

NOTICE

THIS DOCUMENT HAS BEEN REPRODUCED FROM THE BEST COPY FURNISHED US BY THE SPONSORING AGENCY. ALTHOUGH IT IS RECOGNIZED THAT CERTAIN PORTIONS ARE ILLEGIBLE, IT IS BEING RELEASED IN THE INTEREST OF MAKING AVAILABLE AS MUCH INFORMATION AS POSSIBLE.

BIBLIOGRAPHIC DATA SHEET	1. Report No. NIOSH-TR-75-01	2.	3. Recipient's Accession No. OACD 707-2101101241
4. Title and Subtitle Protective Clothing-Assessment of Need Vol. II		5. Report Date August 1974	
7. Author(s) W. L. Barnhart, C. R. Toney, L. A. Nicodemus		6.	
9. Performing Organization Name and Address The Bendix Corporation Cocoa Beach, Florida		8. Performing Organization Rept. No.	
12. Sponsoring Organization Name and Address U.S. Dept. HEW National Institute for Occupational Safety and Health 5600 Fishers Lane Rockville, Maryland 20852		10. Project/Task/Work Unit No.	
15. Supplementary Notes		11. Contract/Grant No. HSM-99-73-75	
16. Abstracts This report presents the safety research findings and recommendations of Bendix Launch Support Division, which has conducted a year-long study on behalf of the National Institute for Occupational Safety and Health. The document contains recommendations to conduct research in the general area of industrial/occupational protective clothing aimed toward the development of criteria and performance standards for protective clothing in 27 Industrial/Occupational Areas. This work is a valuable contribution to the identification of occupational safety research needs and will undergo immediate and careful analysis by appropriate Institute staff. The recommendations contained in this report do not, however, reflect the Institute's final decisions concerning a priority rating method, the rating of protective clothing, or future research objectives. Modifications in these areas will be made as necessary. This report is believed to be the first organized effort to assess protective clothing in 27 different Industrial/Occupational Areas. As such, it will provide the National Institute for Occupational Safety and Health with a baseline for future research in the area of protective clothing.		13. Type of Report & Period Covered Final report	
17. Key 17b. Identifiers/Open-Ended Terms 17c. COSATI Field/Group		14.	
18. Availability Statement release unlimited		19. Security Class (This Report) UNCLASSIFIED	21. No. of Pages
		20. Security Class (This Page) UNCLASSIFIED	

TABLE OF CONTENTS

	<u>Page</u>
SURVEY AREA NO. 1 NARRATIVES	1
SURVEY AREA NO. 2 NARRATIVES	71
SURVEY AREA NO. 3 NARRATIVES	134
SURVEY AREA NO. 4 NARRATIVES	190
SURVEY AREA NO. 5 NARRATIVES	228
SURVEY AREA NO. 6 NARRATIVES	242

DATA TABLES

	<u>Page</u>
SURVEY AREA NO. 1	261
<u>Table No.</u>	
I Industrial Areas Showing Related Occupational Areas	262
II Companies Surveyed Showing Product and Worker Population	265
III Protective Clothing Policies of Companies Surveyed	267
IV Companies Surveyed Showing Surveyor's Rating of Protective Clothing	269
V Companies Surveyed Showing Clothing Review Policy	273
VI Companies Surveyed Showing Added Risk of Clothing	275
VII Available Protective Clothing vs. Hazard	277
SURVEY AREA NO. 2	282
VIII Industrial Areas Showing Related Occupational Areas	283

<u>Table No.</u>		<u>Page</u>
IX	Companies Surveyed Showing Product and Worker Population	285
X	Protective Clothing Policies of Companies Surveyed	287
XI	Companies Surveyed Showing Surveyor's Rating of Protective Clothing	289
XII	Companies Surveyed Showing Clothing Review Policy	292
XIII	Companies Surveyed Showing Added Risk of Clothing	294
XIV	Available Protective Clothing vs. Hazard	296
SURVEY AREA NO. 3		300
XV	Industrial Areas Showing Related Occupational Areas	301
XVI	Companies Surveyed Showing Product and Worker Population	304
XVII	Protective Clothing Policies of Companies Surveyed	305
XVIII	Companies Surveyed Showing Surveyor's Rating of Protective Clothing	306
XIX	Companies Surveyed Showing Clothing Review Policy	307
XX	Companies Surveyed Showing Added Risk of Clothing	308
XXI	Available Protective Clothing vs. Hazard	309
SURVEY AREA NO. 4		314
XXII	Industrial Areas Showing Related Occupational Areas	315
XXIII	Companies Surveyed Showing Product and Worker Population	317
XXIV	Protective Clothing Policies of Companies Surveyed	318

<u>Table No.</u>		<u>Page</u>
XXV	Companies Surveyed Showing Surveyor's Rating of Protective Clothing	319
XXVI	Companies Surveyed Showing Clothing Review Policy	320
XXVII	Companies Surveyed Showing Added Risk of Clothing	321
XXVIII	Available Protective Clothing vs. Hazard.	322
SURVEY AREA NO. 5		324A
XXIX	Industrial Areas Showing Related Occupational Areas	325
XXX	Companies Surveyed Showing Product and Worker Population	326
XXXI	Protective Clothing Policies of Companies Surveyed	327
XXXII	Companies Surveyed Showing Surveyor's Rating of Protective Clothing	328
XXXIII	Companies Surveyed Showing Clothing Review Policy	329
XXXIV	Companies Surveyed Showing Added Risk of Clothing	330
XXXV	Available Protection Clothing vs. Hazard	331
SURVEY AREA NO. 6		333
XXXVI	Industrial Areas Showing Related Occupational Areas	334
XXXVII	Companies Surveyed Showing Product and Worker Population	335
XXXVIII	Protective Clothing Policies of Companies Surveyed	336
XXXIX	Companies Surveyed Showing Surveyor's Rating of Protective Clothing	337
XL	Companies Surveyed Showing Clothing Review Policy	338

<u>Table No.</u>		<u>Page</u>
XLI	Companies Surveyed Showing Added Risk of Clothing	339
XLII	Available Protection Clothing vs. Hazard	340
BENDIX ACCIDENT DATA		342
XLIII	First Report of Accident Data-Welding Operations	343
XLIV	First Report of Accident Data-Abrasive and Buffing Operations	344
XLV	First Report of Accident Data-Painting Operations	345
XLVI	First Report of Accident Data-Lumber and Wood Products	346
XLVII	First Report of Accident Data-Asbestos Operations	351
XLVIII	First Report of Accident Data-Construction	355
XLIX	First Report of Accident Data-Motor Vehicle Parts & Accessories	357
STATE ACCIDENT DATA		364
L	Accident Statistics, Ohio, 1972	365
LI	Percentage Distribution of Disabling Injuries by Nature, Florida, 1971	370
LII	Percentage Distribution of Disabling Injuries by Accident Cause	371
LIII	Percentage Distribution of Disabling Injuries by Nature, California, 1972	372
LIV	Percentage Distribution of Disabling Injuries by Accident Cause, California, 1972	373
LV	Torso Protective Clothing Related Injuries, California, 1971	374
LVI	Torso Protective Clothing Related Injuries, Pennsylvania, April 1973	379
LVII	Torso Protective Clothing Related Injuries, Florida, 1971	384

SURVEY AREA NO. 1
ON-SITE SURVEY NARRATIVES

Company Code: 1-1 SIC Number 7692
Date of Visit: 7-27-73
Industrial/Occupational Area: Welding Shops, General Repairs
Hazard Observed: Thermal, Electrical, Radiological

I. Company Summary

This company employs over 1,000 people in the performance of a maintenance and operational support contract. The operations discussed in this report are both manual and automatic. The entire body requires protection in some phases of the work (oxygen lancing), and in some (silver soldering), only minimal face and upper torso protection is required. Protective clothing is worn, required, and supplied by the company. Maintenance of the clothing is accomplished by both a proprietary contractor and the company through periodically cleaning, treating and repairing, or replacing as required. Protective clothing requirements are periodically reviewed by the various shop foremen and the company safety staff. The articles of protective clothing currently in use in this shop do not add any degree of risk due to their design or construction. The protective clothing is somewhat bulky and heavy, when a full ensemble is required for maximum protection. However, a high degree of protection with minimum discomfort is available through the proper utilization of the provided protective clothing. Employees indicated complete satisfaction with the welding apparel provided by the employer.

II. Survey Representatives' Observations and Comments

The shop area is very well lighted, ventilated, and shielded. Air conditioning is available during normal operations, with blowers and exhaust systems utilized under heavy cutting or welding activities. Noise varies, depending on the work in progress. Chipping hammers, air tools, and grinders contribute to the usual noisy background. Thermal and ultraviolet hazards are encountered in metal cutting (oxygen - acetylene) and welding (gas, arc and resistance) operations. Mechanical and electrical hazards

exist in the grinding and rough finishing of metal components. Operations included in this shop's activities consist of the fabrication of metal objects ranging from model structures to large catwalks, and vehicle components. Welding and cutting is accomplished through the methods mentioned above with the addition of electric spot welding, automatic gas cutting, and inert gas shielding. Temperatures as high as 9,400 degrees F are encountered in fusing the metals together. After joining, tacking, and filling, the seam or edge is ground to a smooth surface and moved into the paint shop for finishing, or submitted to customers in the rough. The workers' opinion of the clothing was completely "Adequate," protective clothing being available in both the proper quantities and configuration. New heat- and flame-resistant materials and ensembles could be procured to replace the heavier hides and asbestos articles now in use. This shop's operations are performed in a very efficient and safe manner. Equipment and tools are modern and well maintained. Mechanics are all certified journeymen. Helpers work under very close scrutiny of craftsmen and supervision.

III. Photographs

Photography was not permitted at this facility.

IV. Conclusions

The current working procedures appear completely adequate relative to the availability and use of protective clothing. The replacement of heavy hides with lighter synthetics would make shop and especially outside work more comfortable. The rating of available and adequate is based on the information listed above.

Company Code: 1-2 SIC Number 4941
Date of Visit: 8/1/73
Industrial/Occupational Area: Public Utilities
Hazards Observed: Chemical and Mechanical

I. Company Summary

This is a modern and well-equipped municipal water-treatment plant employing 25 employees in supplying state-approved potable water to several cities. The well field and treatment plant have adequate lighting and have a fairly low noise level. Body exposure in this area varies from absolutely none at the monitoring console to complete exposure in the chlorine metering room during adjustments. Protective clothing is not worn for each specific hazard. In fact, there is an attempt to utilize general industrial work clothing instead of specially designed types in all but a few of the most hazardous areas. Protective clothing in the form of rubber boots, aprons, gloves, and a special ensemble comprising an air pack, goggles, splash suit, hood, gloves, and boots are supplied and maintained by the department. These items are used in various configurations to satisfy protective requirements peculiar to different hazards. The protective clothing maintenance program consists of repair by local maintenance personnel, proprietary representatives, or by replacement. The protective clothing plan is a part of the general safety program and is administered by the superintendent and his foreman. There is a continuous program of selecting, evaluating, and issuing protective clothing suitable for the hazards encountered at the water plant and well field.

The protective clothing currently in use does not contribute to risk, but is far short of the type felt necessary for complete personal protection. Self-contained atmospheric protective ensembles, chemically impervious clothing, closed hood, and accessory items, such as rain suits, boots, gloves, face shields, and helmets, should be stocked. These articles should be available in the quantity necessary to supply all operations and maintenance personnel with ensembles adequate to safely perform their tasks.

When questioned regarding suitability of the available protective clothing, the majority of employees expressed their satisfaction with the protective clothing presently supplied them. Complaints were related to personal preferences;

II. Survey Representatives' Observations and Comments

The water treatment area consists of diesel, gas, and electric pumps; open storage and settlement tanks; underground lines; traps; chemical treatment equipment; storage; and control stations. This facility is approximately 5 years old, and is well equipped and maintained. Lighting is very good, and noise presents no problem. Exposure to chemical hazards occurs at central treatment plants and at water tanks and wells. Shop work, falls from heights, and slippery floors are the most common mechanical hazards in this water plant.

Water purification and treatment begins as raw water is pumped out of deep-water wells into settling basins, filtered, treated with chemicals, and pumped to storage tanks and distribution lines. Most of the purification, filtration, and treatment processes are automatic, with cleaning, maintenance, and repairs being the major manual operations.

It was felt the worker's satisfaction with the protective clothing presently in use is sincere, but not well founded. The plant employee's knowledge of the availability and application of protective clothing is very limited.

III. Photographs

No photographs were permitted at this plant.

IV. Conclusions

There are a variety of self-contained, atmospheric protective ensembles, heavy-duty acid clothing, accessories, and respiratory protective devices available from commercial sources that would satisfy all of the safety requirements felt necessary for full personal protection in this facility. There was no lack of protective clothing noted but the clothing was not located where the worker had easy access to it, nor was there any enforcement to wear it.

Company Code: 1-3 SIC Number 5462
Date of Visit: 8/1/73
Industrial/Occupational Area: Bakeries
Hazards Observed: Thermal, Mechanical

I. Company Summary

This bakery employs four people in a retail operation selling bread and pastries produced on the premises. Manual and semiautomatic means are employed during the baking process. The only body areas requiring protection are the baker's front torso and hands. Protection is needed when deep-fat frying and handling hot baking pans. There is no protective clothing of any type provided or worn in this shop. Good-quality, heat-resistant gloves and aprons would afford adequate protection from thermal hazards encountered in this operation. Upon being questioned, employees indicated they were satisfied with the protective clothing currently in use and saw no requirement for more or different items of clothing.

II. Survey Representatives' Observations and Comments

The shop was found to be very clean, well lighted, and relatively free of hazards. Manual operations included measuring, weighing, sifting, and blending dough. The dough is mixed, raised, separated, formed, and automatically baked in a gas-fired oven. The baked goods are then processed, wrapped as necessary, and either shipped or held in refrigerated cases for local sale. Hazardous areas include the deep-fat fryer, mixer, baking ovens, and bread-cutting machine. The mixer and bread-cutting machine have adequate mechanical protective devices, leaving only the deep-fat fryer and baking ovens identifiable as potentially dangerous. The workers' contention that there was no requirement for protective clothing in this operation was not entirely correct. Heat-resistant, splatter-proof aprons and gauntlet gloves should be used in the frying and baking operations to protect workers from possible burns.

III. Photographs

No photographs were permitted at this plant.

IV. Conclusions

There was a definite requirement for thermal protective aprons and gloves at this facility; however, the Surveyor found no protective clothing items of this type available to workers. The addition of thermal protective clothing would enhance the overall safety of the workers exposed to thermal hazards.

Company Code:

1-5

SIC Number 3471

Date of Visit:

8/2/73

Industrial/Occupational Area: Operations Generating Silica Dust

Hazards Observed:

Mechanical and Chemical

I. Company Summary

This company's work force consists of two employees. These men are involved in the sandblasting and rough priming of large metal components. All operations are manual. The entire body requires protection during large blasting operations, and a hood with face piece during very minor jobs. The biggest portion of the painting is accomplished in the open. This makes the use of special clothing unnecessary as the paint is usually dry if and whenever it blows or falls back on the painter. Protective clothing is always worn when, in the opinion of the owner or operator, it is felt necessary. Protective clothing is required, supplied, and maintained by the owner of the company. Protective clothing maintenance consists of patching and repairing as necessary and replacement when worn out. Protective clothing requirements are periodically reviewed by the owner during the normal course of business. The protective clothing currently in use does not contribute to added risks in any way. The workers felt the supplied protective clothing to be adequate for the type work being performed. There is sufficient protective clothing and devices available on the market to provide any desirable degree of comfort and safety to operators engaged in this type of work.

II. Survey Representatives' Observations and Comments

The shop working environment is very poor, lighting is not adequate, the noise level is very high, and the shop atmosphere is permeated with abrasive dust and paint residue. The mechanical hazards are occasioned by high-pressure air blasts, abrasives, scaffolding, and material/equipment handling. Chemical hazards are composed of those encountered in degreasing, cleaning, stripping, and painting processes. The basic operation begins with the positioning of the item to be sandblasted. Chemical cleaning of oil and grease whenever practical; removal or masking of chrome, glass, or accessories; and the grounding of the article is accomplished prior to blasting. Sandblasting to either basic primer coat or bare metal per specification, and using a variety of abrasives, is completed using the required pressure, angle of abrasive, and duration of application. The item may be primed (if blasted to bare metal) or returned to the

customer in an unprimed condition. Priming is usually to a rough condition and is normally accomplished (depending on item's size) in the open. The employees' comments regarding protective clothing being adequate for the task were considered to be correct by the Surveyor. The sandblasting ensemble, consisting of a helmet and hood, long-sleeved sweat shirt, safety boots, heavy-rubber gauntlet gloves, and work trousers, does appear adequate for the tasks performed by the company. The painter/helper's use of ordinary coveralls, cap, and respirator seems to satisfy his protective requirements on open jobs. Lack of ventilation inside would cause a problem with primer sticking to the skin. Disposable coveralls and hood would quickly and economically resolve this problem. This small operation is handled in a very professional manner. There is no waste of material, power, or labor. This maximizing of return for effort has begun to result in a general rundown appearance to the area and operating equipment.

III. Photographs

No photography was permitted at this shop.

IV. Conclusions

The current practices of this shop fall into the generally accepted classification of those observed in larger operations. The addition of a "vortex" device and harness for summer cooling of the sandblasting ensemble would probably improve production through making the operator more comfortable. This unit would also provide cool, filtered breathing air to the operator while cooling his body at the same time. The rating of Available but Inadequate is based on this requirement. The lack of a cooling and filtering device for supplying cool, filtered air to the worker results in his discomfort and stress, and increases the possibility of carelessness.

Company Code: 1-6 SIC Number 3623
Date of Visit: 8/2/73
Industrial/Occupational Area: Metal Products Fabricator
Hazards Observed: Thermal, Electrical, Mechanical

I. Company Summary

This survey was conducted in a small metal fabrication company with 18 employees. The company production consisted of welding ferrous and non-ferrous metal parts using manually operated equipment. The complete body is exposed to both thermal and electrical hazards. Torso protection was not observed in use during the survey and was not provided or required by the employer. Accessory items such as gloves, helmets, and face shields were provided, maintained, and issued through the tool crib. However, these items were not required to be worn by the employees. Protective clothing requirements are not periodically reviewed. The following protective clothing should be provided for the employees and the use of this clothing should be required:

- Welding hoods
- Leather or fire-resistant suits
- Leather sleeves
- Leather spats
- Leather aprons
- Leather leggings

II. Survey Representatives' Observations and Comments

This company had well-maintained and -lighted work areas. There is an intermittent noise problem during metal working without hearing protection being provided. Large metal sheet plates, bars, and shapes are cut, rolled, machined, welded, blasted, coated, and tested to government and commercial specifications. Workers demonstrated complete satisfaction with the personal protective items supplied by the company; however, these items did not include torso safety clothing. Workers' satisfaction appears to be based on their lack of information as to the hazards they faced and the availability of protective clothing. Good torso protection could be provided through the use of fire-resistant suits and aprons and accessory items for the extremities.

III. Photographs

No photography was permitted by management.

IV. Conclusions

Workers are currently wearing their own clothing for all shop work. Accessory safety items such as gloves, hoods, and glasses are provided by the employer. Carefully planned use of the safety clothing listed in the last paragraph of Section II would result in a very high rate of personal protection at minimum cost and materially improve the original survey rating of "Inadequate."

Company Code: 1-7 SIC Number 2824
Date of Visit: 8/3/73
Industrial/Occupational Area: Fiberglass Boat Construction
Hazards Observed: Chemical and Mechanical

I. Company Summary

This company employs 25 people in the manufacture of industrial, commercial, and pleasure craft by manual means. Employees are subjected to injuries to all parts of the body. Protective clothing is not worn by the employees in this plant. A general work coverall and a hard hat or hood with a respiratory protective device should be sufficient to afford adequate protection for all employees involved in the production process.

II. Survey Representatives' Observations and Comments

This shop was extremely cluttered with fiberglass molds, residue, and chop fragments. The lighting was very poor, the ventilation was inadequate, and potential fire hazards were apparent throughout the entire plant. Materials and equipment were insecurely stored and stacked too high. Flammable compounds were observed in open containers in the work areas. Fiberglass, moving in sheet form, is hand-laid onto a waxed, gel-coated mold in half sections. The fiberglass is impregnated with resin by using a compressed-air spray gun, and a chopped mixture of fiberglass cord is sprayed on top of the moving mat. This process (less the gel finish coat) is repeated until the desired thickness is obtained. After the chemical transformation is complete, the sections are cured, removed from the mold, set in a jig, mated, and the hull sections fused into one. This process is repeated in molding the deck, cabin, and interior assemblies which are then inserted and attached to and fused with the hull. Motor and control installation, and attachment of the keel and hardware completes the hull construction. Then the assembly is tested. The various steps involved in fiberglass boat construction could be accomplished with a minimum amount of risk to workers through the use of good housekeeping, stringent fire regulations, and the use of the simple, protective-clothing work ensemble described in Section I of this report.

III. Photographs

Photography was prohibited by this company.

IV. Conclusions

There is no protective clothing program available or planned by management of this company. Some protective clothing should be available to workers constantly exposed to the chopped fibers and chemicals used in fiberglass lay up and filler operations in boat manufacturing. The articles of clothing mentioned in Section I of this report would, if made available in sufficient quantities, provide adequate protection to employees assigned to tasks involving handling of glass fibers and resins.

Company Code: 1-8 SIC Number 2036
Date of Visit: 8/6/73
Industrial/Occupational Area: Food Packing Operation
Hazards Observed: Thermal and Mechanical

I. Company Summary

Over 60 people are employed by this company in manually cleaning, cooking, picking, and canning of crabs for retail and wholesale distribution. The front torso and upper and lower extremities (in cooking) and the feet and hands (in picking and packing) are exposed to both thermal and mechanical hazards in the various steps involved in this operation. Protective clothing in the form of gauntlet gloves, apron, and rubber boots are used in the cooking process and appears to provide satisfactory protection. A uniform dress, apron, and water-repellent shoes are used in the picking and packing area. Protective clothing worn in the food-processing portion of this operation appears to be adequate. The company supplies (individual issue) and maintains (launders and replaces as worn out) protective clothing and equipment to personal satisfaction. Protective clothing provided employees of this plant does not increase the hazard due to design and material features and meets with general worker approval.

II. Survey Representatives' Observations and Comments

The general work area in this plant was unusually clean, well lighted, uncluttered, and well arranged, and there was no appreciable noise interference. The following separate steps are involved in processing the crab from trap to can: delivery by crabber, weigh in by receiving personnel, transfer to cooking basket, transport (by overhead crane and trolley) to pressure pot, place in pot and steam-cook for several minutes, and remove to cooling room. Following approximately 1 hour of cooling time, the crabs are dumped onto the pickers' tables where they are sorted, picked, packed in cans of various capacities, and automatically sealed. These cans are weighed, labeled, and refrigerated until shipping. Employees of this concern were completely satisfied with the protective clothing provided them and indicated any addition would be surplus to their requirements. The clothing provided the employees of this company appeared adequate; however, there did not appear to be any real protective clothing program or plan and there was no indication of management and employee coordination in this area.

III. Photographs

No photographs are available of this operation.

IV. Conclusions

The thermal and mechanical hazards evident in this operation have mechanical guarding, are visible, and are identified. Clothing currently worn in this operation appears adequate to provide a good degree of protection against hazards normally present in an operation of this type.

Company Code: 1-9 SIC Number 8062
Date of Visit: 8/6/73
Industrial/Occupational Area: X-ray Operations
Hazards Observed: Radiological and Chemical

I. Company Summary

This hospital employs over 100 people in providing complete medical services, including an automated X-ray laboratory, to the community.

Technicians and patients utilize lead aprons, gonadal protection devices, lead body shields, and gloves when there is a possibility of unintentional exposure to X-rays.

The protective equipment and clothing required, provided, and maintained by the hospital, though heavy and uncomfortable according to wearers, does not add any risk due to its design. These items of lead-filled or -impregnated personal equipment are supplied in compliance with federal regulations, hospital rules, and trade association procedures. The described articles seem to be sufficient protection for the technicians and patients.

II. Survey Representatives' Observations and Comments

This hospital is approximately 10 years old, very clean and well lighted, and includes a modern automatic X-ray operation. Most of the X-ray procedures and film development are automatic, and operators are fully protected from radiation sources either by mechanical or personal safety equipment and clothing.

The usual X-ray laboratory hazards of electrical shock and burns from failure of insulation, radiation from breakdown of protective devices, and burns from cleaning and developing chemicals are present, though closely monitored or controlled in this operation.

The most hazardous operation for technicians is fluoroscopy. During this operation, the technician is exposed to radiation as a result of direct contact with the patient during adjustments and diagnosis. Operators wear lead aprons, gloves, and various shields as protection against any rays that might escape the mechanical shielding on the machine; however, the head remains unguarded.

The effect of X-rays on the heads of radiologists, acquired while performing their duties, is as yet undefined. It is probably more practicable to design and provide protection for that area while research is in progress than to try to rectify irreparable damage done in the meantime.

III. Photographs

No photographs were taken at this hospital.

IV. Conclusions

The departments' shielding, clothing, and mechanical and procedural devices leave nothing to be desired in the way of personal protective equipment or clothing.

Company Code: 1-10 SIC Number 3599
Date of Visit: 8/6/73
Industrial/Occupational Area: Metal Fabrication
Hazards Observed: Mechanical, Thermal, and Electrical

I. Company Summary

This shop employs 12 machinists and welders in the fabrication and repair of metal assemblies and components for the government and private industry. The various operations are almost entirely manual, with only a few of the machines utilizing automatic devices in their processes. The full body is exposed to either mechanical, thermal, or electrical hazards in each of the several shop classifications. The only protective clothing provided or worn is in the welding area. This ensemble consists of leather jackets, aprons, gloves, goggles, and welding hoods, worn in various combinations to satisfy job requirements. The welding ensemble is supplied and maintained by the company and its use is recommended by the company but not rigidly enforced. There is no additional risk incurred through the use of these items of protective clothing. Employees were satisfied with the protection provided by company-supplied hides but complained of the weight and heat of the welding ensemble.

II. Survey Representatives' Observations and Comments

This is a very old shop with no separation of operations other than shop and administrative areas. Lighting, ventilation, and noise control is very poor or non-existent. Mechanical hazards from grinding and cutting equipment, electrical hazards from all types of Machine Shop tools and equipment, and thermal hazards from the cutting and welding operation are almost constantly present in this shop. Various materials are manually cut, formed, punched, drilled, sheared, machined, and welded, or are, by some other machine operations, formed into a specified size and shape and finished by grinding or blasting for government, commercial, and industrial use. The workers felt that the protective clothing was very good; however, they were prejudiced against methods that were not "custom of the trade," and it is unlikely any new equipment will be used. It was felt any additions to the current protective clothing inventory, and its enforced wear, would meet with stiff resistance from the workers.

III. Photographs

Photography was not permitted in this shop.

IV. Conclusions

The use of protective clothing available, especially in the welding area, has prevented extremely serious injury up to this time. Minor to fairly severe burns have been experienced in both the cutting and welding activities in this shop. Most of these injuries, reportedly, were the result of worker carelessness, or the irregular use of available protective clothing and accessory items. Strict enforcement of the wearing of available protective clothing, and the addition of head protection for the welders would improve worker protection in this facility.

Company Code: 1-11 SIC Number 3721
Date of Visit: 8/9/73
Industrial/Occupational Area: Aircraft Manufacturing
Hazards Observed: Mechanical, Thermal, and Chemical

I. Company Summary

This aircraft manufacturing company employs 2,400 people in the manual and automated assembly line type fabrication and assembly processes. The entire body requires protection in the paint, heat treat, and welding shops, and the hands require it in the vacuform and milling areas. Protective clothing supplied employees in the heat treat area consists of face shield, gauntlets, and leather apron to prevent burns from 980° F molten salt solution used in annealing process. In the welding area, the only protective accessory observed in use was a welding helmet. No other protective clothing items were supplied to welders. The company also provides safety glasses, and supports a safety-shoe program. The safety clothing and equipment is distributed through personal issue and repaired or replaced by the company as required. There is no independent protective clothing program in effect at this facility, protective clothing being a component of the general safety program. Safety clothing issued by this company adds no risk due to design and satisfies workers. However, protection afforded workers is inadequate in the welding shop. Most employees felt the protective clothing provided by the company to be adequate; however, additional protective clothing such as hides, aprons, and leggings should be made available to the welders, and their use enforced.

II. Survey Representatives' Observations and Comments

The main fabrication plant houses the machine and sheet metal shops, heat treating, and welding departments, and the fabric and paint areas. The fiberglass and vacuform manufacturing and assembly shops are in a separate building several hundred feet away. All areas are well lighted and employees assigned to high-noise-level shops are provided ear protection. There are three hazards present in this plant: mechanical, in machine power tools and operations and on the flight line; thermal, in the heat treating, welding, and vacuform operations; and chemical in the stripping, metal testing, and paint shops. Manufacturing operations involve airframe assembly using tools, fixtures, and jigs. Sheet metal is cut and shaped, finished, and formed in place over airframe and assemblies. Control lines, components, and subassemblies are installed and adjusted. Hydraulic and fuel systems, power plant, and interior are installed and completed as the next step. The plane is painted, checked out, and identified, and, following final inspection, is made available for sale. The employees commented that the clothing presently available was adequate. This is attributed to their lack of knowledge of protective clothing currently available through commercial sources, and the specific hazards they faced. There is a general lack of uniformity of protective

equipment and clothing available and worn in both the main plant and the fiberglass shop. Welders are lacking in the very rudimentary parts of an industrial welding ensemble. There is fairly lightweight protective welding clothing available through commercial sources. It should be procured and supplied to the welders, and its use enforced.

III. Photographs

Management would permit no photographs in this facility.

IV. Conclusions

The current trend in this company is toward automation and mechanical guards. The protective clothing provided employees in this plant is inadequate in design and material, and its wear is not enforced. Better-quality, lighter materials, and enforcement of their use, along with the mechanical guards presently in use, should provide an acceptable degree of safety in this industry.

Company Code: 1-12 SIC Number 2875
Date of Visit: 8/9/73
Industrial/Occupational Area: Chemical Compounding
Hazards Observed: Mechanical and Chemical

I. Company Summary

There are 25 employees employed in this plant to mix, package, and transport bulk and bagged fertilizers. Operations are both manual and automatic. The only employee normally requiring protective clothing is the bagger. This employee holds bags under a open hopper for loading and weighing. He is subjected to the dust of whatever type fertilizer is being packaged at the time. Protective clothing is not worn during the above operation, and is not required nor supplied by the company. The employees voiced their satisfaction with the two-piece, company-supplied cotton work suit, and stated that this was adequate protection for them. They did not see the need of a respirator during loading or mixing. The workers felt the chemicals involved in fertilizer processing to be sufficiently isolated from them to pose no danger to their health or safety. Personnel in direct contact with, or involved in mixing, loading, or bagging of these chemicals should have complete body protection and the service of an outside air source or approved respirator despite the lack of concern of management or workers.

II. Survey Representatives' Observations and Comments

This plant is very old, poorly lighted and ventilated, and in a general rundown condition. Mechanical hazards exist in the mixing area, stitching machine, loading and transfer machinery, and materials handling equipment. Chemical hazards abound; the holding bins and hopper are open; transport dumps and conveyors are partially open; and the loading, weighing, and filling ramp has no ventilation features. Various chemical compounds, including copper and sulfur, are unloaded out of rail cars and semi-trailers, transported by mechanical equipment to holding bins, segregated, weighed, and mixed to specification. These various compounds are packaged and delivered in bulk to

distributors or growers. The workers feel no protection is required against any of the chemicals except sulfur. Those working in the plant during sulfur loading or mixing either stand clear or use some protection over their mouth and nose. This lack of concern appears to be a result of their ignorance of the hazards associated with the chemicals to which they are exposed. Protective clothing in the form of disposable coveralls, dust masks, and an outside air supply at the filling chute should satisfy the safety requirements of this operation.

III. Photographs

No photographs were taken in this plant.

IV. Conclusions

The clothing currently in use at this plant does not provide even basic protection to the employees involved in bagging the fertilizer or in the handling of constituent chemicals. Drivers, operators, and employees separated from the mixing plant do receive adequate protection in the form of the two-piece cotton suits supplied by the company. The use of an outside air source or self-contained environmental equipment would solve the hazards of bagging, and a good respirator and post-handling uniform change should satisfy the handling personnel's clothing requirements. The Unavailable rating of protective clothing could be improved to Available and Adequate by simply providing full protection for filling point personnel, and an approved respirator, and uniform change procedure for all chemical handling personnel.

Company Code: 1-13 SIC Number 5462
Date of Visit: 8/10/73
Industrial/Occupational Area: Bakeries
Hazards Observed: Mechanical and Thermal

I. Company Summary

This bakery employs 30 people in its almost completely automatic bread and roll production. The only portion of the body observed exposed to mechanical and thermal hazards were the hands.

Protective clothing is not normally worn as protection against any hazard as it is not required nor provided by the company.

The employees assigned to removing baked products from the oven for cooling and processing should be provided a lightweight, heat-resistant jacket or bib-type apron, and gloves.

Workers questioned about the articles of protective clothing mentioned above felt any added item of clothing, protective or not, would only add to their discomfort and would not be worn. (Oven operation results in extremely high temperatures in the unloading area.)

II. Survey Representatives' Observations and Comments

This bakery was physically very well arranged, with work group organization taking full advantage of the building. Lighting was very good in all areas of the plant and the noise level was negligible.

Mechanical hazards consist of open-chain, power-transmission systems, slicers, and conveyor equipment. Thermal hazards comprise open, oven-radiated heat and direct contact with hot surfaces. Formula compounding and batch mixing are semi-automatically accomplished by electrically controlled methods. Products are measured, weighed, sifted, mixed, and blended and allowed to rise. The yield is then rolled, divided, and formed. The final product is then baked, proofed, cooled, and wrapped for storage or immediate delivery as desired.

Bakery employees are well satisfied with their current company-issued clothing of white dresses, two-piece work suits, hair nets, cloth hats, and cotton gloves. These items are provided to maintain strict sanitation control in compliance with state laws and in contract requirements.

None of the above clothing is supplied for personal protection but some, as with the gloves in hot areas and the hair nets in areas of exposed gears or moving equipment, supply some degree of protection.

Provision of the items of clothing listed in the third paragraph of Section I above would result in a satisfactory degree of personal protection.

III. Photographs

No photography was permitted at this shop.

IV. Conclusions

The company's practice of not providing protective clothing in the oven areas results in a survey rating of "Inadequate."

The addition of a lightweight, heat-resistant jacket, apron, and gloves to the company's current inventory would provide satisfactory personal protection in the critical areas.

Company Code: 1-14 SIC Number 0721
Date of Visit: 8/10/73
Industrial/Occupational Area: Pesticides and Insecticides
Hazards Observed: Chemical

I. Company Summary

This operation employs 12 people in the manual spraying of insecticides and defoliantes.

All spraying of insecticides is controlled from inside an air-conditioned truck cab on a moving vehicle. Defoliantes are sprayed by handlines off the fenders and sides of a moving vehicle. Exposure of unprotected body areas (torso and upper extremities) to this chemical results in painful chemical burns and freezing sensations.

No protective clothing is made available by the operation and none is required or worn by any employee under this contract.

The recirculation of cab air for operator protection in the insecticide application is adequate protection. However, the employee handling the defoliation should use an approved respirator and a synthetic-coated fabric suit with hood and gloves.

Upon questioning regarding the need for protective clothing, workers agreed there was a definite need for some degree of protection in the defoliation operation and that protective clothing could best meet this need.

II. Survey Representatives' Observations and Comments

The work area, maintenance shops, and storage and mixing areas are very well arranged, separated, and equipped with safety and fire equipment.

There is sufficient lighting (area open to sun with overhead fluorescent fixtures) and the equipment now in use produces a very low level of noise.

The only hazards encountered in this operation are the mixing and application of insecticides and defoliantes. These chemicals are applied either by a fogging machine or by a hand-operated bayonet nozzle.

The provision of a protective ensemble for both mixing and applying the defoliation agents, as described in the fourth paragraph of Section I above, would provide the necessary protection for safety in the performance of both tasks.

III. Photographs

No photographs were taken of this facility.

IV. Conclusions

The current practice of fogging from a closed vehicle cab with recirculated air appears safe. However, the operator of hand-held defoliation application equipment should be provided protective clothing and equipment.

The survey rating of "Not Available" is applicable to the chemical defoliation operation and could be corrected through the provision of suitable clothing and respirators to the operators of the hand-held nozzle involved in defoliation.

Company Code: 1-15 SIC Number 2752
Date of Visit: 8/9/73
Industrial/Occupational Area: Printing and Lithography
Hazards Observed: Thermal

I. Company Summary

This company employs seven people in the automatic specialty printing field. The front torso and extremities require protection in the lead smelting and casting process incidental to the operation of the printing machines and presses. The employee assigned this job is supplied a pair of asbestos gloves to protect against accidental splashing of lead bars during the melting process. Adequate protective clothing in the smelting operation should consist of an asbestos apron, gloves, boots or leggings, and a face shield. Upon questioning, the workers voiced their satisfaction with the protective clothing supplied by the company.

II. Survey Representatives' Observations and Comments

The general condition of this shop was very poor. Lighting was good in the composing room; however, the rest of the shop received only indirect or reflected illumination. Noise presented no real problem, with the Linotype operation and producing the only noise of any consequence. The thermal hazard referenced in this report is that produced during the melting of lead and the casting of billets and type. This shop performs specialty printing, with some fairly large commercial and industrial accounts. Most of the printing is accomplished automatically following manual preparation and composition. The workers' high opinion of the protective clothing provided them was erroneous, since only hand and upper arm protection was provided by the gloves used in lead melting for typesetting. The previously mentioned articles of clothing, asbestos apron, boots or leggings and a face shield, should be included in the shop's inventory to ensure full protection against lead splashes.

III. Photographs

No photographs were taken of this shop.

IV. Conclusions

The current practice of melting lead without sufficient body coverage could result in serious injury to the lower extremities and splash burns to the front torso, face, and eyes. The inclusion of the protective items referenced in the last paragraph of Section II would improve worker safety at this facility.

Company Code: 1-16 SIC Number 0181
Date of Visit: 8/10/73
Industrial/Occupational Area: Ornamental Floriculture and Nursery Products
Hazards Observed: Chemical

I. Company Summary

This company employs 50 people in the almost completely automated growing of chrysanthemums. The actual harvesting of the plants is the major manual operation involved in this process. The entire body often requires protection against chemicals (insecticides) during the harvesting cycle and during the application of the insecticides. The insecticide application vehicle operator is provided protective clothing for both mixing and spraying. The harvesting personnel frequently work in the fields without body protection immediately following insecticide application. Protective clothing for spray machine operators is provided by the company. Its use is encouraged though not enforced. Protective clothing is issued as a tool crib item to the insecticide mixer and spray truck driver and is repaired or replaced when damaged or worn out. The protective clothing currently in use does not cause added risk by design. This spray operator's ensemble was developed by the company. It appears to perform adequately. Workers advise they feel the suit and accessories are too hot for use during most of the growing season. Its use is often determined by the ambient humidity and temperature.

II. Survey Representatives' Observations and Comments

This is a farm-type work environment with no noise or lighting problems. The only hazard of consequence encountered in this industry is the use of very toxic insecticides. Employees involved in the chemical application and later in the handling of the plants are exposed to the insecticides. Protective clothing in various stages is worn by the spray vehicle operator during insecticide application. The operator commences spraying early in the cool of the morning wearing a two-piece plastic suit with gloves, boots, and a respirator. He usually finishes in the heat of the day with only the boots remaining. Employees responsible for the plant harvesting work in shorts, slacks, or dresses. No protective clothing is provided harvesting personnel. The application operators are satisfied with their protective ensemble except for its heat discrepancy. Other employees have no suggestions for protective clothing utilization or any desire for the implementation of such a program. Most of the employee opposition to the institution

of a general protective clothing program appears founded on natural reluctance to add any clothing while they are working in this tropical climate. The clothing used by application personnel appears adequate. Its use should be strictly enforced and encouraged. Harvesting personnel should be supplied with insecticide-proof trousers, boots, and gloves, or work should be scheduled to eliminate exposure until after the insecticide concentrations have diminished.

III. Photographs

No photography was permitted at this farm.

IV. Conclusions

Current practices, though not satisfactory, are completely described in Section I. Suggested additions to the above protective clothing inventory are listed in Section II. The original survey rating of "Not Available" relates to the lack of protective clothing in the harvesting area.

Company Code: 1-17 SIC Number 8062
Date of Visit: 8/15/73
Industrial/Occupational Area: Medical X-ray Operations
Hazards Observed: X-ray Radiation

I. Company Summary

This hospital employs approximately 20 technicians in the X-ray and fluoroscopy laboratories. The entire body requires various degrees of protection as determined by the operation in progress. Protective clothing is worn in fluoroscopy work wherever the physician, head radiologist, or technician feels there is a requirement. Protective clothing is required, supplied, and maintained, and its use enforced by the hospital. The provision and maintenance of protective clothing and accessory items is in compliance with State and Federal regulations, and hospital rules. The immediate replacement, upon report of damage, of X-ray shielding, curtains, and clothing, is the major constituent of the maintenance program. The head radiologist periodically reviews the X-ray laboratories' protective clothing condition, availability, and practicality. Protective clothing presently used in the X-ray laboratories creates no added risk due to design, and provides adequate protection when properly worn. The laboratory workers' only complaint regarding the protective clothing was the weight of the lead incorporated in the various articles of clothing.

II. Survey Representatives' Observations and Comments

The X-ray laboratory presented an extremely clean, well-lighted, orderly, quiet, and functional appearance. Automatic protective devices have been incorporated into the unit's design, and safety practices were included in most operating procedures. Ionizing radiation is the major hazard in the X-ray operations, with electrical hazards taking second place. Patient X-ray starts with the patient being positioned between the X-ray source and film. The image of bone structure and substances of varying resistance to X-ray are recorded on the film plates for photographic process development. Fluoroscopy involves the use of an X-ray source to provide a visual observation of bodily functions. This involves placing

the patient between the source and the observer with suitable screens to provide images of body functions. The technician's general complaint regarding lead-impregnated clothing was the weight of protective clothing provided at this hospital. The Survey Representative feels the protective clothing provided by this company, in conjunction with the automatic and physical protection available at this facility, is sufficient to provide adequate protection to employees.

III. Photographs

No photographs are available of this laboratory.

IV. Conclusions

Practices described in Section I of this report appear to provide adequate protection against radiation hazards in this hospital. Electrical hazards associated with X-ray equipment can be eliminated through periodic maintenance and the use of non-conductive gloves when changing components. The survey rating of "Adequate" was based on the availability of protective clothing at this hospital.

Company Code: 1-18 SIC Number 2621
Date of Visit: 8/14/73
Industrial/Occupational Area: Pulp and Paper Manufacturing
Hazards Observed: Thermal, Chemical, and Mechanical

I. Company Summary

This paper company is engaged in the manufacturing of Kraft paper and cardboard. The 750 employees are involved in both automatic and manual operations comprising paper manufacturing. Various articles of protective clothing are worn for each hazard as conditions require. The use of protective clothing is required by the company, and is supplied and maintained by the company. Protective clothing requirements are periodically reviewed by the safety and operating department management personnel. The only item of personal protective equipment that caused added risk in this plant was the use of loose-fitting gloves in freeing paper from the rolling mill. This problem could be easily eliminated by the utilization of very snug and proper-fitting gloves available on the market. Employees working in high temperature areas stated the heat-resistant clothing currently in use was unnecessarily heavy and hot.

II. Survey Representatives' Observations and Comments

This mill is very modern, automated, and well lighted. The noise level is fairly high but not so much that earmuffs become necessary. Mechanical and thermal hazards are encountered in the rolling, drying, and chipping mills. Chemical hazards exist in the pulp operation, including digestion, evaporation, and reclamation phases. Kraft paper and cardboard products are manufactured through the pulp process. Raw materials are chipped and ground into small particles, cooked, digested, and fed by conveyor to the pressing and rolling plants. There, the pulp is strained and pressed to a semi-dry state. This amalgam is conveyed onto large cylinders and finally pressed and dried. The employees' comments relative to the "hot and heavy" protective clothing presently provided by the company are completely valid; however, the minor discomfort experienced in its use is more than compensated for by the protection afforded.

III. Photographs

No photographs were taken of this mill.

IV. Conclusions

The current practice of wearing protective clothing as required by the task assigned has great virtue in an operation such as this. The clothing supplied by the company provides adequate protection with a minimum of discomfort. Protective clothing was available to workers and provided adequate protection against hazards involved.

Company Code: 1-19 SIC Number 3443
Date of Visit: 8/14/73
Industrial/Occupational Area: Metal Fabrications
Hazards Observed: Thermal and Mechanical

I. Company Summary

This company employs 10 mechanics in the fabrication of metal fuel tanks. The entire operation is manual, consisting of rolling, cutting, welding, and grinding metal sheet, shapes, and plates. The body areas requiring protection range from the hands and feet in the rolling mill to the entire body in the welding shop. Protective clothing is not required or provided by the company. Employees do not wear nor express any desire for protective clothing. There are many different types of suitable protective clothing for this industry available on the open market. Chaps, sleeves, coveralls, and aprons of hides and flame-retardant materials are available, to name a few.

II. Survey Representatives' Observations and Comments

This shop is open, well lighted, and fairly free of harsh or persistent sound. Most of the hazards are located around the rolling machines, portable grinding and cutting machines, and cutting and welding devices. This shop operates on an assembly-line principle. Metal is cut and machine-rolled, then welded and ground to finish and shape. The workers' lack of concern for a protective clothing program is probably due to their ignorance of general safety. Articles of clothing listed in Section I of this narrative would provide an adequate inventory of protective clothing in the thermal hazard area. The use of good, snug-fitting work gloves in the mechanical area should protect against hazards observed during this survey.

III. Photographs

No photographs were taken at this shop.

IV. Conclusions

There are no protective clothing items currently in use at this facility. The institution of a protective clothing program utilizing the items of apparel noted in Section I would greatly enhance the safety of the workers involved in manufacturing processes at this plant.

Company Code: 1-20 SIC Number 3731
Date of Visit: 8/14/73
Industrial/Occupational Area: Ship Building and Repairing
Hazards Observed: Mechanical, Chemical, Thermal

I. Company Summary

This shipyard employs 60 people in the modification, repair, and overhaul of military and commercial vessels through manual means. The body requires complete protection in some chemical application jobs, and a varied degree of protection to the torso and extremities in the cutting, welding, and machining areas. Protective clothing is worn as required to meet each hazard: hide aprons, sleeves, gloves, and jackets for the thermal hazards encountered during cutting and welding; disposable coveralls and gloves and an air-supplied hood for chemical exposure; and a complete body ensemble with a personal air-conditioner operated through an outside air supply for sandblasting. Protective clothing is worn for each specific hazard and is maintained by the company through regular issue, repair, and replacement. Mechanical hazards were observed during sandblasting, work on the ways, material fabrication and movement, grinding, riveting, machining, hoisting, lifting, and pulling. Thermal hazards were noted in cutting, welding, heat treating, and melting, and chemical in pickling steel components and applying chemicals to hulls and other structures. The production operations include removal of damaged or obsolete accessories; hull sections are modified or repainted, and superstructure exteriors and interiors are modified or replaced. The vessel may be completely or partially sandblasted, and the bottom painted with a hot coat of antifouling paint. Hand and power equipment, both electrical and pneumatic, are used. Hull preservative is usually red lead paint. Interior painting is normally accomplished by hand, using brush, spray, and roller application methods. Workers are generally well satisfied with the protective clothing provided by the company. Clothing and safety equipment are maintained and handled through the shops' tool cribs, or on an individual- and shop-issue basis. Protective clothing requirements are periodically reviewed by management and line supervision. Protective clothing adds no risk due to design or utilization. The current

inventory of protective clothing available to employees of this yard would be adequate with the addition of chemical-resistant aprons and gloves. Employees were satisfied with the protection provided by the safety clothing available to them, but complained of the weight of the clothing used during welding. This is a common complaint of welders wherever the use of protective clothing is enforced.

II. Survey Representatives' Observations and Comments

This yard is unusually clean, uncluttered, and well arranged. The storage area is tidy; the buildings are sufficiently ventilated and lighted. Noise is present but at an acceptable level. The protective clothing provided workers in this yard is adequate for all except the chemical hazards. The addition of a face shield, rubber apron, and knee-high rubber boots would provide the pickling employees satisfactory protection against acid splashes and spills.

III. Photographs

Photography was not permitted at this facility.

IV. Conclusions

Current practices relative to protective clothing use are outlined in Section I of this narrative. The suggested addition of chemical protective clothing would provide an added degree of safety to workers in the chemical handling areas.

Company Code: 1-21 SIC Number 2952
Date of Visit: 8/14/73
Industrial/Occupational Area: Asphaltic Felts and Coatings
Hazards Observed: Mechanical, Thermal, and Chemical

I. Company Summary

This company employs 60 people in the manufacture of felt roofing material. Manufacturing processes are both manual and automated. Various portions of the body are exposed to hazards during the manufacturing operations. The face, hands, front torso, and legs are exposed to acid and caustic chemical splashes in both the digesting and coating processes. The same body areas are exposed to thermal hazards from live steam in the sizing, packing, and marking machines. There was no protective clothing provided or worn during any of the production or maintenance phases observed during the survey.

II. Survey Representatives' Observations and Comments

Noise levels were extremely high in the pressing and rolling areas, lighting was inferior, and ventilation was inadequate. Mechanical hazards were observed around the mixers, shop material handling equipment, rolling cylinders, shears, and conveyors. Thermal hazards were noted around hot asphalt mixing tanks, holding tanks, and spray equipment, while digesting tanks, cleaning solvents, and fuels exhibited chemical hazards. The manufacturing process is started when raw felt materials are received in bales, cleaned, and digested. This mixture is squeezed to a semi-dry state and run through heated rollers forming sheets of felt. Additional processing requires the felt to be coated with hot asphalt on both sides. This is accomplished in a dipping tank, with drying accomplished by running the felt over suspended, heated rollers. The final manufacturing process is preparing the product for shipment by cooling, marking, and labeling. Employees in both the manufacturing and maintenance disciplines wear no protective clothing. They do not desire protective clothing and have a very limited understanding of either the availability or advantage of protective clothing.

The company could develop a good safety clothing program with the procurement of aprons, gloves, rubber boots, and acid-resistant splash suits.

III. Photographs

No photography was permitted in this plant.

IV. Conclusions

Current company safety programs do not include the provisioning of protective clothing items. Articles of protective clothing as listed in Section II would provide adequate protection for workers. The original survey rating of "Not Available" applies to the fact that the company did not provide protective clothing nor was it worn.

Company Code: 1-22 SIC Number 7397
Date of Visit: 8/15/73
Industrial/Occupational Area: X-ray Operations
Hazards Observed: Radiological

I. Company Summary

This laboratory employs 22 technicians in the automatic and manual testing of ferrous metals and materials. There is no protective clothing worn, required, or supplied by this company. There is no requirement for protective clothing in this particular process.

II. Survey Representatives' Observations and Comments

The work area was very clean, light, and uncluttered and there were no noise hazards. There were no unguarded radiological hazards evident in this laboratory. Items to be tested are placed between the source and a photographic plate and the resulting image examined for flaws. Equipment used is either fixed or portable as work requires. Stationary and portable X-ray, monitor, and scanning machines comprise basic equipment inventory. The employment of lead shield barriers, remote-control devices, and equipment isolation provides adequate protection to the operators and technicians. Periodic testing of shielding, and the use of a monitor badge ensures the integrity of the protective procedures and equipment. There is no requirement for protective clothing in this facility at this time.

III. Photographs

No photographs were taken at this laboratory.

IV. Conclusions

Adequate protection against X-rays is provided at this facility by mechanical and procedural means. The original survey rating of "Not Available" takes into account the fact that protective clothing is not needed in this operation.

Company Code: 1-23 SIC Number 3731
Date of Visit: 8/15/73
Industrial/Occupational Area: Ship Building
Hazards Observed: Mechanical, Thermal, and
Electrical

I. Company Summary

There are 300 employees working at this shipyard at the refurbishment and maintenance of military and commercial vessels. The body areas requiring protection in this yard range from the entire body during sandblasting and hot-coat application, to head, torso, and extremities during welding, and to head, face, front torso, and extremities in chemical process areas. Protective clothing used in this yard is limited to a leather jacket and an air-supplied hood used in sandblasting areas. These items are stored and maintained by the particular workers using the ensemble. The company has no formal protective clothing program. Line and section supervision, as a rule, encourage workers to use care in hazardous areas. This provides some degree of safety direction. Employees indicated satisfaction with the company's practice of leaving protective clothing policy to the individual worker.

II. Survey Representatives' Observations and Comments

This shipyard is well lighted and uncluttered, and has a tolerable noise level. All of the shops are adequately ventilated. Most mechanical hazards were found in the material handling and equipment operations areas. Thermal hazards exist in the cutting, melting, welding, and hot coat areas. Electrical hazards are found throughout the yard in junction boxes, switches, equipment connections, and controls. Modification projects on the ships commence with the blueprinting of the working plans and breaking various stages of modification into work orders. Steel plates and beams are cut and shaped and various components assembled. Subassemblies and components are then assembled onto the hull. After sandblasting, painting, and finishing of the interior, the vessel is launched for completion of other work.

This might include work on or modification to the propulsion and steering systems, electronics, or other systems as required. After final yard inspection, the vessel is prepared for customer buy-off. The workers' apparent satisfaction with the lack of a company-sponsored protective clothing program is the result of custom. This company has never supplied protective clothing items to the employees and the employees don't seem to want to make an issue of the policy. Protective clothing of the type mentioned in Section I with the usual standard safety accessories (face shields, goggles, hard hats, gloves, and safety shoes) would provide adequate protection against the hazards normally encountered in this industry.

III. Photographs

Photography was prohibited at this yard.

IV. Conclusions

The current practice of employees supplying their own protective clothing and guarding against hazards at their own discretion is not satisfactory. The initiation of a Safety Program and provision of an inventory of protective clothing for general use would be a step toward adequate worker protection. The provisions for review of protective clothing requirements, with worker participation during the preliminary planning stages, would ensure complete coverage of all yard job classifications.

Company Code: 1-24 SIC Number 2086
Date of Visit: 8-17-73
Industrial/Occupational area: Bottled and Canned Soft Drink
and Carbonated Water
Hazards Observed: Mechanical and Chemical

I. Company Summary

This bottling company employs 70 people in the automated bottling of soft drinks. The only portions of the body exposed to hazards are the face and hands. Protective clothing is not worn for each specific hazard and is not required or supplied by the company. The requirements for protective clothing are reviewed periodically by the plant manager. There does not appear to be any real requirement for protective clothing in this plant, except for cleaning operations. A pair of rubber boots, rubber gloves, splash suits, and face shield should satisfy these requirements. Employees questioned indicated they felt there was no need for protective clothing in this plant.

II. Survey Representatives' Observations and Comments

This plant is very roomy, clean, and well lighted. There is a very high noise level in the bottling section. The employees wear hearing protection devices while working in this section. Mechanical hazards were observed on the line and in the sealing area. The hazards were very well isolated with guards and shields. Chemical hazards were found in the cleaning operations where caustic compounds, and solutions were used to clean floors, mixers, conveyors, and bottling machines. The bottles are run through washers where they are cleaned with caustic solutions and hot water in an automatic operation. The bottling process includes the mixing of sweetening agents, concentrates, and water to form a basic syrup. This is pumped into bottling machines where the syrup, water, and carbon dioxide are combined, put into bottles, and then automatically capped and cased. The workers' lack of concern for protective clothing is supported by the fact that the plant is almost fully automated. However, the maintenance and cleaning workers could use clothing

to protect them from the strong cleaning agents. Such items as rubber boots, gloves, and water-repellent suits would appear indicated in these operations.

III. Photographs

No photographs were taken at this plant.

IV. Conclusions

The current practice of isolating and shielding hazards is very successful. The inclusion of the use of splash clothing and face shields in the cleaning procedure, when mixing or using caustics, should result in adequate personal protection.

Company Code: 1-25 SIC Number 1731
Date of Visit: 8/17/73
Industrial/Occupational Area: Construction
Hazards Observed: Mechanical and Electrical

I. Company Summary

This small electrical construction company employs seven mechanics in the installation of electrical wire, fixtures, switches, and other electrical devices. The portions of the body normally requiring protection are the hands and forearms. There is no protective clothing supplied, required, or used by this contractor. Only rubber gloves were worn when working hot electrical systems. There are infrequent cases when articles of protective clothing of the type used by linemen in power transmission work could be used to provide protection against accidental high-voltage contact. These items, sleeves, helmets, gauntlets, gloves, capes, and special insulators, are readily available on the open market. Employees are in almost complete agreement that there is no need for protective clothing in this trade.

II. Survey Representatives' Observations and Comments

The subject company of this survey performs maintenance, refurbishment, new construction, and emergency services under general contract. Most of the work takes place in homes, wholesale and retail businesses, and government construction. Noise, lighting, and housekeeping vary from contract to contract, and are not controllable by the contractor. Both electrical and mechanical hazards exist in new construction and refurbishment of old structures. In new construction, electricians working from blueprints string overhead electrical service through portions and joists to termination points. This type of work is done at various stages of the building construction. Household work and refurbishment includes removal and replacement of fixtures, and wiring of new systems, fixtures, and appliances. The electricians' comments regarding protective clothing is basically factual; however, the linemen's protective clothing and equipment on some critical jobs could prevent serious electrical shock. The procurement and use of articles of protective clothing

referenced in Section I would improve worker protection considerably.

III. Photographs

No photographs were taken at this job site.

IV. Conclusion

The current work procedure does not include protective clothing. The addition of a protective clothing inventory as recommended in Section I would result in an improvement of worker protection. Protective clothing was not available at this company.

Company Code: 1-26 SIC Number 3471
Date of Visit: 8/20/73
Industrial/Occupational Area: Chemical and Allied Products
Hazards Observed: Thermal, Mechanical, Chemical,
and Electrical

I. Company Summary

This plating concern employs 15 workers in the manual electroplating of ferrous and nonferrous components and assemblies. Both commercial and military specifications are used. Various portions of the body require protection of different degrees during operations. The entire body is subjected to electrical, chemical, and thermal hazards. Protective clothing is not required by the company and there is no true protective clothing program in effect at this time. Protective clothing needs vary greatly by department. The cleaning personnel should wear splash protection with a face shield or goggles, head covers, rubber boots, gloves, and approved respirator. Plating employees should utilize long aprons, rubber boots or high galoshes, goggles, and gauntlet gloves as needed by their assignment. The electrical hazards, switch box open connections, motor control wirings, and plating terminals, should be eliminated by mechanical guards or proper covers. Employees feel the rubber gloves and aprons supplied by the company to be adequate protection against hazards encountered during their jobs.

II. Survey Representatives' Observations and Comments

This plating facility is crowded, cluttered, and the atmosphere is heavily laden with chemical fumes. Hazards exist in the mechanical, electrical, and thermal classifications, in both the cleaning and plating phases of the operations. Electrical shock hazards were prevalent from wet floors and faulty wiring of appliances or devices. Eye and face hazards were in evidence from grinding, deburring, and acid splashes; and there were respiratory hazards from toxic fumes; skin irritations and burns from toxic chemical absorption hazards were also noted. The plating process is initiated by putting chemical salts in suspension which are then decomposed by electrical current. The resulting metallic ions are

deposited upon items to be plated as a coating. A low voltage of 2 to 30 volts direct current is used in the process. Prior to plating, the product is cleaned using steam, caustics, or other chemical cleaning agents. The item is then rinsed in clear water. After plating, the item is rinsed again in clear water, dried, polished, and packaged. Employees mistakenly feel the gloves and aprons are adequate protection for the hazards that are encountered. Their knowledge of the availability of protective clothing for this industry is very limited. The inclusion of the articles of clothing listed in Section I would make most of the operations much safer.

III. Photographs

Photography was prohibited at this shop.

IV. Conclusions

The current practice includes only the wearing of gloves and aprons, which are used in very few assignments. The addition of the items recommended in Section I, and elimination of all electrical hazards would result in a much safer operation.

Company Code: 1-27 SIC Number 2819
Date of Visit: 8/20/73
Industrial/Occupational Area: Chemical and Allied Products
Hazards Observed: Chemical

I. Company Summary

This company employs 17 persons in the blending and packaging of chemicals for the wholesale, institutional, and government trades. Various parts of the body require protection. Complete protection is required in unloading tank cars of acids and cleaners. Splash protection is required during the mixing and packaging of some types of chemicals, and hand and face protection during the handling of other chemicals. Protective clothing is required, supplied, and maintained by the company. Distribution to the workers is accomplished through the tool crib. The task of periodic review of protective clothing requirements is assigned to the plant supervisor and is coordinated with the plant and shift foremen. Protective clothing used at this facility does not add to the workers' risk. However, the design of the face shield used in some operations had a tendency to catch and hold chemical vapors. The use of respiratory protective devices and acid-proof suits, with helmets, in offloading tank cars and semi-trailer loads of acid, would improve worker safety. The workers are satisfied with the protective clothing presently supplied.

II. Survey Representatives' Observations and Comments

This chemical blending and packaging company was very clean, well lighted, and functionally designed. There are chemical safety showers and eye bath stations located inside and outside the central plant. Emergency equipment, posted instructions/directions, and warning devices are placed at strategic locations throughout the work areas. Since storage, blending, and packaging operations involve such large quantities, a major spill or accident could be catastrophic; therefore the safety equipment that is issued is very important to workers' safety. The operation of this plant involves the mixing of chemicals, synthetics, and

solvents to produce finished products. The finished product is then loaded into bulk delivery systems, or packaged in cans, drums, or cartons. The cans are labeled by machine, drums are hand-stenciled, and cartons are premarked for shipment. The employees state that the clothing supplied by the company is sufficient for the work in this plant. These statements are based more on a desire for comfort than safety. The protective clothing available at this plant, supplemented with the ensemble described in Section I, would provide adequate personal protection to employees.

III. Photographs

No photographs were taken at this plant.

IV. Conclusions

The protective clothing currently being used while handling bulk chemicals at this plant does not provide adequate personal safety to the workers involved in these operations. The addition of the ensemble mentioned in Section I is recommended. Protective clothing at this facility is rated Available but Inadequate.

Company Code: 1-28 SIC Number 2819
Date of Visit: 8/20/73
Industrial/Occupational Area: Chemical and Allied Products
Hazards Observed: Chemical

I. Company Summary

This chemical company employs 15 people in the storing and wholesale packaging of liquid chemicals including acetones, acids, alcohols, soaps, and detergents. The front torso, face, and extremities require protection in most of the transfer and packaging operations. Protective clothing consisting of apron and gloves is worn during bulk chemical transfers. Protective clothing is not required; however, it is supplied and replaced as required by the company. No utilization enforcement procedures or periodic review of protective clothing requirements were observed. The use of protective clothing at this plant caused no added risk due to its design. Splash suits and rubber boots would be desirable articles in this company's personal protective clothing inventory. Their use during liquid commodity transfer would make this a much safer operation. Interviews with employees indicated they were satisfied with the performance of protective clothing supplied.

II. Survey Representatives' Observations and Comments

The warehouse area was light, roomy, and open with a good system of commodity storage. The only hazards were observed in the product transfer operation. These hazards chiefly comprised splash or spill potentials. General plant operation involves the transfer of liquid chemicals from bulk carriers to bulk storage and from there to delivery vehicles and containers. Warehousing, material handling, container marking, and delivery are basic phases of this operation. Employees feel that company-provided clothing is adequate for the occupation. The company-provided clothing is adequate for the powered material-handling portion of the operation; however, there is a definite need for the items of clothing mentioned in Section I for the chemical transfer portion of this job.

III. Photographs

No photography was permitted at this plant.

IV. Conclusions

The current practice of handling dangerous chemicals without adequate protective clothing and equipment could eventually result in a serious accident. The addition of the articles of protective clothing mentioned in Section I to the present personal equipment inventory would give adequate worker protection. The Surveyor's rating of protective clothing utilized on the site was "Available and Inadequate."

Company Code: 1-29 SIC Number 1541
Date of Visit: 8/20/73
Industrial/Occupational Area: Construction
Hazards Observed: Mechanical

I. Company Summary

This construction company employs 15 people (mechanics and helpers) in the assembly of prefabricated building sections. The hands, feet, upper forearm, and face are exposed to cutting hazards in sheet metal assembly, and the entire body is subject to crushing and cutting injuries in the excavation and forming of building foundations.

Protective clothing (other than rain suits and boots) is not required or supplied by the company. The use of a face shield, gauntlet, gloves, and leggings by fabrication personnel would reduce the injuries received in handling the sheet metal building sections. Employees were well satisfied with the general, street-type work clothes supplemented with raingear being used on this job.

II. Survey Representatives' Observations and Comments

The work environment varies with each job. The noise, lighting, and ventilation levels are all acceptable. The cutting hazards are usually encountered in the trimming, handling, and assembling of metal building sections and components. The installation of prefabricated buildings includes foundation construction, frame, plumbing, heating, and electrical work. The floor and roof, interior and exterior finish, and landscaping is also considered part of the general contractor's responsibility. Most of the usual construction tasks, digging, reinforcing, drilling, etc. are encountered in the prefabrication business. Most hazards observed were in the assembly and fabrication and excavating and forming areas.

III. Photographs

Photography was prohibited by management of this company.

IV. Conclusions

The current practice of not using protective clothing in fabrication and assembly of metal unnecessarily exposes workers to hazards. The use of items listed in Section I would provide a good degree of personal protection to assembly and fabrication personnel. The Surveyor rated protective clothing at this facility as "Unavailable."

Company Code: 1-30
Date of Visit: 8/21/73
Industrial/Occupational Area: Frozen Fruits, Fruit Juices,
and Vegetables
Hazards Observed: Mechanical, Thermal, Electrical,
and Chemical

I. Company Summary

This is a very large fruit-processing plant employing over 600 people in the primary (frozen concentrate) and byproducts (animal feed) production areas. It is subject to both Federal and State sanitary regulations. There are both automatic and manual operations employed in the processing of citrus fruit into its various products. Body areas subject to injury include the extremities, the face and eyes, and the torso. Protective clothing utilized in the food-handling assignments encountered in this plant consists of two-piece cotton work suits and gloves for outside workers. The same clothing plus an apron is used for conveyor line personnel. A four-piece ensemble, composed of a parka, thermal trousers, gloves, and boots, is worn for work in the freezer. Maintenance personnel employ a variety of clothing items to make up ensembles suitable for each job. Food machinery cleaners dress in a two-piece plastic/fabric suit, plus hat, gloves, face shield, and boots while using a lye cleaning solution. All maintenance personnel wear hard hats, plus two-piece cotton work suits. Gloves, aprons, and safety shoes are optional. Welders have access to hides, hoods, and gloves but very few wear more than the hood. Use of protective clothing available to the employees resulted in no additional risk to the wearer. Protective clothing is considered a part of safety equipment and is included in safety programs discussions and meetings. Responsibility is divided between unit supervision and the Safety Department. Special protective clothing (welding hoods, hides, and freezer gear) was available, and accessory items such as gloves, glasses, and helmets were observed in use throughout the facility.

There does not appear to be a strong, general safety program with a person directly responsible for implementing and enforcing it, in effect. A checkerboard pattern existed in almost all areas, with some employees properly dressed and equipped for the task, and others nearby woefully lacking. Workers in all areas of the plant indicated they were satisfied with the available protective clothing.

II. Survey Representatives' Observations and Comments

The general condition of this plant left much to be desired. In addition to the usual wet floors, there existed steep, slippery steps; open containers; stacked pallets; hot or freezing-cold pipes; and dark corners. Also, extensive construction was in progress. Ladders, lines, scaffolds, cranes, and welding/cutting equipment were scattered throughout the complex, with construction, maintenance, and operating personnel intermingling.

Fruit is picked manually, sized, and graded prior to washing. Upon receipt by the plant, fruit is washed in mild detergent, air-dried, and conveyed to squeezers where the juice is automatically separated from the pulp, seeds, and skin.

Whole juice intended for immediate consumption is pasteurized and bottled or canned. Raw juice is reduced, mixed, and frozen into concentrate slush form. This product is packaged in tanks, drums, or cans for automatic quick freezing and eventual shipment.

The pulp and seeds are automatically dried and ground, and then transported to a pelletizing machine where molasses is derived from the skin. Additional filler fluids and preservatives are added, and pellets are formed and cooked, dried, and then bagged to customers' specifications.

The biggest hazards encountered in this process are mechanical, with many open and exposed positions in the conveyor line, squeezing area, transmission system, and packaging operation. Another extremely hazardous area is in the electrical maintenance department. Work on open switch boxes, relays, and instruments in the constantly wet plant were observed on several occasions.

Thermal hazards exist in both the pellet drying/forming operation and in the freezing process.

Food-handling-machinery cleaning procedures necessary to meet health standards require the application of high-pressure lye solutions at regular intervals. This is accomplished with high-pressure hoses and adjustable nozzles as required to suit conditions. Protective clothing provided employees appears adequate for the hazards encountered and meets with the majority of workers' approval.

III. Photographs

Management would not permit photographs at this plant.

IV. Conclusions

The protective clothing presently available at this facility, supplemented with a supply of electricians' gloves, sleeves, and mats, would probably be adequate for this operation. The fact remains, however, that unless employees are required to wear the proper clothing for their assigned jobs, preventable injuries will continue to occur.

Company Code: 1-31
Date of Visit: 8/21/73
Industrial/Occupational Area: Phosphate Mining
Hazards Observed: Mechanical, Thermal, and
Electrical

I. Company Survey

This mine employs 400 people in various job classifications to automatically mine phosphate. The entire body occasionally requires protection from mechanical, thermal, and electrical hazards in various areas. Usually the extremities and front torso are the most endangered areas. Protective clothing is available, maintained, and required by the company. The clothing is replaced through the tool crib when worn out. The protective clothing requirements and suitability are periodically reviewed by the Safety Director. Protective clothing worn in tube-cleaning operations (splash suit and hood) does cause added risk due to entanglement of the hood during work. This has been remedied by making the hood detachable from the rest of the suit. The protective clothing available to employees at this mine appears adequate and is felt completely satisfactory by the workers, although a minor worker complaint was heard relative to the weight and heat of some of the clothing.

II. Survey Representatives' Observations and Comments

The mining area was open strip mining. Hazards exist in the operation, maintenance, and overhaul areas. The welding and cutting shop has the usual thermal hazards; the machine shop and operations groups were exposed to mechanical hazards encountered in moving machinery and equipment, and the operating crews were subjected to many electrical hazards in both transmission and distribution areas. This operation involves exposing the wanted materials by stripping off the overburden. Drag lines, power shovels/loaders, and other earth-moving equipment are used in the stripping process. A huge, electric, self-propelled drag line is used in the mining of the phosphate, and loading is accomplished directly into the rail cars for shipment to the processing plant. The mine workers were satisfied with the protection afforded by the clothing and hides supplied by the company, but complained of their weight and heat. This is a minor problem

and does not affect the wearing of the clothing or the workers' comfort to any measurable degree.

III. Photographs

No photographs were taken at this mine.

IV. Conclusions

The current practices relative to the wearing of protective clothing (splash suits, boots, and raingear in the areas where employees are exposed to acid splashes and cleaning chemicals; long, high-tension gloves and aprons in the electrical power area; and protective hides in the cutting and welding area) appear to provide adequate personal protection. The original survey rating of protective clothing "Available and Adequate" is based on the availability of the clothing listed above.

Company Code: 1-32
Date of Visit: 8/20/73
Industrial/Occupational Area: Fabricated Plate Work (Boiler Shop)
Hazards Observed: Mechanical, Thermal

I. Company Summary

This firm employs eight mechanics and helpers in the manufacture of water-treatment tanks and the excavation and installation of the completed units. Full body protection is required for the welding phase of manufacturing. Protection is required for the extremities in excavation and installation work.

Protective clothing is worn in each hazardous operation and is required, supplied, and maintained by the company. The protective clothing requirements are periodically reviewed by the company supervisor. Worn or damaged clothing is replaced by the company through an individual-issue policy. Protective clothing does not cause an added risk due to its design, and clothing available on this job appears adequate for the task. The workers felt the clothing supplied to be adequate but "too hot" in the welding area.

II. Survey Representatives' Observations and Comments

There is a construction-type work atmosphere and a field environment in this industry. The noise and lighting is dependent on the locale in which work is being performed. The shop is well lighted and, though there is a high level of noise, it is not intolerable. Hazards are dominant in the welding and grinding operations. The manufacturing/fabrication process begins with the receipt of metal castings, sheets, plates, and forms.

The stock is laid out, marked, and sized for burning. Shaping is accomplished by heating, hammering, metal brakes, and rollers. The fabricating phase includes wedging, clamping, heating, forging, welding, and grinding the components into shape. Following finishing and painting, the assembly is transported to the installation site, a foundation having been prepared, connected, and tested. The workers' comments

that the clothing supplied by the company was too hot is directed at the weight of the welding hides and is an unavoidable discomfort in this heavy welding process. The protective clothing supplied workers by the company is felt to be suitable for the tasks encountered in this type of work.

III. Photographs

No photographs were taken of this operation.

IV. Conclusions

The current fabrication and installation operations have hazards that are either procedurally protected against, isolated, or reduced through the use of protective equipment and clothing. The use of lighter clothing, wherever possible in the welding area, is encouraged. This, if adequate thermal protection was maintained, would reduce heat stress and improve worker comfort.

The original survey or rating of protective clothing was "Available but Inadequate" due to workers' dissatisfaction with protective clothing comfort.

Company Code: 1-33
Date of Visit: 8/20/73
Industrial/Occupational Area: Construction
Hazards Observed: Mechanical and Electrical

I. Company Survey

This company employs 19 people in the manual trades required in the industrial and commercial building construction field. The entire body is exposed to electrical and mechanical hazards at some phase of buildings construction. There is no protective clothing required or supplied by the company and none worn by employees. Protective clothing requirements are not considered necessary by the company or by the employees. Construction workers exposed to mechanical and electrical hazards should utilize the proper equipment and clothing for each assignment. Face shields, helmets, gloves, aprons, and safety boots should provide adequate protection in reducing mechanical hazards such as cutting cinder block. Long rubber gloves, safety glasses, and nonconductive helmet would provide adequate protection from electrical hazards.

II. Survey Representatives' Observations and Comments

The work environment varies with the job type and location but usually is open, noisy, light outside, dark inside, and dusty when dry. Hazards exist in both the mechanical and electrical areas. Hazards are evident in climbing, overhead work, and moving vehicles and equipment. Trade hazards include sheet metal (cutting), iron work (cutting and strains), concrete construction (falls and crushing), carpentry (cutting, crushing, falling, and impaling), and electrical (shock, burns, and falls). Operations include the complete run of construction activities: excavating, forming, pouring concrete, plumbing, sheet metal, electrical, carpentry, masonry, glazing, painting, and roofing. The final phase is the landscaping of the project. The workers indicated there was no requirement for protective clothing and that its use would only complicate the work efforts. This attitude is felt to be erroneous and due to the lack of knowledge among the employees and management relative to protective clothing and equipment.

The use of the protective clothing listed in Section I would result in a much safer work area.

III. Photographs

No photographs were taken of this operation.

IV. Conclusions

The current practice does not include the use of protective clothing. The use of protective clothing listed in Section I would result in a protective clothing "Available and Adequate" rating for this operation, rather than the "Not Available" currently assigned.

Company Code: 1-34 SIC Number 3471
Date of Visit: 8/20/73
Industrial/Occupational Area: Chemical and Allied Products
Hazards Observed: Thermal and Chemical

I. Company Summary

This plating concern employs eight people in the manual plating of ferrous and non-ferrous metals. The body areas requiring protection range from complete to front torso and face. The wear of protective clothing is not required; however, it is supplied and is maintained by the company through replacement as it becomes worn or damaged. Protective clothing requirements are not periodically evaluated and would change only if found and proven unsatisfactory. Protective clothing presently in use does not add risk due to its design. There are adequate items of protective clothing available on the market such as splash suits, face shields, rubber gloves and boots, and air-supplied hoods. These should be made available for all employees and their use enforced as required. The employees of this shop appeared satisfied with the protective clothing provided by the company.

II. Survey Representatives' Observations and Comments

This shop was very crowded, the floor littered with trash and scraps. It had a very poor ventilation system, and heavy fumes were noted in the air. Hazards exist in the mechanical, electrical, and thermal areas and in the buffing, cleaning, and plating portions of this operation. Electric shock from open connections and exposed wiring; eye and face injuries from grinding; acid splashes from mixing chemicals and immersing items for plating; and injuries from falls and material-handling equipment have occurred in this operation and may be expected in the future. The operation includes steam cleaning, chemical baths of caustics and petroleum, and rinsing in clear water. After plating, the article is rinsed, dried and buffed or polished as required, and packaged for shipment or pickup. Employees are satisfied with the protective clothing made available by the company. This feeling of satisfaction is due to

their lack of knowledge of the commercial availability of more and better protective clothing.

III. Photographs

No photography was permitted in this shop.

IV. Conclusions

The current practice does not include the mandatory use of what little protective clothing is available. The addition of one or more individual ensembles consisting of face shield with cap, splash suit, long rubber gloves, and rubber boots to this company's protective clothing inventory would improve the safety aspects of this company's operation.

Company Code: 1-35 SIC Number 1742
Date of Visit: 8/21/73
Industrial/Occupational Area: Construction
Hazards Observed: Thermal, Mechanical

I. Company Summary

This drywall company employs two people in the manual installation of sheet rock in home and business construction. There is no specific requirement for protective clothing in this industry. Injuries sustained during this type of work are not preventable through the use of protective clothing.

II. Survey Representatives' Observations and Comments

This is a field construction environment with natural light and ventilation, an acceptable noise level, and an extremely high, humid working temperature during the summer months. Other hazards observed in this operation are mechanical, found in cutting and nailing sheet rock, and material handling involved in setting up ladders and scaffolds. Employees and the Survey Representative feel there is no necessity for protective clothing in this particular operation.

III. Photographs

No photographs were permitted.

IV. Conclusions

The current company safety program does not include nor require protective clothing.

Company Code: 1-36 SIC Number 1629
Date of Visit: 8/15/73
Industrial/Occupational Area: Heavy Construction
Hazards Observed: Mechanical

I. Company Summary

This company employs 289 people in the heavy construction field. The company product is resort development. Operations are manual. The front lower torso, legs and forearms are the portions of the body most exposed to the hazards encountered in this type of work. Protective clothing is not utilized in all hazardous areas. It is not required, supplied, or maintained by the company. Only accessory items such as boots, hard hats, and gloves are provided. The accessory maintenance program consists of repair or replacement as required and is handled by supply department personnel and unit supervisors. There is no protective clothing used by personnel of this company; therefore, there is no contribution to risk through design. Ballistic nylon forearm and arm guards, cut pads, kickback pads, and aprons of various designs and materials are readily available through commercial sources. Provision of these articles would provide a satisfactory degree of safety to employees engaged in the tree and stump removal activities. There were no employee interviews and consequently no workers' evaluation of the available protective clothing.

II. Survey Representatives' Observations and Comments

The work environment differs depending on terrain. All work is performed out of doors. Lighting depends on weather conditions and time of day. The noise level is fairly high, involving power-saw engines, dozers, and air shovel/chisels. Mechanical hazards involving the use of power saws are the most critical and prevalent in this operation. The job includes cutting and trimming of trees, removal of stumps, usually accomplished by hand, blasting, or burning. Workmen dig around the tree root, cut the heavy main roots, and pull the stump out of the ground. The residue is then hauled to a dump or stockpiled for later cutting and sale. Vehicle and equipment maintenance, some performed while running, present hazards indefensible through the use of protective clothing. Employees were not available for interview. This type of work involves the use of heavy earth-moving equipment, trucks, tractors, trailers, and powered hand-tools. All of the operations take place in the open, making work conditions completely dependent on the weather and terrain.

III. Photographs

Photographs of this operation were not available due to weather conditions.

IV. Conclusions

The current practice or company policy does not include provisions for protective clothing. There is a definite need for protective clothing previously discussed in this report. The survey rating of "Not Available" was based on the type of work and hazards present compared to protective clothing availability at the work site.

SURVEY AREA NO. 2
ON-SITE SURVEY NARRATIVES

Company Code:

2-1

SIC: 3711

Date of Visit:

9/13/73

Industrial/Occupational Area: Vehicle Assembly

Hazards Observed: Thermal, Electrical, Ultraviolet, Chemical, and
Mechanical

I. Company Summary

This is a very large company, employing 4,000 workers. The company has many different types of operations, and combines these different operations for an end product of automobile manufacturing. Each operation will be treated as a separate entity in itself.

The first operation observed was welding. It can be broken into two major areas: the first, automatic spot welding, and the second, manual welding.

Due to the design of the operation, the employee never comes in contact with the actual operation. The welding is controlled by a panel 12' to 15' away from the actual welding. The hazards are eliminated by remote control. Protective clothing requirements become unnecessary for this reason.

The welder is exposed to hazards such as thermal, hot-slag sparks; and electrical, since high-voltage arc welding is performed. Ultraviolet rays are produced by welding and adversely affect the eyes. Mechanical hazards exist at every turn, as the assembly line is continuously running. The possibility of misjudgement in moving around is quite likely. Protruding sharp edges of metal are displayed in every step of the operation. High-pressure cylinder carts containing flammable or combustion-supporting gases make potential hazards evident such as explosion and escaping gas fumes. Housekeeping in both areas was extremely good.

Utilization of welders' helmets, leather gloves, cotton coveralls, and hard-toe safety shoes was prevalent; however, only the hard-toe safety shoes were a required item. There was a possible added risk in using the cotton coveralls because cotton is quite flammable. In this case, where protective clothing is not mandatory, prohibiting the use of certain materials would enhance the safety of the operation. The company made the cotton coveralls available to the employees, which is fine in some of the other work areas, but not in the welding operation. At the employees' discretion, all items of protective clothing are turned in to the supply area where they are replaced with new clothing. The company has a program of revising their protective clothing through observations made by the safety director and recommendations from the foreman and employees.

The workers felt that they had adequate protection by wearing the coveralls, welding helmets, leather gloves, and hard-toe safety shoes. It was noted, however, that a few employees felt that the coveralls were too hot, and caused them to perspire profusely.

The grinding operation was accomplished manually with portable hand grinders. This operation was performed in a soundproof booth that was ventilated by overhead duct exhaust fans. Mechanical and some chemical hazards were prevalent in this operation, mechanical in that the portable grinding wheel could easily become entangled in the metalwork, clothing, lines, and any surface with which it made contact unless certain care was taken to avoid inadvertent contacts. Also, the assembly line was in constant operation, presenting a mechanical hazard of its own. Chemical hazards were represented by lead fumes and dust. The lead is used in joint areas as a filler, and then ground to prepare a surface for painting.

This operation incorporated protective clothing in the following manner: face shields and ear defenders for the head and face area, cotton coveralls for torso and upper and lower extremities, and gloves and hard-toe shoes for the hands and feet. When leaded areas were being ground, employees used airline hooded respirators to protect them from fumes and lead dust. No added risk has ever resulted or been presented through the use of these items.

The use of protective clothing is not mandatory in this area; however, it is highly recommended by the company safety director. The company does supply and maintain all protective clothing items. Protective clothing is revised in the same manner in this operation as it is in the welding operation.

The leading operation contains two major hazards, thermal and chemical. This is a manual operation in which lead bars are melted and applied directly to the seams of the assembled automobile. This operation is performed in an open shop environment, segregated from the main assembly line area. The hot lead is an obvious thermal hazard. Coveralls, gloves, and face shields are used as a deterrent to the hazards in this operation. The fumes emitted from the hot lead are eliminated through use of an air-fed respirator, thus preventing inhalation of the toxic fumes. Hard-toe safety shoes were worn as standard plant wear.

The painting operation was performed manually and contained chemical, electrical, and mechanical hazards. The painting was performed in a downdraft water reservoir booth. Protective clothing was afforded for several operations. Leg stats were worn by all painters to protect against electrical shock. Air-fed hoods were supplied for added protection from paint vapors, mists, and fumes, but were not worn by all painters. Cartridge respirators were worn by those painters that didn't wear the air-fed hoods. Coveralls were worn by all painters, and gloves were also worn. One peculiarity about the gloves was that the thumb area was cut

off. When questioned on this alteration, the painters replied that it allowed them more sensitivity in operating the spray guns. Hard-toe shoes were also a part of the ensemble. These were standard required wear throughout the plant.

The painters felt that they were adequately safeguarded in using these items of protective wear. There was no indication of added risk through the use of the aforementioned protective clothing.

II. Survey Representatives' Observations and Comments

The Surveyor's evaluation of the protective clothing used in the manual welding operation was that the clothing available was inadequate and caused added risk to the employees due to its design. There is available, on the market, much better-suited protective clothing. Welders should wear welding hoods, leather/fire-resistant gloves, aprons, or jackets and trousers. In any overhead areas, leather skull caps or hard hats should be worn under the welding hood. These articles of clothing would protect against thermal, minor electrical, and mechanical hazards.

In the grinding operation, the Surveyor's evaluation of protective clothing was that it was available but inadequate because there is protective clothing available on the market; however, the company is not supplying it to the employees. The lower torso area, covered only by the coveralls supplied, does not afford enough protection. The portable grinding wheel can inadvertently become entangled with the coveralls, especially at the lower torso area. Penetration of the coveralls would allow the lower torso to be quite vulnerable to injury. To prevent this from occurring, a snug-fitting belly pad, sufficiently padded and of proper makeup should be added to the presently used protective clothing ensemble. Protective clothing that is used is mandatory, supplied, and maintained in the same manner as in the welding operations.

The Surveyor's rating for the leading operation is Available and Adequate. Observations indicate that protective clothing used in this operation allows sufficient protection from thermal and chemical hazards.

The Surveyor's rating of protective clothing in the painting operation is Available and Adequate. Either of the respirators used in the painting operation would suffice in itself. The preference shown towards the cartridge type of respirator was due mainly to the cumbersomeness of the air-fed hood.

III. Photographs

No photographs were allowed by the company.

IV. Conclusions

The general picture received in the plant indicated good environmental conditions. Although a high production rate is maintained, there did not seem to be any overt disregard for safety. Ventilation in all areas was good, as was the lighting. Housekeeping was excellent and generally presented a desirable atmosphere for the employee to work in.

The only protective clothing accessories that were required in all operations were the hard toe shoes and safety glasses.

The following items of protective clothing were used in the welding operation; however, they were not mandatory.

1. welder's helmet
2. leather gloves
3. cotton coveralls
4. hard-toe safety shoes - this was the only item required to be used.

The Surveyor's evaluation of protective clothing currently used was Available but Inadequate. Cotton coveralls are a potential hazard in themselves. Cotton is quite capable of catching fire very easily. In some cases, fire-resistant treating of the cotton coveralls would suffice, but to ensure a safer operation, the following items should be added to the presently used ensemble:

1. leather/fire-resistant apron
2. leather/fire-resistant jacket
3. leather/fire-resistant trousers
4. leather skull cap or hard hat - when welding on any overhead operation.

Protective clothing items used in the grinding operations are as follows: (They were not required items, but were highly recommended by the company.)

1. face shields
2. ear defenders
3. cotton coveralls
4. gloves
5. hard-toe shoes - only item required
6. airline hooded respirator

The Surveyor's evaluation of protective clothing was that it was Available but Inadequate. The following addition to the presently used ensemble is available to the company; however, the company is not supplying it to the employees.

1. belly pad - sufficiently padded and of the proper material. Many different types are available and are made of many different materials, e.g., woven metal, leather, and asbestos.

The leading operation incorporated the following protective clothing:

1. cotton coveralls
2. gloves
3. face shield/safety goggles
4. air-fed respirators
5. hard-toe safety shoes - only item used that was company-required

The Surveyor's rating was Available and Adequate. The protective clothing used in this operation afforded the employee a sufficient amount of protection. The leading was done on a very small scale. No large amount of lead was handled.

Protective clothing was used in the painting operation as follows:

1. rubber grounds
2. air-fed hoods
3. cartridge respirators
4. coveralls
5. gloves

The Surveyor's rating was Available and Adequate, with all hazards taken into consideration. The protective clothing used was quite adequate for all of them.

Company Code: 2-2 SIC: 1611
Date of Visit: 9/13/73
Industrial/Occupational Area: Asphalt
Hazards Observed: Thermal, Mechanical

I. Company Summary

This is a small company employing 20 workers that manually apply hot asphalt to surfaces. A prepared base of stone is sprayed with hot liquid tar, and then asphaltic compound is applied to form a finished surface.

Full-body protection should be used when spraying the hot liquid tar. The hazard in this operation is thermal. Hot tar is sprayed on a surface. The protective clothing accessories used consists of asbestos gloves, and corded bottom shoes. These items are not required or maintained by the company and only the asbestos gloves are supplied. The gloves are issued at the discretion of the employees. When they feel that the gloves are worn out, they just take another pair. Rain-gear is also used by the employees. Here again, the employee supplies himself with these items.

The application of the asphalt compound is also manually performed. In this operation, again, thermal hazards present themselves. The body areas that need to be protected are the hands and feet. Another hazard is quite evident here, that of a mechanical nature. Dump trucks and rollers are constantly operating in and around the work areas. The protective clothing accessories utilized in this operation were of the same nature as those in the hot tar application. Here again, the protective clothing accessories worn were not supplied, maintained, or required by the company.

The company takes very little interest in providing their employees protective clothing. There are no requirements for protective clothing; however, the employees have tried some other pieces of protective clothing such as wooden shoes, but found them to be very uncomfortable and therefore unacceptable. The employees feel that they have supplied themselves with an adequate amount of protective clothing.

II. Survey Representatives' Observations and Comments

The asphalt application is performed at different locations each time; therefore, the job site changes constantly. Recommendations for added protective clothing in the hot tar application would consist of some type of face protection, along with a torso covering, to protect against hot tar splashes. Also, trying to keep in mind that this operation involves high temperatures, any ensembles recommended for this operation should give this factor a great deal of consideration.

III. Photographs

Photographs were not allowed by the company.

IV. Conclusions

Presently used protective clothing accessories in the hot tar spray operation are listed as follows:

1. asbestos gloves
2. corded bottom shoes
3. raingear - when raining

The Surveyor's evaluation of presently used protective clothing accessories is Available but Inadequate. Suggested additions should include:

1. face shield
2. air-cooled full body ensemble/lightweight, cool coveralls affording thermal protection from hot tar.

Company Code: 2-3 SIC Number 2421
Date of Visit: 9/7/73
Industrial/Occupational Area: Sawmills and Planing Mills
Hazards Observed: Mechanical

I. Company Summary

This is a small lumber-stacking operation employing 25 workers. All operations performed in this facility are manual. Machines such as planers, power table saws, and forklifts present many mechanical hazards. In the planing operation, noise levels were quite high and ear defenders were worn to protect the employees' hearing. There were many mechanical hazards found throughout the work environment such as lumber being stacked, forklifts operating in and around machinery, and strapping equipment moving within the storage area. Lumber scraps were scattered throughout, and protruding edges of materials presented potential safety hazards. Sawdust chips and slivers of wood become dangerous objects from the table-saw operations. The eyes are quite vulnerable in this type of operation. There is no use made of protective clothing in any operation. The only items of protective wear employed in this facility are hard hats, gloves, and ear plugs. Approximately 50 percent of the employees have furnished themselves with hard-toe safety shoes and hard hats. The gloves and ear plugs are supplied by the company and maintained through a reissue program when an item is worn out, which is determined by the employees. The company does not require these items to be worn. The workers felt that they were adequately protected by using the aforementioned accessory items. Some employees refused to wear the hard-toed shoes because they were uncomfortable.

II. Survey Representatives' Observations and Comments

The entire facility was cluttered with wood scraps, creating potential tripping hazards throughout the work site. The workers appeared completely satisfied with their work environment and the protective clothing accessories utilized in the operations. They do not seem to recognize the hazards inherent in their work.

Protective clothing items to improve the personal safety protection are available from protective clothing manufacturers. These items vary in design and could be adapted to this operation with ease.

III. Photographs

No photography was allowed in this mill.

IV. Conclusions

Only two safety items are provided by the company, cotton gloves and ear plugs. Their use is not enforced. They are replaced by the company, when worn out. The Surveyor's rating in this operation is "Not Available" through the employer. Protective clothing manufacturers list, in current inventory, leather and mesh aprons for torso and upper-leg protection, leather gloves for hands and forearms, safety boots to protect feet and lower legs, and sleeves of leather, plastic, or mesh to protect the arms.

Company Code:

2-4

SIC: 2251

Date of Visit:

9/6/73

Industrial/Occupational Area: Chemicals and Allied Products

Hazards Observed: Mechanical

I. Company Summary

Mild chemicals such as lanolin are mixed automatically in covered mixing tanks for an end product of panty hose finishes. There are eight employees performing mixing, storage, and loading operations. The storage and loading for shipment is performed manually. Lanolin and dye are mixed inside sealed tanks that will not operate unless closed. This eliminates exposure to contents. The mixture is then placed in drums or cartons and readied for shipment. The company supplies a rubber ensemble consisting of coat, boots, and gloves. Basically this is to keep the employees dry due to a minor amount of spillage and splash. Slippery conditions exist around the mixing tanks. Here, some type of non-skid soles on the rubber boots would control slipping. The employees seldom if ever wear the coat and gloves, only the boots. The employees feel that this is a safe enough operation and protective clothing is unnecessary.

II. Survey Representatives' Observations and Comments

The work environment was quite pleasant. The work areas were void of all debris and the water kept to a minimum. Although the water was squeezed away, it still presented the biggest hazard. The employees didn't feel that the protective clothing supplied them is necessary. They also complained that the coat was too hot and bulky.

The protective clothing supplied was quite adequate but lacked the users' acceptance in its entirety.

III. Photographs

No photographs were allowed.

IV. Conclusions

The Survey Representative's observations conclude that the ensemble made available to the employees lacked their acceptance. What has been made available was quite adequate for protection. To improve the acceptance, a more suitable material could be substituted.

Company Code:

2-5

SIC: 7397

Date of Visit:

9/7/73

Industrial/Occupational Area: Industrial X-Ray

Hazards Observed: Radiological, Chemical

I. Company Summary

The two major operations observed in this facility are industrial X-ray and chemical analysis. These operations are performed manually and automatically for clientele in need of this service.

In the X-ray operation, the hazard is eliminated through procedure. The X-raying is performed in a lead-lined room. A light located outside the room indicated when an operation was in process. Also, the controls were located outside the room to eliminate exposure. This is a completely automatic process and protective clothing was not worn or supplied when performing this task. Due to the design of this operation, protective clothing needs are eliminated.

In the chemical analysis operation, metals are treated with various chemicals to give off gases. Through spectography, the compositions are analyzed and the results charted. This, like the X-ray process, is an automatic operation; but is performed manually on special items. Exposure to gases is kept to a minimum. However, in some cases, exposure to fumes and gases is inevitable. Rubber gloves, aprons, and face shields are used as a protective ensemble in this operation. These items are required, supplied, and maintained by the company. It is maintained through a turn-in reissue program. The needs for protective clothing are revised by management through the use of pamphlets and brochures circulated by protective clothing manufacturers.

No added risk is involved through the use of these protective clothing items. The employees feel that they are adequately protected when using this ensemble.

II. Survey Representatives' Observations and Comments

In the X-ray operation, the use of protective clothing becomes unnecessary due to the remote-control design.

The chemical analysis operation, when performed manually, exhibits chemical hazards. These hazards are dealt with through the use of a protective ensemble. The only addition to the presently used ensemble would be some type of respiratory device to protect against fumes and gases, which are byproducts of this process.

The workers felt that the ensemble used afforded adequate protection. However, the Survey Representative feels that to be adequate, the ensemble needs to incorporate a respiratory protective device, which is rated as not available to the employees.

III. Photographs

No photographs were allowed.

IV. Conclusions

Protective clothing in the X-ray operation is not needed through design of the operation.

The protective clothing used in the chemical operation is rated as Not Available because the employer does not make it available to the workers, although it is available to the employer through clothing manufacturers. The presently used ensemble consists of the following:

1. rubber gloves
2. rubber apron
3. face shield

The item needed in this ensemble would be a respirator that is capable of removing fumes and gases. An air-fed mask could be used to eliminate both fume and gas hazards.

Company Code:

2-6

SIC: 7692

Date of Visit:

9/12/73

Industrial/Occupational Area: Welding

Hazards Observed: Thermal, Electrical, Mechanical, and Ultraviolet Rays

I. Company Summary

This is a small welding and metal-fabrication operation employing four workers. All welding, cutting, grinding, and rolling is performed manually. The welding and cutting operation employed the use of leather gloves or gauntlets, a welders helmet, and the availability of a leather apron. The leather gloves or gauntlets and welding helmet were required by the company to be worn when employees were welding. The apron was available to them but not required. All the items available to the employees were supplied and maintained by the company. When the item showed excessive wear, it was turned in and a new one was issued. The welder's entire body was exposed to hot-slag sparks, high-voltage arcing, ultraviolet rays, and the handling of cumbersome sheet metal and steel. These created thermal, electrical, mechanical, and ultraviolet hazards. The company had no program for revising the presently used items or for acquiring better protection.

In the grinding operation, only the use of a face shield was evident. This was usually a bench grinding operation, although occasionally a portable grinder was used. Entanglement of the hands and loose clothing presents a potential mechanical hazard.

The rolling operation also involves a mechanical hazard. Gloved hands are very easily trapped in the rollers. Therefore, the use of gloves is prohibited when rolling metal. The rolling machine has a trip bar guard to prevent such accidents from occurring.

The rating for protective clothing by the employees was adequate.

II. Survey Representatives' Observations and Comments

The employees showed little regard for protective clothing. The wearing of the apron was at the discretion of the welders, a privilege that was extremely abused. This evidence came out in a discussion with the welders. They stated that quite often their street clothes would catch on fire and they would frantically beat it out. They reasoned that the apron was too hot to wear.

There was a large exhaust fan at one end of the shop. This was primarily used for circulation of air. The shop condition was cluttered, the lighting poor and the machinery in poor repair.

The protective clothing in the welding operation should be required wear and enforced by the company. Close-fitting wear could be used in all operations and gloves used in the grinding operation.

III. Photographs

No photographs were allowed in this company.

IV. Conclusions

Presently used or available protective clothing for welding is rated by the Surveyor as Available but Lacks Users' Acceptance.- Items used such as the welder's helmet and leather gloves are well accepted, but the apron is felt to be too hot to wear.

The grinding operation should add the following items to their availability list.

1. gloves
2. close-fitting coveralls
3. face shield (which is presently used alone)

The rolling operation seems to be adequately treated in that no protective clothing is necessary. Hard-toe safety shoes and safety glasses could be added to the overall shop as added protective accessories to ensembles.

Company Code:

2-7

SIC: 3292

Date of Visit:

9/11/73

Industrial/Occupational Area: Asbestos

Hazards Observed: Mechanical, Chemical

I. Company Summary

There are 25 employees performing cutting, grinding, drilling and milling of fabricated asbestos. Surfaces for lab tables, gaskets, sheets, and pipe are some of the end products from these operations. All operations were performed manually. The body areas exposed to the hazards were the face (chemical from inhalation of asbestos dust), the hands, which come in contact with asbestos in all forms, and the feet, which were exposed to mechanical hazards, such as machinery and moving large bulk items. Street clothes were worn by all employees; such items as a respirator, ear plugs, and gloves were available to employees but were not required to be worn. There was no ensemble supplied or felt necessary by both the employees and management.

There is a potential added risk in wearing gloves when operating the machinery. The use of gloves impedes manual dexterity. An injury was sustained by one employee when his glove became entangled in the drilling operation; one finger sustained a sprain and bruises.

II. Survey Representatives' Observations and Comments

Overhead hooded exhaust fans vented dust from asbestos operations. The work areas were void all debris. A generally clean work environment was noted. Workers were of the opinion that there was no need for protective clothing in these operations. The Survey Representative agrees with the employees that protective clothing is not necessary. The accessory items used afford an adequate amount of protection from the mechanical hazards.

III. Photographs

No photographs were available.

IV. Conclusions

Exposures to asbestos were deterred through the use of protective clothing accessories consisting of gloves and respirator. Enforcing the use of these items seems to be a major problem. The employees lack the education necessary to appreciate the use of protective clothing accessories. Education is the major problem in this operation, not the protective clothing.

The use of an ensemble is deemed unnecessary by the Survey Representative.

Company Code: 2-9 SIC Number 2841
Date of Visit: 9/5/73
Industrial/Occupational Area: Chemical and Allied Products
Hazards Observed: Chemical and Mechanical

I. Company Summary

This company has a total of 60 employees performing manual operations involved in the manufacturing of janitorial supplies and soaps. Raw materials are delivered to the plant in drums. The materials are then selected to complete different formulas. Acids, caustics, germicides, soaps, grease, and emulsifiers are dumped, in various combinations and quantities, into large receiving and mixing tanks. The operation is constantly monitored until the mixture is completely blended and of the proper consistency. The final mixture is then drawn into drums, labeled, and readied for shipment. Worker exposure to chemical hazards in the mixing operations was evident. The entire body of the worker was exposed to chemical splashes, spills, and occasional vapors. The employees were not supplied or required to wear any protective clothing, although frequent utilization of protective clothing was observed. Employees supplied their own protective clothing, claiming a high chemical burn rate exists at this factory. The requirements for protective clothing are not reviewed by the company. Mechanical hazards were apparent in all areas of the plant. Transporting of bulk chemicals exposed employees' hands, feet, and heads to squeezing, crushing, pinning, and pinching injuries. A great deal of spillage was noted in all areas, increasing hazards by making walking surfaces extremely slippery. Chemicals were dumped into the mixing tanks from elevated platforms. Spillage also made these catwalks slippery and extremely dangerous. The employees expressed a desire for protective clothing and rated the presently used accessories as inadequate but had no suggestions for improvement.

II. Survey Representatives' Observations and Comments

General housekeeping was substandard. Powder residue

was evident on all surfaces, and spills were in evidence throughout the plant. Some accessories were used by workers such as rubber boots, goggles, and respirators. Full-body coverage against chemical hazards should be instituted in this operation.

III. Photographs

No photography was permitted at this factory.

IV. Conclusions

The employees' use of only rubber boots, gloves, goggles, and respirator in handling dangerous chemicals resulted in an "Inadequate" rating. The inclusion of a chemical-resistant coat, pants, apron, rain-type head gear and hard safety hats, rubber sand-grip gloves and boots, and a face shield in the protective clothing inventory would significantly improve the safety aspects of this operation.

Company Code: 2-10 SIC Number 2879
Date of Visit: 9/5/73
Industrial/Occupational Area: Pesticides and Insecticides
Hazards Observed: Chemical and Mechanical

I. Company Summary

This company employs 50 workers in pesticide and insecticide compounding. All formulating processes are automatically performed. Other operations, such as raw materials movement, storage, and shipping are performed manually. Materials are received in drums, selected by contents, and automatically mixed in large tanks. Some of the chemicals involved are phosphates, cyanides, chlorinated hydrocarbons, arsenates, and kerosene. Although this is an automatic process, it is constantly monitored by employees. These employees are frequently exposed to chemical hazards such as fumes, splash, and spillage. Full-body chemical protection is advisable in all phases of manufacturing, as all mixing tanks have covers and shields that must be opened to charge the chemical ingredients. Mechanical hazards exist in the storage and shipping departments where wet surfaces make footing potentially hazardous. The head, hands, and feet are the body areas primarily exposed to chemical hazards. Protective clothing in both areas is nonexistent and the company has no program for studying or revising protective clothing needs. The employees felt that some type of splash gear should be supplied and that more care should be taken in providing efficient and less bulky gloves.

II. Survey Representatives' Observations and Comments

There was no protective clothing program in effect in this plant. Both chemical and mechanical hazards exist throughout the facility. Some mechanical guards were observed but not enough to completely eliminate the need for protective clothing. The few accessories supplied did not adequately protect the employees and were both clumsy and hot to wear. Full-body coverage should be provided employees involved in hazardous chemical movements and mixing. No protective clothing is available to workers for protection against mechanical hazards, only accessories such as goggles, eye glasses, and hard hats.

III. Photographs

No photography was allowed at this plant.

IV. Conclusions

There are no ensembles supplied workers in any department of this plant. The few accessories used in the chemical operation were rated inadequate by the employees. The Survey Representative also rated the clothing inadequate and noted that adequate protection was not available to employees. Accessories currently available were rubber boots, rubber gloves, and goggles. Inclusion of rubber acid coats, rubber pants, rubber apron, and a face shield would result in the availability of satisfactory ensembles for chemical workers. Laceration caps, safety shoes, safety glasses, and gloves comprise the accessory protection items available and worn by employees in the areas of mechanical hazards.

Company Code: 2-11 SIC Number 2426
Date of Visit: 9/10/73
Industrial/Occupational Area: Furniture Turning and Carving
Hazards Observed: Mechanical and Chemical

I. Company Summary

This is a furniture manufacturing shop employing 50 workers divided into two major work areas. The woodworking area which contains most of the mechanical hazards, and the wood finishing shop where several chemical hazards exist. In both work areas, operations are manual. Planing, cutting, turning, grinding, and sanding are accomplished in the woodworking shop. The various articles of furniture are then assembled and moved to the finishing department. Strains and sprains from handling heavy materials, foot and leg abrasions from falling material, and finger and hand injuries from machines and handtools are the most common hazards to which workers are exposed. Extremities are exposed to moving conveyors, jacks, and lift trucks. Sanding and chipping debris are constant threats to the workers' eyes. Furniture-finishing-area operations such as spray painting, staining, and finishing expose employees to chemical hazards. Inhalation of fumes may result in respiratory disorders, and constant contact with chemicals may result in dermatitis. The company does not require, supply, or maintain any protective ensembles; however, they do provide accessory items for both work areas. The employees felt that adequate protection was afforded through the use of the accessory items supplied by the company. They had no suggestions for improving or adding to the accessories now on hand and indicated they did not want to be burdened with an ensemble.

II. Survey Representatives' Observations and Comments

The entire work area was littered with wood scraps and debris. The air was laden with sawdust and the fumes of thinner, paint, and solvents. A large exhaust fan located in the roof gable of the plant was the only means of ventilation, and was not at all effective. General housekeeping and lighting were substandard. Employees were not protected against the hazards described above through the use of protective clothing,

and only to a small degree by mechanical guards. There was no protective clothing used at this company.

III. Photographs

No photographs were permitted by this company.

IV. Conclusions

The accessories currently in use were rated by the workers as adequate; however, the Survey Representative rated them as inadequate. Only safety glasses and goggles were observed in use in this factory as protective equipment. Incorporating the following protective clothing items would improve the personal protection of employees in both work areas. Woodworkers should be provided a bump cap and snug-fitting coveralls, and finishing personnel should be supplied plastic aprons and gloves.

Company Code: 2-12 SIC Number 2841
Date of Visit: 9/11/73
Industrial/Occupational Area: Chemicals and Allied Products
Hazards Observed: Chemical and Mechanical

I. Company Summary

This is a large company employing 300 workers in the manufacturing of janitorial soaps. In the mixing operation, different chemicals are combined for different types of soap powders. Large-scale mixing is done automatically, with small quantities of additives mixed manually. Two other work areas, packing and storage, have the same chemical and mechanical hazards that are exhibited in the mixing operation. Vegetable oils, animal fats, and alkalis such as potash and soda ash, lye, salt, ammonia, alcohol, acid, caustic soda, enzymes, solvents, and phosphates are used in the manufacturing of soap. The basic manufacturing operation consists of mixing, boiling, filtering, cutting, and pressing.

II. Survey Representatives' Observations and Comments

This manufacturing plant is crowded, wet, and poorly ventilated and lighted. The air is heavy with steam and chemical fumes. Employees are exposed to hazards such as wet and slippery footing, falls, chemical and thermal burns, and open, moving machinery. Protective clothing items that are standard and worn throughout the facility are two-piece, acid-resistant uniforms, safety glasses, rubber boots, and gloves. In the mixing areas, a rubber apron and face shield are added to the standard ensemble mentioned above. The workers handling enzymes wore airline respirators, two-piece uniforms, gloves, and boots, and work in an isolated and well-ventilated room. Hard hats were added to the standard ensemble described above when working in the storage or material handling areas. The use of all items of protective clothing, as determined by the hazard, was mandatory. The company supplied and maintained (by repair or replacement) all protective clothing and equipment. Company management made use of a plant-wide Safety Committee consisting of operating supervisors, to keep abreast of new and better protective

clothing availability. The workers rated the protective clothing as inadequate, saying it was too hot and the gloves were too bulky, impeding manual dexterity. The use of the full combination of face shield, suits, apron, gloves, and boots did appear to result in excessive body temperatures. Perhaps the making of an ensemble similar to an air-cooled suit would be both beneficial and practical in this area. The survey rating of the clothing currently in use is "Available and Adequate."

III. Photographs

No photographs were allowed in this factory.

IV. Conclusions

This company appears to provide workers adequate personal protection. Workers evaluated the protective clothing as adequate and, with the exception of heat-stress involvement, the Survey Representative concurs. The physical condition of the plant poses a much greater threat to the worker than can be reasonably protected against by protective clothing.

Company Code: 2-13 SIC Number 2641
Date of Visit: 9/6/73
Industrial/Occupational Area: Paper Waxing/Stencils
Hazards Observed: Thermal and Mechanical

I. Company Summary

The company surveyed employed 43 persons in the waxing, oiling, and printing of specialized papers. Operations in the plant were completely automated with the exceptions of the shipping and receiving departments. There were some exposures to thermal hazards around the paraffin dip tanks where hot wax at 200° F was applied to paper. No protective clothing was worn by employees nor was any supplied by the company. The rationale for this was that as all processes were automated, there were few exposure hazards to employees. The plant's management forbid interviews with employees; therefore, employees' comments on protective clothing were not attainable.

II. Survey Representatives' Observations and Comments

The work areas were well lighted and generally clean. In the waxing process area, protective clothing accessories such as splash shield, rubber gloves, and rubber boots could have been utilized. The area was very wet and slippery from splashed wax and water, and was potentially hazardous to employees. For the most part, hazards were kept to a minimum through the use of automation. In the shipping and receiving areas, where there was no automation, no protective clothing was utilized. In this area, gloves, hard hats, safety glasses, and steel-toed shoes would be advantageous accessories for the employee's safety.

III. Photographs

No photographs were allowed by management.

IV. Conclusions

The company did not have a protective clothing program. The only protective apparel which was worn by some employees were steel-toed shoes. The Survey Representative rated the protective clothing as Not Available. Suggested additions to the plant's use of protective clothing would be a face shield, rubber boots, and rubber gloves in paraffin-application areas. In the Shipping and Receiving areas, gloves, hard hat, safety glasses, and steel-toed shoes should be required for employee safety.

Company Code: 2-14 SIC Number 3549
Date of Visit: 5/9/73
Industrial/Occupational Area: Welding
Hazards Observed: Thermal, Electrical, Mechanical

I. Company Summary

This shop employs 10 people. The major company product is the labor and equipment required to fabricate metal components. All of this shop's operations, welding, cutting, rolling, and grinding are manual. The front of the body requires protection in the welding, cutting, and grinding processes. There is no protective clothing program in progress at this time. There was no sign of use or even the presence of any articles of protective clothing. An exception was one case where a welder utilized an apron during overhead welding. There are numerous articles of protective clothing available to provide an adequate degree of safety to employees of this shop. Welding hides, Nomex work uniforms, and armored sleeves are typical protective items readily available on the open market. Employees were completely satisfied with the working apparel, which was a general, two-piece cotton work uniform currently in use.

II. Survey Representatives' Observations and Comments

This shop is fairly crowded, poorly lighted, and lacks proper ventilation or exhaust systems. Thermal hazards exist in the cutting, welding, and brazing of ferrous metals, and mechanical in the grinding, rolling, sawing, and finishing of metals. Electrical hazards exist in the plant wiring and junctions. Clothing would not afford practical protection against this general electrical hazard. Employees' feelings relative to protective clothing were that the less used the better, and a few nicks and burns were to be expected in this kind of work. Questions directed to working personnel regarding the extent or severity of the mentioned nicks and burns received no reply. Protective clothing of the general type mentioned in Section I of this report would probably eliminate most of the injuries discussed, regardless of extent or severity. The general attitude of both management and labor in this shop did not seem to include any interest in protective clothing, and very little concern for safety in any form.

III. Photographs

Photography was not permitted in this facility.

IV. Conclusions

The current work practices in this shop do not take protective clothing into consideration. The providing of very basic thermal and mechanical protective clothing articles such as sleeves, aprons, and chaps would ensure at least minimum protection to employees of this shop. The original survey rating of "Not Available" is applicable to all of the listed hazards.

Company Code: 2-15 SIC Number 3721
Date of Visit: 9/13/73
Industrial/Occupational Area: Vehicle Production
Hazards Observed: Thermal, Radiological, Chemical,
and Mechanical

I. Company Summary

This is a large company, employing approximately 10,000 workers engaged in the manufacture of aircraft assemblies and subassemblies. Automated processes observed were vacublast (a type of sand-blasting), metal plating, and industrial X-ray. All other operations such as foundry works, metal spraying, cutting, grinding, machining, welding, painting, and laboratory work were done manually. Specific body areas requiring protection were face, eyes, hands, torso, legs, and feet. Protective clothing ensembles were noted in two operations, the first during welding operations. Welders were equipped with leather aprons for torso protection and either welding helmets or goggles for eye protection. The main hazards to be protected against during welding operations were thermal hazards. Medical X-ray facilities, which were separate from the industrial X-ray, had employees utilizing a radiological protective clothing ensemble which consisted of leaded aprons, gloves, and gonadal shields. In other areas of the plant, protective clothing ensembles were not in evidence. Worker protection was provided by accessory items such as face shields, spats, gloves, and respiratory protective devices. Protective clothing was supplied by the company as required wearing apparel, and was maintained by the company. Defective equipment was returned to the tool crib where re-issue was made of like serviceable equipment. The defective items were routed to a safety appliance maintenance area for inspection, repair, cleaning, and sanitizing. Respiratory protective equipment was cleaned and checked daily by user personnel. Replacement of cartridges, filters, and air-supply cylinders was accomplished by safety appliance repair personnel. Protective clothing requirements were reviewed periodically, using suggestions received from supervisors, foremen, and workers. During the survey, there were no instances noted where

protective clothing added undue worker risk. Employees interviewed stated that the protective clothing offered by the company was readily available and provided adequate protection in all work areas.

II. Survey Representatives' Observations and Comments

The personnel at the facility were extremely conscious of safety clothing and safety practices. Housekeeping in the plant areas was excellent. Ventilation was good throughout the plant. Exhaust fans provided good airflows in the areas where metal plating and sandblasting operations took place. An inclosed exhaust system was utilized in the automated vacublast area. Hazards noted during the survey were thermal hazards found in the foundry furnace operations and welding operations; chemical hazards found in the metal-plating operations and laboratory areas; mechanical hazards found in the cutting, grinding, and machining operations; and radiological hazards found in the operational X-ray areas. The Survey Representative's evaluation of protective clothing items in use was in concurrence with the employees' comments. The protective clothing provided by the company was readily available and afforded sufficient protection in all work areas. Although in some work areas only protective accessories were worn, it was felt that they were adequate for the particular operation.

III. Photographs

Photography was not allowed at the plant site due to proprietary work in progress.

IV. Conclusions

There is no suggestion for adding protective clothing requirements to any of the operations discussed. The employees rated their protective clothing as adequate, and the Survey Representative agrees.

Company Code: 2-16 SIC Number 2842
Date of Visit: 9/5/73
Industrial/Occupational Area: Chemical and Allied Products
Hazards Observed: Mechanical and Chemical

I. Company Summary

This company employs 24 people in the manual custom-blending and formulating of industrial chemicals and cleaners. The complete body is exposed to hazards while unloading chemical tankers. The face, front torso, and extremities require protection, in various degrees, during the mixing and packaging operations. Protective clothing is not worn for each specific hazard. Only the personnel unloading tank cars regularly use an ensemble. This is the only use of protective clothing required by the company and the only piece supplied through personal issue, with the employee fully responsible for maintenance. Protective clothing requirements are not periodically reviewed by the company. Protective clothing does not cause added risk due to its design. This employer should make protective clothing available to personnel involved in the blending or mixing of chemicals. A standard outfit would include long rubber gloves, apron, boots, and a splash shield, the various components to be worn as required.

II. Survey Representatives' Observations and Comments

The general work area, outside and inside, was cluttered with empty containers, crates, pallets, and trash. Inside lighting was very poor, ventilation was inadequate, and fire protection was practically nonexistent. Hazards in the chemical transfer, mixing, and material handling were predominant in this industry. The basic operation depends on whether the product is in liquid or powder form. Basically, materials are received in bulk (rail and motor freight) and weighed or measured for proper proportioning and mixing. Further processing can include separation, packaging, labeling, and shipping. The protective clothing (other than the bulk transfer ensemble) available to this plant's employees is not sufficient for their needs. The ensemble used in unloading bulk chemical shipments fills the bill fairly well,

but other employees should have access to the articles mentioned in Section I.

III. Photographs

No photography was permitted in this plant.

IV. Conclusions

There is a definite need for the clothing referenced in Section I of this report for general work in the chemical blending area of this industry. The original survey rating of "Available but Inadequate" applies to the availability of the special bulk transfer ensembles, and the unavailability of other adequate protective clothing.

Company Code: 2-17 SIC Number 3295
Date of Visit: 9/5/73
Industrial/Occupational Area: Minerals and Earths, Ground or
Otherwise Treated
Hazards Observed: Mechanical, Thermal, and Chemical

I. Company Summary

This company employs 150 people in the processing of crushed barite ore into crude amyl barium sulphate. Operations are both manual and automatic. The entire body requires protection to some degree in the many operations involving heat, chemical additives (including sulfuric acid), and mechanical processes. The wearing of protective clothing is mandatory for each hazard, and it is supplied and maintained by the company. The protective clothing requirements are not periodically reviewed. Local management is of the opinion that the effectiveness of the clothing now in use is sufficient enough to eliminate further consideration. Protective clothing in use at this mill does not contribute to risk due to its design. Employees expressed their satisfaction with both the protective clothing program and its implementation.

II. Survey Representatives' Observations and Comments

The general work area is efficiently designed, uncrowded, though a bit cluttered, and well lighted. Ventilation appeared less than adequate, but did not seem to bother the workers or management. Noise in the processing and transfer pump areas reached uncomfortably high levels at times. Mechanical hazards were observed in the rail-yard, conveyor system, drum mill section, and maintenance shops. Thermal hazards were located in the boiler, drying drum, steam-cleaning, and shop maintenance areas. Chemical hazards arise from the sulfuric acid treatment, chemical processing plant, and the dust of dried barium. Processing begins with the unloading of the raw material from rail cars. The material is washed, roughly ground in a crushing mill, and mechanically conveyed to a mixing mill where other agents are introduced into the compound. The mixture is then wet-ground to a very uniform size; mixed with a water/chemical compound; and either shipped bulk in suspension, or dried and shipped bagged or

packaged. The employees were satisfied with the plastic-coated splash suits, boots, gloves, hood, and face shield making up the complete acid ensemble. Hides in the welding area, aprons, and gloves of leather or asbestos make up the protective clothing available in the thermal and mechanical areas. The protective clothing supplied by this company, when worn in the right combinations, appears to provide adequate protection in this mill.

III. Photographs



Millwright in heavy equipment repair section. (Note extremely dusty conditions.)

IV. Conclusions

The current practice relative to protective clothing in this plant is based on several years of reportedly efficient and safe operation with a very low injury rate, which was documented by management and does appear to include adequate employee protection. The protective clothing rating of "Available and Adequate" is based on the adequacy of the complete acid ensemble, and the protection afforded by the other items of safety clothing used in the correct combination.

Company Code: 2-18 SIC Number 2816
Date of Visit: 9/6/73
Industrial/Occupational Area: Inorganic Pigments
Hazards Observed: Mechanical, Chemical, and Thermal

I. Company Summary

This company employs 152 people in the manual and automatic manufacturing of paint pigments. The complete body requires protection in the "glass furnace" (thermal); the balance of personal protection would be acquired through the use of accessory items such as gloves, respirators, face shields, and safety shoes. Protective clothing is worn in the furnace area only and is supplied, maintained, and required by the company. The maintenance of protective clothing (furnace ensemble) is accomplished by tool crib personnel who repair or replace as required. Protective clothing requirements are periodically reviewed by foremen and shift supervisors. The protective clothing in use at this mill does not add to risk due to design and appearance which are adequate for the processes involved in this operation. Worker interviews were prohibited by plant management.

II. Survey Representatives' Observations and Comments

This was a very well-arranged plant, well lighted, and not too noisy. However, there was a heavy barium dust accumulation throughout the area. Traffic congestion in the rail yard and truck-loading facility was very heavy, with lift truck and pedestrian activities adding greatly to the problem. Thermal hazards exist in the furnace and mill, mechanical in the grinding and conveyor areas, and chemical throughout the plant, and specifically in the acid mixing area. This plant's main operation is in the processing of barium pigment grinding and blending it for use in paints, ceramics, plastics, and other goods. Size is very critical in the pigment particles, making it necessary to grind the compound to a very fine powder. This grinding is accomplished in a pebble mill; the mixture is conveyed to a tumbling mixer where various chemicals are added to produce an extended homogeneous mixture.

This mixture is canned, labeled, and palletized for rail and truck shipment. The protective clothing used in this plant provides adequate protection for workers exposed to most hazards encountered in the various phases of pigment grinding.

III. Photographs

No photography was permitted at this facility.

IV. Conclusions

The current practices relative to the use of protective clothing in this plant are satisfactory in the areas where extremely dangerous hazards are known to exist. However, workers involved in other less dangerous but still hazardous areas are provided nothing in the way of protective clothing. The addition of a general splash ensemble to this company's protective clothing inventory would result in an improvement in the survey rating from, "Available but Inadequate" to "Available and Adequate."

Company Code: 2-19 SIC Number 3221
Date of Visit: 9/6/73
Industrial/Occupational Area: Glass Production
Hazards Observed: Mechanical, Chemical, and Thermal

I. Company Summary

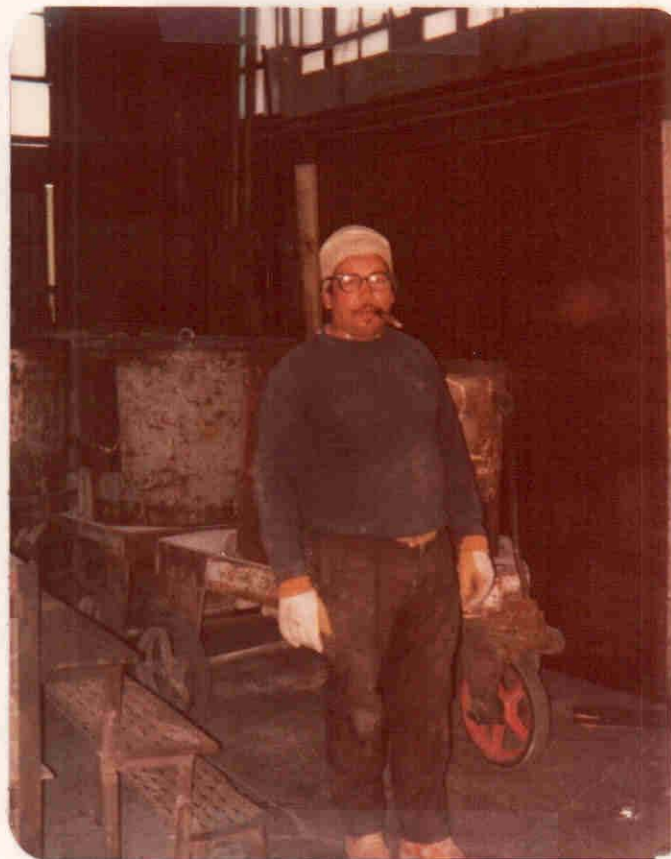
This plant employs 1,500 people in the manufacturing of glass containers, using both manual and automatic processes. The entire body requires thermal and chemical protection in the furnace repair area. The hands and front torso need chemical protection in the silk screening and cleaning areas. The hands, face, and front torso require mechanical protection on the conveying lines, cutter jigs, and batch-mixing operations. Protective clothing is not worn for each specific hazard, but some articles are required and supplied to workers involved in activities the company rates as hazardous. Aluminized fabric suits with hoods and air packs are available to furnace repair crews, and splash suits with face shields, gloves, and boots are used by workers in the etching department. Maintenance of this clothing is accomplished through replacement or repair by tool crib personnel under Safety Department direction. The protective clothing requirements of this plant are periodically reviewed by the Safety Director, management, and the plant Safety Committee. Protective clothing used at this plant does not add risk due to design features. Employee interviews were not permitted by this corporation.

II. Survey Representatives' Observations and Comments

This plant is very modern and well designed with many built-in safety features. Noisy areas are isolated from heavy worker populations, the mix and batching area is enclosed in coated fabric, lighting is generally good, and dust concentrations are very minor. There are mechanical hazards in the bottle-molding and -blowing phase, the mixing area, and conveyor lines. Thermal hazards exist in the furnace room, forming machines, annealing line, and ovens. Chemical hazards are found in the mixing room, cleaning process, and container-identification painting operation. The container-

manufacturing process begins with the mixing of raw materials and the weighing of batches. These are charged into gas-fired furnaces and heated to the desired consistency. Machines gather this mixture and cut correct portions for mechanical transfer into molds. There, the wares are automatically blown into shape. The wares move through tempering furnaces where temperatures are gradually lowered to ambient. Where desired, acid etching, grinding, cutting, painting, and decorating operations are performed. The glassware is then inspected, packaged, and either stored or shipped. No employee interviews were authorized at this plant. The protective clothing available for the known hazardous areas such as the kilns or furnaces were completely adequate for the tasks. Protective clothing for use in some areas such as the molding line and lehrs was not always available in adequate quantities. The provision of heat-resistant jackets, gloves, and caps or hats would result in much safer work conditions in the general production area.

III. Photographs



Mixing room worker with batch carts in background.

IV. Conclusions

The current company procedure covering protective clothing provides adequate safety in the areas where known hazards exist but leaves the general workman without any sort of personal protection for use in many areas where hazards may lie. The addition of the articles listed in Section II would improve the survey rating of "Available but Inadequate" to "Available and Adequate."

Company Code: 2-20 SIC Number 5199
Date of Visit: 9/7/73
Industrial/Occupational Area: Chemical and Allied Products
Hazards Observed: Mechanical, Thermal, and Chemical

I. Company Summary

This company employs 21 people in the manual and automatic filling and pressurizing of aerosol spray cans. The face, front torso, and upper extremities should be protected during pressurizing operations, and the face, arms, and hands in the glue mixing and heating operation. Protective clothing is not required, supplied, or maintained by the company. The employees do not wear protective clothing. Employees involved in glue mixing, melting, and application should be provided gloves, face shield, and a protective rubber apron. Those involved in mixing chemicals and filling containers should have respirators, face shields, gloves, and protective rubber aprons available to use as required. Employees pressurizing and testing containers with gas should be provided face shields, long gloves, and aprons of heavy protective material.

II. Survey Representatives' Observations and Comments

This shop's general work condition was considered to be very poor, cluttered, poorly lighted, and disorderly. There was no problem apparent in the noise level or ventilation. Thermal hazards exist in the glue mixing and application area, chemical hazards exist in the mixing and filling of containers, and mechanical hazards exist in the pressurizing and testing of containers. The production process involves several steps in the preparation and pressurizing of aerosol cans. Chemicals are mixed to customer or industrial standards, weighed in containers, sealed, and labeled. The filled cans move along a conveyor line to the pressurizing operator where they are semi-automatically pressurized with an inert gas and topped with a spray button. The filled, pressurized, and labeled can is then checked for operation and leaks, cased, palletized, and prepared for shipment. The articles of protective clothing referenced, if procured and supplied to

employees, would provide an adequate level of personal safety for those operations.

III. Photographs



Custom aerosol can filling and packaging

IV. Conclusions

Current practices in this shop lack provisions for protective clothing that is vitally required in several steps of this operation. The addition of the articles of protective clothing listed in Section I should be instituted. The Surveyor saw no instance of protective clothing being made available to workers in this facility.

Company Code: 2-21 SIC Number 1041
Date of Visit: 9/9/73
Industrial/Occupational Area: Metal Mining
Hazards Observed: Mechanical

I. Company Summary

This is a small (eight employees) family-operated gold mine. The mine's operations are basically manual; however, stamping and initial screening is automatic. There were no body areas noted that required protective clothing in this particular operation. Protective clothing was not required, supplied, maintained or worn in this mine. The tasks involved in a mine operation of this sort do not require the use of protective clothing. Employees advised they knew of no areas in which protective clothing would provide any significant degree of personal protection.

II. Survey Representatives' Observations and Comments

This mine is located at the base of a small mountain, is poorly lighted and ventilated, and has a serious drainage problem. Normal mine operation produces very little irritating noise but the blasting and ore stamping (intermittent operations) create a veritable din. Hazards are encountered in the mine and mill are falling rocks, dust-laden atmosphere, drilling, blasting, and moving equipment. This method of mining involves locating the ore body through digging and testing samples, driving a tunnel into the deposit, blasting a tunnel into the deposit, and blasting the ore loose. The ore is then loaded onto cars and hauled to the stamping mill where it is separated from the parent rock, graded, and mechanically and chemically processed to extract the gold. Employees' comments regarding protective clothing were that there was no requirement for protection in that form.

III. Photographs

Photography was not permitted at this mine.

IV. Conclusions

It is the current practice in this mine to provide maximum protection to employees through the diligent use of guards, shields, and operational procedures. The results of this practice appear completely satisfactory and no recommendations for improvement are offered.

Company Code: 2-22 SIC Number 2891
Date of Visit: 9/9/73
Industrial/Occupational Area: Adhesive and Sealants
Hazards Observed: Chemical and Thermal

I. Company Summary

This glue manufacturing company employs 53 people in the manual and automatic compounding, preparing, and packaging of glue and adhesives. Protective clothing is required, supplied, and maintained by the company. Protective clothing maintenance is accomplished by the users at company expense, and is issued to individuals on a "one-time" basis. There is no added risk inherent in the particular design of the protective clothing used at this factory. The protective clothing supplied employees at this plant appeared to provide adequate personal protection except for those employees engaged in dry adhesives bagging. These employees are frequently exposed to a variety of dry chemical mixtures composed of clays, starches, preservatives, and other proprietary ingredients. Exposure is greatest during boxing and bagging operations. Coveralls, gloves, and a hat of dust-impervious material would provide an effective protective uniform for this operation. Employees who were questioned in all of the compounding operations expressed complete satisfaction with the commercial cotton coveralls, gloves, and caps supplied by this company.

II. Survey Representatives' Observations and Comments

This plant was found to be well designed, adequately lighted, and well ventilated. There was, generally, an acceptably low noise level. Initiation of the steam-cooking process produced a fairly high level of noise but only for a very short duration. The hazards present in this factory were in the compounding, mixing, and packaging section and in the steam-cooking units located under the charging room floor. The manufacturing process involved the weighing and compounding of the glue batch to standard commercial and customer specifications. The usual procedure required clays, starches, polyvinyl acetates, dextrans, and preservatives in various

quantities to be blended and cooked by steam in a mixing kettle. Materials are usually automatically packaged on the conveyor line, or, occasionally, low-yield batches are weighed and packaged by hand. Most dry batches of commercial standard mixes are weighed and bagged by hand. Employees indicated complete satisfaction with the protective clothing made available by the company. Their statements seemed well founded with the exception of clothing provided workers in the dry mixing and packaging section. The addition of the articles of clothing mentioned previously should eliminate this problem.

III. Photographs

Photography was not permitted in this factory.

IV. Conclusions

The currently unsatisfactory practice relative to protective clothing can be easily corrected through the addition of the referenced protective clothing.

Company Code: 2-23 SIC Number 3312
Date of Visit: 9/4/73
Industrial/Occupational Area: Blast Furnace, Steelworks, and
Finishing Mills
Hazards Observed: Mechanical, Chemical, Electrical,
and Thermal

I. Company Summary

This is a very large steel manufacturer employing over 12,000 people in the manual and automatic production of ferrous metal products. The areas of the body requiring protection range from complete in the furnace area to the face and front torso in the pickling processes. Protective clothing is worn in each hazardous area and does not contribute to any risk due to design. Protective clothing is required, supplied, and maintained by the company. The maintenance program is accomplished through the plant's departmental tool crib on a repair-or-replace basis. Protective clothing requirements are periodically reviewed by a safety committee composed of management, union, and worker personnel. The articles of protective clothing provided employees by this company appear adequate for the operations performed. No employee interviews were authorized by this company.

II. Survey Representatives' Observations and Comments

This mill is cluttered, poorly lighted, hot, smoky, and extremely noisy. The prevailing atmosphere is one of disorder, pressure, and general confusion. Material handling equipment, both overhead and wheeled type, seemingly operates without caution or due regard for pedestrian traffic. Mechanical and thermal hazards exist in the furnace loading and charging area. Chemical hazards are found mainly in the pickling plant, and electrical hazards abound throughout the mill. The steel-making process begins with required ingredients being fed into an open-hearth furnace. Feeding is accomplished with automatic equipment. Heat samples are periodically laboratory-tested to ensure uniformity of heat, and to ensure a yield of the exact grade and alloy of steel desired. Following laboratory tests and sampling, the

furnace tap door is opened, allowing the molten metal to run into ingot molds for final mold forming and cooling. As employee interviews were not permitted at this mill, no worker comments were obtained relative to protective clothing. The protective clothing supplied by this company provides adequate protection against unguarded hazards of less than catastrophic dimensions. It is felt the general use of fire-retardant clothing throughout the facility would be a desirable practice in a flame- and heat-producing industry such as this as it would eliminate many of the minor but painful burns to workers common to steel manufacturing.

III. Photographs

Photography was prohibited at this mill.

IV. Conclusions

The current practices toward the use of protective clothing are fairly standard in this plant and are satisfactory in most cases; however, addition of fire-retardant clothing throughout all working areas would probably improve the overall safety record of this mill.

Company Code: 2-24 SIC Number 3312
Date of Visit: 9/11/73
Industrial/Occupational Area: Blast Furnace, Steelworks, and
Rolling Mill
Hazards Observed: Mechanical and Thermal

I. Company Summary

This company employs over 200 people in the continuous production of iron reinforcing bars ranging in size from 3/8- to 2-inch diameter. The basic mill operations, scrap loading, melting, casting, and reheating are manual operations up to the point of rolling and sizing, which are automated. Following the rolling process, the bars are cut, bundled, banded, and forwarded to common carriers for transportation to job sites or sales centers. Body areas exposed to hazards vary from the complete torso, in the furnace operation, to torso and upper and lower extremities in the scrap packing yard. As in all mill operations of this type, head and eye hazard exposure is anticipated in all labor classifications. The use of protective clothing appeared to be at the option of the employees. Workers utilized various items of protective clothing resulting in the use of the minimum required to afford basic protection against the particular hazard, whether heat, flash, glare, splash, or impact. Employees in the melting area and at the furnace face wear heat-resistant underwear and coveralls with special furnace hoods, while helpers wear heat-resistant coveralls, helmet, and face shield. Charging personnel and batch loaders work in regular two-piece street work suits, often shirtless and gloveless. Clothing is not readily available to the employee as it is often stored outside of the immediate work area. The usual procedure is to check out protective clothing as required and return it to the storage area after use. Protective clothing is a special crib issue item and is repaired or replaced as required. Safety clothing is considered part of the general company Safety Program, and is reviewed in the regularly scheduled safety meetings. During discussions with employees relative to protective clothing and mill conditions, the workers' desire for lighter, cooler, heat-resistant clothing, even at the

cost of some protection, was apparent. The basic design of the protective clothing in current use appeared satisfactory, but its weight and body-heat-retention properties resulted in its failure to meet workers' acceptance. Protective clothing must provide an acceptable degree of comfort; protect against sparks, splashes, and radiant heat; and be durable enough to withstand mill-worker normal abuse. There is no added risk in the use of protective clothing available at this mill. There is a problem getting the workers to utilize this clothing due to its weight and heat retention. The production of reinforcing bars begins with the automatic dumping of scrap steel and pig iron with various mineral additives into furnaces in predetermined amounts, depending on alloy; samples of the melt are periodically taken and laboratory-tested for content and quality. Just prior to pouring, the melt is oxidized, slag is skimmed off the surface, and the melt poured from the transfer ladle into individual ingot molds.

II. Survey Representatives' Observations and Comments

A potentially dangerous mechanical hazard exists throughout the mill. The overhead scrap and mill cranes transport heavy loads of iron over working personnel. A warning horn is the only safety device employed here. Lighting is generally very poor and the noise throughout the mill is at an extremely high level. A process revealing both mechanical and thermal hazards is the line run forming of red hot reinforcing bar. When this bar reaches the end of the line, it swings at high speed approximately 45° horizontally for several yards at knee level. This movement is finally stopped by a steel post, and the rod is rerouted for cutting; the danger area is not guarded nor marked in any way. Floors, gangways, and bridges in this mill are cluttered, poorly lighted, and intersected by conduit and drainage pipes. Scrap is piled haphazardly throughout the mill. Extremely high temperatures exist in most work areas. Employees classified as billet handlers must transfer hot iron bars weighing up to 300 pounds manually, using tongs, onto the rolling platen. Workers are exposed to another hazard at this time as they are working under overhead cranes transporting more billets onto the preheating stand. Furnace employees working near the crucible use proximity suits and hoods during oxygenation, metal test, and transfers. Billet handlers at the pouring point employ tough, heat-resistant, Aramid clothing with hide aprons and gloves for protection.

Other employees, millwrights, machine operators, and other labor classifications, have access to special protective clothing as their occupations demand. All mill employees normally wear head, foot, and eye protection. A lighter clothing of similar design to that now in use would probably be utilized to a greater degree and afford approximately the same protection.

III. Photographs



Monitoring mill telemetry instruments.

IV. Conclusions

There is a definite requirement for an aggressive program of enforced wearing of currently available protective clothing, with periodic work breaks as

necessary to compensate for heat stress. Replacement of the present inventory of heavy, bulky, and hot clothing with lighter fire-retardant, heat-resistant protective clothing presently available through industrial sources would satisfy worker comfort requirements. This type of clothing would provide an acceptable degree of protection in most areas of the mill where thermal hazards exist.

Company Code: 2-25 SIC Number 3321
Date of Visit 9/11/73
Industrial/Occupational Area: Gray Iron Foundries
Hazards Observed: Mechanical and Thermal

I. Company Summary

One hundred and thirty employees are engaged in the fabrication of casting molds to customers' specifications at this facility. Other activities include mixing and melting iron to specific compounds, and forming and finishing castings. Most of the pattern-making, mold-forming, and melting are manual operations. The casting, grinding, and finishing processes are basically semi-automatic or automatic operations. Protective clothing is usually worn in some form in hazardous areas. Employees charging furnaces, general workers, and maintenance and grinding employees wear various combinations of aprons, gloves, leggings, eye and face protection devices, and either caps or hard hats. Material of the garments ranged from cotton duck to asbestos. There is no uniformity in utilization, application, or enforcement of protective clothing at this foundry. Protective clothing is not required, supplied, or maintained by the company, nor is it part of the company's safety program. Most of the articles of protective clothing referenced above are the property of employees or are supplied by individual supervisors. A walkthrough of the mill revealed that excessive heat prevents the use of heavier, permanent type protective clothing. Very light, heat- and impact-resistant protective clothing of the slipover or backless-tie type would be very effective in this particular environment. Employees generally feel the few safety accessories available at this mill are adequate.

II. Survey Representatives' Observations and Comments

This mill was in an extensive modification and expansion phase, presenting a very cluttered, busy, and apparently unmanaged appearance. Noise was bearable; however, lighting was extremely poor. Lighting fixtures were hung very high and far apart, and the bulbs were not of adequate size to provide sufficient illumination. Mechanical and

thermal hazards were observed in the charging, furnace-molding, and grinding areas. These hazards were generated in the basic foundry processes. Scrap, pig iron, and special alloying elements are melted in a standard cupola. The molten metal is then cast into various shapes, cooled, ground, finished, and boxed or palletized for shipment. Employees were well satisfied with the clothing provided by the company. Most of this mill's employees appeared to have no conception of what protective clothing would be needed and were interested only in the comfort afforded. Enforced use of the clothing mentioned in Section I, regardless of the responsibility for providing the articles, would be adequate for this operation.

III. Photographs



Worker filling casting and mold with basic sand and clay mix.

IV. Conclusions

There is no current protective clothing program in effect at this foundry. The company could improve its survey rating of "Not Available" to "Available and Adequate" by supplying articles of clothing similar to those suggested in Section I, and by initiating a comprehensive protective clothing program.

Company Code: 2-26 SIC Number 3398
Date of Visit: 9/12/73
Industrial/Occupational Area: Operations Involving Heat Stress
Hazards Observed: Mechanical, Thermal, and Chemical

I. Company Summary

This is a small company employing 18 people involved in custom heat-treating of metals. All of the operations are manual. The body areas requiring protection are the face, hands, and feet. There is no protective clothing required, supplied, or maintained. There is no periodic review of requirements, new items of protective clothing, or accessories. The minimum protective clothing for some jobs in this plant should be upper torso protection as well as face, arms, and hand protection. The workers do not consider that any protective clothing is required.

II. Survey Representatives' Observations and Comments

This is a well-laid-out plant with adequate lighting and a suitable noise level. The hazards are heat, toxic fumes, vapors, and sprains. The parts to be treated are manually loaded into ovens and the temperature raised to a given level and held for a specific time. At the end of the heat treatment, the parts are removed and immersed in water or oil bath. The workers consider their personal protection adequate; however, the Surveyor recommends the addition of upper torso protection and a face shield.

III. Photographs

Photography was not permitted in this mill.

IV. Conclusions

Some employees wear safety shoes and some have gloves. These items are purchased by the employees and this is the extent of the protective clothing program at this plant. The use of upper torso protection, face shield, and asbestos gloves is recommended for employees working at the heat-treat ovens. Hard hats, safety glasses, and safety shoes for all employees is recommended. It is impossible to rate the protective clothing in this plant as none is used. The few accessories used seem to be adequate.

Company Code: 2-27 SIC Number 3321
Date of Visit: 9/12/73
Industrial/Occupational Area: Operations Involving Heat Stress
Hazards Observed: Mechanical, Thermal

I. Company Summary

This is a small company employing 50 people in the production of iron castings. The majority of the operations are manual. However, there are some automatic deburring and cleaning operations. The entire body required protection during foundry operations. Protective clothing is worn in the welding operations only. This consists of helmet, leather jacket and apron, and gloves. Other operations use only a few accessory items. The clothing worn is required, supplied, and maintained by the company. The maintenance program consists of periodic inspections, with replacement when required. The protective clothing requirements are reviewed periodically by the Management Safety Committee. The protective clothing utilized does not cause added risk due to design. The foundry workers should be provided with upper and lower torso protection. However, the workers evaluate their present equipment as "adequate."

II. Survey Representatives' Observations and Comments

This is a well-laid-out plant and uncluttered; however, the lighting is poor and the ventilation is non-existent. The noise levels in some areas are very high. The thermal hazards were noted around the furnace and during the handling of molten metal. Mechanical hazards were noted during the handling of pig and scrap iron, and from flying particles from cleaning and grinding operations. The manufacturing process starts when sand is mixed with a bonding material, molded to the desired shape, and the inside dusted with a parting agent. Appropriate mixtures of pig and scrap iron are loaded into the furnace and the metal is melted. The molten metal is drawn off into a ladle and poured into the molds. After solidification, the sand is shaken off the casting and the casting is finished by grinding, tumbling, or sandblasting.

The workers indicated they were satisfied with the protective clothing they presently were using, and would rate it as "adequate." The Surveyor concurs but would recommend the addition of torso, face, head, hand, and feet protection during foundry operations.

III. Photographs

Photographs were prohibited at this plant.

IV. The current protective clothing practice at this plant was "Adequate" in some operations but was "Inadequate" in foundry operations. The pattern indicates the lack of a well-organized safety program.

Company Code: 2-28 SIC Number 1711
Date of Visit: 9/13/73
Industrial/Occupational Area: Construction
Hazards Observed: Mechanical, Thermal

I. Company Summary

This is a large company employing 60 people engaged in plumbing, heating, and air conditioning installations in industry. The operations are all manual. The body areas requiring protection are the torso, head, hands, and feet. Protective clothing is worn for welding operations and on specific jobs, when required by the customer. The clothing used is required, supplied, and maintained by the company. The maintenance program consists of replacing worn-out items. The protective clothing requirements are periodically reviewed by the company Safety Committee. The design of the protective clothing in use does not cause added risk. The protective clothing required for the operations other than welding should consist of torso protection against mechanical hazards. The workers' comments regarding the protective clothing supplied them was "adequate" for the welding operations. The evaluation of items for protection against flying particles in the grinding operation and sharp objects was "inadequate."

II. Survey Representatives' Observations and Comments

The environment is that typically found in the construction industry. The exterior is cluttered with building supplies, and the ground is uneven. The interiors of the sites have ventilation and lighting which are almost nonexistent. The operations are those encountered in installing prefabricated sheet-metal ducts for heating and air conditioning, installing heating and refrigeration units, applying insulating material to pipes for the conservation of heat and/or cold, and installing plumbing fixtures, pipes, etc. The hazards are lifting heavy objects, working in confined areas, sheetmetal with sharp edges, welding arc, and flying particles from grinding operations. The workers were satisfied with the protective clothing provided for the welding operations but expressed a

desire for some type of clothing which would protect the torso from sharp objects and flying particles. The Surveyor's evaluation of the clothing supplied was that it was "Adequate." The recommendations for additional protective clothing would be torso protection to protect against sharp objects, safety shoes with steel insole, face shields, and gloves.

III. Photographs



Mason finishing a cinder block wall.



Preparing footing prior to pouring concrete.

IV. Conclusions

The current protective clothing program seems to be directed toward the welding operations. There is a requirement for hard hats in the work area. The workers require protection in the other areas of operation and the following is a minimum of requirements: torso protection, face shields, gloves, and safety shoes with a steel insole. The rating of the welding protective clothing is "Available and Adequate." The rating is "Not Available" for the other hazards.

Company Code: 2-29 SIC Number 3321
Date of Visit: 9/13/73
Industrial/Occupational Area: Operations Involving Heat Stress.
Hazards Observed: Mechanical, Thermal

I. Company Summary

This is a small company employing 18 people in the production of iron castings. All of the operations are manual. The body areas requiring protection are the upper and lower torso, head, face, feet, and hands. This company does not require, provide, or supply protective clothing. Protective clothing which should be used in this plant would consist of upper and lower torso thermal protection, face shields, gloves, safety shoes, gloves, and hard hats. Since no protective clothing is used, there were no worker evaluations.

II. Survey Representatives' Observations and Comments

This is a very old, poorly lighted foundry with only natural ventilation. The noise level is extremely high in all phases of this process. The hazards are hot furnaces, molten metal pouring, handling pig and scrap iron, and flying particles from the cleaning and grinding operations. Sand is mixed with a bonding material, molded to the desired shape, and the inside dusted with a parting agent. Pig and scrap iron are received and stored. Appropriate mixtures of pig and scrap are loaded into the furnace and the metal is melted. The molten metal is drawn off into a ladle and poured into molds. After solidification, the sand is shaken off and the casting is finished by grinding or sandblasting. The recommended protective clothing was outlined in Section I above.

III. Photographs

Photography was prohibited at this mill.

IV. Conclusions

This plant does not have a protective clothing program. None was worn and there were no plans for future programs. There was no interest shown in this type of protection.

Company Code: 2-30 SIC Number 1211
Date of Visit: 9/13/73
Industrial/Occupational Area: Coal Mining
Hazards Observed: Mechanical, Electrical

I. Company Summary

This is a large company employing 325 people in the production of coal. The operations are both manual and automatic. The body areas requiring protection are the torso, head, eyes, hands, legs, and feet. Protective clothing is required by the company and supplied and maintained by the individual through a company clothing allowance program. There are some accessories which the company requires, supplies, and maintains through a program of periodic inspection and replacement of worn components. Protective clothing in use at the present time does not cause added risk due to design. There is a program where the protective clothing requirements are periodically reviewed by the mine safety supervisor, the mine superintendent, and a member from the workers' committee. There are no recommendations for additional protective clothing or for items which should be developed. The workers' evaluation of the protective clothing presently available to them is that it is "adequate."

II. Survey Representatives' Observations and Comments

This is a well-lighted mine with excellent ventilation. However, the noise level is high. The hazards are mine shafts, flying particles, working in difficult positions, strains, sharp objects, and electrical shock. The Surveyor's evaluation of the protective clothing now in use was that it was Available and provided adequate protection. There are no recommendations for additional protective clothing.

III. Photographs



Coal miners gathering roof support materials.
(Note rock-dusted walls.)

IV. Conclusions

The protective clothing practices at this mine are in line with the latest state of the art in personnel protection. There are no suggestions for additional clothing.

SURVEY AREA NO. 3
ON-SITE SURVEY NARRATIVES

Company Code: 3-1 SIC Number 3711
Date of Visit: 9/28/73
Industrial/Occupational Area: Vehicle Production
Hazards Observed: Mechanical, Chemical, Thermal

I. Company Summary

This is a large company employing 12,000 people in the production of motor vehicles. The operations are both manual and automatic. The body areas requiring protection are the head, face, arms, hands, torso, legs, and feet. Protective clothing is worn for each of the specific hazards. The clothing is required, supplied, and maintained by the company. The maintenance program consists of periodic inspections, with wornout equipment returned to the issue crib for replacement. The protective clothing requirements are periodically reviewed by the Safety Director. The protective clothing now in use does not cause added risk due to design. There are no items of additional protective clothing which need to be furnished or developed for protection against the hazards which now exist in this plant. The workers' evaluation of the protective clothing they presently use is adequate.

II. Survey Representatives' Observations and Comments

This is a well-organized, well-laid-out plant. The lighting and ventilation are excellent. The noise level is high. Thermal hazards are encountered in welding operations and in the booths where the paint is baked on the bodies. Mechanical hazards are encountered in overhead crane and conveyor operations, sharp metal edges, grinding operations, strains, trips, and falls. Chemical hazards are encountered in the wash operation prior to painting and in the painting operations. Sub-assemblies are received and stored. As they are needed, they are loaded onto conveyors and routed to assembly points. As the assembly line moves, more subassemblies are installed until the vehicle is completed and driven away to a storage lot. The workers' evaluation of the protective clothing they are using at the present time is adequate. The Surveyors concur in that evaluation and do not have any recommendations for additional protective clothing.

III. Photographs

Photographs were not allowed in this plant.

IV. Conclusions

The protective clothing practices currently in effect at this plant are suitable for the hazards the workers are exposed to. The Safety Department seems highly motivated and gives the appearance of attempting to keep abreast of the state of the art in protective clothing. There are no suggestions or deletions to be made concerning the protective clothing inventory at this plant at this time. The protective clothing presently provided for the hazards observed is rated correctly as being adequate.

Company Code: 3-2 SIC Number 3693
Date of Visit: 9/28/73
Industrial/Occupational Area: X-ray Operations
Hazards Observed: Radiation (ionizing)

I. Company Summary

This is a small service company employing 15 people engaged in industrial X-ray activities. The operations are both manual and automatic. The full-body protection against radiation exposure hazards would be required. Protective clothing is not required, worn, supplied, nor maintained. There is no program of periodic review of protective clothing requirements. The operations are contained in a lead-lined room while the operator is at a remote location. For this reason, there are no recommendations for protective clothing, and the workers' evaluation of the clothing they are presently utilizing is "adequate" although it is street clothing.

II. Survey Representatives' Observations and Comments

This is a well-designed and well-lighted and -ventilated facility. The noise level is very acceptable. The hazard is the standard hazard associated with X-ray radiation. During X-ray operations, the test specimen is mounted on a fixture, the machine is positioned, and then the room is vacated. The operator at his remote station makes the necessary adjustments and actuates the machine. At the completion of this operation, the film is retrieved and processed. When the film processing is completed, the film is read or interpreted. Because of the design of the test facility, the workers do not consider that there is a requirement for any protective clothing. The surveyor concurs with this evaluation and has no recommendations for additional protective clothing.

III. Photographs

The company would not authorize the taking of photographs at this facility.

IV. Conclusions

The workers at this facility do not use any protective clothing. Due to the design of the facility, none is required.

Company Code: 3-3 SIC Number 3312
Date of Visit: 9/26/73
Industrial/Occupational Area: Operation Involving Heat Stress
Hazards Observed: Thermal and Mechanical

I. Company Summary

This is a large operation employing 225 workers engaged in the manufacturing of coke. Operations in this facility are automatic. Operation begins with raw coal which is crushed and blended and placed in heated ovens in the foundry area. The coke is placed on hot cars or cool cars, quenched with a water rinse, screened for size and grade, and then delivered to the prospective buyers. Hazards exist in the oven areas where a two-piece, fire-retardant, cotton work suit, face shield, wooden platform shoes, and gloves are made available to the employees and used at their discretion, although the company highly recommends the use of these items. In high-dust-concentration areas, a respirator and two-piece work uniform were used to protect against the dust hazard. The quenching operation was completely automatic. Evident everywhere, coveralls were worn in conjunction with the respirator. Safety glasses, goggles, face shields, hard-toe shoes, hard hats, and gloves were also worn. In the screening operation, foul-weather gear was supplied for outdoor work. Pants, coats, hats, and rubber boots were used where inclement weather prevailed. The standard work uniform throughout the facility was a two-piece work uniform, hard hat, safety shoes, and safety glasses. Protective clothing for the most part was required or at least highly recommended. The company supplied all protective clothing which was maintained through a weekly laundry service and replaced when signs of excessive wear were evident. Protective clothing requirements were revised by the Safety Director and his staff of Safety Committee personnel, which was composed of foremen and supervisors. Protective clothing requirements were revised mainly through the use of brochures and pamphlets, and through recommendations from the Safety Committee. No additional protective clothing should be furnished or developed for this facility. The workers evaluated the protective clothing as adequate for the hazards that exist. One comment during the survey was that the grade of clothing was poor (wore out too fast) and was too expensive to replace often.

II. Survey Representatives' Observations and Comments

The work environment was extremely poor; it was dirty, debris was everywhere, and coal dust was evident throughout the facility. Most operations were performed outdoors; lighting was good during the day, but at night, it was not good although spot and floor lights existed throughout the area. Primary hazards were thermal, mechanical, and dust. Thermal hazards exist mainly around the ovens where it was extremely hot. Mechanical hazards exist throughout the facility. Workers felt that the protective clothing supplied them was adequate. Most workers did not care whether they had protective clothing or not, and this was due to lack of education concerning the hazards. The Survey Representatives' evaluation of protective clothing was Available and Adequate.

III. Photographs

Photographs were not allowed in the facility.

IV. Conclusions

The current use of the two-piece, cotton, fire-retardant work suit, face shield, wooden platform shoes, and gloves in the oven area afforded sufficient personnel protection as rated by the Survey Representative. The provision of the respirators and two-piece uniforms in the crushing department was considered adequate for hazards encountered in that area. No other hazards were noted in this plant which would make additional protective clothing requirements necessary. The Available and Adequate survey rating of this operation was based on information contained in this report.

Company Code: 3-4 SIC Number 7399
Date of Visit: 9/21/73
Industrial/Occupational Area: Metal Fabrications
Hazards Observed: Mechanical and Electrical

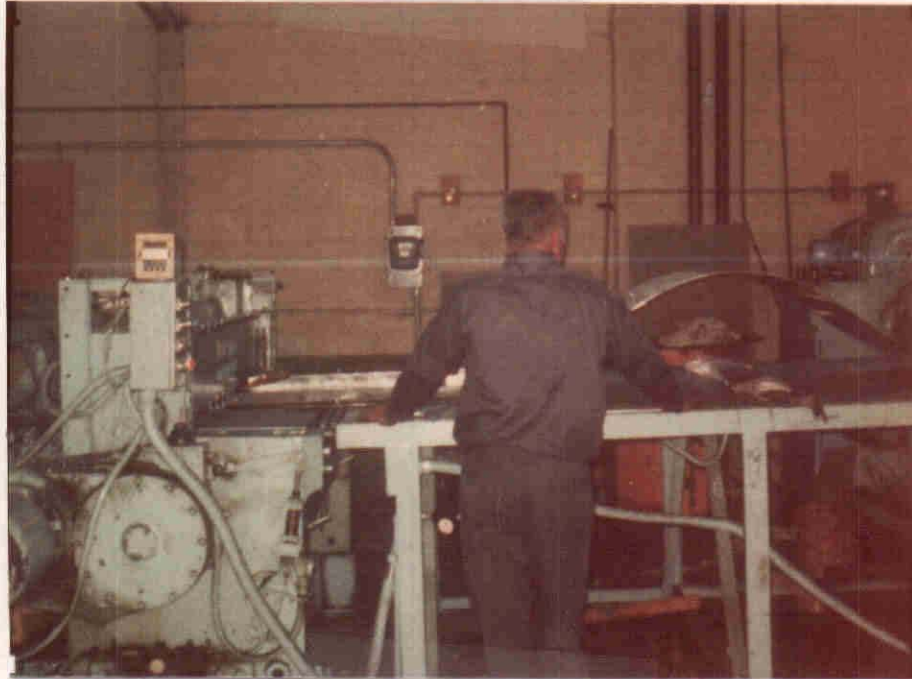
I. Company Summary

This is a small company employing 31 workers engaged in metal fabrications. Metal sheets and rolls are fed manually into the shears, slitters, and rollers. Once they have been fed manually, the operation becomes automatic. All other operations are manual. Body areas requiring protective clothing would be the hands and head. Protective clothing was not required, supplied, nor maintained by the company for any of the operations mentioned above; therefore, protective clothing was not used. The bulk-handling area and the shipping area utilized gloves and safety shoes; the grinding areas utilized goggles; the rolling operation used no protective clothing; and the slitting machine and shearing machine areas utilized gloves. Gloves, safety shoes, and hard hats were supplied by the employer and were worn at the employees' discretion. The employer believes that once the operation is automatic, the exposure to hazards becomes nonexistent. Safety accessory items (gloves, shoes, and hard hats) supplied by the employer were not maintained nor required for normal use. The workers' evaluation of protective clothing was adequate concerning accessory items only. Workers felt there was no need for a protective clothing ensemble for this type of operation. The Surveyor's rating was "Not Available" for an ensemble as defined in our contract; however, the accessory items were Adequate.

II. Survey Representatives' Observations and Comments

Working conditions were very conducive to safe working habits. Lighting was very good and the noise level was kept to a minimum although the slitting machinery was noisy due to the design of the machine. Accessory items afforded adequate protection to the workers and no protective clothing is recommended.

III. Photographs



The above photograph was taken of a slitting machine operated by an employee not wearing any protective accessories or ensemble. Metal buckling, as shown in the picture, represents a mechanical hazard. Educating the employee on the hazard of this type of operation would enhance the safety of this machine.

IV. Conclusions

No protective ensemble was utilized at this facility. The current practice is the use of accessory items (gloves, safety shoes, and hard hats). Accessory items are adequate protection because operations become automatic once they are started manually. Workers rated protective clothing as adequate and the Survey Representative rated protective clothing as Adequate; however, an ensemble was not made available to employees.

Company Code: 3-5 SIC Number 3325
Date of Visit: 9/27/73
Industrial/Occupational Area: Steel Mills
Hazards Observed: Mechanical, Thermal, and Chemical

I. Company Summary

This steel manufacturer has more than 6,000 employees engaged in automatic and manual production of steel plates, sheets, and shapes. The entire body requires protection in some of the coke and furnace operations; the face, front torso, and extremities require protection in the tempering mill. Protective clothing is worn during each hazardous operation. This clothing is required to be supplied and periodically maintained by the company. Program maintenance consists of the original issuance through the tool crib, and replacement or repair of damaged equipment. A constant evaluation of protective clothing is a part of this manufacturer's safety program. This is a responsibility of both the safety and operating departments. Protective clothing in use at this facility does not cause added risk due to its design; it is felt to be adequate protection against the hazards observed in this plant. Employees questioned were unanimous in voicing their complete satisfaction with the protective clothing supplied by this company.

II. Survey Representatives' Observations and Comments

This specialty steel manufacturing mill is very modern, well arranged, ventilated (air conditioned in some areas), and lighted. Noise was present in some departments, but workers were protected with earmuffs or through isolation. The hazards, mechanical, thermal, and chemical, were present in some form in almost all of the steel manufacturing areas. Thermal and mechanical hazards were in evidence in the basic manufacturing processes involved in the coke ovens. There were both mechanical and thermal hazards in the furnace areas, blooming and bar mills, and the annealing line. Chemical and mechanical hazards were encountered in the pickling and maintenance departments.

Steel manufacturing operations begin with the batching of pig iron, scrap, sand, limestone, dolomite iron ore, burnt lime, nickel, aluminum, manganese, and chrome ore. This mixture is fed into an open hearth furnace by automatic equipment. Samples are drawn during the heating and submitted to the laboratory periodically for testing to alloy specifications. When the heating operation has reached the proper temperature and the laboratory tests confirm conditions to be correct, the door (tap) is opened and the metal runs into ingots. After cooling, these ingots are moved to the rolling mill where they are preheated and run through graduated mills for shaping. After initial shaping, the sheet

and bars are cut, tempered, or annealed per company specifications. The above processes are necessary to produce the exact type of specialty steels to the manufacturing department's specifications. The employees' high opinion (shared by the writer) of the protective clothing supplied by the company is probably based on their previous experience in other less safety-oriented steel companies. The protective clothing and the program by which it is maintained and updated appears entirely satisfactory for the hazards encountered in this industry.

III. Photographs

Photography was not permitted at this mill.

IV. Conclusions

The current high ranking and enforcement of the protective clothing policies in this company's safety program is indicative of the management's concern for personnel protection at this mill. The protective clothing provided employees in hazardous operations at this mill appears "Available and Adequate."

Company Code: 3-6 SIC Number 3069
Date of Visit: 9/24/73
Industrial/Occupational Area: Rubber and Tire Production
Hazards Observed: Thermal, Chemical, and Mechanical

I. Company Summary

This company employed 45 persons in industrial rubber fabrication operations. Milling and mixing operations were done automatically with ingredients being added manually. No protective clothing was used during operations. Protective clothing was neither required nor supplied by the company. Mechanical protection for workers was provided by trip bars and machinery guards on the machines. Workers interviewed stated present practices regarding protective clothing were adequate and more protection would be unnecessary. Protective clothing needs were periodically evaluated by the company's safety representative using OSHA laws, Insurance Company, and fire department as information source.

II. Survey Representatives' Observations and Comments

During the visit, the Survey Representative noted several areas where protective clothing accessories should be utilized, or operational changes made to reduce worker exposures to hazards. Mixing operations involved hand-feeding dry rubber and other ingredients into mixing rollers, then cutting the mixed rubber compound off the rollers while they were still turning. This is an extremely hazardous method as far as exposure to hand injury is concerned. Another method of removing compounds from rollers should be developed. Workers performing urethane molding processes should wear respiratory protective devices for protection against fumes while urethane is melted to pour into pressure form molds. The rubber compounds are molded by pressure and heat to form final products. Workers were observed scrapping excess rubber from hot molds by hand. While workers wore work gloves for this operation, thermal protective accessories for upper extremities and a respiratory protective device are recommended. It is also recommended that gloves and safety glasses be required as accessory items of protective clothing throughout the entire facility.

III. Photographs

No photography was permitted in this plant.

IV. Conclusions

Protective clothing at the plant was not available. The incidences of hazards of a thermal, chemical, and mechanical nature would make the additions of eye, face, torso, and upper extremity protection highly desirable.

Company Code: 3-7 SIC Number 3069
Date of Visit: 9/21/73
Industrial/Occupational Area: Rubber and Tire Production
Hazards Observed: Thermal, Chemical, and Mechanical

I. Company Summary

This is a company employing 50 persons engaged in rubber forming and molding. Most rubber-forming operations were automatic, with the machines being manually fed. Exhaust blowers were installed in the plant to disperse fumes and dusts from the work areas; however, no protective clothing was available from the company and none was used by employees. Protective clothing items such as rubber aprons, gauntlets, and face shields should be used to afford protection when mixing rubber and chemicals. Protective clothing needs were not evaluated by company management. The workers' rating of the clothing worn was adequate.

II. Survey Representatives' Observations and Comments

The personnel interviewed during the survey were to some degree hostile to the Survey Representative. Operations in the manufacturing area were not allowed to be seen by the Representative; information was extremely difficult to obtain from personnel interviewed. From what information was obtained, there seemed to be a lack of protection to workers engaged in the mixing areas where chemicals were added to the rubber to obtain the correct consistencies.

III. Photographs

Photography was not allowed at this plant.

IV. Conclusions

The inability of the Survey Representative to obtain firsthand information makes conclusions speculative at best; there is reasonable certainty that some operations that could be described as hazardous are done without benefit of protective clothing devices. Thermal hazards exist in the plant around the rubber cookers where temperatures in excess of 340° F are common. Chemical hazards exist in the mixing areas where chemicals are added to change consistencies and properties of the rubber. The protective clothing that would protect against these hazards was not available.

Company Code: 3-8 SIC Number 2861
Date of Visit: 8/1/73
Industrial/Occupational Area: Chemicals and Allied Products
Hazards Observed: Thermal, Electrical, Chemical, and Mechanical

I. Company Summary

This company was a large chemical manufacturer employing 2,400 persons. All operations in the plant other than welding and maintenance were done by automation. Protective clothing as a rule is not worn by employees, and employees feel their normal work clothes are adequate for tasks assigned. Protective clothing requirements are not reviewed by management, but protective clothing accessories are available for use if needed.

II. Survey Representatives' Observations and Comments

All work operations in the plant with the exception of maintenance and welding are done automatically. Workers are not exposed to hazards during routine operations, and protective clothing ensembles are not worn during these operations. Employees did state that during maintenance and repair operations, protective clothing was worn 90 percent of the time. Protective clothing accessories made available by the company consisted of the following: cotton dust hoods for mild dusting operations with materials such as lime and bicarbonate of soda; tinted face shields for spot welding, splash protection, and grinding; hard hats for in all areas of operation; safety glasses for in all areas of operation; goggles for eye protection against dusts, splashes, welders glare, and chipping with airhammers and air spades; respiratory protective devices for protection against dusts, mists, fumes, and gases of chlorine and ammonia; gloves for handling chemicals and other materials; and rubber boots and shoe covers for protection against chemicals. All the above-mentioned protective clothing is made available for operations,, but is not usually required, with the exception of hard hats and safety glasses which are required all the time. When personnel are needed to correct malfunctions to maintain plant operations, protective clothing as required by the task becomes mandatory.

III. Photographs

No photography was permitted in this plant.

IV. Conclusions

The current practices regarding the use of protective clothing are considered adequate for the protection of workers. The use of automated processes to isolate workers from hazardous operations for worker protection is a trend noticed in most of the larger companies.

Company Code: 3-9 SIC Number 3471
Date of Visit: 9/25/73
Industrial/Occupational Area: Chemical and Allied Products
Hazards Observed: Chemical

I. Company Summary

The company surveyed employed 60 persons in plating automobile parts and subassemblies. Operations included both manual and automated processes. For large numbers of items to be plated, processing was done by conveyor lines; small jobs were done by hand. Protective clothing was not required by the company, but the company did supply some protective clothing items. Maintenance on the protective clothing consisted of turning clothing in to Supply when it was worn out and drawing new items. Protective clothing needs were not periodically evaluated by management. The workers' rating of apparel worn was "adequate"; however, there were suggestions for improvement as it was commented that the rubber splash aprons were too hot to wear. Operations performed during processing were: cleaning, alkaline dipping, rinsing, acid dipping, rinsing, plating, rinsing, and final drying in gas-heated ovens. There was no evidence that protective clothing added risk to operations.

II. Survey Representatives' Observations and Comments

It was noted by the Survey Representative that employees engaged in manual dipping of items in the caustic and acid tank wore only protective boots, gloves, and safety glasses. Full splash protection should be provided employees by requiring the use of face shields and aprons. The Survey Representative rated the protective clothing provided by the company as "Available but Inadequate." The inadequate rating was due to management not requiring protective clothing to be worn, and protective clothing which was worn did not provide complete chemical protection against splash hazards.

III. Photographs

Photography was not permitted at this plant.

IV. Conclusions

The current practices regarding protective clothing usage and provisioning are not adequate for worker protection. A full-body-protection ensemble should be used by personnel engaged in manual dipping operations. The policy of not requiring protective clothing to be worn should be changed. Workers should be trained in the hazards applicable to this work environment.

Company Code: 3-10 SIC Number 3811
Date of Visit: 9/24/73
Industrial/Occupational Area: Biological Operations
Hazards Observed: Biological and Chemical

I. Company Summary

This company is a small biological testing laboratory employing eight persons. The company tests water and foods for bacterial content. All operations observed were manual. Operations performed are standard laboratory procedures for biological and analytical testing. Protective clothing is required for acid handling only. The items worn for acid handling are safety glasses and gloves. Protective clothing needs are periodically revised and evaluated by the owner through information gained from trade publications and vendor circulars. Workers in the laboratory rated their protective clothing "adequate." A suggestion for improvement is the obtaining of gloves with a high touch sensitivity for handling small test tubes and containers holding acids.

II. Survey Representatives' Observations and Comments

The chemical and biological hazards encountered during the survey were relatively minor due to the small amounts of material involved. It was felt by the Surveyor that face shields rather than safety glasses would afford better protection during acid-handling operations. During the obtaining of field samples from onsite test areas, hard hats were required wear for employees. No other protective items were worn. From information gained from the survey, the Survey Representative rated the protective clothing as Available but Inadequate.

III. Photographs

Photography was prohibited at this plant.

IV. Conclusions

Protective clothing being supplied by the laboratory for employees is Available but Inadequate in that face shields are not utilized during acid-handling operations. The small amount of materials being handled does not warrant full-body protection against the hazards involved. The addition of rubber gloves with high touch sensitivity to the company's inventory would make handling of small containers more sure and lessen the danger of dropping or breaking.

Company Code: 3-11 SIC Number 3398
Date of Visit: 9/25/73
Industrial/Occupational Area: Operations Involving Heat Stress
Hazards Observed: Thermal

I. Company Summary

This is a small company employing 12 people in the custom heat-treating of metals. All of the operations are manual. The body areas requiring protection are the upper torso, face, arms, and hands. This company does not have a protective clothing program, nor are there periodic reviews of requirements, new items of equipment, or accessories. There is no protective clothing required, supplied, or maintained by the company. The minimum requirement should be upper torso protection, as well as face, arms and hand protection; however, the workers do not believe protective clothing is required for their safety.

II. Survey Representatives' Observations and Comments

This is a small plant that is cluttered, poorly lighted, and noisy. The hazards are high temperatures, and toxic fumes and vapors. The parts to be heat-treated are manually loaded into ovens; the temperature is raised to a given level and held for a specific time. At the end of the heat treatment, the parts are removed and immersed in a water or oil bath. The method of operation gives employees a false sense of security from burns. Workers replied, "we don't need any," when questioned about the need for protective clothing. The Surveyor's recommendations are for a minimum of upper torso, face, and hand protection.

III. Photographs

This company had no objections to photographs but the employees did not want their pictures taken.

IV. Conclusions

The company issues hard hats and safety glasses, which was the extent of the protective clothing program. The Surveyor suggests consideration of the addition of thermal protective clothing for the upper torso, face, arms, and hands. It was impossible to rate the protective clothing in this plant as none was used. The accessories used here appeared satisfactory for basic worker protection.

Company Code: 3-12 SIC Number 3316
Date of Visit: 10/2/73
Industrial/Occupational Areas: Steel Mills
Hazards Observed: Mechanical, Thermal, Electrical

I. Company Summary

This is a small company employing 38 people in the production of specialty steel products. The operations in this plant are manual and automatic. Full-body protection is required during welding operations. Protective clothing is not required; however, it is supplied and maintained by the company. The maintenance program consists of periodic inspection of equipment and turn-in for replacement of items when they are worn out. The protective clothing supplied does not cause added risk. In this plant there is no program for a periodic review of protective clothing requirements. The only item of protective clothing which should be furnished or developed to protect workers against the hazards they are exposed to is more adequate hand protection in the cold drawn area. The workers' evaluation of their equipment is that it is available and adequate.

II. Survey Representatives' Observations and Comments

This is a small, cluttered plant where the lighting is poor and the noise level high. The hazards encountered were flash, hot slag, sparks, sharp-edged metals, grinding, and high voltage. The drawing machines are manually loaded, and, from that point until the completion of the process, all functions are automatic. The various drawn forms are cut into sizes and welded to form the desired end products.

The workers' evaluation of the protective clothing in the welding operations is that it protects adequately. The personnel in the drawing operation do not think there is a requirement for protective clothing in their area. The Surveyor's evaluation of the protective clothing provided is that it is adequate for the hazards the workers are exposed to during welding operations.

III. Photographs

The company had no objections to photographs; however, the workers in the plant refused permission to have their pictures taken.

IV. Conclusions

The current practice regarding protective clothing is to provide the minimum amount to afford good protection. There is no program to keep up with the state of the art in protective equipment. The Surveyor's only suggestion would be to provide the workers in the cold drawn operation more adequate hand protection. The rating for the protective clothing in the welding process is Available and Adequate. In the cold drawn area, there is no protective clothing provided.

Company Code: 3-13 SIC Number 3316
Date of Visit: 9/27/73
Industrial/Occupational Area: Steel Mill-Cold Rolled
Hazards Observed: Mechanical, Chemical

I. Company Summary

This is a large company employing 200 people in the production of sheet steel in various thicknesses, bar stock, and reinforcing rods. The processes are completely automatic which results in limited exposure of workers to hazards. There is no protective clothing used and none is required, supplied, or maintained. There are no recommendations for clothing to be furnished or developed. The workers' evaluation is that protective clothing is not available because of the highly automated environment in which they work.

II. Survey Representatives' Observations and Comments

This is a highly automated facility where the workers' exposure to the process is very limited. Their environment is well lighted and clean, and the noise level is acceptable. Exposure to the mechanical hazards is in the areas of maintenance warehousing, and shipping. The chemical hazard is encountered in the pickling process, but due to automation, exposure is very limited. The workers consider themselves adequately protected, and the Surveyor had no recommendations for added protection.

III. Photographs



Preparing a cracked machine base for arc welding repairs.
(PLANT MAINTENANCE ACTIVITY)

IV. Conclusions

The current mode of operation of this plant is such that no protective clothing is used. The worker has been removed from the hazards, and the Surveyor has no suggestions for additions or deletion of protective clothing. This is a well-organized plant. While there is no protective clothing as such, the protection of the workers in this plant is considered adequate. Hardhats, safety glasses, and accessory items are required and supplied for plant operations.

Company Code: 3-14 SIC Number 3693
Date of Visit: 10/2/73
Industrial/Occupational Area: X-ray Operations
Hazards Observed: Radiation (ionizing)

I. Company Summary

This is a small company with four employees engaged in nondestructive testing utilizing completely automatic, industrial X-ray equipment. Although the operation is automated, full-body protection is required for radiation hazards a worker may be exposed to. No protective clothing is required, supplied, or maintained, and there are no periodic reviews of clothing requirements.

II. Survey Representatives' Observations and Comments

The work environment is a very pleasant one in a well-lighted, and well-ventilated building. The specimen to be evaluated is placed under the X-ray machine in a room that is provided with a lead shield barrier. The operator is completely isolated from the X-ray source. Periodic testing of the shielding and safety interlocks, the use of monitor badges on all personnel, and regular physical examinations provide the safety controls required which make protective clothing unnecessary.

III. Photographs

Photographs were not permitted.

IV. Conclusions

The current practice of no use of protective clothing seems adequate at this time. Worker protection is accomplished by isolation from the hazard source. There are no suggestions for addition, deletion, or a rating of clothing.

Company Code: 3-15 SIC Number 7692
Date of Visit: 9/26/73
Industrial/Occupational Area: Welding Operations
Hazards Observed: Mechanical, Thermal, Electrical

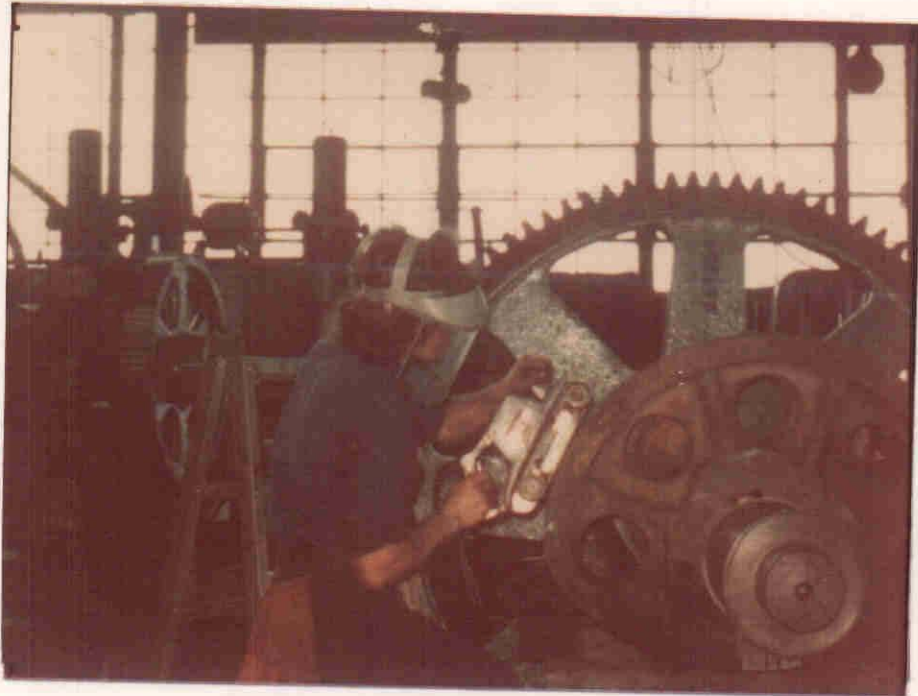
I. Company Summary

This is a large company employing 90 people engaged in welding operations resulting in fabricated metal objects. Machine repair and service is also accomplished. The operations accomplished at the facility are manual and semiautomatic. The full body requires protective clothing to be worn for each specific hazard. This clothing is required wear by the company, is supplied to the workers, and is periodically maintained. Maintenance is accomplished by inspection; an item is replaced when excessive wear is evident. The protective clothing requirements are periodically reviewed by the Safety Director. The design of the clothing presently used by this company does not cause added risk. There are no added items of protective clothing required for this process, and the workers' evaluation of their protective clothing is "adequate" for the hazard involved.

II. Survey Representatives' Observations and Comments

This is a well-ventilated, well-lighted shop with the noise level normally associated with a shop where the work is concerned with metal fabrication. The hazards encountered are thermal from hot slag, and mechanical from rough or sharp edges, falls from ladders, and high working places, head injuries from crowded working areas, and electrical high-voltage sources. The operations consist of welding accomplished by oxygen and gas (acetylene), electric resistance welding, arc welding, cutting operations utilizing an oxygen-fuel torch, and grinding operations. The workers' evaluation of the protective clothing provided is that it is adequate for the hazards they are exposed to. The Surveyor's evaluation is that the clothing is Available and Adequate. There are no recommendations for additional protective clothing.

III. Photographs



Belt-grinding of rough-cast cam and gear

IV. Conclusions

The current protective clothing program appears to be adequate. The workers are well protected from the hazards they are exposed to. No suggestions can be made for additions or deletions to the current program. The rating of Available and Adequate is well founded for the hazards which presently exist at this company.

Company Code: 3-16 SIC Number 2819
Date of Visit: 10/1/73
Industrial/Occupational Area: Chemical and Allied Products
Hazards Observed: Mechanical, Chemical, Thermal

I. Company Summary

This is a large company employing 600 people in the production of inorganic chemicals. The processes are automatic until the products are packaged. These operations are manual operations including the storage and loading for shipment activities. Protective clothing is required, supplied, and maintained by the company and is worn for all hazardous operations with the exception of one. The maintenance program for protective clothing consists of periodic inspection of equipment with a replace-when-worn-out program. The Safety Director reviews protective clothing requirements periodically by a review of the hazards and by reviewing industry publications to keep abreast of the latest "state of the art" in protective devices for a specific hazard. The clothing provided for the hazards encountered in their company does not cause added risk. The workers' evaluation of the protective clothing presently supplied them is "Adequate."

II. Survey Representatives' Observations and Comments

This is a well-lighted plant with a noise level that allows conversation at a normal voice level. The floors are slippery and hazardous as a continuous flow of water seems to be present. The plant is well ventilated. Mechanical hazards exist in the form of slips and falls; some trip hazards were apparent in the warehouse area. Chemical hazards are present in all of the areas where the raw and finished materials are handled manually. Thermal hazards are confined to the drying cells. The workers evaluate the protective clothing supplied them as "adequate." The surveyor concurs with this rating and observed that the clothing is worn when required. The general condition of the plant is good. The workers seem to be well educated to the hazards they encounter. Hard hats and safety glasses are worn throughout the entire plant. The one instance of inadequate protection noted was during sampling operations. A sample, for quality control purposes, is taken from the drying cells every 10 minutes. The personnel taking these samples are not provided with any protection from thermal hazards.

III. Photographs

No photographs were allowed in this plant.

IV. Conclusions

This appears to be a well-organized, efficiently operated plant. There is a high level of safety awareness as is indicated by all employees adhering to the requirement to wear hard hats and safety glasses in all areas of the plant. Workers exposed to specific hazards seem well adapted to using the protective clothing provided. The protection for mechanical and chemical hazards is rated "Adequate." The rating for protection against thermal hazards is rated "Inadequate" due to the lack of protection provided the personnel taking samples from the drying cells. These personnel should be provided a face shield and asbestos or aluminized gloves.

Company Code: 3-17 SIC Number 3541
Date of Visit: 9/21/73
Industrial/Occupational Area: Machine Tools
Hazards Observed: Thermal, Chemical

I. Company Summary

The plant surveyed was engaged in the manufacture of industrial machines. Broach and tracer machines were the major products. The plant employed 340 persons. Manufacturing operations were both manual and automated. Most of the manufacturing processes were automatic or semiautomatic. Cleaning, finishing, coating, and crating operations were done manually. Protective clothing was not required apparel at the plant; however, the company had a safety-shoe sales program and did supply helmets and leather protective ensembles for their welders' use. There was no indication that protective clothing requirements were periodically reviewed, or that protective clothing caused added risk in the work environment. The body areas requiring protection were the face, hands, front torso, and lower extremities depending on operations involved. A standard welding ensemble to provide protection against thermal hazards was available in the welding shop, but employees were reluctant to wear it due to comfort considerations. The ensemble provided by the company was made up of a helmet, leather sleeves, apron, leggings, and gloves. Personnel in the cleaning shop were observed wearing impervious-material aprons, boots, and face shields for protection against chemical hazards. The workers' evaluation of the protective clothing used in the company was "Adequate."

II. Survey Representatives' Observations and Comments

The presence of safety signs, special equipment, guards, shields, safety glasses, and fire lanes plus employee attitudes indicates a strong emphasis on safety in this plant. Supervision appears to be attempting to eliminate worker exposure to safety hazards rather than protect employees from them. The only areas that seem to present a higher risk of hazard exposure are the welding area where welders are reluctant to wear the provided protection, and the cleaning and protective-coating areas where personnel may be exposed to chemical and thermal hazards to body areas not protected by face shields and aprons.

III. Photography

Photography was not permitted on the plant site.

IV. Conclusions

The welder ensembles provided by the company are felt to provide adequate thermal protection when they are utilized. The rating of those apparel items would be Adequate, but Lacks User Acceptance due to comfort factors. The ensemble utilized by personnel in the cleaning and protective coating areas would be rated Inadequate from the standpoint of inability to protect exposed body areas. The addition of leggings, gloves, and sleeves would seem to be indicated.

Company Code: 3-18 SIC Number 3542
Date of Visit: 9/21/73
Industrial/Occupational Area: Machine Tools
Hazards Observed: Thermal, Chemical, and Mechanical

I. Company Summary

This plant was a small facility employing three persons. The product of the plant was refurbished, used, or damaged machinery such as lathes, presses, shears, slitting machines, and rolling equipment. All processes observed were performed manually. The work performed in the plant consisted of the degreasing and stripping of defective machines. The machines were then disassembled, repaired, and reassembled. No protective clothing was available to employees of the company, although chemical hazards were apparent in the degreasing and stripping operations, and thermal hazards were evident during welding operations. The standard work ensemble in the shop consisted of bib overalls, long-sleeved shirt, and heavy work shoes. Protective clothing items which should be made available to employees are a welding ensemble for thermal protection consisting of helmet, and leather apron, leggings, sleeves, and gloves, and chemical protective clothing for employees engaged in degreasing and stripping processes consisting of face shield, rubber apron, boots, and gloves. Workers in the plant rated their clothing adequate protection for the hazards encountered.

II. Survey Representatives' Observations and Comments

The shop work areas were fairly clean and well kept. Work areas were for the most part uncrowded and separated. There was no evidence of safety glasses or any other protective clothing accessories being used in work areas. The workers were satisfied that protective clothing or accessories were not required for their safety.

III. Photographs

No photography was allowed in this facility.

IV. Conclusions

A protective clothing program was totally absent in the plant although the usual hazards inherent in machine shops and repair shops were visible. Protective clothing providing chemical, thermal, and mechanical hazard protection should be made available to the employees.

Company Code: 3-19 SIC Number 3399
Date of Visit: 9/24/73
Industrial/Occupational Area: Metal Fabrications
Hazards Observed: Thermal and Mechanical

I. Company Summary

The plant surveyed employed 20 persons. Nickel-base metal powders were manufactured. Operations performed by the company to manufacture the powders consisted of induction melting, inert gas atomization, sizing, and packaging of the finished products. Most grinding, sizing, and packaging processes were semiautomatic. All material movements were accomplished manually. Body areas requiring protection that were noted by the survey representative were front torso, and lower and upper extremities during furnace operations. Protective clothing was provided by the company for this operation and usage by workers was mandatory. The ensemble furnished by the company consisted of face shield, hood, and asbestos apron, coat, leggings, and gloves. The apparel was checked out to workers on request by tool crib personnel and was maintained by tool crib personnel. The general work ensemble observed was a two-piece, synthetic-material coverall with a respiratory protective device for dust protection, all provided by the company. Protective clothing requirements were not periodically reviewed or revised as company supervision maintained standards at set levels. No interviews were permitted with employees; therefore, worker evaluations of protective clothing are not available.

II. Survey Representatives' Observations and Comments

The survey was very limited due to the distrust by management of the survey. Photography was prohibited in the plant, and interviews with employees were not permitted. The plant appeared to be recently constructed. The general area was very clean and orderly. The Surveyor's rating of protective clothing provided was Adequate.

III. Photographs

No photography was permitted on the plant site.

IV. Conclusions

The current protective clothing available in the plant was deemed adequate by the Surveyor; however, it would appear that the practice of having no protective clothing reviews for adequacy should be changed. The fact that there are no reviews by management would exclude the additions of new state-of-the-art advances in the field of protective clothing.

Company Code: 3-20 SIC Number 3471
Date of Visit: 9/24/73
Industrial/Occupational Area: Abraiding and Buffing
Hazards Observed: Chemical and Mechanical

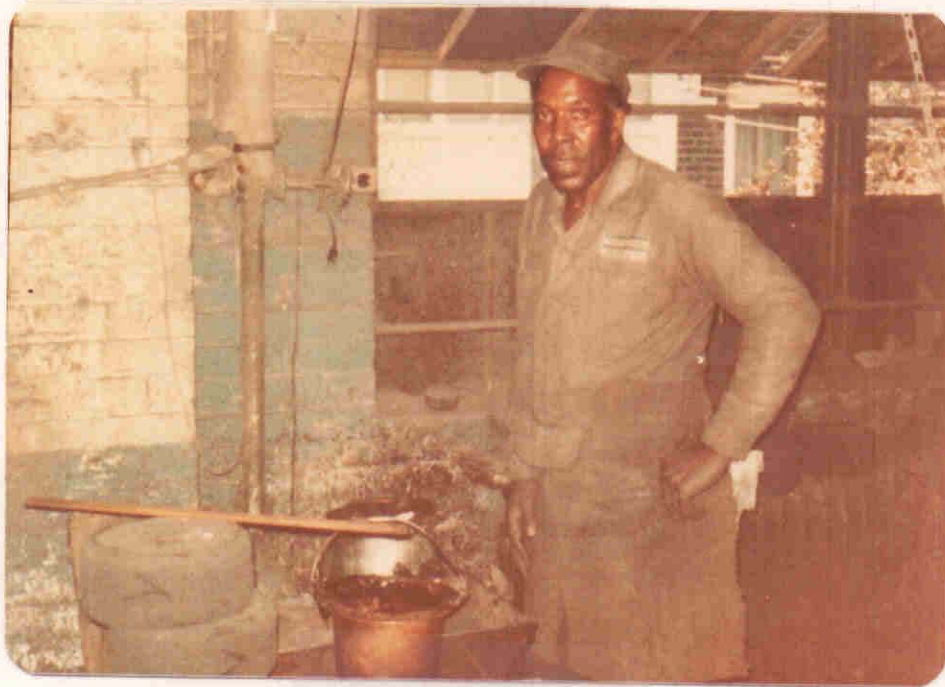
I. Company Summary

The plant surveyed was a small jobber to the automobile industry. The primary business of the company was preparing automobile bumpers and fittings for chrome plating. The number of personnel employed was six. All operations observed were done manually using electrically powered pedestal, bench, and hand tools. It was noted by the observer that complete bodily protection should be provided against the chemical and mechanical hazards workers are exposed to in the preparation for, and electroplating of the company's products. Protective clothing was not supplied by the company nor was it seen in general use by the employees. Items of protective clothing felt necessary to these operations are: impervious-material aprons, face shields, gloves, and boots for chemical hazards of electroplating, and face, torso, and upper-extremity protection against the mechanical hazards involved in the grinding and buffing operations observed. The workers all rated their clothing as giving adequate protection for hazards encountered in their tasks.

II. Survey Representatives' Observations and Comments

It was noted during the survey that the employees worked in a very cramped and dirty environment. The shop floor was completely covered with work residue, black with grinding compound, mixed with tallow and oil. General work wear consisted of a two-piece work suit with soil apron and gloves. The work wear seen being worn was completely saturated with tallow, black carborundum, and emory. No respiratory protection equipment, face shields, goggles, or other protection equipment was available to employees. Shields and guards were not installed on any of the power tools being utilized. Workers' comments regarding protective clothing would appear to point out the need for education of workers to the need for protective clothing. Workers interviewed stated that the apparel worn was adequate protection for them. Protective clothing should be made available to workers for the hazards to which workers may be exposed.

III. Photographs



Employee applying a compound of carbon, silicon, and tallow to buffing wheels

IV. Conclusions

The current practice of the company in not providing protective clothing should be reviewed by management, and protective clothing made available to workers. The protective clothing items discussed in Section I of this review should be provided. In the grinding and buffing operations, protective respiratory devices should be available to protect workers against inhalation of dusts generated.

Company Code: 3-21 SIC Number 3541
Date of Visit: 9/25/73
Industrial/Occupational Area: Machine Tools, Metal Cutting
Hazards Observed: Thermal and Mechanical

I. Company Summary

The company was a small tool and die shop manufacturing industrial tools for the auto and aircraft industries. Operations included designing, machining, and fabrication. The company, according to the company contact, employed three men. Fabrication and machining operations were done manually using electrical- and compressed air-powered machinery and tools. Some small casting processes were done using small electric furnaces. No protective clothing was supplied nor required by the company; however, full frontal protection would be appropriate for casting operations, and upper torso and extremities protection appropriate for machine shop operations. The workers wore a two-piece cotton work suit and an apron for soil protection when it was felt needed. Workers at the plant felt this was adequate for their situation.

II. Survey Representatives' Observations and Comments

The shop was equipped to provide work stations for approximately 20 men; however, company management acknowledged only three employees. The Survey Representative was not allowed access to the rear of the building; this was attributed to the requirements for industrial security in the automobile and peripheral industries. The products of the shop appeared to be all custom-made and likely proprietary to the shop's customers. Safety in the shop seemed to be the responsibility of the individual. A full frontal thermal protective ensemble would be suggested for casting operations, and upper torso, upper extremities, and face protection would be recommended for protection against mechanical hazards involved in metal cutting and machining.

III. Photographs

No photography was permitted on the plant site.

IV. Conclusions

Protective clothing was not available for other than general machine and sheet metal work. The adequate rating given by employees can be directly attributed to lack of worker education of hazards involved in casting and machining operations. A full frontal thermal protective ensemble would be recommended for casting operations.

Company Code: 3-22 SIC Number 3542
Date of Visit: 9/25/73
Industrial/Occupational Area: Machine Tools, Metal Forming
Hazards Observed: Mechanical and Thermal

I. Company Summary

Over 100 persons are employed by this company in the designing and manufacturing of die-forming tools. Most operations are automatic or semiautomatic with highly skilled journeymen utilizing hand and powered tools to build dies. The face and front torso are exposed to mechanical hazards in the machine and grinding areas, and thermal hazards in the casting and welding processes. Protective clothing is not supplied or worn for each specific hazard as there is no protective clothing program in effect at this facility. There is adequate protective clothing available on the market to satisfy the requirements of this shop. The provision of leather protective ensembles for welders and furnace personnel, and heavy gloves and aprons for the raw stock men should provide adequate protection in these areas.

II. Survey Representatives' Observations and Comments

The general work area is very modern, well maintained, ventilated, and exceptionally well lighted. There is very little noise in most of the work areas, and when it does reach an uncomfortable level, employees use earplugs. Isolation through automatic processes is used whenever possible for ultimate noise protection during peak heavy operations. Mechanical hazards were conspicuous in the material-handling and rough-cutting areas, and thermal hazards were observed in both the welding and electric furnace operations.

The operations of the company include development of the die machine from the drafting board to the finished product. The manufacturing process includes metal casting, cutting, turning, drilling, shaping, welding, heat treating, and final assembly and testing. Hand and machine tools, including very accurate measuring devices, files, picks, lathes, drill presses, abrasive wheels, shapers, milling machines, and welding/cutting tools are used to form the products of this shop. There is no protective clothing program in effect at this shop; however, workers provide some aprons and gloves for their own use. The provision of hides to

welding and furnace personnel, and heavy gloves and aprons to the stock men in the raw material areas should provide an acceptable level of personnel protection to workers in these most hazardous operations.

III. Photographs



Sorting punched materials preparatory to heat treating

IV. Conclusions

The current safety practice does not include provisions for a protective clothing program at this facility. The addition of articles of clothing for welders and furnace personnel referenced in Section I of this report would satisfy the protective clothing requirements of this company. The original survey rating of protective clothing "Not Available" is fully discussed above.

Company Code: 3-23 SIC Number 3541
Date of Visit: 9/26/73
Industrial/Occupational Area: Machine tools, Metal Cutting
Hazards Observed: Mechanical

I. Company Summary

This corporation employs 35 men in the manufacture of special multiple drilling equipment. This operation includes both manual and automatic phases. The front torso, face, and upper extremities are exposed to mechanical hazards in the grinding and machining operations. Protective clothing is not supplied, worn, or maintained at this facility. There is no protective clothing program in effect within this company at this time. There is suitable safety and protective clothing available commercially in adequate quantities to provide personal protection for employees of this plant.

II. Survey Representatives' Observations and Comments

This facility is in a state of expansion (company doubling size). Machinery is down and some disassembled, offices and storage areas are in the process of being torn down, and excavations are in progress throughout the work site. There is a tremendous noise problem with the air compressors and jack hammers; however, lighting is excellent as many of the sides and roof structures have been removed. Operating processes consist of machine design and development to customers' specifications. Manufacturing involves metal casting, cutting, turning, shaping, drilling, welding, heat treating, and final assembly. Highly trained journeymen utilize hand and machine tools in the manufacture of precision tools, machinery manufacturing components, and fixtures.

III. Photographs

No photography was permitted at this point.

IV. Conclusions

There is no protective clothing program in effect at this plant. Protective clothing is not supplied, worn, or maintained by employees of this corporation. There is adequate protective clothing (gloves and aprons) available on the market to satisfy the safety requirements of this company. The survey rating of protective clothing "Not Available" was based on the lack of protective clothing for the employees exposed to mechanical hazards in the machining and grinding operations.

Company Code: 3-24
Date of Visit: 9/26/73
Industrial/Occupational Area: Machine Tools, Metal Cutting
Hazards Observed: Thermal and Mechanical

I. Company Summary

This plant is engaged in the manufacturing of special machine tools. The plant employs 180 persons. The machinery used in the manufacturing process is semiautomatic. Body areas requiring protective clothing are torso, head, and upper extremities for welding operations, and front torso for general operations. Protective clothing is not required by the company; however, it does supply welding accessories and other items of protective apparel. There was no evidence that the protective clothing provided caused added risk to workers. The clothing provided by the company was termed adequate by the workers. Protective clothing needs were not periodically evaluated by management as protective clothing requirements were not considered part of the safety program.

II. Survey Representatives' Observations and Comments

This machine manufacturing company utilizes approximately 25 different types of automatic and semiautomatic machines to produce a variety of special machine tools to their own design. Weldments, casting, and many fabrications are purchased from outside vendors. Most of the work in the plant involves machining, assembly, and testing. There was a small welding shop which provided leather aprons, gloves, and hoods for workers' use. Workers in the paint shop were provided coveralls, caps, and a respirator. The general work uniform was a two-piece, cotton work suit, with apron and gloves optional. There were no unusual hazards requiring special protective clothing. The Surveyor rated the protective clothing as Adequate and Available.

III. Photographs

Photography was prohibited in this plant.

IV. Conclusions

Other than the welders' protective clothing ensemble, protective clothing was not required due to the limited hazards noted. Protective clothing accessories, as provided by the company, were considered adequate for worker protection.

Company Code: 3-25 SIC Number 3999
Date of Visit: 9/26/73
Industrial/Occupational Area: Metal Fabrications
Hazards Observed: Mechanical

I. Company Summary

This shop specializes in the making of prototype automotive and industrial metal models. The facility employs 30 persons. Operations observed were manual and semiautomatic, using metal spinning lathes, and hydroform and hydraulic presses with a capacity up to 1,500 tons pressure. Protective clothing was not required or provided by the company. Comments on the use or performance of protective clothing were unattainable as management refused worker interviews. Periodic reviews of protective clothing needs were not accomplished by this company.

II. Survey Representatives' Observations and Comments

As the company was involved in prototype and design work, there were no production quotas, assembly lines, or other items associated with high-output, mass-manufacturing facilities. Most work was performed at benches or by machine specialists. Conventional work clothing was observed in general use with aprons or gloves sometimes worn. Apparel appeared snug and well fitting with no loose ties or other items observed. Worker protection was accomplished by mechanical guarding of machines at point of work. The Survey Representative rated the protective clothing worn as Adequate.

III. Photographs



Performing final adjustment on a mechanical press.

IV. Conclusions

No protective clothing was provided by the company. Employees provided any accessories worn. The accessories worn were considered adequate for the hazards found in this shop.

Company Code: 3-26 SIC Number 3069
Date of Visit: 9/27/73
Industrial/Occupational Area: Fabricated Rubber Products
Hazards Observed: Chemical, Thermal, and Mechanical

I. Company Summary

This company employs 51 persons in the manufacture of automotive replacement parts. A portion of the operations are automated; the balance are manual. The processes observed in the plant were rubber forming/molding, metal stamping, finishing, and rubber bonding. It was felt by the Surveyor that front torso and upper-extremity protection should be utilized for rubber stripping, metal cleaning, transferring of hot liquids, and grinding operations. No protective clothing was required nor provided by the company. In the above operations, worker safety would be enhanced by the wearing of rubberized fabric aprons, gloves, and boots. There were no responses from workers when questioned as to their rating of protective clothing.

II. Survey Representatives' Observations and Comments

This particular molded-rubber-products company probably operates today as it did 20 years ago. The factory and machinery were very outdated, with very little provided to employees in the way of safety protection. Production pace was very slow and inefficient. The protective clothing mentioned above would suffice for worker protection if it was provided to employees. A general work uniform of shirt and trousers and work gloves should be adequate for the balance of other operations. The Surveyor's observations noted no protective clothing available.

III. Photographs

Photography was prohibited in this shop.

IV. Conclusions

Protective clothing was not provided by the company nor was it required. Protective clothing should be available for the specific operations mentioned previously. Rubberized aprons, boots, and gloves should be provided by the company to enhance worker protection.

Company Code: 3-27 SIC Number 7397
Date of Visit: 9/27/73
Industrial/Occupational Area: Industrial X-Ray Inspection Services
Hazards Observed: Chemical, Mechanical, and Radiological

I. Company Summary

This is a service-oriented company utilizing fixed and mobile metal-inspection units for industrial X-ray and dye penetrant inspections. Twelve employees are involved in both the manual and automatic phases of this inspection operation. The entire body requires protection from the radiation emitted by the radiological source. This protection is provided by heavy shielding of the source, directional control, and isolation. This mechanical/procedural method of protection is monitored through the use of film badges and dosimeters. Extremely strong chemicals are used under pressure and with steam to degrease items prior to inspection. This activity requires the use of chemically impervious clothing, boots, and a face shield for adequate protection. The above clothing and accessories comprise the basic cleaning ensemble. All protective clothing used in this shop is supplied and maintained (through tool crib issue) by the company. Protective clothing requirements are not periodically reviewed, as the above ensemble is approved and standardized within the company. The cleaning ensemble described above with the mechanical and procedural safeguards against accidental radiation exposure are felt adequate for this industry. The employees rated the protective clothing very high and seemed well satisfied with both the protection and utility of the cleaning ensemble.

II. Survey Representatives' Observations and Comments

The general work environment within the laboratory and testing areas is clean, well lighted, and reasonably quiet. Field environments would depend completely upon the type and location of each industry requiring testing services. Hazards prevalent in radiological testing are well guarded through isolation and the use of shielding.

Mechanical hazards were observed during the careless operation of material-handling equipment and can not be guarded against through the use of protective clothing.

Chemical hazards in the cleaning of customers' items prior to testing are due to the use of caustic cleaning compounds, and can be reduced or eliminated through the use of the cleaning ensemble supplied by this company.

Operations involved in this service begin with the cleaning and drying of items to be X-rayed or inspected with dye penetrants. Items to be dye-inspected are placed under the machine, the suspected areas are sprayed with a colored dye which is highly visible in certain light, and the areas are examined by the unaided eye, or under magnification if required.

In the case of radiography, opaque objects are reproduced on sensitized film, and fluoroscopic techniques are used to form images of the subject on a screen.

This company utilizes both fixed and portable equipment for testing welding, forging, rolling, forming, and extrusion processes. Employees, when questioned regarding the protective clothing provided by this company, expressed complete satisfaction in both the protection provided and the practicality of the clothing. The views of the employees relative to protective clothing used for the conditions prevalent are concurred in by the interviewer. The lack of a planned, periodic review of the conditions and clothing leaves future adequacy of the clothing presently in use questionable.

III. Photographs

Photography was not permitted at this facility.

IV. Conclusions

Current personnel protection practice includes mechanical, clothing, and procedural protection. No additional protective clothing is deemed necessary at this facility. The original survey rating of protective clothing "Available and Adequate" is based on the above information.

Company Code: 3-28 SIC Number 3465
Date of Visit: 9/28/73
Industrial/Occupational Area: Metal Fabrication
Hazards Observed: Mechanical and Thermal

I. Company Summary

This shop employs 17 mechanics and helpers in the auto and semiautomatic stamping of metal parts. The front of the body requires protection where there are thermal hazards. Protective clothing is required, provided, and worn at this shop. Maintenance of protective clothing is accomplished on a repair-or-replace, as-required basis and is a tool crib function. Protective clothing requirements are not periodically reviewed. The clothing currently in use does not cause added risk due to its design. Items of protective clothing presently in use are completely adequate to provide protection to the workers. Employees rated the protective clothing available to them as adequate.

II. Survey Representatives' Observations and Comments

This is a very clean, orderly, well-lighted (though a bit noisy) plant. The mechanical hazards are either isolated from employees or designed to shut down automatically when employees are threatened. No special protective clothing is provided in the mechanical hazards area. The thermal hazard imposes a requirement for hides, shields, and aprons in the welding and heat-treating areas. The general operation involves the cutting of raw material to size by shears and by hand. Sheet stock is fed into power presses and brakes where it is blanked to size, punched, formed, and trimmed. The stampings are then deburred, polished, and automatically primed, when specified, and packaged for shipment to the customer. Employees considered the protective clothing supplied to be adequate. Their opinion appeared completely correct to the Surveyor. This shop appeared to be a very safe and efficiently operated plant. Employees appeared to be very proficient at their jobs in all phases of this operation. The condition of the plant and employer/employee attitudes toward safety appeared to be a major and very valuable asset of this shop.

III. Photographs

No photographs were taken at this facility. Employees indicated unwillingness to submit to photography.

IV. Conclusions

Current practices at this plant leave little to be desired in the area of work safety. Protective devices and protective clothing appear sufficient to ensure employees a good degree of personal safety. The original Available and Adequate rating of the protective clothing was predicated on these premises.

Company Code: 3-29 SIC Number 3519
Date of Visit: 9/28/73
Industrial/Occupational Area: Internal Combustion Engines
Hazards Observed: Thermal and Mechanical

I. Company Summary

This factory employs 8,000 mechanics and technicians of various job classifications in the auto and semi-automatic manufacturing, assembly, and testing of diesel engines. Assembly line employees did not require any special protective clothing. Employees in the welding and grinding areas did require and utilize articles of protective clothing to protect the front of the body. Protective clothing is required, provided, and maintained through unit supply issue, control, and repair. Most employees engaged in hazardous operations wear protective clothing. There is no periodic review of protective clothing requirements in the current protective clothing program. Protective clothing does not contribute in any way to hazards in the operations. Clothing available to the workers appears adequate and there are no requirements for further development of protective clothing for this industry. Employees were well satisfied with both the availability and quality of the protective clothing supplied at this facility.

II. Survey Representatives' Observations and Comments

This large plant appears to be headed toward complete automation. One line is presently completely automated, one is in modification to full automation, and a new line in construction will be fully automated. The general work environment at this plant is good, noise levels vary but are acceptable, lighting is adequate, and ventilation is excellent. Mechanical hazards exist in assembly and finishing processes, and thermal in the heat-treating and welding areas. The manufacturing process begins with the placing of raw castings on a moving conveyor in a special unit jig. The basic block undergoes various grinding, drilling, lapping, and machining processes, being turned, twisted, and inverted

as required by operations. Human involvement is almost entirely limited to observation, startup, adjustments, testing, and materials functions. The finished engine receives a functional and complete operational testing program of several hours' duration under automatic and manual control. Upon completion of testing, the engines are packaged as required by specifications and shipped throughout the world by common carrier. The employees' apparent satisfaction with the company's protective clothing program seemed sincere. The clothing provided did appear adequate; however, observation revealed many instances of employees performing tasks requiring some degree of protection, without using the available clothing. A certain laxity in the general safety program and especially as far as protective clothing is concerned was apparent.

III. Photographs

Photography was prohibited at this plant.

IV. Conclusions

Current practices indicate a trend toward automation and consequent isolation of hazardous operations. The protective clothing now provided employees involved in hazardous operations seems to provide an acceptable degree of protection. There was a shortage at some work stations of both accessory safety items and special protective clothing. That shortage was the basis for the original survey rating of Available but Inadequate.

Company Code: 3-30 SIC Number 3832
Date of Visit: 10/1/73
Industrial/Occupational Area: Beryllium Operations
Hazards Observed: Chemical, Mechanical

I. Company Summary

This precision manufacturing plant employs 140 highly trained technicians in the automated manufacturing of precision electro-optical, gimbals inspection, and machining systems. The front torso and lower extremities require protection in the beryllium machining operations. Protective clothing (standard, two-piece, cotton work suit and shoes for dust protection) is supplied, required, and maintained by the company. It is worn for each specific hazard and its use and suitability are constantly monitored by the plant safety supervisor. The protective clothing program is the responsibility of the safety supervisor. Maintenance is handled through the tool crib, where clean, two-piece work suits and work shoes are issued daily to each employee in beryllium machining. These are turned in to the tool crib at the end of each shift for cleaning and reissue. The protective clothing used in the operations does not contribute added risk due to design. The protective clothing used in conjunction with the available mechanical safety devices is felt to be adequate for the operations involved in this factory. No interviews with the workers were permitted.

II. Survey Representatives' Observations and Comments

This plant was found to be exceptionally clean, well lighted, and quiet. Mechanical and chemical hazards were observed in the machining, shaping, and grinding of beryllium. The manufacturing processes include machining, grinding, lapping, and polishing of solid stock, castings, rods, tubes, sheets, and shapes of ferrous and nonferrous metals and glass. Operations are performed by skilled machinists and technicians using shapers, punch presses, drill presses, cutting tools, surface grinders, lathes, and precision measuring devices. The protective clothing used in the above-mentioned manufacturing processes seem adequate for the hazards encountered.

III. Photographs

Photography was prohibited at this plant.

IV. Conclusions

The current practice of a daily exchange of the entire ensemble used in machining beryllium, along with the use of isolation and ventilation equipment, appears to offer adequate protection against hazards encountered in this operation. The protective clothing "Available and Adequate" rating of this concern is based on the current practices outlined above.

Company Code: 3-31 SIC Number 3398
Date of Visit: 10/1/73
Industrial/Occupational Area: Operations Involving Heat Stress
Hazards Observed: Mechanical, Thermal

I. Company Summary

This is a small company employing 18 people engaged in flame-hardening processes of various customer-furnished components. The operations in this plant are all manual. The body areas requiring protection are the upper torso, head, face, hands, and feet. There is no protective clothing worn at this company. It is not required, supplied, nor maintained. A periodic review of protective clothing requirements is not made. The items of protective clothing which should be furnished are an aluminized coat, face shield, asbestos gloves, safety shoes, hard hats, and safety glasses.

II. Survey Representatives' Observations and Comments

This is a cluttered, poorly ventilated, dark plant with a very high noise level. The thermal hazards are open flame and hot metal components, and the mechanical hazards are flying particles, sharp metal edges, heavy parts, overhead crane operations, and grinding operations. The operation consists of manually positioning the part to be hardened in the fixture, and adjusting the flame head to obtain the proper coverage of the area to be treated. The flame is applied long enough to heat the surface above the critical temperature range of the steel. As soon as the desired temperature is reached, the part is cooled with a water spray. The part is then removed from the fixture. The items of protective clothing recommended for protection against the hazards observed have been listed in Section I.

III. Photographs



Welder repairing (building up) industrial equipment preceding heat treatment.

IV. Conclusions

At the present time, this plant does not have a protective clothing program. The hazards and working conditions observed substantiate the fact that no safety program exists. The items of protective clothing which should be furnished and are available on the market are outlined in Section I.

Company Code: 3-32 SIC Number 3312
Date of Visit: 10/2/73
Industrial/Occupational Area: Blast Furnaces, Steel Mills, and Rolling Mills
Hazards Observed: Mechanical, Thermal, Chemical, and Electrical

I. Company Summary

This stainless steel mill employs 1,400 people in the manufacture of basic stainless steel metals through both manual and automated processes. The body areas requiring protection range from complete coverage in the furnace area (crucible pourers) to only the torso in general mill operation (plant laborers). Protective clothing is required, supplied, and worn for each specific hazard. Protective clothing is issued to operating personnel through the supply department and is maintained by repair or replacement as required. Protective clothing requirements are not reviewed within this company as corporate requirements and policies are inflexible relative to protective clothing. The protective clothing used at this mill does not add to risk due to design. Employee interviews were prohibited by the mill's management. Protective clothing provided to employees consists of the following:

- Heavy cotton and woolen two-piece work suits for the melt area personnel.
- Aluminized asbestos coats, gloves, leggings, and hoods for the pourers.
- Hide apron, gloves, sleeves, and leggings for welders.
- Synthetic-coated aprons, gloves, and boots for pickling department workers.

II. Survey Representatives' Observations and Comments

This specialty steel mill was representative of most mills in operation. It was poorly lighted, extremely hot, noisy, and cluttered with materials and equipment. Stainless steelmaking starts with charging the furnace with prepared and weighed amounts of materials as determined by the alloy desired. The charge is fed by crane into the furnace across three carbon electrodes carrying up to 500 volts of ac current. Samples are taken during the melting for laboratory analysis to ensure alloy stability. Heat is adjusted as required by operators, and various amounts of components making up the charge are added to satisfy alloy percentages. When the mix is ready to pour, it is oxidized by shooting oxygen through a probe directly into the molten metal to form a surface slag. This slag is skimmed off the mix, and the mix is then poured into molds and cooled for delivery to customers, or storage for eventual sale.

III. Photographs

Photography was not permitted on the plant site.

IV. Conclusions

The clothing currently provided workers in this mill appears adequate protection against hazards observed in this operation. The protective clothing maintenance program seems satisfactory; however, there are no provisions for periodic review of the protective clothing requirements of this mill. The original survey rating of Available and Adequate was not applicable to the periodical review of protective clothing requirements, only to the availability and maintenance of protective clothing.

Company Code: 3-33 SIC Number 3398
Date of Visit: 10/2/73
Industrial/Occupational Area: Operations Involving Heat Stress
Hazards Observed: Mechanical, Thermal

I. Company Summary

This is a small company employing 25 people engaged in the heat-treating of metals. All of the operations are manual with the exception of the temperature and time controls on the heat-treat furnaces. The body areas requiring protection are the upper torso, face, head, hands, and feet. Protective clothing is required, supplied, and maintained for the hazards mentioned. The maintenance program consists of periodic replacement of worn equipment. The protective clothing requirements are not periodically reviewed. Protective clothing utilized at this time does not cause added risk due to design. The items of protective clothing which are recommended are aluminized jackets or vests for upper torso protection, face shields, hard hats, and safety shoes. The workers' evaluation of the protective clothing presently available to them is adequate.

II. Survey Representatives' Observations and Comments

This is a dirty, poorly ventilated plant. The noise level is very high, and there has been no attempt to keep up with the state of the art in plant design and layout. Hazards noted were heat, toxic fumes, vapors, sharp metal edges, equipment moving, and overhead crane operations. The parts to be treated are manually loaded into ovens. The temperature is raised to a given level and held at that point for a specific time; parts are then removed from the oven and, depending on the process, are allowed to cool in the air or are immersed in a water or oil bath. The workers' evaluation of the protective clothing they presently use is adequate. The Surveyor concurs with this evaluation. Recommended items of protective clothing are outlined in Section I above.

III. Photographs

Photography was prohibited at this shop.

IV. Conclusions

The current protective clothing practices employed in this plant are obviously not a part of any long-range, overall safety plan. The minimum protection for hazards has been provided. There is no ongoing program to review protective clothing requirements or to keep abreast of the state of the art in clothing developments.

The rating for both the thermal and mechanical hazard is Adequate for the equipment supplied.

SURVEY AREA NO. 4
ON-SITE SURVEY NARRATIVES

Company Code: 4-1 SIC Number 3819
Date of Visit: 10/16/73
Industrial/Occupational Area: Chemical and Allied Products
Hazards Observed: Chemical and Mechanical

I. Company Summary

The company surveyed had an employment of 250 people engaged in the formulation and packaging of industrial chemicals. Production operations in the plant were both manual and automated. Protective clothing was required wear, and was supplied and maintained by the company. The maintenance program consisted of a periodic turn-in of equipment for reissue of refurbished items. Requirements of protective clothing were reviewed periodically by the Safety Director of the company. The review included a plant survey of the foremen and workers. Protective clothing utilized at the facility did not cause added risk to the workers due to defective design. Workers wear the protective clothing items provided by the company; however, they are of the opinion that it is not necessary. Their contention is that the clothing provides more protection than is necessary.

II. Survey Representatives' Observations and Comments

The plant facility was well laid out and lighted but ventilation was poor and the noise level was high. Exposures to chemical hazards occurred during bulk handling, blending, and packaging operations, while mechanical hazards were encountered during receiving, moving, storage, and shipping operations. The production process in the plant is initiated when bulk chemical materials are received and stored. The method of handling and storage depends on whether the materials are in liquid or in dry form. As they are required, the stored materials are mixed and processed to various formulations. The resultant chemical compounds are then packaged either in liquid or dry form and stored until shipped. The Surveyor's evaluation of the protective clothing used in the liquid chemical transfer area was that it was Available and provided adequate protection

to workers. Complete acid suit ensembles with self-contained compressed air breathing apparatus were noted in this area. It was not felt by the Surveyor that adequate protective clothing was made available to employees in the packaging area. It should be suggested that a rubber apron be provided along with the normally provided accessories.

III. Photographs

Photography was not permitted in this plant.

IV. Conclusions

Current protective clothing policies were very good, as evidenced by the use of complete acid suit ensembles with breathing air. The only suggestion for improvement was noted in Section II above.

Company Code: 4-2 SIC Number 3339
Date of Visit: 10/16/73
Industrial/Occupational Area: Beryllium
Hazards Observed: Mechanical and Chemical

I. Company Summary

This company employed 200 machine shop workers in the manual and automated shaping and forming of beryllium articles. Protective clothing is worn for each specific hazard and is supplied by the company. Clothing is maintained by a local laundry under a subcontract which provides for washing, repair, and replacement as necessary. The protective clothing worn by the workers in forming and shaping areas consisted of approved respirators, a two-piece work garment, rubber boots, and gloves. These garments are exchanged daily for cleaning and maintenance due to the toxicity hazards inherent in beryllium operations. Employees involved in work in the etching section of the plant wore rubber aprons, boots, and gloves. Protective clothing requirements are periodically reviewed by corporate level management. The protective clothing available for use by employees was considered to give adequate protection against the hazards encountered and did not contribute added risk by their design.

II. Survey Representatives' Observations and Comments

The general work environment in the plant was excellent. The entire area was clean, well lighted, and ventilated. Noise was not noted to be a problem. Normal mechanical hazards found in machine shop operations were in evidence. Chemical hazards associated with beryllium operations and etching processes were observed. Shop operations included the cutting, drilling, shearing, shaping, and punching of beryllium stock. Lathes, punches, drill presses, grinders, shapers, planers, brakes, cutting tools, and screw machines were used as fabricating equipment. Vacuum devices, fabric and plastic machine guards, and procedural practices, in addition to protective clothing requirements, provide safeguards to the employee during work operations. Employees appeared well satisfied with the above safety measures and could not offer any methods of improvement. The employees' comments were felt to be accurate by the Surveyor.

III. Photographs

No photography was permitted at this facility.

IV. Conclusions

The current worker protective practices at this plant include the use of procedural, mechanical, and personal protective equipment methods of guarding against injury. These measures appear adequate to meet the protection requirements of the operation.

Company Code: 4-3 SIC Number 1476
Date of Visit: 10/16/73
Industrial/Occupational Area: Mining
Hazards Observed: Thermal, Electrical, and Mechanical

I. Company Summary

The facility surveyed was a large mining operation employing 245 people engaged in the mining and refining of common salt. Operations in the facility were both manual and automated. The use of protective clothing was very limited in the plant. Coveralls and raingear, while not required wear, were supplied and maintained by the company. Protective clothing accessories such as hard hats, gloves, and safety shoes were required wear. The accessory items were provided and maintained by the company. Protective clothing requirements were reviewed periodically by the Safety Department in the refining plant and the Safety Department and mine foreman in the mine. The protective clothing used did not cause added risk due to design. The workers' evaluation of the protective clothing available from the company was that it provided adequate protection.

II. Survey Representatives' Observations and Comments

The mining and refining facilities were well laid out and lighting was excellent. The mine itself was well ventilated; however, the noise level was high and standing water was noted everywhere. Thermal hazards were encountered in the steam plant from piping runs that contain brine at temperatures of approximately 230° F and from evaporators. Electrical hazards were encountered in both the refining plant and the mine in wiring runs and electrical equipment. Mechanical hazards were encountered in falls on wet floors, moving machinery, sharp objects, machinery drives, and conveyors. All equipment at the facility was subjected to a highly corrosive environment due to high ambient salt concentrations. Process operations in the facility begin as the salt ore is mined and brought to the surface. The salt ore is dissolved in

water to produce a brine of the desired concentration for processing. Caustic soda and soda ash are added to the brine to precipitate out calcium and magnesium salts. The brine solution is then evaporated by heating to produce crystals of pure salt which are then further dried. The salt crystals are then ground to the desired granular size and packaged. The Surveyor agreed with the workers' comments relative to protective clothing with the exception that it was felt an ensemble should be provided to maintenance personnel for use in emergency repair or maintenance of hot brine piping runs and evaporators. This should consist of trunk protection, face shields, gloves, and boots for protection against the 230^o F temperatures encountered.

III. Photographs

Photography was not permitted at this plant.

IV. Conclusions

Hard hats, safety gloves, and safety shoes were required wear in all areas of the facility. Coveralls and rain-gear were provided by the company on a voluntary-use basis. The only suggested addition to the protective clothing used at this plant would be the thermal protective ensemble previously mentioned. The Surveyor agreed with all other aspects of the protective clothing program.

Company Code: 4-4 SIC Number 3325
Date of Visit: 10/17/73
Industrial/Occupational Area: Foundries
Hazards Observed: Mechanical, Chemical, Thermal,
and Electrical

I. Company Summary

This company employs 450 persons in the operations necessary to produce sand-molded and core-formed products of ferrous and nonferrous metals. Production processes in the facility were both manual and automated. Protective clothing wear was required by the company, and the company supplied and maintained the protective clothing worn. Requirements for protective clothing were reviewed periodically by the Safety Director. There was no contribution of additional risk through the design of the protective clothing used at the facility. Employees surveyed expressed satisfaction with the protective clothing supplied them.

II. Survey Representatives' Observations and Comments

The plant was very clean, orderly, and well illuminated. Mechanical hazards were observed in equipment handling and metal processing machines. Chemical hazards were observed in the laboratory during chemical compounding, mixing, and testing; electrical hazards around furnace electrical controls, exposed connections, and open switches; and thermal hazards in furnace and welding operations. The manufacturing and testing processes consist of receiving, weighing, and segregating raw materials. Fabrication of molds and cores is then accomplished. Next, furnaces are charged with fuel and materials. Necessary formula adjusting is performed during the melting and testing processes. Pouring of the alloys into molds follows satisfactory testing. The castings are then cooled, inspected, and packaged for shipment. Occasionally, if specified by the customer, the castings are cleaned by chipping and sandblasting. The company's protective clothing practices include providing workers in the furnace areas with asbestos suits, gloves, hoods with tinted glass face pieces, and spats. Welders are issued heavy leather aprons, gauntlets,

spats, and a helmet with hood. Chemical-resistant coats and gloves are utilized in the testing laboratory and compounding section. It was the Surveyor's opinion that the clothing provided by the company was readily Available and Adequate in the protection afforded workers.

III. Photographs

No photography was permitted on the plant site.

IV. Conclusions

The protective clothing available for workers' use appeared satisfactory and there were no recommendations for either additional or different types of protective clothing. Protection against mechanical hazards was provided in the form of locking switch boxes, guards, and shields on moving equipment. This was considered to be adequate in protecting the workers.

Company Code: 4-5 SIC Number 3325
Date of Visit: 10/17/73
Industrial/Occupational Area: Metal Smelting
Hazards Observed: Thermal, Electrical, and Mechanical

I. Company Summary

Thirty employees were engaged in the production of metal castings at this company. Processing operations were both manual and automated. Protective clothing was not required, worn, or maintained. Neither was there a program of periodic review of protective clothing requirements accomplished by management. The items of protective clothing the Surveyor felt necessary to provide adequate protection to the workers were: an aluminized asbestos fire proximity ensemble consisting of coat, trousers, hood, gloves, and boots for workers in the foundry area, and a complete welder's ensemble consisting of leather cape sleeves, apron, leggings, gloves, and helmet. It is interesting to note that the workers felt the present protection provided was adequate.

II. Survey Representatives' Observations and Comments

The facility surveyed was a small poorly organized shop. Lighting and ventilation were very poor, and the noise level was high. Thermal hazards were evident around the foundry furnaces in the forms of hot ladles, hot castings, molten metal, and high ambient heat around the welding area. Electrical hazards evident were those normally associated with arc welding operations. Mechanical hazards were noted in overhead crane operations, flying particles, sharp metal edges, trips, and falls. Production processes were initiated by the making of molds. Sand was moistened and mixed with a bonding material and molded to form the desired shape; and then, the casting surfaces were dusted with a parting compound. Pig and scrap iron in the appropriate mixtures were charged into the furnace, melted, and drawn off into a ladle. The molten metal was then poured into the mold. When the metal had solidified, the sand was shaken off the castings and the castings were cleaned and finished by grinding or sandblasting.

The Surveyor did not agree with the workers as to the adequacy of the present protective clothing program.

III. Photographs

Photography was not permitted in this plant.

IV. Conclusions

The current protective clothing program of the company is not considered adequate. Protective clothing is not made available to workers; however, some accessories are. It was found that goggles, gloves, and safety shoes were provided foundry workers, and welding helmets and gloves were provided for welders. This would indicate a "stopgap" program rather than a well-organized, well-executed program.

Company Code: 4-6 SIC Number 3398
Date of Visit: 10/17/73
Industrial/Occupational Area: Operations Involving Heat Stress
Hazards Observed: Thermal and Mechanical

I. Company Summary

This was a large company employing 85 people in manual heat-treating operations. Protective clothing was not required wear, nor was it supplied or maintained by the company. There was no program in existence to review the clothing requirements. Some protective clothing accessories such as gloves and safety glasses were made available to workers. The workers felt that these items were adequate in giving them the personal protection needed. This evaluation was not shared by the Survey Representative.

II. Survey Representatives' Observations and Comments

The plant facility was very old and poorly organized. Lighting levels within the plant were very poor and the noise level was very high. Ventilation within the plant was not considered adequate. Thermal hazards were encountered around furnace areas during the handling of heated parts, and in the area of the molten salt baths. High ambient temperatures in these areas identify them as heat-stress, high-incidence areas. Mechanical hazards were encountered in overhead crane operations, material handling, sharp metal parts, and falls. The material processing starts with the metal parts being placed in furnaces or ovens. The temperature is then raised to a specified point and held for a given length of time, depending on the process; the parts are then removed from the heat and quenched in an oil, water, or molten salt bath. The Survey Representative's evaluation of the protective clothing practices at the facility was that they did not provide the protection needed for the workers' well-being. Items of protective clothing which should be furnished to employees are aluminized or asbestos coats, pants, spats, gloves, and face shields. Provision should also be made for suit-cooling to eliminate the dangers of heat stress.

III. Photographs

Photography was not permitted at this plant.

IV. Conclusions

The protective clothing practices observed at this facility were typical of those where the safety program was inadequate or nonexistent. The accessories used did not provide adequate protection to the workers. Thermal protective ensembles with suit-cooling capabilities were not made available by the company.

Company Code: 4-7 SIC Number 3398
Date of Visit: 10/18/73
Industrial/Occupational Area: Operations Involving Heat Stress
Hazards Observed: Mechanical and Thermal

I. Company Summary

The company surveyed was a small one employing 30 people in the heat-treating of metal parts. The operations involved in processing were manual; however, the temperatures of the ovens were automatically controlled. Protective clothing was supplied to the workers and its wear was required. There was no maintenance program provided for the protective clothing, nor were there reviews of clothing requirements. There were no indications that the clothing provided added risk to workers due to design deficiencies. The workers evaluated the protective clothing provided by the company as adequate for their protection.

II. Survey Representatives' Observations and Comments

The plant was small and well laid out. Lighting and ventilation were noted to be excellent. The noise level was high. The ovens and the handling of hot metal parts constituted the thermal hazard areas. Mechanical hazard areas were: overhead crane operations, falls, sharp metal edges, and material handling. Production processes included loading of ovens with parts to be heat-treated, raising of temperatures inside the ovens to a specified level, and heat-soaking the parts for a required period of time. At the conclusion of the heat-soak period, the parts were removed from the ovens and quenched in water or oil baths. The treated parts were then readied for shipment. Although workers were generally satisfied with the performance of the clothing provided, some expressed a desire to have more adequate gloves for handling hot parts. The workers stated that after repeated handling of hot items, the effectiveness of the gloves' protection diminished. It was the opinion of the Surveyor that protective clothing provided by the company did not provide

adequate protection against thermal hazards. No provisions were allowed for heat-stress protection, and it was felt that workers in the oven area required face protection in the form of hoods or face shields.

III. Photographs

Photography was not permitted in the facility.

IV. Conclusions

The current practice at this plant was to provide the minimum protection necessary. The company lacked an organized safety program which could provide a strong and vital protective clothing program. The Surveyor felt that while the protective clothing issued to workers did provide some protection, the protection was inadequate from the standpoint of the discrepancies previously discussed.

Company Code: 4-8 SIC Number 3369
Date of Visit: 10/18/73
Industrial/Occupational Area: Metal Smelting
Hazards Observed: Thermal, Mechanical

I. Company Summary

This was a large company employing 101 persons engaged in the production of nonferrous castings. Production processes were manual. Protective clothing wear was not required by the company, but it was made available to workers if they so desired. A maintenance program consisting of periodic inspection and replacement was carried out by the company. The plant did not have a program of review of protective clothing requirements. There were no indications that the use of protective clothing provided workers added risks due to defective design.

II. Survey Representatives' Observations and Comments

The plant facility was noted to be well laid out, with good lighting; however, ventilation was marginal and the noise level was high. Sources of thermal hazards were observed during furnace operations, and handling molten metals and hot castings. Sources of mechanical hazards were observed during overhead crane operations, handling operations, shot blasting, and grinding operations; from strains, falls, and flying particles; and contact with irregular surfaces. Production processes were typical for metal smelting operations of this type. Sand molds were fabricated for pouring of molten metal. The metals were melted in crucibles by gas furnaces. The melt was then poured into the molds and cooled. Removal of the resultant castings from the molds was accomplished by mechanical shakeout equipment or by hand. Finishing was accomplished by tumbling or shot blasting. Rough edges were removed by grinding. The Survey Representative had no recommendations for clothing which could be furnished or developed for the hazards encountered in this plant. The workers considered the protective clothing provided as adequate to protect them from injuries.

III. Photographs

No photography was permitted in this facility.

IV. Conclusions

The current practices at this plant indicated a good start on a protective clothing program, but it has not been a continuing process due to the lack of periodic assessments. The Survey Representative, however, concurred with the workers' evaluation of their protective clothing being adequate for their protection.

Company Code: 4-9 SIC Number 3325
Date of Visit: 10/18/73
Industrial/Occupational Area: Metal Smelting
Hazards Observed: Thermal, Mechanical

I. Company Summary

This was a very small company employing four people engaged in the production of metal castings. All operations in the plant were done manually. The worker in the furnace and welding area was protected adequately from the thermal hazards encountered. Torso protection was lacking to the worker in the grinding area. The company required protective clothing to be worn and they supplied it. However, there was no maintenance program nor was there a periodic review of protective clothing requirements. The items of protective clothing in use did not cause added risk due to design. Workers rated the clothing supplied them as adequate to their needs.

II. Survey Representatives' Observations and Comments

The plant, although small, was well lighted and ventilated, but had a high noise level. Furnaces, hot ladles, and hot castings were the sources of thermal hazards; while overhead crane operations, sharp edges, flying particles, and falls and trips were the sources of mechanical hazards. Production processes consisted of loading iron into the furnace, melting the iron, pouring molten iron into molds, removing casted items from molds, and finishing castings. Molds are fabricated using sand mixed with a bonding agent. The sand is molded to the desired shape and the casting surfaces dusted with a parting compound. When the molten iron has cooled, the mold is removed by shaking the sand loose. The casting is then finished by dressing mold marks and rough edges with grinders. Protective clothing issued employees seemed to offer good protection. The only item of clothing which could be recommended for addition to the inventory was an apron or other type of torso protection to provide mechanical protection to the worker in the finish grinding operation.

III. Photographs

Photography was not permitted at this facility.

IV. Conclusions

The current practices regarding protective clothing were adequate to provide the necessary protection against the hazards encountered with the exception of not providing torso protection to the grinder worker. The safety program of the company could be greatly improved if the safety organization was more active and the protective clothing requirements were periodically reviewed.

Company Code: 4-10 SIC Number 3011
Date of Visit: 10/19/73
Industrial/Occupational Area: Rubber and Tire Production
Hazards Observed: Thermal, Chemical, and Mechanical

I. Company Summary

Seven thousand people were employed by this company in the production of automobile tires, truck tires, and other rubber products. The operations involved in production of these items were both manual and automated. Protective clothing was furnished and maintained by the company. Employees were required to wear clothing furnished to them. The maintenance program consisted of a daily laundering of some of the items and periodic inspections and replacement of the balance of the items. A committee consisting of a Safety Engineer and representatives of the union periodically reviewed protective clothing requirements. The Surveyor did not feel that the design of clothing utilized by the facility added injury risk to the employees. Workers interviewed stated that the clothing issued provided adequate protection for their needs.

II. Survey Representatives' Observations and Comments

The facility was a well laid out and highly automated one. Lighting and ventilation were excellent. The noise level was considered moderately high. Thermal hazards were noted in curing machine areas and in hot piping runs. Overhead conveyors, rollers, gears, and material handling were areas where mechanical hazards were evident. Production processes involving the handling and use of sulfur, formaldehyde, naphtha, and toluene, and latex and rubber cements constituted the chemical hazards. Tire production is accomplished by first blending raw rubber with other materials to improve its wearing ability and heat resistance. The rubber is then processed through a machine which forms the material into shapes of specific weight, width, and profile to be used for tire tread. The fabric which will form the plies of the body of the tire is dipped, dried, coated with latex resin, and rolled. The tire manufacturing process continues with the rubber being pressed to both sides of the

prepared fabric in carefully controlled layers. After coating, the rubber-impregnated fabric is put through a bias cutter where it is cut to prescribed angles and widths. Wire beads for the sealing edges of the tires are formed by drawing many strands of wire together and impregnating them with rubber. The prepared fabric is wrapped around a building drum and spliced. These form the plies of a tire, and the number of plies wrapped depends on the standard of the tire being constructed. Next, the previously constructed beads are applied automatically. The tire is then sent to a automatic curing machine, or, as it is called, a press. In the press, hot steam expands a curing tube to force the tire against the mold forms inside the press. After curing, the tire is cooled and sent to packaging and shipping departments. The workers' comments regarding protective clothing provided were that it was adequate and no additional protection could be provided.

III. Photographs

Due to the nature of the operations and the existence of company-private material, photographs were prohibited.

IV. Conclusions

The current practices of the protective clothing program at the facility were considered to be adequate and provided workers with the desired degree of protection. The Survey Representative concurs with the workers' rating of the protective clothing provided.

Company Code: 4-11 SIC Number 2891
Date of Visit: 10/19/73
Industrial/Occupational Area: Chemical and Allied Products
Hazards Observed: Chemical, Mechanical, and Thermal

I. Company Summary

The company surveyed employed 7,000 people in the production of commercial adhesives. The operations involved in the manufacturing processes were both manual and automated. Protective clothing was required, supplied, and maintained by the company. The maintenance program consisted of daily laundering and periodic inspections, with worn-out equipment being replaced as required. The Safety Director and a worker assigned by the union periodically reviewed the protective clothing requirements. It was not felt by the Survey Representative that risk was added to workers by deficiencies in clothing design. During the survey interviews, workers stated that the protective clothing required by the company adequately protected them.

II. Survey Representatives' Observations and Comments

The plant facility was well lighted and ventilated, with a low noise level. Thermal hazards were encountered in the heat-processing area, while chemical hazards were encountered in the mixing and packaging areas. Overhead crane operations, material handling, slips, and falls were the mechanical hazards noted. The manufacturing of adhesives consists of weighing specific amounts of clays, starches, polyvinyl acetates, dextrans, and preservatives. The ingredients are then compounded to commercial or customer specifications. The process is completed by cooking the mixtures in steam-heated kettles for a specific length of time. The finished adhesives are then packaged automatically in the case of liquid forms, or weighed and packaged by hand in dry forms. The Survey Representative considered the workers' comments as to the adequacy of the protective clothing provided to be correct.

III. Photographs

Photography was prohibited at this facility

IV. Conclusions

The protective clothing program at this plant was well organized, and the protection furnished the workers against the hazards encountered was considered adequate. Protective clothing was made available to workers by the company.

Company Code: 4-12 SIC Number 3069
Date of Visit: 10/19/73
Industrial/Occupational Area: Rubber and Tire Production
Hazards Observed: Thermal, Mechanical

I. Company Summary

This was a large company employing 3,300 people in the production of rubber products. Production operations were both manual and automated. With the exception of one operation which utilized protective clothing, the balance of the operations performed in this plant were done without benefit of protective clothing. Accessories such as safety glasses, gloves, and safety shoes were worn in other areas of operations. The clothing and accessories worn by the workers was required, supplied, and maintained by the company. The maintenance program consisted of inspections with a turn-in for new issue when the item was worn out. Requirements for protective clothing were reviewed at set intervals by the company safety engineer and a member of the union Safety Committee. The items of protective clothing utilized at the facility did not cause added risk due to design. Workers felt the clothing provided by the company gave adequate protection for their safety.

II. Survey Representatives' Observations and Comments

This was a crowded, poorly designed plant. Ventilation was poor throughout and lighting was not adequate in some areas. There was an extremely high noise level in the facility. Thermal hazards were evident around the curing machines and associated hot piping runs. Moving machinery such as rollers, gears, and conveyors, and material handling constituted the mechanical hazards. The production process is initiated with various ingredients being weighed, batched, and fed into mixers. The resultant material is then milled, and colors, waxes, and small quantities of specialized ingredients added. The material is then extruded to form a variety of shapes. Open steam vulcanization is employed for curing. Silicone rubber is further cured in high-temperature electric ovens. The Surveyor felt that additional thermal protection in the form of a heat-resistant jacket or apron, and gloves

should be provided workers in the silicone rubber curing operations. All other aspects of the protective clothing program provided adequate protection to workers.

III. Photographs

Photography was not permitted at this facility.

IV. Conclusions

Workers assigned to the steam vulcanization area were furnished adequate protective clothing, but workers assigned to the silicone rubber curing ovens were not. Workers assigned to this and other operations in the facility were provided only protective clothing accessories.

Company Code: 4-13 SIC Number 3469
Date of Visit: 10/23/73
Industrial/Occupational Area: Metal Stamping
Hazards Observed: Mechanical, Chemical

I. Company Summary

This was a large, modern metal-stamping, painting, and plating company employing over 250 people in the production of industrial metal stampings and automotive accessories. Most of the manufacturing operations were automatic, with material handling and shipping being the major manual tasks performed. Protective clothing wear was required by the company in the cleaning and metal-pickling areas. The clothing was provided and maintained by the company. The protective clothing maintenance program consists of tool crib issue, cleaning, and replacement when needed. The protective clothing requirements were periodically reviewed by the company management and the union safety committee. The design of the protective clothing did not cause added risk to personnel due to its design. Workers expressed satisfaction with the protective clothing provided by the company.

II. Survey Representatives' Observations and Comments

The plant was found to be very clean, orderly, and well lighted. Noise was at an acceptable level and the production pace seemed ideally suitable to the facility. Most of the manufacturing machines were equipped with transmission and work-point guards, eliminating most mechanical hazards in this area. This left material handling and shipping operations as the major source of mechanical hazards. Hazards such as moving material-handling equipment, conveyor lines, pallet lifts, and shop cranes were observed in all sections of the plant. Acids and other chemicals used in the cleaning, pickling, and plating operations constituted the chemical hazards observed. Protective clothing was made available for these operations. Production processes involved in this plant's operations included the cutting of raw materials to size by sawing, cutting, or shearing. The shapes are then formed by stamping and

assembled into assemblies by mechanical fasteners or welding. After assembly, the products are finished by grinding, sandblasting, and sanding, then either painted or plated. The parts are then crated or packaged for shipping. The employees' rating of their protective clothing did not take into consideration the need for protection against the mechanical hazards involved in the material-handling operations. The Survey Representative did not feel adequate protection was made available to workers in those operations.

III. Photographs

No photography was permitted at this facility.

IV. Conclusions

The current protective clothing practices within this company do not include provisions to protect employees against the mechanical hazards found in material operations. Protection against these hazards could be provided by making available aprons, sleeves, and gloves of metal mesh, leather, or abrasion-resistant fabrics. The protective clothing provided to workers for chemical protection was considered adequate and was made readily available.

Company Code: 4-14 SIC Number 8071
Date of Visit: 10/23/73
Industrial/Occupational Area: Medical Laboratories
Hazards Observed: Chemical, Biological

I. Company Summary

The laboratory employed 22 people, ranging from medical doctors to laboratory technicians, in commodity quality-control services. The basic operations involved in this facility were manual, although there were a few automatic preparatory operations observed in the metering of chemicals into testing devices. Protective clothing was worn for each specific hazard although adequate protection was provided by procedural and mechanical guards. Protective clothing was required wear in the laboratory and was supplied and maintained by the company. Maintenance was performed by a laundry under subcontract to the laboratory, and by replacement as required. Requirements for clothing were not reviewed by the company, as the present work uniform was felt more than sufficient and had remained the standard of dress within the company for several years. The use of protective clothing did not cause undue risk to workers from design deficiencies. Workers felt the company's protective clothing program unnecessary, as the mechanical and procedural safeguards were deemed adequate for their protection.

II. Survey Representatives' Observations and Comments

The laboratory was very modern, well lighted, and quiet. There were no unguarded hazards noted, but there existed a very slight possibility of injury from valve failures, flask breakage, or splashing of caustic liquids. Various chemicals, some acid or caustic, were used in cleaning and laboratory procedures; mixing and dispensing were semiautomatic. Biological hazards were present in the various bacterial cultures being grown. The company's services included quality-control inspections of the hygiene practices of commercial food preparation industries. Tests were performed on commercial food and dairy products, drugs, and compounds. The tests were then analyzed for evidence of oliform bacteria and other contamination. The protective clothing provided by

the company was considered by the Survey Representative to be more than adequate for the workers' protection.

III. Photographs

Photography was not permitted in this facility.

IV. Conclusions

The current practice of the laboratory to provide procedural, mechanical, and personal protective clothing and equipment safeguards to employees was considered adequate. There were no recommendations for either additional protective clothing or changes in the existing procedures.

Company Code: 4-15 SIC Number 3351
Date of Visit: 10/24/73
Industrial/Occupational Area: Mill Operations
Hazards Observed: Mechanical, Thermal

I. Company Summary

Four hundred and ninety people were employed by this highly automated mill to manufacture copper- and aluminum-coated wire and rods. Although operations in the mill were highly automated, protective clothing wear was required, supplied, and maintained by the company. Maintenance was accomplished by tool crib personnel either repairing or replacing articles as required. Distribution was through daily tool crib signout or semipermanent issue. The protective clothing utilized in this plant did not add risk to the operations due to design. Employees were not allowed to be interviewed; consequently, workers' evaluation of the protective clothing issued by this company was not available.

II. Survey Representatives' Observations and Comments

The mill surveyed was fairly modern and well lighted and ventilated. It was noted that the noise level within the facility was high, and ambient high temperatures were noted around the furnace area and rolling mills. Mechanical hazards were observed throughout the plant, with vehicles, moving equipment, and machinery all contributing to the risks. Thermal hazards were very common in steel- and copper-melting operations, forging operations, and the rolling mills. The fusing and forming processes involved in this industry start with long round bars of steel stock of uniform forging quality being tested to rigid metallurgical specifications. The bars are then mechanically and chemically cleaned and preheated to welding temperature. Molten copper or aluminum is deposited on the rods to form a concentric bimetallic product which is then further processed by automatic rolling, shaping, and drawing, depending upon its intended use. A basic ensemble consisting of hard hat, face shield or goggles, leather sleeves, gloves, spats, and steel-toed shoes was used in the furnace

operations. Combinations of this ensemble were used in other areas of the facility depending on the requirements for protection. The protective clothing used in the facility appeared to give adequate protection to employees.

III. Photographs

Photography was not permitted in this mill.

IV. Conclusions

As the company's operations were for the most part automated, hazards normally protected against by protective clothing were nonexistent except in the furnace areas. Adequate protective clothing was made available to workers in these areas.

Company Code: 4-16 SIC Number 3293
Date of Visit: 10/24/73
Industrial/Occupational Area: Asbestos Operations
Hazards Observed: Mechanical

I. Company Summary

The company surveyed was a small company employing six people. The company's production consisted of the automated and manual manufacture of asbestos, fabric, and rubber gaskets. Protective clothing wear was not required by the company due to the high degree of automation. The company did not provide any protective clothing to employees, nor was there a periodic review of clothing requirements. Workers interviewed stated protective clothing was unnecessary.

II. Survey Representatives' Observations and Comments

The work environment was very clean and well lighted and ventilated. There was little noise present. The work area was generally spacious and comfortable. Mechanical hazards existed in the cutting area only. These were guarded against mechanically by the use of thermal, proximity, and mechanical shutoffs on all machines. The asbestos material used in the manufacture of gaskets was clean and coated with a substance to eliminate dust and fiber hazards normally associated with asbestos operations. The Survey Representative felt the mechanical safeguards effectively isolated the workers from the hazards encountered and protective clothing was not required at this facility.

III. Photographs



Cutting waxed asbestos sheets on machine punch to make gaskets. (Note proximity sensing safety device on punch.)

IV. Conclusions

The safety practices at this facility included the use of clean, coated asbestos sheets and prepackaged, coated braided asbestos to eliminate dust and fiber hazards of asbestos. Electrical, mechanical, and thermal machine guards, along with the high degree of automation, effectively eliminated the mechanical hazards that would normally be encountered in a plant of this type. The Survey Representative felt there were no requirements for protective clothing at this facility.

Company Code: 4-17 SIC Number 1111
Date of Visit: 10/25/73
Industrial/Occupational Area: Coal Mining
Hazards Observed: Mechanical, Electrical

I. Company Summary

This company employs 200 people in the manual and automated extraction of lower Kittanning coal from this very old mine. The protective clothing normally worn by workers is required, supplied and maintained by the company. Maintenance is accomplished by including a clothing allowance in the workers' wages. The protective clothing ensemble, consisting of helmet, light, safety glasses, gloves, coveralls, leg clamps, and safety shoes, with accessory items comprising safety lamp and self rescuer, is issued to employees in two parts. The coveralls, gloves, safety glasses, and safety shoes are provided through a clothing and equipment allotment. The helmet, light, safety lamp, and self rescuer are issued daily by the mine portal attendant. Protective clothing requirements and practices are governed by the Bureau of Mines, company policies, and union contract agreements. These are periodically reviewed by both company management and union committees. The protective clothing used in these mining operations did not cause added risk due to design, and appears adequate for the hazards encountered in this mine. Employees expressed complete satisfaction with the company's personal protection program.

II. Survey Representatives' Observations and Comments

The work environment of this mine left much to be desired. The noise of operations and maintenance was extremely loud, lighting was very poor, and ventilation was erratic through the mine. Electrical hazards existed throughout the mine, with open wiring, switches, worn insulation, and loose electrical guards and grounds contributing to them. Loose timber, low ceilings, moving equipment without audible warning devices, and loose track were some of the mechanical hazards observed. The mining operation involved breaking the

coal loose with handtools and automatic drills, and by continuous-process machines. Conveyor belts and coal cars are used to transport the coal to the washing area. The coal is then crushed, screened, washed, and graded. The coal is loaded into railroad cars and hauled away. The Survey Representative agreed with the employees that the protective clothing supplied at this mine was adequate and in accordance with accepted mine practices. The work position assumed by most workers in the mine, and the effort expended in mining coal makes the addition of any other protective clothing impractical.

III. Photographs



Machine operator unloading coal onto conveyor belt.

IV. Conclusions

Safety practices within the mine involved the use of mechanical, procedural, and personal protective devices. Most of the electrical and mechanical hazards mentioned in Section I of this narrative could be eliminated through a working preventive maintenance program. The protective clothing at this facility was made available to workers and provided adequate protection.

Company Code: 4-18 SIC Number 3544
Date of Visit: 10/26/73
Industrial/Occupational Area: Special Tool and Die Manufacturing
Hazards Observed: Mechanical

I. Company Summary

Cutting tools, cams, gears, cutting heads, and other high-tolerance, extreme-wear items were manufactured in this shop employing eight men. Both manual and automated work methods were utilized in this facility. Protective clothing was not worn by employees, nor was it supplied by management. Protective clothing requirements were not reviewed as management felt adequate protection was provided to workers through the use of shields and mechanical guards installed on the machinery. Workers were satisfied with the protection provided to them without the use of protective clothing.

II. Survey Representatives' Observations and Comments

The shop was very new, and was very clean, quiet, and well lighted. Mechanical hazards existed in the form of flying metal particles from grinding, cutting, and forming equipment. The manufacturing of the company's products included the following operations: cutting, drilling, punching, shaping, grinding, machining, welding, and heat-treating. The production process included development of the part from the drafting board to complete assembly, packaging, and delivery. There did not appear to be any requirement for protective clothing in this shop as the combination of automation and effective machine guarding adequately isolated the workers from hazards.

III. Photography

No photography was permitted in this facility.

IV. Conclusions

Operating practices relative to personal protection incorporated full use of machine guarding and automation. This practice appeared adequate to provide a satisfactory degree of personal protection for the workers. The Survey Representative agreed with the workers and management that there were no requirements for protective clothing.

SURVEY AREA NO. 5
ON-SITE SURVEY NARRATIVES

Company Code: 5-1 SIC Number 2911
Date of Visit: 12/4/73
Industrial/Occupational Area: Oil Refining
Hazards Observed: Mechanical, Chemical, Thermal,
Electrical

I. Company Summary

This was a large company employing 1700 people engaged in the production of petroleum products. The production was a continuous automatic process. Pipe connections, disconnections, and maintenance functions were the only manual operations observed. Protective clothing wear was required, with it being supplied and maintained by the company. The maintenance program consisted of periodic inspections and replacement of worn items. The clothing requirements were reviewed by the Safety Department through reviews of safety and industry periodicals and consultations with protective clothing manufacturers. The protective clothing utilized at the facility did not cause added risk due to design. Interviews with workers in the refinery were not permitted, therefore workers comments regarding protective clothing were not available.

II. Survey Representatives' Observations and Comments

The refinery's facilities were well laid out and designed, lighting levels were adequate, and noise levels were acceptable in most areas with the exception of the furnaces which had high noise levels. Thermal hazards were encountered at the heat exchangers, fractionating towers and associated piping runs. Mechanical hazards were found in climbing, working in high places, and handling materials. Hazards of a chemical nature were found in chemical handling, storage, and maintenance facilities. Electrical hazards were encountered throughout the plant. At this refinery, crude oil arrived by barge and was off-loaded into storage tanks. The crude oil was then pumped through heat exchangers, where its temperature

was raised to 400° F. From the heat exchangers, the oil flowed into fractionating towers where it was heated to 700° F. Vapors of different boiling point rise to various heights in the towers, where they are drawn off. Gasoline is drawn off at the upper sections of the tower. The gasolines undergo further processing and chemical purification while corrosion inhibitors are added. The gasolines and petroleum distillates are finally shipped for marketing. The Survey Representative felt the protective clothing provided to workers was adequate to meet their needs. However, as worker interviews were prohibited by management the Representative's evaluation was speculative.

III. Photographs

Photography was not permitted at this facility.

IV. Conclusions

The protective clothing practice, employed at this refinery, indicated a keen awareness of personal protection needs. Every attempt was made to keep pace with the state of the art of protective clothing. The inventory of items available to workers was such that no suggestions for additions could be made by the Survey Representative.

Company Code: 5-2 SIC Number 2911
Date of Visit: 12/5/73
Industrial/Occupational Area: Petroleum Refining
Hazards Observed: Mechanical, Thermal, Chemical,
Electrical

I. Company Summary

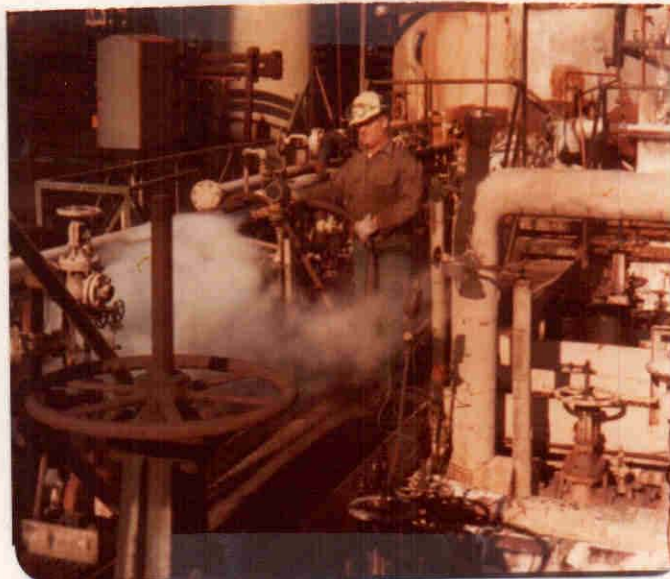
This refinery produced a full line of petroleum products from Eastern crude base. Over 260 people were employed by this highly automated facility. Special-purpose protective clothing was supplied by the company. One ensemble consisted of a one-piece, plastic-coated work suit, gloves, boots, and head cover for tank cleaning and repairs. Another ensemble was a modified fire-fighters aluminized suit and hood for hot furnace work. There was no general protective clothing program in effect at the facility. The special-purpose clothing is maintained by the company's tool crib and Safety Department. Management and a safety committee periodically reviewed clothing requirements. Plans have been made to provide "Nomex" two-piece work suits to all employees. The suits with accessories available such as hard hat, safety glasses, and safety shoes should provide sufficient personal protection to all employees. Protective clothing provided by this company appeared not to increase risks to workers from its design. Employees interviewed seemed well satisfied with the special-purpose ensembles and accessories provided them, and felt no need for additional protective clothing in any form or for any purpose.

II. Survey Representatives' Observations and Comments

Lighting and ventilation at the facility was excellent. Noise in some areas was excessive, especially in the construction areas where a section of the refinery is undergoing overhaul by contractors. Chemical and thermal hazards were the most common and potentially dangerous in the operations of this facility. Mechanical and electrical hazards were observed in both the receiving docks and refinery area. Protection against all these hazards was provided through the use of mechanical guards, procedural operating steps, and

accessory personal protection equipment such as gloves, face shields, helmets, boots, and warning devices. Both the thermal cracking and catalytic refining processes were used at this refinery to convert crude oil into propane, butane, cyanogen, naphtha, benzene, and other petroleum products. The process begins as crude oil is unloaded from barges and ships, pumped through heat exchangers, where its temperature is raised 400° F, and pumped into the hot cracking towers. The oil is heated in the towers to approximately 700° F. At this time, almost 80 percent of crude oil has vaporized and started to fractionate. Vapors with different boiling points rise to different levels of the tower where they are continuously drawn off. The unfractionated residue, which is Bunker C fuel oil, is drawn off from the bottom. Most of the products undergo further processing and chemical purification. These operations provide improvements in color, octane, purity, odor, and chemical content. After anti-oxidents and corrosion inhibitors are added, the products are shipped to markets. The workers' comments relative to protective clothing were to the effect that there were no additional requirements. The Survey Representative felt these comments were not based on fact but, rather, based on the employees' personal comfort and convenience.

III. Photographs



Construction worker using high pressure steam hose to loosen asbestos insulation from pipe during refinery overhaul. (Note lack of thermal protection).

IV. Conclusions

Current protective clothing practices in the area of special-purpose ensembles were considered adequate. The implementation of the proposed "Nomex" work clothing program should enhance worker protection in other areas of the refinery, and should satisfy the major safety clothing requirements.

Company Code: 5-3 SIC Number 2911
Date of Visit: 12/6/73
Industrial/Occupational Area: Petroleum Refining
Hazards Observed: Mechanical, Chemical, Thermal,
Radiological

I. Company Summary

This refinery employed 400 workers in the operation of its basically automated facility. The refinery produced approximately 100,000 barrels per day of petroleum products. Such products as propane, butane, cyanogen, naphtha, benzene, gasoline, and fuel oils were produced by thermal or catalytic cracking procedures. Hazards in the mechanical, electrical, and radiological areas were either isolated from the worker, or identified through the use of warning devices or placards. Protective clothing is required wear for employees and is provided and maintained by the company. Requirements for protective clothing were reviewed by local and corporate Safety personnel and through Safety Association meetings. The only article of protective clothing that could add risk from design was the full face mask used with an emergency self-contained suit. Complaints had been made by workers to the company Safety Department of visibility restrictions due to the face mask's design. There are other suitable and less vision-restricting face masks that can be used with the ensemble. The replacement of the present face mask with one of these would eliminate the problem. Otherwise, employees expressed satisfaction with the protective clothing provided at this facility.

II. Survey Representatives' Observations and Comments

This was a fairly large, older refining facility with modernization efforts being undertaken throughout the entire complex. Noise levels from the construction efforts and refinery operations were very high. Lighting and ventilation, other than that found in the newer structures, was very poor. Extremely heavy construction equipment traffic contributed to the hazards observed in the area. Mechanical, chemical, thermal, electrical, and radiological hazards were found in the refinery. Vapors, fumes, hot liquids, radiological tracing devices,

heights, moving equipment, and electrical equipment comprised the main source of hazards observed. Both thermal and catalytic refining processes were employed in production of petroleum products. The processes observed were similar to those of other refineries surveyed. Most hazard safeguarding was done by mechanical or procedural means. The workers' statements as to the adequacy of their clothing was felt to be correct by the Surveyor.

III. Photographs



Refinery workers on structure changing defective valve.

IV. Conclusions

The current protective clothing practices of this company appear practical and sufficient to provide adequate protection against hazards encountered in this industry. It was felt, however, by the Surveyor that there would be a significant improvement in workers' odds of survival in the event of flash fires if a general work uniform of fire-resistant clothing was provided. This plan was under consideration by the company at the time.

Company Code: 5-4 SIC Number 3221
Date of Visit: 12/7/73
Industrial/Occupational Area: Glass Container Manufacturing
Hazards Observed: Mechanical, Chemical, Thermal,
and Electrical

I. Company Summary

This large manufacturing company employed 3,500 people in the manual and automatic production of glass containers. Mechanical hazards in the form of moving machinery and equipment, conveyors, manufacturing equipment, and structural devices were present throughout the plant. The entire torso, head, eyes, face, arms, hands, legs, and feet were exposed to the mechanical hazards referenced. The same information is generally applicable to chemical, thermal, and electrical hazards; however, protective clothing was not worn for many of the hazards encountered in this plant. Protective clothing was required and supplied by the company in the areas where thermal and chemical hazards existed. The protective clothing maintenance program was the responsibility of the safety and tool crib personnel. The program involved repair or replacement of various articles of clothing as required. The protective clothing requirements of both maintenance and manufacturing operations were periodically reviewed by the Safety Department and the company management. Protective clothing worn in this plant did not contribute to risk due to its design. The company did not utilize many of the safety and personal protective clothing items or accessories currently available from commercial sources. Cut-resistant sleeves and gloves would eliminate many of the lacerations now suffered by assembly, inspection, and packaging personnel. Employees considered the protective clothing available to them to be adequate and satisfactory in all respects.

II. Survey Representatives' Observations and Comments

The factory complex consisted of two facilities. One is ultra-modern, well lighted and ventilated, and almost devoid of irritating noise. The older factory is far below current structural, lighting, ventilation,

and noise standards. Production in the old factory is much less than that in the new, and the operating problems, compared to the new plant, appear much more numerous. Mechanical, chemical, thermal, and electrical hazards exist throughout this complex. Grinding and mixing machines, automatic mold machines, industrial trucks, rail cars, cranes, conveyors, and grinders make up the majority of mechanical hazards found in this industry. Furnaces, lehrs, cutting and welding equipment, and hot-forming machines contribute most of the thermal hazards. Mixing machines, storage and batching areas, kiln charging, hydrofluoric acid wash, etching equipment, and decorating paints comprise the major chemical hazards. Electrical hazards were encountered in the motor controls, switches, and in some lighting fixtures, and appliances. Most of the hazards were controlled through isolation, guards, shields, ventilators, limit switches, automatic shutoffs, and procedural steps. The glass-container manufacturing operations start with the mixing of the basic raw materials (crushed glass, lime, silica sand, phosphate, antimony oxide, arsenic trioxide, silica) and the charging of predetermined amounts of these into furnaces. When the mixture reaches the right temperature and consistency, it is gathered and moved into molds shaped in the form of the end product. The product is automatically blown, through the use of compressed air. After removal from the molds, the product is tempered in lehrs as it moves on a conveyor. The temperature is gradually lowered and the product is tempered to specification. Grinding, polishing, acid etching, and decorating are performed as required. The glassware is then inspected, packaged, and shipped. The employees' evaluation of the protective clothing would be correct if it were not for the lack of adequate protection available to glass-inspection and -packing personnel. These workers should be provided gloves, armllets, and aprons capable of giving maximum protection against dangerous cuts.

III. Photographs



Employee cutting fire brick during furnace refurbishment

IV. Conclusions

The current practice of providing and maintaining protective clothing for employees working in dangerous areas is satisfactory; however, there is an area where the issue of additional protective clothing should be considered. Accomplishment of this would improve the safety of workers involved in inspection and packing operations.

Company Code: 5-5 SIC Number 3229
Date of Visit: 12/7/73
Industrial/Occupational Area: Pressed and Blown Glass and Glassware
Hazards Observed: Mechanical and Thermal

I. Company Summary

This small specialty glass molding company employed 60 artisans and technicians in the manual production of custom glass objects. Protective clothing was not supplied, required, or maintained by the company, nor was it worn by employees of this company. There were periodic reviews of the protective clothing requirements of this division by the corporate Safety Manager; however, there was no evidence of official action toward local implementation of such a program. There is adequate protection available through commercial sources for the thermal and cutting hazards encountered in this industry. Fire-retardant clothing, reflective face shields, and asbestos gloves would satisfy the requirements found in the thermal hazard areas, and cut-resistant sleeves, gloves, and aprons would supply adequate protection against the cutting hazards. The workers at this plant were satisfied that their general work clothing was adequate protection against hazards originating in this type of work.

II. Survey Representatives' Observations and Comments

This factory was made up of a group of small, old wood and metal buildings located some distance from the main industrial manufacturing complex. The lighting and ventilation in this facility is, to a great degree, dependent on the weather conditions. Noise presents no problem, as most of the operations are manual and not powered. Hazards observed were basically of the mechanical and thermal types found in material handling, kiln charging, glass grinding and cutting, lehrs, small furnaces, and glass-forming and -blowing operations. Plant equipment, molds, conveyors, frames, cooling tables, crushers, and torches also contribute to the general hazards present in this operation.

The manufacturing process commences with the mixing of crushed glass, lime, silica sand, phosphate, antimony oxide, arsenic trioxide, silica fluorides, and borox, and the charging of the mixture into gas furnaces. When the mixture reaches the right temperature and consistency, it is collected and passed to a blower who uses compressed air and breath action to form the article. Accessory items, stems, and handles, may be added at this time. The article is then passed on to a finisher who further forms the piece using a wrought-iron tool. The object is placed in an endless metal conveyor which passes under a series of torches; this permits slow cooling. This device is called a lehr; it improves the hardness and durability of glass. Certain lots of glassware may be further cut and etched. Designs are drawn over a wax, inked paper sprayed with an acid-proof coating, conveyed to an acid bath and automatically dipped, rinsed, inspected, and packaged. Fine abrasive wheels and sandblasting is used to perform other cutting or etching if desired. The workers' comments, indicating satisfaction with the use of their own clothing in the plant and no desire to add or replace these with company-supplied protective clothing, appeared to be completely founded on comfort, with no regard for personal protection. The provision of protective clothing such as fire- and heat-retardant gloves, sleeves, aprons, and leggings, and cut-resistant sleeves and gloves would surely reduce or eliminate most of the injuries occurring in this facility. This plant's lack of protective shields, guards, and equipment, as well as the complete absence of protective clothing, becomes more apparent when you are able to compare its conditions with those of the adjacent very modern glass factory.

III. Photographs

Photography was prohibited in this plant.

IV. Conclusions

Current practices of this factory do not include provisions for either basic mechanical guards or protective clothing. The application of the above protective measures in high hazard areas would provide an adequate degree of personal protection for all of the workers.

SURVEY AREA NO. 6
ON-SITE SURVEY NARRATIVES

Company Code: 6-1 SIC Number 1021
Date of Visit: 10/16/73
Industrial/Occupational Area: Metal Mining
Hazards Observed: Electrical, Mechanical

I. Company Summary

This was a small company employing eight people engaged in the mining of copper ore. The operations were both manual and semiautomatic. Protective clothing was not required, supplied, or maintained by the company, and clothing requirements were not reviewed on a periodic basis. A two-piece, snug-fitting work suit, hard hat, safety glasses, gloves, and safety boots should be furnished workers in this mine.

II. Survey Representatives' Observations and Comments

This mine was in the process of being rejuvenated. It was neither organized nor well lighted and the ventilation was almost nonexistent. Noise levels were very high. The mechanical hazards were encountered in falls, strains, working in confined places, falling rock, and handling equipment. The electrical hazards were present in motors, wire runs, and terminations. The ore body is reached by sinking a shaft. Development continues by driving cross-cuts or raises throughout the ore body. Ore rock is broken out of its parent rock formation by drilling and blasting with explosives. The rock is loaded onto carts and hauled to a shaft where it is hoisted to the surface for further processing.

III. Photographs

Photography was not permitted in this mine.

IV. Conclusions

The safety practices at this facility included the use of clean, coated asbestos sheets and prepackaged, coated, braided asbestos to eliminate dust and fiber hazards of asbestos. Electrical, mechanical, and thermal machine guards, along with the high degree of automation, effectively eliminated the mechanical hazards that would normally be encountered in a plant of this type. The Survey Representative felt there were no requirements for protective clothing at this facility.

Company Code: 6-2 SIC Number 1031
Date of Visit: 10/16/73
Industrial/Occupational Area: Lead and Zinc Mining
Hazards Observed: Mechanical and Electrical

I. Company Summary

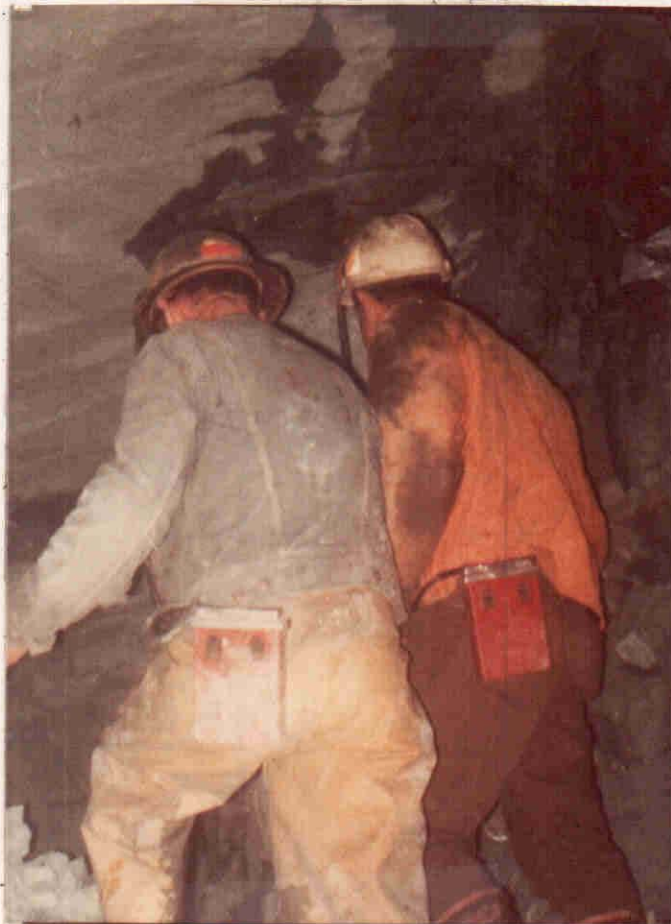
This company employed 360 people in the manual shaft mining of lead, copper, zinc, gold, and silver. The machine shop, welding shop, and electrical repair facility personnel used hides (sleeves, aprons, gloves, and leggings), electrician's gloves, and regular work gloves as required by the job. Protective clothing was not worn for each specific hazard. Electricians, carpenters, and construction personnel were not supplied adequate protective clothing. Protective clothing such as welders' ensembles and wet suit wear, was required and supplied by the company. Maintenance was accomplished by the tool crib, repairing or replacing clothing and accessories as necessary. Protective clothing requirements were not periodically reviewed. The clothing now in use in this mine has been standard for the past 20 years and, in the opinion of the Safety Manager, provides adequate worker protection. The protective clothing worn by personnel at this mine did not contribute to workers' risk due to its design. The addition of arm protectors and kickback, impact, and cut-protection aprons and vests to the mine's current protective clothing inventory would provide a better degree of personal protection to the workers. Employees, upon being questioned, voiced their complete satisfaction with the present supply of protective clothing.

II. Survey Representatives' Observations and Comments

This mine was approximately 30 years old, large, and well lighted and ventilated. There was a high noise level in the repair shops and a sound level throughout the mine approximately equal to that found in home construction. Hazards in the mechanical area included those resulting from moving equipment, hoist operations, timber construction, and haulage equipment. Thermal hazards were found in the welding and forging operations, and electrical hazards in the mine shafts were found in

elevator operations and in the power generation station. Mining operations of this sort begin with the sinking of a shaft or tunneling through a mountain-side into the ore-bearing rock. The mine is developed by drilling shafts, cross-cuts, and stopes throughout the ore deposit. Ore is blasted out of the rock, loaded onto transporters, carried to the ore rail cars, and hauled directly to the outside. The ore is then loaded into gondolas for delivery to the crusher and processing mill. Tasks include drilling; blasting; constructing support structures; laying rail; stringing electrical and communication wires; laying water, air, and fuel lines; and installing elevators, switches, motors, and other electrical devices. These tasks, with the constant maintenance and repair requirements of the mine, result in an extensive area of potential hazards. The workers' comments indicating their satisfaction with the protective clothing provided by the company appeared sincere; however, this opinion appeared to result from a general lack of knowledge concerning the commercial availability of miners' protective apparel.

III. Photographs



Miners in tunnel during lead and zinc mining.

IV. Conclusions

The protective clothing practices in this mine were typical of the industry. The routine use of the old and tried with only an occasional review of new protective clothing designs was a prevalent practice. The suggested protective clothing additions would give a much greater degree of hazard protection to workers involved in this operation.

Company Code: 6-3 SIC Number 1094
Date of Visit: 10/17/73
Industrial/Occupational Area: Metal Mining
Hazards Observed: Radiological, Mechanical

I. Company Summary

This was a small company employing 10 people engaged in mining uranium and vanadium ore. The operations were manual. Protective clothing was required, supplied by the company, and worn. The maintenance program consisted of periodic inspections, with items replaced when worn out. The design of the protective clothing now in use did not cause added risk. At the time, the company did not have a program where the protective clothing needs were periodically evaluated and revised. There were no recommendations for items of protective clothing which should be furnished or developed for this process. The workers evaluated the protective clothing presently furnished them as adequate.

II. Survey Representatives' Observations and Comments

This was a poorly lighted, poorly ventilated mine with a high noise level. The mechanical hazards were encountered in falls, falling rocks, explosions, hauling and hoisting equipment. The ore vein is reached by sinking a shaft or driving an adit. By driving drifts, cross-cuts, or raises throughout the ore body, development continues. The ore rock is broken out of its parent rock formation by drilling and blasting with explosives. Ore rock is then loaded into cars and hauled to a shaft where it is hoisted to the surface. The Survey Representative was informed that the workers complained of their protective clothing being loose fitting; too hot, causing early stages of heat exhaustion; and of too-heavy material. The Representative recommends the substitution of clothing made from lighter material be considered by management.

III. Photographs



Typical uranium miners of small mine. (Note respirator around neck of miner on left and heavy dust deposits around noses of other miners without respirator.)

IV. Conclusions

The protective clothing practices employed at this mine are abreast of the present state of the art. Torso protection is provided as well as hard hats, safety glasses, and respirators. The workers rated the protective clothing presently provided as "adequate." The Survey Representative rated the clothing as "Available but Inadequate" due to the complaints the workers expressed. When work becomes heavy, the workers remove portions of the clothing as it becomes too hot to wear comfortably.

Company Code: 6-4 SIC Number 1044
Date of Visit: 10/17/73
Industrial/Occupational Area: Silver and Copper Ore Mining
Hazards Observed: Mechanical

I. Company Summary

This mine was a fairly small operation, employing 10 people in the manual extraction of silver and copper ore. Worker protection was provided primarily by the mechanical structure, guards, and life-support systems of the mine. Secondary protection against the mechanical hazards was provided in the form of personal protective equipment and clothing. Protective clothing was not worn for each hazard, but some protective clothing was required and supplied by the company. There was no periodic maintenance of protective clothing, only replacement of items as they were worn out. Protective clothing needs of this mine were not periodically evaluated or revised. The protective clothing supplied personnel at this mine was loose fitting, contributing to the risk of injury by entanglement in moving machinery. There are several types of waterproof clothing on the market that are better-fitting and -ventilated than that now in use, and would provide better protection. Workers insisted the clothing furnished at this mine was adequate for their protection, and any additional clothing would simply create a hardship on the miners.

II. Survey Representatives' Observations and Comments

The general work environment in this mine left much to be desired. The shafts were very steep, muddy, rocky, and unlighted. The ventilators supplied only a small portion of the mine with clean air. Numerous air-driven pumps which are required to control water seepage added to the noise created by the diesel engines of the mine equipment, and ventilating fans. Operating equipment, shaft conditions, ladders, catwalks, water pools, and blasting processes comprised the major mechanical hazards associated with this mine. The mine consists of several horizontal shafts, sunk several hundred feet deep, at approximately 30 degrees into the side of a mountain. The mine is

wet, having a high seepage rate and a poor pumping network. The mine is worked by drilling and blasting rock to get to the ore. This results in shafts, cross-cuts, and stops at several levels in the ore deposit. Ore is blasted out of the rock, slushed down the stopes, and loaded onto diesel trams for transporting up the incline. The ore is dumped onto the stockpile for later transportation to the crushing mill. Employees expressed complete satisfaction with the protective clothing provided by the company. Their statements regarding the clothing appeared patterned by custom, not practicality. The protective clothing supplied workers in this mine is too heavy, hot, and bulky. Replacement with lighter, better-ventilated, and more closely fitting clothing would provide much better personal worker protection.

III. Photographs



Miner operating diesel tram at portal of mine.

IV. Conclusions

The current practice of wearing heavy, bulky, and poorly ventilated protective clothing results in rapid worker fatigue, the risk of entanglement, and worker clumsiness. The clothing replacement recommended in Section II would significantly improve the personal protection of workers at this mine.

Company Code: 6-5 SIC Number 1094
Date of Visit: 10/20/73
Industrial/Occupational Area: Uranium/Vanadium Mining
Hazards Observed: Thermal, Electrical, Radiological,
Chemical, and Mechanical

I. Company Summary

This ore-refining mill employs 125 men in the crushing and processing of uranium and vanadium ores. Most of the operations are automated or involve very little manual effort. The body areas requiring protection range from total in the acid storage and metering area, to none in the crusher control room. Intermediate exposures include face, torso, extremities, and combinations of the above. Protective clothing is worn for each specific hazard. Protective clothing is required, supplied, and maintained by the company. Maintenance is performed by the employee to whom the clothing is assigned; irreparable clothing is replaced by direct issue. More sophisticated clothing and accessories are maintained and repaired either under the safety supervisor's direction or by the supplying manufacturer. Protective clothing requirements are periodically reviewed by a steering committee composed of management and union personnel. The protective clothing used in acid transfer and metering tasks is constructed of rubber or neoprene-coated fabrics. These ensembles trap heat and have been known to contribute to users' heat prostration. Clothing currently utilized at this mill provides adequate protection. The problem with heat prostration resulting from wearing the coated ensembles can be corrected through procurement of ventilated clothing, or reducing the length of time clothing is worn during hot weather. Employees expressed dissatisfaction with the acid-handling ensembles for the reasons stated. Other clothing supplied workers at this mill appeared to meet workers' approval.

II. Survey Representatives' Observations and Comments

This mill has been in operation for approximately 20 years and some of the equipment and structures are beginning to show evidence of wear and deterioration.

Lighting is acceptable, noise tolerable, and ventilation adequate. Most of the hazards encountered in the area are either isolated, shielded, guarded, or identified in an effort to protect the employee from injury or death. Thermal hazards exist in the form of boilers, roasting ovens, hot chemicals, cutting and welding equipment, and hot exhaust systems. Electrical hazards are found in switching systems, lighting, machinery controls, and wiring conditions. Radiological hazards are found in some phases of the uranium processing operation and in the hydrate transference to carriers. The major chemical hazards are located in the storage, mixing, and metering of sulfuric acid, ammonia, caustics, and soda ash. The milling operations involved in processing uranium and vanadium begin with the rough crushing of ore delivered directly from the mines. The rough ore is partially separated from the common rock and dirt and conveyed to a fall mill where the ore is reduced to a finer form. This material is mixed with water to form a slurry which is passed over gravity separators where light barren rock is washed away as the heavier ore sinks. The improved ore slurry then passes into open vats and tanks where chemical agents separate various ores by flotation or suppression. The uranium ore slurries are then thickened by removing excess water; they are then piped into rail tank cars for shipment to ore foundries. The vanadium slurry is dried by passing it through a rotary kiln; the resulting cakes and powder are loaded onto cars and trucks for shipment to refining companies. The employees' comments regarding protective clothing were reviewed against the survey information and found completely accurate. There are no recommendations for additional protective clothing in this industry, only suggestions for improving the service of the ensembles in current use.

III. Photographs



View of open ore slurry vats for vanadium processions.

IV. Conclusions

The current practice aimed at employee protection seem adequate at this mill. Any suggestions for improving protection through the use of protective clothing would be centered on the comfort of the workers utilizing the clothing.

Company Code: 6-6 SIC Number 1041
Date of Visit: 10/19/73
Industrial/Occupational Area: Gold Ore Mining
Hazards Observed: Mechanical and Thermal

I. Company Summary

This is a manually operated placer mine employing five people in the separating of gold and other valuable metals from crushed ore. The front torso, face, and extremities require protection during welding and cutting operations; the torso and extremities require protection during some mining operations. Protective clothing is not required, supplied, or maintained by this company. Protective clothing is not worn, nor are protective clothing requirements periodically reviewed by any one in this organization. Employees indicated they felt there was no requirement for protective clothing of any sort in this work environment.

II. Survey Representatives' Observations and Comments

This mine is located at the base of a very steep mountain. The entire operation is performed outdoors during daylight hours. The noise produced by the generators, crusher, earth-moving equipment, and compressor was noticeable, but did not pose a real problem. Thermal hazards exist in the welding area, and mechanical hazards exist in the mining and crushing operations. The placer mining operation involves exposing the ore by stripping off the overburden with a bulldozer. A power loader is used to transfer the material into a crusher where it is reduced to the size desired. The crushed ore is moved by conveyor belt to a shaker table where the mixture is mechanically separated. The gold and other valuable metals are then piped off the table into containers. These containers are forwarded to processors for reduction of the yield into pure elements. The employees mentioned that there was no need of any protective clothing in this industry; however, it was felt by the Surveyor that a welding protective ensemble should be made available to the welders on site. The addition

of this item would provide adequate protection against the hazards normally associated with cutting and welding.

III. Photographs



Place miner at site. (Note lack of protective clothing and use of hard hat accessory.)

IV. Conclusions

The current safety practices in this mining operation do not include the use of protective clothing. The addition of the protective clothing ensembles for welders is recommended to provide protection for the cutting and welding mechanics. Protective clothing was not made available to workers at this facility.

Company Code: 6-7 SIC Number 1094
Date of Visit: 10/18/73
Industrial/Occupational Area: Uranium and Vanadium Ore Mining
Hazards Observed: Mechanical, Electrical, and Radiological

I. Company Summary

This mine employs six people in the manual extraction of uranium and vanadium ore from a heavy-bearing mountain range. The entire body is exposed at some time to hazards in the various phases of this mining operation. Protective clothing is not required, supplied, or worn for each specific hazard in this mine. Protective clothing is not periodically maintained by this company, but is replaced when damaged beyond repair. The requirements for protective clothing are not periodically reviewed. Protective clothing in use at this mine does not contribute risk due to design, and provides the protection expected of this class of clothing. Employees were satisfied with the protection provided by the slickers they wore, but complained of their being too hot for extended use.

II. Survey Representatives' Observations and Comments

This mine's condition was found to be well above the others surveyed in this area. There was very little noise involved in the mining operations, lighting was adequate in the mine and excellent in the maintenance area, and ventilation was adequate throughout the mine. Mechanical hazards such as moving equipment, falling rocks, and timbers were observed throughout the mine and maintenance area. Open switch stations, and exposed wiring and light fixtures comprised the major electrical hazards. Radiological hazards in the form of radon and its particulate daughters existed throughout the mine. The uranium mining commences with construction of a portal into the ore-bearing rock and earth. The mine is further developed through drilling and cross-cutting through the ore deposit. Uranium ore is blasted out of the rock, loaded onto mine transportation equipment, and hauled out to the stockpile. The ore is then loaded

by diesel-powered tractors onto tandem dump trucks for delivery to the mill. Employees felt the protective clothing supplied at this mine to be adequate but complained of its being too hot for comfortable work. Their opinion of the clothing appears logical and justified. The two-piece rain suit and rubber boots worn in some portions of the mine are extremely heavy and hot. The particular suit worn lacks adequate ventilation flaps and is constructed of a very heavy impermeable material. It appears the suits were purchased with durability rather than comfort in mind. Lighter, better ventilated suits and boots are readily available on the market. Replacement of the heavy suits with the recommended lighter ones would probably increase utilization and reduce worker fatigue to a great extent. The major personal protection afforded workers in this mine is done through the use of shields, guards, lights, warning devices, isolation, and ventilators. Protective clothing serves very little purpose in this operation other than safeguarding miners' health by protecting them against the ever-present moisture and cold.

III. Photographs



Miner riding mine car into mine. (Note heavy raingear and respirator around neck.)

IV. Conclusions

The current practice of providing mechanical and procedural protection to workers, and the use of foul-weather clothing in this cold and wet environment appears adequate for this particular operation. The use of lighter, better-ventilated foul-weather clothing would probably improve utilization and lessen worker fatigue. The survey indicated a lack of users' acceptance due to the heaviness and uncomfortableness of the clothing supplied.

DATA TABLES
SURVEY AREA NO. 1

TABLE I

SURVEY AREA 1

Industrial Areas Showing Related Occupational Areas

Standard Industrial Classification Short Title	S. I. C. Code	Company Code	Related Occupational Areas*																	
			A	B	C	D	E	F	G	H	I	J								
Welding Repair	7692	1-1				X														
Water Supply	4941	1-2																		
Retail Bakeries	5462	1-3																		
Baking & Selling Machinery, Except Electrical nec**	3599	1-4				X				X										
Plating & Polishing	3471	1-5					X			X										
Fabricated Plate Work (Boiler Shops)	3443	1-6					X			X										
Boat Building & Repairing	3732	1-7					X			X										
Canned & Cured Seafoods	2091	1-8																		X
General Medical & Surgical Hospitals	8062	1-9																		
Welding Repair	7692	1-10							X	X										
Aircraft	3721	1-11							X	X										
Fertilizers, Mixing Only	2875	1-12																		
Retail Bakeries	5462	1-13																		
Baking & Selling																				
Crop Planting & Protection	0721	1-14																		X
Commercial Printing, Lithographic	2752	1-15																		X
Ornamental Nursery Products	0181	1-16																		
General Medical & Surgical Hospitals	8062	1-17																		X

TABLE I

SURVEY AREA 1 (Cont)

Industrial Areas Showing Related Occupational Areas

Standard Industrial Classification Short Title	S.I.C. Code	Company Code	Related Occupational Areas*																	
			A	B	C	D	E	F	G	H	I	J								
Paper Mills, Except Building Paper	2621	1-18																		X
Fabricated Plate Work (Boiler Shops)	3443	1-19				X			X											
Ship Building & Repairing	3731	1-20				X			X											X
Asphalt Felts & Coatings	2952	1-21																		
Commercial Testing	7397	1-22																		X
Laboratories																				
Ship Building & Repairing	3731	1-23				X			X											X
Bottled & Canned Soft Drinks	2086	1-24																		
Electrical Work	1731	1-25																		
Plating & Polishing	3471	1-26																		X
Industrial Inorganic Chemicals	2819	1-27																		
nec																				
Industrial Inorganic Chemicals	2819	1-28																		
nec																				
Industrial Buildings & Warehouses	1541	1-29																		
Frozen Fruits & Vegetables	2037	1-30																		X
Phosphate Rock	1475	1-31																		X
Fabricated Plate Work	3443	1-32																		X
(Boiler Shops)																				
Industrial Buildings & Warehouses	1541	1-33																		X

TABLE I

SURVEY AREA 1 (Cont)

Industrial Areas Showing Related Occupational Areas

Standard Industrial Classification Short Title	S.I.C. Code	Company Code	Related Occupational Areas*																	
			A	B	C	D	E	F	G	H	I	J								
Plating & Polishing	3471	1-34																		X
Plating Dry Wall Installation	1742	1-35																		
Heavy Construction nec	1629	1-36																		

- *A = Beryllium Operations
- B = Asbestos Operations
- C = Painting Operations
- D = Welding Operations
- E = Abrading & Buffing Operations
- F = Silica Dust Generating Operations
- G = Insecticide & Pesticide Spraying Operations
- H = X-ray Operations
- I = Bacterial Involvement Operations
- J = Heat Stress Involvement Operations

** = Not elsewhere coded

TABLE II

SURVEY AREA 1

Companies Surveyed Showing Product and Worker Population

<u>COMPANY CODE</u>	<u>S.I.C.</u>	<u>PRODUCT</u>	<u>TOTAL EMPLOYEES</u>
1-1	7692 3599	Welding and machine shop operations	40
1-2	4941	Public utility-water supply	25
1-3	5462	Retail bakery	4
1-4	2951	Asphaltic mixture for paving	7
1-5	3471	Sandblasting of metal parts	2
1-6	7692	Welding operations	18
1-7	3471 3479	Sandblasting Painting operations	25
1-8	2091	Canned seafood	60
1-9	8062	General hospital	100
1-10	7692 3599	Welding operations Machine shop operations	12
1-11	3721	Aircraft manufacturing	2400
1-12	5191	Agricultural chemicals	25
1-13	5462	Retail bakery	30
1-14	0721	Crop dusting & spraying	12
1-15	2752	Commercial printing, lithographic	7
1-16	0181	Nursery products	50
1-17	8062	General hospital	200
1-18	2621	Baker mill	750
1-19	3443	Metal fuel tanks	10
1-20	3731	Ship building & repairing	60
1-21	2952	Roofing materials	60
1-22	7397	Testing laboratory	22
1-23	3731	Ship building & repairing	300
1-24	2086	Bottled soft drinks	70

065

TABLE II (Continued)

<u>COMPANY CODE</u>	<u>S.I.C.</u>	<u>PRODUCT</u>	<u>TOTAL EMPLOYEES</u>
1-25	1731	Electrical construction	7
1-26	3471	Plating	15
1-27	2819	Industrial chemicals	17
1-28	2819	Industrial chemicals	15
1-29	1541	General building contractor	15
1-30	2037	Frozen fruit juices	600
1-31	2874	Phosphate fertilizers	400
1-32	3443	Water tanks, metal	8
1-33	1541	General building contractor	19
1-34	3471	Plating	8
1-35	1742	Drywall contractor	2
1-36	1629	Land reclamation	289

TABLE III

SURVEY AREA 1

PROTECTIVE CLOTHING POLICIES OF COMPANIES SURVEYED

<u>COMPANY CODE</u>	<u>S.I.C.</u>	<u>IS PROTECTIVE CLOTHING WORN</u>	<u>IS PROTECTIVE CLOTHING REQUIRED BY THE COMPANY</u>	<u>DOES THE COMPANY SUPPLY PROTECTIVE CLOTHING</u>
1-1	7692 3599	Yes	Yes	Yes
1-2	4941	Yes	Yes	Yes
1-3	5462	Yes	No	Yes
1-4	2951	No	No	No
1-5	3471	Yes	Yes	Yes
1-6	7692	No	Yes	Yes
1-7	3471 3479	No	No	No
1-8	2091	Yes	Yes	Yes
1-9	8062	Yes	Yes	Yes
1-10	7692 3599	Yes	Yes	Yes
1-11	3721	Yes	No	Yes
1-12	5191	Yes	Yes	Yes
1-13	5462	No	No	No
1-14	0721	No	No	No
1-15	2752	Yes	Yes	Yes
1-16	0181	No	Yes	Yes
1-17	8062	Yes	Yes	Yes
1-18	2621	Yes	Yes	Yes
1-19	3443	No	No	Yes
1-20	3731	Yes	Yes	Yes
1-21	2952	No	No	No

TABLE III

SURVEY AREA 1 (Continued)

<u>COMPANY CODE</u>	<u>S.I.C.</u>	<u>IS PROTECTIVE CLOTHING WORN</u>	<u>IS PROTECTIVE CLOTHING REQUIRED BY THE COMPANY,</u>	<u>DOES THE COMPANY SUPPLY PROTECTIVE CLOTHING</u>
1-22	7397	No	No	No
1-23	3731	Yes	Yes	No
1-24	2086	Yes	Yes	Yes
1-25	1731	No	No	No
1-26	3471	No	No	Yes, except boots
1-27	2819	Yes	Yes	Yes
1-28	2819	Yes	No	Yes
1-29	1541	No	No	No
1-30	2037	Yes	No	Yes
1-31	2874	Yes	Yes	Yes
1-32	3443	Yes	Yes	Yes
1-33	1541	No	No	No
1-34	3471	Yes	No	Yes
1-35	1742	No	No	No
1-36	1629	No	No	No

TABLE IV

SURVEY AREA I

COMPANIES SURVEYED SHOWING SURVEYOR'S RATING OF PROTECTIVE CLOTHING

<u>COMPANY CODE</u>	<u>S. I. C.</u>	<u>SURVEYOR'S RATING</u>	<u>REMARKS OR COMMENTS</u>
1-1	7692 3599	Available and adequate	
1-2	4941	Available and inadequate	Waders instead of boots with slicker over the waders so that heavy gases will not become trapped in pockets next to the skin.
1-3	5462	Available and inadequate	Need protective clothing to protect against hot grease splatters and around baking ovens.
1-4	2951	Not available	Not required.
1-5	3471	Available and inadequate	Protective clothing being used in this operation is too heavy and hot and very trying to the user. It does provide good body protection. A lighter, air-cooled suit would make his work much easier and less detrimental to his health.
1-6	7692	Not available	Fire-retardant coveralls, goggles, face shields, safety shoes, welding helmet, and gloves were protective clothing lacking in this operation. Company didn't want to go to the expense.
1-7	3471 3479	Not available	Protective clothing was not made available and even if it was available, employees would not wear any. Employees were not educated to hazards to which they were exposed.
1-8	2091	Available and adequate	
1-9	8062	Available and adequate	
1-10	7692 3599	Available and inadequate	Need some type of leg protection when welding in this operation.
1-11	3721	Available and inadequate	Painting operation needs respirators and coveralls for employees. In machine shop operation, protective clothing was available but not worn. In this company, protective clothing is not required but recommended. All employees should wear coveralls and safety shoes.

TABLE IV
SURVEYOR'S RATING (Continued)

<u>COMPANY CODE</u>	<u>S.I.C.</u>	<u>SURVEYOR'S RATING</u>	<u>REMARKS OR COMMENTS</u>
1-22	7397	No protective clothing available	
1-23	3731	Available and inadequate	Welders need some type of protective clothing on the torso and lower extremities of the body.
1-24	2086	Available and inadequate	Alkali solution is used to clean bottles. Possibly, employees could wear a rubber apron during this operation.
1-25	1731	No protective clothing available	"Inside electricians do not customarily utilize protective clothing," as stated by owner. Electricians could utilize linemen's ensemble as a means of protective clothing.
1-26	3471	Available but inadequate	No safety clothing regulation in this company. Company had no real interest in providing or maintaining. Employees were not educated to the hazards they were exposed to.
1-27	2819	Available but inadequate	In this operation there is a definite need for complete body protection in the transfer of bulk hazardous chemicals (employees wore no protective clothing in this area).
1-28	2819	Available and inadequate Inadequate for following operations	In the transfer of liquid chemicals, employees wore rubber gloves, aprons, and respirators. More splash gear should be added to this such as face shields and protection for the lower extremities of the body.
1-29	1541	No protective clothing available	Protective clothing not recommended for this operation.
1-30	2037	Available and adequate	
1-31	2874	Available and adequate	
1-32	3443	Available and inadequate	Welders need protective clothing for torso and lower extremities of the body. Employees operating grinding machines should use face shields instead of goggles to protect the entire face.
1-33	1541	No protective clothing available	In this operation (construction), hard hats, safety shoes, eye protection, and gloves should at least be made available to the employees but are not. Employees feel that safety clothing would only get in the way.

TABLE IV
SURVEYOR'S RATING (Continued)

<u>COMPANY CODE</u>	<u>S.I.C.</u>	<u>SURVEYOR'S RATING</u>	<u>REMARKS OR COMMENTS</u>
1-34	3471	Available and lacks users' acceptance	In this operation (electroplating), a complete ensemble should be worn. The boots, aprons, gloves, and face shields that are available are used by only a very small portion of workers.
1-35	1742	No protective clothing available	Protective clothing not recommended for this operation.
1-36	1629	None available	

TABLE IV
SURVEY AREA 1
COMPANIES SURVEYED SHOWING CLOTHING REVIEW POLICY

<u>COMPANY CODE</u>	<u>S. I. C.</u>	<u>ARE PROTECTIVE CLOTHING REQUIREMENTS PERIODICALLY REVIEWED</u>	<u>REVIEWED BY</u>
1-1	7692 3599	Yes	Foreman & safety engineer
1-2	4941	Yes	Plant manager
1-3	5462	No	-
1-4	2951	No	-
1-5	3471	Yes	By owner
1-6	7692	Yes	By owner
1-7	3471 3479	No	-
1-8	2091	No	-
1-9	8062	Yes	Chief technologist
1-10	7692 3599	No	-
1-11	3721	No	-
1-12	5191	No	-
1-13	5462	No	-
1-14	0721	No	-
1-15	2752	No	-
1-16	0181	No	-
1-17	8062	Yes	Chief radiologists
1-18	2621	Yes	Safety supervisor
1-19	3443	No	-
1-20	3731	Yes	Management
1-21	2952	No	-
1-22	7397	No	-
1-23	3731	Yes	Safety Department
1-24	2086	Yes	Plant manager

TABLE V
 SURVEY AREA 1 (Continued)
 ARE PROTECTIVE CLOTHING
 REQUIREMENTS
 PERIODICALLY REVIEWED

<u>COMPANY CODE</u>	<u>S.I.C.</u>	<u>PERIODICALLY REVIEWED</u>	<u>REVIEWED BY</u>
1-25	1731	No	-
1-26	3471	No	-
1-27	2819	Yes	Plant supervisor
1-28	2819	No	-
1-29	1541	No	-
1-30	2037	Yes	Safety supervisor
1-31	2874	Yes	Safety director
1-32	3443	Yes	By owner
1-33	1541	No	-
1-34	3471	No	-
1-35	1742	No	-
1-36	1629	No	-

TABLE VI
 SURVEY AREA 1
 COMPANIES SURVEYED SHOWING ADDED RISK OF CLOTHING

<u>COMPANY CODE</u>	<u>S. I. C.</u>	<u>DOES CLOTHING CAUSE ADDED RISK</u>
1-1	7692 3599	No
1-2	4941	Yes, boots, entrap heavy gases
1-3	5462	No
1-4	2951	No
1-5	3471	No
1-6	7692	No
1-7	3471 3479	No
1-8	2091	No
1-9	8062	No
1-10	7692 3599	No
1-11	3721	No
1-12	5191	No
1-13	5462	No
1-14	0721	No
1-15	2752	No
1-16	0181	No
1-17	8062	No
1-18	2621	Yes, working in the area of steam dryer in paper mill. Workers' hands have been trapped by gloves when dislodging jam.
1-19	3443	Yes, employees using gloves at a rolling machine
1-20	3731	No
1-21	2952	No
1-22	7397	No
1-23	3731	No

TABLE VI
 SURVEY AREA 1 (Continued)

<u>COMPANY CODE</u>	<u>S.I.C.</u>	<u>DOES CLOTHING CAUSE ADDED RISK</u>
1-24	2086	No
1-25	1731	No
1-26	3471	No
1-27	2819	Yes, face shield traps chemical vapors.
1-28	2819	No
1-29	1541	No
1-30	2037	No
1-31	2874	Yes, when assigned to a particular area which is very confining.
1-32	3443	No
1-33	1541	No
1-34	3471	No
1-35	1742	No
1-36	1629	No

TABLE VII
 AVAILABLE PROTECTIVE CLOTHING vs. HAZARD
 SURVEY AREA 1
 FIELD SURVEY

COMPANY CODE	S.I.C.	SPECIFIC HAZARD	PROTECTIVE CLOTHING (TYPE)	USERS' ACCEPTANCE	REMARKS
1-1	7692 3599	Mechanical, Thermal, Electrical	Full ensemble (gloves, jacket, apron, hood, goggles, leggings, helmet, sleeves, and coveralls)	Adequate	
1-2	4941	Chemical	Slickers, boots, air-fed masks (MSA), safety liners, and goggles	Adequate	
1-3	5462	Thermal	Apron (cotton)	Inadequate	
1-4	2951	Chemical	None	N/A	
1-5	3471	Mechanical, Chemical	Sandblast helmet, long- sleeved sweat shirt, safety boots, heavy rubber gloves, and work trousers	Available but Inadequate	Protective clothing workers' wear is heavy and hot. Need a lighter air-cooled suit.
1-6	7692	Thermal, Electrical	Safety glasses/face shield, helmet, and gloves	Adequate	
1-7	3471 3479	Mechanical, Chemical	Respirator, normal apparel	Adequate	Employees did not want to wear protective clothing.
1-8	2091	Mechanical, Thermal	Gauntlet, apron, and rubber boots	Adequate	

TABLE VII

AVAILABLE PROTECTIVE CLOTHING VS. HAZARD (Continued)

FIELD SURVEY

COMPANY CODE	S.I.C.	SPECIFIC HAZARD	PROTECTIVE CLOTHING (TYPE)	USERS' ACCEPTANCE	REMARKS
1-9	8062	Chemical, Radioactive	Full protection for patient and technician - lead aprons, lead shields, and gloves; entire room is leaded	Adequate	
1-10	7692 3599	Mechanical, Thermal, Electrical	Leather jackets, aprons, gloves, helmets, and eye protection	Adequate	
1-11	3721	Mechanical, Thermal, Chemical, Radioactive, Electrical	Gauntlets, aprons, helmet, face shield, safety glasses, and gloves.	Adequate	
1-12	5191	Mechanical, Chemical	Respirators and normal apparel	Adequate	
1-13	5462	Mechanical, Thermal	No protective clothing. Hair nets and white clothing (State health laws)	Adequate	
1-14	0721	Chemical	No protective clothing available	Inadequate	Need protective clothing when handling chemicals.
1-15	2752	Thermal	Asbestos gloves, aprons, and plastic gloves	Adequate	Face shield and apron should be available for lead melting process.
1-16	0181	Chemical	Rain suit, respirator, boots, and gloves	Adequate	
1-17	8062	Radioactive	Leaded aprons, wrap-arounds, and gloves	Adequate	

TABLE VII
 AVAILABLE PROTECTIVE CLOTHING vs. HAZARD (Continued)

FIELD SURVEY

COMPANY CODE	S.I.C.	SPECIFIC HAZARD	PROTECTIVE CLOTHING (TYPE)	USERS' ACCEPTANCE	REMARKS
1-18	2621	Mechanical, Thermal, Chemical	Helmets, safety glasses, coveralls, gloves, hard hats, rubber rain gear and gloves, boots, aluminized jackets, and asbestos gloves	Inadequate	Aluminized jackets too heavy and hot.
1-19	3443	Mechanical, Thermal, Electrical	Helmet, goggles, gloves, and safety glasses	Adequate	Protective clothing not available.
1-20	3731	Mechanical, Thermal, Chemical	Coveralls, gloves, diving suits, aprons, sleeves, gloves, and jackets	Inadequate	Lighter protective clothing for welding and cutting operations.
279	2952	Mechanical, Thermal, Chemical	No protective clothing available	N/A	
1-22	7397	Radioactive	No protective clothing available	N/A	
1-23	3731	Mechanical, Thermal, Electrical	Safety helmet, shoes, and glasses; welding helmet; gauntlets; leather jackets, and respirator	Adequate	
1-24	2086	Mechanical, Chemical	Safety glasses, ear protection, cloth apron, face shield, and rubber boots	Adequate	
1-25	1731	Electrical	No protective clothing available	Not available	"Inside electricians" customarily do not utilize protective clothing.

TABLE VII

AVAILABLE PROTECTIVE CLOTHING vs. HAZARD (Continued)

FIELD SURVEY

<u>COMPANY CODE</u>	<u>S.I.C.</u>	<u>SPECIFIC HAZARD</u>	<u>PROTECTIVE CLOTHING (TYPE)</u>	<u>USERS' ACCEPTANCE</u>	<u>REMARKS</u>
1-26	3471	Thermal, Chemical	Rubber gloves and aprons and respirators	Adequate	No safety clothing regulations.
1-27	2819	Chemical	Boots, aprons, gloves, goggles and hard hats, gas masks, face shields	Adequate	
1-28	2819	Chemical	Hard hats, safety shoes, rubber gloves, aprons, and respirators	Adequate	
1-29	1541	Mechanical	No protective clothing available	Protective clothing is not necessary	
1-30	2037	Mechanical, Thermal, Chemical	Aprons, coat, bib-type trousers, gloves, boots, face shields, parka, thermal trousers, and hard hats	Adequate	
1-31	2874	Mechanical, Thermal, Electrical	Hard hat, safety glasses and shoes, raingear, gloves, and respirator	Adequate	Raingear is too hot.
1-32	3443	Mechanical, Thermal, Electrical	Welding helmet, gauntlets, apron, shoes, and gloves; goggles; safety glasses; and hard hats	Adequate	Welding protective clothing is too hot.
1-33	1541	Mechanical, Electrical	No protective clothing available	Protective clothing is not necessary	

TABLE VII

AVAILABLE PROTECTIVE CLOTHING vs. HAZARD (Continued)

FIELD SURVEY

<u>COMPANY CODE</u>	<u>S.I.C.</u>	<u>SPECIFIC HAZARD</u>	<u>PROTECTIVE CLOTHING (TYPE)</u>	<u>USERS' ACCEPTANCE</u>	<u>REMARKS</u>
1-34	3471	Thermal, Chemical	Apron, rubber boots and gloves, face shields, and respirators	Adequate	
1-35	1742	Thermal	No protective clothing available	Protective clothing is not necessary	Too hot to wear any additional clothing other than normal apparel and boots.
1-36	1629	Mechanical	Safety boots, hard hats, gloves, and goggles	Adequate	

DATA TABLES
SURVEY AREA NO. 2

TABLE VIII

SURVEY AREA 2

Industrial Areas Showing Related Occupational Areas

Standard Industrial Classification Short Title	S.I.C. Code	Company Code	Related Occupational Areas*																		
			A	B	C	D	E	F	G	H	I	J									
Motor Vehicles & Car Bodies	3711	2-1			X	X															
Highway & Street Construction	1611	2-2																			
Sawmills & Planing Mills	2421	2-3																			
General																					
Women's Hosiery, Except Socks	2251	2-4																			
Commercial Testing Laboratories	7397	2-5																			X
Welding Repair	7692	2-6																			X
Asbestos Products	3292	2-7																			X
Welding Repair	7692	2-8																			X
Soap & Other Detergents	2841	2-9																			
Pesticides & Agricultural Chemicals, nec**	2879	2-10																			
Hardwood Dimension & Flooring	2426	2-11																			X
Soap & Other Detergents	2841	2-12																			
Paper Coating & Glazing	2641	2-13																			
Metal Working Machinery, nec	3549	2-14																			
Aircraft	3721	2-15																			
Polishes & Sanitation Goods	2842	2-16																			X
Minerals, Ground or Treated	3295	2-17																			
Inorganic Pigments	2816	2-18																			
Products of Purchased Glass	3221	2-19																			
Non Durable Goods, nec	5199	2-20																			
Gold Ores	1041	2-21																			
Adhesives & Sealants	2891	2-22																			

TABLE VIII

SURVEY AREA 2 (Cont)

Industrial Areas Showing Related Occupational Areas

Standard Industrial Classification Short Title	S.I.C. Code	Company Code	Related Occupational Areas*																		
			A	B	C	D	E	F	G	H	I	J									
Blast Furnaces & Steel Mills	3312	2-23																			X
Blast Furnaces & Steel Mills	3312	2-24																			X
Gray Iron Foundries	3321	2-25												X							X
Metal Heat Treating	3398	2-26												X							X
Gray Iron Foundries	3321	2-27												X							X
Plumbing, Heating, & Air-conditioning	1711	2-28											X								
Gray Iron Foundries	3321	2-29												X							X
Bituminous Coal & Lignite Mining	1211	2-30																			

- * A = Beryllium Operations
- B = Asbestos Operations
- C = Painting Operations
- D = Welding Operations
- E = Abrading & Buffing Operations
- F = Silica Dust Generating Operations
- G = Insecticide & Pesticide Spraying Operations
- H = X-ray Operations
- I = Bacterial Involvement Operations
- J = Heat Stress Involvement Operations

** nec = Not elsewhere coded

TABLE IX
SURVEY AREA 2
COMPANIES SURVEYED SHOWING PRODUCT AND WORKER POPULATION

<u>COMPANY CODE</u>	<u>S. I. C.</u>	<u>PRODUCT</u>	<u>TOTAL EMPLOYEES</u>
2-1	3711	Motor vehicles	4000
2-2	1611	Asphalt paving	20
2-3	2421	Sawmill & planing mill	25
2-4	2251	Dying panty hose	8
2-5	7397	Testing laboratory	10
2-6	7692	Welding operation	4
2-7	3292	Asbestos products	25
2-8	3471	Plating	45
2-9	2841	Soap & detergent manufacturing	60
2-10	2879	Insecticides & pesticides	50
2-11	2426	Furniture	50
2-12	2841	Soap & detergent manufacturing	300
2-13	2641	Paper coating & glazing	43
2-14	7692	Welding operations	10
2-15	3721	Aircraft	10,000
2-16	2842	Specialty cleaning & polishing	24
2-17	1472	Barite mining	150
2-18	2816	Inorganic pigments	152
2-19	3221	Glass containers	1,500
2-20	5199	Aerosol cans	21
2-21	1041	Gold mining	8
2-22	2891	Adhesives & sealants	53
2-23	3312	Steel works & rolling mills	12,000
2-24	3312	Steel works & rolling mills	200
2-25	3312	Gray iron foundry	130
2-26	3398	Metal heat treating	18

TABLE IX (Continued)

<u>COMPANY</u> <u>CODE</u>	<u>S.I.C.</u>	<u>PRODUCT</u>	<u>TOTAL</u> <u>EMPLOYEES</u>
2-27	3321	Gray iron foundry	50
2-28	1711	Plumbing, heating, & air conditioning	60
2-29	3321	Gray iron foundry	8
2-30	1211	Bituminous coal mining	325

TABLE X
SURVEY AREA 2
PROTECTIVE CLOTHING POLICIES OF COMPANIES SURVEYED

<u>COMPANY CODE</u>	<u>S.I.C.</u>	<u>IS PROTECTIVE CLOTHING WORN</u>	<u>IS PROTECTIVE CLOTHING REQUIRED BY THE COMPANY</u>	<u>DOES THE COMPANY SUPPLY PROTECTIVE CLOTHING</u>
2-1	3711	Yes	Yes	Yes
2-2	1611	No	No	No
2-3	2421	No	No	No
2-4	2251	No	No	Yes
2-5	7397	Yes	Yes	Yes
2-6	7692	Yes	Yes	Yes
2-7	3292	No	No	No
2-8	3471	Yes	Yes	Yes
2-9	2841	No	No	No
2-10	2879	No	No	No
2-11	2426	No	No	No
2-12	2841	Yes	Yes	Yes
2-13	2641	No	No	No
2-14	7692	No	No	No
2-15	3721	Yes	Yes	Yes
2-16	2842	Yes	Yes	Yes
2-17	1472	Yes	Yes	Yes
2-18	2816	Yes	Yes	Yes
2-19	3221	Yes	Yes	Yes
2-20	5199	No	No	No
2-21	1041	No	No	No
2-22	2891	Yes	Yes	Yes
2-23	3312	Yes	Yes	Yes
2-24	3312	Yes	Yes	Yes
2-25	3312	No	No	No

TABLE X
 SURVEY AREA 2 (Continued)

<u>COMPANY CODE</u>	<u>S.I.C.</u>	<u>IS PROTECTIVE CLOTHING WORN</u>	<u>IS PROTECTIVE CLOTHING REQUIRED BY THE COMPANY</u>	<u>DOES THE COMPANY SUPPLY PROTECTIVE CLOTHING</u>
2-26	3398	No	No	No
2-27	3321	Yes	Yes	Yes
2-28	1711	Yes	Yes	Yes
2-29	3321	No	No	No
2-30	1211	Yes	Yes	Yes

TABLE XI
SURVEYOR'S RATING (Continued)

<u>COMPANY CODE</u>	<u>S.I.C.</u>	<u>SURVEYOR'S RATING</u>	<u>REMARKS OR COMMENTS</u>
2-14	7692	None available	Welders wore very basic protective clothing. They need additional protection for exposed body areas such as legs, arms, torso, and lower extremities.
2-15	3721	Available and adequate	
2-16	2842	Available but inadequate and lacks users' acceptance	In this operation, general workers wore normal apparel. Need some type of protective clothing here. Employees reluctant to wear any protective clothing.
2-17	1472	Available and adequate	
2-18	2816	Available	Employees in this operation are subjected to some grinding process residue and dust inhalation in the bagging area. A possible need for dust respirators in this area.
2-19	3221	Available and adequate	
2-20	5199	None available	Workers in the chemical mixing department wore normal apparel. A possible need for rubber aprons, gloves, and face shields in this department.
2-21	1041	None available	
2-22	2891	Available and inadequate	In bagging operation, hazardous (potentially) chemicals are used. A possible need for protective clothing in this area.
2-23	3312	Available and adequate	
2-24	3312	Available and adequate but lacks users' acceptance	Employees feel that protective clothing is too hot and is a handicap.
2-25	3321	Protective clothing not available	In this foundry, employees wore normal 2-piece work clothing which was not adequate. Employees need to wear some type of protective clothing around the furnaces and grinding department.
2-26	3398	None available	
2-27	3321	Available but inadequate	Workers in welding and grinding department lack adequate protection. Neither area utilized more than very basic shield, goggles and gloves.

TABLE XI

SURVEYOR'S RATING (Continued)

<u>COMPANY CODE</u>	<u>S.I.C.</u>	<u>SURVEYOR'S RATING</u>	<u>REMARKS OR COMMENTS</u>
2-28	1711	Available and inadequate	Standard cotton work clothing is insufficient protection in open flame and arc areas in this operation.
2-29	3321	Protective clothing not available	No safety program at all in this foundry. Employees "could'nt care less."
2-30	1211	Available and adequate	

TABLE XII
 SURVEY AREA 2
 COMPANIES SURVEYED SHOWING CLOTHING REVIEW POLICY
 ARE PROTECTIVE CLOTHING
 REQUIREMENTS
 PERIODICALLY REVIEWED

<u>COMPANY CODE</u>	<u>S. I. C.</u>	<u>PERIODICALLY REVIEWED</u>	<u>REVIEWED BY</u>
2-1	3711	Yes	Safety Director
2-2	1611	No	-
2-3	2421	No	-
2-4	2251	No	-
2-5	7397	Yes	Management
2-6	7692	No	-
2-7	3292	No	-
2-8	3471	Yes	Foreman
2-9	2841	No	-
2-10	2879	No	-
2-11	2426	No	-
2-12	2841	Yes	Safety Committee (Supervisors)
2-13	2641	No	-
2-14	7692	No	-
2-15	3721	Yes	Safety Assurance Department
2-16	2842	Yes	Safety Committee (President & Shop Supervisor)
2-17	1472	No	-
2-18	2816	Yes	Safety Committee (Superintendent & Safety Supervisor)
2-19	3221	Yes	Shop Supervisor and Safety Professional
2-20	5199	No	-
2-21	1041	No	-
2-22	2891	No	-
2-23	3312	Yes	Safety Personnel
2-24	3312	Yes	Safety Committee (Union & Management)

TABLE XII
 SURVEY AREA 2 (Continued)

<u>COMPANY CODE</u>	<u>S.I.C.</u>	<u>ARE PROTECTIVE CLOTHING REQUIREMENTS PERIODICALLY REVIEWED</u>	<u>REVIEWED BY</u>
2-25	3312	No	-
2-26	3398	No	-
2-27	3321	Yes	Safety Committee (Management)
2-28	1711	Yes	Safety Committee
2-29	3321	No	-
2-30	1211	Yes	Safety Supervisor

TABLE XIII
 SURVEY AREA 2
 COMPANIES SURVEYED SHOWING ADDED RISK OF CLOTHING

<u>COMPANY CODE</u>	<u>S. I. C.</u>	<u>DOES CLOTHING CAUSE ADDED RISK</u>
2-1	3711	No
2-2	1611	No
2-3	2421	No
2-4	2251	No
2-5	7397	No
2-6	7692	No
2-7	3292	
2-8	3471	Yes, fogs - face shield and glasses
2-9	2841	
2-10	2879	No
2-11	2426	No
2-12	2841	No
2-13	2641	No
2-14	7692	No
2-15	3721	No
2-16	2842	No
2-17	1472	No
2-18	2816	No
2-19	3221	No
2-20	5199	No
2-21	1041	No
2-22	2891	No
2-23	3312	No
2-24	3312	No

TABLE XIII
SURVEY AREA 2 (Continued)

<u>COMPANY CODE</u>	<u>S.I.C.</u>	<u>DOES CLOTHING CAUSE ADDED RISK</u>
2-25	3312	No
2-26	3398	No
2-27	3321	No
2-28	1711	No
2-29	3321	No
2-30	1211	No

TABLE XIV
AVAILABLE PROTECTIVE CLOTHING vs. HAZARD (Continued)

FIELD SURVEY

<u>COMPANY CODE</u>	<u>S.I.C.</u>	<u>SPECIFIC HAZARD</u>	<u>PROTECTIVE CLOTHING (TYPE)</u>	<u>USERS' ACCEPTANCE</u>	<u>REMARKS</u>
2-10	2879	Chemical, Biological	Hard hat, rubber gloves, boots, and goggles	Inadequate	Gloves too bulky and hot.
2-11	2426	Mechanical	Safety glasses and goggles	Adequate	
2-12	2841	Chemical	Safety glasses, boots and gloves, face shields, rubber aprons	Adequate	Need thinner gloves for summer.
2-13	2641	Thermal	No protective clothing available	No data	
2-14	7692	Mechanical, Thermal	Welding helmets, aprons, gauntlets, safety shoes, goggles, asbestos gloves, and aprons	Adequate	
2-15	3721	Mechanical, Thermal, Chemical, Radioactive	Goggles, safety glasses, face shields, helmets, respirators, foul-weather gear, coveralls, spats, safety shoes, leaded aprons, gloves, and shields	Adequate	
2-16	2842	Mechanical, Chemical	Face shield, splash suit, gloves, and boots	No data	
2-17	1472	Mechanical, Thermal, Chemical	Gloves, boots, splash suit, hat, and shields	Adequate	
2-18	2816	Mechanical, Thermal, Chemical	Hard hat, aluminized coat, goggles, asbestos gloves, and safety shoes	No data	

TABLE XIV
AVAILABLE PROTECTIVE CLOTHING vs. HAZARD (Continued)

FIELD SURVEY

<u>COMPANY CODE</u>	<u>S.I.C.</u>	<u>SPECIFIC HAZARD</u>	<u>PROTECTIVE CLOTHING (TYPE)</u>	<u>USERS' ACCEPTANCE</u>	<u>REMARKS</u>
2-19	3221	Mechanical, Thermal, Chemical	Face shield, aluminized suit, asbestos gloves, leather safety shoes, and aprons	Adequate	
2-20	5199	Mechanical, Thermal, Chemical	Safety glasses, gloves, and work clothing (normal apparel and boots)	Adequate	
2-21	1041	Mechanical	No protective clothing available	Adequate	Protective clothing not necessary for this operation. Normal apparel is adequate.
2-22	2891	Thermal, Chemical	Gloves, safety shoes, face shields, rubber apron, and boots	Adequate	
2-23	3312	Mechanical, Thermal, Chemical	Aluminized asbestos coats, hoods, spats, and gloves and special cotton, flame-resistant suits	No data	
2-24	3312	Mechanical, Thermal	Shields, gloves, leggings, coats, and pants	Adequate	Protective clothing worn is too hot and heavy.
2-25	3321	Mechanical, Thermal	Safety glasses, helmet, shoes, and spats (knee-high)	Adequate	
2-26	3398	Mechanical, Thermal	No protective clothing available	Adequate	Gloves and safety shoes are worn with 2-piece uniform supplied by company.

TABLE XIV
 AVAILABLE PROTECTIVE CLOTHING vs. HAZARD (Continued)

FIELD SURVEY

<u>COMPANY CODE</u>	<u>S.I.C.</u>	<u>SPECIFIC HAZARD</u>	<u>PROTECTIVE (CLOTHING (TYPE)</u>	<u>USERS' ACCEPTANCE</u>	<u>REMARKS</u>
2-27	3321	Mechanical, Thermal	Leggings, goggles, gloves, and ankle spats	Adequate	
2-28	1711	Mechanical, Thermal	Hard hats, goggles/face shield, gloves, sleeves, and ankle spats	Inadequate	Need lighter, less bulky, flame-resistant clothing.
2-29	3321	Mechanical, Thermal	No protective clothing available	No data	
2-30	1211	Mechanical, Electrical, Biological	Overalls, long-sleeved shirts, hard hat, safety shoes, leg-bands, jumpers, and respirators	Adequate	

DATA TABLES
SURVEY AREA NO. 3

TABLE XV

SURVEY AREA 3

Industrial Areas Showing Related Occupational Areas

Standard Industrial Classification Short Title	S.I.C. Code	Company Code	Related Occupational Areas*																		
			A	B	C	D	E	F	G	H	I	J									
Motor Vehicles & Car Bodies	3711	3-1		X	X	X															
Commercial Testing Laboratories	7397	3-2								X											
Products of Petroleum & Coal, nec**	2999	3-3									X										X
Sheet Metal Work	3444	3-4										X									
Blast Furnaces & Steel Mills	3312	3-5																			X
Fabricated Rubber Products, nec	3069	3-6																			
Fabricated Rubber Products,	3069	3-7																			
nec																					
Gum & Wood Chemicals	2861	3-8											X								
Plating & Polishing	3471	3-9																			
Commercial Testing Laboratories	7397	3-10																			X
Metal Heat Treating	3398	3-11																			
Cold Finishing of Steel Shapes	3316	3-12											X								
Cold Finishing of Steel Shapes	3316	3-13																			
Commercial Testing Laboratories	7397	3-14																			X
Welding Repair	7692	3-15											X								
Industrial Inorganic Chemicals nec	2819	3-16																			
Machine Tools, Metal Cutting Types	3541	3-17																			X
Machine Tools, Metal Forming Types	3542	3-18																			X

TABLE XV

SURVEY AREA 3 (Cont)

Industrial Areas Showing Related Occupational Areas

Standard Industrial Classification Short Title	S.I.C. Code	Company Code	Related Occupational Areas*																	
			A	B	C	D	E	F	G	H	I	J								
Primary Metal Products nec	3399	3-19																		X
Plating & Polishing	3471	3-20						X												
Machine Tools, Metal Cutting Types	3541	3-21																		
Machine Tools, Metal Forming Types	3542	3-22						X												X
Machine Tools, Metal Cutting Types	3541	3-23						X												X
Machine Tools, Metal Cutting Types	3541	3-24						X												
Manufacturing Industries nec	3999	3-25																		
Fabricated Rubber Products nec	3069	3-26												X						
Commercial Testing Laboratories	7397	3-27																		X
Automotive Stampings	3465	3-28																		
Internal Combustion Engines, nec	3519	3-29												X						
Optical Instruments & Lenses	3832	3-30																	X	
Metal Heat Treating	3398	3-31											X							X

TABLE XV

SURVEY AREA 3 (Cont)

Industrial Areas Showing Related Occupational Areas

Standard Industrial Classification Short Title	S.I.C. Code	Company Code	Related Occupational Areas*													
			A	B	C	D	E	F	G	H	I	J				
Blast furnaces & Steel Mills	3312	3-32				X										X
Metal Heat Treating	3398	3-33														X

- *A = Beryllium Operations
- B = Asbestos Operations
- C = Painting Operations
- D = Welding Operations
- E = Abrading & Buffing Operations
- F = Silica Dust Generating Operations
- G = Insecticide & Pesticide Spraying Operations
- H = X-ray Operations
- I = Bacterial Involvement Operations
- J = Heat Stress Involvement Operations

**nec = Not elsewhere coded

TABLE XVI
 SURVEY AREA 3
 COMPANIES SURVEYED SHOWING PRODUCT AND WORKER POPULATION

<u>COMPANY CODE</u>	<u>S.I.C.</u>	<u>PRODUCT</u>	<u>TOTAL EMPLOYEES</u>
3-1	3711	Motor Vehicle	12,000
3-2	3693	X-Ray Operations	15
3-3	3312	Coke	225
3-4	7399	Metal Works	31
3-5	3325	Steel	6,000
3-6	3069	Rubber Products	45
3-7	3069	Rubber Forms	50
3-8	2861	Chemicals	2,400
3-9	3471	Plating	60
3-10	3811	Testing Laboratory	8
3-11	3398	Heat Treating	12
3-12	3316	Steel	38
3-13	3316	Steel	200
3-14	3693	Testing Laboratory	4
3-15	7692	Welding Shop	90
3-16	2819	Inorganic Chemicals	600
3-17	3541	Machine Tools	340
3-18	3542	Machine Tools	3
3-19	3399	Metal Products	20
3-20	3471	Metal Finishers	6
3-21	3541	Tool & Die Works	3
3-22	3542	Tool & Die Works	100
3-23	3541	Tool & Die Works	35
3-24	3541	Tool & Die Works	180
3-25	3999	Speciality Metal Products	30
3-26	3069	Rubber Products	51
3-27	7397	Commercial X-ray Inspection Service	12
3-28	3465	Metal Stamping Works	17
3-29	3519	Engines	8,000
3-30	3832	Precision Machinery	140
3-31	3398	Heat Treating	18
3-32	3312	Steel	1,400
3-33	3398	Heat Treating	25

TABLE XVII
 SURVEY AREA 3
 PROTECTIVE CLOTHING POLICIES OF COMPANIES SURVEYED

<u>COMPANY CODE</u>	<u>S.I.C.</u>	<u>IS PROTECTIVE CLOTHING WORN</u>	<u>IS PROTECTIVE CLOTHING REQUIRED BY THE COMPANY</u>	<u>DOES THE COMPANY SUPPLY PROTECTIVE CLOTHING</u>
3-1	3711	Yes	Yes	Yes
3-2	3693	No	No	No
3-3	3312	Yes	Yes	Yes
3-4	7399	No	No	No
3-5	3325	Yes	Yes	Yes
3-6	3069	No	No	No
3-7	3069	No	No	No
3-8	2861	No	No	No
3-9	3471	No	No	Yes
3-10	3811	Yes	Yes	Yes
3-11	3398	No	No	No
3-12	3316	Yes	No	Yes
3-13	3316	No	No	No
3-14	3693	No	No	No
3-15	7692	Yes	Yes	Yes
3-16	2819	Yes	Yes	Yes
3-17	3541	No	No	No
3-18	3542	No	No	No
3-19	3399	Yes	Yes	Yes
3-20	3471	No	No	No
3-21	3541	No	No	No
3-22	3542	No	No	No
3-23	3541	No	No	No
3-24	3541	No	No	No
3-25	3999	No	No	No
3-26	3069	No	No	No
3-27	7397	Yes	Yes	Yes
3-28	3465	No	No	No
3-29	3519	Yes	No	Yes
3-30	3832	Yes	Yes	Yes
3-31	3398	No	No	No
3-32	3312	Yes	Yes	Yes
3-33	3398	Yes	Yes	Yes

TABLE XVIII
SURVEY AREA 3

COMPANIES SURVEYED SHOWING SURVEYOR'S RATING OF PROTECTIVE CLOTHING

<u>COMPANY CODE</u>	<u>S.I.C.</u>	<u>SURVEYOR'S RATING</u>	<u>REMARKS OR COMMENTS</u>
3-1	3711	Available & Adequate	Welding, Buffing & Plating, Painting. Protective clothing not necessary.
3-2	3693	Lacks Users' Acceptance Adequate Protection	
3-3	3312	Available & Adequate	Not necessary for this type operation.
3-4	7399	Not Available - No Protective Clothing Used.	
3-5	3325	Available & Adequate	Additional components required.
3-6	3069	Not Available	
3-7	3069	Not Available	More-sensitive rubber gloves should be added.
3-8	2861	Not Available	
3-9	3471	Available But Inadequate	
3-10	3811	Available & Adequate	
3-11	3398	Protective Clothing Not Necessary for This Operation.	
3-12	3316	Available & Adequate	
3-13	3316	Not Available - Not Necessary	
3-14	3693	None Available - Not Needed	
3-15	7692	Available & Adequate	
3-16	2819	Available & Adequate	
3-17	3541	Available But Not Provided to Workers	
3-18	3542	Not Available - No Protective Clothing Utilized	
3-19	3399	Available & Adequate	
3-20	3471	Not Available	
3-21	3541	Not Available	
3-22	3542	Not Available	
3-23	3541	Available & Adequate	
3-24	3541	Available & Adequate	
3-25	3999	Available & Adequate	
3-26	3069	Not Available	
3-27	7397	Available & Adequate	
3-28	3465	Available & Adequate	
3-29	3519	Available & Inadequate	Lacks users' acceptance
3-30	3832	Available & Adequate	
3-31	3398	Available & Adequate	
3-32	3312	Available & Adequate	Lacks users' acceptance
3-33	3398	Available & Adequate	

TABLE XIX
 SURVEY AREA 3
 COMPANIES SURVEYED SHOWING CLOTHING REVIEW POLICY
 ARE PROTECTIVE CLOTHING
 REQUIREMENTS

<u>COMPANY CODE</u>	<u>S.I.C.</u>	<u>PERIODICALLY REVIEWED</u>	<u>REVIEWED BY</u>
3-1	3711	Yes	Safety Department
3-2	3693	No	-
3-3	3312	Yes	Safety Director
3-4	7399	No	-
3-5	3325	Yes	Safety Engineer
3-6	3069	No	-
3-7	3069	No	-
3-8	2861	No	-
3-9	3471	No	-
3-10	3811	Yes	Safety Department
3-11	3398	No	-
3-12	3316	No	-
3-13	3316	No	-
3-14	3693	No	-
3-15	7692	Yes	Safety Director
3-16	2819	Yes	Safety Director
3-17	3541	No	-
3-18	3542	No	-
3-19	3399	No	-
3-20	3471	No	-
3-21	3541	No	-
3-22	3542	No	-
3-23	3541	No	-
3-24	3541	No	-
3-25	3999	No	-
3-26	3069	No	-
3-27	7397	No	-
3-28	3465	No	-
3-29	3519	No	-
3-30	3832	Yes	Supervision
3-31	3398	No	-
3-32	3312	No	-
3-33	3398	No	-

TABLE XX

SURVEY AREA 3

COMPANIES SURVEYED SHOWING ADDED RISK OF CLOTHING

<u>COMPANY CODE</u>	<u>S.I.C.</u>	<u>DOES CLOTHING CAUSE ADDED RISK</u>
3-1	3711	No
3-2	3693	No
3-3	3312	No
3-4	7399	No
3-5	3325	No
3-6	3069	No
3-7	3069	No
3-8	2861	No
3-9	3471	No
3-10	3811	No
3-11	3398	No
3-12	3316	No
3-13	3316	No
3-14	3693	No
3-15	7692	No
3-16	2819	No
3-17	3541	No
3-18	3542	No
3-19	3399	No
3-20	3471	No
3-21	3541	No
3-22	3542	No
3-23	3541	No
3-24	3541	No
3-25	3999	No
3-26	3069	No
3-27	7397	No
3-28	3465	No
3-29	3519	No
3-30	3832	No
3-31	3398	No
3-32	3312	No
3-33	3398	No

TABLE XXI
AVAILABLE PROTECTIVE CLOTHING vs. HAZARD
SURVEY AREA 3
FIELD SURVEY

<u>COMPANY CODE</u>	<u>S.I.C.</u>	<u>SPECIFIC HAZARD</u>	<u>PROTECTIVE CLOTHING (TYPE)</u>	<u>USERS' ACCEPTANCE</u>	<u>REMARKS</u>
3-1	3711	Thermal, Chemical, Mechanical	Spats, Apron, Sleeves, Glasses, Hood, Rubber Boots, Gloves, Apron, Face Shield, Belly Pad, Metatarsals	Accepted	Painters do not use complete ensemble.
3-2	3693	Radioactive	Lab Coat	Accepted	Employees isolated from hazard.
3-3	3312	Thermal, Mechanical	Two-Piece, Flame-Retardant, Cotton Work Suit, Face Shield, Wooden Platform Shoes, Gloves (Asbestos), Hard Hat, Safety Glasses, Safety Shoes	Accepted	Poor grade of cotton cloth. Suits wear out too fast.
3-4	7399	Mechanical	No Protective Clothing Used		
3-5	3325	Thermal, Chemical, Mechanical	Hard Hats, Safety Glasses, Face Shield, Gloves (Cotton), Wooden Platform Shoes, Leggings, Spats, Goggles, Boots (Rubber), Gloves (Rubber), Apron	Accepted	Employees complain about some articles being too hot.

TABLE XXI
 AVAILABLE PROTECTIVE CLOTHING vs. HAZARD (Continued)

FIELD SURVEY

<u>COMPANY CODE</u>	<u>S.I.C.</u>	<u>SPECIFIC HAZARD</u>	<u>PROTECTIVE CLOTHING (TYPE)</u>	<u>USERS' ACCEPTANCE</u>	<u>REMARKS</u>
3-6	3069	Thermal, Chemical, Mechanical	No Protective Clothing Used		
3-7	3069	Thermal, Chemical, Mechanical	No Protective Clothing Used		
3-8	2861	Thermal, Electrical, Chemical, Mechanical	No Protective Clothing Used		
3-9	3471	Chemical, Mechanical	Apron (Rubber), Gloves (Rubber), Boots (Rubber), Safety Glasses	Accepted	
3-10	3811	Biological, Chemical	Apron (Rubber), Boots (Rubber), Safety Glasses, Hard Hat, Lab Coat	Accepted	
3-11	3398	Thermal	No Protective Clothing Used		Management comment to the effect no P. C. was needed

TABLE XXI

AVAILABLE PROTECTIVE CLOTHING vs. HAZARD (cont)

FIELD SURVEY

<u>COMPANY CODE</u>	<u>S. I. C.</u>	<u>SPECIFIC HAZARD</u>	<u>PROTECTIVE CLOTHING (TYPE)</u>	<u>USERS' ACCEPTANCE</u>	<u>REMARKS</u>
3-12	3316	Thermal, Electrical, Mechanical	Leather Apron, Sleeves, Gauntlets, Welding Helmet	Accepted	
3-13	3316	Chemical, Mechanical	No Protective Clothing Used.		
3-14	3693	Radioactive (Ionizing)	No Protective Clothing Used.		
3-15	7692	Thermal, Electrical, Mechanical	Fire-Retardant Cotton Coveralls, Gauntlets, Gloves, Welding Helmet, Goggles.	Accepted	
3-16	2819	Thermal, Chemical, Mechanical	Apron (Rubber), Gloves (Rubber), Face Shield, Safety Glasses, Hard Hat,	Accepted	Protective clothing is available, but adequate, but seldom used
3-17	3541	Thermal, Chemical, Mechanical	Apron (Leather), Gloves, Gauntlets, Goggles, Welding Hood, Face Shield, Apron (Rubber), Boots (Rubber), Gloves (Rubber)		

TABLE XXI

AVAILABLE PROTECTIVE CLOTHING vs. HAZARD (Cont)

FIELD SURVEY

<u>COMPANY CODE</u>	<u>S.I.C.</u>	<u>SPECIFIC HAZARD</u>	<u>PROTECTIVE CLOTHING (TYPE)</u>	<u>USERS' ACCEPTANCE</u>	<u>REMARKS</u>
3-18	3542	Thermal, Chemical Mechanical	No Protective Clothing Used		
3-19	3399	Thermal, Mechanical	Apron (Asbestos), Coat (Asbestos), Leggings, Gloves (Asbestos)	Accepted	
3-20	3471	Chemical, Mechanical	No Protective Clothing Used		
3-21	3541	Thermal, Mechanical	No Protective Clothing Used		
3-22	3542	Thermal, Mechanical	No Protective Clothing Used		
3-23	3541	Mechanical	Apron, Gloves, Face Shield, Safety Glasses		
3-24	3541	Thermal, Mechanical	Apron (Leather), Gloves, Spats, Welding Hood	Accepted	
3-25	3999	Mechanical	No Protective Clothing Used		
3-26	3069	Thermal, Mechanical	No Protective Clothing Used		
3-27	7397	Radioactive (Ionizing), Mechanical	Gloves, Face Shield, Apron, Safety Shoes	Accepted	

TABLE XXI

AVAILABLE PROTECTIVE CLOTHING vs. HAZARD (Cont)

FIELD SURVEY

<u>COMPANY CODE</u>	<u>S.I.C.</u>	<u>SPECIFIC HAZARD</u>	<u>PROTECTIVE CLOTHING (TYPE)</u>	<u>USERS' ACCEPTANCE</u>	<u>REMARKS</u>
3-28	3465	Mechanical	Apron, Gloves, Safety Glasses	Accepted	
3-29	3519	Thermal, Mechanical	Apron (Asbestos), Gloves (Asbestos)	Accepted	
3-30	3832	Biological, Chemical, Mechanical	Apron, Two-Piece Work Suit, Shoes	Accepted	Clothing items changed and laundered each night.
3-31	3398	Thermal, Mechanical	Apron (Asbestos), Gloves (Asbestos), Safety Glasses	Accepted	
3-32	3312	Thermal, Mechanical, Chemical	Aluminized/Asbestos Coats, Apron, Gauntlets, Gloves, Leggings, Hood, Boots, Aprons, Gloves (Rubber)	Accepted	
3-33	3398	Mechanical	No Protective Clothing Used		

DATA TABLES
SURVEY AREA NO. 4

TABLE XXII*

SURVEY AREA 4

Industrial Areas Showing Related Occupational Areas

Standard Industrial Classification Short Title	S.I.C. Code	Company Code	Related Occupational Areas*																	
			A	B	C	D	E	F	G	H	I	J								
Industrial Inorganic Chemicals nec**	2819	4-1																		
Primary Nonferrous Metals nec	3339	4-2	X					X												
Rock Salt	1476	4-3						X												X
Steel Foundries nec	3325	4-4					X	X												X
Steel Foundries nec	3325	4-5					X	X												X
Metal Heat Treating	3398	4-6																		X
Metal Heat Treating	3398	4-7																		X
Nonferrous Foundries nec	3369	4-8											X	X						X
Steel Foundries nec	3325	4-9										X	X							
Tires & Inner Tubes	3011	4-10																		
Adhesives & Sealants	2891	4-11																		
Fabricated Rubber Production nec	3069	4-12																		
Metal Stampings nec	3469	4-13									X	X	X	X						
Commercial Testing Laboratories	7397	4-14																		X

TABLE ~~XXIII~~

SURVEY AREA 4

COMPANIES SURVEYED SHOWING PRODUCT AND WORKER POPULATION

<u>COMPANY CODE</u>	<u>S.I.C.</u>	<u>PRODUCT</u>	<u>TOTAL EMPLOYEES</u>
4-1	2819	Industrial Chemicals	250
4-2	3339	Nonferrous Metal Casting	200
4-3	1476	Salt Mining	245
4-4	3325	Steel Castings	450
4-5	3325	Steel Castings	30
4-6	3398	Metal Heat Treating	85
4-7	3398	Metal Heat Treating	30
4-8	3369	Nonferrous Metal Castings	101
4-9	3325	Steel Castings	4
4-10	3011	Tires & Inner Tubes	7,000
4-11	2891	Adhesives & Sealants	7,000
4-12	3069	Rubber Products	3,300
4-13	3469	Automotive Metal Stampings	260
4-14	7397	Commercial Testing Laboratory	22
4-15	3351	Copper Rolling & Drawing	490
4-16	3293	Asbestos Gaskets & Packings	6
4-17	1111	Coal Mining	200
4-18	3544	Tools & Dies	8

TABLE XXIV

SURVEY AREA 4

PROTECTIVE CLOTHING POLICIES OF COMPANIES SURVEYED

<u>COMPANY CODE</u>	<u>S.I.C.</u>	<u>IS PROTECTIVE CLOTHING WORN</u>	<u>IS PROTECTIVE CLOTHING REQUIRED BY THE COMPANY</u>	<u>DOES THE COMPANY SUPPLY PROTECTIVE CLOTHING</u>
4-1	2819	Yes	Yes	Yes
4-2	3339	Yes	Yes	Yes
4-3	1476	Yes	No	Yes
4-4	3325	Yes	Yes	Yes
4-5	3325	No	No	No
4-6	3398	No	No	No
4-7	3398	Yes	Yes	Yes
4-8	3369	Yes	No	Yes
4-9	3325	Yes	Yes	Yes
4-10	3011	Yes	Yes	Yes
4-11	2891	Yes	Yes	Yes
4-12	3069	Yes	Yes	Yes
4-13	3469	Yes	Yes	Yes
4-14	7397	Yes	Yes	Yes
4-15	3351	Yes	Yes	Yes
4-16	3293	No	No	No
4-17	1111	Yes	Yes	Yes
4-18	3544	No	No	No

TABLE XXV

SURVEY AREA 4

COMPANIES SURVEYED SHOWING SURVEYOR'S RATING OF PROTECTIVE CLOTHING

<u>COMPANY CODE</u>	<u>S.I.C.</u>	<u>SURVEYOR'S RATING</u>	<u>REMARKS OR COMMENTS</u>
4-1	2819	Adequate	Generally adequate except in packaging are where protective clothing is provided.
4-2	3339	Adequate	-
4-3	1476	Adequate	-
4-4	3325	Adequate	Based on interviews only.
4-5	3325	Inadequate	No protective clothing supplied.
4-6	3398	Inadequate	No protective clothing supplied.
4-7	3398	Adequate	-
4-8	3369	Adequate	-
4-9	3325	Adequate	-
4-10	3011	Adequate	-
4-11	2891	Adequate	-
4-12	3069	Inadequate	Hazards encountered indicated a need for more protective clothing.
4-13	3469	Inadequate	Hazards encountered indicated a need for more protective clothing.
4-14	7397	Adequate	-
4-15	3351	Adequate	-
4-16	3293	Adequate	-
4-17	1111	Adequate	-
4-18	3544	Adequate	-

TABLE XXVI

SURVEY AREA 4

COMPANIES SURVEYED SHOWING CLOTHING REVIEW POLICY

<u>COMPANY CODE</u>	<u>S.I.C.</u>	<u>ARE PROTECTIVE CLOTHING REQUIREMENTS PERIODICALLY REVIEWED</u>	<u>REVIEWED BY</u>
4-1	2819	Yes	Safety Director
4-2	3339	Yes	Reviewed at Corporate level.
4-3	1476	Yes	Safety Department.
4-4	3325	Yes	Safety Director
4-5	3325	No	-
4-6	3398	No	-
4-7	3398	No	-
4-8	3369	No	-
4-9	3325	No	-
4-10	3011	Yes	Safety & Union Representatives
4-11	2891	Yes	Safety & Union Representatives
4-12	3069	Yes	Safety Engineer
4-13	3469	Yes	Management & Union Committee
4-14	7397	No	-
4-15	3351	Yes	Management, Union & Safety
4-16	3293	No	-
4-17	1111	Yes	Management & Safety
4-18	3544	No	-

TABLE XXVII

SURVEY AREA 4

COMPANIES SURVEYED SHOWING ADDED RISK OF CLOTHING

<u>COMPANY CODE</u>	<u>S.I.C.</u>	<u>DOES CLOTHING CAUSE ADDED RISK</u>
4-1	2819	No
4-2	3339	No
4-3	1476	No
4-4	3325	No
4-5	3325	No
4-6	3398	No
4-7	3398	No
4-8	3369	No
4-9	3325	No
4-10	3011	No
4-11	2891	No
4-12	3069	No
4-13	3469	No
4-14	7397	No
4-15	3351	No
4-16	3293	No
4-17	1111	No
4-18	3544	No

TABLE XXVIII

AVAILABLE PROTECTIVE CLOTHING vs. HAZARD

SURVEY AREA 4

FIELD SURVEY

<u>COMPANY CODE</u>	<u>S.I.C.</u>	<u>SPECIFIC HAZARD</u>	<u>PROTECTIVE CLOTHING (TYPE)</u>	<u>USERS' ACCEPTANCE</u>	<u>REMARKS</u>
4-1	2819	Chemical, Mechanical	Self-contained Acid Suit, Face Shields, Rubber Gloves Chemical Cartridge Respirators	Acceptable	-
4-2	3339	Chemical, Mechanical	2-pc. Synthetic Work Suit, Chemical-Resistant Apron, Face Shield, Rubber Boots and Gloves	Acceptable	-
4-3	1476	Thermal, Electrical, Mechanical	Raingear, Coveralls, Hard Hat, Safety Shoes, and Glasses	Acceptable	-
4-4	3325	Thermal, Electrical, Chemical, Mechanical	Asbestos Suit, Hood, Gloves, and Spats; Leather Apron, Gauntlets, and Welder's Helmet; Chemical-Resistant Smock; Rubber Gloves; and Respirator	Acceptable	-
4-5	3325	Thermal, Electrical,	Goggles, Gloves, Safety Shoes, and Hard Hats. Welding Gloves, Helmet, and Gloves	Acceptable	-

TABLE XXVIII

AVAILABLE PROTECTIVE CLOTHING vs. HAZARD (Cont)

FIELD SURVEY

<u>COMPANY CODE</u>	<u>S.I.C.</u>	<u>SPECIFIC HAZARD</u>	<u>PROTECTIVE CLOTHING (TYPE)</u>	<u>USERS' ACCEPTANCE</u>	<u>REMARKS</u>
4-6	3398	Thermal, Electrical	Rubber Gloves, Dust Respirator, Asbestos Mittens	Acceptable	-
4-7	3398	Thermal, Mechanical	Asbestos Jacket, Welding Gloves, Goggles, and Helmet; Respirator	Acceptable	-
4-8	3369	Thermal, Mechanical	Goggles, Hard Hat, Safety Shoes, and Asbestos Coat; Leather Apron, Ear Defenders, Dust Respirator, Face Shield	Acceptable	-
4-9	3325	Thermal, Mechanical	Asbestos Apron, Gloves, Leggings, and Shin Guards; Hard Hat, Safety Shoes, Goggles, and Face Shield	Acceptable	-
4-10	9011	Thermal, Mechanical	Chemical-Resistant Coveralls, Respirator, Safety Glasses and Shoes	Acceptable	-
4-11	2891	Thermal, Chemical, Mechanical	Chemical-Resistant Coveralls, Gloves, Aprons, and Face Shield	Acceptable	-

TABLE XXVIII

AVAILABLE PROTECTIVE CLOTHING vs. HAZARD (cont)

FIELD SURVEY

<u>COMPANY CODE</u>	<u>S.I.C.</u>	<u>SPECIFIC HAZARD</u>	<u>PROTECTIVE CLOTHING (TYPE)</u>	<u>USERS' ACCEPTANCE</u>	<u>REMARKS</u>
4-12	3069	Thermal, Mechanical	Chemical-Resistant Aprons, Gloves, and Coveralls; Face Shield, and Heat-Resistant Gloves	Acceptable	-
4-13	3469	Chemical, Mechanical	Rubber Splash Suit, Apron, and Boots; Face Shield	Acceptable	-
4-14	7397	Chemical	Chemical-Resistant Smock, Gloves, and Apron; Safety Glasses	Acceptable	-
4-15	3351	Thermal, Mechanical	Leather Sleeves and Spats, Face Shield, Hard Hat, Goggles, Safety Shoes	Unknown	Worker interviews not permitted
4-16	3293	Mechanical	None Provided	Acceptable	Workers adequately protected by isolation.
4-17	1111	Electrical, Mechanical	Helmet, Coveralls, Safety Glasses, Safety Shoes, and Self Rescuer	Acceptable	-
4-18	3544	Mechanical	None Provided	Acceptable	Workers adequately protected by isolation.

DATA TABLES
SURVEY AREA NO. 5

TABLE XXIX

SURVEY AREA 5

Industrial Areas Showing Related Occupational Areas

Standard Industrial Classification Short Title	S.I.C. Code	Company Code	Related Occupational Areas*																	
			A	B	C	D	E	F	G	H	I	J								
Oil Refining	2911	5-1																		
Oil Refining	2911	5-2																		
Oil Refining	2911	5-3																		
Glass Containers	3221	5-4							X											X
Pressed & Blown Glass nec**	3229	5-5							X											X

- *A = Beryllium Operations
- B = Asbestos Operations
- C = Painting Operations
- D = Welding Operations
- E = Abrading & Buffing Operations
- F = Silica Dust Generating Operations
- G = Insecticide & Pesticide Spraying Operations
- H = X-ray Operations
- I = Bacterial Involvement Operations
- J = Heat Stress Involvement Operations

**nec = Not elsewhere coded

TABLE XXX

SURVEY AREA 5

COMPANIES SURVEYED SHOWING PRODUCT AND WORKER POPULATION

<u>COMPANY CODE</u>	<u>S.I.C.</u>	<u>PRODUCT</u>	<u>TOTAL EMPLOYEES</u>
5-1	2911	Petroleum Products	1,700
5-2	2911	Petroleum Products	260
5-3	2911	Petroleum Products	400
5-4	3221	Glass Containers	3,500
5-5	3229	Custom Glass Products	60

TABLE XXXI

SURVEY AREA 5

PROTECTIVE CLOTHING POLICIES OF COMPANIES SURVEYED

<u>COMPANY CODE</u>	<u>S.I.C.</u>	<u>IS PROTECTIVE CLOTHING WORN</u>	<u>IS PROTECTIVE CLOTHING REQUIRED BY THE COMPANY</u>	<u>DOES THE COMPANY SUPPLY PROTECTIVE CLOTHING</u>
5-1	2911	Yes	Yes	Yes
5-2	2911	Yes	Yes	Yes
5-3	2911	Yes	Yes	Yes
5-4	3221	Yes	Yes	Yes
5-5	3229	No	No	No

TABLE XXXII

SURVEY AREA 5

COMPANIES SURVEYED SHOWING SURVEYOR'S RATING OF PROTECTIVE CLOTHING

<u>COMPANY CODE</u>	<u>S.I.C.</u>	<u>SURVEYOR'S RATING</u>	<u>REMARKS OR COMMENTS</u>
5-1	2911	Adequate	-
5-2	2911	Adequate	-
5-3	2911	Adequate	-
5-4	3221	Adequate	-
5-5	3229	Not Adequate	Hazard encountered indicated a need for more protection.

TABLE XXXIII

SURVEY AREA 5

COMPANIES SURVEYED SHOWING CLOTHING REVIEW POLICY

<u>COMPANY CODE</u>	<u>S.I.C.</u>	<u>ARE PROTECTIVE CLOTHING REQUIREMENTS PERIODICALLY REVIEWED</u>	<u>REVIEWED BY</u>
5-1	2911	Yes	Management
5-2	2911	Yes	Management and Safety Committee
5-3	2911	Yes	Safety Staff.
5-4	3221	Yes	Management and Safety Staff
5-5	3229	Yes	Safety Manager

TABLE XXXIV

SURVEY AREA 5

COMPANIES SURVEYED SHOWING ADDED RISK OF CLOTHING

<u>COMPANY CODE</u>	<u>S.I.C.</u>	<u>DOES CLOTHING CAUSE ADDED RISK</u>
5-1	2911	No
5-2	2911	No
5-3	2911	Yes, airline-supplied respirator reduces vision
5-4	3221	No

TABLE XXXV

AVAILABLE PROTECTIVE CLOTHING vs. HAZARD
SURVEY AREA 5
FIELD SURVEY

<u>COMPANY CODE</u>	<u>S.I.C.</u>	<u>SPECIFIC HAZARD</u>	<u>PROTECTIVE CLOTHING (TYPE)</u>	<u>USERS' ACCEPTANCE</u>	<u>REMARKS</u>
5-1	2911	Mechanical, Chemical, Thermal, Electrical	Self-contained Ensemble, 2-pc. Chemical Suit, Cape Sleeves, Hard Hat, Face Shield, Safety Glasses, Safety Shoes/Boots	-	No comments from employees management would not permit inter- views.
5-2	2911	Mechanical, Chemical, Thermal, Electrical	One-pc. Plastic Suit, Gloves, Boots, Hard Hat, Aluminized Suit & Hood, Head Covering, Safety Glasses, Hard- Toed Shoes	Acceptable	-
5-3	2911	Mechanical, Thermal, Radiological, Chemical	Self-contained Ensemble, 2-pc. P.V.C. Suit, Aprons, Pants, Hard Hat, Overallis, Face Shield, Safety Glasses, Goggles, Gloves, Proximity Suits, Safety Boots/Shoes, Air Packs	Acceptable	-
5-4	3221	Mechanical, Thermal, Chemical, Electrical	Asbestos Suit and Hood, Apron, Cape Sleeves, Hard Hat, Face Shield, Safety Glasses	Acceptable	-

TABLE XXXIV

AVAILABLE PROTECTIVE CLOTHING vs. HAZARD (cont)

FIELD SURVEY

<u>COMPANY CODE</u>	<u>S.I.C.</u>	<u>SPECIFIC HAZARD</u>	<u>PROTECTIVE CLOTHING (TYPE)</u>	<u>USERS' ACCEPTANCE</u>	<u>REMARKS</u>
5-5	3229	Mechanical, Thermal	General work clothing was worn.	Acceptable	Hazards encountered indicate need for more protection.

DATA TABLES

SURVEY AREA NO. 6

TABLE XXXVI

SURVEY AREA 6

Industrial Areas Showing Related Occupational Areas

Standard Industrial Classification Short Title	S. I. C. Code	Company Code	Related Occupational Areas*																	
			A	B	C	D	E	F	G	H	I	J								
Copper Ores	1021	6-1																		
Lead & Zinc Ores	1031	6-2																		
Uranium, Radium, Vanadium Ores	1094	6-3																		
Silver Ores	1044	6-4																		
Uranium, Radium, Vanadium Ores	1094	6-5																		
Gold Ores	1041	6-6																		
Uranium, Radium, Vanadium Ores	1094	6-7																		
Sawmills & Planing Mills General	2421	6-8																		

- *A = Beryllium Operations
 B = Asbestos Operations
 C = Painting Operations
 D = Welding Operations
 E = Abrading & Buffing Operations
 F = Silica Dust Generating Operations
 G = Insecticide & Pesticide Spraying Operations
 H = X-ray Operations
 I = Bacterial Involvement Operations
 J = Heat Stress Involvement Operations

TABLE XXVII

SURVEY AREA 6

COMPANIES SURVEYED SHOWING PRODUCT AND WORKER POPULATION

<u>COMPANY CODE</u>	<u>S.I.C.</u>	<u>PRODUCT</u>	<u>TOTAL EMPLOYEES</u>
6-1	1021	Copper Mining	8
6-2	1031	Lead Mining	360
6-3	1094	Uranium Mining	10
6-4	1044	Silver Mining	10
6-5	1094	Uranium Mining	125
6-6	1041	Gold Mining	6
6-7	1094	Uranium Mining	5
6-8	2421	Lumber	12

TABLE XXXVIII

SURVEY AREA 6

PROTECTIVE CLOTHING POLICIES OF COMPANIES SURVEYED

<u>COMPANY CODE</u>	<u>S.I.C.</u>	<u>IS PROTECTIVE CLOTHING WORN</u>	<u>IS PROTECTIVE CLOTHING REQUIRED BY THE COMPANY</u>	<u>DOES THE COMPANY SUPPLY PROTECTIVE CLOTHING</u>
6-1	1021	No	No	No
6-2	1031	Yes	Yes	Yes
6-3	1094	Yes	Yes	Yes
6-4	1044	Yes	Yes	Yes
6-5	1094	Yes	Yes	Yes
6-6	1041	No	No	No
6-7	1094	No	No	No
6-8	2421	No	No	No

TABLE XXIX

SURVEY AREA 6

COMPANIES SURVEYED SHOWING SURVEYOR'S RATING OF PROTECTIVE CLOTHING

<u>COMPANY CODE</u>	<u>S.I.C.</u>	<u>SURVEYOR'S RATING</u>	<u>REMARKS OR COMMENTS</u>
6-1	1021	Not Adequate	Other protective clothing items also needed.
6-2	1031	Not Adequate	Other protective clothing items also needed.
6-3	1094	Not Adequate	Loose fit could cause entanglement in machinery, clothing could be lighter and better fitting.
6-4	1044	Adequate	-
6-5	1094	Adequate	-
6-6	1041	Inadequate	Surveyor felt welders should have more protective clothing items.
6-7	1094	Adequate	Slickers very hot to wear.
6-8	None		Protective clothing not issued or worn at this company. Aprons & jackets of metal mesh or leather for kickback protection recommended for certain occupations.

TABLE XL

SURVEY AREA 6

COMPANIES SURVEYED SHOWING CLOTHING REVIEW POLICY

<u>COMPANY CODE</u>	<u>S.I.C.</u>	<u>ARE PROTECTIVE CLOTHING REQUIREMENTS PERIODICALLY REVIEWED</u>	<u>REVIEWED BY</u>
6-1	1021	No	-
6-2	1031	No	-
6-3	1094	No	-
6-4	1044	No	-
6-5	1094	Yes	Management & Union
6-6	1041	No	-
6-7	1094	No	-
6-8	2421	No	-

TABLE XLI

SURVEY AREA 6

COMPANIES SURVEYED SHOWING ADDED RISK OF CLOTHING

<u>COMPANY CODE</u>	<u>S.I.C.</u>	<u>DOES CLOTHING CAUSE ADDED RISK</u>
6-1	1021	No
6-2	1031	No
6-3	1094	No
6-4	1044	Yes, loose fit could cause entanglement in machinery.
6-5	1094	No
6-6	1041	No
6-7	1094	No
6-8	2421	No

TABLE XLIII

AVAILABLE PROTECTIVE CLOTHING vs. HAZARD
SURVEY AREA C
FIELD SURVEY

<u>COMPANY CODE</u>	<u>S. I. C.</u>	<u>SPECIFIC HAZARD</u>	<u>PROTECTIVE CLOTHING (TYPE)</u>	<u>USERS' ACCEPTANCE</u>	<u>REMARKS</u>
6-1	1021	Electrical, Mechanical	Slickers, furnished by worker	Not Acceptable	Workers feel more protection needed.
6-2	1031	Electrical, Mechanical	Leather Sleeves, Aprons, Gloves, and Leggings; Electrician's Gloves, Work Gloves, Wet Suits, Face Shields	Acceptable	
6-3	1094	Radiological, Mechanical	Hard Hats, Safety Glasses, Respirators, 2-pc Rain Suit, Ear Plugs	Not Acceptable	Workers feel clothing could be lighter and better fitting.
6-4	1044	Mechanical	2-pc. Rubber Suit, Slicker, Boots, Hard Hat, Respirator	Acceptable	
6-5	1094	Thermal, Electrical, Radiological	Full Splash Suit, Face Shield, Boots, Gloves, Helmet, Air Pack, Leather Welders' Ensembles, Full Slicker Ensemble	Not Acceptable	Workers feel rubber suits contribute to cases of heat prostration.

TABLE XLII
 AVAILABLE PROTECTIVE CLOTHING vs. HAZARD (cont)

FIELD SURVEY

<u>COMPANY CODE</u>	<u>S.I.C.</u>	<u>SPECIFIC HAZARD</u>	<u>PROTECTIVE CLOTHING (TYPE)</u>	<u>USERS ACCEPTANCE</u>	<u>REMARKS</u>
6-6	1041	Mechanical, Thermal	None Provided	-	-
6-7	1094	Mechanical, Electrical, Radiological	Boots, Slickers, Dust Respirators	Not Acceptable	Workers feel protective clothing too hot.
6-8	2421	Mechanical	None Provided	-	-

BENDIX ACCIDENT DATA

FIRST REPORT OF ACCIDENT DATA

GROUPED BY HAZARD
WELDING OPERATIONS

<u>Hazard</u>	<u>Injury</u>	<u>Body Area</u>	<u>Degree of Injury</u>	<u>Days of Disability</u>	<u>Occupation</u>
M	Fracture	Finger	TTD*	1	Machine Welder
M	Fracture	Foot	Unknown	Unknown	Machine Welder
M	Fracture	Toe	TTD	4	Machine Welder
M	Puncture, Laceration	Hand	Unknown	Unknown	Welder
M	Fracture	Foot	Unknown	Unknown	Welder
M	Puncture, Laceration	Arm	Unknown	Unknown	Welder
M	Laceration	Hand	Unknown	Unknown	Welder
M	Laceration	Arm	Unknown	Unknown	Welder
R	Contusion	Eye	Unknown	Unknown	Welder
R	Flash Burn	Neck	Unknown	Unknown	Welder
T	Burn	Neck	Unknown	Unknown	Welder
R	Flash Burn	Eye	MTI**	0	Planer Feeder

* Total Temporary Disability

** Medical Treatment Injury

FIRST REPORT OF ACCIDENT DATA
 GROUPED BY HAZARD
 ABRASIVE AND BUFFING OPERATIONS

<u>Hazard</u>	<u>Injury</u>	<u>Body Area</u>	<u>Degree of Injury</u>	<u>Days of Disability</u>	<u>Occupation</u>
M	Fracture	Finger	TTD**	6	Grinder
M	Laceration	Hand	TTD	6	Grinder
M	Laceration	Finger	TTD	3	Riveter & Grinder
M	Contusion,	Arm	Unknown	Unknown	Grinder
	Abrasion				
M	Contusion	Chest	MTI***	0	Grinder Operator
M	Fracture	Toe	MTI	0	Grinder
M	Contusion	Arm	TTD	6	Grinder
M	FOE*	Eye	MTI	0	Grinder Operator
M	Laceration	Finger	TTD	6	Grinder Operator
M	Unknown	Leg	TTD	6	Grinder Operator
M	Puncture	Hand	MTI	0	Strip
M	Unknown	Foot	TTD	3	Grinder Operator
M	Unknown	Hand	MTI	0	Grinder Operator
M	Unknown	Unknown	TTD	12	Grinder Operator
M	Unknown	Arm	MTI	0	Grinder Operator
M	Unknown	Unknown	TTD	11	Grinder Operator
M	Unknown	Unknown	TTD	12	Grinder Operator
M	Puncture	Arm	MTI	0	Strip
M	Contusion	Leg	TTD	3	Grinder Operator
M	FOE*	Eye	MTI	0	Grinder Operator
M	Laceration	Hand, Finger	TTD	6	Grinder Operator
M	Unknown	Arm	TTD	6	Grinder Operator
M	Unknown	Hand	TTD	9	Grinder Operator
M	Contusion,	Hand	TTD	1	Grinder Operator
	Laceration				
M	FOE	Eye	Unknown	Unknown	Floor Sander
M	Laceration	Arm	MTI	0	Millwright

* Foreign Object In Eye.
 ** Total Temporary Disability
 *** Medical Treatment Injury

TABLE XLV

FIRST REPORT OF ACCIDENT DATA GROUPED BY HAZARD
PAINTING OPERATIONS

<u>Hazard</u>	<u>Injury</u>	<u>Body Area</u>	<u>Degree of Injury</u>	<u>Days of Disability</u>	<u>Occupation</u>
C	FOE*	Eyes	TTD**	4	Spray Painter
C	FOE	Eyes	TTD	2	Spray Painter
C	FOE	Eyes	Unknown	Unknown	Spray Painter

* Foreign Object In Eye
** Total Temporary Disability

FIRST REPORT OF ACCIDENT DATA GROUPED BY HAZARD
LUMBER AND WOOD PRODUCTS

<u>Hazard</u>	<u>Injury</u>	<u>Body Area</u>	<u>Degree of Injury</u>	<u>Days of Disability</u>	<u>Occupation</u>
M	Laceration	Finger	MTI**	0	Track Crew
M	FOE*	Eye	MTI	0	Conductor
M	FOE	Eye	MTI	0	Section Hand
E	Burns	Face, Arm, Hand	MTI	0	Electrician
M	Puncture	Hand	MTI	0	Unstaker Operator
M	Puncture	Nose	MTI	0	Grader O/B
M	Contusion	Arm	MTI	0	Green Chain Off Bearer
M	Laceration	Finger	MTI	0	Rerip Operator
M	Laceration	Hand	MTI	0	Jack Hammer Operator
M	Contusion	Hand	MTI	0	Millwright
M	Laceration	Hand	MTI	0	Millwright
M	Laceration	Hand	MTI	0	Clean-Up Man
M	Puncture	Hand	MTI	0	Stacker Laborer
M	Contusion	Finger	MTI	0	Laborer
M	Laceration	Finger	MTI	0	Lathe Spotter
M	Contusion	Hand	MTI	0	Oiler
M	Contusion	Knee	MTI	0	Chain Puller
M	Puncture	Thigh	MTI	0	Chain Puller
M	Laceration	Finger	MTI	0	Sort Line Operator
M	FOE	Eye	MTI	0	Skinner Saw Operator
M	Contusion	Finger	MTI	0	Millwright
M	FOE	Eye	MTI	0	Laborer

* Foreign Object In Eye

1 Splinter lodged in thigh of workman wearing leather apron. Apron was twisted and lumber struck employee where apron would have normally protected.

** Medical Treatment Injury

TABLE XLVI

LUMBER AND WOOD PRODUCTS (CONTINUED)

<u>Hazards</u>	<u>Injury</u>	<u>Body Area</u>	<u>Degree of Injury</u>	<u>Days of Disability</u>	<u>Occupation</u>
M	Contusion	Hip	MTI	0	Grader Off Bearer
M	Contusion	Ear	MTI	0	Press Helper
M	Laceration ¹	Arm	MTI	0	Millwright
M	Fracture	Shoulder	TID***	23	Single Rigger
M	Contusion,	Shoulder	MTI	0	Truck Driver
	Laceration				
M	Puncture ²	Hand	MTI	0	Grader Off Bearer
M	Contusion	Hip	MTI	0	Machinist Helper
M	Laceration	Finger	MTI	0	Machinist Helper
M	Contusion	Finger	MTI	0	Glue Press Operator
M	Contusion	Finger	MTI	0	Re-Rip Operator
M	Contusion	Toe	MTI	0	Grader Off Bearer
M	Puncture ³	Abdomen	MTI	0	Grader Off Bearer
M	Puncture	Finger	MTI	0	Carpenter
M	Puncture	Leg	MTI	0	Tallyman
M	Puncture	Leg	MTI	0	Laborer
M	Laceration	Finger	MTI	0	Mechanic
M	Contusion	Knee	MTI	0	Millwright
M	Abrasion	Back	MTI	0	Brush Crew
	Contusion	Leg			
M	Puncture	Foot	MTI	0	Laborer
M	FOE	Eye	MTI	0	Sheet Turner
M	FOE	Eye	MTI	0	Deck Utility
M	Contusion	Chest	MTI	0	Deck Utility
M	Contusion	Foot	MTI	0	Clean-up Man

¹ Employee using angle head portable grinder. Abrasive disk contacted shoulder when he slipped on power cord.

² Splinter penetration hand through leather gloves he was wearing.

³ Splinter from veneer sheet penetrated abdomen; employee was not wearing apron.

***Total Temporary Disability

TABLE XLVI

LUMBER AND WOOD PRODUCTS (CONTINUED)

<u>Hazard</u>	<u>Injury</u>	<u>Body Area</u>	<u>Degree of Injury</u>	<u>Days of Disability</u>	<u>Occupation</u>
M	Contusion	Elbow	MTI	0	Laborer
M	Laceration	Finger	MTI	0	Moulding Tie Up
M	Puncture	Hand	MTI	0	Trimmer-Grader
M	Contusion	Hand	MTI	0	Laborer
M	Abrasion	Head	MTI	0	Green Chain-Off Bearer
M	Contusion	Wrist	TJD	5	Green Chain-Off Bearer
M	FOE	Eye	MTI	0	Stacker Operator
M	Laceration	Chest	MTI	0	Laborer
M	Puncture	Hand	MTI	0	Chain Puller
R	Flash Burn	Eyes	MTI	0	Planer Feeder
M	Contusion, Laceration	Finger	MTI	0	Millwright
T	Burn	Hand	TDD	Unknown	Grader O/B
M	Laceration	Hand	MTI	0	Carrier Driver
M	Puncture	Buttocks	MTI	0	Lift Truck Helper
M	Puncture	Hand	MTI	0	Core Layer
M	FOE	Eye	MTI	0	Clean-up & Hog Tender
M	Crushed	Finger	TJD	Unknown	Trimmer Helper
M	Contusion	Chest	MTI	0	Cut-off Man
M	Puncture	Finger	MTI	0	Laborer
M	Puncture	Leg	MTI	0	Dryer-Tender
C	Dermatitis	Hand	MTI	0	Clean-up Man
M	Laceration	Thumb	MTI	0	Laborer
M	Puncture	Thumb	MTI	0	Green Chain O/B

1 Splinter penetrated hand through leather gloves employee was wearing.

TABLE XLVI

LUMBER AND WOOD PRODUCTS (CONTINUED)

<u>Hazards</u>	<u>Injury</u>	<u>Body Area</u>	<u>Degree of Injury</u>	<u>Days of Disability</u>	<u>Occupation</u>
M	Contusion	Foot	TTD	Unknown	Stacker Helper
M	Contusion	Leg	MTI	0	Green Chain Puller
M	Laceration	Hand	MTI	0	Maintenance Helper
M	Laceration	Head	MTI	0	Fork Lift Operator
M	Puncture	Finger	MTI	0	Veneer Patcher
M	Laceration	Thumb	MTI	0	Chipper Operator
M	Puncture ¹	Hand	MTI	0	Chain Puller
M	Fracture	Rib	MTI	0	Chain Puller
M	Laceration ²	Finger	MTI	0	Choker Setter
M	Laceration	Finger	MTI	0	Press Operator
M	Contusion	Hand	MTI	0	Clean-up Man
M	Laceration	Face	MTI	0	Green Stacker Operator
M	Laceration	Mouth	MTI	0	Brush Crew
M	Laceration	Finger	MTI	0	Clean-up & Hog Tender
M	Laceration	Mouth	MTI	0	Laborer
M	Puncture	Hand	MTI	0	Moulding Tie-up Man
M	Puncture	Hand	MTI	0	Chain Puller
M	Contusion	Shoulder	MTI	0	Green Chain O/B
M	Contusion	Hand	MTI	0	Mill Laborer
M	Laceration	Shoulder	MTI	0	Brush Crew
M	FOE	Eye	MTI	0	Truck Driver

¹ Splinter went through gloves and entered hand.

² Glove caught between wraps of cable during winch operation.

TABLE XLVI

LUMBER AND WOOD PRODUCTS (CONTINUED)

<u>Hazard</u>	<u>Injury</u>	<u>Body Area</u>	<u>Degree of Injury</u>	<u>Days of Disability</u>	<u>Occupation</u>
M	FOE*	Eye	MTI	0	Fork Lift Operator
M	Laceration	Hand	MTI	0	Millwright
M	Fracture, Contusion	Ribs, Back	MTI	3	Rigger
M	Puncture	Foot	MTI	0	Scaler
M	Fracture	Knee	TTD	13	Lead Man-Road Crew
C	Dermatitis	Arm, Face	MTI	0	Sheet Turner
M	Laceration	Hand	MTI	0	Clipper Man
M	Contusion	Wrist	MTI	0	Sorter Feeder
M	Puncture	Finger	MTI	0	Laborer
M	Contusion	Back	MTI	0	Chain Puller
M	Puncture	Hand	MTI	0	Rip Saw Operator
M	Abrasion	Finger	MTI	0	Stacker Operator
M	Contusion	Foot	MTI	0	Stacker Helper
M	Contusion	Knee	MTI	0	Millwright
M	FOE*	Eye	MTI	0	Core Layer
M	Laceration	Finger	MTI	0	Cut-Off Man
M	Puncture	Leg	MTI	0	Grader-off Bearer
M	Abrasion	Leg	MTI	0	Patcher Operator
M	Puncture	Hand	MTI	0	Veneer Feeder
M	Puncture	Thigh	MTI	0	Log Truck Sealer
M	Puncture	Finger	MTI	0	Millwright

TABLE XLVI

LUMBER AND WOOD PRODUCTS (CONTINUED)

<u>Hazards</u>	<u>Injury</u>	<u>Body Area</u>	<u>Degree of Injury</u>	<u>Days of Disability</u>	<u>Occupation</u>
M	Puncture	Leg	MTI	0	Grader
M	Laceration	Finger	MTI	0	Grader Off Bearer
M	Laceration ¹	Head	MTI	0	Utility Man
M	Contusion	Foot	MTI	0	Laborer
M	FOE*	Eye	MTI	0	Core Layer
M	Puncture	Hand	MTI	0	Core Layer
T	Burn ²	Hand	MTI	0	Fork Lift Driver
M	Puncture	Hand	MTI	0	Fork Lift Driver
M	Contusion	Throat	MTI	0	Lathe Spotter
M	Contusion	Elbow	MTI	0	Laborer
M	Contusion	Ankle	MTI	0	Fork Lift Operator
M	FOE*	Eye	MTI	0	Clipper Man
M	Laceration ³	Leg	MTI	0	Chain Puller
M	FOE*	Eye	MTI	0	Millwright
M	Contusion ⁴	Toe	MTI	0	Millwright
M	FOE*	Eye	MTI	0	Fork Lift Operator
M	FOE*	Eye	MTI	0	Fork Lift Operator
M	Puncture	Hand	MTI	0	Moulding Grader
M	Unknown	Arm	MTI	0	Grader-Off Bearer
M	Contusion ⁵	Neck	MTI	0	Laborer
M	Punctures	Leg	MTI	0	Chain Puller
M	Puncture	Finger	MTI	0	Re-Saw Operator

¹ Employee was wearing hard hat; however, piece of lumber struck him under hard hat.

² Employee burned hand checking water level of radiator of fork lift.

³ Employee struck by board which went behind apron.

⁴ Employee dropped heavy object on toe. He was not wearing safety shoes.

⁵ Employee struck by board which went behind apron. Splinter lodged in leg.

TABLE XLVII

ASBESTOS INVOLVEMENT OPERATIONS

FIRST REPORT OF ACCIDENT DATA
GROUPED BY HAZARD

<u>Hazard</u>	<u>Injury</u>	<u>Body Area</u>	<u>Degree of Injury**</u>	<u>Days of Disability</u>	<u>Occupation</u>
Mechanical	Contusion	Finger	MTI	0	Press Operator
	Abrasion				
Mechanical	Contusion	Toe	MTI	0	Internal Grinder
Mechanical	Contusion	Hand	MTI	0	Oven Operator
Mechanical	Contusion	Hand	MTI	0	Stacker Operator
Mechanical	Laceration	Head	TTD	1	Unknown
Mechanical	Contusion	Chest	MTI	0	Grinder Operator
Mechanical	Contusion	Hand	MTI	0	Oven Operator
Mechanical	Contusion	Hand	MTI	0	Machine Operator
Mechanical	*FOE	Eye	MTI	0	Cure Press Operator
Mechanical	Laceration	Finger	MTI	0	Drill Operator
Mechanical	Contusion	Leg	MTI	0	Drill Operator
Mechanical	Laceration	Head	MTI	0	Width Saw Operator
Mechanical	Laceration	Finger	MTI	0	Briquette Press Operator
Mechanical	Contusion	Toe	MTI	0	Briquette Press Operator
Mechanical	*FOE	Eye	TTD	4	Compression Molder
Mechanical	Laceration	Finger	MTI	0	Foreman
Mechanical	Contusion	Finger	MTI	0	Foreman
	Laceration				
Mechanical	Contusion	Arm	MTI	0	Oven Operator
Mechanical	Fracture	Hand	MTI	0	Unknown
Mechanical	Contusion	Arm	MTI	0	Oven Operator

TABLE XLII

ASBESTOS INVOLVEMENT OPERATIONS

FIRST REPORT OF ACCIDENT DATA
GROUPED BY HAZARD
(cont)

<u>Hazard</u>	<u>Injury</u>	<u>Body Area</u>	<u>Degree of Injury**</u>	<u>Days of Disability</u>	<u>Occupation</u>
Mechanical	Laceration	Finger	MTI	0	Cure Press Operator
	Contusion				
Mechanical	Fracture	Arm	TTD	Unknown	Press Operator
Mechanical	Fracture	Toe	MTI	0	Press Operator
Mechanical	Contusion	Foot	TTD	1	Press Operator
Mechanical	Laceration	Finger	MTI	0	Machine Operator
Mechanical	*FOE	Eye	MTI	0	Machine Operator
Mechanical	Laceration	Finger	MTI	0	Machine Operator
Mechanical	Fracture	Arm	TTD	52	Block Department Operator
Mechanical	Fracture	Finger	MTI	0	Block Stamper
Mechanical	Puncture	Arm	TTD	52	Block Mach. Setup Operator
Mechanical	Contusion	Leg	MTI	0	Unknown
Mechanical	Laceration	Head	TTD	1	Receiving
Mechanical	Contusion	Hand	MTI	0	Unknown
Mechanical	Broken	Head	MTI	0	Shipper
	Tooth				
Mechanical	Laceration	Finger	TTD	7	Bender Operator
Mechanical	Fracture	Foot	TTD	Unknown	Bender Operator
Mechanical	*FOE	Eye	TTD	3	Inspector
Mechanical	Contusion	Trunk, Low Abd., and Back	MTI	0	Stock Re-work Operator

252

TABLE XLII

ASBESTOS INVOLVEMENT OPERATIONS

FIRST REPORT OF ACCIDENT DATA
GROUPED BY HAZARD
(cont)

<u>Hazard</u>	<u>Injury</u>	<u>Body Area</u>	<u>Degree of Injury**</u>		<u>Days of Disability</u>	<u>Occupation</u>
Mechanical	Contusion	Finger	MTI		0	Inspector
Mechanical	Contusion	Toe	MTI		0	Inspector
Mechanical	*FOE	Eye	MTI		0	Millwright
Mechanical	Sprain	Leg	TTD		40	Mixer Man
	Contusion					
Mechanical	Fracture	Toe	MTI		0	Grinder
Mechanical	Contusion	Arm	TTD		6	Grinder
Chemical	Dermatitis	Arm	MTI		0	Machine Operator
Chemical	Dermatitis	Arm	TTD		5	Oven Operator
Chemical	Dermatitis	Arms & Legs	MTI		0	Oven Operator
Chemical	Dermatitis	Arms	MTI		0	Oven Operator
Chemical	Dermatitis	Arms	MTI		0	Oven Operator
Chemical	Dermatitis	Arms & Abdomen	MTI		0	Oven Operator
Chemical	Dermatitis	Arms & Abdomen	TTD		10	Machine Operator
Chemical	Dermatitis	Arms, Back, & Trunk	MTI		0	Block Mach. Setup Oper.
Chemical	Dermatitis	Arms & Legs	MTI		0	Block Machine Operator

TABLE XLVII

ASBESTOS INVOLVEMENT OPERATIONS

FIRST REPORT OF ACCIDENT DATA
GROUPED BY HAZARD

(cont)

<u>Hazard</u>	<u>Injury</u>	<u>Body Area</u>	<u>Degree of Injury**</u>	<u>Days of Disability</u>	<u>Occupation</u>
Chemical	Dermatitis	Arms	TTD	Unknown	Compression Molder Mixer Man
Chemical	Dermatitis	Trunk	MTI	0	Block Department
Chemical	Dermatitis	Hands & Trunk	TTD	14	Mixer Man
Chemical	*FOE	Eye	MTI	0	Maintenance Man
Chemical	*FOE	Eye	MTI	0	Custodian
Chemical	Dermatitis	Arms, Trunk, & Leg	MTI	0	Oven Operator
Thermal	Burn	Arm	MTI	0	Cure Press Operator

*Foreign Object in Eye

**MTI = Medical Treatment Injury

TTD = Total Temporary Disability

TABLE XLVIII

CONSTRUCTION

FIRST REPORT OF ACCIDENT DATA
GROUPED BY HAZARD

<u>Hazard</u>	<u>Injury</u>	<u>Body Area</u>	<u>Degree of Injury**</u>	<u>Days of Disability</u>	<u>Occupation</u>
Mechanical	Laceration	Head	MTI	0	Carpenter
Mechanical	Puncture	Hand	MTI	0	Carpenter
Mechanical	Puncture	Hand	MTI	0	Carpenter
Mechanical	Laceration	Finger	MTI	0	Roofing Installer
Radiological ¹	Flash Burn	Eyes	TTD	Unknown	Welder
Mechanical	Abrasion	Finger	MTI	0	Welder
Mechanical	Contusion	Toe	TTD	1	Fork Lift Driver
Mechanical	Puncture	Wrist	MTI	0	Carpenter
Mechanical	Fracture	Thumb	TTD	3	Insulation Installer
Mechanical	Laceration	Finger	MTI	0	Electrician
Mechanical	Fracture	Tooth	MTI	0	Plumbing Installer
Mechanical	Laceration	Hand	MTI	0	Electrician
Chemical ¹	FOE*	Eyes	TTD	Unknown	Spray Painter
Mechanical ²	FOE*	Eyes	MTI	0	Electrician
Mechanical	Puncture	Leg	MTI	0	Carpenter
Mechanical	Puncture	Thumb	MTI	0	Carpenter
Mechanical	Puncture	Wrist	TTD	Unknown	Carpenter
Mechanical	FOE*	Eyes	MTI	0	Plumbing Installer
Mechanical	Puncture	Hand	TTD	5	Siding Installer
Mechanical	Puncture	Hand	MTI	0	Siding Installer
Mechanical	Abrasion	Thumb	MTI	0	Mechanic
Thermal	Burn	Ear	MTI	0	Welder
Chemical	FOE*	Eye	TTD	6	Cabinet Maker
Mechanical	FOE*	Eye	MTI	0	Carpet Installer

¹Employee was not using welding helmet provided. He struck an arc without first pulling down helmet.

²Employee was not utilizing safety goggles provided.

TABLE XLVIII

CONSTRUCTION

FIRST REPORT OF ACCIDENT DATA
GROUPED BY HAZARD
(cont)

<u>Hazard</u>	<u>Injury</u>	<u>Body Area</u>	<u>Degree of Injury**</u>	<u>Days of Disability</u>	<u>Occupation</u>
Mechanical	Puncture	Foot	MTI	0	Laborer
Mechanical	Laceration	Hand	MTI	0	Carpenter
Mechanical ¹	FOE*	Eye	MTI	0	Unknown
Mechanical	Puncture	Foot	MTI	0	Carpenter
Thermal	Burn	Neck	MTI	0	Welder
Mechanical ²	Puncture	Hand	MTI	0	Stock Worker
Mechanical	Laceration	Hand	TTD	4	Insulation Installer
Mechanical	Puncture	Hand	TTD	6	Electrician
Mechanical	Laceration	Finger	MTI	0	Cabinet Maker
Mechanical	Abrasion	Hand	MTI	0	Unknown
Mechanical	Puncture	Leg	TTD	5	Paneling Installer
Mechanical	Laceration	Hand	TTD	3	Carpenter
Mechanical	Puncture	Hand	MTI	0	Electrician
Mechanical	FOE	Eye	MTI	0	Furniture Handler
Mechanical	Laceration	Thumb	MTI	0	Siding Installer
Mechanical	Laceration	Hand	TTD	4	Table Saw Operator
Mechanical ³	FOE	Eye	MTI	0	Table Saw Operator
Mechanical	Laceration	Finger	MTI	0	Finisher

¹Employee was not using safety glasses provided.

²Employee was not using leather gloves provided.

³Employee was not using safety glasses provided.

*Foreign Object in Eye

**MTI = Medical Treatment Injury

TTD = Total Temporary Disability

TABLE XLIX

MOTOR VEHICLE PARTS AND ACCESSORIES

FIRST REPORT OF ACCIDENT DATA
GROUPED BY HAZARD

<u>Hazard</u>	<u>Injury</u>	<u>Body Area</u>	<u>Degree of Injury**</u>	<u>Days of Disability</u>	<u>Occupation</u>
Mechanical	Fracture	Finger	TTD	6	Grinder
Mechanical	Fracture	Toe	Unknown	Unknown	Unknown
Mechanical	Fracture	Finger	TTD	1	Machine Welder
Mechanical	Contusion	Foot	Unknown	Unknown	Unknown
Mechanical	Contusion	Leg	MTI	0	Machine Repair
Mechanical	Fracture	Finger	MTI	0	Unknown
Mechanical	Laceration	Finger	TTD	6	Grinder
Mechanical	Laceration	Finger	TTD	3	Unknown
Mechanical	Contusion	Toe	TTD	7	Unknown
Mechanical	Fracture	Hand	Unknown	Unknown	Unknown
Mechanical	Contusion	Foot	Unknown	Unknown	Unknown
Mechanical	Fracture	Foot	Unknown	Unknown	Machine Welder
Mechanical	Fracture	Toe	TTD	1	Set Up Man
Mechanical	Fracture	Hand	Unknown	Unknown	Unknown
Mechanical	Contusion	Foot	TTD	16	Assembler
Mechanical	Laceration	Finger	Unknown	Unknown	Unknown
Mechanical	Contusion	Foot	TTD	4	Unknown
Mechanical	Puncture	Foot	TTD	1	Press Operator
Mechanical	Fracture	Finger	Unknown	Unknown	Unknown
Mechanical	Contusion	Head	TTD	1	Unknown
Mechanical	Fracture	Finger	MTI	0	Unknown
Mechanical	Laceration	Finger	TTD	3	Riveter & Grinder

TABLE XLIX

MOTOR VEHICLE PARTS AND ACCESSORIES

FIRST REPORT OF ACCIDENT DATA
GROUPED BY HAZARD

(cont)

<u>Hazard</u>	<u>Injury</u>	<u>Body Area</u>	<u>Degree of Injury**</u>	<u>Days of Disability</u>	<u>Occupation</u>
Mechanical	Fracture	Finger	Unknown	Unknown	Unknown
Mechanical	Laceration	Finger	TTD	2	Unknown
Mechanical	Contusion	Hand	Unknown	Unknown	Unknown
Mechanical	Laceration	Head	Unknown	Unknown	Unknown
Mechanical	Fracture	Finger	Unknown	Unknown	Die Maker
Mechanical	Laceration	Hand	Unknown	Unknown	Unknown
Mechanical	Laceration	Finger	Unknown	Unknown	Unknown
Mechanical	Contusion	Leg	Unknown	Unknown	Bench Maintenance
Mechanical	Fracture	Hand	Unknown	Unknown	TIP Driver
Mechanical	Fracture	Finger	TTD	4	Chucker Operator
Mechanical	Fracture	Foot	Unknown	Unknown	Unknown
Mechanical	*FOE	Eye	TTD	5	Unknown
Mechanical	Laceration	Finger	Unknown	Unknown	Unknown
Mechanical	Laceration	Finger	Unknown	Unknown	Unknown
Mechanical	Contusion	Toe	TTD	4	Unknown
Mechanical	Fracture	Finger	MTI	0	Unknown
Mechanical	Contusion	Foot	TTD	3	Unknown
Mechanical	Contusion	Toe	TTD	6	Unknown
Mechanical	Infection				
Mechanical	Fracture	Toe	TTD	4	Machine Welder
Mechanical	Contusion	Toe	TTD	5	Welder
Mechanical	Contusion	Finger	Unknown	Unknown	Grinder
	Abrasion				

TABLE XLIX

MOTOR VEHICLE PARTS AND ACCESSORIES

FIRST REPORT OF ACCIDENT DATA
GROUPED BY HAZARD

(cont)

<u>Hazard</u>	<u>Injury</u>	<u>Body Area</u>	<u>Degree of Injury**</u>	<u>Days of Disability</u>	<u>Occupation</u>
Mechanical	Fracture	Foot	Unknown	Unknown	Welder
Mechanical	Fracture	Hand	Unknown	Unknown	Unknown
Mechanical	Laceration	Finger	Unknown	Unknown	Unknown
Mechanical	Laceration	Arm	TTD	4	Riveter - Grinder
Mechanical	Fracture	Finger	TTD	1	Unknown
Mechanical	Contusion &	Toe	TTD	7	Store Keeper
Mechanical	Laceration	Laceration & Finger	Unknown	Unknown	Unknown
Mechanical	Fracture	Finger	Unknown	Unknown	Welder
Mechanical	Puncture	Finger	Unknown	Unknown	Millwright
Mechanical	Laceration	Laceration &	Unknown	Unknown	
Mechanical	Laceration & Contusion	Head & Arms	Unknown	Unknown	
Mechanical	Fracture	Chest	Unknown	Unknown	Unknown
Mechanical	Fracture	Finger	Unknown	Unknown	Unknown
Mechanical	Fracture	Finger	Unknown	Unknown	Unknown
Mechanical	*FOE	Eye	Unknown	Unknown	Unknown
Mechanical	Contusion	Toe	Unknown	Unknown	Unknown
Chemical	*FOE	Eye	TTD	4	Spray Painter
Mechanical	Contusion	Foot	TTD	4	Unknown

*Foreign Object in Eye
 **MTI = Medical Treatment Injury
 TTD = Total Temporary Disability

TABLE XLIX

MOTOR VEHICLE PARTS AND ACCESSORIES

FIRST REPORT OF ACCIDENT DATA
GROUPED BY HAZARD

(cont)

<u>Hazard</u>	<u>Injury</u>	<u>Body Area</u>	<u>Degree of Injury**</u>	<u>Days of Disability</u>	<u>Occupation</u>
Mechanical	Fracture	Toe	TTD	30	Shipper & Receiver
Mechanical	Laceration	Hand	TTD	4	Oven Relief Operation
Mechanical	Fracture	Finger	MTI	0	Oven Operator
Mechanical	Contusion	Foot	TTD	5	Resin Tester
Mechanical	Contusion	Hand	TTD	1	Press Operator
Mechanical	Laceration	Finger	TTD	13	Oven Operator
Mechanical	*FOE	Eye	MTI	0	Grinder Operator
Mechanical	*FOE	Eye	MTI	0	Resin Maker
Mechanical	Laceration	Finger	TTD	6	Grinder Operator
Mechanical	Unknown	Foot	TTD	6	Grinder Operator
Mechanical	Unknown	Hand	MTI	0	Inspector
Mechanical	Contusion	Finger	TTD	10	Oven Operator
Mechanical	Unknown	Arm	MTI	0	Millwright
Mechanical	Puncture	Finger	TTD	10	Oven Operator
Mechanical	Laceration	Head	TTD	2	Oven Operator
Mechanical	Unknown	Arm	TTD	2	Inspector
Mechanical	Unknown	Foot	TTD	9	Oven Operator
Mechanical	Laceration	Finger	TTD	15	Press Operator
Mechanical	Puncture	Arm	MTI	0	Strip Grinder Operator
Mechanical	Unknown	Foot	TTD	16	Oven Operator
Mechanical	Fracture	Toe	MTI	0	Electrician
Mechanical	Puncture	Arm	MTI	0	Press Operator

TABLE XLIX

MOTOR VEHICLE PARTS AND ACCESSORIES

FIRST REPORT OF ACCIDENT DATA
GROUPED BY HAZARD

(cont)

<u>Hazard</u>	<u>Injury</u>	<u>Body Area</u>	<u>Degree of Injury**</u>	<u>Days of Disability</u>	<u>Occupation</u>
Mechanical	Laceration	Arm	TTD	23	Shipper & Receiver
Mechanical	Unknown	Foot	TTD	3	Grinder Operator
Mechanical	Unknown	Hand	TTD	2	Press Operator
Mechanical	Laceration	Finger	MTI	0	Press Operator
Mechanical	Laceration	Finger	MTI	0	Resin Maker
Mechanical	Contusion	Finger	TTD	5	Oven Operator
Mechanical	Puncture	Arm	TTD	19	Electrical
Mechanical	Unknown	Head	MTI	0	Parts Fabricator
Mechanical	Contusion	Foot	TTD	13	Slitter Operator
Mechanical	Unknown	Finger	TTD	7	Oven Operator
Mechanical	Unknown	Chest	TTD	24	Curing & Compacting
Mechanical	Laceration	Finger	MTI	0	Electrician
Mechanical	Laceration	Finger	MTI	0	Press Operator
Mechanical	Amputation	Finger	TTD	53	Slitter Operator
Mechanical	Contusion	Finger	TTD	6	Oven Operator
Mechanical	Puncture	Finger	MTI	0	Stencil & Packer
Mechanical	Unknown	Toe	TTD	18	Extruder Operator
Mechanical	*FOE	Eye	MTI	0	Press Operator
Mechanical	Unknown	Finger	MTI	0	Grinder Operator
Mechanical	Unknown	Finger	MTI	0	Inspector
Mechanical	Unknown	Finger	TTD	12	Press Operator
Mechanical	Fracture	Toe	TTD	12	Bender Operator

TABLE XLIX

MOTOR VEHICLE PARTS AND ACCESSORIES

FIRST REPORT OF ACCIDENT DATA
GROUPED BY HAZARD

(cont)

<u>Hazard</u>	<u>Injury</u>	<u>Body Area</u>	<u>Degree of Injury**</u>	<u>Days of Disability</u>	<u>Occupation</u>
Mechanical	Laceration	Hand	TTD	4	Bender Operator
Mechanical	Unknown	Chest	TTD	4	Press Operator
Mechanical	Unknown	Finger	TTD	20	Press Operator
Mechanical	Unknown	Knee	TTD	3	Press Operator
Mechanical	Unknown	Groin	TTD	6	Bender Operator
Mechanical	Contusion	Knee	TTD	4	Stencil & Packer
Mechanical	Contusion	Toe	TTD	3	Oven Operator
Mechanical	Fracture	Wrist	TTD	50	Truck Driver
Mechanical	Unknown	Chest	MTI	0	Oven Operator
Mechanical	Puncture	Finger	TTD	3	Inspector
Mechanical	*FOE	Eye	MTI	0	Press Operator
Mechanical	Unknown	Finger	MTI	0	Shipper
Mechanical	Unknown	Finger	TTD	10	Slitter Operator
Mechanical	Laceration	Hand	TTD	33	Bender Operator
Mechanical	Unknown	Finger	TTD	30	Bender Operator
Mechanical	Unknown	Toe	TTD	30	Leader
Chemical	Dermatitis	Arm	MTI	0	Laborer
Chemical	Dermatitis	Hand	MTI	0	Compression Molder
Chemical	Dermatitis	Body, Face & Arms	TTD	14	Press Operator
Chemical	Burn	Eye	TTD	5	Resin Leader
Chemical	Dermatitis	Unknown	TTD	4	Resin Tester

TABLE XLIX

MOTOR VEHICLE PARTS AND ACCESSORIES

FIRST REPORT OF ACCIDENT DATA
GROUPED BY HAZARD
(Cont)

<u>Hazard</u>	<u>Injury</u>	<u>Body Area</u>	<u>Degree of Injury**</u>	<u>Days of Disability</u>	<u>Occupation</u>
Chemical	Dermatitis	Arm	TTD	4	Press Operator
Chemical	Burn	Leg	MTI	0	Stock Control
Thermal	Burn	Finger	TTD	4	Press Operator
Unknown	Unknown	Eye	TTD	9	Millwright
Unknown	Unknown	Finger	TTD	11	Press Operator
Unknown	Unknown	Finger	TTD	12	Grinder Operator
Unknown	Unknown	Eye	TTD	1	Resin Tester

*Foreign Object in Eye

**MTI = Medical Treatment Injury

TTD = Total Temporary Disability

STATE ACCIDENT DATA

TABLE L

ACCIDENT STATISTICS, OHIO, 1972

ACCIDENT CAUSE	TOTAL CASES	DEGREE OF INJURY				TYPE OF ACCIDENT								NATURE OF INJURY							PART OF BODY					
		Fatal	Permanent Total Disability	Permanent Partial Disability	Temporary Total Disability (+7 days)	Temporary Total Disability (-7 days)	Contact with Temperature Extremes	Contact with Electric Current	Inhalation Absorption	Striking Against Objects or Material	Struck by Moving Objects	Occupational Disease	Asphyxiation Including Drowning	Burns, Scalds	Contusion	Foreign Body	Laceration	Puncture	Occupational Disease	Chest	Back	Trunk	Arms			
MECHANICAL HAZARDS																										
Buffers	61			6	45	10																				
Grinders	550	3		23	287	237																				
Die Casting Machines	50	1		16	31	2																				
Misc. Foundry Machines	84			4	70	10																				
Forging Press	45			7	36	2																				
Borer or Drill, Metal	205			21	142	42																				
Lathe	167			16	123	28																				
Borer or Drill, Stone	39			8	28	3																				
Punch Press	424			127	258	37																				
Folders, Brakers	59			15	43	1																				
Clay, Glass, Stone Mold.	49			9	34	5																				
Plastic Inject.	125	1		22	83	19																				
Gear Cutting/ Milling	95			10	65	20																				
Tire & Tube Maker	157			6	140	11																				

TABLE L

ACCIDENT STATISTICS, OHIO, 1972
(cont)

ACCIDENT CAUSE	TOTAL CASES	DEGREE OF INJURY					TYPE OF ACCIDENT					NATURE OF INJURY					PART OF BODY							
		Fatal	Permanent Total Disability	Permanent Partial Disability	Temporary Total Disability (+7 days)	Temporary Total Disability (-7 days)	Contact with Temperature Extremes	Contact with Electric Current	Inhalation Absorption	Striking Against Objects or Material	Struck by Moving Objects	Occupational Disease	Asphyxiation Including Drowning	Burns, Scalds	Contusion	Foreign Body	Laceration	Puncture	Occupational Disease	Chest	Back	Trunk	Arms	
ELECTRICAL HAZARDS																								
Transformers Overhead	14	1	1		11	1			4				1								4	3		
Conductors Underground	35	12		2	20	1		34													28	3		
Conductors In Buildings	4			4				2													1	3		
Switch Board and Bus	34	3			25	6		34													22	1		
Switches, Circ. Breakers, Fuse	7		1		5	2		6													4			
	60		1	1	46	13		54					1	1							27	9		

TABLE L

ACCIDENT STATISTICS, OHIO, 1972
(cont.)

ACCIDENT CAUSE	TOTAL CASES	DEGREE OF INJURY				TYPE OF ACCIDENT				NATURE OF INJURY							PART OF BODY									
		Fatal	Permanent Total Disability	Permanent Partial Disability	Temporary Total Disability (+7 days)	Temporary Total Disability (-7 days)	Contact with Temperature Extremes	Contact with Electric Current	Inhalation Absorption	Striking Against Objects or Material	Struck by Moving Objects	Occupational Disease	Asphyxiation Including Drowning	Burns, Scalds	Contusion	Foreign Body	Laceration	Puncture	Occupational Disease	Chest	Back	Trunk	Arms			
997 CHEMICAL HAZARDS																										
Gas Mfg. (light & heat)	24				21	3	17														15			3		
Natural Gas (light & heat)	26	2			19	5	19			1											16			4		
Acids	37				24	13															4			6		
Formic	1				1																1			1		
Hydrochloric	24	1			14	8				1											1			1		
Nitric	7				6	1															1			1		
Alkalies	11				9	2															1			5		
Ammonia	13				9	4															2			2		
Cement	56				46	10															2			4		
Lime	15				12	3															2			2		
Caustic Soda	12				6	6																		3		
Gasoline	12				5	7																		1		
Oils	15				8	7																		2		
Chlorine	20				8	12																		2		
Poison Ivy	21				13	8						15												4		

TABLE L

ACCIDENT STATISTICS, OHIO, 1972

(cont.)

ACCIDENT CAUSE	TOTAL CASES	DEGREE OF INJURY				TYPE OF ACCIDENT								NATURE OF INJURY						PART OF BODY					
		Fatal	Permanent Total Disability	Permanent Partial Disability	Temporary Total Disability (+7 days)	Temporary Total Disability (-7 days)	Contact with Temperature Extremes	Contact with Electric Current	Inhalation Absorption	Striking Against Objects or Material	Struck by Moving Objects	Occupational Disease	Asphyxiation Including Drowning	Burns, Scalds	Contusion	Foreign Body	Laceration	Puncture	Occupational Disease	Chest	Back	Trunk	Arms		
THERMAL HAZARDS																									
Fire & Flame	387	5			300	82	387													1	4	172	57		
Metal-Molten	632	1			488	143	632															91	98		
Gasoline	27	2			22	3	27															13	3		
Petroleum Products	77				58	19	77															20	15		
Slag	40				28	12	40															1	3		
Steam	102				73	29	102															29	14		
Hot Water	355				267	87	355															108	42		
Hot Grease	166	1			126	40	166															3	30	43	

TABLE LI
 PERCENTAGE DISTRIBUTION OF DISABLING
 INJURIES AND DAYS LOST BY NATURE OF INJURY
 FLORIDA 1971

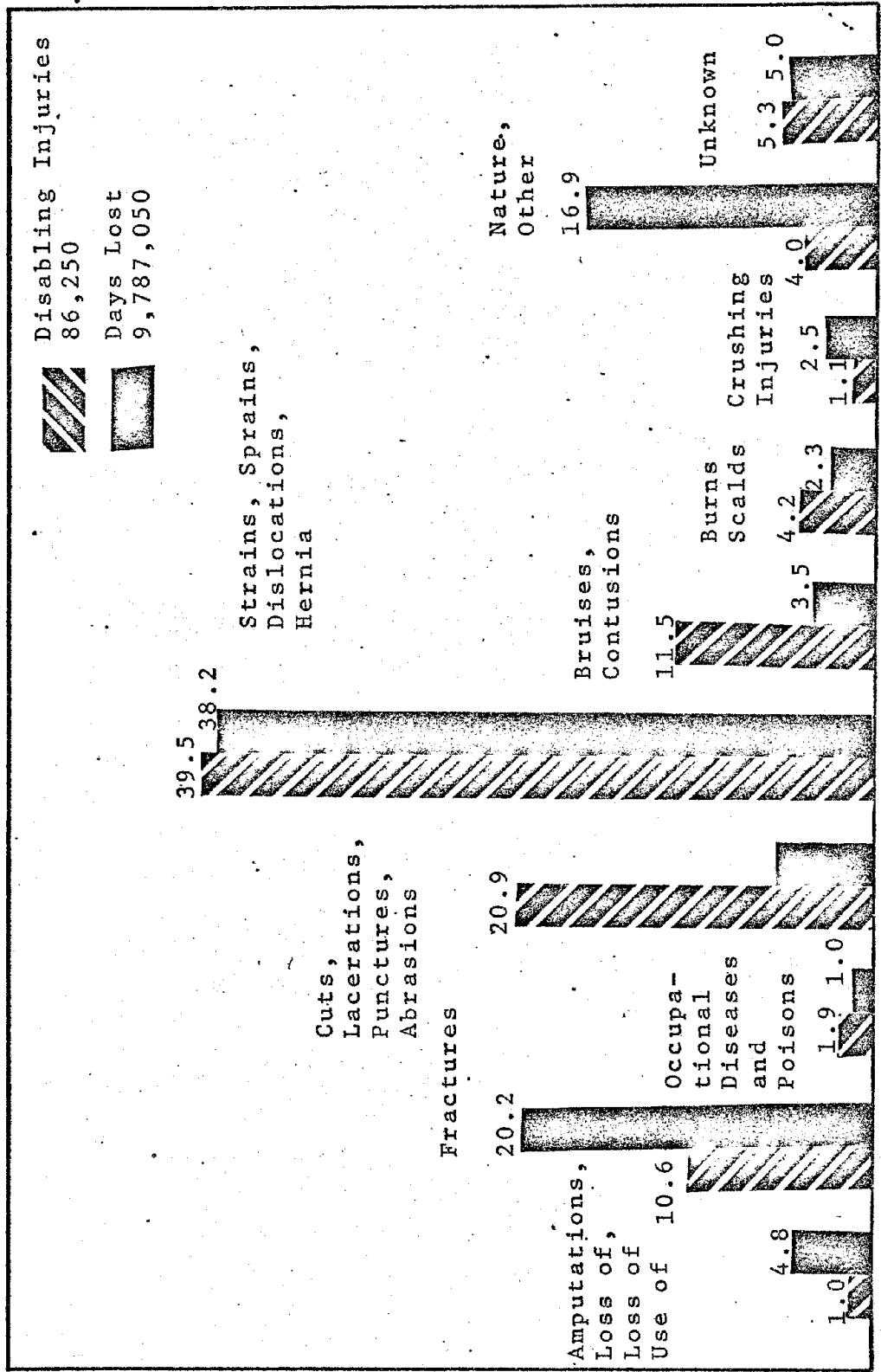


TABLE LII
 PERCENTAGE DISTRIBUTION OF
 DISABLING INJURIES AND DAYS LOST
 BY ACCIDENT CAUSE
 FLORIDA 1971

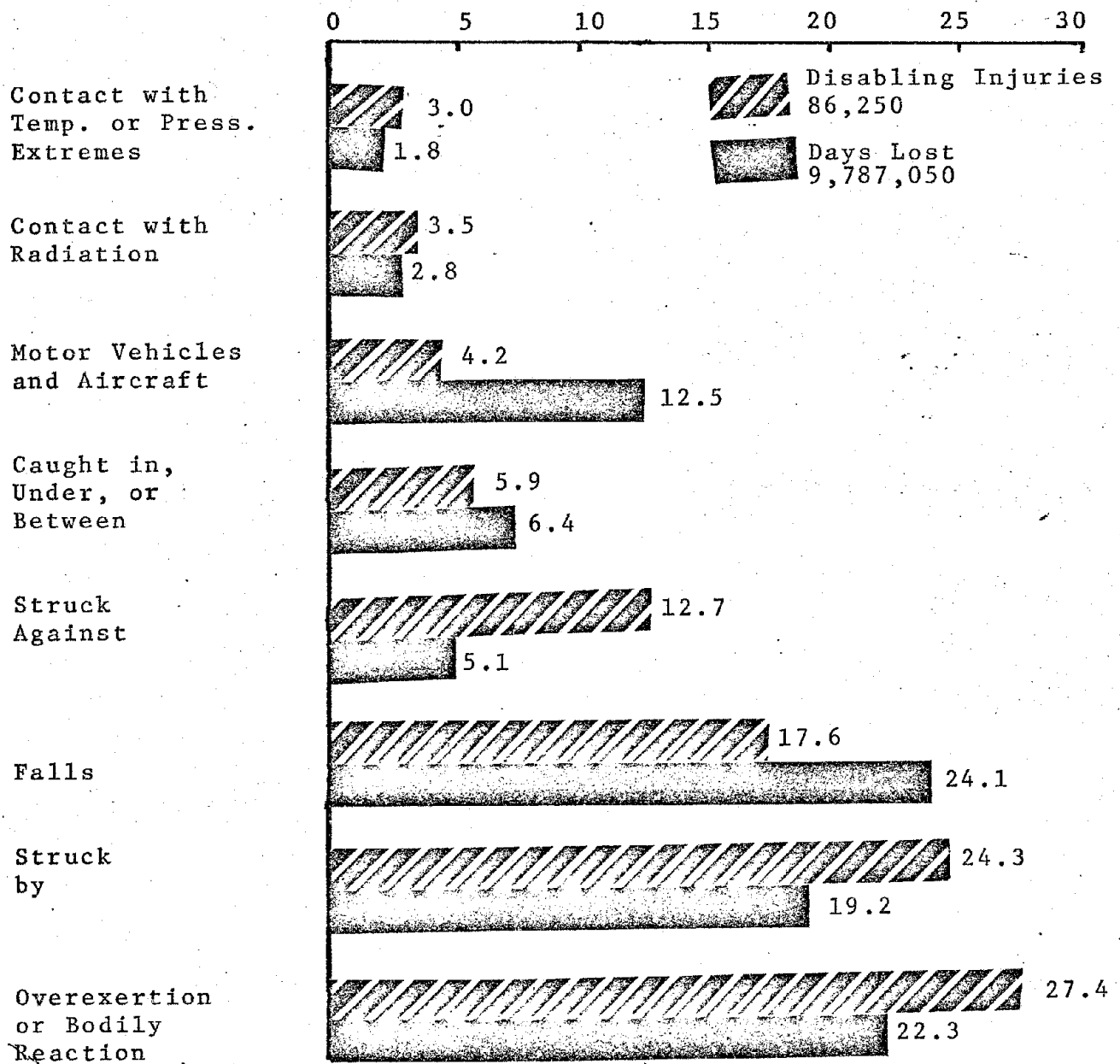


TABLE LIII

PERCENTAGE DISTRIBUTION OF DISABLING INJURIES BY NATURE CALIFORNIA 1972

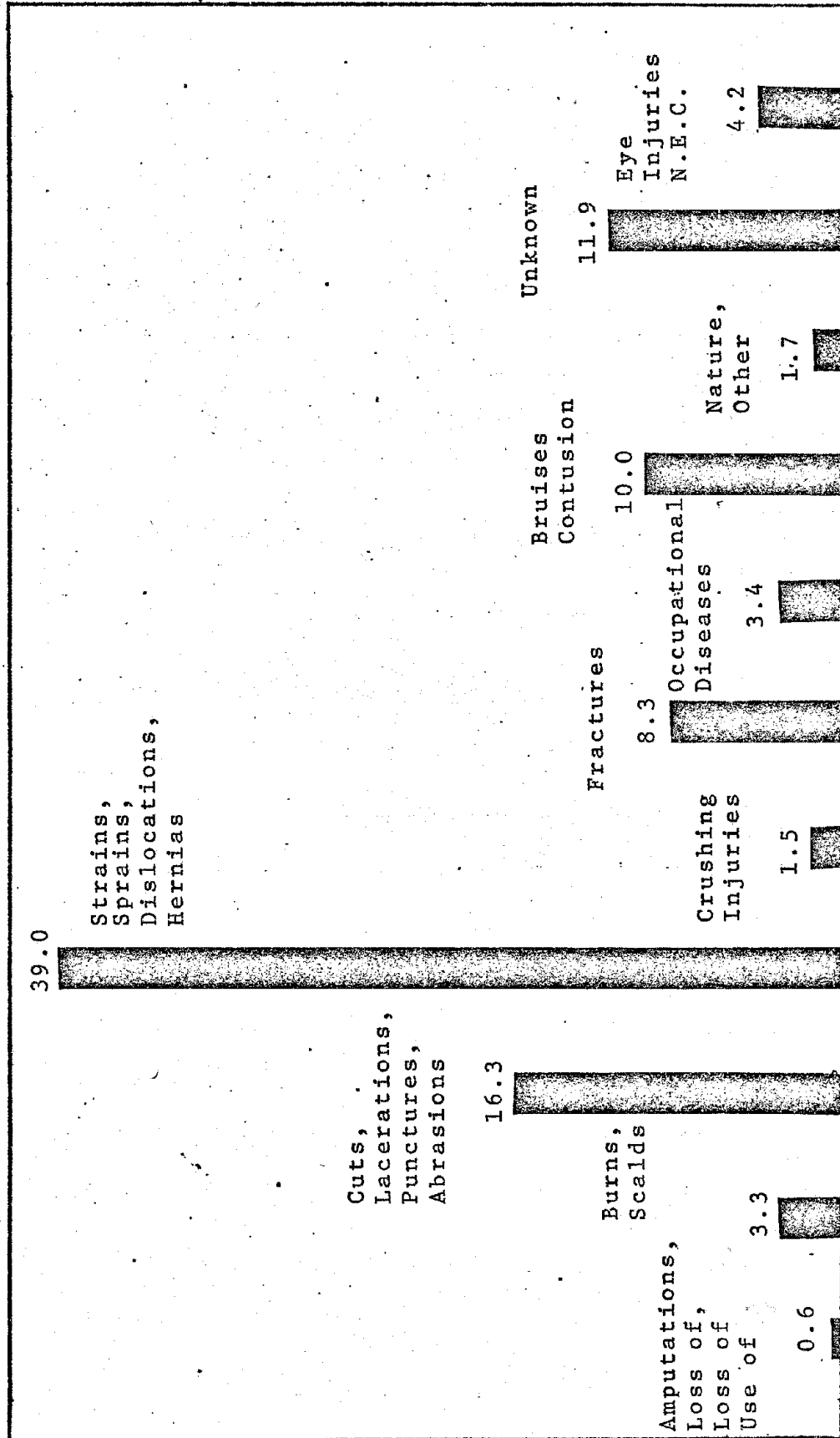


TABLE LIV
 PERCENTAGE DISTRIBUTION OF DISABLING INJURIES
 BY ACCIDENT CAUSE
 CALIFORNIA, 1972

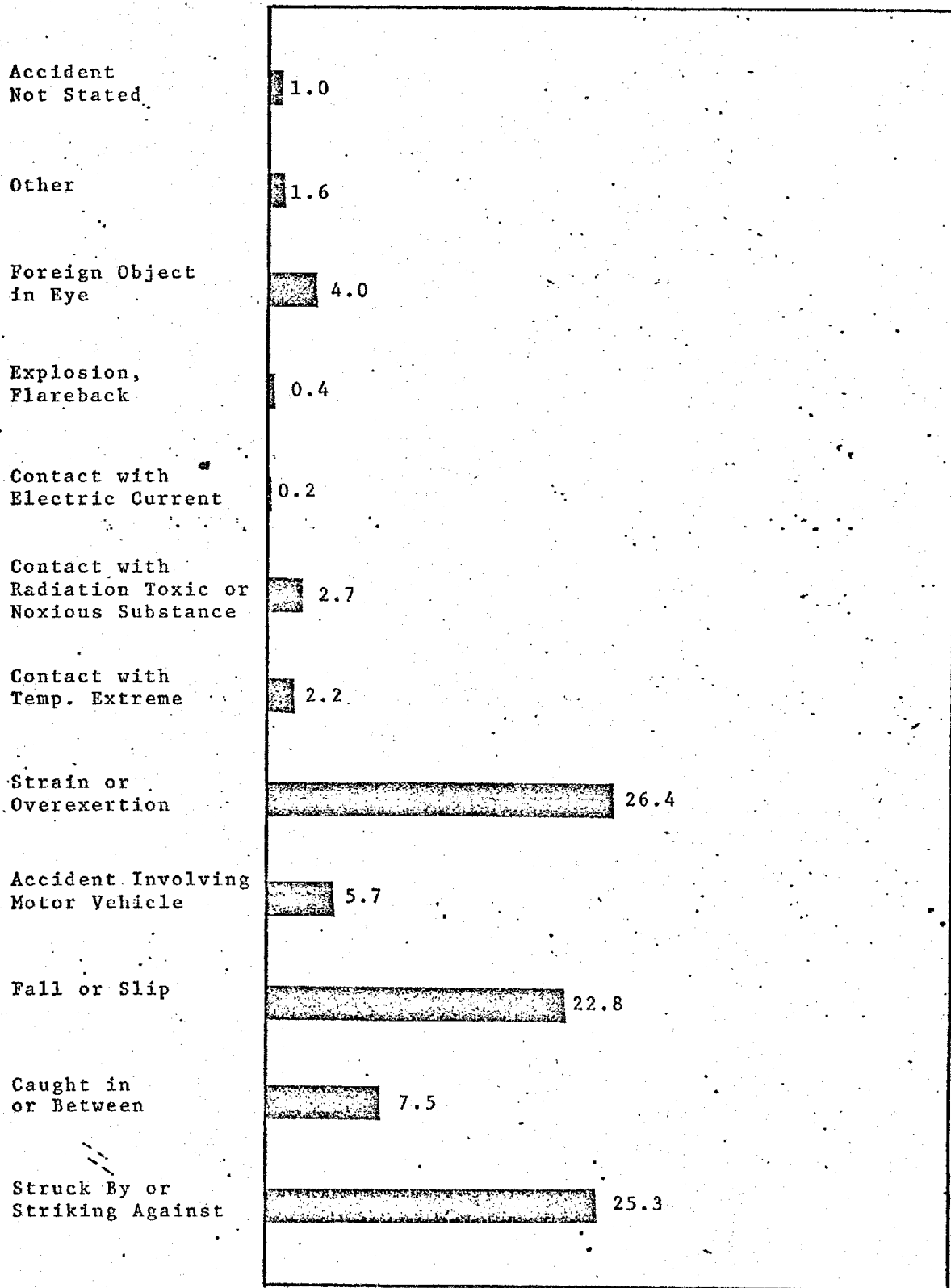


TABLE LV

STATE OF CALIFORNIA, 1971

TORSO PROTECTIVE CLOTHING RELATED INJURIES

Abrasive and Buffing Operations

<u>Industry</u>	<u>Injury Total</u>	<u>Trunk Injuries</u>	<u>Torso Protective Clothing Related %</u>
Iron and Steel Foundries	678	202	18.2
Nonferrous Foundries	601	173	17.6
Average			17.90

Metal Mining and Uranium Mining

<u>Industry</u>	<u>Injury Total</u>	<u>Trunk Injuries</u>	<u>Torso Protective Clothing Related %</u>
Metal Mining	178	49	16.5

Steel Mills and Pig Iron Production

<u>Industry</u>	<u>Injury Total</u>	<u>Trunk Injuries</u>	<u>Torso Protective Clothing Related %</u>
Blast Furnaces and Basic Steel Products	949	262	16.8

Construction

<u>Industry</u>	<u>Injury Total</u>	<u>Trunk Injuries</u>	<u>Torso Protective Clothing Related %</u>
Construction	20,832	6,567	19.2

Painting Operations

<u>Industry</u>	<u>Injury Total</u>	<u>Trunk Injuries</u>	<u>Torso Protective Clothing Related %</u>
Painting and Paper Hanging	637	202	19.3

Welding Operations

<u>Industry</u>	<u>Injury Total</u>	<u>Trunk Injuries</u>	<u>Torso Protective Clothing Related %</u>

No Data Available

TABLE LV

STATE OF CALIFORNIA, 1971

TORSO PROTECTIVE CLOTHING RELATED INJURIES
(Continued)Silica Dust Generating Operations

<u>Industry</u>	<u>Injury Total</u>	<u>Trunk Injuries</u>	<u>Torso Protective Clothing Related %</u>
Masonry, Stonework, Plastering	1,547	529	20.9
Rock, Sand, Gravel Quarrying Stone, Clay, and Glass Products	188	52	16.9
Iron and Steel Foundries	3,100	1,014	20.0
Nonferrous Foundries	678	202	18.2
	601	173	17.6
Average			18.72

Lumber and Wood Products

<u>Industry</u>	<u>Injury Total</u>	<u>Trunk Injuries</u>	<u>Torso Protective Clothing Related %</u>
Lumber and Wood Products	4,538	1,246	16.7

Metal Fabrications

<u>Industry</u>	<u>Injury Total</u>	<u>Trunk Injuries</u>	<u>Torso Protective Clothing Related %</u>
Fabricated Metal Products	6,408	1,671	15.9

Public Utilities

<u>Industry</u>	<u>Injury Total</u>	<u>Trunk Injuries</u>	<u>Torso Protective Clothing Related %</u>
Electric and Gas Utilities Water, Heat, and Sanitary Services	1,330	501	23.0
	3,480	1,299	22.8
Average			22.9

Glass Production

<u>Industry</u>	<u>Injury Total</u>	<u>Trunk Injuries</u>	<u>Torso Protective Clothing Related %</u>
Glass and Glassware	683	190	17.0

TABLE LV

STATE OF CALIFORNIA, 1971

TORSO PROTECTIVE CLOTHING RELATED INJURIES
(Continued)Machine Tool Production

<u>Industry</u>	<u>Injury Total</u>	<u>Trunk Injuries</u>	<u>Torso Protective Clothing Related %</u>
Metal Working Machinery	380	98	15.7

Chemical and Allied Products

<u>Industry</u>	<u>Injury Total</u>	<u>Trunk Injuries</u>	<u>Torso Protective Clothing Related %</u>
Chemical and Allied Products	2,177	706	19.8

Oil Refining

<u>Industry</u>	<u>Injury Total</u>	<u>Trunk Injuries</u>	<u>Torso Protective Clothing Related %</u>
Petroleum Refining	295	106	21.9

Vehicle Production

<u>Industry</u>	<u>Injury Total</u>	<u>Trunk Injuries</u>	<u>Torso Protective Clothing Related %</u>
Motor Vehicle and Equipment	1,329	419	19.2

Insecticide and Pesticide Spraying Operations

<u>Industry</u>	<u>Injury Total</u>	<u>Trunk Injuries</u>	<u>Torso Protective Clothing Related %</u>
Spraying and Pest Control	237	48	12.4

Heat-Stress Involvement Operations

<u>Industry</u>	<u>Injury Total</u>	<u>Trunk Injuries</u>	<u>Torso Protective Clothing Related %</u>
Primary Metal Industries	3,326	951	17.4
Glass and Glassware	683	190	17.0
Average			17.2

TABLE LV

STATE OF CALIFORNIA, 1971

TORSO PROTECTIVE CLOTHING RELATED INJURIES
(Continued)Asbestos Operations

<u>Industry</u>	<u>Injury Total</u>	<u>Trunk Injuries</u>	<u>Torso Protective Clothing Related %</u>
-----------------	-------------------------	---------------------------	--

No Data Available

Rubber and Tire Production

<u>Industry</u>	<u>Injury Total</u>	<u>Trunk Injuries</u>	<u>Torso Protective Clothing Related %</u>
-----------------	-------------------------	---------------------------	--

Tires and Inner Tubes	507	178	21.4
-----------------------	-----	-----	------

Other Fabricated Rubber Products	582	176	18.4
-------------------------------------	-----	-----	------

Average			19.9
---------	--	--	------

Coal Mining

<u>Industry</u>	<u>Injury Total</u>	<u>Trunk Injuries</u>	<u>Torso Protective Clothing Related %</u>
-----------------	-------------------------	---------------------------	--

No Data Available

Bakeries

<u>Industry</u>	<u>Injury Total</u>	<u>Trunk Injuries</u>	<u>Torso Protective Clothing Related %</u>
-----------------	-------------------------	---------------------------	--

Bakery Products	1,047	324	18.9
-----------------	-------	-----	------

Bacterial Involvement

<u>Industry</u>	<u>Injury Total</u>	<u>Trunk Injuries</u>	<u>Torso Protective Clothing Related %</u>
-----------------	-------------------------	---------------------------	--

Medical and Other Health Services	6,565	2,944	27.4
--------------------------------------	-------	-------	------

TABLE LV

STATE OF CALIFORNIA, 1971

TORSO PROTECTIVE CLOTHING RELATED INJURIES
(Continued)Beryllium Operations

<u>Industry</u>	<u>Injury Total</u>	<u>Trunk Injuries</u>	<u>Torso Protective Clothing Related %</u>
Misc. Fabricated Metal Products	840	213	15.5

X-ray Operations

<u>Industry</u>	<u>Injury Total</u>	<u>Trunk Injuries</u>	<u>Torso Protective Clothing Related %</u>
Hospitals	3,388	1,522	27.4

Metal Smelting

<u>Industry</u>	<u>Injury Total</u>	<u>Trunk Injuries</u>	<u>Torso Protective Clothing Related %</u>

No Data Available

California reports 39 percent of all injuries are strains, sprains, dislocations and hernias.

TABLE LVI

STATE OF PENNSYLVANIA, APRIL 1973

TORSO PROTECTIVE CLOTHING RELATED INJURIES

Abrasive and Buffing Operations

<u>Industry</u>	<u>Injury Total</u>	<u>Trunk Injuries</u>	<u>Torso Protective Clothing Related %</u>
-----------------	---------------------	-----------------------	--

No Data Available

Metal Mining and Uranium Mining

<u>Industry</u>	<u>Injury Total</u>	<u>Trunk Injuries</u>	<u>Torso Protective Clothing Related %</u>
-----------------	---------------------	-----------------------	--

Mining and Quarrying, N.E.C.	33	7	14.8
------------------------------	----	---	------

Steel Mills and Pig Iron Production

<u>Industry</u>	<u>Injury Total</u>	<u>Trunk Injuries</u>	<u>Torso Protective Clothing Related %</u>
-----------------	---------------------	-----------------------	--

No Data Available

Construction

<u>Industry</u>	<u>Injury Total</u>	<u>Trunk Injuries</u>	<u>Torso Protective Clothing Related %</u>
-----------------	---------------------	-----------------------	--

General Building Contractors	336	85	17.7
Heavy Construction Contractors	133	30	15.8
Special Trade Contractors	476	96	14.1

Average			15.87
---------	--	--	-------

Painting Operations

<u>Industry</u>	<u>Injury Total</u>	<u>Trunk Injuries</u>	<u>Torso Protective Clothing Related %</u>
-----------------	---------------------	-----------------------	--

No Data Available

Welding Operations

<u>Industry</u>	<u>Injury Total</u>	<u>Trunk Injuries</u>	<u>Torso Protective Clothing Related %</u>
-----------------	---------------------	-----------------------	--

No Data Available

TABLE LVI

STATE OF PENNSYLVANIA, APRIL 1973

TORSO PROTECTIVE CLOTHING RELATED INJURIES
(Continued)Silica Dust Generating Operations

<u>Industry</u>	<u>Injury Total</u>	<u>Trunk Injuries</u>	<u>Torso Protective Clothing Related %</u>
Stone, Clay, Glass Products	303	87	20.1

Lumber and Wood Products

<u>Industry</u>	<u>Injury Total</u>	<u>Trunk Injuries</u>	<u>Torso Protective Clothing Related %</u>
Lumber and Wood Products	136	26	13.4

Metal Fabrications

<u>Industry</u>	<u>Injury Total</u>	<u>Trunk Injuries</u>	<u>Torso Protective Clothing Related %</u>
Fabricated Metal Products	609	137	15.7

Public Utilities

<u>Industry</u>	<u>Injury Total</u>	<u>Trunk Injuries</u>	<u>Torso Protective Clothing Related %</u>
Communication and Utilities	148	62	29.3

Glass Production

<u>Industry</u>	<u>Injury Total</u>	<u>Trunk Injuries</u>	<u>Torso Protective Clothing Related %</u>

No Data Available

Machine Tool Production

<u>Industry</u>	<u>Injury Total</u>	<u>Trunk Injuries</u>	<u>Torso Protective Clothing Related %</u>

No Data Available

TABLE LVI

STATE OF PENNSYLVANIA, APRIL 1973

TORSO PROTECTIVE CLOTHING RELATED INJURIES
(Continued)

Chemical and Allied Products

<u>Industry</u>	<u>Injury Total</u>	<u>Trunk Injuries</u>	<u>Torso Protective Clothing Related %</u>
Chemical and Allied Products	128	43	23.5

Oil Refining

<u>Industry</u>	<u>Injury Total</u>	<u>Trunk Injuries</u>	<u>Torso Protective Clothing Related %</u>
Petroleum and Coal Products	48	14	20.4

Vehicle Production

<u>Industry</u>	<u>Injury Total</u>	<u>Trunk Injuries</u>	<u>Torso Protective Clothing Related %</u>
Transportation Equipment	305	75	17.2

Insecticide and Pesticide Spraying Operations

<u>Industry</u>	<u>Injury Total</u>	<u>Trunk Injuries</u>	<u>Torso Protective Clothing Related %</u>
-----------------	---------------------	-----------------------	--

No Data Available

Heat-Stress Involvement Operations

<u>Industry</u>	<u>Injury Total</u>	<u>Trunk Injuries</u>	<u>Torso Protective Clothing Related %</u>
Primary Metal Industries	710	140	13.8

Asbestos Operations

<u>Industry</u>	<u>Injury Total</u>	<u>Trunk Injuries</u>	<u>Torso Protective Clothing Related %</u>
-----------------	---------------------	-----------------------	--

No Data Available

TABLE LVI

STATE OF PENNSYLVANIA, APRIL 1973

TORSO PROTECTIVE CLOTHING RELATED INJURIES
(Continued)

Rubber and Tire Production

<u>Industry</u>	<u>Injury Total</u>	<u>Trunk Injuries</u>	<u>Torso Protective Clothing Related %</u>
-----------------	---------------------	-----------------------	--

No Data Available

Coal Mining

<u>Industry</u>	<u>Injury Total</u>	<u>Trunk Injuries</u>	<u>Torso Protective Clothing Related %</u>
-----------------	---------------------	-----------------------	--

Anthracite Mining	43	11	17.9
-------------------	----	----	------

Bituminous Coal and Lignite Mining	214	64	20.9
------------------------------------	-----	----	------

Average			19.4
---------	--	--	------

Bakeries

<u>Industry</u>	<u>Injury Total</u>	<u>Trunk Injuries</u>	<u>Torso Protective Clothing Related %</u>
-----------------	---------------------	-----------------------	--

No Data Available

Bacterial Involvement

<u>Industry</u>	<u>Injury Total</u>	<u>Trunk Injuries</u>	<u>Torso Protective Clothing Related %</u>
-----------------	---------------------	-----------------------	--

No Data Available

Beryllium Operations

<u>Industry</u>	<u>Injury Total</u>	<u>Trunk Injuries</u>	<u>Torso Protective Clothing Related %</u>
-----------------	---------------------	-----------------------	--

No Data Available

X-ray Operations

<u>Industry</u>	<u>Injury Total</u>	<u>Trunk Injuries</u>	<u>Torso Protective Clothing Related %</u>
-----------------	---------------------	-----------------------	--

No Data Available

TABLE LVI

STATE OF PENNSYLVANIA, APRIL 1973

TORSO PROTECTIVE CLOTHING RELATED INJURIES
(Continued)

Metal Smelting

<u>Industry</u>	<u>Injury Total</u>	<u>Trunk Injuries</u>	<u>Torso Protective Clothing Related %</u>
-----------------	-------------------------	---------------------------	--

No Data Available

TABLE LVII

STATE OF FLORIDA, 1971

TORSO PROTECTIVE CLOTHING RELATED INJURIES

Abrasive and Buffing Operations

<u>Industry</u>	<u>Injury Total</u>	<u>Trunk Injuries</u>	<u>Torso Protective Clothing Related %</u>
Abrasive Products	23	1	2.6
Iron and Steel Foundries	133	7	3.2
Glass and Glassware, Pressed or Blown	25	4	9.6
Nonferrous Primary Smelting and Refining	19	1	3.2
Average			4.65

Metal Mining and Uranium Mining

<u>Industry</u>	<u>Injury Total</u>	<u>Trunk Injuries</u>	<u>Torso Protective Clothing Related %</u>
Metal Mining	3	1	20.0

Steel Mills and Pig Iron Production

<u>Industry</u>	<u>Injury Total</u>	<u>Trunk Injuries</u>	<u>Torso Protective Clothing Related %</u>
Blast Furnaces and Steel Mills	14	3	12.9

Construction

<u>Industry</u>	<u>Injury Total</u>	<u>Trunk Injuries</u>	<u>Torso Protective Clothing Related %</u>
Contract Construction	14,134	1,175	5.0

Painting Operations

<u>Industry</u>	<u>Injury Total</u>	<u>Trunk Injuries</u>	<u>Torso Protective Clothing Related %</u>
Painting and Paper Hanging	215	20	5.6

TABLE LVII

STATE OF FLORIDA, 1971

TORSO PROTECTIVE CLOTHING RELATED INJURIES
(Continued)Welding Operations

<u>Industry</u>	<u>Injury Total</u>	<u>Trunk Injuries</u>	<u>Torso Protective Clothing Related %</u>
-----------------	---------------------	-----------------------	--

No Data Available

Silica Dust Generating Operations

<u>Industry</u>	<u>Injury Total</u>	<u>Trunk Injuries</u>	<u>Torso Protective Clothing Related %</u>
-----------------	---------------------	-----------------------	--

Abrasive Products	23	1	2.6
Nonferrous Primary Smelting and Refining	133	7	3.2
Iron and Steel Foundries	133	7	3.2
Stone, Clay, and Glass Products	1,159	101	5.2
Average			3.55

Lumber and Wood Products

<u>Industry</u>	<u>Injury Total</u>	<u>Trunk Injuries</u>	<u>Torso Protective Clothing Related %</u>
-----------------	---------------------	-----------------------	--

Lumber and Wood Products	1,649	139	5.1
--------------------------	-------	-----	-----

Metal Fabrications

<u>Industry</u>	<u>Injury Total</u>	<u>Trunk Injuries</u>	<u>Torso Protective Clothing Related %</u>
-----------------	---------------------	-----------------------	--

Fabricated Metal Products	1,613	142	5.3
---------------------------	-------	-----	-----

Public Utilities

<u>Industry</u>	<u>Injury Total</u>	<u>Trunk Injuries</u>	<u>Torso Protective Clothing Related %</u>
-----------------	---------------------	-----------------------	--

Electric, Gas, and Sanitary Services	795.	75	5.7
---	------	----	-----

TABLE LVII

STATE OF FLORIDA, 1971

TORSO PROTECTIVE CLOTHING RELATED INJURIES
(Continued)Glass Production

<u>Industry</u>	<u>Injury Total</u>	<u>Trunk Injuries</u>	<u>Torso Protective Clothing Related %</u>
Glass and Glassware, Pressed or Blown	24	4	9.6

Machine Tool Production

<u>Industry</u>	<u>Injury Total</u>	<u>Trunk Injuries</u>	<u>Torso Protective Clothing Related %</u>
Metalworking Machinery and Equipment	75	6	4.8

Chemical and Allied Products

<u>Industry</u>	<u>Injury Total</u>	<u>Trunk Injuries</u>	<u>Torso Protective Clothing Related %</u>
Chemical and Allied Products	541	47	5.2

Oil Refining

<u>Industry</u>	<u>Injury Total</u>	<u>Trunk Injuries</u>	<u>Torso Protective Clothing Related %</u>
Petroleum Refining and Related Industries	91	6	4.0

Vehicle Production

<u>Industry</u>	<u>Injury Total</u>	<u>Trunk Injuries</u>	<u>Torso Protective Clothing Related %</u>
Motor Vehicles and Equipment	106	4	2.26

TABLE LVII

STATE OF FLORIDA, 1971

TORSO PROTECTIVE CLOTHING RELATED INJURIES
(Continued)Insecticide and Pesticide Spraying Operations

<u>Industry</u>	<u>Injury Total</u>	<u>Trunk Injuries</u>	<u>Torso Protective Clothing Related %</u>
Agricultural Services	245	25	7.5
Horticultural Services	264	16	4.2
Average			5.85

Heat-Stress Involvement Operations

<u>Industry</u>	<u>Injury Total</u>	<u>Trunk Injuries</u>	<u>Torso Protective Clothing Related %</u>
Flat Glass	1	0	0.0
Glass and Glassware, Pressed or Blown	25	4	9.6
Primary Metal Industries	228	14	3.7
Average			6.65

Asbestos Operations

<u>Industry</u>	<u>Injury Total</u>	<u>Trunk Injuries</u>	<u>Torso Protective Clothing Related %</u>
Abrasive and Misc. Mineral Products	23	1	2.6

Rubber and Tire Production

<u>Industry</u>	<u>Injury Total</u>	<u>Trunk Injuries</u>	<u>Torso Protective Clothing Related %</u>
Rubber and Misc. Plastic Products	304	29	5.7

Coal Mining

<u>Industry</u>	<u>Injury Total</u>	<u>Trunk Injuries</u>	<u>Torso Protective Clothing Related %</u>

No Data Available

TABLE LVII

STATE OF FLORIDA, 1971

TORSO PROTECTIVE CLOTHING RELATED INJURIES
(Continued)Bakeries

<u>Industry</u>	<u>Injury Total</u>	<u>Trunk Injuries</u>	<u>Torso Protective Clothing Related %</u>
Bakery Products	201	22	6.6

Bacterial Involvement

<u>Industry</u>	<u>Injury Total</u>	<u>Trunk Injuries</u>	<u>Torso Protective Clothing Related %</u>
Medical and Dental Laboratories	32	15	28.6

Beryllium Operations

<u>Industry</u>	<u>Injury Total</u>	<u>Trunk Injuries</u>	<u>Torso Protective Clothing Related %</u>
Misc. Fabricated Metal Products	61	16	15.7

X-ray Operations

<u>Industry</u>	<u>Injury Total</u>	<u>Trunk Injuries</u>	<u>Torso Protective Clothing Related %</u>
Hospitals	805	323	24.1

Metal Smelting

<u>Industry</u>	<u>Injury Total</u>	<u>Trunk Injuries</u>	<u>Torso Protective Clothing Related %</u>
Secondary Smelting and Refining	8	1	7.50