochloric acid.
**Solubility:**
Infinitely soluble.
**Specific Gravity:**
ca. 1
**pH:**
For HCL solutions: 0.1 (1.0 N), 1.1 (0.1 N), 2.02 (0.01 N)
**% Volatiles by volume @ 21C (70F):**
100 (as water and acid)
**Boiling Point:**
ca. 100C (ca. 212F)
**Melting Point:**
ca. 0C (ca. 32F)
**Vapor Density (Air=1):**
Essentially the same as water.
**Vapor Pressure (mm Hg):**
Essentially the same as water.
**Evaporation Rate (BuAc=1):**
Essentially the same as water.

---

# 10. Stability and Reactivity

**Stability:**
Stable under ordinary conditions of use and storage.
**Hazardous Decomposition Products:**
When heated to decomposition, emits toxic hydrogen chloride fumes and will react with water or steam to produce heat and toxic and corrosive fumes. Thermal oxidative decomposition produces toxic chlorine fumes and explosive hydrogen gas.
**Hazardous Polymerization:**
Will not occur.
**Incompatibilities:**
A strong mineral acid, concentrated hydrochloric acid is highly reactive with strong bases, metals, metal oxides, hydroxides, amines, carbonates and other alkaline materials. Incompatible with materials such as cyanides, sulfides, sulfites, and formaldehyde.
**Conditions to Avoid:**
Heat, direct sunlight, incompatibles.

---

# 11. Toxicological Information

Hydrochloric acid: Inhalation rat LC50: 3124 ppm/1H; Oral rabbit LD50: 900 mg/kg.
Investigated as a tumorigen, mutagen, reproductive effector.

```
--------\Cancer Lists\------------------------------------------------------
                                                  ---NTP Carcinogen---
```

| Ingredient | Known | Anticipated | IARC Category |
|---|---|---|---|
| Hydrogen Chloride (7647-01-0) | No | No | 3 |
| Water (7732-18-5) | No | No | None |

## 12. Ecological Information

**Environmental Fate:**
For Hydrochloric Acid (Concentrated Solutions):
When released into the soil, this material is not expected to biodegrade. When released into the soil, this material may leach into groundwater.
**Environmental Toxicity:**
For Hydrochloric Acid (Concentrated Solutions):
This material may be toxic to aquatic life. LC50 Shrimp: 100-300 ppm/48-hr/salt water; LC100 trout: 10 mg/l/24-hr; TLm mosquito fish: 282 ppm/96-hr.

## 13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved waste facility. Processing, use or contamination of this product may change the waste managem^nt options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

## 14. Transport Information

**Domestic (Land, D.O.T.)**
-----------------------
**Proper Shipping Name:** HYDROCHLORIC ACID SOLUTION
**Hazard Class:** 8
**UN/NA:** UN1789
Packing Group: II
**Information reported for product/size:** 200L

**International (Water, I.M.O.)**
-----------------------------
**Proper Shipping Name:** HYDROCHLORIC ACID SOLUTION
**Hazard Class:** 8
**UN/NA:** UN1789
Packing Group: II
**Information reported for product/size:** 200L

# 15. Regulatory Information

--------\Chemical Inventory Status - Part 1\--------------------------------

| Ingredient | TSCA | EC | Japan | Australia |
|---|---|---|---|---|
| Hydrogen Chloride (7647-01-0) | Yes | Yes | Yes | Yes |
| Water (7732-18-5) | Yes | Yes | Yes | Yes |

--------\Chemical Inventory Status - Part 2\--------------------------------

| Ingredient | Korea | --Canada-- DSL | --Canada-- NDSL | Phil. |
|---|---|---|---|---|
| Hydrogen Chloride (7647-01-0) | Yes | Yes | No | Yes |
| Water (7732-18-5) | Yes | Yes | No | Yes |

--------\Federal, State & International Regulations - Part 1\---------------

| Ingredient | -SARA 302- RQ | -SARA 302- TPQ | ------SARA 313------ List | ------SARA 313------ Chemical Catg. |
|---|---|---|---|---|
| Hydrogen Chloride (7647-01-0) | 5000 | 500* | Yes | No |
| Water (7732-18-5) | No | No | No | No |

--------\Federal, State & International Regulations - Part 2\---------------

| Ingredient | CERCLA | -RCRA- 261.33 | -TSCA- 8(d) |
|---|---|---|---|
| Hydrogen Chloride (7647-01-0) | 5000 | No | No |
| Water (7732-18-5) | No | No | No |

Chemical Weapons Convention: No TSCA 12(b): No CDTA: Yes
SARA 311/312: Acute: Yes Chronic: Yes Fire: No Pressure: No
Reactivity: No (Mixture / Liquid)

**Australian Hazchem Code:** None allocated.
**Poison Schedule:** None allocated.
**WHMIS:**
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

---

# 16. Other Information

**NFPA Ratings:** Health: **3** Flammability: **0** Reactivity: **0**
**Label Hazard Warning:**
DANGER! CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED OR INHALED.
**Label Precautions:**
Do not get in eyes, on skin, or on clothing.
Do not breathe vapor or mist.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
**Label First Aid:**

In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. In all cases get medical attention immediately.

**Product Use:**

Laboratory Reagent.

**Revision Information:**

MSDS Section(s) changed since last revision of document include: 8.

**Disclaimer:**

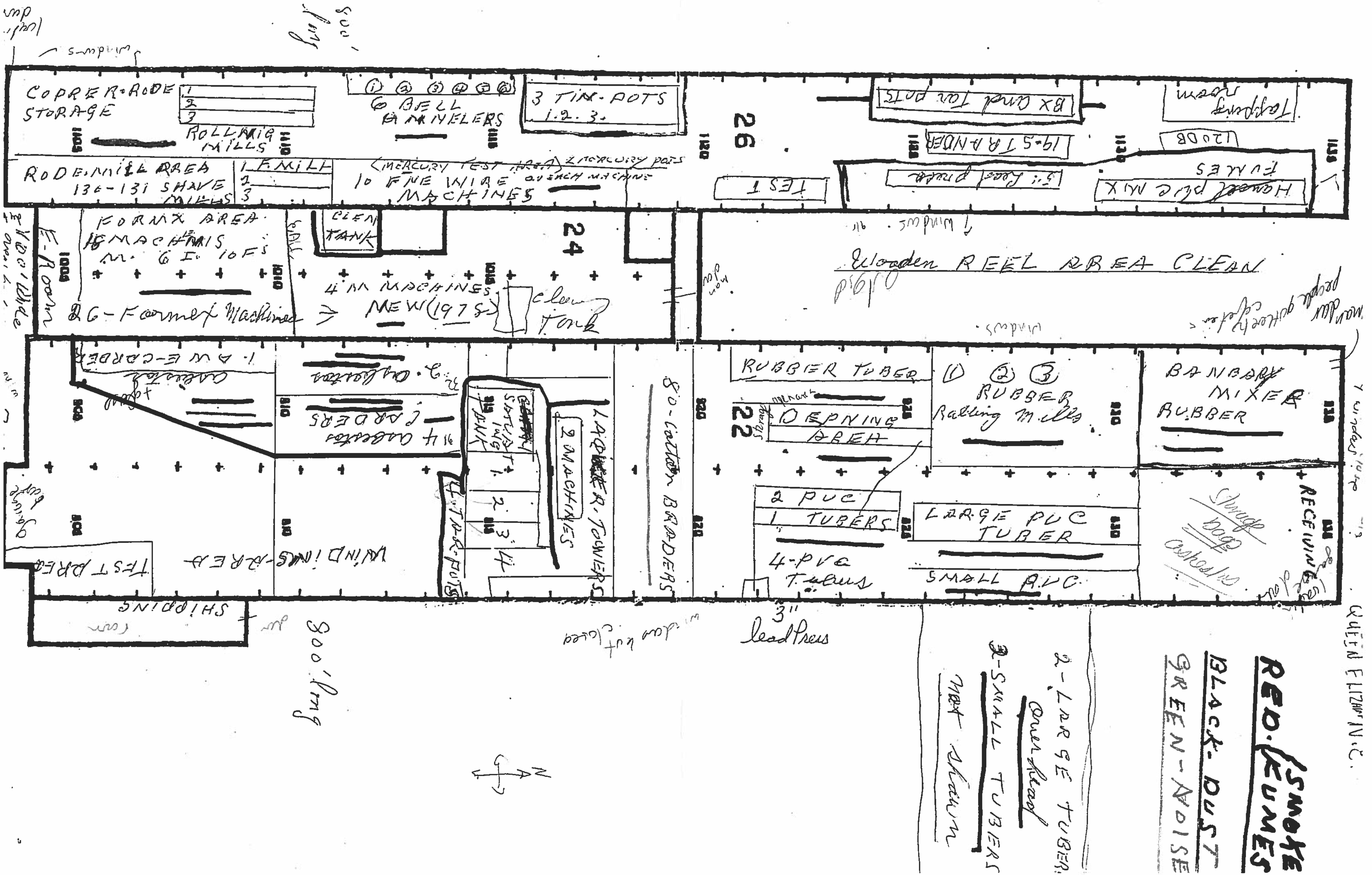
************************************************************************************

**Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.**

************************************************************************************

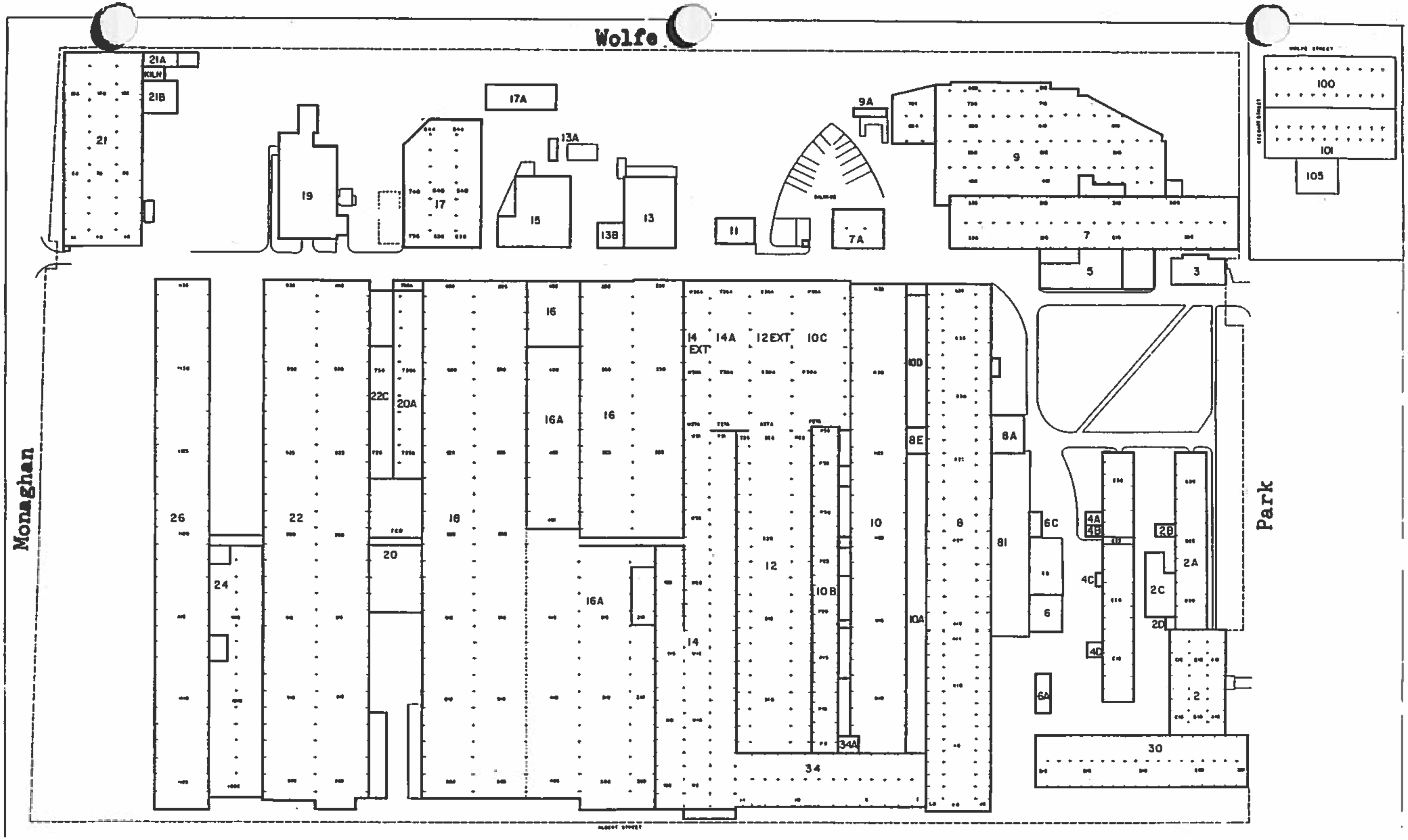
**Prepared by:** Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

# APPENDIX B -WIRE AND CABLE EQUIPMENT AND PROCESS LAYOUT



COPPER-RODE STORAGE
ROLLING MILLS
6 BELL ANNEALERS
3 TIN-POTS 1.2.3.
26
BX and Tar pots
Tapping room
RODE MILL AREA 130-131 SHAVE MILLS
1 F. MILL
(MERCURY TEST AREA) 2 MERCURY POTS
10 FINE WIRE MACHINES
QUENCH MACHINE
TEST
19-5 STRANDER
5:1 Reel press
120 DB
FUMES
Hand pvc MIX
E-Room
FORMX AREA
16 MACHINES
M. 6 I. 10 FS
26-Formex Machines
4 M MACHINES NEW (1975)
CLEAN TANK
clean Tank
24
Wooden REEL AREA CLEAN
1. AWE-CARDER
2. Asbestos
14 asbestos CARDERS
SATURATING TANK
4-TAR-POTS
2 MACHINES
LACQUER TOWERS
80-cotton BRAIDERS
WINDING AREA
TEST AREA
SHIPPING
RUBBER TUBER
22
OPENING AREA
2 PVC
1 TUBERS
4-PVC Tubers
RUBBER Rolling mills
LARGE PVC TUBER
SMALL PVC
BANBURY MIXER RUBBER
RECEIVING
800' long
500' long
3" lead Press
2-LARGE TUBERS Overhead
2-SMALL TUBERS not shown
SMOKE RED-FUMES
BLACK-DUST
GREEN-NOISE
QUEEN ELIZABETH N.C.

## APPENDIX A -PLANT WIDE LAYOUT




No. 2 MAIN OFFICE
No. 2A CONSTRUCTION
SWGR. ENG. & MARKETING
No. 3 RELATIONS
No. 4 CAPACITORS
No. 5 COIL IMPREGNATING
No. 6 GARAGE
No. 6B TRANSPORTATION
No. 6C HOSPITAL
No. 7 ARMATURE
No. 7A SALVAGE
No. 8 MACHINE SHOP
No. 8A PLANT ENG.
No. 81 BAR STOCK STORES

No. 10 GENERATOR ASSEMBLY
No. 10B BABBIT SHOP
No. 11 FIRE HALL
No. 12 PUNCH PRESS
No. 13 STEAM PLANT
No. 13B COMPRESSOR BUILDING
No. 14 STRUCTURAL STEEL
No. 14A -do-
No. 14 2nd, 3rd FLOORS G.P. CONTROL
No. 15 PAINT SHOP
No. 16 SWITCHGEAR
No. 16A TRANSPORTATION EQUIIPMENT, TOOL ROOM
No. 17 N.M. MACHINE SHOP
No. 18 INDUCTION MOTORS MAIN-

No. 20 WIRE, CEMA & I.P.C. OFFICE
No. 20A COMPUTERS & SCOPS
No. 21 APD OFFICE, LAB
No. 22 WIRE & CABLE
No. 24 FORMEX
No. 26 WIRE & CABLE
No. 30 APP. SHIPPING, RECEIVING, WAREHOUSE, RECTIFIERS, COMMUNICATIONS, EMPLOYEE STRS., STATIONERY
No. 34 STEEL CUTTING
No. 34 2nd FLOOR G.P. CONTROL
No. 100 APP. ENG. LAB
APP. ENG. PERSONNEL
No. 101 APPARATUS MARKETING, I.P.S

#24

O.H.S. File No. 4G-20

Ontario

MINISTRY OF HEALTH

OCCUPATIONAL HEALTH PROTECTION BRANCH

365-4066

SEP 10 1973

# FIELD VISIT REPORT
## PART 1

Memorandum to:
Dr. V. L. Tidey
Chief, Occupational Health Service

Date: September, 4, 1973

From: R. Fliegl, B.A. Sc.

| | | | |
|---|---|---|---|
| Plant: | Canadian General Electric Co. Ltd., | Requested by: | Company, |
| Address: | 107 Park Street North, Peterborough, Ontario. | Accompanied by: | Mr. R. Dickie, ISB<br>Mr. M. Taherzadeh, EHB |
| | | Date of Visit: | August 13, 1973 |
| Contracts: | Mr. Dan Abel - Safety Specialist,<br>Mr. Glen Hansen-Safety Specialist,<br>Mr. K. Faggetter-Production Eng.,<br>Wire & Cable Dept. | Copies to: | Mr. J. McNair (3)<br>Mr. Dan Abel (1) |

Abstract: A visit was made to review the mercury exposure and assess completion of directions for asbestos control, in the Wire and Cable Department. A significant exposure to elemental mercury still exists. One additional direction for control of mercury-in-air is suggested. One direction for asbestos control at Bay 815 seems to be completed but the other directions remain outstanding.

This plant visit involves the following three separate areas:

(1) The Beryllium facility,

(2) The mercury exposure in the wire and cable departments.

(3) Asbestos controls in the wire and cable department.

A memo to Dr. V.L. Tidey dated August 23, 1973 covers the discussions held regarding the beryllium facility. Visits to the wire and cable department are described in this report.

&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&

The use of mercury in buildings No. 22 and 24 of the wire and cable department is discussed in Mr. L. Bithel's report dated June 22,1973. That report suggests; three directions, and two recommendations for the control of the mercury exposure. During the current visit, air sampling was carried out using a J.W. Model MV-2 Mercury Vapour Sniffer and the following was found to be the conditions at the wire testing machines:

| Air Sampling Location | MERCURY VAPOUR | |
|---|---|---|
| | At Floor Level | At Breathing Zone |
| At Mercury Bath | > TLV | > TLV |
| 2' away from Bath | > TLV | > TLV |
| 4' away from Bath | At TLV | At TLV |
| Greater than 4' away | Much less than TLV | Much less than TLV |
| TLV for Mercury = 0.05mg/m$^3$ | | |

A visual inspection of areas below the mercury baths revealed a considerable quantity of mercury droplets on the testing machines, and on nearby floor surfaces. Mr. Faggetter pointed out that spills can occur whenever one of the eight copper wires breaks, since the broken tip of the moving strand will suddenly withdraw a large amount of mercury from the baths. Mr. Faggetter also indicated that the floor areas around the testing machines were washed with thiosulphate solution during the annual plant summer shut-down.

The small braiding machine located near the "wax-pot" at Bay 815 was found to be mechanically exhausted. This machine uses asbestos coated wires. It was noted that the exhaust system is similar to that suggested by Mr. G.S. Rajhans in comment No. 1 of his report dated March 1, 1973. After some adjustment of the two dampers (for simultaneous operation). the face velocity measured across one open door to the braiding machine enclosure was found to be about 50 fpm. The quantity of air entering the 27" x 15" exhaust hood above the wax-pot was noted to be 600 cfm.

3/...

The two large braiding machines located at Bay No. 819, have been isolated by a 20' x 20' x 10' high enclosure. Although some general exhaust was provided to the enclosure, Mr. Faggetter indicated that work is not yet completed. A check of face velocities at the two 7' x 3' open entry doors, indicated no air movement into the enclosure when the exhaust system was turned on. The observation was verified by the use of a smoke tube. At the time of the visit asbestos coated wires were being used.

The area at Bay No. 908 contains machines used to braid, twist, etc., asbestos coated wires. None of the machines were in operation during the visit, but visual inspection revealed that complete enclosures have been fabricated around those machines using asbestos. Some asbestos particles were found at the base of the right side of twisting machine No. 46, near the lower enclosure.

Comments:

(1) An effort has been made to clean up mercury spills however, air sampling and visual inspections demonstrate that a significant exposure to mercury-in-air concentrations at the wire testing machines still exists. As is well known, any mercury spillage produces many tiny globules and they can easily become lodged in the cracks and crevices of the rough floor, or they may adhere to the metallic surfaces of the testing machines. These particles remain exposed to atmosphere and will slowly release mercury vapour into the workroom air for extended time periods. For example, the vapour pressure at S.T.P. of a mercury droplet results in a concentration, immediately above the particle, that is many times the TLV of 0.05 $mg/m^3$. Although this concentration will decrease very rapidly with increasing distance from the particle, the overall situation will, when multiplied by many spills and compounded by poor housekeeping, impart a harmful atmosphere to the workplace. The following are necessary to correct the present situation:

(a) Douse all spills with water and collect the pools and droplets of mercury on the machines, floors etc., by means of a suction pump and aspirator bottle. A long hose fitted with a fine capillary is desirable and will allow for considerable mobility. If a vacuum pump is used, the discharge must be vented to the out-of-doors.

(b) Any fine droplets in unaccessible places (in the rough floor), may be chemically converted with a sulphur compound. For example, sodium thiosulphate, calcium polysulphide and excess sulphur, etc. The solution is poured into the crack and is allowed to react.

(c) Spills from the mercury baths can be controlled by:

(i) Providing covers for all the baths.

4/...

(ii) Installing a large tray, about 2' x 3' x 4" high immediately below the bath and wire strands on each machine.

The tray must be of a material impervious to mercury, stainless steel, or plastic, etc. The trays could be filled with some water and mercury spills may be removed by method (a) above.

(2) The small braiding machine located at Bay 815 in the wire and cable department, has been completely enclosed and is fitted with mechanical exhaust. The face velocity of about 50 fpm measured at an open door is low. However, since the braiding machine is completely isolated, automatic, and there is no need for the operator to enter the enclosure for a significant time period, the 600 cfm should be adequate for asbestos control.

(3) The enclosure at the right (lower) side of twisting machine No. 46 does not seem to be adequate for the control of asbestos. The asbestos particles found at the base of the machine suggest that the enclosure should be extended.

Directions Issued:

(1) All the directions in Mr. L. Bithel's report for handling of mercury still apply.

(2) Direction No. 2 in Mr. G. Rajhans report dated October 4, 1972 may be considered completed.

(3) All other directions for asbestos control remain in effect.

Directions Suggested:

A suitable tray or enclosure shall be provided so that further mercury losses from the wire testing machines are avoided.

RF:gm

Rudy Fliegl

R. Fliegl, B.A. Sc.

#23

Ontario
Ministry of
Labour

O.H.B. File No. 39681BMOW
I.H.S.B. File No.

Occupational Health Branch

# FIELD VISIT REPORT

Date: April 27, 1981

From: W. R. Waddell, M.D.

| | |
|---|---|
| Plant: Canadian General Electric Co. Ltd. | Requested by: O.H.B. |
| Address: 107 Park Street, North,<br>PETERBOROUGH, Ontario.<br>K9J 7B5. | Date of Request: February 25, 1981 |
| Contacts: Mr. E. Hatherly, Machining Section Foreman<br>Mr. C. Card, Grinder | Accompanied by: |
| | Date of Visit: April 9, 1981 |
| Hazard: Trichloroethylene | Copies to: Dr. P. Pelmear (O.H.B.)<br>Mr. J. McNair (I.H.S.B.) (3)<br>Mr. S. Bell (O.H.B.)<br>Mr. R. C. Bergey |


Abstract: This visit was made to assess the possible occupational cause of an illness in one employee of this company. Possible exposure to trichloroethylene vapours was confirmed.

One suggestion is made.

One order is suggested to be issued.

No further action by the Occupational Health Branch is requested.


* * *

This incident occurred near a vapour degreaser in building #8.

Comments

1. The degreaser is located on the west side of Bay K18. It measures 6 x 8 x 10 feet and uses trichloroethylene ("Royalene") as the degreasing agent. One operator and a helper operate the equipment. Another 10 employees work in the general area.

2. The cooling coils of the degreaser appeared to function well. A lip exhaust was seen to be present around the entire perimeter of the top of the degreaser. This did not function as it was not connected to any system local mechanical exhaust ventilation.

3. Degreasing was in progress at the time of the visit. Good work practices were observed. The parts to be treated were slowly lowered into the vapour phase. Some parts required spraying with trichloroethylene in addition to vapour degreasing. The cleaned parts were slowly lifted from the vapour phase. No residual trichloroethylene liquid was present on or in the finished work.

4. At the time of the visit, the air in the area of the degreaser was clear. Occasionally, the odour of solvent was detectable. Using appropriate Drager tubes, 3 air tests for trichloroethylene were done. At two locations only a trace of trichloroethylene was indicated. At the third location, 100 ppm was indicated.

5. Trichloroethylene is a central nervous system depressant and a mild irritant of respiratory tract; injury to the cardio-vascular system, the gastrointestinal system, the liver and kidneys has also been observed. In Ontario, the accepted TLV-TWA for trichloroethylene is 100 ppm (ACGIH 1980).

<u>Suggestion</u>

1. To minimize trichloroethylene exposure by inhalation, the ventilation in the area of the degreaser should be improved. Efforts should be made to protect the vapour blanket in the degreaser from drafts which can cause spillage of vapour into the ambient air.

Accordingly, under the authority of Regulation 145 of the Occupational Health and Safety Act, 1978, the following order is suggested to be issued: -

> All measures necessary to prevent exposure to any toxic substance by inhalation shall be taken and without limiting the generality of the foregoing, where any toxic substance is used, adequate ventilation shall be provided.

No further action by the Occupational Health Branch is requested.

W. R. Waddell, M.D.
Medical Consultant
Occupational Health Medical Service

WRW/pc

#22

Ministry of Labour

I.H.S.B. File No.

Occupational Health Branch

# FIELD VISIT REPORT

Date: August 26, 1980

From: W.R. Waddell, M.D.

| | |
|---|---|
| Plant: Canadian General Electric Company Limited | Requested by: O.H.B. |
| Address: 107 Park Street North<br>Peterborough, Ontario K9J 7B5 | Date of Request: May 28, 1980 |
| Contacts: Mr. K. Faggetter, Safety Manager<br>Mrs. J. Mather, Plant Nurse | Accompanied by: |
| | Date of Visit: August 12, 1980 |
| Hazard: Lead | Copies to: Dr. P. Pelmear<br>Mr. G. Rajhans<br>Mr. J. McNair (3)<br>Mr. K. Faggetter |

Abstract: This visit was made to assess the lead hazard in this plant and to review the medical surveillance program with regard to this hazard. Possible exposure to lead was confirmed at a number of work sites.

One recommendation is made.

No orders are suggested to be issued.

No further action by the Occupational Health Branch is requested.

* * *

General

At present, operations involving lead at this plant are carried out in

a) the armature department in the gallery of building #7B,

b) the babbit shop in building #10B,

c) the lead press in bay #824 of building #22,

d) the tinning section in bay #1117 of building #26, and

e) the polyvinyl chloride compounding section in bay #1129 of building #26.

All of these areas were inspected.

Comments

1. To simplify its compliance with Bill 70, this company is in the process of phasing out some of its lead handling operations. As examples, the lead press is presently permanently shut down; the tinning section is to be permanently shut down within weeks and the polyvinyl chloride compounding section is to be eliminated by the end of this year.

2. Local mechanical exhaust ventilation was seen to be applied at all lead handling stations. These systems were tested at random by smoke tube and appeared to be in working order.

3. Housekeeping in the lead handling areas varied from good in the armature department, lead press and tinning section; to fair in the babbit shop where babbit metal splatters and cuttings were evident; to poor in the polyvinyl chloride compounding area where dust from Tribase-E (basic lead silicate sulphate) was seen on the floor and fixtures.

4. Lead cards in various states of repair were seen to be posted in all lead handling areas with the exception of the babbit shop.

5. The workers are instructed to maintain a good standard of personal hygiene and washing facilities are available to them, usually in reasonable proximity to the work site. Food, drink and tobacco are not supposed to be kept or consumed in the lead handling areas although the babbit shop workers were seen eating their lunches in the rear of the shop.

6. A medical program is in place for all lead handling employees. This is supervised by Dr. D. Curtis, the plant physician and Mrs. J. Mathers, the plant nurse. The program consists of

   a) a pre-placement or pre-employment medical examination including a urinalysis and a hemoglobin and blood lead determination,

   b) an annual medical examination including the biologic sampling listed above, and

   c) the determination of urinary lead concentrations at three month intervals.

   Seven workers are presently on this program, their numbers having decreased as lead handling operations are phased down. A review of the urinary lead results of the past year shows uniformly low results, suggesting the adequacy of the hazard control program.

RECOMMENDATIONS

1. Housekeeping should be improved in the polyvinyl chloride compounding area. Vacuuming is the preferred cleaning method.

No orders are suggested to be issued.

No further action by the Occupational Health Branch is requested.

W.R. Waddell, M.D.
Medical Consultant
Occupational Health Medical Service

WRW/gb

Ministry of Labour

Health Branch

Date
May 26, 1980

| | |
|---|---|
| Name Dr. Richmond | Organization Name and Address<br>Canadian General Electric Co.<br>107 Park St. N.<br>Peterborough, Ont. |
| Telephone Number<br>(705) 742-7711 | |

Message:
Assigned to Dr. W. Waddell

475 80EMOB

Audit visit for lead exposure.

Action

Signature

Ontario
Ministry of
Labour



April 30, 1981.

Canadian General Electric Co. Ltd.,
107 Park Street, North,
PETERBOROUGH, Ontario.
K9J 7B5.

Att: Mr. R. C. Bergey

Dear Sir:

Please find enclosed a copy of the Field Visit Report.

Yours truly,

G Debow

G. Debow, M.D., D.I.H.
Senior Medical Consultant
Occupational Health Medical Service
Occupational Health Branch
400 University Avenue, 7th Floor
Toronto, Ontario
M7A 1T7

Telephone: 416/965-3610

Encl.

#21

Ministry of Health

Ontario

I.S.B. File No. 336-00005-0008
O.H.P.B. File No. : 61-91

OCCUPATIONAL HEALTH PROTECTION BRANCH

# FIELD VISIT REPORT

416/965-4066

Date: November 20, 1975

From: Dr. M. Cohen, P. Eng.

| | |
|---|---|
| Plant: | Canadian General Electric |
| Address: | 107 Park Street North<br>Peterborough, Ontario |
| Contacts: | Dan Abel, Safety Specialist |
| Hazard: | 1) Mercury<br>2) Asbestos |
| Requested by: | I.S.B. |
| Accompanied by: | F.E. Watts, I.S.B. |
| Date of Visit: | 17 September 1975 |
| Copies to: | Dr. V.L. Tidey<br>Mr. K. Cleverdon (3)<br>Mr. Dan Abel |


Abstract: A visit was made to determine compliance with directions suggested previously.

1) Mercury concentrations of above the TLV level were found during the visit.

2) The recent air sampling has shown asbestos counts close to the TLV level in one location. Housekeeping at the asbestos area was poor.

Although the company has endeavoured to improve the conditions some of the directions previously suggested have not been complied with and are suggested for re-issuing with a time limit of 3 months.

Two further directions and three recommendations are suggested.


* * * * *

DIRECTOR
OCCUPATIONAL HEALTH
DEC 23 1975
PROTECTION BRANCH

.....2/

1) MERCURY

The wire and cable department is described in a previous report dated September 4, 1973 by Mr. R. Fliegl. A significant exposure to mercury was then found and several directions were than suggested.

During this visit air sampling was carried out using a J.W. Model MV-2 Mercury Vapour Sniffer and the following results were found: -

TABLE I

| | LOCATION | MERCURY VAPOUR At floor level $mg/m^3$ | MERCURY VAPOUR At breathing zone $mg/m^3$ |
|---|---|---|---|
| 1. | Building 27-F room | 0.02 | 0.01 |
| 2. | Building 24 East room 2I | 0.06 | 0.08 |
| 3. | Building 24-5I | 0.05 | 0.08 |
| 4. | Building 24 - at dielectric test | 0.04 | 0.03 ÷ 0.05 |

TLV for Mercury = 0.05 $mg/m^3$

An inspection of areas below the mercury baths around the testing machines revealed a considerable amount of mercury droplets on the testing machines and on the floor surface.

2) ASBESTOS

The braiding machines No. 2, No. 3 and No. 6 and the twisting machine No. 46 have not been operating on asbestos during the last 7 months.

The Braiding machine at Bay 815, was found to be mechanically exhausted and the quantity of air entering the 24" x 15" exhaust hood was 600 cfm as previously reported.

The asbestos carding machine, Bay 907 and a small carding machine were found to have 400 cfm and 300 cfm air capacities respectively.

One worker operates the carding machine, Bay 907 on one shift and two man operate the Braiding machine, Bay 815 on two shifts.

The housekeeping was poor.

Asbestos fibres were noticed on the floor, on equipment and on the braiding and carding machines.

.....3/

Air sampling results are presented in Table II.

| No. and Location | Asbestos Total fibres >5µ per cc of air |
|---|---|
| 1. Asbestos Carding Machine, Bay 907, Bldg. #22, Wire & Cable Section, 1 operator, 1 shift. | 0.2 |
| 2. Asbestos Braiding Machines, Bay 815, Bldg. #22, Wire & Cable Section, 1 operator, per two shifts. | 0.2 |
| 3. Perry St., Drive Systems, Unit 677, N.E. Corner (Fan operating). | 1.4 |
| 4. Perry St., Drive Systems, Unit 677, S.E. Corner (Fan operating). | 2.1 ∓ 0.5 |

The Threshold Limit Value (TLV) for asbestos is 2 fibres greater than 5 microns in length per cc of air.

COMMENTS

1. There does appear to be a significant mercury exposure in the wire and cable division, as the threshold limit value for mercury of 0.05 mg/m$^3$ is approached or exceeded. The high vapour concentrations would appear to be due mainly to the large amount of spilled mercury in the areas. If the spilled mercury can be eliminated, a large reduction of mercury vapour should occur.

2. Steps to eliminate spills of mercury would include: -

   (a) Picking-up all large globules with paper, or with a suction device having a small nozzle, a mercury trap, a vacuum pump and a discharge going to the outside.

   (b) Chemical conversion of the fine droplets by applying a suitable solution to convert the mercury to mercuric sulphide. Solutions could contain sodiumthio sulphate ("hypo"), or a mixture of slaked lime and flowers of sulphur, or calcium polysulphide.

   (c) A general improvement in housekeeping which would require an improvement in the floor surface. Cracks should be filled in, and floor surfaces should be smoothed as much as possible, either by standing, filling with epoxy etc. The final surface should be covered by a suitable finish (epoxy paint, etc. as is presently used in some areas) which would give a smooth surface permitting spilled mercury to be readily picked up or converted.

.....4/

(d) Consideration should be given to placing trays, having upturned edges, under the mercury troughs to catch any spills.

(e) Some machine bases were seen to have a gap between the floor and the base. This gap should be filled up (after cleaning up or converting any mercury within the base) to prevent mercury droplets running underneath the machine.

(f) Similarly any furniture in the area such as lockers, benches etc. should either have their bases sealed to the floor, or be placed on legs so that the floor below them can be cleaned.

3. A total of 4 samples for asbestos were taken in #22 building on October 16, 1975 using the membrane filter technique. The results are shown in the lab report AQA-#33 dated October 27, 1975.

   The Occupational Health Protection Branch of the Ministry of Health uses as a guideline, time weighted average (TWA) of 2 fibres per ml. for asbestos fibres. A comparison of this TWA with the fibre counts indicates that one of the four samples is close to the TWA.

   The highest count was found at the Perry St., Drive System, Unit 677, South East Corner when the fan was operating. Judging visually this location appeared to be the dustiest one in the building. It has been indicated earlier in this report, that housekeeping was very poor in the building. The braiding and carding machines, the floors and surfaces near the asbestos areas were covered with fibrous dust.

   The asbestos dust should be regularly cleaned using wet or high efficiency vacuum cleaners and the dust appropriately disposed. The men doing the cleaning should be provided with respiratory protection.

4. It is recommended that body coverage be required in asbestos handling areas. It is necessary to provide protective clothings such as coveralls so that a worker may not accidentally inhale or ingest contaminants adhering to his clothing or body. The coveralls should be cleaned after use.

CONCLUSIONS

An immediate improvement in housekeeping is required in the mercury and in the asbestos handling areas.

DIRECTIONS TO BE RE-ISSUED

1. Housekeeping in the mercury handling areas shall be maintained at a high level.

2. No eating, drinking, or smoking shall be permitted in the mercury handling area.

DIRECTIONS TO BE ISSUED

1. Housekeeping in the asbestos handling areas shall be maintained at a high level.

2. Coveralls should be provided to workers in the asbestos handling area.

RECOMMENDATIONS

1. Employees should be encouraged to practice good personal hygiene in the mercury and asbestos handling area. This should include washing before eating, drinking, smoking or using washroom facilities.

2. No eating, drinking, or smoking should be permitted in the asbestos area.

3. A further visit from this branch should be made in the near future.

Margaret Cohen

M. Cohen, P. Eng.

MC:dk

15 Overlea Boulevard, 5th Floor,
Toronto, Ontario M4H 1A9

416/965-4066

December 19, 1975.

Mr. Dan Abel,
Safety Specialist,
Canadian General Electric,
107 Park Street North,
Peterborough, Ontario.

Dear Mr. Abel:

Enclosed is a copy of the Field Visit Report prepared by Dr. M. Cohen following a visit to your plant on September 17, 1975. The directions suggested at the end of the report are for issue to you by the Minister of Labour's Industrial Safety Officer.

Yours truly,

H M Nelson

H. M. Nelson, P. Eng.,
Senior Consultant,
Occupational Health Protection Branch

HMN:dj
Encl.

Ministry of
Labour

September 12, 1980

OCCUPATIONAL HEALTH
OCT 7 1980
MEDICAL SERVICE

Mr. K. Faggetter,
Safety Manager
Canadian General Electric Company Limited
107 Park Street North
PETERBOROUGH, Ontario
K9J 7B5

Dear Mr. Faggetter:

Please find enclosed a copy of the Field Visit Report.

Yours truly,

PLP

P.L. Pelmear, MD, MFOM, DIH,
Chief,
Occupational Health Medical Service,
Occupational Health Branch,
400 University Avenue, 7th Floor,
Toronto, Ontario. M7A 1T7

Telephone (416) 965-3610

PLP/gb

Encls.

#20

Ontario

File
336-00005-0008

To
Dr. V.L. Tidey, Chief
Occupational Health Service
Environmental Health Services Branch
Ministry of Health
15 Overlea Blvd., 5th Floor
Toronto, Ontario

From
Industrial Safety Branch

| | Yr. | Reg. | No. |
|---|---|---|---|
| INSPECTION REQUEST | 75 | 010 | 103 |

PROBLEM: 1) Mercury
2) Asbestos - see attached sheet.

EMPLOYER: Canadian General Electric Co. Ltd.,
107 Park Street North,
Peterborough.

I.S.B. FILE NO: 336-00005-0008

COMPLAINT NO.:

PRIME CONTACT: R. Manning, Manager - Region # 10

SECONDARY CONTACT: R. Turton, Toronto Office

REPORT DATED:

INDUSTRIAL SAFETY OFFICER: F. E. Watts

DIRECTOR
OCCUPATIONAL HEALTH
SEP 4 1975
PROTECTION BRANCH

6 I-9

J. McNair, P. Eng.
Director

Dr. Debow
Sept 8/75

Date of Inspection

Date of Report

Number of Directions

Date Directions Issued

ISA 1035

ONTARIO
PROVINCE OF OPPORTUNITY

DEPARTMENT OF LABOUR
44 VICTORIA STREET TORONTO 1A, ONTARIO 365-4125

CANADIAN GENERAL ELECTRIC C^O L^TD
107 PARK S^T. N.
PETERBOROUGH
ATT^N R. MANNING. REG^L M^GR

| FILE NUMBER | | |
|---|---|---|
| SIC. | REGIS. NO. | DIV. |
| 3360 | 000050 | 008 |

| DIRECTION NUMBER | E OR Ø | A C | I X | ACT OR REGULATION SECTION | Take notice that you are required to comply with the following directions under the Industrial Safety Act, 1964, and the regulations, and notify the branch upon completion. |
|---|---|---|---|---|---|

request for OHPB assistance.

ASBESTOS.

There are 6 locations at which machines are used to cover electrical wire with Asbestos. In my opinion, the exhaust systems used to capture asbestos are not working at the required efficiency.

MERCURY.

Mercury is used at six machines in the re-wind department. The mercury is used in connection with a wire-measuring device. All areas of Mercury locations are heavily contaminated with spilled Mercury.

I wish to request assistance from OHPB in evaluating the above conditions.

[signature]

#19

Labour
Ontario

File 336-00005-0008

To
Dr. V.L. Tidey, Chief
Occupational Health Service
Environmental Health Services Branch
Ministry of Health
15 Overlea Blvd., 5th Floor
Toronto, Ontario

From
Industrial Safety Branch

SECOND PRIORITY INSPECTION REQUEST

| Yr. | Reg. | No. |
|---|---|---|
| 75 | 010 | 066 |

PROBLEM: Use of poly-vinyl chloride in wire processing and in painting operation in General Purpose Control.

EMPLOYER: Canadian General Electric Co. Ltd., 107 Park Street North, Peterborough.

I.S.B. FILE NO: 336-00005-0008

COMPLAINT NO.: 75/52

PRIME CONTACT: Mr. R. Manning, Manager - Region # 10

SECONDARY CONTACT: Mr. R. Turton, Toronto Office

REPORT DATED:

INDUSTRIAL SAFETY OFFICER: Mr. F. Watts

D. Barker
for
J. McNair, P. Eng.
Director

6G-41

A

Dr H McNelson
10 Jul 75
12 Aug 75

DIRECTOR
OCCUPATIONAL HEALTH
AUG 11 1975
PROTECTION

Dr. M. Cohan _ O.H.P.B. to visit
August 8, 1975

Date of Inspection
Date of Report
Number of Directions
Date Directions Issued

ISB 1035

Telephone: (416) 965-4066

Community Health Division

15 Overlea Blvd., 5th floor,
Toronto, Ontario. M4H 1A9

July 29, 1975

Mrs. M. Johns,
Health Centre,
Canadian General Electric Co.,
107 Park Street North,
PETERBOROUGH, Ontario.

Dear Mrs. Johns:

It was a pleasure to meet with you and to have the opportunity to discuss your excellent program. It is always encouraging to see such a service in action and to discuss any new elements that have been added.

The Communications Branch has forwarded copies of the material available, covering the Ministry of Health Alcohol Education Program. The materials are available in quantity on request.

Please accept my apology for the delay in expressing my appreciation for your thoughtfulness and hospitality. Unfortunately, the office work load has been heavy.

Best wishes for a happy and healthful vacation,

Yours sincerely,

(Miss) M. I. Hardy, Reg. N.,
Senior Nursing Consultant,
Occupational Health Protection Branch.

MIH:er

Health
Ontario

Date July 16, 1975

Memorandum to

Dr. V.L. Tidey, Acting Director
Occupational Health Protection Branch

c. / Dr. G.A. Sinclair, Consultant
Occupational Health

Mr. H.M. Nelson, Chief
Occupational Health Engineering Service

From

Dr. M. Cohen, P. Eng.

Re Article in the Peterborough Common Press from July 15, 1975

An article, published in Peterborough Common Press from July 15, 1975, states that the Union in Canadian General Electric (C.G.E.) plant in Peterborough is investigating the use of vinyl chloride, after noticing that a number of people (7) had died over the years in the north end of the wire department.

I am investigating a union complaint on vinyl chloride exposure at the CGE wire department.

I recommend assigning a doctor from this branch to look into the causes of the above cited deaths.

MC:ms

6G-72

To J. Budlovsky
Arrange to visit at same time that Dr Cohen re-visits please.
22 Jul 75
GS

Form 86 — A4

Labour
Ontario

File
336-00005-0008

To
Dr. V.L. Tidey, Chief
Occupational Health Service
Environmental Health Services Branch
Ministry of Health
15 Overlea Blvd., 5th Floor
Toronto, Ontario

From
Industrial Safety Branch

PRIORITY INSPECTION REQUEST — Yr. 75 Reg. 010 No. 066

PROBLEM: Use of poly-vinyl chloride in wire processing and in painting operation in General Purpose Control.

EMPLOYER: Canadian General Electric Co. Ltd.,
107 Park Street North, Peterborough.

I.S.B. FILE NO: 336-00005-0008

COMPLAINT NO.:

PRIME CONTACT: Mr. R. Manning, Manager - Region # 10

SECONDARY CONTACT: Mr. R. Turton, Toronto Office

REPORT DATED:

INDUSTRIAL SAFETY OFFICER: Mr. F. Watts.

DIRECTOR
OCCUPATIONAL HEALTH
JUL 9 1975
PROTECTION BRANCH

[signature] for
6F-41

J. McNair, P. Eng.
Director

To H [illegible]
10 July 75
[illegible]

A

Date of Inspection

Date of Report

Number of Directions

Date Directions Issued

#18

I.S.B. File No. 336-00005-0008
O.H.S. File No. 4E-85
4E-89

Ontario

MINISTRY OF HEALTH
ENVIRONMENTAL HEALTH SERVICES BRANCH
365-4066

OCCUPATIONAL HEALTH SERVICE
JUN 26 1973

# FIELD VISIT REPORT
## PART 1

Memorandum to:
Dr. V. L. Tidey
Chief, Occupational Health Service

Date: June 22,1973

From: L. Bithel, P. Eng.

Plant: Canadian General Electric Co. Ltd.

Address: 107 Park Street North
Peterborough, Ontario

Requested by: Company

Accompanied by: Mr. R. Dickey, I.S.B.

Date of Visit: June 7,1973

Contracts:

Mr. Dan Abel, Safety Specialist
Mr. Glen Hansen, Safety Specialist
Mr. Ken Faggetter, Superintendent, Shop Operations
Mr. Ed Ayrheart, Shop Foreman, Magnet Wire
Mr. Jim Dearing, Manufacturing Engineering Technician

Copies to:

Mr. J. McNair (3)
Mr. D. Abel
Mr. H. Wall

Abstract: This visit was made to assess exposure to mercury, lead and epoxies. A potentially significant exposure to mercury was found in the Wire and Cable Division, chiefly due to poor housekeeping. At the lead extrusion process, most of the recently issued directions have been complied with. At the coil wrapping area, a dermatitis problem due to epoxy or solvent has been cleared up by the company's actions. Three directions and two recommendations are made to control the mercury exposure.

* * * * * * *

Three areas of this plant were seen during this visit, involving three different exposures.

1. Wire and Cable Division - Wire testing

In one part of this building, the insulation on fine copper wires is tested for breaks or imperfections by passing the wire continuously through a small pool of mercury and measuring and recording the electrical resistivity. This is in accordance with the NEMA

2 VLT
2 Flr
BW

specification for this type of wire. One room (F room, Building 22) contains 8 machines. Eight spools of wire are positioned at one end of the machine, and the wires from the spools are run individually through pools of mercury (about ½" x ¼") contained in a trough by felt pads. The wires continue to the far end of the machine where they are rewound on spools. A lot of mercury globules were visible on the base of the machine and on the very rough wood block floor.

In the next room (east room) there were three machines, with fewer visible mercury globules. In another adjacent room (Building 24) there were 4 more machines (51) and some large mercury globules were noticed under the end of one machine.

Using a J/W mercury sniffer, the following measurements of mercury vapour concentrations were obtained:

| LOCATION | | MERCURY VAPOUR (milligrams/cubic metre) |
|---|---|---|
| 1. | F room, at breathing level | up to 0.075 |
| 2. | F room, at machine base | up to 0.9 |
| 3. | F room, at floor level | up to 0.8 |
| 4. | East room, at breathing level | 0.025 - 0.04 |
| 5. | Building 24, at breathing level<br>at floor level | 0.04 - 0.05<br>0.1 - 0.2 |

The consumption of mercury is 30-40 pounds per year.

2. <u>Wire and Cable Division - Lead</u>

This area was inspected by G. S. Rajhans on February 15,1973, and his report dated March 1,1973 suggested several directions involving improved local exhaust, plus the standard directions for housekeeping, personal hygiene etc. Since that visit all ducts have been repaired, the fan operation has been improved, an exhaust hood (10" x 16') has been placed above the outlet extruder head, and covers have been supplied for the dross buckets.

During this visit, no air flow through the hood on the extruder was detected, while the air velocity through a 13½" x 13½" door opening above the lead pot was measured at 320 feet per minute (f.p.m.). With this door closed, the air velocity into the pot through the opening (21½" x 8½") where the scrap lead conveyor enters was measured at 450 fpm. There was considerable dross and metal on the working platform around the top of the pot, but housekeeping elsewhere was fair.

3. <u>Building 7 - Epoxy Resin</u>

A dermatitis problem appeared recently in this building where, in a fairly bright and open mezzanine area, girls wrap glass tape, which has previously been soaked for 24 hours in aliphatic epoxide/ toluene, around copper coils of various types and sizes. Leather gloves were worn on the left hand at one machine for tightening up the tapes, but at some operations (e.g. cleaning the "irons") gloves were not worn.

The epoxy mixture used was changed recently to a formulation consisting of cyclo aliphatic epoxide 97%, bis-phenol A 1% and 2% octylene glycol. This is mixed with an equal quantity of toluene before use. Since the incidents occurred, the personal hygiene measures have been improved, and new types of thin latex gloves have been obtained.

<u>Comments:</u>

1. There does appear to be a significant mercury exposure in the wire and cable division, particularly in F room, as the threshold limit value for mercury (0.05 mg/cu.m.) is approached or exceeded, but the recent urine analyses indicate little or no absorption of mercury. The high vapour concentrations would appear to be due mainly to the large amount of spilled mercury in the areas, and if this mercury can be eliminated, a large reduction in mercury vapour should occur.

2. Steps to be taken to eliminate this source of vapour would include:

   (a) Pick up all large globules with paper, or with a suction device having a small nozzle, a mercury trap, a vacuum pump and a discharge going to the outside.

   (b) Chemical conversion of the fine droplets by applying a suitable solution to convert the mercury to mercuric sulphide. Solutions could contain sodium thio sulphate ("hypo"), or a mixture of slaked lime and flowers of sulphur, or calcium polysulphide.

(c) A general improvement in housekeeping, which would require an improvement in the floor surface (which is presently of wood blocks). Cracks should be filled in, and floor surfaces should be smoothed as much as possible, either by sanding, filling with epoxy etc. or by replacing the blocks. The final surface should be covered by a suitable finish (epoxy paint, etc. as is presently used in some areas) which would give a smooth surface permitting spilled mercury to be readily picked up or converted.

(d) Consideration should be given to placing trays, having upturned edges, under the mercury troughs to catch any spills.

(e) Skin contact should be avoided.

(f) Some machine bases were seen to have a gap between the floor and the base. This gap should be filled up (after cleaning up or converting any mercury within the base) to prevent mercury droplets running underneath the machine.

(g) Similarly any furniture in the area, such as lockers, benches etc. should either have their bases sealed to the floor, or be placed on legs so that the floor below them can be cleaned.

3. At present urine samples are submitted once or twice a year. This should be increased to 4 times per year.

4. Some literature on mercury is enclosed with this report.

5. There has been a marked improvement in conditions at the lead area, but there should be further improvement in housekeeping in the lead pot area. In addition, there was no measurable air flow at the hood above the outlet extruder head, probably because of insufficient suction at the point of connection of its duct to the hood above the lead pot. This suction could only be increased by installing a slide valve or other restriction immediately below the duct connection, so as to reduce the air flow through the lead pot. This may not be satisfactory. Connecting the duct closer to either of the two fans available would require a considerable increase in the length of the small (3" dia.) duct, which would also increase the resistance to air flow. Perhaps the easiest solution would be to instal a small fan just for this hood. The capacity need only be 200-300 cfm, and the fan discharge could go to the main discharge.

6. The dermatitis episode appears to be clearing up due to the measures taken by the company. It would appear that the cause was a slackening of personal hygiene measures following the introduction of a "safe" epoxy formulation, but it is not certain whether the epoxy or the solvent was the cause. There have been no cases of sensitization up to the present.

Conclusions:

An immediate improvement in housekeeping is required in the mercury handling area, and personal hygiene measures should be enforced.

Directions to be Issued:

1. Housekeeping in the mercury handling areas shall be maintained at a high level.

2. No eating, drinking, or smoking shall be permitted in the mercury areas.

3. A urine sample shall be submitted from each worker in the area every 3 months, to the Occupational Health Laboratories, 360 Christie Street, Toronto.

Recommendations:

1. Employees should be encouraged to practise good personal hygiene. This should include washing before eating, drinking, smoking or using washroom facilities.

2. A further visit should be made during the winter when the above directions have been complied with, to evaluate the contribution of the mercury troughs to the mercury-in-air levels, and to determine if further controls are required.

Bithel

LB:sl L. Bithel, P. Eng.

PUBLIC HEALTH DIVISION

ONTARIO

MINISTRY OF HEALTH

ENVIRONMENTAL HEALTH SERVICES BRANCH
ONE ST. CLAIR AVENUE WEST
TORONTO 7, ONTARIO
M4V 1K8

Telephone:
965 - 4066

Area Code:
416

July 6, 1973

Mr. D. Abel,
Safety Specialist,
Canadian General Electric Co. Ltd.,
107 Park Street, North,
PETERBOROUGH, Ontario.

Dear Mr. Abel:

Enclosed is a copy of the Field Visit Report prepared by Mr. L. Bithel, following a visit to your plant on June 7, 1973. The Directions suggested at the end of the report are for issue to you by the Ministry of Labour's Industrial Safety Officer.

Yours sincerely,

H. M. Nelson, P.Eng.,
Officer-in-Charge,
Health Engineering Section.

HMN:jt

Encl. Report

ENVIRONMENTAL HEALTH SERVICES

HEALTH STUDIES · OCCUPATIONAL HEALTH · RADIATION PROTECTION · PESTICIDES CONTROL
EMPLOYEE HEALTH · PUBLIC HEALTH ENGINEERING · VETERINARY PUBLIC HEALTH

Ministry of Health

Ontario

I.S.B. File No.:
O.H.P.B File No.:
A.Q.A. #103

OCCUPATIONAL HEALTH PROTECTION BRANCH

# FIELD VISIT REPORT

416/965-4066

Date: February 4, 1976

From: M. Polny

| | | | |
|---|---|---|---|
| Plant: | Canadian General Electric Co. | Requested by: | Routine Survey |
| Address: | Oakville, Ontario | Accompanied by: | |
| | | Date of Visit: | January 22, 1976 |
| Contacts: | Mr. M. Reeve<br>Mr. William McArthur | Copies to: | Dr. M. Fitch (3)<br>ISB (3)<br>Mr. S. Morton (2)<br>Mr. M. Reeve |
| Hazard: | Mercury | | |

| No. & Location<br>Machine Shop | Mercury<br>$mg/m^3$ of air |
|---|---|
| 1. Tapping mercury from taps, in hood, left side | $<0.01$ |
| 2. Tapping mercury from taps, in hood, right side | $<0.01$ |
| 3. Tapping mercury from taps, in hood, behind operator | $<0.01$ |
| 4. By sink | $<0.01$ |
| 5. By work bench | $<0.01$ |
| 6. Filling pumps, by hood | 0.01 |
| 7. Central area in crib | 0.04 |
| 8. Background, outside crib | $<0.01$ |

Analysis: Mrs. S. Doomernik

Threshold Limit Value (TLV) 0.05 $mg/m^3$ of air.

M. Polny

MP:df

#17

I.S.B. File No. 336-00005-0008
O.H.S. File No. 4A-35
4B-34

Ontario

MINISTRY OF HEALTH
ENVIRONMENTAL HEALTH SERVICES BRANCH
365-4066

OCCUPATIONAL HEALTH SERVICE
MAR 7 1973

# FIELD VISIT REPORT
## PART 1

Memorandum to:
Dr. V. L. Tidey
Chief, Occupational Health Service

Date: March 1,1973

From: G. S. Rajhans, P. Eng.

Plant: Canadian General Electric Co. Ltd.

Address: 107 Park Street North
Peterborough, Ontario

Contracts:

Mr. G. Hansen, Safety Specialist
Mr. A. K. Faggetter, Engineer

Requested by: ISB and EHB

Accompanied by: Mr. R. W. Dickey, ISB

Date of Visit: February 15,1973

Copies to:

Mr. J. McNair (3)
Dr. J. Cowle (2)
Mr. D. Able

Abstract: This visit was a follow-up of the one made in September 1972. In the report dated October 4,1972, the writer suggested a total of 4 directions to control the asbestos and other dust exposures in the "Wire-Cable building." This report would indicate that although the Company has endeavoured to improve the condition, none of the directions have been fully complied with.

During the visit the lead handling area of the "Wire and Cable Division" was also investigated. The recent air sampling has shown high results. The lead handling area can only be described as "hopeless". Directions are suggested to improve the conditions.

* * * * * * * * *

The above mentioned Company has been visited by the writer and Mr. H. M. Nelson several times in the past. The last visit was done in September 1972. The report dated October 4,1972 describes the areas where asbestos and other powders are used. No basic changes in the process have been made since then.

2 VLT
2 file

The last report indicated that there is an urgent need for providing adequate dust control measures for the Braiding machine near Bay 815. It was found during this visit that the Braiding machine has now been provided with a total enclosure but no exhaust. The enclosure is about 42" x 76" x 96" high with two plexiglass doors with magnetic latches on the north and south ends. The doors are each about 27" x 72" in size.

The "wax-pot" near the Braiding machine was considered to be inadequately exhausted on the previous visit. The pot is now hooded with a canopy 31" x 18" located at about 19" above the pot. The face velocity is about 300 fpm and the capture velocity has now been improved from 0 to about 150 fpm by providing side enclosures.

The discharge end of #46 Twisting machine is now provided with a complete enclosure 40" x 30" x 30" in size. The feed end is, however, without any enclosure.

The Braiding machines No. 2, 4, and 6, have not been improved upon. However, no asbestos coated wires were being used on these machines.

No. 31 Carding machine was under repair. The enclosure of this machine is regularly vacuum cleaned and the cleaner bags are dumped in a cardboard box and left open. This was considered to be a bad practise as there is a possibility of some of the dust in the box to be airborne.

In addition to the asbestos exposure, the following places were re-examined:

<u>Aisle #822</u> - No improvement has been made. My previous report suggests a hopper to be built for feeding the mica dust slowly to the container. This would eliminate the need for frequent shovelling. No action has been taken as yet.

<u>Aisle #928 Machine No. 8 Tuber</u> - The brush wiper as suggested in my previous report has not been installed. A piece of cloth has been provided at the discharge end of the tuber but the spillage still occurs in large quantity.

<u>Aisle #928 Machine No. 6A Tuber</u> - No improvement has been made. However, I was told that the tuber is not used regularly.

<u>Aisle #930 Tuber #10</u> - There is a new box for mica about 11" x 30" x 17" high with a screw feed which minimizes the dissemination of dust. A small amount of spillage still occurs when mica bags are dumped.

<u>Aisle #933 #25 Tuber</u> - This tuber was described in detail in the previous report. The existing local exhaust was also commented on. It was indicated that the hood was poorly designed. No change or improvement has been made.

**********************************************************************

Along the eastern wall of the "Wire and Cable building" is located a lead extrusion operation. Here the lead pigs are brought by a conveyor to a melting furnace 5' in diameter. The molten metal comes out through a 4" steam (insulated) duct to an extruder where cables are fed at one end and the extruded cables come out from the other end.

The furnace is fitted with a 16" x 16" square hood exhausted at the rate of about 1500 cfm. A door about 10" x 13" is provided at the furnace for taking the dross out. This dross is piled in open buckets, at the charging platform and at the end of the shift the buckets are taken to the salvage department.

In addition to the above mentioned exhaust, there is a 5' diameter fan located near the roof above the furnace. This was estimated to be exhausting at the rate of 12,000 cfm.

Comments:

1. As mentioned earlier, the company has provided a complete enclosure for the Braiding machine, which was considered to be the dustiest during the previous visit. However, the enclosure is without any local mechanical exhaust. A great deal of discussion was held on the type of exhaust needed for this enclosure. It was pointed out to Mr. Faggetter that a branch duct can very easily be installed at the new exhaust system built for the "wax-pot" and connected to the new enclosure.

   We would normally require about 100 fpm inward air velocity through the doors. As the doors are each about 12 sq. ft., a minimum of 1200 cfm exhaust volume would be required to adequately control the dust. The new exhaust system for the "wax-pot", at present, is exhausting at the rate of 1200 cfm of which only 600 cfm is required for the "wax pot". Thus, the remaining 600 cfm can be utilized for the enclosure. The extra 600 cfm required for the enclosure can be provided by speeding up the fan or if the "wax pot" and the "Braiding machine" are not working simultaneously a damper can be used, to regulate the volumes.

2. In my previous report dated October 4,1972, a direction was suggested to provide proper and adequate enclosure for the feed reels of the small Braiding machines No. 2, 4, and 6. During the visit, I was told that the asbestos braiding on these machines is slowly being phased out. However, no exact date was given. I would, therefore, suggest that the previous direction still should apply as the fibre counts near these machines have been two times the TLV.

3. The cardboard box used to contain dust from the vacuum cleaner bags should not be left open. As soon as the dust is dumped in this box, the box should be covered with a polyethylene sheet and properly disposed. The open box is liable to make some of the dust airborne.

4. As far as dust coating operations are concerned, no improvements have been made since my last visit. A direction was suggested at that time to provide adequate dust control measures. Except #10 Tuber near Bay #930, none of the other dust containers have been changed. The box container for #10 Tuber appears to be able to reduce the dissemination of dust to a considerable degree.

5. The local exhaust at #25 Tuber has not been altered. As was indicated in my previous report, the existing local exhaust is poorly designed for controlling the dust. An effective design would be a rectangular hood about 1' x 1½' with a face velocity of about 150 fpm located not more than 6" from the hopper. The existing fan should be able to handle the required air volume.

6. The Armor-Coat lead pot near the eastern wall is in a very poor shape. A considerable amount of lead fumes is given off when the pigs are charged due to the pressurization of the furnace. The existing local exhaust at the furnace is totally ineffective because of a big leak near the fan outlet. This leak is adding considerable dynamic loss to the system with consequent reduction in fan performance. Furthermore due to the leak, the exhausted air is virtually being recirculated. This should not be permitted in case of fumes as toxic as lead. It is my feeling that the leak had been in existence there for quite some time, and no attempt has ever been made to repair it. This shows that the Company has a very poor maintenance program.

7. The man handling the dross are exposedto a considerable amount of lead fumes as the dross is usually hot and fuming. This is also evident from the sampling results as shown in the Lab report No. 15,275 dated February 6,1973. The lead concentration is about 5 times the TLV. Thus, there is an urgent need for providing adequate respiratory protections to the employees working at the charging platform.

8. Considerable amounts of fumes are generated at the discharge end of the extruder. This is the main reason for high lead concentrations in the background of the extruder area (see the Lab. report 15,275). In my opinion, a local mechanical exhaust is needed to control these fumes.

9. Housekeeping in the lead handling area was considered to be poor. No lead card is posted and most of the employees were not found to be using gloves.

10. The employees working in the lead handling area are under medical supervision.

Directions to be Issued:

1. All the directions suggested in my previous report still apply.

2. The lead pot in the "Wire and Cable building" shall be provided with adequate local mechanical exhaust.

3. Adequate local mechanical exhaust shall also be provided for the discharge end of the extruder to control the lead fumes.

4. The exhausted air shall be discharged outdoors.

5. The men working at the charging platform and handling dross shall be provided with adequate respiratory protections.

6. Lead cards shall be posted in conspicuous places.

7. No eating, drinking, smoking or chewing shall be permitted in lead handling areas.

8. No food, drink, or tobacco shall be brought into the lead handling area.

9. Good housekeeping shall be maintained at a high level in the lead handling area. No dry sweeping shall be permitted.

10. Employees shall be encouraged to practise good personal hygiene, this shall include washing before eating, drinking, smoking or using toilet facilities.

G. S. Rajhans

G. S. Rajhans, P. Eng.

GSR/sl

PUBLIC HEALTH DIVISION

Telephone:
965 - 4066

Area Code:
416

ONTARIO

MINISTRY OF HEALTH

ENVIRONMENTAL HEALTH SERVICES BRANCH
ONE ST. CLAIR AVENUE WEST
TORONTO 7, ONTARIO
M4V 1K8

March 9, 1973

Mr. D. Able,
Canadian General Electric Co. Ltd.,
107 Park Street, North,
PETERBOROUGH, Ontario.

Dear Mr. Able:

Enclosed is a copy of the Field Visit Report prepared by Mr. G. S. Rajhans, following a visit to your plant on February 15, 1973. The Directions suggested at the end of the report are for issue to you by the Ministry of Labour's Industrial Safety Officer.

Yours sincerely,

H. M. Nelson, P.Eng.,
Officer-in-Charge,
Health Engineering Section.

HMN:jt
Encl. Report

#16

ONTARIO DEPARTMENT OF HEALTH
OCCUPATIONAL HEALTH LABORATORIES TEL: 965-7925
360 CHRISTIE STREET, TORONTO 4, ONT.

RE: AIR SAMPLES FOR LEAD TAKEN ON JANUARY 30, 1973 AT CANADIAN GENERAL ELECTRIC CO., PETERBOROUGH, ONTARIO.
REQUESTED BY DR. V. TIDEY.
COMPANY CONTACTS: MR. D. ABLE, SAFETY SPECIALIST
MR. G. HANSON, ASSISTANT.

107 V 9 C

REPORT NO: 15,275
DATE: FEB. 6, 1973
COPIES TO: DR. V. TIDEY(2)
MR. H. NELSON
MR. J. MCNAIR(2)
MR. H. WALL (2)

FROM: C. RHODES

AIR SAMPLES WERE TAKEN IN THE "WIRE AND CABLE DIVISION" OF THE ABOVE COMPANY AND THE FOLLOWING TABLE LISTS THEIR LOCATIONS AND RESULTS:

| NO. AND LOCATION | LEAD MG/M$^3$ OF AIR |
|---|---|
| 1. DROSSING AND CHARGING PLATFORM OF ARMOR-COAT LEAD POT. | 0.78 |
| 2. BESIDE ARMOR-COAT EXTRUDER. | 0.05 |
| 3. BACKGROUND, EXTRUDER AREA. | 0.23 |

THE PRESENT THRESHOLD LIMIT VALUE (T.L.V.) FOR LEAD IS 0.15 MILLIGRAMS PER CUBIC METER (MG/M$^3$) OF AIR. TWO OF THE SAMPLES WERE ABOVE THIS LIMIT.

COMMENTS:

HOUSEKEEPING IN THE LEAD HANDLING AREA WAS POOR AND DROSS BUCKETS WERE NOT COVERED.

THE EMPLOYEES WORKING IN THIS AREA DO NOT WEAR MASKS.

EVIDENCE OF EATING AND SMOKING WAS NOTED IN THIS AREA I.E. EXTINGUISHED CIGARETTES ON THE FLOOR AND ALSO EMPTY MILK CARTONS AND LUNCH WRAPPERS.

A VISIT BY OUR ENGINEERING SERVICES SHOULD BE MADE TO ASSESS THE LEAD EXPOSURE.

LEAD ANALYSIS BY MRS. J. MANDAC.

M. Budlovsky
M. BUDLOVSKY

C. Rhodes
C. RHODES

CR/JS
HW

OCCUPATIONAL HEALTH SERVICE
FEB 7 1973

Telephone:
965 - 4066
Area Code:
416

M4V 1K8

7 February 1973.

Mr. D. Able,
Safety Specialist,
Canadian General Electric Company,
107 Park Street North,
PETERBOROUGH, ONTARIO.

Dear Mr. Able:

I am sending you a copy of our air sampling results which were obtained recently at your plant by our laboratory, for your information.

Yours very truly,

for V. L. Tidey, M.D.,
Chief,
Occupational Health Service.

VLT/bc
encl.

#15

I.S.B. File No. 336-00005-0008

O.H.S. File No. 2I-76
3G-3

OCCUPATIONAL HEALTH SERVICE
OCT 6 1972

# ONTARIO DEPARTMENT OF HEALTH
## ENVIRONMENTAL HEALTH SERVICES BRANCH

365 - 4066

## FIELD VISIT REPORT
## PART I

Memorandum to:
Dr. V. L. Tidey
Chief, Occupational Health Service

Date: October 4,1972

From: G. S. Rajhans, P. Eng.

---

Plant: Canadian General Electric Co. Ltd.

Address: 107 Park Street North
Peterborough, Ontario

Contacts:

Mr. R. Heard, Suggestions
Mr. K. Faggetter, Engineer

Requested by: Dr. G. A. Sinclair, OHS

Accompanied by:

Date of Visit: September 20,1972

Copies to:

Mr. J. McNair (3)
Dr. J. Cowle (2)
Mr. D. Able

---

Abstract: This visit was a follow up of the air sampling done in July 1972. Also included in this visit was a review of asbestos braiding operations, requested by Mr. R. W. Dickey, ISB. This report comments on the improvements made in various areas. The air sampling results are also compared and commented on.

* * * * * *

The above mentioned company was previously visited by the writer in January 1971, and a detailed report describing the various powders used in several areas was written (see the report dated January 18,1971).

It was shown in that report that a total of seven different powders were being used by the company, for more or less identical purposes. Of the seven powders, pyrax "A", was considered to be the most toxic, as it contained about 66% free silica. A suggestion was therefore made by the company to replace this powder with a relatively less toxic powder, e.g. zinc stearate or mica. It appears that the company has been successful in eliminating the use of pyrax "A". Other powders are still in use at the following places in building no. 22.

2nd VLT
2nd file

Aisle #822 - Mica is used here in a newly built box type container, (39" x 18" x 20"), containing a wiper brush at the discharge end. Cables are passed through this container in order to be coated with mica. This container has reduced the spillage considerably, during the coating operation. However, an excessive amount of spillage still occurs when mica is shovelled from a drum into the container. In my opinion, this spillage could very easily be minimized by providing a hopper directly over the container, and thus eliminating the need for frequent shovelling.

Aisle #928 Machine No. 8 tuber - Zinc stearate is used in a newly built box at the south end. This box has been able to reduce the dissemination of dust considerably, but the floor near the tuber is still full of mica dust dropping at the end of the tuber. Apparently there is no brush wiper, at the discharge end of the box, and this is probably the main reason for the spillage near this machine.

Aisle #928 Machine No. 68, tuber - No change or improvement has been made at this machine since the last visit. Mica is still used at this machine.

Aisle #930 Tuber #10 - There is no box or enclosure for mica used here to coat bare copper wires. A considerable amount of spillage was noticed at this machine.

Aisle #933 #25 tuber - Relatively coarse mica is used here. The tuber is fitted with a downdraft hood (4" x 5") located at the south end, exhausting at the rate of about 100 cfm. This hood was considered to be poorly designed as the duct has a "U" bend near the take-off, and may create a considerable amount of resistance. Furthermore, the duct would frequently get plugged by powder falling directly into it. This was pointed out to Mr. Faggetter, who indicated that the company has bought a new kind of tuber, which will be properly exhausted. It was suggested to Mr. Faggetter that a downdraft exhaust is not very practical for a dusty operation, unless a dust trap is designed at the "U" bend. In addition to mica and zinc stearate, several other powders were also found to be stored at the north end of the wire and cable building. These powders include camel white, talfil and clay. Whether these powders are regularly used, was difficult to determine.

---

The south end of the wire and cable building is used for insulating wires by asbestos. The use of asbestos has been described in detail by Mr. H. M. Nelson in his report dated July 26,1971.

The report also describes the local exhausts at various carding, and twisting machines. Since then, #31 carder has been provided with a complete enclosure with a glass window in the front. The enclosure is about 100" long x 70" wide. An inward velocity of 150 fpm was measured through an opening of 49" x 2½". A complete enclosure is also provided for #46 twisting machine. The enclosure is equipped with two side exhaust ducts, 4" diameter each and two backdraft exhaust ducts 6" diameter each. The transport velocities in these ducts varied from 1500 to 2000 fpm, which were considered to be slightly on the low side.

Among the braiding machines, no 2, 4, and 6 were found to be using asbestos coated wires. No enclosure or ventilation is provided at these machines. A waxpot near bay no. 915 is used to coat asbestos wires with wax. A canopy 15" x 27" is located at about 19" above the pot. A face velocity of 150 fpm was detected near the canopy, but the capture velocity near the pot was almost nil.

A small braiding machine located near bay 815 was considered to be the dustiest machine in the building. A considerable amount of asbestos braiding is done at this machine. There is no enclosure or local exhaust provided for this machine.

<u>Comments</u>:

1. Although the company has endeavoured to provide enclosures for the dust coating operations, a considerable improvement is still to be desired. None of the powder containers are provided with adequate local exhausts. An attempt has been made to install a local exhaust at one container at the north end. This exhaust is in the form of a down draft duct, with a "U" bend at the take-off. This was considered to be a poor design, as the duct would be very easily plugged by the dust falling directly into it, and being trapped at the "U" bend. A back drafting slotted exhaust hood with a vertical or inclined take-off should be considered.

2. It appears that the company has discontinued the use of most toxic dusts, like <u>pyrax "A"</u> and <u>Hisil</u>. However, the company is still using a variety of powders which add to the confusion, as far as the requirement of dust control is considered.

3. A total of 8 impinger samples were taken in No. 22 building in July 1972. The results are shown in the lab report No. 15,004A dated July 19,1972. Only one of the eight samples were taken near a mica dusting machine. The count is higher than the calculated TLV. However, the count is taken near the one machine provided with a local exhaust. The other machines are without any exhaust, hence, one can expect much higher counts at these machines.

The lab. report no. 15,004B, of the same date shows the asbestos fibre counts at various braiding and twisting machines. A total of six samples were taken, using the membrane filter technique. No TLV has been calculated and shown in the lab report. The Occupational Health Service of the Ministry of Health, has tentatively decided on a TLV of 2 fibres per ml. for asbestos fibres. A comparison of this TLV with the fibre counts indicates that five out of six samples are either at or above the TLV. The highest count was found at the small braiding machine near bay 815. It has been indicated earlier in this report that, even judging visually, this machine appeared to be the dustiest one in the whole building. There is no enclosure or exhaust provided for this machine, which is also contaminating the neighbouring areas. An employee operating this machine appeared to be a very heavy smoker. It should be realized here that the smoking and asbestos exposures are considered to be synergistic.

4. No 31 carding machine was considered to be adequately enclosed and exhausted. This is also reflected by the lowest fibre count found near the machine.

The enclosure for no. 46 twisting machine was also considered to be adequate. A count of 2 fibres per ml near the machine, although at the TLV level is not considered to be high.

At the braiding machines, most of the fibrous dust is produced from the exposed portions of the feed reels. The counts at these machines are 1.5 to 2 times the TLV. In my opinion, if the feed reels can be provided with complete enclosures, the fibre counts would be considerably reduced.

Directions to be Issued:

1. All dust coating processes shall be properly enclosed and adequately exhausted.

2. Adequate local mechanical exhaust shall be provided for the small braiding machine near bay 815 (see comment no. 3).

3. All the feed reels using asbestos coated wires shall be properly enclosed.

4. Adequate local mechanical exhaust shall be provided at the wax pot used for coating the asbestos wire.

G S Rajhans

G. S. Rajhans, P. Eng.

GSR/sl

ONTARIO DEPARTMENT OF HEALTH
OCCUPATIONAL HEALTH LABORATORIES TEL: 965-7925
360 CHRISTIE STREET, TORONTO 4, ONT.

---

RE: AIR SAMPLES FOR ASBESTOS FIBRES TAKEN ON JULY 5 AND 13, 1972 AT CANADIAN GENERAL ELECTRIC CO., PETERBOROUGH. REQUESTED BY MR. H. NELSON. COMPANY CONTACT: MR. D. ABEL, SAFETY SPECIALIST. ACCOMPANIED BY MR. R. DICKY, I.S.O.

REPORT NO: 15,004 B
DATE: JULY 19, 1972
COPIES TO: DR. V. TIDEY(2
MR. H. NELSON
DR. J. COWLE(2
MR. J. MCNAIR(
MR. H. WALL (

FROM: C. RHODES

---

AIR SAMPLES WERE TAKEN IN THE CABLE DIVISION OF THE ABOVE COMPANY AND THE FOLLOWING TABLE LISTS THEIR LOCATIONS AND RESULTS:

| NO. AND LOCATION | ASBESTOS FIBRES >5 MICRONS IN LENGTH/CC. OF AIR |
|---|---|
| 1. NO.31 CARDING MACHINE (ENCLOSED). | 1 |
| 2. NO.43 BRAIDING MACHINE (MIDWAY). | 3 |
| 3. BACKGROUND, BESIDE OPERATOR'S DESK. | 4 |
| 4. NO.46 TWIST MACHINE. | 2 |
| 5. BAY 815, SMALL BRAIDING MACHINE. | 5 |
| 6. BAY 815, BACKGROUND, SEVEN FEET FROM SMALL BRAIDING MACHINE. | 3 |

COMMENTS:

HOUSEKEEPING IN THE PLANT WAS GOOD.

THE LARGE CARDING MACHINE WAS NOT OPERATING.

THE SMALL CARDING MACHINE (SAMPLE NO.1) WAS FULLY ENCLOSED, WITH A SLOT EXHAUST ABOVE THE OBSERVATION WINDOW.

SAMPLE NO.2 WAS TAKEN MIDWAY ALONG A BRAIDING MACHINE THAT WAS COVERING ASBESTOS COATED WIRE WITH A COTTON EXTERIOR.

M. Budlovsky
M. BUDLOVSKY

C Rhodes
C. RHODES

CR/JS

GM

PUBLIC HEALTH DIVISION

ONTARIO

MINISTRY OF HEALTH

ENVIRONMENTAL HEALTH SERVICES BRANCH
ONE ST. CLAIR AVENUE WEST
TORONTO 7, ONTARIO

Telephone:
965 - 4066

Area Code:
416

October 11, 1972

Mr. D. Able,
Canadian General Electric Co. Ltd.,
107 Park Street North,
PETERBOROUGH, Ontario.

Dear Mr. Able:

Enclosed is a copy of the Field Visit Report prepared by Mr. G. S. Rajans, following a visit to your plant on September 20, 1972. The Directions suggested at the end of the report are for issue to you by the Ministry of Labour's Industrial Safety Officer.

Yours sincerely,

H. M. Nelson, P. Eng.,
Officer-in-Charge,
Health Engineering Section.

HMN:er
Encl. Report

ONTARIO DEPARTMENT OF HEALTH
OCCUPATIONAL HEALTH LABORATORIES TEL: 965-7925
360 CHRISTIE STREET, TORONTO 4, ONT.

RE: AIR SAMPLES FOR ASBESTOS FIBRES TAKEN ON JULY 5 AND 13, 1972 AT CANADIAN GENERAL ELECTRIC CO., PETERBOROUGH. REQUESTED BY MR. H. NELSON. COMPANY CONTACT: MR. D. ABEL, SAFETY SPECIALIST. ACCOMPANIED BY MR. R. DICKY, I.S.O.

REPORT NO: 15,004 B
DATE: JULY 19, 1972
COPIES TO: DR. V. TIDEY(2
MR. H. NELSON
DR. J. COWLE(2
MR. J. MCNAIR(
MR. H. WALL (

FROM: C. RHODES

AIR SAMPLES WERE TAKEN IN THE CABLE DIVISION OF THE ABOVE COMPANY AND THE FOLLOWING TABLE LISTS THEIR LOCATIONS AND RESULTS:

| NO. AND LOCATION | ASBESTOS FIBRES >5 MICRONS IN LENGTH/CC. OF AIR |
|---|---|
| 1. NO.31 CARDING MACHINE (ENCLOSED). | 1 |
| 2. NO.43 BRAIDING MACHINE (MIDWAY). | 3 |
| 3. BACKGROUND, BESIDE OPERATOR'S DESK. | 4 |
| 4. NO.46 TWIST MACHINE. | 2 |
| 5. BAY 815, SMALL BRAIDING MACHINE. | 5 |
| 6. BAY 815, BACKGROUND, SEVEN FEET FROM SMALL BRAIDING MACHINE. | 3 |

COMMENTS:

HOUSEKEEPING IN THE PLANT WAS GOOD.

THE LARGE CARDING MACHINE WAS NOT OPERATING.

THE SMALL CARDING MACHINE (SAMPLE NO.1) WAS FULLY ENCLOSED, WITH A SLOT EXHAUST ABOVE THE OBSERVATION WINDOW.

SAMPLE NO.2 WAS TAKEN MIDWAY ALONG A BRAIDING MACHINE THAT WAS COVERING ASBESTOS COATED WIRE WITH A COTTON EXTERIOR.

M. Budlovsky
M. BUDLOVSKY

C. Rhodes
C. RHODES

CR/JS

OCCUPATIONAL HEALTH SERVICE
JUL 20 1972

Telephone:
965-4066

Area Code:
416

July 21, 1972

Mr. D. Abel,
Safety Specialist,
Canadian General Electric Company,
107 Park Street,
PETERBOROUGH, Ontario.

Dear Mr. Abel:

I am sending you a copy of our air sampling results which were obtained recently at your plant by our laboratory, for your information. The Threshold Limit Value for impinger counts is about 3 m.p.p.c.f. and for fibre counts, the Threshold Limit Value is 2 fibres >5u/cc of air.

Yours very truly,

V.L. Tidey, M.D.,
Chief,
Occupational Health Service.

VLT:jt
encl.

ONTARIO DEPARTMENT OF HEALT
OCCUPATIONAL HEALTH LABORATORIES TEL: 965-7925
360 CHRISTIE STREET, TORONTO 4, ONT.

RE: AIR SAMPLES FOR DUST TAKEN ON JULY 5 AND 13, 1972 AT CANADIAN GENERAL ELECTRIC CO., PETERBOROUGH. REQUESTED BY MR. H.M. NELSON.
COMPANY CONTACT: MR. D. ABEL, SAFETY SPECIALIST.
ACCOMPANIED BY MR. R. DICKY, I.S.O.

REPORT NO: 15,004 A
DATE: JULY 19, 1972
COPIES TO: DR. V. TIDEY(2)
MR. H. NELSON
DR. J. COWLE(2)
MR. J. MCNAIR(2)
MR. H. WALL (2)

FROM: C. RHODES

AIR SAMPLES WERE TAKEN IN THE CABLE DIVISION OF THE ABOVE COMPANY AND THE FOLLOWING TABLE LISTS THEIR LOCATIONS AND RESULTS:

| No. AND LOCATION | DUST M.P.P.C.F. OF AIR |
|---|---|
| 1. No.31 CARDING MACHINE (ENCLOSED). | 4.2 |
| 2. No.43 BRAIDING MACHINE (MIDWAY). | 5.9 |
| 3. BACKGROUND, BESIDE OPERATOR'S DESK. | 6.3 |
| 4. No.46 TWIST MACHINE. | 6.7 |
| 5. BAY 933, MICA COATING MACHINE. | 18.7 |
| 6. BAY 933, BACKGROUND, BESIDE OPERATOR'S DESK. | 3.2 |
| 7. BAY 815, SMALL BRAIDING MACHINE. | 5.3 |
| 8. BAY 815, BACKGROUND, 7 FEET FROM SMALL BRAIDING MACHINE. | 3.4 |

A SAMPLE OF MICA WAS SUBMITTED TO OUR LABORATORY FOR FREE SILICA ANALYSIS.

| | % FREE SILICA | T.L.V. MPPCF. |
|---|---|---|
| MICA | 7.9 | 16.7 |

COMMENTS:
SEE REPORT 15,004 B FOR COMMENTS ON HOUSEKEEPING.
SAMPLES No.5 AND 6 WERE TAKEN TO ASSESS THE AMOUNT OF DUST IN THE AIR CREATED BY THE OVERSPILL FROM THE COATING MACHINE.
A.C.G.I.H. LIST A T.L.V. OF 20 MPPCF. FOR MICA CONTAINING LESS THAN 1% FREE SILICA.
FREE SILICA ANALYSIS BY MR. D. CARROLL.

M. Budlovsky
M. BUDLOVSKY

C Rhodes
C. RHODES
gm

/JS

OCCUPATIONAL HEALTH SERVICE
JUL 20 1972

Telephone:
965-4066

Area Code:
416

July 20, 1972

Mr. D. Abel,
Safety Specialist,
Canadian General Electric Co.,
107 Park Street,
PETERBOROUGH, Ontario.

Dear Mr. Abel:

I am sending you a copy of our air sampling results which were obtained recently at your plant by our laboratory, for your information.

Yours very truly,

V.L. Tidey, M.D.,

Chief,
Occupational Health Service.

VLT:jt
encl.

#14

Ministry of LABOUR
~~xxhealth~~

Ontario

OCCUPATIONAL HEALTH ~~PROTECTION~~ BRANCH

965 - 3610

FIELD VISIT REPORT

PART II

CONFIDENTIAL

I.S.B. File No. :

O.H.P.B. File No. : 8C-71

OCCUPATIONAL HEALTH
MAY 12 1977
PROTECTION BRANCH

Date: May 10, 1977

From: Dr. J. G. Budlovsky, M.D.

| | | | |
|---|---|---|---|
| Plant: Address: | Canadian General Electric Limited, 107 Park Avenue North, Peterborough, Ontario. | Requested by: | O.H.B. |
| | | Accompanied by: | – |
| | | Date of Visit: | May 4, 1977 |
| Contacts: | Mr. K. Faggetter, P. Eng., Safety Specialist<br>Mr. L. Foord, Manager, Manufacturing and Engineering | Copies to: | Dr. V. L. Tidey |
| | | Re: | W.C.B. Claim #S10938417 Mr. D. Richardson |
| Hazard: | Asbestos | | |

Abstract: Mr. Richardson was employed with the above-mentioned company from 1940 until 1976, when he retired. I could not get any information from the company regarding previous employment.

From 1940 until 1945 he worked as a helper in the Wire and Cable Manufacturing Department. In August 1945 he worked for a short period as an operator of an asbestos carding machine and from August 1945 until March 1965 he was an inspector in the Wire and Cable Manufacturing Department. In this department carded asbestos fibres are used for insulating wires. After the wires are covered with asbestos fibres, they pass through a bath of plastic material. The carding machine was dismantled in 1973 and could not be inspected.

The present exposure to asbestos has been described in previous reports and does not appear to be high. However, it may be assumed that dust conditions, when Mr. Richardson worked as a helper, and especially as an operator of the carding machine, were much worse.

Since 1965 Mr. Richardson worked as a clerk in an office area. In this area (under the roofing) pipes of the air-conditioning system were noticed. These pipes are insulated by what appeared to be fibre-glass. Theoretically, it might be assumed that Mr. Richardson was exposed to asbestos while he worked as a clerk only when he passed the Wire and Cable Department on his way to and from the office. Mr. Richardson was a smoker.

Conclusion.

Mr. Richardson worked in direct asbestos exposure from 1940 until 1945. This exposure cannot be evaluated only guessed. Mr. Richardson did smoke and lung-cancer is quite common in man-smokers of his age group, even without exposure to asbestos.

It would be interesting to know whether the chest radiogram shows any signs of asbestos influence like thickened pleura and/or fibrosing of the lungs and whether any fibrotic changes in the lung tissue were found at biopsy.

J. G. Budlovsky, M.D.

JGB/jf

15 Overlea Boul..ard, 5th Floor,
Toronto, Ontario, M4H 1A9.

Telephone: 416/965-3610.

May 11, 1977

Dr. D. Burton, M.D.,
Medical Branch,
Rehabilitation Services Division,
The Workman's Compensation Board,
2 Bloor Street East,
Toronto, Ontario,
M4W 3C3.

Dear Dr. Burton:

Re: Mr. D. Richardson - #S10938417

Canadian General Electric Limited,
107 Park Street North,
Peterborough, Ontario

A visit was made to this plant to review the occupational exposure of the above-named claimant. Attached, for your information, is a copy of the Field Visit Report, Parts I and II, prepared by Dr. J. G. Budlovsky of this Branch.

Yours very truly,

V. L. Tidey, M.D.
Chief
Occupational Health Medical Service

jf
Enclosure

Ministry of LABOUR
~~Health~~

Ontario

I.S.B. File No. :
O.H.P.B. File No. : 8C-71✓

OCCUPATIONAL HEALTH ~~PROTECTION~~ BRANCH

965 - 3610

FIELD VISIT REPORT

Date: May 10, 1977

From: Dr. J. G. Budlovsky, M.D.

| | | | |
|---|---|---|---|
| Plant: | Canadian General Electric Limited | Requested by: | O.H.B. |
| Address: | 107 Park Street North, Peterborough, Ontario. | Accompanied by: | - |
| | | Date of Visit: | May 4, 1977 |
| Contacts: | Mr. K. Faggetter, P. Eng., Safety Specialist.<br>Mr. L. Foord, Manager, Manufacturing and Engineering | Copies to: | Dr. V. L. Tidey<br>Mr. R. K. Cleverdon (3)<br>Mr. H. M. Nelson<br>Mr. K. Faggetter |
| Hazard: | Asbestos | | |

Abstract: This visit was made in order to review the possible occupational cause of a lung disease of one of the employees.

The man in question started employment with this company in 1940 in the Wire and Cable Manufacturing Department and was employed in this department until 1965. For a short period in 1945 he worked in this Department as a carding machine operator.

Asbestos is used in some operations to insulate electrical wires. These operations have been described in previous Field Visit Reports (Mr. J. Toth, P. Eng. December 1976 and Dr. M. Cohen, P. Eng. November 1975). The carding machine was dismantled in 1973 and could not be inspected on my visit, nor is it mentioned in Mr. Toth's or Dr. Cohen's reports.

In 1965 he was transferred to the office, where he worked as a clerk until he retired in 1976.

Comments.

1. It is impossible to compare dust conditions described in both mentioned reports with the actual conditions from 1940 - 1965. However, it may be assumed that they were worse.

Occupational [illegible]
15 Overlea Boulevard, 5th Floor,
Toronto, Ontario, M4H 1A9.

Telephone: 416/965-3610.

May 11, 1977

Mr. K. Faggetter, P. Eng.,
Canadian General Electric Limited,
107 Park Street North,
Peterborough, Ontario.

Dear Mr. Faggetter:

Please find enclosed a copy of the Field Visit Report prepared by Dr. J. G. Budlovsky following a visit to your plant on May 4, 1977.

Yours very truly,

V. L. Tidey, M.D.
Chief
Occupational Health Medical Service

jf
Enclosure

#13

CANADIAN GENERAL ELECTRIC COMPANY LIMITED

INDUSTRIAL APPARATUS DEPARTMENT
107 PARK STREET NORTH, PETERBOROUGH, ONTARIO, K9J 7B5 - TEL: (705) 742-7711

824

14 June 1977

OCCUPATIONAL HEALTH
PROTECTION BRANCH

Ministry of Labour
15 Overlea Blvd.
5th Floor
TORONTO, Ontario
M4H 1A9

Attn: Mr. J. Toth
Occupational Health
Engineering Service

Dear Sir:

During your 2 June 1977 visit here you requested that we advise the names and quantities of materials used on the Banbury machine in our Wire & Cable Section.

The attached list contains a listing of all materials used on the Banbury and also materials used on PVC mix where the pelletizing machine is located. Materials indicated in red are used on the Banbury. Those indicated in blue are used on the PVC mix. If you require suppliers' names these can also be provided.

Yours very truly,

R. E. Fowler

R.E. Fowler
Safety Analyst
Employee & Community Relations

:am

attach.

# TITLE - Material List

| G.E. No's | | | Spec No's | Carbon Black (25001 - 25010) | |
|---|---|---|---|---|---|
| | 25 | 001 | 5760 | Medium Thermal (Sterling MT)(Thermax) | 10475 LBS |
| | | 002 | 5761 | Channel Black EPC (Spheron #9)(Micronex W6) (Kosmobile 77) | |
| | | 003 | 5762 | Furnace Black Oil Base, F.E.F. (Sterling SO)(Statex M)(Philblack A) | 17100 LBS |
| | | 004** | 5763 | Vulcan SC (Super Conducting | |
| | | 005 | 5764 | ~~(Loose) for PVC - Type F12~~ RAVEN 890 | 2275 LBS. |
| | | 006 | 4765 | Thermax MT (Powder Form) | 1320 LBS. |
| A | | 007 | 5820 | Philblack S315 | 3750 LBS. |
| | B | 008 | | Vulcan X C 72 Carbon Black | 1450 LBS |
| | | 009 | | | |
| | | 010 | | | |

BANBURY AND/OR 5A MILL

PVC MIXER WS & 2VL

TITLE - Material List

| G.E. No's | | Spec No's | Accelerator - Rubber (42001 - 42029) | |
|---|---|---|---|---|
| 42 | 001 | 3809 | Benzothiazyl Disulphide (MBTS)(Thiofide)(Altax Rodform) | 1800 LBS |
| | 002 | 3808 | Mercapto Benzo Thiazole (Mercapto)(MBT)(Thiotax)(Captax) | 50 LBS |
| | 003 | 3807 | Tetra Methyl Thiuram Monosulphide (Thionex)(Mon Thiurad Pettets)(TMTM Pellets) (Monex Naugets)(Unads Coloured Rodform) | 650 LBS. |
| | 004 | 5700 | Tetra Methyl Thiuram Disulphide (Thiuram M) (Tuex Naugets)(Methyl Tuads Coloured Rodform) | 150 LBS. |
| | 005 | 5701 | Zinc Dimethyl Dithiocarbamate (Methazate Naugets) (Methyl Zimate Coloured Rodform) | 150 LBS. |
| | 006 | 5702 | Zinc Salt of Mercapto Benzo Thiazole Bantex (OXAF) ETU DISPERSED | 750 LBS |
| | 007 | 5703 | Mercapto Imidazoline ~~(NA22)~~ (~~ETU Dustless~~) | |
| | 008 | 5704 | Piperidine Pentamethylene Dithiocarbamate (552) | — |
| | 009 | 5705 | Tellurium Diethyldithiocarbamate (80% Tellurac Rodform) | |
| | 010 | 5706 | Diorthotholylouanioine (DOTG) | 450 LBS |
| | 011 | 5707 | 25% Poly Papra-Cinitrosobenzene (Polyac) | |
| | 012** | 5708 | Permalux | 207 LBS. |
| | 013 | 5709 | NBC | 915 LBS. |
| | 014 | 5710 | Tetrone "A" (Sulfads Rodform) | |
| | 015 | 5711 | Ware Chem. 70%, MBTS in Polybutene & Wax | 746 LBS. |
| | 016 | | PDD-70 (Dibenzo GMF) Poly Dispersion | [illegible] 713. |
| | 017 | 5809 | PWD-70 (Dibenzo GMF) Poly Dispersion | [illegible] |
| | 018 | 5824 | HVA 2 (DuPont) | 65 LBS. |
| B | 019 | 5825 | Pentacrythritol 200 (Accelerator) | 928 LBS. [illegible] |
| | 020 | | | |
| | 021 | | | |
| | 022 | | | |
| | 023 | | | |
| | 024 | | | |
| | 025 | | | |
| | 026 | | | |
| | 027 | | | |
| | 028 | | | |
| | 029 | | | |

| .E. No's | | Spec No's | Acids - Rubber (42030-42035) | |
|---|---|---|---|---|
| 42 | 030 | 2212 | Stearic - Rubber Grade 2390 LBS. | |
| | 031 | | | |
| | 032 | | | |
| | 033 | | | |
| | 034 | | | |
| | 035 | | | |
| | | | Activators - Rubber (42036 - 42040) | |
| 42 | 036** | 5712 | Dibenzoxyl Quinone Dioxime (Dibenzo G.M.F.) | |
| | 037* | 5713 | Poly Dispersion Dibenzo PQD 70% (BD90) | |
| | 038 | | | |
| | 039 | | | |
| | 040 | | | |
| | | | Antioxidants - Rubber (42041 - 42045) | 1115 LBS |
| 42 | 041 | 5717 | Polymerized Trimethyl Dihydroquinoline (Powder Form)(Flectol H | |
| | 042** | | Mixture of Octylated Diphenylamines (nonox H.F.N.) (Agerite Stalite Liquid) | — |
| | 043 | | | |
| | 044 | 5718 | (Sym-Di-Beta-Naphtyl-Para-Phenylendiamine (nonox C.I.) (Santowhite CI)(Agerite WHT) | 40 LBS |
| | 045* | 5719 | P-(P-Toluene-Sulfony)-Amido)-Diphenylamine (Aranox) | — |
| | 046 | 5720 | Rio-Resin | |
| | 047 | 5721 | Diphenylamine -DI Isobutylene Reaction Product (Improved Octamine)(Agerite Stalites) - Sold | 3200 LB. |
| | 048 | 5722 | Dialkyl Phenol-Sulphide (Santowhite Crystals) | — |
| | 049 | 5725 | Flexzone 6H 450 LBS | |
| | 050** | 5723 | ~~Neozone A Pellets (DuPont)~~ | |
| | 051* | 5724 | ~~Akroflex C Pellets (DuPont)~~ | |
| | 052 | | | |
| | 053 | 5535 | B.L.E. No. 25 200 LBS. | |
| | 054 | | | |
| | 055 | | | |
| | 056 | | | |
| | 057 | | | |
| | 058 | | | |
| | 059 | | | |
| | 060 | | | |
| | 061 | | | |
| | 062 | | Nitrol (Rubber Stiffener) | |

TITLE - Material List

| E. No's | | Spec No's | Clays - Rubber |
|---|---|---|---|
| 42 | 066 | 5726 | Hard Clay (Champion)(Dixie) 58350 LBS |
| | 067 | 5727 | Soft Clay (Catalpo) 63550 LBS |
| | 068 | 5728 | Calcined Clay (Whitetex #2) 40100 LBS |
| | 069 | | |
| | 070 | | |
| | 071 | | |
| | 072 | | |
| | 073 | | |
| | 074 | | |
| | 075 | | |
| | | | **Colours - Rubber Dispersed (42076-42090)** |
| 42 | 076 | | |
| | 077 | 5743 | Fast Blue (P.C.D.) R501 — |
| | 078 | | 100 LBS |
| | 079 | 5743 | Fast Green (G.S.D.) ~~X1200~~ |
| | 080 | 5743 | Orange (.D.) ~~V130~~ 136 65 LBS |
| | 081 | 5743 | Red (2 B.D.) ~~V245~~ 240 100 LBS |
| | 082 | 5930 | Cyan Green Y15-3040 50 LBS |
| | 083 | 5743 | Yellow ~~V5245~~ 825 50 LBS |
| | 084 | | DuPont BT 284 Blue Pigment 175 LBS |
| | 085 | | DuPont RT-~~653~~ Walchung Red Pigment 101 LBS |
| | 086 | | Chemitron YT 8047 Yellow 100 LBS |
| | 087 | 5830 | DuPont GT 805 Monastral Green — |
| | 088 | | Williams G6099 Green Chrome Oxide 190 LBS |
| | 089 | | Mapico Lemon Yellow 300 LBS |
| | 090 | | Mapico Black 350 LBS |
| | | | **Deodorants - Rubber (42091 - 42095)** |
| 42 | 091** | 5744 | [redacted] |
| | 092 | | |
| | 093 | | |
| | 094 | | |
| | 095 | | |
| | | | **Dyes - AWE Wire (42096-42100)** |
| 42 | 096** | 5744 | Golden Brown (B68835) |
| | 097 | | |
| | 098 | | |
| | 099 | | |
| | 100 | | |
| | | | **Fillers - Rubber (42101-42129)** |
| 42 | 101 | 5729 | Calcium Carbonate (Atomite)(Camel White) 307700 LBS |
| | 102 | 5730 | Calcium Carbonate (Snowflake)(Camel Carb) 52100 LBS. |
| | 103 | | |
| | 104 | 5731 — | Calcium Carbonate (Purecal S.C.)(Calcene T.M.)(Calofort-S) 7690 LBS |
| | 105 | | |
| | 106** | | Calcium Carbonate (Dicalite P.S.) |
| | 107 | | |
| | 108 | | |
| | 109 | 5632 | Nytal 300 17700 LBS. |
| | 110 | 5633 | Mistron Vapour Talc 7020 LBS. |
| | 111 | 5634 | Translink #37 Clay 6600 LBS |

TITLE - MATERIAL LIST

| G.E. No's | | Spec No's | Fillers - Rubber (Continued) |
|---|---|---|---|
| 42 | 112 | | |
| | 113 | | |
| | 114 | | |
| | 115 | 5783 | Silca (HI SIL #233) 2950 LBS |
| | 116 | | |
| | 117 | | |
| | 118 | | |
| | 119 | | |
| | 120** | | Hydrated Alumina (C-741) |
| | 121 | | |
| | 122 | | |
| | 123 | | |
| | 124 | | |
| | 125 | | |
| | 126 | | |
| | 127 | | |
| | 128 | | |
| | 129 | | |
| | | | Lubricants - Rubber (42130 - 42140) (#10) |
| | 130 | | |
| | 131 | | |
| | 132** | 5732 | Plasticizer 3 GH (Flexol) Use 81160 |
| | 133 | | Kenflex "A" |
| | 134 | 5733 | Dicup T (Vulkene) 1710 LBS |
| | 135 | | |
| | 136 | | |
| | 137 | | |
| | 138 | | |
| | 139 | | |
| | 140 | | |
| | | | Oils - Rubber Processing (42141 - 42150) |
| | 141 | 5734 | (Circo)(Imperial - #711) 1350 GALS |
| | 142 | 5735 | ~~Sundex #53~~ SUNDEX 790 135 GALS |
| | 143 | | Sunpar 2280 Oil 105 GALS |
| | 144 | | |
| | 145 | | |
| | 146 | | |
| | 147 | | |
| | 148 | | |
| | 140 | | |
| | 150 | | |
| | | | Oxides - Rubber (42151 - 42165) |
| | 151 | D04C704 | Light Red Ferrate of Iron (403) — |
| | 152 | D04C705 | Crimson Red Ferrate of Iron (409) — |
| | 153 | 5736 | Light Magnesium (21) 5400 LBS |
| | 154 | D04C9A2 | Titanium (Tioxide)(Titanox A-10) 100 LBS |
| B | 155 | | DuPont R960 Rutile Titanium Oxide 1300 LBS |
| | 156 | | |
| | 157 | | |
| | 158 | | |

WIRE AND CABLE ENGINEERING
# DATA BOOK



## TITLE - MATERIAL LIST

| G.E. No's | | Spec No's | Plasticizers - Rubber (42166 - 42175) |
|---|---|---|---|
| 42 | 166 | DQ5E7 | Tri-Cresyl Phosphate "X" |
| | 167** | 5738 | Bondogen — |
| | 168 | | |
| | 169 | | |
| | 170 | | |
| | 171 | | |
| | 172 | | |
| | 173 | | |
| | 174 | | |
| | 175 | | Resins - Rubber (42176 - 42189) |
| 42 | 176** | | ~~Marbon 9200 M.E.~~ |
| | 177 | 5740 | ~~Nevchem 100 Picco 6100 - 1½~~ |
| | 178* | | (D-75) |
| | 179 | | |
| | 180 | | |
| | 181 | | |
| | 182 | | |
| | 183 | | |
| | 184 | | |
| | 185 | | |
| | 186 | | |
| | 187 | | |
| | 188 | | |
| | 189 | | Softeners - Rubber (42180 - 42195) |
| 42 | 190 | 5739 | RPA #3 400 LBS. |
| | 191 | | |
| | 192 | | |
| | 193 | | |
| | 194 | | |
| | 195 | | Sulphur (42196 - 42199) |
| 42 | 196 | 3050 | Rubber makers 1350 LBS |
| | 197 | 5741 | Sulphur Prespersion 80% (Ware) 215 LBS |
| | 198 | | |
| | 199 | | Waxes - Rubber (42200 - 42210) |
| 42 | 200 | 5742 | Witco #100 Sunolite (Sunproof Canadian) 8290 LBS. |
| | 201 | | |
| | 202 | | |
| | 203 | | |
| | 204 | | |
| | 205 | | |
| | 206 | | |
| | 207 | | |
| | 208 | | |
| | 209 | | |
| | 210 | | |

| PREPARED BY - | APPROVED BY - | DATE - | REVISIONS |
|---|---|---|---|
| F Parsons:3a | | Jan 4/71 | 1 4 / 2 5 |

TITLE - MATERIAL LIST

| No's | | Spec No's | Retarders - Rubber (42211 - 42215) |
|---|---|---|---|
| 42 | 211 | 5784 | (Retarders W) |
| | 212 | | |
| | 213 | | |
| | 214 | | |
| | 215 | | |
| | | | <u>Specials</u> |
| | 216** | | Acryloid |
| | 217 | | |
| | 218 | 5714 | ACC Bismate Rodform (Accelerator) |
| | 219** | 5715 | ~~[illegible] of (#[illegible] Tellurium) (Accelerator)~~ |
| | 220 | 5631 | Uniflex 500 |

| PREPARED BY - | APPROVED BY - | DATE - |
|---|---|---|
| Parsons:sa | | Feb 25/[illegible] |

| REVISIONS | | | |
|---|---|---|---|
| 1 | [illegible] | 4 | |
| 2 | [illegible] | 5 | |
| 3 | | 6 | |

# TITLE - MATERIAL LIST

| G.E.No's | | Spec.No's | Lead- Red (67001 to 67010). |
|---|---|---|---|
| 67 | 001 | DQ4C13C | Red Lead |
| | 002** | | Ware Chem. 90% in Circo Oil |
| | 003 | 5815 | PRD 90% Red Lead in Polyisobutylene. |
| | 004 | | |
| | 005 | | |
| | 006 | | |
| | 007 | | |
| | 008 | | |
| | 009 | | |
| | 010 | | |

PREPARED BY - [illegible] Parsons/ch

APPROVED BY -

DATE - Jan.19/70

| REVISIONS | | | |
|---|---|---|---|
| 1 | | 4 | |
| 2 | | 5 | |

TITLE - Material List



| G.E.No's | | Spec.No's | Lead- Oxide (68001 to 68010) |
|---|---|---|---|
| 68 | 001 | DQ4C29B | (Litharge) 3950 LBS. |
| | 002** | DQ4C29D | (Fumed Litharge) |
| | 003* | | Litharge 83 1/3% Kenmix |
| | 004 | 5923 | TLD 90 900 LBS |
| | 005 | | |
| | 006 | | |
| | 007 | | |
| | 008 | | |
| | 009 | | |
| | 010** | | Litharge PLD90 (Special) |

PREPARED BY - [illegible]/eb
APPROVED BY -
DATE - Feb 7/68
REVISIONS 1 4

TITLE - Material List

| | G.E. No's | | Spec No's | Polyethylene - Colours (80001 - 80020) | |
|---|---|---|---|---|---|
| | | | | Colour | |
| | 80 | 001** | | Black | (S3830) |
| | | 002** | | Blue | (S3828) |
| | | 003** | | Green | (S3826) |
| | | 004** | | Grey | (S3836) |
| | | 005** | | Orange | (S3773) |
| | | 006** | | Red | (S3768) |
| | | 007** | | White | (S3776) |
| | | 008** | | Yellow | (S3780) |
| | | 009 | | | |
| | | 010 | | | |
| | | 011 | | | |
| | | 012 | | | |
| | | 013 | | | |
| | | 014 | | | |
| | | 015 | | | |
| | | 016 | | | |
| | | 017 | | | |
| | | 018 | | | |
| | | 019 | | | |
| | | 020 | | | |
| | | | | Polyethylene Compounds (80021 to 80075) | |
| | | | | Colours | |
| | 80 | 021* | | Black (DFBY - 6401 9845) | |
| | | 022 | | | |
| | | 023* | | Natural (DFD-2005)(Alathon 58-MC10) | |
| | | 024* | | Black (DFDY-0506-9845) | |
| | | 025 | 5737-S1 | Natural (DYNH-5) 18650 LBS | |
| | | 026 | | Black HFDB 4575 Vulcanizable Poly | |
| B | | 027 | ——— | Neutral Vulkene Compounds #3051 | |
| | | 028 | ——— | [illegible] | |
| | | 029 | | | |
| | | 030* | 5746 | Poly A.C. Release Agent | |
| A | | 031 | | Conductive Polyethylene (DHDA 7704) Black 55 | |
| | | 032 | | Natural HFDY 4201 Vulcanizable Poly. | |
| | | 033 | | Conductive Polyethylene HFDA 0580 | |
| | | 034 | | | |
| | | 035 | | | |
| | | 036 | | | |
| | | 037 | | | |
| | | 038 | | | |
| | | 039 | | | |
| | | 040 | | Urethane-Natural-Estane 58110-Ultra Violet Light Stable — | |
| | | 041 | | Yellow Colour-16 YE13- Concentrate (Urethane Masterbatch) | |
| B | | 042 | | Mobay Texin 985A | |
| | | 043 | | | |
| | | 044 | | | |

| PREPARED BY: | APPROVED BY: | DATE: | REVISIONS | |
|---|---|---|---|---|
| McAlpine:ss | | Nov 13/74 | 1 Dec 16/74 | 1 |
| | | | 2 Jan 8/74 | |

# TITLE - Material List

| G.E. No's | | | Spec No's | Polyvinyl Chloride - Colours (81001-81020) |
|---|---|---|---|---|
| | | | | Colors |
| A | 81 | 001 | 5777 | Black Wilson A488 |
| | | 002* | 5777 | Dark Blue (1CC7) |
| | | 003 | 5777 | Light Blue (M41) |
| | | 004 | 5777 | Brown (1CC59) |
| | | 005** | 5777 | Dark Green (1CC55) |
| | | 006* | 5777 | Pink (1CC30) |
| | | 007 | 5777 | Green (1-CC-5) for Light and Dark |
| | | 008** | 5777 | Grey (1-CC-13) |
| | | 009 | 5777 | Orange (1CC61) |
| | | 010 | 5777 | Red (1CC54) |
| | | 011** | 5777 | Tan (1CC51) |
| | | 012 | 5777 | Yellow (1CC62) |
| | | 013** | | VR24 Powder Marvinol (Special) |
| | | 014* | 5777 | Purple (1CC33) |
| A | | 015 | 5778 | Harmon Red R6278 |
| | | 016 | 5778 | Ferro Orange (13-8208-3) |
| | | 017* | 5778 | Ferro Lustran Cream (216631) |
| | | 018** | 5778 | Ferro Off-White (215633) |
| | | 019* | 5778 | Oxford Yellow 84-210 |
| | | 020 | 5778 | ~~Phthalo Blue V.C. B-4705~~ IMPERIAL BLUE 5785 924 LBS |

Polyvinyl Chloride - Compounds (81021-81200)

| G.E. No's | | Spec No's | Type | Colour | S.G. | |
|---|---|---|---|---|---|---|
| 81 | 021 | 5779 | Primary | Black-C02 | 1.40(X-1004) | W571 |
| | 022 | 5779 | " | Natural | 1.40 | W572 |
| | 023* | 5779 | " | Blue -C171 | Use Colour Chips & 81022 | |
| | 024* | 5779 | " | Brown -C81 | " " " & 81022 | |
| | 025* | 5779 | " | Green-C176 | " " " & 81022 | |
| | 026* | 5779 | " | Grey - C107 | " " " " | |
| | 027* | " | " | Orange C06 | " " " " | |
| | 028* | " | " | Red C06 | " " " " | |
| | 029* | " | " | Yellow-C58 | " " " " | |
| | 030** | | " | Black | 1.315 (X1010) | |
| | 031** | | " | Natural | 1.315 (X1010) | |
| | 032** | | " | Blue | Use Colour Chips | |
| | 033** | | " | Brown | " " " | |
| | 034** | | " | Green | " " " | |
| | 035** | | " | Grey | " " " | |
| | 036** | | " | Orange | " " " | |
| | 037** | | " | Red | " " " | |
| | 038** | | " | Yellow | " " " | |
| | 039 | Make | " | Black | 1.38(X1037)(W5073)(C1048) | |
| | 040 | " | " | Natural | 1.38(X1037)W5074)(C1068) | |
| | 041* | " | " | Blue | Use colour chips & 81040 | |
| | 042* | " | " | Brown | " " " " | |
| | 043* | " | " | Green | " " " " | |
| | 044* | " | " | Grey | " " " " | |
| | 045* | " | " | Orange | " " " " | |
| | 046* | " | " | Red | C1047-X1037(W5129)(81040) | |
| | 047* | " | " | Yellow | Use Colour Chips and 81040 | |

| PREPARED BY - | APPROVED BY - | DATE - | REVISIONS |
|---|---|---|---|
| WRM:ss | | Oct 3/74 | [illegible] |

# TITLE - Material List

| | G.E. No's | | Spec No's | Polyvinyl Chloride - Ingredients |
|---|---|---|---|---|
| | 81 | 150 | M5810 | Resin for Mixing PVC Compound 993516 LBS |
| | | 151 | | |
| | | 152 | | |
| | | 153 | | |
| B | | 154 | | Plasticizer Paraflex G25 — |
| | | 155 | 5788 | Plasticizer DTDP (G306) — |
| | | 156 | 5789 | Plasticizer D.I.D.P. - E (TW) G 301 156916 LBS |
| | | 157** | | Plasticizer Santicizer 409 (105°) |
| | | 158 | 5790 | Pla~~sticizer Pareplex G62~~ (105°) |
| | | 159 | 5791 | Plasticizer Cereclor 42 (T. TW) 60643 LBS. |
| | | 160 | 5808 | Plasticizer D.I.D.A. G 309 358654 LBS. |
| | | 161 | 5792 | Plasticizer Dictylazelate Doz. 20725 LBS 12376 LBS |
| | | 162 | 5798 | Antimony Oxide (Flameproof Ing.)(Thermoguard L) 17.7 LBS. |
| | | 163 | | Basic Lead Silicate 50 LBS |
| | | 164 | | |
| | | 165 | 5825 | Tribase XL (Stabilizer) 10694 LBS |
| | | 166 | 5793 | Dythal (Stabilizer) 5482 LBS. |
| | | 167 | 5794 | DS-207 (Stabilizer) 3291 LBS. |
| | | 168 | 5795 | Tribase E " (105°) 37317 LBS |
| | | 169** | | Vanstay IR |
| | | 170 | 5796 | Topanol CA |
| | | 171 | 5778 | Ferro Red 13-8428-3 (Special for Barrie) |
| B | | 172 | | Black Colour Concentrate A-3918 |
| B | | 173 | | White Colour Concentrate A-3919 |
| | | 174 | | |
| | | 175 | 5797 | Pigment #33 Special Clay 52335 LBS |
| B | | 176 | 5821 | TOTM Plasticizer G338 44905 LBS |
| | | 177 | | |
| | | 178 | 5822 | 610 TRIMILLITATE G330. — |
| | | 179 | 5826 | TP 90 B PLASTICIZER — |

| PREPARED BY - | APPROVED BY - | DATE - | REVISIONS | | | |
|---|---|---|---|---|---|---|
| WHM:33 | | June11/74 | 1 | Jan19/70 | 4 | Oct. 11/72 |
| | | | 2 | Feb21/68 | 5 | |

WIRE AND CABLE ENGINEERING
# DATA BOOK



TITLE - Material List

SECTION No. 85

| lo's | | Spec.No's | Rubber- Natural (85001-85010) | |
|---|---|---|---|---|
| 35 | 001 | 2273 | IX RSS Yellow Circle, Technically Classified | 27052 LBS |
| | 002 | | | |
| | 003 | | | |
| | 004 | | | |
| | 005 | | | |
| | 006 | | | |
| | 007 | | | |
| | 008 | | | |
| | 009 | | | |
| | 010 | | | |

| RED BY - | APPROVED BY - | DATE - | REVISIONS | |
|---|---|---|---|---|
| rsons/ch | | Feb. 21/68 | 1 | 4 |

# TITLE - MATERIAL LIST

| G.E. No's | | Spec No's | Rubber - Synthetic (87001 - 87030) Type | |
|---|---|---|---|---|
| 87 | 001 | 5747 | Syn. Rubber (Neoprene Type GNA) | 10820 LBS |
| | 002 | 5748 | Syn. Rubber (Neoprene Type WM1) | 59400 LBS |
| | 003* | 5749 | Syn. Rubber (Neoprene Type WS) | — |
| | 004** | | Syn. Rubber (Naugapol 1016) | — |
| | 005** | | Syn. Rubber (Naugapol 1018) | — |
| | 006 | 5752 | Syn. Rubber (Butyl)(100) | 2066 LBS |
| | 007 | | | |
| | 008 | 5753 | Syn. Rubber Krylene 1512 | 18194 LBS |
| | 009 | 5754 | Syn. Rubber Polysar S1018 | 8566 LBS |
| | 010** | | Syn. Rubber Krylene 1515 | |
| | 011 | 5755 | Hypalon #40 DuPont | 47690 LBS |
| | 012 | 5518 | Krymix ~~2314~~ 7266 (Carbon Black Masterbatch) | 34792 LBS |
| | 013 | | | |
| | 014 | | | |
| | 015 | | | |
| | 016 | | | |
| | 017 | | | |
| | 018 | | | |
| | 019 | | | |
| | 020 | | | |
| | 021 | | | |
| | 022 | | | |
| | 023 | | | |
| B | 024 | 5829 | Nordel 1040 | 12675 LBS |
| | 025 | 5756 | Vistanex MML100 (Enjay) | 125 LBS |
| | 026** | 5750 | Neoprene W.H.V. | |
| | 027 | 5751 | Neoprene Type WD | 35455 LBS |
| | 028 | 5757 | SBR 1504 Arctic Type GRS | |
| | 029** | | Neoprene S | |
| | 030** | | WRT Neoprene | |
| | 031 | 5819 | EPR 404 (Enjay) Vistalon EPR | — |
| | 032 | 5817 | Ricon 150 polybutadiene | 800 LBS |
| B | 033 | 5827 | SR 350 | 80 LBS |

# TITLE - Material List

| C.No's | | Spec.No's | Zinc- Pure (93001-93010) |
|---|---|---|---|
| 93 | 001** | BQ10C1C | Zinc Pure |
| | 002 | | |
| | 003 | | |
| | 004 | | |
| | 005 | | |
| | 006 | | |
| | 007 | | |
| | 008 | | |
| | 009 | | |
| | 010 | | |
| | | | <u>Zinc- Stearate (93011-93015)</u> |
| | 011 | 5759 | Witco ~~Spec. #11S~~ Grade H. H L Blackford [illegible] ([illegible]) |
| | 012 | | |
| | 013 | | |
| | 014 | | |
| | 015 | | |

PREPARED BY - F. Parsons/cb

APPROVED BY -

DATE - Apr. 9/5[illegible]

REVISIONS

| | | | |
|---|---|---|---|
| 1 | | 4 | |
| 2 | | 5 | |
| 3 | | 6 | |

# TITLE - MATERIAL LIST

| G.E.No's | | Spec.No's | Zinc - Oxide (97001-97010) | |
|---|---|---|---|---|
| 97 | 001 | DQ4C8A2 | (Std. Rubber Grade) (R.Q.A.) ~~(Blue Seal)~~ Canfelge Zinc grade 105. | 19250 LBS |
| | 002 | | | |
| | 003 | | | |
| | 004 | | | |
| | 005 | | | |
| | 006 | | | |
| | 007 | | | |
| | 008 | | | |
| | 009 | | | |
| | 010 | | | |

| PREPARED BY - | APPROVED BY - | DATE - | REVISIONS |
|---|---|---|---|
| F.Parsons.cb | | Mar. 26/68 | |

#12

DEPARTMENT OF HEALTH
- __vision of Industrial Hygiene -

Plant Visit Report

Date: November 10th,1947

nd dum to:
Dr. J. G. Cunningham,
Director.

From:

F. M. R. Bulmer, M.B.,

ant: Canadian General Electric,
dress: Peterboro, Ontario.

. Employees: M- F-

zard: Mercury

Requested by:

Accompanied by:

Date of visit: October 31st, 1947.

Contacts: Mr. Lister and others

mpany to be notified by:

ave in abeyance: Take no action:

opies to:

Some progress has been made respecting the use of mercury contact cells for testing wires. The testing machines are located in special porcelain pans provided with a catch basin. Linoleum has been placed on the floor. Exhaust booth equipment will be installed as soon as it arrives. I indicated smocks buttoning up the back should be provided and maintained by the company. This will be done. We will test the air in this area sometime in January.

Information on the toxicity of Pyranol (Monsanto Chemical) was requested. It is said to be diphenyl penta chloride. So far we have not found any information on this chemical. Further enquiry is being made.

F M R Bulmer

F. M. R. Bulmer, M.B.,

FMRB:JG

Nl

DEPARTMENT OF HEALTH
- Division of Industrial Hygiene -

**Plant Visit Report**

Date: May 6th, 1947.

o  ium to:
r. J. G. Cunningham,
irector.

From:

Dr. F. M. R. Bulmer

| | |
|---|---|
| nt: Canadian General Electric | Requested by: Mr. Lister, C.G.E. |
| ress: Peterboro, Ontario. | Accompanied by: |
| , Employees: M- F- | Date of visit: May 1st, 1947. |
| zard: Mercury | Contacts: Mr. D. Fowler |

npany to be notified by: F. M. R. Bulmer, M.B.,

ave in abeyance: Take no action: ✓

pies to: Mr. Gilbert (2)

For the past ten months wires have been tested for electrical conductivity by five special machines. These machines are provided with small cups of mercury and to obtain contact the ends of the cords are placed in the mercury. All machines have two cups except one which has three. The cups are open at the top and are approximately 1 1/8" in diameter and 1" deep. Each cup contains about ½ lb of metallic mercury. Mercury is used because it is difficult to establish contact with the cut end of an insulated wire by other means. The wire when removed from the cup carries with it some mercury. This is removed by manual wiping and shaking. A considerable amount of mercury is spilt on the tables and the floors. Recently galvanized iron receptacles have been placed under the cups. These are not too satisfactory because of zinc coating. Evidence of spillage on floor is present. After ten months operation 7¾ lbs of mercury were recovered from the floor. About ten lbs of mercury are used each month. The condition was brought to the attention of the safety department because of the rather large amount of the metal being used each month. As far as I could determine the wires were not subsequently handled in the plant. They appeared to be well cleaned before going into packing cases.

Six girls do this work in the day time and two men at night. There are about 4 - 5 girls near this area. As far as I could determine no complaints of ill health have been made.

The operation is carried out in the corner of a very large room which is the main floor of a building. The area involved is about 40' x 40'.

The company are going to have the ten workers in this area examined. I told the nurse and Mr. Fowler that I would send information respecting the examinations also recommendations regarding environmental changes. Copies are attached.

FMRB

F. M. R. Bulmer, M.B.,

FMRB:JG

u of thi

Parliament Buildings,
Toronto 2, Ontario.
May 5th, 1947.

Mr. T. A. Lister,
Safety Engineer,
Canadian General Electric Company Limited,
Peterboro, Ontario.

Dear Mr. Lister: Re: Mercury

I visited Peterboro last Thursday and Mr. Fowler showed me the location where mercury is used.

It may be possible that some of your technical men might be in a position to devise a way to test wires which does not require mercury contacts. It would appear to me, however, that with present equipment a suitable substitute is not likely to be found. This angle, while not hopeful, should be explored.

Whether or not the use of mercury is continued the corner of the room where the testing machines are located requires cleaning up. At present, I would estimate that an area of about forty feet square is contaminated. With this section cleared it may be found that the mercury on the floor has travelled further.

To clean this area it would be necessary to remove all the dirt from the cracks in the floor and those about the base boards. This could be done by scraping out the cracks in the floor. In the case of base board cracks the base boards would most likely have to be removed. The use of an industrial type of vacuum cleaner would be helpful. After the cracks are cleaned the floor should be scrubbed and well rinsed and the cracks filled with a suitable material to provide a floor free from cracks. All equipment, benches, chairs etc. should be thoroughly cleaned and washed and where places of lodgement for mercury are provided these areas should be filled with a plastic material. After this cleaning the floor and other wooden equipment should be painted with a varnish or paint that will provide a smooth hard impervious surface. At this stage, if the testing equipment could be removed for a day, we could take air samples to determine if mercury vapour is present. If temporary removal of testing machines is not possible little information would be obtained from air sampling.

After the area is cleaned the following recommendations are in order:

(1) All tables, chairs etc. should be covered with impervious material. They should have no cracks or crevices for the lodgement of mercury.

(2) The floor should be covered with a linoleum or another more impervious material. If linoleum is used it should be cleaned and waxed frequently or varnished. The linoleum should be turned up around the base boards to prevent any spilt mercury from lodging in base boards cracks. The two inside dimensions of the area should be separated from the rest of the plant by a railing of convenient height to form a barrier. The floor underneath the railing should be raised so that the linoleum can be turned up at least 2 inches. The idea here is to segregate the area and to have a floor of such a nature that spilt mercury cannot contaminate the floor beyond this area. The floor in the enclosure should be if possible tilted at a slight angle so that mercury spilt would tend to collect in a common spot. This spot might be in the form of a trough in which a little water could be kept to cover any mercury present.

(3) The testing machines using mercury should be placed in ventilated booths similar to those used for spray painting. These booths should be equipped with fans of a capacity to provide a 200 F.P.M. velocity at the face of the booth. The bottom of the booths should be provided with a pan with turned up edges to prevent spilt mercury from getting on the floor. The pans should be made of a material which is impervious to mercury. Galvanized iron is not satisfactory as an amalgam may be formed. A vitreous enamel pan is probably the best type. Wire ends which have been in contact with mercury should be cleaned in the booth. You could probably work out a satisfactory procedure for doing this job without hand contact with the contaminated end of the wire. After cleaning the wire should be placed directly into the carton.

(4) Receptacles containing mercury should be covered. This applies to the cups on the testing machines when such equipment is not being used. The temperature of the workroom should be kept as low as possible commensurate with comfortable working conditio[n]

(5) Only employees required to work in this area should be permttted to enter. The workers in the area should be provided with smocks that come well below the knees and fit closely at the cuffs. Smocks that button or fasten at the back are preferable. The smocks should be kept in a clean condition. The use of such apparel prevents contamination of personal clothing in case of spillage. Hats are advisable as the hands might become contaminated and thus the hair. It would appear to me that the work can be done without the hands coming in contact with mercury. If this is not the case gloves are indicated. Gloves are difficult to wear.

(6) Eating and drinking in the area where mercury is used should not be permitted. The workers should be instructed to wash well before leaving work at the end of the work period and before lunch. Washing facilities should be available close to or in the area and soap and paper towels should be provided.

(7) Workers regularly in contact with mercury should be periodically examined to determine possible ill-effects. The frequency of such examinations, however, will best be determined after the initial check is done. The workers should have ready access to the plants medical department and special attention should be paid to minor complaints as these may be the first signs of mercurialism (see notes on mercury).

The above suggestions give in a general way the steps necessary to correct conditions and to use mercury in a safe manner. It is necessary to keep a close check on the amount of mercury used. A high loss indicates that further checking is necessary. Regular inspection by the safety department is advisable as it helps to control the personal element.

I am enclosing notes on mercury which should be of help to the examining physician. Such information was requested by the plant nurse. I am sending bottles for the samples of urine to be tested for mercury. At least 200 cc of urine is required for a determination. For collection see notes on mercury.

You might have other ideas how the situation could be handled. During the period of decontamination and the installation of necessary changes for the safe handling of mercury in the present area production would be disturbed. It might be easier and quicker to set up a new area, along the lines suggested for this work. If a new location is selected I would be glad to give an opinion on its suitability for this type of work. //

Yours very truly,

F. M. R. Bulmer, M.B.,
Research Physician,
Division of Industrial Hygiene.

FMRB:JG

#11

O.H.P.B. File No.: 0L-40

Ontario

Health

OCCUPATIONAL HEALTH ~~PROTECTION~~ BRANCH

FIELD VISIT REPORT

Date: June 29, 1977

From: J. Toth, P.Eng.

Plant: Canadian General Electric Limited

Address: 107 Park Street North
Peterborough, Ontario

Contacts: Mr. K. Faggetter - Safety Specialist
Mr. R. Fowler - Safety Analyst
Mr. J. Ball - Member of Comp./Union Safety Commission
Mr. B. Harris - Member of Comp./Union Safety Commission

Hazard: Dust, solvent vapours, gases

Requested by: Company

Accompanied by: Mr. F. Watts, O.S.B.

Date of Visit: June 2, 1977

Copies to: Dr. V. Tidey
Mr. K. Cleverdon (3)
Dr. J. Vingilis
Mr. K. Faggetter

Abstract: A visit was requested by the company to assist in the investigation of exposure to dust, solvent vapours and gases in various areas. The exposure if any is the consequence of poor maintenance and employees negligence. Recommendations are made and directions are suggested.

*   *   *

The company was previously visited by the members of the Occupational Health Branch and is described in their reports. During this visit the following areas were investigated.

In the Industrial Apparatus department in the building #5a, one Blister Pack machine is used to produce different moulds from plastic sheets. Odours and fumes are generated during this process. The clearance of fumes is adequate but the odour can be smelt all over the shop. No local exhaust is installed at the machine and no general mechanical exhaust can be seen in the shop.

In the Banbury mixer area the scale is enclosed in a 2' X 4' X 1' deep booth. Air velocity into the booth was 150-200 fpm. A second scale is used under a 4' X 3' canopy hood. Air velocity was 400 fpm at the booth face. The Banbury is locally exhausted and through the loading chute (2' X 2') the air velocity was in the range of 200-300 fpm. The empty bags are thrown through a window to the neighbouring room, and the air moving with velocity of 400 fpm, brings back the dust.

In the Formex department copper wires are insulated with resins. The resins are diluted with phenol and cresol isomers which are evaporated in a gas fired furnace. The area is about 150' X 150' X 45' high and is exhausted by 4 roof fans of about 3' diameter each. Two furnaces are not locally exhausted. Carbon monoxide concentration was about 10 ppm in this area.

In the 240 PVC mixer area Tribase E lead and antimony oxide ($Sb_2O_3$) are also used. The scales are enclosed in booths (3' X 4' X 2½' and 3' X 3' X 1' deep) and are exhausted at face velocity of about 200 fpm. The drum containing the Tribase E lead is exhausted by a 5" diameter flexible duct at duct velocity of 3200 fpm. The skip to the mixer is exhausted by a 3' X 2" slot placed behind the skip. The ingredients are lifted by the skip to the chute on the top of the mixer. The chute is enclosed in a 2' X 2½' X 2' deep booth and is exhausted at face velocity of 150-200 fpm.

In the Shaft Preheat Oven (12' X 3½' X 3½' deep ) shafts are heated to 250-300° C and welded by welders staying close to the oven. The oven at the welders' side is covered with asbestos blanket to protect the welders from heat radiation. The welders are working about 4 hours/shift on the job. Airborne fibre counting, carried out by the plant, shows 0.6 fibres/cc of air.

Comments

1. The weighing, dumping and mixing at the Banbury mixer appears to be properly enclosed and adequately exhausted. However, the workers are ignoring the safety precautions in the handling of toxic ingredients. They should be informed of the hazard of the materials they are dealing with. I was informed, that, some workers consume their lunch sitting on the stairs at the Banbury.

2. In the Formex department the airborne phenol-cresol concentration appears to be significant, but I could not measure. One of the furnances was operating during this visit and through a leak at the furnance top phenol-cresol vapours were released. The plant will be shut down for maintenance in July and defects will be repaired at that time.

3. Lead cards are posted in the Banbury and PVC mixer area.

4. Exposure to significant amounts of asbestos fibres from an asbestos blanket is not likely, provided that precautions are taken and an effort is made to keep the work area clean.

## Recommendations

1. Around the Blister Pack machine no carbon monoxide or vinyl chloride could be detected. The generated odour may cause discomfort and the installation of some kind of exhaust fan (local or general) is suggested.

2. The employer should instruct the workers in the Banbury area about the dangers of exposure to lead, antimony etc. and the preventative measures to be taken. The empty bags should be disposed of in a safe manner.

3. The plant should have available sufficient maintenance people to repair the defects occuring during the operation of the equipment. Priority should be given to repairs, where toxic substances or agents can be released (eg Formex furnace, 240 PVC mixer booth etc.).

4. Employees should be encouraged to practise good personal hygiene. This should include washing before eating, drinking, smoking or using washroom facilities. Showering at the end of the shift should be a normal habit.

## Directions to be Issued

1. Housekeeping in the Banbury and PVC mixer areas shall be maintained at a high level. No dry sweeping shall be permitted.

2. Definitely no eating, drinking, smoking or chewing shall be permitted and no drink, food or tobacco shall be brought into the Banbury and PVC mixer areas.

3. The empty bags and drums shall be disposed of in a safe manner.

J. Toth

J. Toth

JT:sr

#10

ONTARIO DEPARTMENT OF HEAL
INDUSTRIAL HYGIENE LABORATORIES
360 CHRISTIE STREET, TORONTO 4, ONT.

O: R.G. ELSON

E: SAMPLES FROM CANADIAN GENERAL ELECTRIC, PETERBOROUGH, SUBMITTED BY D.E. MOORE.

REPORT NO: 12,556
DATE: JUNE 9TH, 1966.
COPIES TO: MR. D.E. MOORE
DR. SUTHERLAND

FROM: H. WALL

FREE SILICA

THE FOLLOWING RESULTS WERE OBTAINED BY THE PHOSPHORIC ACID METHOD:

| | |
|---|---|
| EXELON GRIT BLAST: | 6.7% |
| WEC MICA DUST: | 6.0% |
| MICA DUST COMMUTATOR: | 3.3% |
| MICA FLAKE, MICA ROOM: | 3.3% |

THESE RESULTS MAY BE HIGH SINCE DIGESTION IN THE PHOSPHORIC ACID WAS NOT COMPLETE.

HI - SIL 233

THIS CONTAINED 85.5% FREE SILICA, THE REMAINDER BEING MOSTLY MOISTURE. UNDER THE MICROSCOPE THE MATERIAL APPEARED AS PLATES RANGING FROM A FEW MICRONS UP TO 150 MICRONS IN DIAMETER.

CAB - O - SIL (CABOT, BOSTON)

THIS CONTAINED 97.8% FREE SILICA, THE REMAINDER BEING MOSTLY MOISTURE. UNDER THE MICROSCOPE THE MATERIAL APPEARED AS PLATES RANGING FROM A FEW MICRONS UP TO 100 MICRONS IN DIAMETER.

ASBESTOS FIBRE (RAYBESTOS, U.S.A.)

THIS WAS IDENTIFIED AS SERPENTINE ASBESTOS.

WEC TALC

THIS CONTAINED 33.3% SILICATES, MAINLY TREMOLITE WITH MINOR AMOUNTS OF STEATITE. THE REMAINDER WAS MOSTLY CARBONATES. THE FREE SILICA CONTENT OF THE SAMPLE WAS 2.5%.



ANALYSIS BY ............................
M. POLNY

HW/AR

#9

ONTARIO DEPARTMENT OF HEALTH
ENVIRONMENTAL HEALTH BRANCH
Telephone: 365-4066

FIELD VISIT REPORT
PART I

1F-19

Memorandum to:
Dr. V. L. Tidey
Chief, Occupational Health Service

Date: January 18, 1971.

From: G.S.Rajhans, P.Eng.

Plant: Canadian General Electric,

Address: Peterborough, Ontario.

Contacts: Mr. D. Able,
Safety Engineer.

OCCUPATIONAL
HEALTH SERVICE
JAN 22 1971

SILICA
ASBESTOS BLDG #22

Requested by: Mr. R.W. Dickey, ISB.
Mr. J. Knight, EHB.

Accompanied by: Mr. R. Dickey, ISB.

Date of Visit: January 5 & 6, 1971.

Copies to: Mr. J. McNair (3)
Dr. J. Cowle (2)
Mr. H. Wall

Abstract: This visit was made at the request of the Department of Labour and the Occupational Chest X-Ray Section to assess the environmental conditions of all dusty areas in the above mentioned plant. In total, there are 8 places where powders containing varying percentages of silica are used. Asbestos fibres are used at only one place. This report describes the areas and comments on the dusty conditions. The Occupational Health Laboratory is requested to do air sampling.

---

The above mentioned company uses varieties of powders containing 5% to 66% free silica. Most of these powders are used for coating the cables so that they do not stick when being rolled on drums. Detailed descriptions of the powders, and areas where the powders are used, are given below.

(1) Celite: This material is essentially amorphous silica but after calcination, there is a partial conversion to approximately 5% crystalline silica and when flux calcined, the conversion is approximately 35%. However, the crystalline silica is in the form of cristobalite, not quartz. The form of celite being used by the company is supplied by the Johns-Manville and is supposed to be a mixture of flux calcined diatomaceous earth and calcium silicate. The material is used as an oil filtering agent in one of the operations of the machine shop. The material is received in 50 lb. bags. A man tears open the bag and

2c file / BL

dumps the contents into a container near the oil filtering machine. The operator transfers the material into the machine by means of a scoop. The operation was not taking place during the visit. I was told that the maximum amount of celite used per week is fifty pounds. There is no ventilation at the filter operation. A respirator approved for the protection against silica dust inhalation was found to be hanging on the filter machine. It was pointed out during the visit, that storing a respirator in a contamined area, is considered a bad practise. The reason is that fine dust particles in due coarse settle inside the filter and a man wearing the respirator gets unnecessary exposure to the dust.

(2) Mica Dust: The lab. report No. 13,900 dated January 6, 1970, shows that mica dust used by the company contains 5.3% free silica. The calculated TLV then would be 24 m.p.p.c.f. (million particles per cubic foot of air). The A.C.G.I.H. recommends a TLV of 20 m.p.p.c.f. for mica dust. This indicates that mica dust is more toxic than a nuisance dust, but less toxic than a dust containing 10% free silica. Mica powder is received in 50 lb. bags from Frank C. Dempsey and Sons Ltd., and used in the wire and cable building (no. 22, bay 822). The powder in an open box, is placed on a stand and a wire cable covered with silicone material, is drawn through the powder to prevent the cables sticking together on the drum. The operation was seen during the visit. A considerable amount of mica is spilled onto the floor during the process. The settled dust on the floor makes the housekeeping very poor and also creates a possibility of getting some of the dust air-borne by the movement of men or machines. There is no ventilation on the mica dust application process. The dust from the floor is picked up and reused.

(3) Zinc Stearate: In general, this dust is considered to be a nuisance dust (containing less than 5% free silica). This material is used for coating the uncured rubber in order to prevent the sticking. Zinc stearate is received in 50 lb. cartons and one carton is used in a week. The man working in the area was found to be covered with the white powder. Zinc Stearate is used at three mills and on odd occasions all the three mills could be in operation simultaneously.

(4) Pyrax 'A': The lab. report No. 14,053 dated June 5, 1970, indicates that Pyrax contains about 65.8% free silica. This determines the TLV of the air-borne dust to be about 3.5 m.p.p.c.f. A figure (TLV) as low as 3.5 m.p.p.c.f. suggests that the dust is toxic and requires extensive dust control measures. This powder is used at two places in the wire and cable building. It is used for coating the trays holding the uncured rubber and as a coating on the cables to prevent them sticking on the drum. The material is received from the Pyrax Standard Mineral Company of North Carolina. The powder was examined during the visit and found to be very fine (possibly - 200 mesh). Its use could create a considerable amount of dust in the air.

(5) Talfil: This is similar to Pyrax 'A' and also used as a non-stick coating on the cables to prevent them sticking on the drums. The material is received in 50 lb. bags from the Canadian Talc Industries Limited, Madoc, Ont. The free silica content of the material is as high as 66.9% which makes the material most toxic of all powders. The powder is kept in an open container and cables are passed through it. A considerable amount is spilled on the floor. No particular care is taken in handling this material. The spilled material on the floor is dry swept, collected and reused.

(6) Soapstone: (No. 22 Building): This material is used on Type 'SJ' and Type 'S' wire (flexible kind). The purpose is the same, i,e. to make non-stick surface. Soapstone is also used to coat rubber cables. This process is slightly different from the above mentioned processes. First of all, three or four large pans of about 5' diameter each, are filled with soapstone powder. The filling is accomplished by means of a swinging feeder attached to a hopper which has been previously filled by manual operation. The pans are then put in a depanner box where the cables are passed through them. There is no local or general ventilation in the area. The material looked very similar to talc but it was difficult to determine whether it was steatite type or tremolite type. A sample hasbeen submitted to the Occupational Health Laboratory.

(7) Clay: (used in No. 26 Building near Bay 1130): A small amount of clay is used as a filler in making a product called 'Geon' which is essentially a PVC covering for wire and cable. The other powders used in the manufacture of the PVC covering are tribase E-XL (a basic lead silicate - sulphate complex) and dythal (dibasic lead pathalate). Following local exhausts are provided in this area.

| Operation | Type of exhaust | Hood Dimension | Face Vel. FPM | Volume CFM |
|---|---|---|---|---|
| 1.Weighing Platform | Backdrafting rectangular hood | 28" x 21" | 200 | 816 |
| 2.Weighing Scale | Backdrafting rectangular hood | 35" x 30" | 250 | 1822 |
| 3.Drum #1 containing powders | A duct attached to the lid | 5" diameter | 3000 | 408 |
| 4.Drum #2 | Slotted exhaust at top | 21" x 1½" | 800 | 168 |
| 5.Blender | Top exhaust with 6" dia. duct, 3 sides enclosed | 36" x 12" | 150 | 491 |

These exhausts were considered to be adequate for the various operations.

(8) Tumbling Operation: On the third floor, there is a small sand cleaning operation where bimetal strips are cleaned. The sand for the operation is received from Perry Glass Company Limited. A man tears open the bag and dumps the sand into the tumbler. The bimetal strips were put in and the tumbler is let run for 2 hours. At the end of the operation, the bimetal strips are picked up by using a magnet and sand is dropped onto a screen. The sand is not reused. About 100 lbs. of fresh sand is used per week. There is no local exhaust provided at the tumbler. However, the man operating the tumbler is provided with an approved type dust respirator.

(9) Asbestos: Chrysotile asbestos is used to card the wires to be used for toasters and stoves. The entire operation takes place in an area of 70' x 46' x 20' high, which houses three carding machines, one twisting machine and six braiding machines. Asbestos laps are received from Quebec and put on carding machines. The carded wires are put on the twisting machine where two wires are twisted to make one. The twisted wires are then fed to six braiding machines. The braided wires are cured in a gas oven. The carding machines are fitted with the following local exhausts:

| Operation or Equipment | Type of Local Exhaust | Dimension of Hood | Face Vel. FPM | Vol. CFM |
|---|---|---|---|---|
| Big Carding Machine | Rectangular Hood | 1' x 2' | 100 | 200 |
| Small Carding Machine #1 | Rectangular Hood | 1' x 1' | 150 | 150 |
| Small Carding Machine #2 | Rectangular Hood | 1' x 1' | 150 | 150 |

All the three asbestos carding machines were found to be covered with asbestos fibres. The floor near the carding machines and the twisting machine was also covered with asbestos dust. I was told that the dry sweeping is practised to clean the floor near these machines. During the visit, a considerable amount of asbestos fibres was found to be accumulated on the floor, which suggested that the floor had not been cleaned for days. About 500 lbs. of asbestos are used in a day and a total of two employees work in the area.

Comments

1. As mentioned earlier, celite contains a small percentage of free silica and hence, could be considered hazardous if inhaled in large concentrations over a period of time. As the amount being used is not large, the man working in the area could be adequately protected using an approved respirator. In any case, the respirator should never be stored in the working area, (see the text).

2. Mica dust exposure can be minimized by enclosing the entire process of dust coating. The open container produces excessive dust and adds to the spillage. A cover could very easily be placed on the container and the stand to the point where the excess mica drops down to the floor. If an enclosure could be built for the entire process, then the material on the floor does not have to be swept to clean. Once the enclosure is built, a local exhaust can also be easily attached to control the fine dust which could be air-borne during the application process.

3. Zinc Stearate is considered to be a nuisance dust. However, any nuisance dust could become hazardous if inhaled in large concentrations over a long period of time. The writer, at present, has no knowledge of the air-borne concentration. A second thought will be given on the method of controlling this dust once the air sampling results are available.

4. Pyrax 'A' and Talfil are two very toxic powders being used by the company. My suggestion will be to replace these powders with relatively less toxic powders. I was wondering why mica, zinc stearate or any other material cannot be used, as the purpose of all these powders seems to be the same to me. In any case, if Pyrax 'A' and Talfil have to be used, the containers should be enclosed and adequately exhausted. The face velocity of the exhaust hoods should not be less than 150 f.p.m.

5. No comment on talc (soapstone) exposure is made in this report as the type of talc is not recognized. A supplementary report will be written when the lab. reports are available.

6. The PVC pellitizing area is relatively free from air-borne dust. The local exhausts provided for various operations were considered to be adequate. All precautions to prevent lead exposure are taken. I was told that the area has been previously visited by Dr. Tidey and others of this service.

7. The tumbling operation on the third floor was considered to be an intermittent operation. Some amount of dust could be produced when the sand from the tumbler is dropped onto a screen. However, this is an extremely short term exposure. An approved respirator should be able to provide an adequate protection.

8. Asbestos handling area was considered to be the worst in the entire plant. It was realised during the visit that the company was not fully aware of the hazards associated with the inhalation of asbestos dust. The area is located in the south-west corner of No. 22 Building. There are some employees working in the north and south ends of the area. These workers are unnecessarily exposed to asbestos fibres being produced in this area. It was, therefore, suggested during the visit that the area should be segregated from the rest of the building. I was told during the visit, that dry sweeping is practised to clean the floor and machine in this area. It should be realised that dry sweeping stirs up the settled fibres in the air. Hence, vacuuming or wet mopping should only be practised to clean the floor and machine regularly. Local exhausts at the carding machines were not considered to be adequate. It is my opinion, that better enclosures and higher face velocities should be provided. The twister also provides a considerable amount of dust. A local exhaust should be provided at each end of the twister.

Directions to be issued

1. Adequate respiratory protection shall be provided for the employee handling celite in the machine shop. The respirator, when not in use, shall be stored in a relatively clean area.

2. An adequate enclosure shall be provided for the mica dust coating process (see the comments).

3. Adequate local mechanical exhausts shall be provided for the Pyrax and Talfil using processes.

4. Adequate respiratory protection shall be provided for the man engaged in tumbling operation. The respirator when not in use, shall be stored in a relatively clean area.

5. The asbestos handling area (carding, twisting and braiding), shall be segregated from the rest of the building. The exhausts at the carding machines shall be improved to provide adequate local mechanical exhaust.

6. Adequate local mechanical exhaust shall be provided at the twister (see the comments).

7. No dry sweeping shall be practised.

Recommendation

Air sampling should be done by the Occupational Health Laboratory in the above mentioned areas.

G. S. Rajhans

G.S.Rajhans, P.Eng.

GSR/sb

c.c. Vardey

ONTARIO DEPARTMENT OF HEALTH
OCCUPATIONAL HEALTH LABORATORIES TEL: 365-2201
360 CHRISTIE STREET, TORONTO 4, ONT.

| | |
|---|---|
| RE: SAMPLES FROM CANADIAN GENERAL ELECTRIC, 107 PARK ST. N., BUILDING NO.22, PETERBOROUGH, ONT. SUBMITTED BY R.W. DICKEY, I.S.B. | REPORT NO: 14,053<br>DATE: JUNE 5, 1970<br>COPIES TO: DR. TIDEY (3)<br><br>FROM: H. WALL |

PYRAX: THIS CONTAINED 65.9% FREE SILICA. PREVIOUS EXPERIENCE HAS SHOWN THAT THE USE OF "PYRAX" CAN RESULT IN LARGE AMOUNTS OF AIR-BORNE DUST CONTAINING HIGH CONCENTRATIONS OF FREE SILICA.

TALFIL(?): THIS SAMPLE WAS TAKEN FROM THE MACHINE AND CONTAINED 66.9% FREE SILICA. IT WAS IDENTICAL IN APPEARANCE WITH "PYRAX".

ANALYSIS BY D. CARROLL.

H Wall

H. WALL

HW/JG

IF-85

To H. McIldowney
B S Rayham
17 Jun 70
BS

ONTARIO DEPARTMENT OF HEALTH
OCCUPATIONAL HEALTH LABORATORIES TEL: 363-2201
360 CHRISTIE STREET, TORONTO 4, ONT.

RE: MICA DUST GE 71001 USED BY CANADIAN GENERAL ELECTRIC CO. LTD., 187 PARK STREET NORTH, PETERBOROUGH BOUGHT FROM FRANK E. DEMPSEY AND SONS LTD., 147 DAVIES AVE., TORONTO. SUBMITTED BY [illegible] DICKEY, I.S.O.

REPORT NO: 13,900
DATE: JAN. 5, 1970
COPIES TO: DR. TIDEY (C)

FROM: H. WALL

THE SAMPLE WAS FOUND TO BE MICA CONTAINING 5.3% FREE SILICA.

ANALYSIS BY H Wall
H. WALL

HW/JG

[illegible]

#8

Parliament Buildings
Toronto 2, Ontario
January 27, 1947

Mr. T. A. Lister
Safety Engineer
Canadian General Electric Co.
PETERBOROUGH, Ontario

Dear Mr. Lister:

The results of the lead tests in the wire department are as follows:

(1) Sample taken as wire leaves the press, on side away from lead pot. Lead - 1.0 mg. per 10 cu.m.

(2) Sample taken between press and lead pot.
Lead - 0.3 mg. per 10 cu.m.

Both findings are below the maximum allowable concentration of 1.5 mg. lead per 10 cu.m.

The dust counts in the porcelain department are as follows:

(1) At girl fettling - east end, no exhaust - 5,200,000 particles per cu.ft.

(2) At girl fettling - centre, ventilation - 1,300,000 " " " "

(3) At girl felting - west end, no exhaust - 9,000,000 " " " "

As the count on the third sample approaches the maximum allowable count of 10,000,000 particles per cu.ft., it is recommended that ventilation be provided for all these operations.

Yours very truly,

J. H. Johnston, Chemist
Division of Industrial Hygiene

JHJ:VW

CANADIAN
GENERAL ELECTRIC
COMPANY LIMITED

# SAFETY COMMITTEE

SAFETY IS YOUR CHEAPEST INSURANCE.
LET YOUR ACTIONS PAY
YOUR PREMIUMS.

SUBJECT:

LOCATION: Peterborough, Jan. 29, 1947.

REFERRING TO.

Department of Health,
Parliament Buildings,
Toronto 2, Ontario.

Attn. C. H. Wilson, M.D.
Clinician,
Division of Industrial Hygiene.

Dear Sir:

In answer to your letter of January 27, 1947, re examination of personnel exposed to the lead hazard.

We regret our failure to have these workmen examined periodically as we were under the impression that the tests were only necessary when requested by your department. In view of the information contained in your letter we have immediately made arrangements to have the workmen examined, and have set up a file to ensure that they will be done in the proper periods in future.

Kindly address all correspondence and reports on Safety and Health matters to the writer and we will give them our immediate attention.

Yours very truly,

T. A. Lister

Safety Engineer.

TALister:JH

Parliament Buildings
Toronto 2, Ontario
January 27, 1947

Mr. T. A. Lister
Safety Engineer
Canadian General Electric Co.
PETERBOROUGH, Ontario

Dear Mr. Lister:

In some unknown manner, the file on your company concerning periodic examinations for lead poisoning has been misplaced. I find that your periodic reports are now many, many months overdue and I would suggest that they immediately be brought up to date. Would you kindly take this matter up with your Nurse and Physician.

These examinations are required at three-monthly intervals and it is not the intention of the Department to notify you when these are due but they are expected to be forwarded voluntarily.

Any attention you may be able to give to this matter will be greatly appreciated.

Yours very truly,

C.H. Wilson, M.D.
Clinician,
Division of Industrial Hygiene

CHW:VW

DEPARTMENT OF HEALTH
- Division of Industrial Hygiene -

**Plant Visit Report**

Date: January 29, 1947

Memorandum to:
Dr. J. G. Cunningham,
Director.

From:
J. H. Johnston, Chemist

Plant: Canadian General Electric Company

Address: Peterborough, Ontario

No. Employees: M- F-

Hazard: Lead

Requested by:

Accompanied by: Mr. D. Douglas, F.I.B.

Date of visit: January 21, 1947

Contacts: Mr. T.A. Lister, Safety Engineer

Company to be notified by:

Leave in abeyance: Take no action:

Copies to: Mr. J. R. Prain (2)

The following air samples were taken in the Wire Department at the lead extrusion presses:

(1) at exit end of press, on the side away from lead pot

Lead - 1.0 mg. per 10 cu.m.

(2) between lead pot and press

Lead - 0.3 mg. per 10 cu.m.

The amounts found are below the maximum allowable concentration of 1.5 mg. lead per 10 cu.m.

JHJ

J. H. Johnston

JHJ:VW

DEPARTMENT OF HEALTH
- DIVISION OF INDUSTRIAL HYG...E-

**Plant Visit Report**

Date: March 3rd, 1949

ac dum to:
)r. J. G. Cunningham,
)irector.

From:

F. M. R. Bulmer, M.B.,

---

ant: Canadian General Electric,

dress: Peterborough, Ontario.

. Employees: M- F-

zard: Lead. Di phenyl chloride

Requested by:

Accompanied by:

Date of Visit: February 24th, 1949.

Contacts: Mr. T. A. Lister

mpany to be notified by:

ing forward: Take no action:

opies to:

---

**Lead**

I went over the question of stippled cell counts and lead exposures. Evidently we have been doing slides from men who have no significant exposure. Paints used do not contain lead except a lead primer coat which because of specifications they have to use about once every six months for about a half a day. Two men do this job. They have no other significant exposure. About 15 lbs of litharge a day is used in their wire department for compounding into insulation covering. This amount is mixed in 43 batches per day in varying amounts. Two to four men work at this job. A large melting pot is used for melting lead for the lead sheeting machine. The pot is well ventilated. Some exposure may occur when taken off the dross. Two to eight men may be employed at this work.

**Di phenyl chloride Pyranol**

We have taken air samples in this area. The amount found is higher at spots then we like. While pyranol is said to be diphenyl chloride it is probably a mixture of phenyl chlorides. A large sample was obtained and Mr. Johnston is going to determine how much comes off at room temperatures. If significant amounts are liberated at room temperatures a change of handling would be indicated. I told Mr. Lister we would check the air again and make recommendations. The material is used at their Pittsfield plant (U.S.A.) in large quantities. I previously asked that they obtain details as to how it was handled in the American plant. I was shown the letters received. The information was too general to be of value.

I am writing Mr. Lister indicating what men should have blood smears done.

FMRB

F. M. R. Bulmer, M.B.,

FMRB/JG

Parliament Buildings,
Toronto 2, Ontario.
March 3rd, 1949.

Mr. T. A. Lister,
Safety Engineer,
Canadian General Electric Company,
Peterboro, Ontario.

Dear Mr. Lister:

I have gone over my notes regarding lead exposures and I would suggest that blood smears be sent every three months from the men working in the following jobs. Later the period might be increased if indicated by experience.

A. Compounding Room where litharge is mixed with rubber. (two to four men)

B. Large Melting Pot associated with lead sheeting (two - eight men)

In the case of Braun I would suggest his smear be repeated in about three month's time. As his blood smear shows some stippling without apparent plant exposure, I would suggest he be kept at work where lead is not used.

Slides from the two men spraying lead primer coat about once every six months probably should be checked. I would suggest that slides from these men be sent in two or three days after a spraying period.

In sending slides the name and work location of each man should be given. This information should not be written on the slide as too much writing on the film affects staining.

As plant conditions probably change from time to time I would keep close watch for any new operations involving the use of lead. If any are found let me know.

As soon as Mr. Johnston has investigated the sample of pyranol I obtained we will arrange to go to Peterboro and check over this exposure.

Yours very truly,

F. M. R. Bulmer, M.B.,
Division of Industrial Hygiene.

Copies: Dr. Wilson
Mr. Bishop

#7

General Electric Company, Peterborough

Peterborough, 17 September 1971

OCCUPATIONAL HEALTH SERVICE SEP 21 1971

CC: J.P. Watts
K.A. Faggetter
R.C. Bergey
W. Virgo
G. Hansen

Subject: Memo on Meeting with the Environmental Health Services Branch

Attending were: Hugh Nelson, Bob Dickey, Glen Hansen, Ken Faggetter, Lance Foord,

Silica

Purpose of the meeting was to discuss two conditions in our operation which were of concern to the Health Services Branch, Department of Health.

First of these was the use of various powders in the rubber compounding and extrusion areas to coat insulations and wire.

As a result of the discussion of this item, it was learned that three of the powders we use are acceptable to the Branch. These are: mica, talfil 325, and zinc stearate. Two of the powders are decidedly unacceptable, namely; Hisil and Pyrax A. Both of these have high content of silicate.

In discussion we agreed to investigate the possibility of using only mica, talfil, and zinc stearate in our operations. We advised that we would investigate with our Laboratory the substitution of these three powders in place of the Hisil and Pyrax A.

We did agree to improve the handling procedures when using these compounds and also to improve the ducting and exhaust systems.

At the strainer where rubber trays are dusted, the Branch very strongly recommended the use of respirators by the operators whenever they are doing this work irregardless of the powder. We indicated that we could follow this recommendation.

Considerable discussion took place with respect to the asbestos operation, in the area of 31 carder, and the heater cord operations. Nelson indicated that he recognized that a considerable improvement had taken place but that further improvements were required in order to completely eliminate particles of asbestos floating about the area. We further agreed to a solution of the problem which would involve enclosing the carder heads including not only the carder head per se but also including the brush wiper and sprockets and chains, all of which create an air turbulence and scatter particles.

In addition we were requested to improve the housekeeping by more frequent cleaning around the various machines in order to reduce the amount of asbestos which could be scattered.

Ken Faggetter is investigating the aspects of housecleaning and improvements both in the north end of 22 and around the asbestos area. L. Poord will check with W. Virgo regarding the use of powders, the improvement to exhausts in the north end of 22 and the installation of complete hoods over the asbestos machines. We will attempt to complete this program by mid December.

L. J. Foord, Manager

Manufacturing Engineering
Wire and Cable Section

/bn

#6

ONTARIO DEPARTMENT OF HEALTH
OCCUPATIONAL HEALTH LABORATORIES TEL: 365-2201
360 CHRISTIE STREET, TORONTO 4, ONT.

RE: AIR SAMPLES FOR ASBESTOS, DUST, LEAD AND ZINC TAKEN ON APRIL 14, 1971 AT CANADIAN GENERAL ELECTRIC CO., 107 PARK STREET NORTH, PETERBOROUGH, ONTARIO. REQUESTED BY MR. G. RAJHANS.
COMPANY CONTACT: MR. D. ABLE, SAFETY ENGINEER
MR. G. HANSON.

REPORT NO: 14,436
DATE: APRIL 27, 1971
COPIES TO: DR. V. TIDEY(2)
DR. J. COWLE(2)
MR. G. RAJHANS
MR. J. MCNAIR(2)
MR. H. WALL (2)

FROM: C. RHODES

AIR SAMPLES WERE TAKEN IN VARIOUS LOCATIONS THROUGHOUT THE ABOVE PLANT. FOR DETAILS OF PROCESSES SEE MR. G. RAJHANS' REPORT NO. IF-19, DATED JANUARY 18, 1971.

1) "CELITE" - USED IN THE TOOL ROOM. A DUST SAMPLE WAS TAKEN BESIDE THE OIL FILTERING MACHINE, DURING CHARGING WITH CELITE, AND DURING ITS OPERATION.

2.8 MILLION PARTICLES PER CUBIC FOOT WAS DETECTED HERE. CELITE HAS A THRESHOLD LIMIT VALUE OF 20 MPPCF, AND THE AIR SAMPLE TAKEN WAS NOT ABOVE THIS LIMIT. A RESPIRATOR IS PROVIDED FOR THE OPERATOR'S USE.

2) MICA DUST - USED IN THE WIRE AND CABLE BUILDING. THIS PROCESS WAS NOT IN OPERATION AT THE TIME OF OUR VISIT.

3) ZINC STEARATE - USED IN THE WIRE AND CABLE BUILDING AS A COATING MATERIAL TO PREVENT THE FINISHED CABLE FROM STICKING TOGETHER. AN AIR SAMPLE WAS TAKEN BESIDE THE BIN CONTAINING ZINC STEARATE, WHERE THE CABLE IS DRAWN THROUGH, AND COATED. 0.02 MILLIGRAMS OF ZINC PER CUBIC METER OF AIR WAS DETECTED BY THIS SAMPLE. ZINC STEARATE IS 11% ZINC AND THE AIR SAMPLE WOULD HAVE A TOTAL LOAD OF 0.18 MILLIGRAMS OF ZINC STEARATE PER CUBIC METER OF AIR.

AS A NUISANCE DUST A T.L.V. OF 15 MILLIGRAMS PER CUBIC METER OF AIR IS LISTED AND THIS SAMPLE WAS WELL BELOW THIS LIMIT.

4) PYRAX "A" - USED IN THE WIRE AND CABLE BUILDING AS A COATING MATERIAL. THERE ARE TWO MACHINES USING PYRAX "A", ONE OF WHICH WAS IN OPERATION AT THE TIME OF OUR VISIT.

AN AIR SAMPLE FOR DUST WAS TAKEN BESIDE THE BIN WHERE THE WIRE IS COATED. 3.6 MILLION PARTICLES PER CUBIC FOOT OF AIR WAS DETECTED HERE. A HIGH VOLUME SAMPLE WAS TAKEN HERE AS WELL AND THE COLLECTED AIRBORNE DUST CONTAINED 66.3% FREE SILICA. BASED ON THE FORMULA:

$$\frac{250}{\%\ \text{FREE SILICA} + 5} = \text{MPPCF. OF AIR}$$

THE THRESHOLD LIMIT FOR THIS DUST WOULD BE 3.5 MPPCF. OF AIR.

THIS SAMPLE WAS IN THE NEIGHBORHOOD OF THIS LIMIT. THE OPERATOR WAS WEARING AN APPROVED RESPIRATOR.

OCCUPATIONAL
HEALTH SERVICE
APR 29 1971

CONTINUED..

5) TALFIL - THIS PROCESS IS NO LONGER USED BY THE COMPANY.

6) SOAPSTONE - THIS PROCESS WAS NOT IN OPERATION AT THE TIME OF OUR VISIT.

7) CLAY - USED IN THE MANUFACTURE OF P.V.C. AND CONTINUOUS VULCANIZED RUBBER. AN AIR SAMPLE FOR DUST AND LEAD WAS TAKEN AT THE P.V.C. WEIGH SCALES.
A) DUST:
5.5 MILLION PARTICLES PER CUBIC FOOT OF AIR WAS DETECTED HERE. CAMEL WHITE CLAY WAS BEING WEIGHED. A FREE SILICA CONTENT OF LESS THAN 1% WAS FOUND IN CAMEL WHITE CLAY (SEE O.H.L. REPORT 14,269).
A T.L.V. FOR DUST CONTAINING LESS THAN 1% FREE SILICA IS LISTED AS 50 MILLION PARTICLES PER CUBIC FOOT OF AIR. THE SAMPLE WAS WELL BELOW THIS LIMIT.

B) LEAD PHTHALATE WAS ALSO WEIGHED AT THIS STATION AND AN AIR SAMPLE FOR LEAD WAS TAKEN. 0.17 MILLIGRAMS OF LEAD PER CUBIC METER OF AIR WAS FOUND HERE.
THE PRESENT T.L.V. FOR LEAD IS 0.2 MILLIGRAMS OF LEAD PER CUBIC METER OF AIR. THE SAMPLE WAS NOT OVER THIS LIMIT.

ANOTHER AREA WHERE CLAY IS USED (CATALPO CLAY - FREE SILICA CONTENT 12%, SEE O.H.L. REPORT 14,269) IS THE CONTINUOUS VULCANIZED RUBBER WEIGH STATION.
A MIXTURE OF 2 TYPES OF NEOPRENE PLUS CATALPO CLAY AND LAMP BLACK IS WEIGHED. AN AIR SAMPLE FOR DUST SHOWED 4.8 MILLION PARTICLES PER CUBIC FOOT OF AIR. BASED ON THE FREE SILICA CONTENT OF THE CLAY THE T.L.V. IS 14.7 MILLION PARTICLES PER CUBIC FOOT OF AIR. THE SAMPLE WAS NOT OVER THIS LIMIT, HOWEVER, I WOULD RECOMMEND THE OPERATOR BE SUPPLIED WITH AN APPROVED RESPIRATOR.

8) TUMBLING OPERATION - AN AIR SAMPLE FOR DUST WAS TAKEN BESIDE THE TUMBLE MILL DURING THE CHARGING AND OPERATION. 3.8 MILLION PARTICLES PER CUBIC FOOT WAS DETECTED. ASSUMING THE SAND IS 100% FREE SILICA THE T.L.V. FOR THIS DUST WOULD BE 2.4 MILLION PARTICLES PER CUBIC FOOT OF AIR.
A RESPIRATOR IS WORN BY THE OPERATOR.
THIS SAMPLE IS SLIGHTLY GREATER THAN THE T.L.V., HOWEVER, THE OPERATOR ONLY WORKS HERE FOR A FEW MINUTES PER DAY.

9) ASBESTOS - AN AIR SAMPLE FOR ASBESTOS WAS TAKEN BESIDE THE CARDING MACHINES, NEAR THE FEED END, AND ONE SAMPLE BESIDE A "TWISTER" MACHINE. NO ASBESTOS FIBRES WERE DETECTED IN EITHER AREA. HOWEVER, A LARGER CARD MACHINE, LOCATED IN THE SAME GENERAL AREA, WAS SHUT DOWN FOR REPAIRS.
THE T.L.V. FOR ASBESTOS FIBRE IS 5 FIBRES GREATER THAN 5 MICRONS PER ML. OF AIR.
I FEEL THAT ADDITIONAL SAMPLES SHOULD BE TAKEN IN THIS AREA, AT A FUTURE DATE, WHEN ALL THE EQUIPMENT IS OPERATING.

LEAD AND ZINC ANALYSIS BY MRS. J. MANDAC.
FREE SILICA ANALYSIS BY MR. D. CARROLL.

M. Budlovsky
M. BUDLOVSKY

C. Rhodes
C. RHODES

CR/JG

TW

May 3, 1971.

Mr. D. Abel,
Safety Engineer,
Canadian General Electric Company,
107 Park Street North,
PETERBOROUGH, ONTARIO.

Dear Mr. Abel:

I am sending you a copy of our air sampling results which were obtained recently at your plant by our laboratory, for your information.

Yours very truly,

V. L. Tidey, M.D.,
Chief,
Occupational Health Service.

VLT/bc
Encl.

#5

ONTARIO DEPARTMENT OF HEALTH
OCCUPATIONAL HEALTH LABORATORIES TEL: 365-2201
360 CHRISTIE STREET, TORONTO 4, ONT.

: AIR SAMPLING FOR LEAD AND MERCURY AT CANADIAN GENERAL ELECTRIC CO. LTD., PETERBOROUGH, ONTARIO. REQUESTED BY DR. V.L. TIDEY. ACCOMPANIED BY MR. R. DICKEY, I.S.O.
COMPANY CONTACTS: MR. T.A. LISTER, SAFETY ENG.
MR. D. ABEL, ASST. SAFETY ENG.

REPORT NO: 13,175
DATE: MAY 31, 1968
COPIES TO: DR. MASTROMATTEO
DR. TIDEY
MR. H.M. NELSON
MR. F. ROBBINS(2)

FROM: M. POLNY

AT THE REQUEST OF DR. V.L. TIDEY THE CANADIAN GENERAL ELECTRIC CO. WAS VISITED ON THREE OCCASIONS (MAY 2, 14 AND 30, 1968) FOR THE PURPOSE OF AIR SAMPLING FOR LEAD AND MERCURY AT THE FOLLOWING LOCATIONS:

1. P.V.C. PELLETIZING (BLDG. 26)
2. WIRE AND CABLE (BLDG. 22)
3. BABBITT SHOP (BLDG. 10D)
4. ARMATURE UNIT (BLDG. 7)
5. CAPACITOR TREAT AREA

THE FOLLOWING ARE THE RESULTS:

| NO. AND LOCATION (LEAD) MAY 2, 1968 | MG PB/M$^3$ |
|---|---|
| 1. ARMATURE UNIT (BLDG. 7) BAY 207 (LOWER FLOOR) | 0.01 |
| 2. ARMATURE UNIT (BLDG. 7) BAY 320 (UPPER FLOOR) | 0.02 |
| 3. WIRE AND CABLE (BLDG. 26) BAY 1129 (P.V.C. PELLETIZING) | 0.04 |

| NO. AND LOCATION (MERCURY) MAY 2, 1968 | MG HG/M$^3$ |
|---|---|
| 1. CAPACITOR AREA, BEHIND TREAT TANKS, AT TESTING UNITS. SOUTH END, EAST LINE | 0.03 |
| 2. CAPACITOR AREA, BEHIND TREAT TANKS, AT TESTING UNITS. CENTER, WEST LINE | 0.02 |

| NO. AND LOCATION (LEAD) MAY 14, 1968 | MG PB/M$^3$ |
|---|---|
| 1. BABBITT SHOP (BLDG. 10D) FLUXING LEAD POT | 0.03 |
| 2. BABBITT SHOP (BLDG. 10D) BABBITTING | 0.02 |
| 3. BABBITT SHOP (BLDG. 10D) BACKGROUND AT TIN POTS | 0.02 |
| 4. BABBITT SHOP (BLDG. 10D) TINNING KEYS (LEAD BATH) | 0.02 |

JUN 12 1968

| | |
|---|---|
| 5. Wire and Cable (Bldg. 22) Extruding lead (Pure) | 0.01 |
| 6. Wire and Cable (Bldg. 22) Drossing lead pot (Platform) | 0.04 |

| No. and Location (Lead) May 30, 1968 | MG $PB/M^3$ |
|---|---|
| 1. Babbitt shop (Bldg. 10D) Large tin pot (no tinning) | 0.04 |
| 2. Babbitt shop (Bldg. 10D) Melting babbitt off stationary ring segments | 0.01 |
| 3. Babbitt shop (Bldg. 10D) Babbitting bearing | 0.02 |
| 4. Same as location (1) Tinning and pouring Babbitt | 0.03 |

As is seen by the results there appeared to be no excessive concentrations of either lead or mercury at the locations which were sampled.

Threshold Limit Values:

| | |
|---|---|
| Lead | 0.20 |
| Mercury | 0.10 |

M. Polny

M. Polny

MP/JG
HW

#4

OCCUPATIONAL HEALTH
MAY 8 1968
Ěn

ONTARIO DEPARTMENT OF HEALTH
ENVIRONMENTAL HEALTH BRANCH

# FIELD VISIT REPORT
## PART I

Date: May 7, 1968.

Memorandum to:
Dr. E. Mastromatteo, ✓
Chief, Occupational Health Service

From: H.M. Nelson

| | |
|---|---|
| Plant: Canadian General Electric Co.Ltd. | Requested by: Company |
| Address: PETERBOROUGH, Ontario. | Accompanied by: Dr. V.L. Tidey, EHB<br>Dr. D.R. Parliament, EHB<br>Mr. R. Dickey, ISB |
| | Date of Visit: March 26, 1968. |
| Contacts: Mr. D. Able, Safety Superintendent<br>Mr. C. Durant, Manager of Fuel & Feed Channels<br>Mr. E. Gregson, Facilities Engineering APD. | Copies to: Dr. V.L. Tidey<br>Dr. D.R. Parliament<br>Mr. G.F. Robbins (3) |

Abstract: This visit was made to review use of beryllium, uranium, lead, and mercury in various areas. This report will deal with only areas where lead is involved and one where mercury is involved. Dr. Tidey has prepared a report dated April 23, 1968 covering most of the areas. This report will act as an adjunct to his report.

*****

Building 22 - Wire and Cable

In the operation examined here, lead is extruded around electrical cable. It is a fairly standard operation. Lead is melted in an elevated pot 36 in. dia. The molten lead flows to the extrusion press by gravity. Some slitting of lead sheathing is done with the product remelted. In general though lead pigs are used.

The lead pot is covered with 2 openings in the cover. They are 18 in. x 9 in. and 12 in. x 5 in. Both have air flows into them of about 150 fpm or 230 cfm.

Comments

1. Housekeeping in the area is poor. Thick layers of dust were noted on the control cabinet, and lead plates (about 1 in. square) were strewn around the floor.

...2

Canadian General Electric Co. Ltd
Peterborough, Ontario

Comments (Cont'd)

2. On the pot operating platform (8 ft above floor level) there were 3 overfilled dross buckets.

3. Several paper cups were noted in the area, and remains of food such as orange skins were seen in the scrap drums.

Direction to be Issued (In addition to those suggested by Dr. Tidey)

1. Dross buckets are not to be overfilled. The level of dross should never exceed 2 or 3 inches below the lip of the container.

Recommendation

1. Local exhaust should be applied to the drossing operation.

Building #22 - Babbit Shop

There are eight lead melting units where various babbit materials are handled. The units are as follows:

1. A 9 ft x 5 in. lead trough with a similar sized fluxing bath. 40% tin and 60% lead is handled with a slot 9 ft x 3 in. located between the two pots. Exhaust rate is 2200 fpm for a volume of 4950 cfm.

2. 3 small 18 in. dia. gas fired units for handling 80 - 88% lead material. No exhaust is provided except for combustion products.

3. 3 -30 in. dia. pots mounted on an elevated platform handling 80 - 88% lead. Each fitted with slot exhaust of 1½ in. x 24 in. with only half of each exposed. Air flow rate at each pot about 4000 fpm for 550 cfm.

4. A 36 in. x 8 in. pot for handling 60% tin, 40% lead is fitted with a slot 36 in. x 1½ in. exhausted at 1200 fpm for a capacity of 450 cfm.

...3

Canadian General Electric Co. Ltd
Peterborough, Ontario

The total area involved is about 100 ft x 40 ft x 30 ft high. The exhaust in the area represents about 4 air changes per hour.

Comments

1. Housekeeping in the area is not good. It was also noted that smoking is carried out in the area.

2. In general the exhaust rates could be considered low. Melting temperatures though are low, and so perhaps not much hazard exists. Air sampling will have to be carried out to determine degree of exposure.

Building #7 - Armature Unit

One melting pot of a total of 5 or 6 was examined. It is 12 in. dia. and fitted with an 8 in. x $1\frac{1}{2}$ in. slot exhausted at 200 fpm for a capacity of 17 cfm. Armature leads are buffed after dipping in the pot. The buffing, a flux holder and dross container are fitted with exhaust hoods, but there was no definite indication of airflow. At first we were told the pot contains 60% tin and 40% lead. Later this was "hedged on", because routine laboratory analysis of baths showed mostly tin with only traces of lead. It was felt that we did not know the actual contents of the pots and as it was then about 5.30 p.m., the people who knew had left.

Comments

1. Housekeeping in the area was poor. The dross bucket looked as though it had never been cleaned out. There were bits of splashed metal around.

2. Because of the extent of the operation, if no lead is used in the pot then no health hazard should occur. However, if lead is actually used then the exhaust systems are inadequate and require complete overhaul and improvement.

Capacity Treat Area

Electrolytic capacitors manufactured by the company are mounted in tins which are then filled with pyranol using vacuum chests.

<u>Canadian General Electric Co. Ltd</u>
<u>Peterborough, Ontario</u>

There are a total of 16 chests fitted with local exhaust slots having a total of 11,250 cfm air movement. The room is about 60 ft x 50 ft x 35 ft high. Some further exhaust is located at pyranol handling tanks, so that the total air movement is about 15,000 cfm or about 8 air changes per hour. There is an air make-up unit in the room.

Behind each chest is a glass manometer for measuring vacuum. It is possible for a gauge to break spilling mercury on the floor. Because of cracks in the floor some of this mercury may be trapped there and possibly vaporize.

<u>Comments</u>

1. Because of the high rate of air exchange the chance of significant mercury exposure is very remote. However, air sampling has been requested.

H.M. Nelson

H.M. Nelson,
Occupational Health Service,
Environmental Health Branch.

HMN:jej

#3

.H.S. File No. 2G-85

OCCUPATIONAL HEALTH SERVICE
SEP 28 1971

ONTARIO DEPARTMENT OF HEALTH
ENVIRONMENTAL HEALTH SERVICES BRANCH

365 - 4066

FIELD VISIT REPORT

PART 1

Date: September 28, 1971

emorandum to:
Dr. V. L. Tidey
Chief, Occupational Health Service

From: Mr. H.M. Nelson, P. Eng.

lant: Canadian General Electric Co. Ltd.

ddress: 107 Park St., N.
Peterborough, Ontario.

ontacts: Mr. D. Able, Specialist Safety
Mr. G. Hansen, Safety Analyst
Mr. L.J. Foord, Manager Manufacturing Engineering
Mr. A.K. Faggetter, Superintendent Shop Operations - Wire & Cable.

Silica + Asbestos

Requested by: E.H.B.

Accompanied by: Mr. R. Dickey, I.S.B.

Date of Visit: September 15, 1971

Copies to: Mr. J. McNair (3)
Mr. D. Able
Dr. J.E. Cowle

The above-mentioned company was visited, by the writer, July 7, 1971 regarding the use of powders containing silica and also the use of asbestos. Directions for these operations had been suggested by Mr. Rajhans in January 1971 and were upheld by the writer. This visit was made to discuss directions with production personnel.

In the wire and cable department a variety of powders are used on rubber and plastic to prevent sticking. Of five powders considered, one, zinc stearate was considered of low toxicity, two - talfil 325 and mica were considered of moderate toxicity and two - Hisil and Pyrax A were considered of high toxicity because of their silica content. Because the powders appeared to be used interchangeably, it was suggested that the use of the more toxic powders could be discontinued.

During this discussion it was pointed out to me that zinc stearate (the least toxic powder) cannot be used in many cases because it tends to be absorbed into the rubbers and therefore cannot prevent sticking. It was agreed that probably the use of the two most toxic powders could be discontinued. A general agreement was reached that -

a) Non toxic powders including zinc stearate could be used with no modifications in equipment or operations.

b) To use powders of moderate toxicity holders will be covered and fitted with a container to catch most of the overflow and droppings from the cable being coated.

A special case is one in which sheets of vinyl or rubber are sprinkled with "talfil 325". It was agreed this dust would be difficult to control and that the operator is to wear an approved respirator.

c) If dusts considered to have high toxicity are used then local exhaust will be applied at the point of application.

---

A further discussion was held regarding local exhaust of the various carding and twisting machines used for the application of asbestos insulation to wire. The asbestos is formed into place using the head end of a 2 in. paint brush rotated in such a way that the bristles stroke the wire. This is a dust producing operation, with the rotating brush acting as a small blower to blow the dust away from the local exhaust hood. In addition the carding operations are high speed dust producers that are difficult to control. The present hoods which would be adequate for most dusts, do not efficiently remove asbestos fibres. Following the twisting operation wires are pulled over pulley and around corners, particularly at #32 machine, producing some dust.

It was agreed during the visit that more complete enclosures would be built for the various carding and twisting machines. The general discussion indicated each machine would be isolated in its own exhausted hood. This would depend, of course, on practical considerations such as ease of operation and maintenance.

COMMENTS:-

1) At the time of this visit housekeeping in the area could be described as the best ever seen by the writer. Some fibres were noted at all machines so that further improvement could be made.

2) At the large wire twisting machine near #32 machine, work was being done at the time of the visit to tighten up the enclosure. This was the one machine considered adequate at the time of my last visit.

3) It was agreed, that if satisfactory asbestos control can be applied to the machines, then isolation of the area will not be necessary.

4) Air sampling should be done when enclosures are complete followed by a visit by an engineer.

H.M. Nelson

H.M. Nelson, P. Eng.

HMN/cap

PUBLIC HEALTH DIVISION

Telephone:
365-[illegible]
Area Code:
416

DEPARTMENT OF HEALTH

ONTARIO

ENVIRONMENTAL HEALTH SERVICES BRANCH
ONE ST. CLAIR AVENUE WEST
TORONTO 7, ONTARIO

September 29, 1971

Mr. D. Able,
Specialist Safety,
Canadian General Electric
Company Limited,
107 Park Street N.,
Peterborough, Ontario.

Dear Mr. Able,

Enclosed is a copy of the Field Visit Report prepared by me following a visit to your plant on September 15, 1971.

Yours sincerely,

H. M. Nelson

H. M. Nelson, P.Eng.,
Officer-in-Charge,
Engineering Section.

Enc. Report
HMN/vr

#2

H.S. File No. 2F-49

OCCUPATIONAL HEALTH SERVICE
JUL 26 197

ONTARIO DEPARTMENT OF HEALTH

ENVIRONMENTAL HEALTH SERVICES BRANCH

365 - 4066

# FIELD VISIT REPORT

## PART 1

Date: July 26, 1971

emorandum to:
Dr. V. L. Tidey
Chief, Occupational Health Service

From: Mr. H.M. Nelson, P. Eng.

lant: Canadian General Electric Co. Ltd.,

ddress: 107 Park St. N.
Peterborough, Ontario.

ontacts: Mr. D. Able
Specialist-Safety.

Silica + Asbestos
Bldg #22

Requested by: Mr. R.W. Dickey, I.S.B.

Accompanied by: Mr. R.W. Dickey, I.S.B.

Date of Visit: July 7, 1971

Copies to: Mr. J. McNair (3)
Mr. D. Able
Dr. J.E. Cowle

Abstract:

Mr. G.S. Rajhans visited the above-mentioned company to investigate dust exposures in the plant. In #22 building, asbestos is used for insulation on wire for irons, toasters, etc. Also in the same building various powders are used to coat wires and vinyl sheeting to prevent sticking. This visit was made to review the exposures.

There has been considerable confusion about the powders used, and their toxicity. This report will suggest one material be used, and that perhaps routine checks of it should be made.

In addition, changes in the asbestos area will be discussed and some directions are suggested.

A further meeting has been requested by the company for early September, 1971.

---

In building #2 a large variety of industrial, heavy duty and other special wires are made using a variety of materials for insulation including cotton, PVC, rubber, asbestos, etc. Much of the applications depends on the extrusion of PVC or other resins or rubbers. The wires as coated are normally pulled through a powder bed which is handled in a variety of ways. The powder as a rule tends to be carried along with the wire and then falls off as the wire wipes across the container. Dust is formed at the open trough and also as the power falls to the floor.

At the suggestion of Mr. Rajhans, in one or two cases the powder hopper has been fitted with a cover and a container has been fitted at the wire discharge of the hopper so that powder droppings do not fall to the floor. With the modifications, dusting is reduced and housekeeping is improved.

It is difficult to determine types of powder used at any given operation, nor overall use of powder. It is known at least five powders are used and it is probable several others are used. What is used seems to depend on the operator to a certain extent. As there has been considerable question as to the crystalline free silica content of the materials, four samples were obtained from original bags located in the stores. These samples were submitted for analysis. The following materials are definitely used.

| Material | Analysis |
|---|---|
| Mica | 8.6% Free $SiO_2$ |
| Hisil | 97.7% Free $SiO_2$ (of which about 50% is considered to be crystalline) |
| Pyrax A | 66.8% Free $SiO_2$ |
| Talfil 325 | Tremolite type talc with 1.5% Free $SiO_2$ |
| Zinc stearate | ---- |

COMMENTS:-

1) In addition some operators mentioned using soapstone. In an attempt to obtain a sample it became clear that they were referring to talfil 325. Some clays are used but these seem to be used for other purposes.

2) Of the materials used only zinc stearate would be considered a nuissance material with little inherent toxicity. Of the others Hisil and Pyrax A have high crystalline silica content and must be considered as toxic. To express a TLV for them I would suggest 4.5 - 5.0 mppcf for the hisil and 3.0 - 3.5 mppcf for the pyrax A. Talfil 325 is fibrous type of talc and therefore exhibits toxic properties similar to asbestos. No TLV is suggested in published lists for tremolite but the figure given for talc is 20 mppcf. If this is the TLV for stealite (non fibrous) form then something less should be used for tremolite. A level of 5 fibres/cc. is sometimes suggested. The mica used is fairly low in free silica. A TLV of 16-18 mppcf would be used for this powder.

3) Air sampling in April showed no very high concentrations of dust, but it was suggested further samples be taken when all operations were going. Further sampling in June showed some high dust counts. It was

the writer's opinion that exposures can be variable and intermittent. Much depends on the individual operator. I also got the impression that powders are used interchangeably, and in mixes. This is why a sample from a work station does not give a true picture of material used.

4) Because of the way they were being used it was my opinion, that the use of toxic powders could be discontinued.

5) No directions are suggested at this time, but it was agreed a meeting would be held, at the plant, with production people sometime in September.

---

In the same building wires are insulated with asbestos. There are three machines for the operation. Basically a roll of asbestos betting is fed to each machine at a carding operation which tears the fibres apart and feeds them to a twisting machine which places the fibres around the wires. One or two cotton threads will be wound on the wire to hold the asbestos in place.

Two machines are capable of handling one wires each and one can handle two wires. In addition to the machines there is a further machine for twisting covered wires together, and finally there are 6 braiding machines for putting a cotton braid on the twisted wires. These machines have no local exhaust.

Ventilation was checked as follows:-

| Machine or operation | Hood type & size | Face velocity fpm | Air volume cfm |
|---|---|---|---|
| Large carding machine #32 bay 909 | hood over carder, with windowed doors, 1 ft. x 3½ ft. opening into canopy | 100-125 control velocity less than 100 fpm | 400 |
| | downdraft hood same size approximately | 800 est. | 2400 |
| *Twister on #32 machine | canopy 10 in. x 5 in. | 600 | 210 |
| *Take up reel | downdraft hood 22 in. x 8 in. 4 in. takeoff | 1600 | 135 |
| Wire twisting machine | complete enclosure with 17 in. x 8 in. sliding door & est. 8 in. x 22 in. end opening | 500) 400) | 1025 |

| Machine or operation | Hood type & size | Face velocity fpm | Air volume cfm |
|---|---|---|---|
| Machine #31 carding twister | 2 hoods 14 in. square<br>2 hoods 4 in. x 5 in. | | control vel. - 200-300 fpm<br>control vel.- 200-300 fpm |
| Machine #130 carding | 18 in. x 11 in. hood updraft | 125 low control vel. | 180 |
| | downdraft hood | | 115 est. |
| twister | complete hood 5 in. x 9 in. takeoff | 850 | 265 |
| Varnish drying for Machines #31 and 130 | tunnel enclosures | Not measured | |

COMMENTS :-

1) In general housekeeping has improved in the asbestos area over what the writer has observed in the past and what has been reported. However though there are still a large amount of settled fibres on the machines and to a small extent on the floors. The fibres are particularly noticeable at the braiding machines and at #31 machine.

2) Fibres are difficult to control, because if too high an air velocity is used some of the material is lost to the exhaust systems. A balance must be maintained though between adequate control for health reasons and too much velocity. Too little control was applied at the carding on #32 and #130. The twisting operation is done with a spindle type action. A turbine effect is created tending to blow air away from the exhaust hoods.

3) At the large carding operation (#32) in particular the wire was carried over pulleys and around corners with each contact some fibres were given off. An attempt has been made to control the fibres by 2 new hoods. There still appears to be considerable escape. Air sampling at this machine in June showed up to 10 fibres/cc., one of the highest counts recorded by the laboratory recently.

4) In summary equipment is inadequate. At #130 machine it is better than the others. More adequate enclosure is needed for all machines with perhaps moderate increases in exhaust rates. Segregation of the area is desirable. Housekeeping requires improving and respirators, at present should be worn by employees.

5) Directions suggested by Mr. Rajhans in January still apply. A visit is planned for September 1971. These directions can again be discussed with the company. //

H M Nelson

H.M. Nelson, P.Eng.

HMN/cap

PUBLIC HEALTH DIVISION

[illegible]

ONTARIO

DEPARTMENT OF HEALTH

ENVIRONMENTAL HEALTH SERVICES BRANCH
ONE ST. CLAIR AVENUE WEST
TORONTO 7, ONTARIO

July 27, 1971

Mr. D. Able,
Specialist-Safety,
Canadian General Electric
Company Limited,
107 Park St. N.,
PETERBOROUGH, Ontario.

Dear Mr. Able,

Enclosed is a copy of the Field Visit Report prepared by me following a visit to your plant on July 7, 1971.

Yours sincerely,

H. M. Nelson

H. M. Nelson, P.Eng.,
Officer-in-Charge,
Engineering Section.

Enc. Report

HMN/vr

# APPENDIX K – MINISTRY OF LABOUR REPORTS

#1

DEPARTMENT OF HEALTH
- ~~XXXXXXXXXXXXXXXXXXXXXXXXX~~-
ENVIRONMENTAL HEALTH BRANCH
Plant Visit Report

Date: September 15, 1966.

orandum to:
Dr. R. B. Sutherland,
Director

From: H.M. Nelson

nt: Canadian General Electric Co. Ltd.,

lress: Peterborough, Ontario.

. Employees: M.- F.-
Total

zard; Naphtha, Asbestos

npany to be notified by:

ing forward: Take no action:

pies to: Dr. E. Mastromatteo✓
Mr. G.F. Robbins (2)
Mr. E. Welds

Requested by: Mr. E. Welds, I.S.B.

Accompanied by: Mr. E. Welds, I.S.B.
Mr. D. Grant, I.S.B.
Mr. R. Dickey, I.S.B.

Date of Visit: September 6, 1966.

Contacts:
Mr. F. Heilenbrummer, Plant Engineering.
Mr. T. Lister, Specialist-Safety.
Mr. L. Foord, Manager of Manufacturing Engineering.
Mr. W. Durant, Superintendent.
Mr. J. Merritt, Wage-Rate Planning
Mr. A. Parker, Fire Chief.

The above mentioned company prepares spools of cotton for wire insulation by dipping them in an asphalt solution in low flash petroleum naphtha. The dipping tank is about 4 ft square x 4 ft deep and fitted with a slot exhaust 4 ft x 1 in. exhausted at about 350 fpm or 115 cfm. A basket is filled with spools of cotton and dipped in the solution for 45 minutes. It is then allowed to drip for 15 minutes and then dumped to a larger basket. When the large basket has received the three small basket loads, then the whole is put in a drying oven for 30-40 hours. It was shown that about 24 baskets are dipped a week, with each basket absorbing 20-25 gallons of naphtha which must then be evaporated. Total time for the 24 baskets is 178 hours. Some evaporation would take place at the tank, but most of it would occur in the drying oven. This works out to 3.1 gallons of naphtha evaporated per hour with probably a peak concentration somewhere around the second day of operation.

The dip tank is presently located in a large shop about 500 ft x 100 ft x 50 ft high. The vapours from the tank and of immediate drying should be well diluted and not represent a serious hazard. The baskets are dried in an oven of dimensions about 12 ft square x 8 ft high. It is heated to about 100°F with a unit heater mounted in the ceiling. There is a circulating fan in the room, but no mechanical exhaust or even provision for natural exhaust. An air sample taken in the room on Tuesday after a



.../2

holiday week-end still showed about 700 ppm naphtha in the air. Lighting in the room was by an ordinary electric bulb. A propane lift truck is used for charging and discharging the room. During peak evaporation periods, the fire and explosion hazard must be very high.

The company was directed to cease operations in the drying room, and it was agreed that a temporary room outside the main building would be satfactory if the construction was fire resistant provided with explosion relief, fitted with H.E.P.C. approved lighting or lighted indirectly from outside the room, not loaded using a spark producing fork lift, and equipped with a mechanical exhaust at a minimum of 1,200 cfm.

The main purpose of the visit was to discuss plans for a new room for the dipping and drying operations. The size of the room is to be about 18 ft x 9 ft divided into two sections for dipping and for drying. It was planned to provide 350 cfm general exhaust in the drying area and the present 115 cfm local exhaust at the dip tank. It was suggested that about 50 cfm per sq ft of dip tank area (800 cfm) be provided at the dip tank, and that a minimum of 1,200 cfm would be necessary in the drying room. The latter figure is based on reduction of naphtha vapours to ¼ the lower explosive limit on a projected increase in production. The method of charging and discharging the drying room was hazy, but it appeared someone may be exposed to vapours. It was pointed out if any exposure was more than 2 or 3 minutes per hour, then increased general exhaust is necessary because of the health hazard.

As it appeared very little consideration had gone into the planning of this room. The company representatives agreed to go over their requirements and on the basis of our suggestions regarding health and safety would redesign the dipping operation.

During the visit we also examined the paint and flammable solvent storage. The room is about 40 ft x 25 ft x 12 ft high. It is equipped with mechanical exhaust at the floor level through 2-10 in. x 6 in. grilles. Total exhaust rate through them is about 1,300 cfm. Make-up air comes through grilles at ceiling level.

Another operation examined was a wire lacquer application. Up to about 30 wires go through about 10-2 gallon capacity tanks of lacquer and then to a tower drying oven. The tower is located about 18 in. above the covered dip tanks. It has an 82 in. x 12 in. opening with an updraft of 350 fpm for a total exhaust of about 2,400 cfm.

.../3

Asbestos is applied to special wire for application in stoves, heaters, etc. The asbestos is carded to a very fine fibrous stage and then rolled or twisted on to the wire. While there is local exhaust applied to the carding operation the rate is very low to prevent drawing the fibres into the system. As a result fibres escape and settle on machines, floor, etc. The operation was not going at the time of the visit, but there were indications that housekeeping needed drastic improvement, and that improved control measures be applied.

Direction to be Issued

(1) Housekeeping shall be improved in the asbestos carding and insulating area.

Recommendation

(1) A further visit be made to check this particular operation when it is going.

H M. Nelson

H.M. Nelson,
Engineering Unit,
Environmental Health Branch.

HMN:jej

# APPENDIX M:

# DOCUMENT FROM THE UNITED ELECTRICAL, RADIO AND MACHINE WORKERS OF AMERICA – PRESENTED TO THE ONTARIO NEW DEMOCRATIC PARTY CAUCUS TASK FORCE ON OCTOBER 5, 1982

February 16, 1983

Ms. Jill Jones
Treasurer - Local 540, 527, 524
United Electrical, Radio & Machine Workers
Of Ontario
203 Reid Street
Peterborough, Ontario
K9J 3P7

Dear Ms. Jones:

The Honourable Claude Bennett, Minister of Municipal Affairs and Housing, has forwarded three briefs to my attention, through the Honourable John Turner's Peterborough constituency office.

As all three briefs fall within my Ministry's jurisdiction, I will be responsible for responding to you directly.

I will, however, ask you for the time that is necessary to respond accordingly. The task is large, but be assured that I will be pleased to answer your briefs after considerable thought and review.

Very sincerely,

R. H. Ramsay
Minister

cc: The Honourable Claude Bennett
The Honourable John Turner

OCCUPATIONAL HEALTH AND SAFETY DIVISION
FEB 17 1983
ASSISTANT DEPUTY MINISTER
FILE No. 83021705

ONTARIO
MINISTRY OF LABOUR
INDUSTRIAL HEALTH & SAFETY BRANCH
FEB 21 1983
OCCUPATIONAL HEALTH & SAFETY DIVISION

Ontario

Office of the Minister

Ministry of Municipal Affairs and Housing

Hearst Block
Queen's Park
Toronto, Ontario
M7A 2K5
416/965-6456

B/F Feb 28
Dr Robinson for action on 2 briefs — Medical Surveillance - Internal Responsibility.
cc Minister
Secret

February 9, 1983

The Honourable Russell H. Ramsay
Minister
Ministry of Labour
14th Floor
400 University Avenue
Toronto, Ontario
M7A 1T7

Dear Russ:

I am enclosing three briefs which were submitted to the Speaker's constituency office following an Availability Day in Peterborough. As the only Minister present, the briefs were sent to me but, since they are within the purview of your Ministry, I am forwarding them to you for response.

Yours sincerely,

Claude

Claude F. Bennett
Minister

Enclosure

cc: John M. Turner, M.P.P.
Peterborough
Speaker
Legislative Assembly

MINISTRY OF LABOUR
RECEIVED
FEB 15 1983
OFFICE OF THE MINISTER
FILE CODE

UNITED ELECTRICAL, RADIO & MACHINE WORKERS OF AMERICA
LOCAL 524 LOCAL 527 LOCAL 540
203 REID STREET PETERBOROUGH ONTARIO TELEPHONE AREA CODE 705-742-3491

Jan 14/83

Mr John M. Turner, M.P.P

re- public meeting held on Jan 14/83

It was unfortunate that we where unable to arrange a time to voice the concerns and issues of our U.E. members. Hopefully there will be another such meeting in the near future where by we will have the opportunity to voice these concerns.

We have left three briefs which we hope you will forward to the appropriate minister concerned.

We would appreciate a written response from ~~these~~ ministers with regards to their feelings ~~and~~ on these matters of great importance to our members.

Sincerely yours

Jill Jones

Treasurer
UE Local 524
453

# B R I E F

Presented To

Ontario New Democratic Party Caucus Task Force

On

Occupational Health and Safety

Medical Surviellance

And

Workplace Monitoring

By The

United Electrical, Radio and Machine Workers
of America

October 5, 1982

This delegation of U.E. members from Peterborough are here to put forward problems encountered with the Occupational Health and Safety Act, as far as monitoring the workplace and investigating health problems of workers.

policy issue

The company where we work, Canadian General Electric, has a company doctor to monitor workers who come in contact with hazardous substances. These workers are told that they have to submit to medical monitoring by the company doctor if they work with hazardous substances. This company monitoring is a complete medical, over and above medicals done by the workers own physician. These medical reports are not kept completely confidential, as the company safety unit (composed of management personnel) have access to these medical reports.

In the case of Cadmium workers who have had high levels of Cadmium in their blood. The company has provided ventilation in all silver soldering jobs, where the Cadmium problem originated. The workers were put on a monitoring system where they submit to continous blood tests for traces of Cadmium, instead of the workplace being monitored. Since the company had put ventilation into operation they assumed the problem of Cadmium was cleared up. One worker still had high Cadmium levels in his blood. This worker was the only operator in this particular silver soldering area, so there was no other worker to compare him to. Since this problem the economic situation has lead to a work shortage in this area and the job has been shutdown.

The Joint Committee has not received any reports on continuous monitoring of these areas, other than the initial tests to substantiate the fact that the workers were being exposed to Cadmium. The committee was involved in the initial setup of testing by the Department of Labour Health Branch. This testing was done after the ventilation system was installed.

In the case of Asbestos workers, medical monitoring was being done on workers and not continous monitoring of the workplace. Again the workers were compelled to submit to complete medicals by the company doctor instead of being given a list of test to have done for Asbestos and sent to their own family physician.

In the case of four workers who worked with cutting oils, the workplace was not monitored. Material Safety Data Sheets on the cutting oil is very vague and gives no real chemical information. But the four workers have broken out with serious skin rashes, some worse than others. They contacted their own physician who sent them to the only skin specialist in Peterborough, who by chance, works in the same clinic as the company doctor. The company doctor along with the skin specialist have concluded that these workers have a hereditary skin disease - all four are different diseases according to the skin specialist.

The cases I have mentioned were brought to the attention of the union members of the committee by the workers involved because they became frustrated and felt that the job was causing their illness. These incidents are not classified as accidents and reported to the Joint Committee. All accidents and incidents reported to the Plant Hospital should be sent to the Joint Committee and the Union members of the committee should be afforded the opportunity to investigate all accidents and incidents. We have questioned 'why' we have to receive permission from the Company's Safety Unit before being allowed to investigate any problem?

As for Designated Substances, workers are again submitted to complete medicals by the company doctor not their own family physician. This is an infringement of a worker's right to medical examination by a doctor of his own choice. Inspectors have interpreted sec. 7-2 (d) (e) of the Regulations on Designated Substances, to mean a company doctor not worker's family doctor.

As for monitoring the workplace, the committee has no input as to what kind of monitoring is to be done on Designated Substances. The committee is informed of test after they are taken by the company's Safety Unit. The company's Accident Prevention Specialist does this testing. This specialist has little to no experience in workplace monitoring and received only a few days training on how to calibrate and use the monitoring equipment.

These cases are to show you the frustration that is encountered by a Health and Safety Committee member representing workers in a large multinational corporation. The company has a complete advisary attitude towards union members on the committee.

The executive of the union along with the Safety Committee members representing the workers have taken our difficulties to the Ministry of Labour. This meeting consisted of area manager, Ernie Chapman and his manager, Jim Nelson. Both agreed there was a problem in the operating of the committee but nothing has been done to correct the problems.

The Act has to be changed in many ways to protect the workers of Ontario.

Material Safety Data Sheets on toxic chemicals have to be more explicit, as to chemicals used in their compounts.

The workers have to be given back their rights, to medical examinations by a doctor of their choice.

With the Act and Regulations as they now stand, companies are trying to set up a perfect work force with the help of a company doctor. These doctors are paid completely by the company.

If a worker becomes ill after a number of years on a job he is removed from the job with no further checks of the workplace. Evidence of this was when a worker had Larynigitis which cleared up when he was off the

[2] welding). This worker's own physician concluded that the fumes welding caused his problem. So the company doctor had him

removed from his job. This worker tried to file a compensation claim through the Plant Medical Services but the Manager of the Plant Safety Unit stopped the claim. The union is now handling the case of the worker.

Medical monitoring is being substituted for workplace monitoring. Workers are still being used as guinea pigs to detect workplace chemical hazards.

We would like to see legislation changed which would force companies to give the workers complete chemical information on hazardous materials.

Workers should have the right to medical examinations by a doctor of their choice where Designated Substances are concerned. These doctors would then send a report to the company stating whether a worker is fit for employment, fit with limitations, or unfit and the amount of toxic chemicals found in the worker's body, if this be the problem.

Joint Committees must be allowed to investigate all accidents and illnesses without any restrictions being placed upon the committee members representing the workers.

This Act was initiated to protect the workers of Ontario. It is being lost in the Political Football Field with Government and Big Businesses - again the worker is coming up on the dirty end of the stick.

# B R I E F

Presented To

Ontario New Democratic Party Caucus Task Force

On

Occupational Health and Safety

"Internal Responsibility System"

By The

United Electrical, Radio and Machine Workers
of America

October 5, 1982

We are told repeatedly by the Department of Labour inspectors that under the 'Internal Responsibility System' our committee is expected to search out, identify and obtain corrective action on any problem in the workplace. These inspectors feel that they need only do a cursory inspection once every six months or so and all other problems will be resolved through committee action.

Although this arrangement looks fine on paper, in real life it is something short of preposterous. As example of how dangerous this sort of program can be, I will give you two instances.

1. In mid 1979, I reported a problem of skin rash among workers on a particular machine using 'Steel Kut Oil'. I was very concerned over the long term risks. At that time I had only limited data on the substance in use, but it is considered carcinogenic and this I reported to the committee.

   Out of that meeting a letter was sent to our Head Nurse to ask that anyone reporting a skin problem from that area be referred to the company doctor immediately.

   We later removed this issue from the minutes under the supposition that the problem was now under expert surveillance.

   Approximately six weeks ago I was doing work on another problem when I ran across a man who is seriously ill from a rash contacted on that job in question. He had lost a months work over his condition although there was no compensation claim involved. Now, over a year later he is still suffering considerably although he has been off that particular job for several months and his condition is slowly improving.

I now have record of five men who have had reactions to the chemical involved. Actually, everyone who I have found to work on it has had a problem, more or less severe.

This man who was severely affected was treated at Plant Surgery several times but never referred to the plant doctor. When I directed him to the plant doctor, the response there, was a refusal to consider any chemical involvement. So much for 'internal responsibility'.

I have called in the Department of Labour and the Department of Health. I also have arranged for compensation claims to be filed through our Union Office.

Incidentally, the symptons this one man is showing are the classic ones that are the forerunner to skin cancer. This could have been avoided if we as union representatives had at least equal authority to our opposites on the committee.

'Internal Responsibility System' is an unworkable premise under the present legislation.

2. May 20, 1980 - I reported an incident at a regular meeting where a worker was seriously poisoned by Toluene solvent fumes. This happened about two hours after I had procured respirator kits for men on the day shift on that job. Even though supervision knew of the extreme concern I had over the job in question, no one bothered to ensure the second shift was wearing respirators.

A brother to the stricken man had died of a stroke several months earlier and so when this worker began feeling similar symptons he panicked and that panic probably saved his health and possibly his life as well. He was off the job and in "Emergency" at Civic Hospital within the hour.

At our next meeting I recounted this accident and made several recommendations to prevent a re-occurrence. These were agreed to by all six people at the meeting.

The company chairman refused to have the minutes typed or distributed.

At the following meeting he identified the passages, that in his estimation, were inadmissable. These I changed to his direction even though I felt it was not necessary.

I rewrote nine pages of minutes and once again he stopped publication of those minutes. They were never allowed to be distributed. I had them typed by the union but when I offered a copy to the Department of Labour inspector, he never accepted them either and refused to comment on the issue at any time.

To this date there have been little or no changes in the handling and use of solvents in our workplace.

In August 1982, I again raised this issue because two workers have suspected nerve damage to their hands, possible from using solvent to wash their hands.

From that meeting a letter was written in bulletin form by members of management and sent to the head of Safety for authorization. That bulletin was reported missing at the September meeting.

From the research I now have on hand I am very concerned that we may be looking at a problem that is far greater and more serious than most people suspect. Management's seeming reluctance to deal squarely with the issue might be more than carelessness or a careless attitude.

Solvents such as Toluene often have benzene as a contaminent, and so should be treated as a possible carcinogen

During the five years of our committee only two or three items have been forwarded by management. All of these (perhaps three) came from the company hygienist who resigned and left the company shortly after his submissions.

It is obvious to union representatives that we have to do the job by oursolves. Only by searching out the problems and securing the facts and then, more or less threatening the company, can we be sure of getting rectification on many problems.

This sort of constant warfare is too trying on the individuals concerned. We need more and better legislation with equal authority vested in union representatives as well.

Ministry of
Labour

Toronto, Ontario M7A 1T7.

Telephone: (416) 965-3211

March 15, 1983.

Dr. W. R. Paul,
Manager,
Occupational Health,
Canadian General Electric,
1420 Dupont Street,
TORONTO, ONTARIO.
M6H 2B2

Dear Bill:

Re: C.G.E., Peterborough

Please find attached copies of two briefs presented to the Ontario NDP Task Force in October 1982 by the United Electrical, Radio and Machine Workers of America.

They were referred to Mr. John Turner, MPP for Peterborough by Miss Jill Jones, Treasurer, U.E. Local 524, 527 and 540 on January 14th, 1983, with a request for a written response by the appropriate Minister. The Minister of Labour advised Miss Jones on February 16th that he would respond when he had fully reviewed the subject matter.

The concerns seem to apply to the C.G.E., Peterborough plant and most of the responses will need input from you and C.G.E. staff. Also attached are a series of questions raised by a member of Dr. Robinson's staff.

It would be appreciated if you would review these documents and as soon as it is convenient contact Dr. Debow of this Branch so that he and Dr. Waddell, the Occupational Health Branch field Consultant, may meet you and any other persons to prepare a response for use by the Assistant Deputy Minister and Minister.

Your help and cooperation will be very much appreciated.

With kind regards,

Yours sincerely,

Peter L. Pelmear, MD, FFOM, CCBOM,
Director,
Occupational Health Branch.

Mtg arranged for April 13 c̄ W.R. Debow + Waddell

PLP/bc
Attach. - discussed him. concerns.

c.c. Dr. G. Debow
Dr. W. Waddell

Ministry of
Labour

March 11, 1983



MEMORANDUM TO: Dr. P. Pelmear
Director
Occupational Health Branch

FROM: Leona Lang
Executive Assistant
Occupational Health & Safety Division

RE: CGE Peterborough

---

Please review the attached briefs on Medical Surveillance and Workplace Monitoring (Brief # 1) and the IRS (Brief #2) and provide the answers for the following questions. I have been asked to prepare a response for the Minister. A reply would be appreciated as soon as possible.

**Brief #1: Medical Surveillance and Workplace Monitoring**

(1) Are there any control programs in place in this company? for what substances? Do the terms of the program(s) require a medical by the company doctor? Was the health and safety committee involved in setting up the control programs and agree to the choice of doctor for medical surveillance? Do the workers have the right to a medical by a personal physician in the case of (a) regulated substances (b) other toxic substances (ex. cadmium?) What is the company's policy with respect to the choice of physician for medical monitoring?

(2) Cadmium (page 1)

- During what period did the company conduct silver soldering?
- Was the operation shut down? When? In all parts of the plant?

- When were the workers put on continuous monitoring for cadmium?

- What did monitoring include? Was monitoring done by the company and the Ministry of Labour?

- How many workers had blood levels, when?

- There was air sampling for cadmium done by Occupational Health Branch on March 24, 1982 in the coil winding department in Bay 13. Was this the first time this was done? Was there any continuous or follow-up monitoring?

- Has Occupational Health Branch ever investigated a cadmium problem previous to March 24, 1982?

- Why did it take until September 24, 1982, (6 months later) for the Occupational Health Branch report to be completed?

- When was ventilation installed (for cadmium)? Where? Was it effective in lowering cadmium levels in blood? If not — why not? If yes — how effective?

- Do workers wear respirators for cadmuim operations? - (before and after the incident)

- Did a worker still have high cadmium levels in his blood after the ventilation was installed? What level and when determined? How is he now? What were air cadmium levels before and after ventilation?

-Was there any monitoring on other workers done after the high blood level was obtained after the ventilation was installed? if not - why not?
if yes, when?

(3) <u>Asbestos</u> (Page 2)

- Did Occupational Health and Safety Branch do any bulk samples or Air Quality Assessments for asbestos — when? results? What areas?

- What is the nature of the asbestos work done? Before? Now?

- How many workers had to have complete medicals for asbestos? By Who? When? Any positive results?

(4) <u>Cutting Oils</u> (Page 2, Brief #1) (Page 1-2, Brief # 2)

- When did the operation using cutting oils commence and when did rashes start appearing? How many are/were exposed to cutting oils. How many had rashes?

- Did the company physician ever see any of the workers with skin rashes? Is it true that the man who was severely affected was treated at Plant Surgery but never referred to the plant doctor? If not why not? Is he still employed? What is his condition now? Does the company doctor have any medical records on the 5 cases of skin rashes? (Page 2 Brief #2) Are the symptoms displayed in this one case a forerunner to skin cancer?

- The Occupational Health Branch investigated for a skin rash claim on March 17, 1981 — no orders suggested —no further action —why? (If workers had reported this problem to company since 1979?) — (this information is needed to answer the question as to why the workplace was not monitored)

- The Occupational Health Branch investigation of September 14, 1982, resulted in advice to the Occupational Health Branch re cutting oils — and the company agreed to change the cutting oil. Has the company changed the oil? —has this been verified by Occupational Health Branch or Industrial Health and Safety Branch?

- Can you provide information on the workers who have hereditary skin rashes? Can we prove these rashes are not occupationally related? (I presume this information cannot be released in any subsequent response I prepare?)

- What are the chemical components of Steel Kut Oil? Is it carcinogenic?

(5) Monitoring

I understand there are no provisions under the designated substances regulations for health and safety committee input regarding the kind of monitoring to take place or worker rep accompanyment during monitoring by the company (is this correct?)

In the case of sampling and testing by Occupational Health Branch — can we confirm that worker reps accompany the hygienist?

Can we confirm who does the monitoring for the company? Does the company Accident Prevention Specialist do the monitoring and what are his/her qualifications?

In order to answer the allegation that medical monitoring is substituting workplace monitoring it would be helpful to have a brief outline on all sampling done by Occupational Health Branch in past 5 years-for what? Any way we can determine what kinds/frequency of monitoring done by the company?

(6) Welding Fumes (Page 4)

- Has Occupational Health Branch done any investigations for welding fumes? What areas? When? results?

- Is there proper ventilation for welding? Is it in use? Did Occupational Health Branch ever suggest orders for ventilation for welding. Do welders wear respirators? Is it necessary ? or does ventilation clear the fumes. Did this particular worker wear a respirator prior to his laryngitis? Are they available if needed?

- Any information available on the Manager of the plant safety unit stopping a WCB claim for welding fumes? (p. 5) - if not, can we obtain this information? What is the conditin of the patient now?

- Did the company doctor remove him from the job? When? For what reason? Was he given another job?

- Frequency of monitoring by company for welding.

**Brief # 2 Internal Responsibility System**

Toluene (or toluol) (page 3) I 've seen it spelled both ways - which is corrrect? Are they two different substances? What is toluene used for? Is it still in use? When discontinued?

When was the worker allegedly "poisoned"? Was he hospitalized? How is he now?

Was his illness attributed to toluene?

Has there ever been air sampling for toluene? When? Results?

Is it a possible carcinogen? (benzene?) (Page 4)

Are there any other solvents in use in this workplace -how are they handled? (page 4, Brief #2)

Any information on two workers with nerve damage to hands from washing hands with solvents? Are rubber gloves and respirators routinely used when workers use toluene and during the use of other solvents?

Leona Lang

Leona Lang

Ontario
Ministry of
Labour

# Memorandum

To: Dr. P. Pelmear,
Director,
Occupational Health Branch,
Toronto.

Date: 1983 April 22

From: Dr. W. R. Waddell, M.D.,
Medical Consultant,
Occupational Health Branch,
Kingston.

File:

APR 26 1983
DIRECTOR
OCCUPATIONAL
HEALTH BRANCH

Re: C.G.E. Peterborough

---

On 83/04/13, a meeting was held at C.G.E. - 1420 Dupont Street in Toronto to address the concerns raised by the U.E. about C.G.E. Peterborough in briefs presented to the Ontario N.D.P. Task Force on Occupational Health & Safety on 82/10/05.

Present at this meeting were: -

Dr. G. Debow, O.H.B. Toronto
Dr. W. Waddell, O.H.B. Kingston
Dr. W. Paul, Corporate Physician - C.G.E. Toronto
Mr. R. Hosein, Corporate Hygienist - C.G.E. Toronto
Dr. D. Curtis, Plant Physician - C.G.E. Peterborough
Mr. R. Bergey, Occupational Health & Safety Manager - C.G.E. Peterborough
Mr. L. Ball, Safety Analyst - C.G.E. Peterborough

Page #1, item (1)

Most of the points raised in this paragraph are covered in Dr. Curtis' letter of 83/03/23 (copy enclosed). In the 4½ years that I have dealt with this company, I have found that they monitor both the workers and the workplace. Such monitoring is done as needed depending on their assessment of the hazard. I am aware that programs exist for lead, mercury, asbestos, beryllium, uranium, cadmium, trichloro-ethylene, MOCA, silica and wood dust. As outlined in Dr. Curtis' letter, the company is flexible in terms of the choice of a physician by the workers.

Page #1, item (2) Cadmium

See Dr. Curtis' comments on pages 4 and 5 of his letter.

To my knowledge, C.G.E. Peterborough has conducted silver soldering for decades. The matter came to my attention during a visit on 81/04/09 (see O.H.B. File #41781CMOW - copy enclosed).

The operation was not shut down. The provision of local mechanical exhaust ventilation at all silver soldering operations throughout the plant was suggested with an appropriate order. It is my understanding, that this order was issued and complied with by the company within a short time of its issuance. Cadmium exposed workers were examined for evidence of cadmium toxicity within several months of the time of my visit of 81/04/09. I think the monitoring included a medical examination to include the determination of blood cadmium and urine cadmium levels. The necessary specimens were taken under the supervision of the plant medical department. The actual determinations were done using both private laboratories and the Occupational Health Laboratory. More than 100 workers had cadmium levels determined in the course of this screening procedure.

I also addressed cadmium exposure in this plant during a visit of 82/01/27 (see O.H.B. File #46782AMOI - copy enclosed). E. Stefov addressed cadmium exposure in the plant on 82/03/16 (O.H.B. File #13582CEAA - copy enclosed). O.H.B. did an Exposure Assessment for cadmium in the plant on 82/05/17 (E.A.R. #34082CAOB - copy enclosed). C.G.E. hired a private contractor to do an Air Quality Assessment for cadmium at one work station in the plant in November 1981 (see comment #5 O.H.B. File #46782AMOI). I have no knowledge of previous O.H.B. Air Quality Assessments for cadmium in this plant but my records only go back 4½ years. I am not aware that the company has done any continuous or follow up monitoring. I am not aware that O.H.B. has ever investigated a cadmium problem previous to 81/04/09. I do not understand the meaning of the first question at the top of page 2 of Ms. Lang's questionnaire. My first visit to the plant re cadmium was on 81/04/09 and the report of that visit is dated 81/04/15. Similarly, my visit of 82/01/27 is dated 82/02/01 and E. Stefov's visit of 82/03/16 is dated 82/03/19. The Air Quality Assessment of 82/05/17 is dated 82/06/09.

As stated above, mechanical exhaust ventilation was installed at all silver soldering stations within the plant shortly after the cadmium problem became evident in April 1981. As cadmium has a half life in the body of about 10 years, it is unrealistic to expect the installation of ventilation to lower blood cadmium levels in a short time. In fact, blood cadmium levels are not a particularly good indicator of recent cadmium exposure and the question would better be addressed to urine cadmium levels. In any case, it will be some time before elevated cadmium levels return to normal.

When I examined the first work station involving cadmium on 81/04/09, the worker involved had only just been supplied with respiratory protection. Previous to this, he had worn no respiratory protection. Subsequent to this he did wear respiratory protection as did one other cadmium exposed worker whose urine cadmium was found to be elevated.

I do not believe that the initial worker of the visit of 81/04/09 ever did have an elevated blood or urine cadmium level. One worker at another silver soldering station, was found to have an elevation of both blood and urine cadmium. The actual results of this testing are considered medically confidential. The remainder of the questions in this particular sub-paragraph are addressed in either Dr. Curtis' letter or my own Field Visit reports. The patient was well when his high urine and blood cadmium levels were found and that to my knowledge, he remains well to this day.

The next sub-paragraph has also been addressed in previous comments and/or documentation.

Asbestos

The asbestos hazard was assessed by O.H.B. personnel on a number of occasions in the past 4½ years (see O.H.B. File #14079DEAA; 21179EEAB-M; 12479GMOB; O.H.L. #17583; 01880BEOB-M and 29782DMOW - copies enclosed). Both Bulk Samples and Air Quality Assessments for asbestos were done as per the attachments. The nature of the asbestos work done is also described in the attachments. At the present time, the only asbestos in the plant is present in the form of old pipe lagging. I believe that 400 workers have had medicals for asbestos by Dr. Curtis within the past several years. I am aware of only 1 case of asbestosis at C.G.E. Peterborough.

Cutting Oils

See O.H.B. File #09079EMOG; 18179EEOB-M; 36681AMOW; 18782IXAA; O.H.L. #19663 - copies enclosed. To my knowledge, the company has used cutting oils for decades. There is some controversy about when the rashes appeared. Dozens of men would have been exposed to cutting oils at various locations throughout the plant. For the plant in general, I have no idea how many have had rashes. Dermatitis, is of course, extremely common in oil exposed individuals. The specific incident mentioned in the brief involves visit #18782IXAA. Three workers were said to definitely have a dermatitis. Two of these dermatitides were not occupational in orgin.

I believe the company physician did see the workers' skin rashes. The remainder of this sub-paragraph is addressed in Dr. Curtis's submission. It is my understanding that the worker who did develop a definite cutting oil dermatitis is well and working at the present time. I do not believe that

Dr. Curtis felt that this man's dermatitis appeared to be pre-cancerous.

No orders were suggested with regard to the skin rash concern of March 1981 (#36681AMOW) because no definite cause for the dermatitis could be identified and the use of the coolant appeared to be within acceptable practices of industrial hygiene.

It is my belief that in fact the cutting oil incident #18782IXAA resulted in the oil being changed within a few days of the time of the visit. This has not been verified by the Occupational Health Branch and I cannot speak for the Industrial Health & Safety Branch. I was told by Dr. Curtis on the telephone that the company had changed the oil.

The workers with the "hereditary skin rashes" were not present at the time of the visit. One was said to have vitiligo and the other is said to have systemic lupus erythematosus. I do not believe that these diseases can be occupationally related to cutting oil.

The safety data sheet for Steel Kut Oil is attached. It does not mention carcinogenic properties. In general, it is wise to minimize skin contact with oils because of the carcinogenic properties of some.

Monitoring

The first subsection under monitoring would better be addressed by the Legal Branch or the I.H.S.B. For the past year I have requested that our A.Q.A. technician make a Union contact while making a plant visit such that some input into the testing procedure might be made. Mr. L. Ball, makes it a practice to have a Union Rep with him when he does short term Drager tube testing.

Subsection 3 - Mr. Ball does the Air Quality Assessment for C.G.E. Peterborough. He has a background of some length in the safety field. He has received a one week training session in C.G.E. - Toronto. He works under the direct supervision of the corporate hygienist, Mr. R. Hosein and it is Mr. Hosein's belief that Mr. Ball's work is accurate and reproducable.

Subsection 4 - This question is so broad as to defy a simple answer. The Occupational Health Branch has done a variety of air sampling in the plant over the past 5 years (the attachments represent only some of the work which has been done). The kind and frequency of the testing done by the company is governed by their perceived needs. The question of medical monitoring vs workplace monitoring is subject to endless debate. Because toxic agents can enter the body via inhalation, ingestion and skin absorption, it should be obvious that monitoring the workplace air cannot completely replace medical monitoring now or ever.

<u>Welding Fumes</u>

See O.H.B. File #00979AEAA; 18079BEAB; 29082HMOW and 18982KAOB - copies enclosed.

The Occupational Health Branch has investigated welding fumes - see attachments.

There is proper ventilation for welding. Sometimes the workers do not use it. To my knowledge, the Occupational Health Branch has not suggested orders re ventilation for welding. The welders do not wear respirators. It is not necessary. The particular worker did not wear a respirator prior to his laryngitis. Respirators are available.

Mr. Bergey denies having stopped any claim for compensation for welding fume. Such claims for compensation are initiated by the family physician and have nothing to do with Mr. Bergey. I believe that the patient is fit at the present time.

As noted in my Field Visit report, the patient went back to his old welding job.

I do not know the frequency of the monitoring by the company for welding fume.

<u>Toluene</u>

See O.H.B. File #05880GMOW. Both toluene and toluol are correct. They are the same substance. Toluene is used for many purposes, most often as a solvent. It is still in use.

The worker was exposed to toluene fumes on 80/05/07. He was hospitalized. I do not know his present condition.

His illness was not directly attributable to toluene.

No air sampling for toluene was done. The operation involved in this incident is very intermittent. If proper work practices are followed, toluene exposure would be minimal.

Toluene can contain trace amounts of benzene. Benzene is suspect of carcinogenic potential for man.

Many other solvents are in use in this workplace. They are handled according to the hazard controls outlined in their respective safety data sheets.

The last sub-paragraph involves health complaints which are unknown to me or to the plant physician. Impermeable protective clothing and respirators are worn when required as a hazard control as outlined in the appropriate safety data sheets.

W. R. Waddell, M.D.,
Medical Consultant,
Occupational Health Branch.

WRW/pc

Encl.

Ministry of
Labour

Telephone: (416) 965-3211

March 15, 1983.

Dr. W. R. Paul,
Manager,
Occupational Health,
Canadian General Electric,
1420 Dupont Street,
TORONTO, ONTARIO.
M6H 2B2

Dear Bill: Re: C.G.E., Peterborough

Please find attached copies of two briefs presented to the Ontario NDP Task Force in October 1982 by the United Electrical, Radio and Machine Workers of America.

They were referred to Mr. John Turner, MPP for Peterborough by Miss Jill Jones, Treasurer, U.E. Local 524, 527 and 540 on January 14th, 1983, with a request for a written response by the appropriate Minister. The Minister of Labour advised Miss Jones on February 16th that he would respond when he had fully reviewed the subject matter.

The concerns seem to apply to the C.G.E., Peterborough plant and most of the responses will need input from you and C.G.E. staff. Also attached are a series of questions raised by a member of Dr. Robinson's staff.

It would be appreciated if you would review these documents and as soon as it is convenient contact Dr. Debow of this Branch so that he and Dr. Waddell, the Occupational Health Branch field Consultant, may meet you and any other persons to prepare a response for use by the Assistant Deputy Minister and Minister.

Your help and cooperation will be very much appreciated.

With kind regards,

Yours sincerely,

Peter L. Pelmear, MD, FFOM, CCBOM,
Director,
Occupational Health Branch.

PLP/bc
Attach.

c.c. Dr. G. Debow
Dr. W. Waddell

21.3.83

Canadian General Electric

EMPLOYEE AND
COMMUNITY RELATIONS
SECTION

107 PARK STREET NORTH, PETERBOROUGH, ONTARIO, K9J 7B5 — TEL: (705) 748-8486

March 11, 1983.

Dr. W. R. Waddell,
Ministry of Labour,
400 University Avenue,
Toronto, Ontario.
M7A 1T7.

c.c. Bob Bergey
Bruce Martin
Jim Gooley

Dear Dr. Waddell,

Thank you for your phone call the 10th of March 1983. I am deeply disappointed in the UE letter to the minister re: confidentiali in Peterborough.

As I indicated to you on the phone and have stressed through our Plant Medical Services, confidentiality to me is critical.

Plant Medical Services in Peterborough is a self contained unit. The only keys for Plant Medical Services are with Joyce Mather, Head Nurse, and myself. The only time there is access to Plant Medical Services is when there is a nurse or myself here. Security does not have a key to Plant Medical Services. In addition to this we have our records located in the nurses's office. This door is locked when we go out of the building. The locking of the medical records has been a standard procedure from the day I arrived here. When we realized that we would have to leave some charts out such as charts on the receptionist's desk for work the next day, we change the locking systems so there is no access to this building unless there is nurse supervision.

Joyce Mather and I have been meeting twice a year with the full executive of the UE, without any management people present. During these meetings over the last three years I have tabled with them for discussion, the paper on confidentiality which reflects my approach to relationships here at CGE Peterborough. In addition to this we have explained to the union how we are approaching attempting to maintain confidentiality.

The most disturbing part about your phone information, Dr. Waddell, is that I have never been questioned at these meetings about our confidentiality or how we are handling ourselves.

..../2

29.3.83

CANADIAN GENERAL ELECTRIC COMPANY LIMITED

Rec'd Mar. 28/83

Canadian General Electric

continued.......

About a year ago we brought all personnel files down to Plant Medical Services and retrieved all medical information that was in them. I can recall being questioned probably two or three times in the last year, particularly by union representatives who are going out with employees being bumped on 1310 about confidentiality but my understanding the explanations being received have always been satisfactory and in fact are not causing any universal grief.

I am disappointed that the UE have elected to use this approach rather than come directly with their concerns. We are more than happy to meet with any of them to talk about individual cases and to try and rectify things. I assure you that if there is a leak of information from here I want to know about it and it will be stopped. I also want to assure you that I have no knowledge of information of "leaks" from Plant Medical Services to management.

As I indicated to you on the phone I would be interested in seeing a copy of the letter UE wrote to the Minister. I did not receive a copy. I would also be interested in a copy of the minister's reply.

I hope the above information is some help to you. Thanking you again I remain,

yours sincerely,

Dr. D. D. Curtis,
Consultant,
Plant Medical Services.

DDC/bam

APP 3060A

Canadian General Electric

EMPLOYEE AND
COMMUNITY RELATIONS
SECTION

107 PARK STREET NORTH, PETERBOROUGH, ONTARIO, K9J 7B5 — TEL: (705) 748-8486

March 23, 1983.

Peter L. Pelmear, MD,FFOM,CCBOM,
Director,
Occupational Health Branch, Ont. Ministry of Labour,
Occupational Health and Safety Division,
400 University Avenue, 7th Floor,
Toronto, Ontario.
M7A 1T7.

Dear Dr. Pelmear,

I received a copy of your letter to Dr. Bill Paul the Corporate Medical Director of GE. We appreciate you sharing the copy of the two briefs presented by the United Electrical Radio and Machine Workers of America in October 1982. During October and November we certainly had lots of indications in Plant Medical Services that in fact some briefs had been prepared and presented but this is the first opportunity I have had to see and review the actual material presented by the UE.

When Dr. Waddell called me about a week ago indicating that there would be some material table on the floor concerning confidentiality in Peterborough, I wrote an immediate reply and that reply still stands.

I would like to stress to you that I came to CGE about five years ago new to occupational medicine but well seasoned in dealing and working with medical care delivery systems. I have been heavily involved in all organizational levels of medicine and spent a large part of my time as "Chief of Staff" of Peterborough Civic Hospital. My initial presentation to GE was on the confidentiality of medical materials. Because of our large nursing staff here at GE Peterborough we have spent a lot of time here internally discussing confidentiality.

In addition, long before I came on the scene, CGE Peterborough was committed to a good level of Plant Medical Services delivery and monitoring. They have had detailed monitoring programs in place for beryllium and uranium for about twenty years. They have also had lead and mercury under surveillance for a number of years prior to 1978. The company has provided when the work force was suitable, 24 hour a day seven day a week nursing coverage with immediate doctor availability. Dr. Thompson, an internist, Dr. Dalton, an internist and Dr. Cyril MacIsaac are three community doctors who have had input into CGE prior to my arrival here.

....2/



13.4.83

Canadian General Electric

continued.......

Dr. Trossman has done beryllium and uranium examinations for approximately ten years for CGE.

There's a few important points that should be made here:

1) The employee in fact does have the option for any designated or non-designated substance where examination is required to go to his family doctor and have this examination done. In fact our receptionist here will set up the appointments for the employees to have this done. We would have, at peak working time, approximately 400 people under surveillance for beryllium and uranium plus 120 for cadmium, 10 to 15 for lead, some 20 in the Plating department where there are problems with inhaled products and some 40 to 45 welders. Approximately 1/3 of these people will see Dr. Trossman for their medical. Approximately 1/3 will come here to Plant Medical Services and will be seen by myself. The remaining 1/3 go to their own family doctors for their medicals.

2) We have set up a full release of information series of forms and we use these diligently. We are quite prepared to share with the family doctor, with the employee, or with the employee and a union person if they come together, any of the information or material we collect. I am sure history will document here, that this is in fact correct. My committment to any employee partaking of either the paramedical or the medical surveillance in the CGE is to contact him directly if anything is abnormal or out of line. I have endeavored to do this 100% of the time.

3) One of the points that I have held to and I think will probably be justified and I am sure this causes some concern within the working force of CGE is that paramedical services of surveillance will be done through Plant Medical Services. There is both a quality of care and a cost factor to this, To give you an example we have three large laboratory units in the city of Peterborough. All three units have to send material outside to places such as London Lab to get some of the work done. The normal readings, the method of reporting and the alerting of abnormal readings are all handled differently by each institution. My committment to CGE is where possible to use Ministry of Labour services such as for urine leads, urine berylliums etc. For the rest of the services we need some direct input into the provision and the quality of care. As indicated in #2 we are quite prepared to share these with the employee, with the employee plus a union representative or on signed release of information to the employee's family doctor or if he wishes, directly to the union.

....3/

ontinued....

4) Running through these two briefs seems to be the theme that union people have not been involved. I would like to stress to you as I did in confidentiality that in fact I feel they have been heavily involved. I have met with the UE executive in entirety two times a year over the last three years. There has been no management attending these meetings. I have outlined to them my goals and objectives for the year that I have presented to management and have had their input. In addition to this as each designated substance or each substance such as cadmium that has caused us concern, I have met with the health & safety people and have given them all the information I have. I make copies of any reports that I have that I am working on and I have also given them all the background material that I have access to. The peculiar thing is that they have done the same for me. I think it is fair to say that if it hadn't been for one of the health & safety workers the cadmium may have gone unnoticed for another 6 or 8 months. In that instance I am very proud of the way Plant Medical Services and the Health & Safety group reacted in the City of Peterborough. I think in fact we have demonstrated some leadership and to stress again that the Health & Safety people from UE were heavily involved in that.

5) In the second paragraph of the initial presentation it is implied that medical records are not kept confidential and the company's safety unit have access to those medical reports. This is not true. Safety people have no access to medical records.

6) There is a running theme through the report that the quality of monitoring done by some of the Health & Safety committee is not adequate. It is true that we had a hygienist here until about two years ago. I would like to stress to you that I have direct access to an industrial hygienist through corporate GE with a Dr. Roly Hoseine. He has with him additional staff that we have called in here from time to time to help us. Dr. Hoseine has been liberal with his time and extremely wise with his advise. While we have missed having a hygienist here in the last couple of years management has indicated, and I have supported the fact the type of person that comes in here that is a hygienist is very critical. The right person has not been available to this time. The past two years we have had lots of input from Dr. Hoseine and Larry Ball has done an exceptionally fine job in terms of the air monitoring. I would support the quality and the integrity of his work.

4/.....

continued.........

With these six basic points in place let me try and address the questions you have asked. I will not repeat the above information.

<u>From brief #1 - point #1</u>: We have control programs for beryllium, uranium, lead, mercury, noise, trichlorethlyene, cadmium, plating, epoxies, asbestos and to a small extent, welders. Medical delivery system is outlined in the above items. The Health & Safety Committee has been heavily involved in setting up any new control programs. The employee has the rights as listed in the points above.

<u>Cadmium</u>: Silver soldering is an on-going process when within the CGE Plant. We found a silver solderer about two years ago who developed pneumonitis which we were able to track down and relate to cadmium in the solder. Appropriate air sampling was done, urine sampling done, blood sampling done, masks supplied, work site re-arranged and on-going monitoring. In this particular instance we continue to see the worker on this job regularly for urines and yearly for blood and physical examination. This gentleman has elected to come to Plant Medical Services for his medical. The operation was not shut down. On tracking through the use of silver solder, we found some 8 to 10 places in CGE where silver solder is used. The heavy users of silver were put on a urine, blood monitoring and yearly physical examination and those people in the surrounding area were surveyed with urines. We continue to monitor these work sites. We occasionally from time to time have mild rises in urine cadmium at which time the safety representative and myself will go to the work site and try and determine the cause. Monitoring includes cadmium levels at the work site, cadmium urines and bloods in the worker and physical examination. From time to time approximately 20 workers would have had blood levels done. The work done in March 24/82 was to confirm the follow ups and problems we were having. There has been intensive follow up in monitoring. The occupational health branch through Dr. Waddell has been notified of our handling of cadmium. I cannot explain to you why it took the Occupational Health Branch about six months to complete the report. The initial episode was handled and worked on within the first two weeks. I can assure you that we continue to run into spots where cadmium is being used and having to set up new parts of the program. I would like to stress to you that the company has made a committment to try and remove the cadmium silver soldering if possible. They have spent a lot of time and expense in the last year experimenting with solder without cadmium. Ventilation has been upgraded, I would indicate in some areas, a great expense, and has been extremely affective in lowering cadmium levels in the blood. Workers do wear respirators for cadmium operation. This was not so, prior to the incident or should I say rather it was not enforced prior to the incident but certainly is now.

5/......

continued.......

We have one worker, and I have shared this with Dr. Waddell from the time we got into this, who continues to run high urine and high blood. The Ministry of Labour came in and did some comparative samples to be sure there is no obvious problem in the vicinity. This gentleman is an extremely good employee who does not smoke, eat, or drink in his work site and handles himself very well. We are unable to explain the cadmium in his blood and urine. In addition to this following three weeks of holiday time at Christmas, his urine and blood cadmium were higher than they were before. Following up on this we had his house reviewed and family, with their consent, all sampled for cadmium. In addition to this I have shared all this information with this gentleman's family doctor and with the family doctor, negociated to have Dr. D. Boyle, an independant internist who deals in endocrinology, see this gentleman. I have shared all the information we have on cadmium and we meet with this gentleman on a regular basis and he continues under intensive monitoring. All this material has been shared with Dr. Waddell. The on-going monitoring is intensive until we are sure the bloods return to a normal level and the urines are within normal level. As with other monitoring as we start to get acceptable values then the surveillance time is spread out. The majority of people involved in cadmium at the present time are having urine test done about once every three months. If in fact their urine is up then they are brought back for a repeat urine and blood.

<u>Asbestos</u>: Asbestos was under surveillance at the time I came to Plant Medical Services. A lot of asbestos used to be used & the committment was to remove all asbestos from the work place. My understanding is there is a very minimal amount of board asbestos available at the present time. There is one brand of wire that has some asbestos in the insulation. In addition to this we have a large number of pipes that are covered with asbestos. We have done medicals chest x-rays, and pulmonary functions on those people exposed in any way to asbestos. This included minor things like using asbestos aprons and asbestos gloves. To my understanding there was one gentleman with chronic obstructive lung disease who was contesting the fact that he was turned down as not having asbestosis.

<u>Cutting Oils</u>: This is an extremely interesting problem and in fact was all documented with Dr. Waddell. Although the union indicates many cases there were in fact three cases presented here. All three were seen after discussion with the family doctor by Dr. Ryan. It is my understanding that the diagnosis in the first gentleman was vitiligo. The diagnosis in the second gentleman was systemic lupus. The third gentleman while he did not have a rash when he came to see me he certainly gave a history of a oil conpatible rash on his groin. This had settled down completely. You should understand that these gentlemen were seen here, were seen by their family doctor, and then were seen by Dr. Ryan.

6/.....

continued.......

Dr. Ryan is a dermatologist who practices in the same building as I do and I can see while their may be some concern from the union point of view of collusion but in fact Dr. Ryan was agreed to by the family doctors of the employees involved. I realize through employees coming to Plant Medical Services in fact this problem had not been cleared up. I invited the three Health & Safety workers from the UE to discuss it. I tried to outline for them the reasons for my stand and the support that Dr. Ryan was giving and also support from the three family doctors. I offered them any independant outside opinion that they would like to get. They were not prepared to indicate an outside expert source. It is my understanding that they have referred this on to Workmen's Compensation and I cannot tell you the outcome of it. I will have to check on the chemical components of still cut oil to see if it is carcinogenic. My recollection is that there were some warnings about the use of the oil and because of this the oil was changed approximately a year ago.

Monitoring: As indicated in the preamble, members of the Health & Safety committee have a direct input into the medical monitoring. From the time a substance is identified, they have all the input that I can give them. It is my understanding that sampling and testing by the Occupational Health Branch worker representatives accompany the safety people. I would like to stress that medical monitoring only supports work site monitoring only supports work site monitoring. The air sampling for beryllium, trichlorethlyene, asbestos, cadmium etc. all play a part in our program.

Welding Fumes: (Fumes from products with vinyl chloride and trichlorethlyene drifting through the welding arc have had extensive follow up here.)

The worker who indicated respiratory problems was never pinned down as a Workmen's Compensation type of incident. The ear, nose & throat doctor said that because of circumstantial evidence he probably should be removed from his job.

A brief explanation of company doctor removing anyone from job. It has been an agreed to policy that where limitations are given to Plant Medical Services either from the family physician, a specialist referral, workmen's compensation etc. that these recommendations will be discussed with the employee plus a union representative and I will do my best to explain to him what will happen if these recommendations are in fact implimented. Once there is agreement among the employee, the union representative and myself in terms of what they will mean then these are written down ~~and are~~ a particular of his medical chart indicating that these are limitations. On this basis alone the employee is transferred out. My feeling is in this case the doctor in charge continued.....

of the case was relectant to say this was related to welding fumes. I presume this is why it was not put through as Workmen's Compensation but would look to the Workmen's Compensation people in the building to answer that. The surveillance of welding at CGE in Peterborough varies from very intense in some areas to hardly any at all. It is one of our objectives in the year 1983 to bring all welders under surveillance. This is going to take us a little time to get in place. It will be in line with the inclusion of chromium etc. in the use of 11 new substances suggested for regulation.

Brief #2:

The allegedly poisoned worker in toluene ( Lynden Jackson ) was taken to St. Joseph's Hospital. I was allerted within a few minutes of this happening and called the family doctor and the neurologist in charge of the case. It is my understanding that this gentleman had finished his shift and in fact was taken to the hospital within the five or ten minutes of his quiting time. His illness was not attributed to toluene: It was attributed to small vessel disease. There are a lot of solvents including trichlorethlyene [illegible] in the work place. We have spent a lot of time dealing with these. We have sent out brochures to employees requesting that they use the standard cleaning agents rather than the solvents. We have done a lot of in-service education with first line managers. We have reviewed all the cleaning agents within the Plant to make sure they are capable of doing the work they are supposed to do. I have no information on nerve damage from washing hands with solvents. There is no doubt that they are defatted and a lot of time much more suseptable to epoxy and other rashes. Where necessary gloves are available for solvent workers and certainly respirators are supplied for people who have to work with toluene.

I want to thank you for the opportunity of replying to these two briefs. Any other information I can obtain for you I would be more than happy to.

Yours sincerely,

Dr. D. D. Curtis,
Consultant,
Plant Medical Services.

C/bam

30A

# APPENDIX L

**1/47 — #8 — EAD**
- ead hazard recognized

**10/47 — #12**
- from Bulmer
- Mercury handling poor - estrict nhy to es in this rk area ly no Eating nere!

**06/66 — #10**
- Cab-O-Sil - 97.8% $SiO_2$
- HiSil - 85.5% Free $SiO_2$

**09/66 — #1 — ASBESTOS**
- from = Nelson
- poor asbestos carding conditions
- local exhaust very poor
- need improved control for fibres and housekeeping

**05/68 — #4 — LEAD**
- from - Nelson
- local exhaust recommended
- 3 overfilled dross buckets
- employees eating in area
- poor housekeeping

**01/71 — #9 — ASBESTOS + POWDERS**
- from - RAJHANS
- MICA - 5.3% free $SiO_2$
- PYRAX - 65.8% free $SiO_2$
- TLV Pyrax = 3.5 mppcf used in 2 places
- poor asbestos housekeeping.
- Free $SiO_2$ in TALFIL is 66.9%. Similar to Pyrax A. no care taken with this powder
- about 500 lbs of Asbestos used/day.
- stated company not aware of Asbestos hazards!
- consider replacing TALFIL + PYRAX A!

**04/71 — #6 — POWDER**
- From: RHODES
- no asbestos detected? ?
- ↑ lead pthalate
- stated no TALFIL X
- PYRAX > TLV!
- PYRAX - 66.3% Free $SiO_2$

**07/71 — #2 — POWDER**
- from = NELSON
- HISIL - 97.7% Free $SiO_2$
- PYRAX A - 66.8% Free $SiO_2$
- TALFIL 325 - "Asbestos-like with 1.5% Free $SiO_2$ ??

**09/71 — #3 — POWDER + ASBESTOS**
- from Nelson
- Asb. Carding - ↑ DUST fund
- HiSil + Pyrax - ↑ TOXICITY
- confusion HERE TALFIL is in same category of MICA?

**10/72 — #15 — POWDERS**
- From RAJHANS
- no Pyrax A?
- Powders stored include - talfil - clay - camel white
- lack of proper asbestos fibre controls.

**02/73 — #16 — LEAD**
- From: RHODES
- Lead above TLV!
- still eating here
- no PPE
- poor lead housekeeping

**03/73 — #17 — Asbestos + Powder**
- still no exhaust at worst asbestos braider
- poor lead fumes - recirculated into de work space
- bad housekeeping in lead area.
- PPE required for lead e/e's.
- no eating @ lead area.

**06/73 — #18 — Hg/Asbest**
- Rajhans
- no eating Hg area
- still poor lead area
- ↑ Hg TLV exceeded

**09/75 — #20 — Hg/Asbestos**
- From - McNair
- poor asbestos exhaust
- Hg - 6 loc.
- ↑ Hg contamination

**11/75 — #21 — Hg/Asbestos**
- From: Cohen
- PPE - Asbestos * recommended.
- Directions circled not complied w/
- poor asbestos housekeeping
- eatings in Hg areas.
- ↑ Hg levels again
- no eating in asbestos area!

**05/77 — #14 — ASBESTOS**
- From: BUDLOVSKY
- MISDIAGNOSES
- PATIENT INFO

**06/77 — #11**
- from - Toth
- eat @ Banbury
- no education on toxicity of Banbury products.
- No dry sweeping (lead also)

**08/73 — #22 — LEAD**
- From: Waddell
- no eating here!
- poor housekeeping
- poor lead handling

**09/73 — #23**
- Asbestos + Mercury
- From - Aliege
- ↑ TLV Hg
- still no conformance to direction issued in 1972