

**Appendix A**

**Descriptions of Major Industrial Groups Included In  
the National Occupational Exposure Survey**

**Appendix A**  
**Descriptions of Major Industrial Groups Surveyed During the NOES**  
**(See Standard Industrial Classification Manual - 1972**  
**Executive Office of the President, Office of Management and Budget)**

<b>MAJOR GROUP</b>	<b>TITLE</b>	<b>ACTIVITY</b>
07	Agricultural Services	Crop preparation services, veterinary services, lawn and garden services, and shrub and tree services
13	Oil and Gas Extraction	Operation of oil and gas field properties; drilling of oil and gas wells; oil and gas exploration services; and general oil and gas field services
15-17	Construction	Contract construction of residential and commercial buildings; construction of roads, bridges, and other heavy projects; and special trade contract construction
20-39	Manufacturing	Mechanical or chemical transformation of materials into new products, usually for resale or transfer to industrial users rather than for domestic consumption
40-49	Transportation, Communications and Utilities	Railroad and local transportation hauling, and warehousing; water and air transportation; communications; transmission and distribution of natural gas and electric energy; operation of water and sanitary services
50-59	Wholesale and Retail Trade	Wholesale distribution of automobiles, and automobile parts; distribution of construction materials, metals and ores; distribution of chemicals and petroleum; automobile dealers and repair, including gas stations

MAJOR GROUP	TITLE	ACTIVITY
70-79	Services	Laundries and dry cleaning; photographic services; beauty shops, funeral services; mailing, art, and reproduction services; cleaning, disinfecting and extermination services; research and development; automotive repair and service; miscellaneous machinery repair
80	Health Services	Medical, surgical, and other health services including hospitals and medical or dental laboratories



**Appendix B**

**Descriptions of Standard Industrial Classifications  
Included In the National Occupational Exposure Survey**

**Appendix B**  
**Descriptions of Standard Industrial Classifications Surveyed in NOES**  
**(See Standard Industrial Classification Manual - 1972**  
**Executive Office of the President, Office of Management and Budget)**

<b>SIC CODE</b>	<b>TITLE</b>	<b>ACTIVITY</b>
07	Agricultural Services	Crop preparation, veterinary, lawn, garden and tree services
13	Oil and Gas Extraction	Operation of oil and gas field properties; drilling of oil and gas wells; exploration and general oil and gas field services
15	General Building Contractors	Contract construction of residential and non-residential buildings; general contractors
16	Construction Other than Building	Highway, street, bridge and tunnel construction; water, sewer, pipeline, communication, and miscellaneous heavy construction
17	Special Trade Contractors	Plumbing, heating, air conditioning, painting and paperhanging, electrical, concrete, plastering and carpentry work; roofing and sheet metal, excavation, and installation of building equipment.
20	Food and Kindred Products	Meat packing, poultry processing, dairy production, canning, grain milling, baking and confectioneries; fats, oils, liquors, and miscellaneous food products.
21	Tobacco Manufacturers	Manufacture of cigars and cigarettes
22	Textile Mill Products	Broad woven fabric milling, cotton and man-made fiber; narrow fabric milling; knitting mills; textile dyeing and finishing, floor covering mills, yarn and thread mills; miscellaneous textiles

<b>SIC CODE</b>	<b>TITLE</b>	<b>ACTIVITY</b>
23	Apparel and Other Finished Products	Manufacture of mens and boys clothing, women's and girls outer wear and under garments/ hats and caps; fur and leather goods and waterproof out garments; miscellaneous fabricated textile products
24	Lumber and Wood Products Except Furniture	Logging camps and contractors; sawmills and planing mills; mill work, veneer and plywood production; wood containers, buildings, and mobile homes; miscellaneous wood products
25	Furniture and Fixtures	Manufacture of wood household furniture, upholstered furniture, and metal furniture; manufacture of office and public building furniture; partitions and office fixtures; miscellaneous furniture and fixtures
26	Paper and Allied Products	Operation of pulp, paper, and paperboard mills; manufacture of paperboard products, building paper, and building boards.
27	Printing and Publishing	Publishing newspapers, periodicals, and books; commercial printing and engraving; manufacture of greeting cards and blank books; printing trade services
28	Chemicals and Allied Products	Production of industrial inorganic chemicals, plastics, and synthetic rubbers and resins; biological products and medicinals; manufacture of soaps, cleaning preparations, and perfumes; paints, varnishes, and lacquers; production of industrial organic and agricultural chemicals and pesticides; inks, adhesives and miscellaneous chemical products

<b>CODE</b>	<b>TITLE</b>	<b>ACTIVITY</b>
29	Petroleum Refining	Petroleum refining; production of paving and roofing materials and miscellaneous products of petroleum and coal
30	Rubber and Miscellaneous Plastic Products	Manufacture of tires and inner tubes; rubber and plastic hose, belting, and miscellaneous products
31	Leather and Leather Products	Leather tanning and finishing; boot, shoe, handbag and miscellaneous leather good manufacture.
32	Stone, Clay, Glass and Concrete Products	Manufacture of flat glass, glassware, glass containers, and glass products; manufacture of hydraulic cement; production brick, clay tile, pottery, and porcelain; manufacture of concrete, gypsum, plaster, ready-mix concrete; asbestos and miscellaneous non-metallic products.
33	Primary Metal Industries	Smelting refining, rolling, drawing, and alloying of ferrous and non-ferrous metals
34	Fabricated Metal Products, Except Machinery and Transportation Equipment	Fabrication of such products as cans, tinware, cutlery, metal stampings, and ordinance; manufacture of enameled iron, cast iron, and metal sanitary ware; plumbing fixtures, heating equipment, structural metal products; screw machine products; nuts and bolts; forging and electroplating services



<b>CODE</b>	<b>TITLE</b>	<b>ACTIVITY</b>
35	Machinery, Except Electrical	Manufacture of steam and gas turbines, internal combustion engines, farm machinery, construction and mining machinery; production of machine tools, industrial trucks, metalworking, and special industry machinery; office, computing, refrigeration, and laundry machinery.
36	Electrical and Electronic Machinery	Production of electric transmission and distribution equipment, switch gear, control apparatus; and welding apparatus; manufacture of household appliances and electric lighting and wiring equipment for residential industrial use; radio, TV, and other electronic components
37	Transportation Equipment	Manufacture of motor vehicles, truck trailers, aircraft, ships, and boats; production of railroad equipment, missiles, travel trailers, and recreational vehicles.
38	Measuring, Analyzing, and Controlling Instruments	Manufacture of engineering and laboratory instrumentation and environmental controls for heating and cooling applications; production of industrial process controls, and measuring instruments; optical and medical instruments and photographic equipment
39	Miscellaneous Manufacturing	Production of jewelry, silverware, stainless steel ware, toys, athletic goods, artists materials, and novelty and miscellaneous items.
41	Local and Suburban Transit	Furnishing local transportation over regular routes on a regular schedule, taxicab and school buses, and terminal maintenance of passenger terminals

<b>CODE</b>	<b>TITLE</b>	<b>ACTIVITY</b>
42	Freight Transportation and Warehousing	Operation of local and "over the road" trucking services; warehousing of agricultural, refrigerated, and general warehousing, and freight terminal operation
44	Water Transportation	Operation of towing and tugboat services, marine cargo handling, and water transport services such as boat hiring, ship cleaning, and cargo salvage
45	Transportation by Air	Operation of passenger or freight airlines, flying fields, and airport terminal services
48	Communication	Furnishing telephone or telegraph services to the public, operation of radio and television broadcast facilities, and miscellaneous services such as cablevision and telecommunication operations
49	Electric, Gas, and Sanitary Services	Provision and distribution of electrical and natural gas service, water supplies, and sanitary or sewage systems
50	Wholesale Trade Durable Goods	Wholesale distribution of new and used vehicles, parts, and tires; lumber, plywood, and millwork; operation of metal and coal marketing and distribution facilities; and miscellaneous scrap and waste salvage facilities
51	Wholesale Trade-Non-Durable Goods	Wholesale distribution of chemicals and allied products, petroleum, and petroleum products such as butane and naphtha
55	Automotive Dealers and Gasoline Service Stations	Operation of facilities for the retail sale of automobiles, auto and home supply stores, and gasoline service stations

<b>CODE</b>	<b>TITLE</b>	<b>ACTIVITY</b>
72	Personal Services	Provision of laundry services, including dry cleaning and carpet or upholstery cleaning; operation of photography studios, beauty shops, and miscellaneous personal services such as health clubs
73	Business Services	Provision of services to business, including; direct mail, photocopying, photography and graphics services; building services such as cleaning, disinfecting and exterminating; the operation of research and development laboratories, photofinishing services, and commercial testing
75	Automotive Services	Operation of vehicle rental facilities; automotive repair shops, including engine and body work, and car washer
76	Miscellaneous Repair Services	Operation of facilities for the repair of: radios, televisions, refrigeration, and electrical or electronic equipment; clock and jewelry repair, specialized repair services, and welding and armature wending services
80	Health Services	Operation of general medical and surgical hospitals, medical laboratories, and other services such as blood banks and medical photography



**Appendix C**

**4-Digit Standard Industrial Classifications Surveyed  
In the National Occupational Exposure Survey**

**APPENDIX D. 4-DIGIT STANDARD INDUSTRIAL CLASSIFICATIONS  
SURVEYED IN DURING THE NOES**

<u>SIC Code</u>	<u>Description</u>
0723	Crop Preparation Services for Market, Except Cotton Ginning
0742	Veterinary Services for Animal Specialties
0782	Lawn and Garden Services
0783	Ornamental Shrub and Tree Services
1311	Crude Petroleum and Natural Gas Extraction
1381	Drilling Oil and Gas Wells
1382	Oil and Gas Field Exploration Services
1389	Oil and Gas Field Services, Not Elsewhere Classified
1521	General Contractors—Single Family Houses
1522	General Contractors—Residential Buildings, Other Than Single Family
1541	General Contractors—Industrial Buildings and Warehouses
1542	General Contractors—Nonresidential Buildings, Other than Industrial Buildings and Warehouses
1611	Highway and Street Construction, Except Elevated Highways
1622	Bridge, Tunnel, and Elevated Highway Construction
1623	Water, Sewer, Pipe Line, Communication and Power Line Construction
1629	Heavy Construction, Not Elsewhere Classified
1711	Plumbing, Heating (Except Electric), and Air Conditioning
1721	Painting, Paper Hanging, and Decorating
1731	Electrical Work
1741	Masonry, Stone Setting, and Other Stonework
1742	Plastering, Drywall, Acoustical and Insulation Work
1743	Terrazzo, Tile, Marble and Mosaic Work
1751	Carpentering
1752	Floor Laying and Other Floorwork, Not Elsewhere Classified
1761	Roofing and Sheet Metal Work
1771	Concrete Work
1781	Water Well Drilling
1791	Structural Steel Erection
1793	Glass and Glazing Work
1794	Excavating and Foundation Work
1796	Installation or Erection of Building Equipment, Not Elsewhere Classified
1799	Special Trade Contractors, Not Elsewhere Classified
2011	Meat Packing Plants
2013	Sausages and Other Prepared Meat Products
2016	Poultry Dressing Plants
2017	Poultry and Egg Processing
2022	Cheese, Natural and Processed
2023	Condensed and Evaporated Milk
2024	Ice Cream and Frozen Desserts
2026	Fluid Milk
2032	Canned Specialties
2033	Canned Fruits, Vegetables, Preserves, Jams, and Jellies
2034	Dried and Dehydrated Fruits, Vegetables and Soup Mixes
2035	Pickled Fruits and Vegetables, Vegetable Sauces and Seasonings, and Salad Dressings

<u>SIC Code</u>	<u>Description</u>
2037	Frozen Fruits, Fruit Juices and Vegetables
2038	Frozen Specialties
2041	Flour and Other Grain Mill Products
2047	Dog, Cat and Other Pet Food
2048	Prepared Feeds and Feed Ingredients for Animals and Fowls, Not Elsewhere Classified
2051	Bread and Other Bakery Products, Except Cookies and Crackers
2052	Cookies and Crackers
2065	Candy and Other Confectionary Products
2066	Chocolate and Cocoa Products
2067	Chewing Gum
2075	Soybean Oil Mills
2077	Animal and Marine Fats and Oils
2079	Shortening, Table Oils, Margarine and Other Edible Fats and Oils, Not Elsewhere Classified
2082	Malt Beverages
2084	Wines, Brandy, and Brandy Spirits
2085	Distilled, Rectified, and Blended Liquours
2086	Bottled and Canned Soft Drinks and Carbonated Waters
2087	Flavoring Extracts and Flavoring Sirups, Not Elsewhere Classified
2091	Canned and Cured Fish and Seafoods
2092	Fresh or Frozen Packaged Fish and Seafoods
2095	Roasted Coffee
2097	Manufactured Ice
2098	Macaroni, Spaghetti, Vermicelli, and Noodles
2099	Food Preparations, Not Elsewhere Classified
2111	Cigarettes
2121	Cigars
2141	Tobacco Stemming and Redrying
2211	Broad Woven Fabric Mills, Cotton
2221	Broad Woven Fabric Mills, Man-Made Fiber and Silk
2231	Broad Woven Fabric Mills, Wool (Including Dyeing and Finishing)
2241	Narrow Fabrics and Other Smallwares Mills: Cotton, Wool, Silk, and Man-Made Fiber
2251	Women's Full Length and Knee Length Hosiery
2252	Hosiery, Except Women's Full Length and Knee Length Hosiery
2253	Knit Outerwear Mills
2254	Knit Underwear Mills
2257	Circular Knit Fabric Mills
2258	Warp Knit Fabric Mills
2261	Finishers of Broad Woven Fabrics of Cotton
2262	Finishers of Broad Woven Fabrics of Man-Made Fiber and Silk
2269	Finishers of Textiles, Not Elsewhere Classified
2271	Woven Carpets and Rugs
2272	Tufted Carpets and Rugs
2281	Yarn Spinning Mills: Cotton, Man-Made Fibers and Silk
2282	Yarn Texturizing, Throwing, Twisting, and Winding Mills: Cotton, Man-Made Fibers and Silk
2283	Yarn Mills, Wool, Including Carpet and Rug Yarn
2284	Thread Mills

<u>SIC Code</u>	<u>Description</u>
2291	Felt Goods, Except Woven Felts and Hats
2295	Coated Fabrics, Not Rubberized
2297	Nonwoven Fabrics
2298	Cordage and Twine
2311	Men's, Youths', and Boys' Suits, Coats, and Overcoats
2321	Men's, Youths', and Boys' Shirts (Except Work Shirts) and Nightwear
2322	Men's, Youths' and Boys' Underwear
2323	Men's, Youths' and Boys' Neckwear
2327	Men's, Youths', and Boys' Separate Trousers
2328	Men's, Youths', and Boys' Work Clothing
2329	Men's, Youths', and Boys' Clothing, Not Elsewhere Classified
2331	Women's, Misses', and Juniors' Blouses, Waists, and Shirts
2335	Women's, Misses', and Juniors' Dresses
2337	Women's, Misses', and Juniors' Suits, Skirts, and Coats
2339	Women's, Misses', and Juniors' Outerwear, Not Elsewhere Classified
2341	Women's, Misses', Children's, and Infants' Underwear and Nightwear
2342	Brassieres, Girdles, and Allied Garments
2352	Hats and Caps, Except Millinery
2361	Girls', Children's, and Infants' Dresses, Blouses, Waists, and Shirts
2369	Girls', Children's, and Infants' Outerwear, Not Elsewhere Classified
2371	Fur Goods
2381	Dress and Work Gloves, Except Knit and All-Leather
2384	Robes and Dressing Gowns
2385	Raincoats and Other Waterproof Outer Garments
2386	Leather and Sheep Lined Clothing
2387	Apparel Belts
2389	Apparel and Accessories, Not Elsewhere Classified
2391	Curtains and Draperies
2392	Housefurnishings, Except Curtains and Draperies
2393	Textile Bags
2394	Canvas and Related Products
2395	Pleating, Decorative and Novelty Stitching, and Tucking for the Trade
2396	Automotive Trimmings, Apparel Findings, and Related Products
2399	Fabricated Textile Products, Not Elsewhere Classified
2411	Logging Camps and Logging Contractors
2421	Sawmills and Planing Mills, General
2426	Hardwood Dimension and Planing Mills
2431	Millwork
2434	Wood Kitchen Cabinets
2435	Hardwood Veneer and Plywood
2436	Softwood Veneer and Plywood
2439	Structural Wood Members, Not Elsewhere Classified
2448	Wood Pallets and Skids
2449	Wood Containers, Not Elsewhere Classified
2451	Mobile Homes



<u>SIC Code</u>	<u>Description</u>
2452	Prefabricated Wood Buildings and Components
2491	Wood Preserving
2492	Particleboard
2499	Wood Products, Not Elsewhere Classified
2511	Wood Household Furniture, Except Upholstered
2512	Wood Household Furniture, Upholstered
2514	Metal Household Furniture
2515	Mattresses and Bedsprings
2517	Wood Television, Radio, Phonograph, and Sewing Machine Cabinets
2521	Wood Office Furniture
2522	Metal Office Furniture
2531	Public Building and Related Furniture
2541	Wood Partitions, Shelving, Lockers, and Office and Store Fixtures
2542	Metal Partitions, Shelving, Lockers, and Office and Store Fixtures
2599	Furniture and Fixtures, Not Elsewhere Classified
2611	Pulp Mills
2621	Paper Mills, Except Building Paper Mills
2631	Paperboard Mills
2641	Paper Coating and Glazing
2642	Envelopes
2643	Bags, Except Textile Bags
2645	Die-Cut Paper and Paperboard and Cardboard
2647	Sanitary Paper Products
2648	Stationery, Tablets, and Related Products
2649	Converted Paper and Paperboard Products, Not Elsewhere Classified
2651	Folding Paperboard Boxes
2652	Set-up Paperboard Boxes
2653	Corrugated and Solid Fiber Boxes
2654	Sanitary Food Containers
2655	Fiber Cans, Tubes, Drums, and Similar Products
2661	Building Paper and Building Board Mills
2711	Newspapers: Publishing, Publishing and Printing
2721	Periodicals: Publishing, Publishing and Printing
2731	Books: Publishing and Printing
2732	Book Printing
2741	Miscellaneous Publishing
2751	Commercial Printing, Letterpress and Screen
2752	Commercial Printing, Lithographic
2753	Engraving and Plate Printing
2754	Commercial Printing, Gravure
2761	Manifold Business Forms
2771	Greeting Card Publishing
2782	Blankbooks, Looseleaf Binders and Devices
2789	Bookbinding and Related Work
2791	Typesetting
2793	Photoengraving
2812	Alkalies and Chlorine
2813	Industrial Gases
2819	Industrial Inorganic Chemicals, Not Elsewhere Classified

<u>SIC Code</u>	<u>Description</u>
2821	Plastics Materials, Synthetic Resins, and Nonvulcanizable Elastomers
2822	Synthetic Rubber (Vulcanizable Elastomers)
2824	Synthetic Organic Fibers, Except Cellulosic
2831	Biological Products
2833	Medicinal Chemicals and Botanical Products
2834	Pharmaceutical Preparations
2841	Soap and Other Detergents, Except Specialty Cleaners
2842	Specialty Cleaning, Polishing, and Sanitation Preparations
2843	Surface Active Agents, Finishing Agents, Sulfonated Oils and Assistants
2844	Perfumes, Cosmetics, and Other Toilet Preparations
2851	Paints, Varnishes, Lacquers, Enamels, and Allied Products
2865	Cyclic (Coal Tar) Crudes, and Cyclic Intermediates, Dyes, and Organic Pigments (Lakes and Toners)
2869	Industrial Organic Chemicals, Not Elsewhere Classified
2873	Nitrogenous Fertilizers
2874	Phosphatic Fertilizers
2875	Fertilizers, Mixing Only
2879	Pesticides and Agricultural Chemicals, Not Elsewhere Classified
2891	Adhesives and Sealants
2893	Printing Ink
2895	Carbon Black
2899	Chemicals and Chemical Preparations, Not Elsewhere Classified
2911	Petroleum Refining
2951	Paving Mixtures and Blocks
2952	Asphalt Felts and Coatings
2992	Lubricating Oils and Greases
3011	Tires and Inner Tubes
3021	Rubber and Plastics Footwear
3031	Reclaimed Rubber
3041	Rubber and Plastics Hose and Belting
3069	Fabricated Rubber Products, Not Elsewhere Classified
3079	Miscellaneous Plastics Products
3111	Leather Tanning and Finishing
3131	Boot and Shoe Cut Stock and Findings
3142	House Slippers
3143	Men's Footwear, Except Athletic
3144	Women's Footwear, Except Athletic
3149	Footwear, Except Rubber, Not Elsewhere Classified
3161	Luggage
3171	Women's Handbags and Purses
3172	Personal Leather Goods, Except Women's Handbags and Purses
3199	Leather Goods, Not Elsewhere Classified
3211	Flat Glass
3221	Glass Containers
3229	Pressed and Blown Glass and Glassware, Not Elsewhere Classified
3231	Glass Products, Made of Purchased Glass
3241	Cement, Hydraulic
3251	Brick and Structural Clay Tile

<u>SIC Code</u>	<u>Description</u>
3253	Ceramic Wall and Floor Tile
3255	Clay Refractories
3259	Structural Clay Products, Not Elsewhere Classified
3261	Vitreous China Plumbing Fixtures and China and Earthenware Fittings and Bathroom Accessories
3262	Vitreous China Table and Kitchen Articles
3264	Porcelain Electrical Supplies
3269	Pottery Products, Not Elsewhere Classified
3271	Concrete Block and Brick
3272	Concrete Products, Except Block and Brick
3273	Ready-Mixed Concrete
3275	Gypsum Products
3281	Cut Stone and Stone Products
3291	Abrasive Products
3292	Asbestos Products
3293	Gaskets, Packing, and Sealing Devices
3295	Minerals and Earths, Ground or Otherwise Treated
3296	Mineral Wool
3312	Blast Furnaces (Including Coke Ovens), Steel Works, and Rolling Mills
3315	Steel Wire Drawing and Steel Nails and Spikes
3316	Cold Rolled Steel Sheet, Strip, and Bars
3317	Steel Pipe and Tubes
3321	Gray Iron Foundries
3322	Malleable Iron Foundries
3324	Steel Investment Foundries
3325	Steel Foundries, Not Elsewhere Classified
3332	Primary Smelting and Refining of Lead
3339	Primary Smelting and Refining of Nonferrous Metals, Not Elsewhere Classified
3341	Secondary Smelting and Refining of Nonferrous Metals
3351	Rolling, Drawing, and Extruding of Copper
3353	Aluminum Sheet, Plate, and Foil
3355	Aluminum Rolling and Drawing, Not Elsewhere Classified
3356	Rolling, Drawing, and Extruding of Nonferrous Metals, Except Copper and Aluminum
3357	Drawing and Insulating of Nonferrous Wire
3361	Aluminum Foundries (Castings)
3362	Brass, Bronze, Copper, Copper Base Alloy Foundries (Castings)
3369	Nonferrous Foundries (Castings), Not Elsewhere Classified
3398	Metal Heat Treating
3399	Primary Metal Products, Not Elsewhere Classified
3411	Metal Cans
3412	Metal Shipping Barrels, Drums, Kegs, and Pails
3421	Cutlery
3423	Hand and Edge Tools, Except Machine Tools and Hand Saws
3425	Hand Saws and Saw Blades
3429	Hardware, Not Elsewhere Classified
3431	Enameled Iron and Metal Sanitary Ware
3432	Plumbing Fixture Fittings and Trim (Brass Goods)
3433	Heating Equipment, Except Electric and Warm Air Furnaces
3441	Fabricated Structural Metal

<u>SIC Code</u>	<u>Description</u>
3442	Metal Doors, Sash, Frames, Molding, and Trim
3443	Fabricated Plate Work (Boiler Shops)
3444	Sheet Metal Work
3446	Architectural and Ornamental Metal Work
3448	Prefabricated Metal Buildings and Components
3449	Miscellaneous Metal Work
3451	Screw Machine Products
3452	Bolts, Nuts, Screws, Rivets, and Washers
3462	Iron and Steel Forgings
3463	Nonferrous Forgings
3465	Automotive Stampings
3466	Crowns and Closures
3469	Metal Stampings, Not Elsewhere Classified
3471	Electroplating, Plating, Polishing, Anodizing and Coloring
3479	Coating, Engraving and Allied Services, Not Elsewhere Classified
3483	Ammunition, Except for Small Arms, Not Elsewhere Classified
3484	Small Arms
3493	Steel Springs, Except Wire
3494	Valves and Pipe Fittings, Except Plumbers' Brass Goods
3495	Wire Springs
3496	Miscellaneous Fabricated Wire Products
3497	Metal Foil and Leaf
3498	Fabricated Pipe and Fabricated Pipe Fittings
3499	Fabricated Metal Products, Not Elsewhere Classified
3511	Steam, Gas, and Hydraulic Turbines and Turbine Generator Set Units
3519	Internal Combustion Engines, Not Elsewhere Classified
3523	Farm Machinery and Equipment
3524	Garden Tractors and Lawn and Garden Equipment
3531	Construction Machinery and Equipment
3532	Mining Machinery and Equipment, Except Oil Field Machinery and Equipment
3533	Oil Field Machinery and Equipment
3534	Elevators and Moving Stairways
3535	Conveyors and Conveying Equipment
3536	Hoists, Industrial Cranes, and Monorail Systems
3537	Industrial Trucks, Tractors, Trailers, and Stackers
3541	Machine Tools, Metal Cutting Types
3542	Machine Tools, Metal Forming Types
3544	Special Dies and Tools, Die Sets, Jigs and Fixtures, and Industrial Molds
3545	Machine Tool Accessories and Measuring Devices
3546	Power Driven Hand Tools
3547	Rolling Mill Machinery and Equipment
3549	Metalworking Machinery, Not Elsewhere Classified
3551	Food Products Machinery
3552	Textile Machinery
3553	Woodworking Machinery
3554	Paper Industries Machinery
3555	Printing Trades Machinery and Equipment
3559	Special Industry Machinery, Not Elsewhere Classified
3561	Pumps and Pumping Equipment

<u>SIC Code</u>	<u>Description</u>
3562	Ball and Roller Bearings
3563	Air and Gas Compressors
3564	Blowers and Exhaust and Ventilation Fans
3565	Industrial Patterns
3566	Speed Changers, Industrial High Speed Drives, and Gears
3567	Industrial Process Furnaces and Ovens
3568	Mechanical Power Transmission Equipment, Not Elsewhere Classified
3569	General Industrial Machinery and Equipment, Not Elsewhere Classified
3572	Typewriters
3573	Electronic Computing Equipment
3579	Office Machines, Not Elsewhere Classified
3582	Commercial Laundry, Dry Cleaning, and Pressing Machines
3585	Air Conditioning and Warm Air Heating Equipment and Commercial and Industrial Refrigeration Equipment
3586	Measuring and Dispensing Pumps
3589	Service Industry Machines, Not Elsewhere Classified
3592	Carburetors, Pistons, Piston Rings, and Valves
3599	Machinery, Except Electrical, Not Elsewhere Classified
3612	Power, Distribution, and Specialty Transformers
3613	Switchgear and Switchboard Apparatus
3621	Motors and Generators
3622	Industrial Controls
3623	Welding Apparatus, Electric
3629	Electrical Industrial Apparatus, Not Elsewhere Classified
3631	Household Cooking Equipment
3632	Household Refrigerators and Home and Farm Freezers
3633	Household Laundry Equipment
3634	Electric Housewares and Fans
3635	Household Vacuum Cleaners
3639	Household Appliances, Not Elsewhere Classified
3641	Electric Lamps
3643	Current-Carrying Wiring Devices
3644	Noncurrent-Carrying Wiring Devices
3645	Residential Electric Lighting Fixtures
3646	Commercial, Industrial, and Institutional Electric Lighting Fixtures
3647	Vehicular Lighting Equipment
3648	Lighting Equipment, Not Elsewhere Classified
3651	Radio and Television Receiving Sets, Except Communication Types
3652	Phonograph Records and Pre-recorded Magnetic Tape
3661	Telephone and Telegraph Apparatus
3662	Radio and Television Transmitting, Signaling, and Detection Equipment and Apparatus
3671	Radio and Television Receiving Type Electron Tubes, Except Cathode Ray
3672	Cathode Ray Television Picture Tubes
3673	Transmitting, Industrial, and Special Purpose Electron Tubes
3674	Semiconductors and Related Devices
3675	Electronic Capacitors

<u>SIC Code</u>	<u>Description</u>
3676	Resistors, for Electronic Applications
3677	Electronic Coils, Transformers and Other Inductors
3678	Connectors, for Electronic Applications
3679	Electronic Components, Not Elsewhere Classified
3691	Storage Batteries
3693	Radiographic X-ray, Fluoroscopic X-ray, Therapeutic X-ray, and Other X-ray Apparatus and Tubes; Electromedical and Electrotherapeutic Apparatus
3694	Electrical Equipment for Internal Combustion Engines
3699	Electrical Machinery, Equipment, and Supplies, Not Elsewhere Classified
3711	Motor Vehicles and Passenger Car Bodies
3713	Truck and Bus Bodies
3714	Motor Vehicle Parts and Accessories
3715	Truck Trailers
3721	Aircraft
3724	Aircraft Engines and Engine Parts
3728	Aircraft Parts and Auxillary Equipment, Not Elsewhere Classified
3731	Ship Building and Repairing
3732	Boat Building and Repairing
3743	Railroad Equipment
3751	Motorcycles, Bicycles, and Parts
3761	Guided Missiles and Space Vehicles
3792	Travel Trailers and Campers
3799	Transportation Equipment, Not Elsewhere Classified
3811	Engineering, Laboratory, Scientific, and Research Instruments and Associated Equipment
3822	Automatic Controls for Regulating Residential and Commercial Environments and Appliances
3823	Industrial Instruments for Measurement, Display, and Control of Process Variables and Related Products
3824	Totalizing Fluid Meters and Counting Devices
3825	Instruments for Measuring and Testing of Electricity and Electrical Signals
3829	Measuring and Controlling Devices, Not Elsewhere Classified
3832	Optical Instruments and Lenses
3841	Surgical and Medical Instruments and Apparatus
3842	Orthopedic, Prosthetic, and Surgical Appliances and Supplies
3843	Dental Equipment and Supplies
3851	Ophthalmic Goods
3861	Photographic Equipment and Supplies
3873	Watches, Clocks, Clockwork Operated Devices, and Parts
3911	Jewelry, Precious Metal
3914	Silverware, Plated Ware, and Stainless Steel Ware
3931	Musical Instruments
3942	Dolls
3944	Games, Toys, and Children's Vehicles; Except Dolls and Bicycles
3949	Sporting and Athletic Goods, Not Elsewhere Classified
3951	Pens, Mechanical Pencils, and Parts

<u>SIC Code</u>	<u>Description</u>
3952	Lead Pencils, Crayons, and Artists' Materials
3953	Marking Devices
3955	Carbon Paper and Inked Ribbons
3961	Costume Jewelry and Costume Novelties, Except Precious Metal
3962	Feathers, Plumes, and Artificial Trees and Flowers
3963	Buttons
3964	Needles, Pins, Hooks and Eyes, and Similar Notions
3991	Brooms and Brushes
3993	Signs and Advertising Displays
3995	Burial Caskets
3996	Linoleum, Asphalted-Felt-Base, and Other Hard Surface Floor Coverings, Not Elsewhere Classified
3999	Manufacturing Industries, Not Elsewhere Classified
4013	Switching and Terminal Establishments
4111	Local and Suburban Transit
4119	Local Passenger Transportation, Not Elsewhere Classified
4121	Taxicabs
4151	School Buses
4172	Maintenance and Service Facilities for Motor Vehicle Passenger Transportation
4212	Local Trucking Without Storage
4214	Local Trucking With Storage
4221	Farm Product Warehousing and Storage
4222	Refrigerated Warehousing
4224	Household Goods Warehousing and Storage
4225	General Warehousing and Storage
4226	Special Warehousing and Storage, Not Elsewhere Classified
4231	Terminal and Joint Terminal Maintenance Facilities for Motor Freight Transportation
4454	Towing and Tugboat Service
4463	Marine Cargo Handling
4469	Water Transportation Services, Not Elsewhere Classified
4511	Air Transportation, Certificated Carriers
4521	Air Transportation, Noncertificated Carriers
4582	Airports and Flying Fields
4583	Airport Terminal Services
4612	Crude Petroleum Pipe Lines
4783	Packing and Crating
4811	Telephone Communication (Wire or Radio)
4821	Telegraph Communication (Wire or Radio)
4832	Radio Broadcasting
4833	Television Broadcasting
4899	Communication Services, Not Elsewhere Classified
4911	Electric Services
4922	Natural Gas Transmission
4923	Natural Gas Transmission and Distribution
4924	Natural Gas Distribution
4932	Gas and Other Services Combined
4941	Water Supply
4952	Sewerage Systems
4953	Refuse Systems
5012	Automobiles and Other Motor Vehicles

<u>SIC Code</u>	<u>Description</u>
5013	Automotive Parts and Supplies
5014	Tires and Tubes
5031	Lumber, Plywood and Millwork
5039	Construction Materials, Not Elsewhere Classified
5051	Metals Service Centers and Offices
5052	Coal and Other Minerals and Ores
5093	Scrap and Waste Materials
5161	Chemicals and Allied Products
5171	Petroleum Bulk Stations and Terminals
5172	Petroleum and Petroleum Products Wholesalers, Except Bulk Stations and Terminals
5521	Motor Vehicle Dealers (Used Only)
5531	Auto and Home Supply Stores
5541	Gasoline Service Stations
7211	Power Laundries, Family and Commercial
7212	Garment Pressing, and Agents for Laundries and Dry Cleaners
7213	Linen Supply
7214	Diaper Service
7216	Dry Cleaning Plants, Except Rug Cleaning
7217	Carpet and Upholstery Cleaning
7219	Laundry and Garment Services, Not Elsewhere Classified
7221	Photographic Studios, Portrait
7231	Beauty Shops
7261	Funeral Service and Crematories
7299	Miscellaneous Personal Services
7331	Direct Mail Advertising Services
7332	Blueprinting and Photocopying Services
7333	Commercial Photography, Art, and Graphics
7339	Stenographic Services; and Reproduction Services, Not Elsewhere Classified
7341	Window Cleaning
7342	Disinfecting and Exterminating Services
7349	Cleaning and Maintenance Services to Dwellings and Other Buildings, Not Elsewhere Classified
7391	Research and Development Laboratories
7395	Photofinishing Laboratories
7397	Commercial Testing Laboratories
7399	Business Services, Not Elsewhere Classified
7512	Passenger Car Rental and Leasing, Without Drivers
7513	Truck Rental and Leasing, Without Drivers
7519	Utility Trailer and Recreational Vehicle Rental
7531	Top and Body Repair Shops
7534	Tire Retreading and Repair Shops
7535	Paint Shops
7538	General Automotive Repair Shops
7539	Automotive Repair Shops, Not Elsewhere Classified
7542	Car Washes
7549	Automotive Services, Except Repair and Car Washes
7622	Radio and Television Repair Shops
7623	Refrigeration and Air Conditioning Service and Repair Shops
7629	Electrical and Electronic Repair Shops, Not Elsewhere Classified
7631	Watch, Clock, and Jewelry Repair



<u>SIC Code</u>	<u>Description</u>
7641	Reupholstery and Furniture Repair
7692	Welding Repair
7694	Armature Rewinding Shops
7699	Repair Shops and Related Services, Not Elsewhere Classified
8062	General Medical and Surgical Hospitals
8071	Medical Laboratories
8072	Dental Laboratories
8091	Health and Allied Services, Not Elsewhere Classified
8411	Museums and Art Galleries



**Appendix D**  
**Technical Notes**

#### **A. The Sampling Frame and Sources of Data**

Listings from the Bureau of the Census publication County Business Patterns - 1979 (CBP)<sup>7</sup> provided data needed to establish sampling rates in the NOES while listings from the 1980 Dun and Bradstreet Market Inventory (DMI)<sup>8</sup> were used to select individual establishments to be surveyed. Supplementing these lists for completeness was considered, but was not done because of the costs involved and extensive coverage of the DMI. Coverage of construction and manufacturing establishments was emphasized in the NOES by defining these categories to include a broad range of SICs. Conversely, finance, mining, and mineral processing establishments were excluded. Mining and mineral processing establishments were excluded because they are the subject of a separate NIOSH survey.

An initial screening operation was done to select a sample of establishments employing eight or more employees and operating in one of the target SIC's of the NOES (See Appendix B). This screening was carried out as a telephone survey which identified establishments still in business and eligible for the survey during the 1981-1983 data collection period.

#### **B. The Sampling Plan**

The sample design developed for NOES maximized the reliability of estimates of numbers of employees. Although estimates of facilities are available using the methodology developed in NOES, breakdown by industry or data on the number of firms with specific characteristics was assigned lower priority in developing the sample design.

The design of NOES made use of prior experience from the 1972-1974 NOHS. The sampling plan attempted to produce estimates with minimum variance for a fixed cost by considering strata determined by number of employees at the worksite. The NOHS data provided guidance as to the method of stratification and most efficient sampling rates in strata. Eleven strata were defined as follows: 8-19, 20-49, 50-99, 100-249, 250-499, 500-999, 1000-1499, 1500-2499, 2500-4999, 5000 + employees, and those for which employment totals were not available. The two largest categories (2500-4999, and 5000 + employees) were treated separately from the others, since they represented a substantial expenditure of time for the surveyor teams and would affect calculation of variances of the survey results.

The NOES used a stratified two-stage sampling strategy for most of the sample. The first stage of sampling involved selection of a sample of 98 PSUs. With the exception of samples of very large establishments drawn irrespective of geographic location, the interviewed sample was confined to these 98 PSUs. The second stage (within PSU) selection for establishments was done using a systematic selection procedure. Very large establishments (2,500 or more employees) were treated separately in order to maintain more nearly equal probabilities of selection across establishments.

Figure D-1 is an outline of the sampling strategy followed in the NOES. A total of 604 PSUs were defined for the sampling process. PSUs were defined geographically with the county as the primary unit. Some PSUs consisted of a single county, e.g., Orange County, California. Other PSUs were made up of counties that constituted a SMSA in 1980, which in a few cases crossed state boundaries: e.g., Cincinnati SMSA consisting of Dearborn County, Indiana; Boone, Campbell, and Kenton Counties in Kentucky; and Brown, Clermont, Hamilton, and Warren Counties in Ohio. The 604 PSUs included 446,125 establishments eligible for the survey.

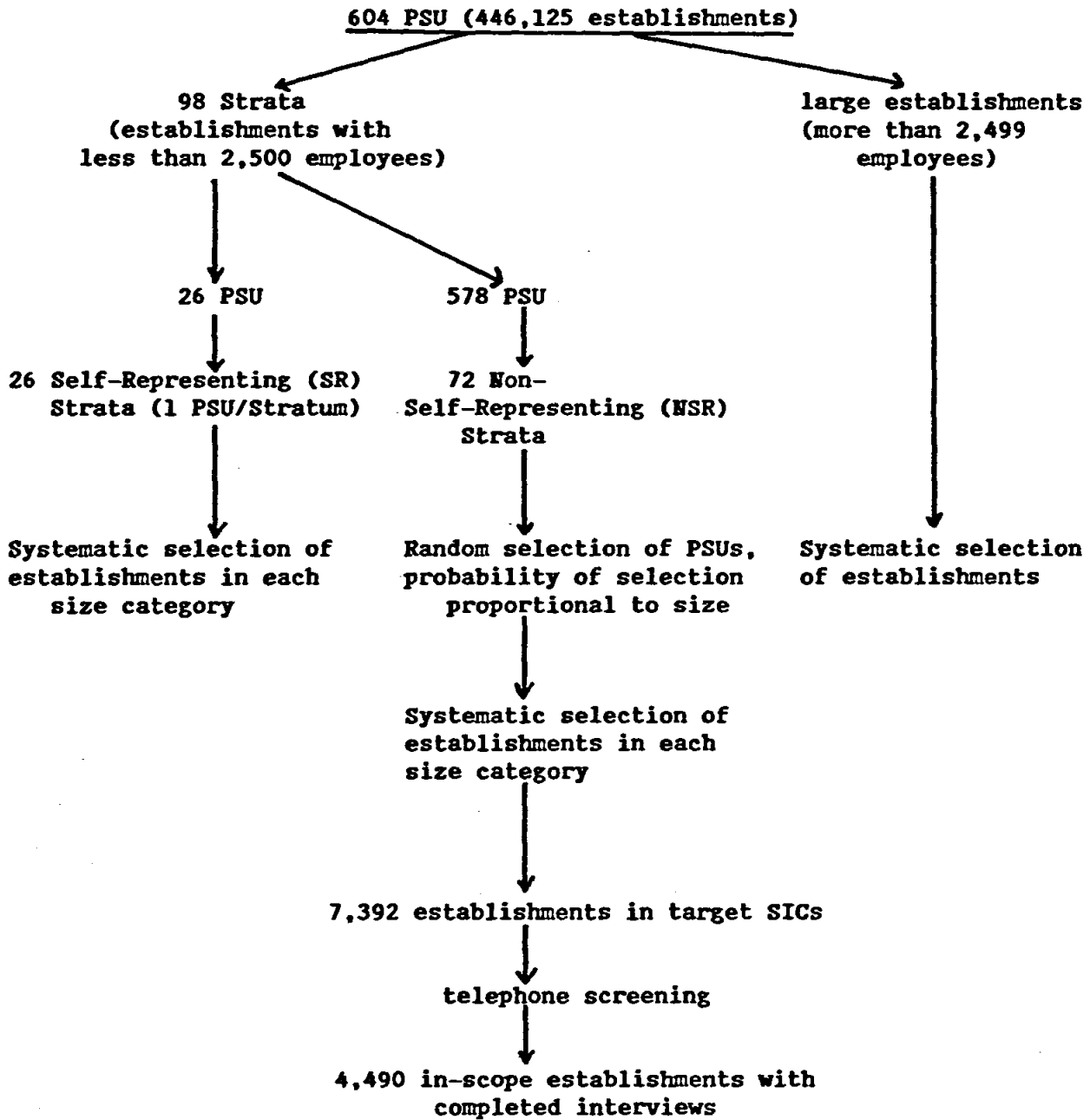
The 604 PSUs were stratified into 98 strata. The purpose of stratification was to obtain groups of PSUs which were of equal size and were homogeneous with respect to variables of interest in the NOES. Some of the criteria used for designing strata included: proportion of employees in firms where high potential exposure to health hazards might be found (e.g., chemical, rubber, or leather industries), geography (census region), and SMSA or non-SMSA. The 98 strata consisted of 26 self-representing (SR) strata, made up of 1 large PSU each, and 72 non-self-representing (NSR) strata made up of the remaining 578 PSUs.

The selection of establishments with less than 2,500 employees was done from 98 PSUs, one from each of the 26 SR and 72 NSR strata. A systematic sample of establishments in each of the 26 PSUs making up the SR strata was designated to be interviewed. Samples were selected independently across establishment size classes, where size was defined as the size of the workforce at that work site. PSUs in the 72 NSR strata from which establishments were to be selected were chosen as a random sample with probability of selection proportional to the number of establishments contributed by that PSU to that stratum, i.e., the measure of size of that PSU. One PSU was chosen from each NSR stratum. Systematic selection of establishments in each NSR PSU was then done using methods identical to those for selecting establishments from SR PSUs.

The sample of establishments employing 2,500 or more employees was designated without regard to sampling from PSUs. Samples in each of the size categories with these employee levels were determined using systematic selection of all firms nationwide with 2,500 or more employees.

Sample establishments were contacted by telephone to confirm that those establishments had enough employees and operated in an appropriate SIC to be included in the survey, and would participate in it. This sample was known as the 'screening' sample and consisted of 7,392 establishments. After screening, 4,504 establishments were designated for field interview, and all but 125 of these establishments were interviewed. Substitutes were found for 111 of the 125, making the total number of completed interviews 4,490. The effective refusal rate of establishments for participation in the NOES was .3 percent.

**FIGURE D-1. OUTLINE OF SAMPLING STRATEGY  
(NOES 1981-1983)**



### C. Estimation Procedures

National estimates of the number of employees and number of establishments conducting business in the SIC ranges covered by the NOES were obtained by assigning appropriate weighting factors to sample establishments and using these factors to project figures found in the NOES sample to the national level. A probability of selection was associated with each of the steps followed in determining the sample establishments which were interviewed. Inverses of these probabilities define sample weights which indicate how much each establishment's results contribute to national totals.

Inflation estimates of totals were obtained by multiplying each establishment's totals by its sample weight and summing across establishments. Ratio estimation was also used to improve the precision of the estimates. The inflation estimates were followed by two stages of ratio estimation before the final publication estimate was determined. The first stage ratio estimation factor was based on establishment counts by employee size class as reported from the Dun and Bradstreet list<sup>8</sup>. The second stage ratio estimation factor was based on employee counts (establishment counts for establishments with greater than 1,000 employees) by employee size class by SIC as reported in the County Business Patterns (CBP)<sup>7</sup>.

Each estimate had a sample error associated with it. Furthermore, the complex survey design and estimation procedures used in the NOES lead to approximate and complicated expressions for estimation of the sampling error. Calculation of the sampling errors was handled using the method of replications. The method required that the estimation procedures be independently carried out several times (replicated) using subsamples of the original sample, and that the variance of the replicate estimates be used to measure the variance of the full sample. Sampling error was taken as the square root of the variance. This system was flexible enough to provide measures reliable for all tabulations planned for the NOES data. Use of ratio estimation and the method of replications to make national projections from the NOES sample data is detailed in Volume II of this series, Sampling Methodology<sup>3</sup>. The methods are summarized here.

## Estimation of Totals

The inflation estimate is an initial estimate of industrial characteristics on the national level. Inflation weights, defined as the inverse of the probability of selecting the sample establishments from which characteristics are to be estimated, are used in determining the estimate. If  $Y$  is a characteristic of all establishments, with  $y$  the value of that characteristic found in the sample, the simple inflation estimate  $Y_1$  would be:

$$Y_1 = W \times y$$

where  $W$  is the inflation weight. For example, suppose  $y = 100$  employees reported working in a sample of establishments with probability of selection  $f = .05$ . The simple inflation estimate  $Y_1$  of all employees working in the category from which the sample was selected would be  $Y_1 = (1/.05) \times 100 = 2,000$  employees.

The simple inflation estimate involves only characteristics of the sample. When more information about the target population is available, more precise estimates for totals can be obtained through the use of ratio estimation. Ratio estimation uses independent sources of information about sample characteristics to determine an estimate which is often more precise than one determined from inflation estimates.

As an example, consider a characteristic  $x$  estimated from the sample, such as the number of employees in an industry surveyed in the NOES. Suppose  $X$  is a measure of the same characteristic but obtained from an independent source. Then the ratio  $r = X/x$  may be used to alter the inflation estimate  $Y_1$  described above. If  $Y_1$  is an inflation estimate of a NOES item, the ratio estimate  $Y_2 = Y_1 * r = W * y * r$  may be more precise than  $Y_1$  alone. In ratio estimation the ratio ( $X/x$ ) should vary in the same proportion as ( $Y/Y_1$ ). In the NOES, two stages of ratio estimation were used, first using number of establishments and then using number of employees. The Dun and Bradstreet<sup>8</sup> and County Business Pattern<sup>7</sup> listings of all establishments were used as outside sources in calculating the ratios. These ratios were then used to correct the initial inflation estimates ( $Y_1$ ). These corrected estimates are presented in this volume.

## Estimation of Sampling Error

Sampling error (also called standard error or standard deviation) refers to the deviation of actual values of the characteristic being studied from values of that characteristic estimated from the survey results. In the NOES, sampling errors were the result of estimates being based on a sample of plants. The sampling error is a measure of the precision of the estimate of total numbers of employees (or plants). Statistically, sampling error is defined as the square root of the variance, where the variance for a group of independent observations  $x_1 \dots x_n$  with mean  $\bar{X}$  is defined as:

$$\sum_{i=1}^n (x_i - \bar{x})^2 / (n-1).$$



The chances are about 68 out of 100 that an estimate calculated from the NOES sample would differ from results of a survey of all plants eligible to be included in the NOES by more than one standard error. The chances are 95 out of 100 that the difference would be less than twice the standard error and 99 out of 100 that it would be less than 2 1/2 times as large.

The method of Balanced Repeated Replications (BRR)<sup>5</sup> was used to estimate NOES variances. This method is one of a class of methods of calculating variances by resampling from the sample many times. BRR in the NOES uses random subsamples generated by combinations of data from pairs defined by PSUs in each of the SR and NSR strata. Sixty-four pairs (half-samples) and 32 replicates were formed. The half-samples are the repeated replications of BRR. They are "balanced" because the replicates were determined from pairs.

Thirty-two replicates for BRR were defined. Each replicate included one member from each of the 64 pairs. Which member to choose from each pair ('first' or 'second') was determined using a random number table.

To use the technique, estimates of characteristics in each of the replicates were found using the ratio estimation procedures described for the full sample estimation process. Variances in each replicate were then found, and summed. Variances were found using the standard formula:

$$\text{Var} (x') = \left( \sum_{r=1}^n (x_r - x_0)^2 \right) / r, \text{ where}$$

Var (x') = variance of characteristic x

$x_r$  = estimate of the characteristic x made from the r<sup>th</sup> replicate,

$x_0$  = estimate of characteristic x made from the full sample.

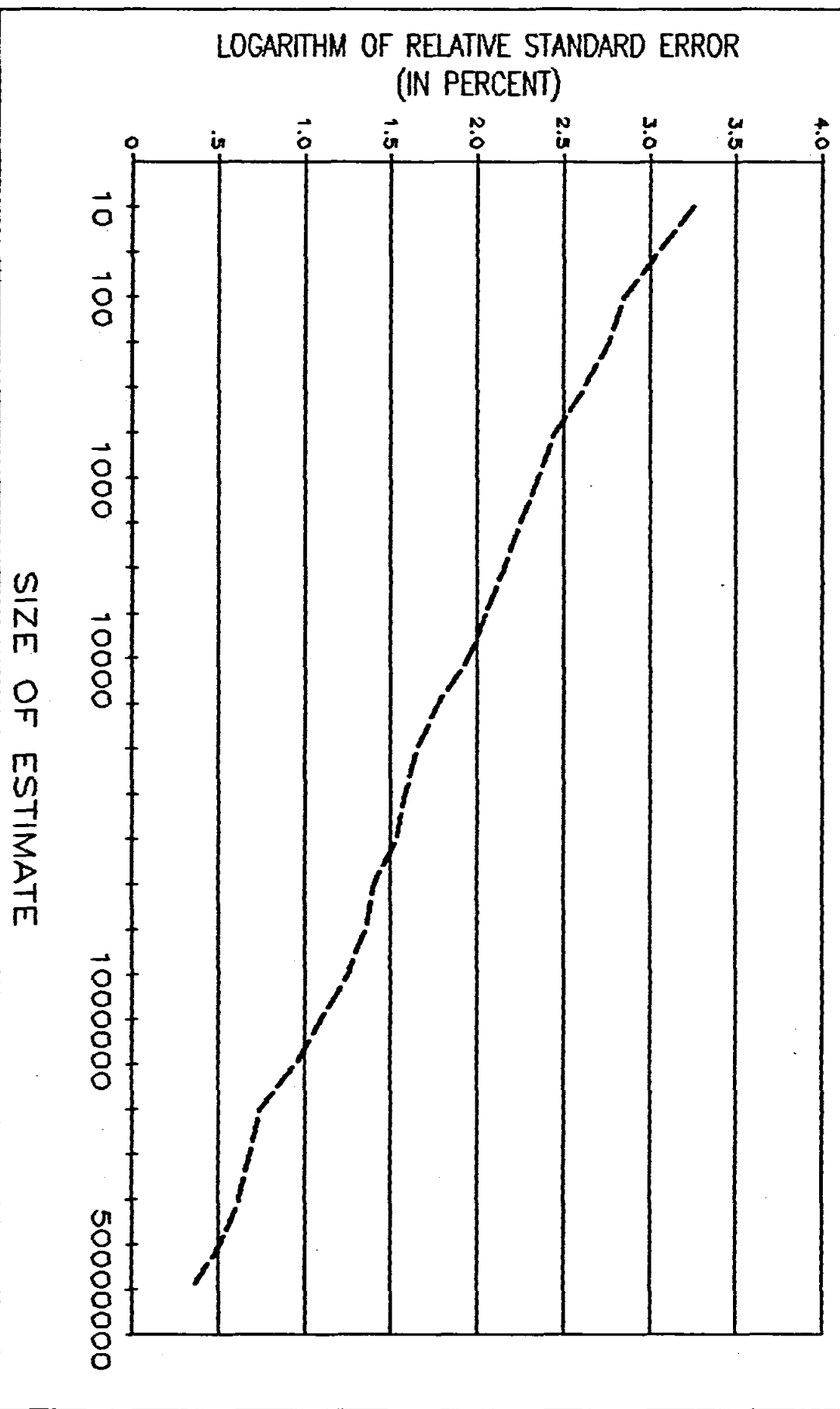
Estimates  $x_0$  of characteristic x were calculated for each replicate using the same methodologies to calculate weights and ratio estimates as were used for the full sample. Since each replicate was a 50 percent subsample of the total sample, numerical values for the inflation weights used in the estimation procedures varied from those used for calculations with the entire sample. Half of the 32 weights (1 for each of the 32 replicates) were zero if the establishment was not in the replicate, and half were about twice as large as for the entire sample.

Sampling error in the NOES was taken as the square root of the variance:

$$\text{S.E.} (x') = \sqrt{\text{Var} (x')}$$

A graph relating relative standard error of the estimate of numbers of employees to the magnitude of the estimate is shown in Figure D-2. This graph may be used to determine standard errors for estimates of numbers of employees which are not presented in this volume. An example of the use of the graph is also given.

FIGURE D-2  
 RELATIVE STANDARD ERRORS FOR ESTIMATES  
 OF NUMBER OF EMPLOYEES



Example of chart use: An estimate of 1,000,000 employees (on scale at bottom of chart) has a relative standard error of 1.1% (on scale at the left of the chart), or a standard error of 11,000 (1.1% of 1,000,000).

#### D. Sampling Error

Much of the analysis in the NOES was to be industry-by-industry breakdowns. For these kinds of analyses, the samples of industries should have had approximately equal reliability. This would have led to a sample design with roughly equal sample sizes by industry. On the other hand, an efficient sample for analysis of statistics for all industries combined would require that the sample size in each industrial sector be proportional to that sector's contribution to the total number of establishments eligible for the survey. Data from the NOES on the distributions of both establishments and employees was also important. An efficient sample design for statistics on employees would use higher sampling rates for larger establishments than for smaller ones. For statistics on establishments, however, the number of plants, rather than their size, would be important.

The sample design ultimately developed for the NOES maximized the reliability of estimates of numbers of employees. Sampling errors resulted from the use of this one sampling design. For example, the probability of selection of certain establishments in some primary sampling units was so large that all establishments in certain size classes would have been included in the sample. This sampling with certainty in some primary sampling units occurred either because of few establishments in that size class in the sampling unit or because of the required sample size. Operational constraints also affected sampling error.

Sampling error is also reflected in the calculation of standard errors. The calculation of variances using standard statistical formulas assumes that sample observations are collected independently of one another, and that a uniform sampling rate is used for the entire sample. In the NOES sampling scheme, however, this assumption does not apply.

The sample selection methods used for NOES result in variance estimates that are slightly biased (usually overestimates), regardless of the type of variance estimation used. In this sense estimation of the variance is a conservative estimate. These biases arise because only one PSU was selected from each of the size strata considered, so some strata had to be combined in the variance estimation procedure to obtain meaningful results. Combining PSU's from different strata introduced an extra element of variance for the estimation procedure; two sample PSU's could have been selected from each stratum at, however, the cost of a decrease in efficiency of the sampling scheme. Also, systematic sampling of establishments within each sample PSU was used to select establishments. Defining half-samples for BRR from samples already determined by a systematic selection procedure also tends to yield slight overestimates of the variance.

### E. Undersampling in the NOES

Valid use of the ratio means in the estimation process requires low standard errors and consequently, appropriate sample sizes. This requirement is especially important in the NOES, since estimates from several subgroups (the individual industrial groups) are needed. The coefficient of variation of size<sup>5</sup> was used as a screening mechanism to determine if enough establishments in the target SICs had been surveyed to give useful results. The coefficient of variation of size is defined as (coefficient of variation)/(size of sample). Since establishments surveyed in a given target SIC varied widely as to the number of employees a Poisson approximation was used, making the coefficient of variation of size:

$$C_x = \frac{1}{\sqrt{Mn}}$$

where M = mean number of establishments surveyed per employee size group

n = total number of establishments surveyed in the target SIC.

A value of  $C_x = .25$  was used as a cutoff value for results from individual SICs to be included in the results presented in this volume.

**Appendix E**

**National Occupational Exposure Survey  
Preface and Part I Questionnaire**

NATIONAL OCCUPATIONAL EXPOSURE SURVEY

Preface

DUPLICATE INTO EACH CARD

ID START DATE FACILITY ID																
0	1	0	M	M	D	D	Y	Y								
2	4	5	6	11	12	17										

A  
1

Facility Name

18 52

Address

18 52

B  
1

City

State Zip Code

18 41 42 44 48 49 52

C  
1

Legal Owner(s)

18 52

D  
1

Area Code

Telephone Number

53 55 56 58 59 62

Survey End Date

M M D D Y Y  
63 65 67

IF MAILING ADDRESS OR PERSON TO CONTACT CONCERNING INFORMATION ABOUT THE SURVEY IS DIFFERENT FROM THAT INDICATED ABOVE, LIST THE CORRECT MAILING ADDRESS AND CONTACT BELOW.

Facility Name

18 52

E  
1

Address

18 52

F  
1

City

State Zip Code

18 41 42 44 48 49 52

G  
1

Attention

18 52

H  
1

Area Code

Telephone Number

53 55 56 58 59 62

DEPARTMENT OF HEALTH AND HUMAN SERVICES  
PUBLIC HEALTH SERVICE  
CENTERS FOR DISEASE CONTROL  
NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH  
4676 COLUMBIA PARKWAY  
CINCINNATI, OHIO 45226

NATIONAL OCCUPATIONAL EXPOSURE SURVEY

Part I - Management Interview

1. Card Code 1  
1
2. Revision Code 0 1 0  
2 4
- Surveyor ID     
5
3. Date Survey Started    /    /    (mo/day/yr)  
6 7 / 8 9 / 10
4. Facility Number                    
12 17

\*\*\* GENERAL FACILITY INFORMATION \*\*\*

5. What is your major activity? \_\_\_\_\_  
18

CARD 2  
1

6. What are your chief products, services, lines of trade, etc? \_\_\_\_\_  
18

CARD 3  
1

7. SIC codes (observed)           
18 21

          
22 25

          
26 29

8. Approximately how many years has this facility been involved in this activity?

      Years (If "unknown" code "UK")  
30 32

9. How many shifts do you have at present?     
33

10. How many hours per shift?

34 35 (If irregular, code "99").

11. How many people are on your payroll for all shifts at the present time?

Males 36 40

Females 41 45

Total 46 50

12. Of this total number, how many are normally in the work areas as opposed to the administrative or other areas?

51 55

13. Are there any labor unions operating in this facility?

56

1 No

2 Yes; list complete union names and acronyms (initials)

CARD 4

Union Names

Acronym

	<u>18</u>	<u>24</u>
	<u>25</u>	<u>31</u>
	<u>32</u>	<u>38</u>
	<u>39</u>	<u>45</u>
	<u>46</u>	<u>52</u>
	<u>53</u>	<u>59</u>
	<u>60</u>	<u>66</u>



14. Is there a formally established health unit at this facility? <sup>18</sup>

- 1 Yes, physician in charge
- 2 Yes, registered nurse in charge
- 3 Yes, licensed practical nurse in charge
- 4 Yes, other in charge
- 5 No

15. Do you have an employee at this facility with formal first-aid training, who has been formally designated to provide emergency medical treatment? <sup>19</sup>

- 1 Yes, full-time
- 2 Yes, part-time
- 3 No

16. Do you have on your payroll one or more on-site physicians to give your employees medical care? <sup>20</sup>

- 1 Yes, full-time
- 2 Yes, part-time
- 3 No

17. Do you have a formal arrangement with any outside source (physicians or clinics) to give your employees access to the care of a physician? <sup>21</sup>

- 1 Yes, physician will travel to this facility on call
- 2 Yes, at clinic (not at this facility)
- 3 Yes, physician is based at this facility either full or part-time
- 4 No

18. Estimate the average number of physician hours that are devoted to your facility per week.

22 — — — 25 hours per week

19. Does this facility have one or more nurses on the payroll to provide care for employees? <sup>26</sup>

- 1 Yes
- 2 No (Skip to Question 21)

20. How many registered nurses and licensed practical nurses are on the payroll at this facility?

RN 27 — — 29

LPN 30 — — 32

21. Estimate the average number of nursing hours that are devoted to your facility per week.

     —           hours  
 33 — 36

22. Do you provide the following examinations or tests to all or to selected groups of employees on a periodic basis?

	No	Yes, All	Yes, All Exec. & Mgmt Only	Yes, All Production Workers Only	Yes, for Selected Mgmt and/or Production Workers
Ophthalmology <sup>37</sup>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
Audiometric <sup>38</sup>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
Blood tests <sup>39</sup>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
Urine tests <sup>40</sup>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
Pulmonary function <sup>41</sup>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
Chest X-rays <sup>42</sup>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
Allergy/Sensitization <sup>43</sup>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
Immunizations (flu, etc.) <sup>44</sup>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
23. Before new employees are hired or placed, are they required to take a medical examination? <sup>45</sup>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
24. Do you record health information about a new employee on some regular form? <sup>46</sup>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
25. Do you require medical examinations of your employees who return to work after an illness? <sup>47</sup>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
26. Do you require medical examinations of your employees when their employment is terminated? (Exit examination) <sup>48</sup>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>

27. How long are medical records and other health information records retained?

     —      Years (If "forever" code "999")  
 49 — 51 (If "unknown" code "UK \_")

**\*\*\* INDUSTRIAL HYGIENE AND SAFETY PRACTICES \*\*\***

28. Do you employ full-time individuals at this facility whose major responsibilities are in the area of prevention of occupational injuries or illnesses?<sub>52</sub>

- 1 Yes, injury prevention
- 2 Yes, illness prevention
- 3 Yes, both injuries and illnesses
- 4 No (Skip to Question 30).

29. How many full-time occupational health and safety specialists are employed at this facility?

53 54 Safety (injuries)  
55 56 Health (illnesses)

For each of those individuals, please write in the appropriate activity number from the activity clusters listed below:

CLUSTER NO.

- |                                 |  |
|---------------------------------|--|
| Individual # 1 <sub>57</sub> —  | 1: Administers (directs, manages) Plans and develops programs, Advises top level management.             |
| Individual # 2 <sub>58</sub> —  | # 2: Inspects work place to identify hazards. Investigates to determine the cause of injuries/illnesses. |
| Individual # 3 <sub>59</sub> —  | # 3: Analyzes plans or specs. to identify hazards, develops operating procedures to control hazards.     |
| Individual # 4 <sub>60</sub> —  | # 4: Provides education and training.  |
| Individual # 5 <sub>61</sub> —  | # 5: Performs and analyzes tests to monitor for the presence of dusts, gases, etc.                       |
| Individual # 6 <sub>62</sub> —  | # 6: Performs engineering design to control hazards.   |
| Individual # 7 <sub>63</sub> —  |  |
| Individual # 8 <sub>64</sub> —  |  |
| Individual # 9 <sub>65</sub> —  |  |
| Individual # 10 <sub>66</sub> — |  |
| Individual # 11 <sub>67</sub> — |  |
| Individual # 12 <sub>68</sub> — |  |

30. Has your facility received industrial hygiene services on a consulting basis during the past 12 months?<sub>69</sub>

- 1 Yes, from government sources
- 2 Yes, from non-government sources
- 3 No

31. Has your facility received occupational safety services on a consulting basis during the past 12 months? <sub>70</sub>

- 1 Yes, from government sources
- 2 Yes, from non-government sources
- 3 No

32. Do you have a program under which you regularly or periodically monitor the presence of physical agents such as heat, vibration, radiation, noise, and magnetic fields? <sub>71</sub>

- 1 No (Skip to Question 34)
- 2 Yes (Circle yes or no for each physical agent listed below:)

	<u>Yes</u>	<u>No</u>
1. Heat <sub>72</sub>	1	2
2. Vibration <sub>73</sub>	1	2
3. Radiation <sub>74</sub>	1	2
4. Noise <sub>75</sub>	1	2
5. Magnetic fields <sub>76</sub>	1	2
6. Other <sub>77</sub>	1	2

33. How long do you retain the records of the monitoring program?

78 79 Years (If "forever" code "99")  
(If "unknown" code "UK")

CARD 6  
1

34. Do you have a program under which you regularly or periodically monitor the presence of fumes, gases, mists, dusts, or vapors? <sub>18</sub>

- 1 Yes
- 2 No (Skip to Questions 38)

35. How is this monitoring conducted? <sub>19</sub>

- 1 Sample collection with laboratory analysis (Skip to Question 37)
- 2 Direct reading instruments
- 3 Both

36. Which types of direct reading instruments are used in the monitoring program? Circle "yes" or "no" for each type listed below:

	<u>Yes</u>	<u>No</u>
1. Direct mass measurement tests <sub>20</sub>	1	2
2. Fibrous aerosol monitors <sub>21</sub>	1	2
3. Detector tubes <sub>22</sub>	1	2
4. Infrared (I.R.) gas monitors <sub>23</sub>	1	2
5. Ultraviolet (U.V.) gas monitors <sub>24</sub>	1	2
6. Gas chromatograph monitors <sub>25</sub>	1	2
7. Electrochemical monitors <sub>26</sub>	1	2
8. Other "wet" chemical methods <sub>27</sub>	1	2

37. How long do you retain the records of the monitoring program?

28 29 Years (If "forever" code "99")  
(If "unknown" code "UK")

38. Have any substitutions of chemical materials been made within the last 5 years?<sub>30</sub>

- 1 Yes  
2 No (Skip to Question 41)

39. Were any of these substitutions made for the primary purpose of reducing employee exposures?<sub>31</sub>

- 1 Yes  
2 No

40. Were any of these substitutions made as a result of inspections of this facility by federal, state, or local authorities?<sub>32</sub>

- 1 Yes  
2 No

41. Have any major equipment or process modifications been made within the last 5 years?<sub>33</sub>

- 1 Yes  
2 No (Skip to Question 45)

42. Were any of these modifications made for the primary purpose of reducing employee exposures?<sub>34</sub>

- 1 Yes  
2 No

43. Were any of these modifications made as a result of inspections of this facility by federal, state, or local authorities?<sup>35</sup>

- 1 Yes
- 2 No

44. What was the nature of the modification?<sup>36</sup>

- 1 A redesign of the process
- 2 Enclosing the process
- 3 Equipment substitution
- 4 A redesign of the equipment
- 5 Combination of the above
- 6 Not listed here

45. Does this facility recirculate exhaust air from any process or plant area?<sup>37</sup>

- 1 Yes
- 2 No (Skip to Question 47)

46. What processes or areas are involved?

_____	_____
_____	_____
_____	_____

47. Are there areas in this facility in which personal protective devices or equipment are required or recommended?<sup>38</sup>

- 1 Yes, required
- 2 Yes, recommended
- 3 Yes, both
- 4 No (Skip to Question 53)

48. Who provides personal protective devices?<sup>39</sup>

- 1 individual employees
- 2 employer
- 3 both
- 4 other (specify) \_\_\_\_\_

49. Who has been designated to see to it that personal protective devices and equipment are serviced and maintained?<sup>40</sup>

- 1 individual employees
- 2 employer representative
- 3 both
- 4 no one
- 5 other Specify \_\_\_\_\_

50. In those instances where employees refuse to wear protective devices or fail to wear them properly, are corrective measures taken? <sub>41</sub>

- 1 Yes
- 2 No (Skip to Question 53)

51. Do those corrective measures involve economic penalties? <sub>42</sub>

- 1 Yes
- 2 No (Skip to Question 53)

52. Have any economic penalties been assessed in the past 12 months? <sub>43</sub>

- 1 Yes
- 2 No, we know of no instances where violations of company policy have occurred within the last 12 months.
- 3 No, although we know that there was a minimum of one violation of company policy within the last 12 months.

53. Do you have a program under which you regularly or periodically conduct safety inspections of this facility? <sub>44</sub>

- 1 Yes
- 2 No (Skip to Question 56)

54. Are written results of these safety inspections required? <sub>45</sub>

- 1 Yes
- 2 No

55. Are the results of the safety inspections posted or otherwise made routinely available to affected employees? <sub>46</sub>

- 1 Yes
- 2 No

56. Do you have a regularly scheduled preventive maintenance program? <sub>47</sub>

- 1 Yes
- 2 No

57. Do you have a regularly scheduled formal safety training program for your employees? <sub>48</sub>

- 1 Yes
- 2 No

58. Do you have a program under which you regularly or routinely assess the employee's awareness of safety rules? <sub>49</sub>

- 1 Yes
- 2 No

59. In those instances where employees are found to be in violation of the safety rules, are corrective measures taken?<sub>50</sub>

- 1 Yes
- 2 No (Skip to Question 62)

60. Do those corrective measures involve economic penalties?<sub>51</sub>

- 1 Yes
- 2 No (Skip to Question 62)

61. Have any economic penalties been assessed in the past 12 months?<sub>52</sub>

- 1 Yes
- 2 No, we know of no instances where violations of company policy have occurred within the last 12 months.
- 3 No, although we know that there was a minimum of one violation of company policy within the last 12 months.

**\*\*\* GENERAL RECORDKEEPING INFORMATION \*\*\***

62. How long are personnel records on terminated employees retained?

53 — 55 Years (If "forever", code "999")  
(If "unknown", code "UK \_")

63. Do you keep employee absenteeism records?<sub>56</sub>

- 1 Yes, showing specific nature of illness where appropriate
- 2 Yes, showing only the type of absence
- 3 Yes, without showing the type of absence
- 4 No

64. What is your rate of unscheduled absenteeism?

57 — 59 days per employee per year (If unknown, code "UK")

65. What is your turnover rate among permanent employees in the nonadministrative areas?

60 — 62 % per year



66. May I see the latest Summary of Occupational Injuries and Illnesses Form (OSHA Form 200)? (OSHA regulations provide for inspection by NIOSH).<sup>18</sup>

- 1 Yes
- 2 No (or company does not keep one)

**SURVEYOR: COPY THE FOLLOWING INFORMATION FROM THE OSHA FORM 200**

Occupational Injuries

- a. Number of deaths (column 1) 19 | 20
- b. Number of injuries with lost workdays (column 3) 21 | 23
- c. Number of injuries without lost workdays (column 6) 24 | 26

Occupational Illnesses

- a. Skin diseases or disorders (column 7a) 27 | 29
- b. Dust diseases of the lungs (column 7b) 30 | 32
- c. Respiratory conditions due to toxic agents (column 7c) 33 | 35
- d. Poisoning (systemic effects of toxic materials) (column 7d) 36 | 38
- e. Disorders due to physical agents (column 7e) 39 | 41
- f. Disorders associated with repeated trauma (column 7g) 42 | 44
- g. Deaths (column 8) 45 | 46
- h. Number of illnesses with lost workdays (column 10) 47 | 49
- i. Number of illnesses without lost workdays (column 13) 50 | 52

## References

1. **Standard Industrial Classification Manual 1972.**  
Executive Office of the President, Office of Management and Budget
2. **National Institute for Occupational Safety and Health (1974, 1977):**  
National Occupational Hazard Survey. DHEW (NIOSH) publications No. 74-127, 77-213, 78-114.
3. **National Occupational Exposure Survey. Sampling Methodology.** DHHS (NIOSH) publication No. 89-102, December, 1989.
4. **National Occupational Exposure Survey Field Guidelines.** DHHS (NIOSH) Publication No. 88-106, March, 1988.
5. **Kish, L., 1965, Survey Sampling,** John Wiley and Sons, New York, New York.
6. **Sieber, W.K., 1987, Researchers' Micros Analyze Workplace Hazards.** Government Computer News, May 22, 1987. pp. 48-49.
7. **U.S. Bureau of the Census, 1982. County Business Patterns, 1980, United States.** U.S. Department of Commerce.
8. **Dun's Marketing Index,** Dun and Bradstreet, Inc. 1983.