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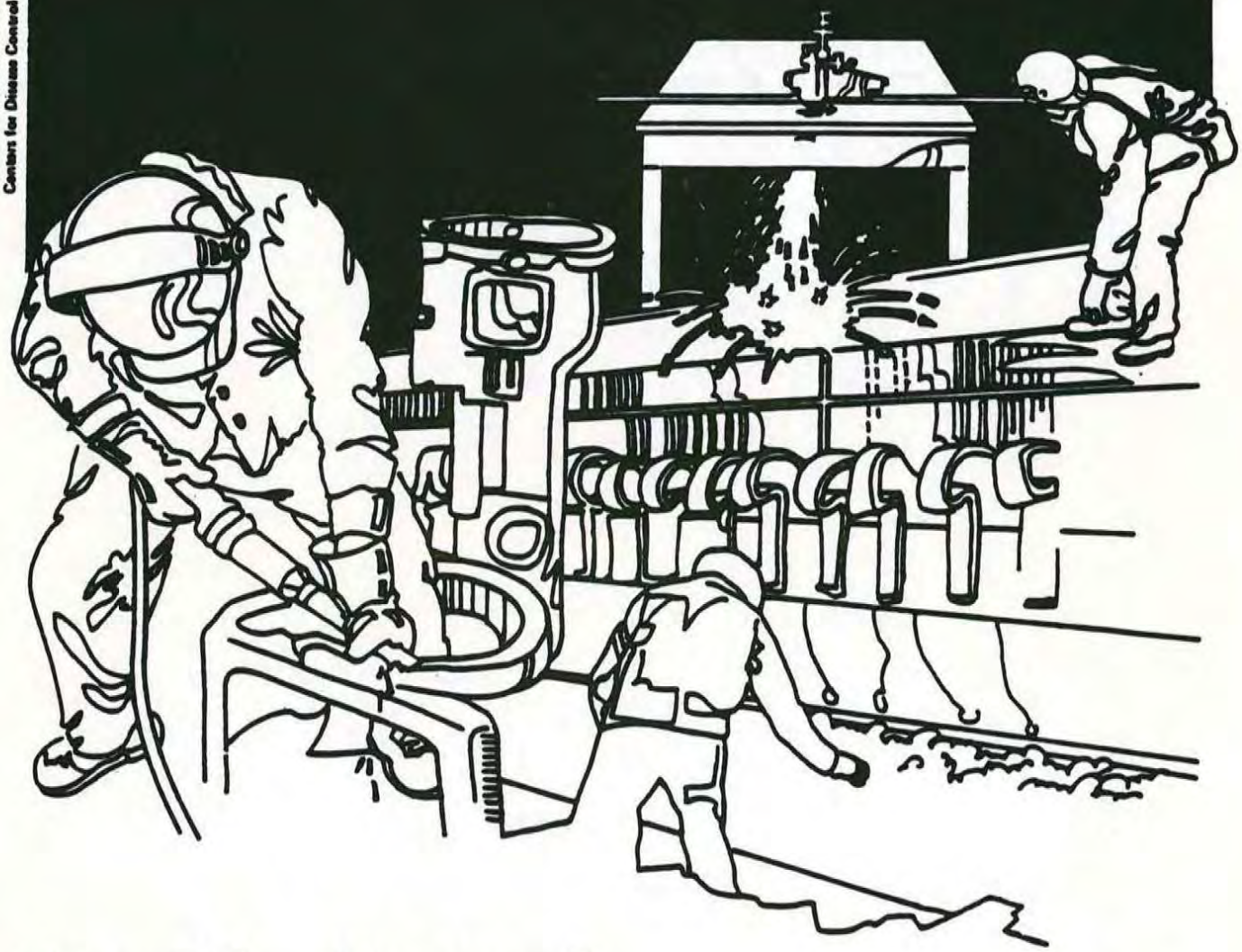

Health Hazard Evaluation Report

HETA 85-334-1676
OLIN CORPORATION
MARION, ILLINOIS

PREFACE

The Hazard Evaluations and Technical Assistance Branch of NIOSH conducts field investigations of possible health hazards in the workplace. These investigations are conducted under the authority of Section 20(a)(6) of the Occupational Safety and Health Act of 1970, 29 U.S.C. 669(a)(6) which authorizes the Secretary of Health and Human Services, following a written request from any employer or authorized representative of employees, to determine whether any substance normally found in the place of employment has potentially toxic effects in such concentrations as used or found.

The Hazard Evaluations and Technical Assistance Branch also provides, upon request, medical, nursing, and industrial hygiene technical and consultative assistance (TA) to Federal, state, and local agencies; labor; industry and other groups or individuals to control occupational health hazards and to prevent related trauma and disease.

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OLIN CORPORATION
MARION, ILLINOIS

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1. SUMMARY

On April 24, 1985, the National Institute for Occupational Safety and Health (NIOSH) was requested to evaluate exposures to polychlorinated biphenyls (PCBs) at the Olin Corporation, Marion, Illinois. The facility, located on the Crab Orchard National Wildlife Refuge, is leased to Olin by the United States Department of the Interior, Fish and Wildlife Service. Portions of the facility had been previously occupied by a manufacturer of PCB-containing electrical components, and a concern was expressed that a potential for PCB exposures may exist in buildings which were being used for the manufacture of ordnance products.

In May 1985, NIOSH investigators conducted an initial visit to the facility. In June 1985, an environmental survey was conducted during which air and surface wipe samples were collected to assess the potential for employee exposures to PCBs.

Only one of 15 area air samples collected in the occupied buildings contained PCBs above the limit of detection of 0.05 micrograms per sample. This sample showed a time-weighted average (TWA) concentration of 0.34 micrograms of Arochlor 1242 per cubic meter of air (ug/M^3). An air sample collected in the one portion of an unoccupied building where occasional maintenance activity was performed showed a TWA concentration of 0.66 ug/M^3 Arochlor 1242. Both of these concentrations are below the NIOSH recommended standard of 1 ug/M^3 for PCBs as a 10-hour TWA, and the Occupational Safety and Health Administration (OSHA) standard of 1000 ug/M^3 as an 8-hour TWA for PCB mixtures containing 42% chlorine.

Levels of PCBs in surface wipe samples were found to be below the limit of detection of 0.5 micrograms per sample in all samples collected in office and production areas of the facility. Relatively low levels of PCBs were detected in wipe samples collected from the floors of the three buildings used for shipping and storage (range: 1.2 to 3.2 ug/100cm^2, mean: 2.2 ug/100cm^2), and in the portion of an unoccupied building where occasional maintenance work was performed (1.2 and 2.3 ug/100cm^2). While no specific federal criteria exist for surface PCB contamination, various decontamination guidelines have been proposed following PCB transformer fires in office buildings. These include 1.0 ug/100cm^2 by the New York State Department of Health and the San Francisco Department of Health, and 0.5 ug/100cm^2 by the New Mexico Expert Advisory Panel. Surface concentrations of PCBs measured in non-manufacturing buildings during previous surveys have indicated background levels as high as 0.50 ug/100cm^2 and 0.72 ug/100 cm^2.

On the basis of the information obtained during this survey, it has been determined that a hazard from exposure to PCBs did not exist at the time of this survey. Recommendations designed to further minimize the possibility of exposure through the reduction of surface contamination of PCBs are included in the body of this report.

Key Words: SIC 3482 & 3483, Polychlorinated Biphenyls (PCBs), Arochlor 1242, Arochlor 1254, Decontamination

II. INTRODUCTION

On April 24, 1985, a representative of the United States Department of the Interior, Fish and Wildlife Service requested that NIOSH conduct a health hazard evaluation at an Olin Corporation leased manufacturing facility on the Crab Orchard National Wildlife Refuge, Marion, Illinois. Portions of the facility had been previously occupied by a manufacturer of PCB containing electrical components, and recent surveys had revealed soil and surface PCB contamination in and around some of the buildings. The requestor was concerned with possible PCB exposure among Olin employees working in the buildings currently being used to manufacture ordnance products.

On May 16, 1985, NIOSH investigators conducted an initial survey. An opening conference was conducted with representatives of the Olin Corporation during which background information was obtained, followed by a walk-through of the facility. On June 26 & 27, 1985, an environmental survey was conducted during which air and surface wipe samples were collected to assess potential employee exposures to PCBs. The results of this survey were provided to the company and requestor by letter on August 22, 1985.

III. BACKGROUND

The Olin Corporation, Marion, Illinois is a manufacturer of ordnance products. The facility is located on the Crab Orchard National Wildlife Refuge and the buildings are leased from the U.S. Department of the Interior, Fish and Wildlife Service. At the time of the survey, the company employed approximately 125 persons in professional, supervisory, clerical, and technician positions, and between 105 and 160 hourly workers, depending on the level of production.

Some of the buildings which comprise the present Olin facility had been previously occupied by the Sangamo Electric Company from the 1950's through 1962. The Sangamo Electric Company manufactured electrical transformers and capacitors, some of which contained PCBs. The use of PCBs (Arochlors 1242 and 1254) was reported to have been primarily restricted to Building I-1-23 and I-1-23A, with the possibility of some limited use in other buildings. Environmental testing conducted by an independent contractor in July and August of 1984, had revealed PCB concentrations of up to 132,000 parts per million (ppm) in the soil directly outside of building I-1-23. Additional testing conducted by the company had indicated the presence of airborne and surface contamination in this building, as well as in other buildings within the facility.

At the time of the survey, the Olin corporation occupied five main buildings for its production and related operations (Diagrams 1 through 3). A portion of Building I-1-20 (Diagram 1) houses the plant's administrative offices. The remainder of this building, as well as the entire adjacent Building I-1-12 (Diagram 2), contains the company's manufacturing operations where the majority of the production employees are located.

Building I-1-3 (Diagram 3) is used primarily for shipping and receiving operations. Three employees spend approximately 50% of their time in this area (primarily in the shipping and receiving office), and approximately 10 drivers and laborers also spend a limited amount of time in this area. The adjacent structures, Buildings I-1-1, and I-1-2 (Diagram 3), are primarily used for storage, and are lightly trafficked, with only occasional entry by employees.

A covered walkway connects the manufacturing area with Buildings I-1-23 and I-1-23A. These buildings have not been occupied by Olin employees since mid-1984, when production operations were ceased due to a concern with potential PCB contamination. Access to these buildings is now restricted, and limited primarily to personnel involved in preventive maintenance activities on the facility's boilers which are located in the rear portion of Building I-1-23. A log is maintained for all individuals entering these buildings, and disposable shoe coverings are required to be worn while in these buildings.

IV. MATERIALS AND METHODS

The environmental survey was designed to determine the potential for employee exposure to PCBs through the collection of airborne and surface wipe samples in the occupied buildings of the facility. In addition, samples were also collected in two unoccupied buildings in order to aid the company in determining the magnitude and extent of contamination in these areas for the purposes of determining the feasibility of their reoccupancy.

A. Air Sampling

General area samples for airborne PCBs were collected using calibrated constant flow vacuum pumps operating at 0.6 liters per minute. The pumps were attached via Tygon tubing to the collection media which consisted of thirteen-millimeter glass fiber filters followed in line by Florisil (30/48 mesh) sorbent tubes. Immediately following sampling, the glass fiber filters were transferred to glass vials and the sorbent tubes were capped with plastic caps for shipment to the laboratory. The filter and sorbent tubes were analyzed separately by gas chromatography equipped with an electron capture detector according to NIOSH Method 5503 with modifications.[1] Information pertinent to sample collection is provided in Tables 1 and 2, with the specific locations of sample collection presented in Diagrams 1 through 4.

B. Surface (Wipe) Sampling

The collection media used for wipe samples consisted of cotton gauze pads which had been previously extracted in the laboratory. Samples were obtained by moistening the cotton gauze with pesticide quality hexane and applying moderate pressure with a tweezers while wiping a unit area of approximately 100 square centimeters. The surface was wiped in two directions, with the second direction performed at a 90° angle to the first. After wiping the surface, the gauze was placed in

30 millimeter glass vials and sealed with a Teflon-lined screw cap. The tweezers were rinsed with hexane between samples to prevent the possibility of cross contamination. In the laboratory, the samples were desorbed with hexane and analyzed using a gas chromatograph equipped with an electron capture detector according to NIOSH Method 5503 with modifications.[1] The presence of an individual Arochlor was determined by comparison with standard samples of Arochlors obtained from the EPA. Information pertinent to sample collection is provided in Tables 3 and 4, with the specific locations of sample collection presented in Diagrams 1 through 4.

V. EVALUATION CRITERIA

A. General

As a guide to the evaluation of the hazards posed by workplace exposures, NIOSH field staff employ environmental evaluation criteria for assessment of a number of chemical and physical agents. These criteria are intended to suggest levels of exposure to which most workers may be exposed up to 10 hours per day, 40 hours per week for a working lifetime without experiencing adverse health effects. It is, however, important to note that not all workers will be protected from adverse health effects if their exposures are maintained below these levels. A small percentage may experience adverse health effects because of individual susceptibility, a pre-existing medical condition, and/or a hypersensitivity (allergy).

In addition, some hazardous substances may act in combination with other workplace exposures, the general environment, or with medications or personal habits of the worker to produce health effects even if the occupational exposures are controlled at the level set by the evaluation criterion. These combined effects are often not considered in the evaluation criteria. Also, some substances are absorbed by direct contact with the skin and mucous membranes, and thus potentially increase the overall exposure. Finally, evaluation criteria may change over the years as new information on the toxic effects of an agent becomes available.

The primary sources of environmental evaluation criteria for the workplace are: 1) NIOSH Criteria Documents and recommendations, 2) the American Conference of Governmental Industrial Hygienists' (ACGIH) Threshold Limit Values (TLV's), and 3) the U.S. Department of Labor Occupational Safety and Health Administration (OSHA) occupational health standards. Often, the NIOSH recommendations and ACGIH TLV's are lower than the corresponding OSHA standards. Both NIOSH recommendations and ACGIH TLV's usually are based on more recent information than are the OSHA standards. The OSHA standards also may be required to take into account the feasibility of controlling exposures in various industries where the agents are used; the NIOSH-recommended standards, are based primarily on concerns relating to the prevention of occupational disease. In evaluating the exposure levels and the recommendations for reducing these levels found in this report, it should be noted that

industry is required by the Occupational Safety and Health Act of 1970 (29 USC 651, et seq.) to meet those levels specified by an OSHA standard.

A time-weighted average (TWA) exposure refers to the average airborne concentration of a substance during a normal 8- to 10-hour workday. Some substances have recommended short-term exposure limits (STEL) or ceiling values which are intended to supplement the TWA where there are recognized toxic effects from high short-term exposures.

B. Polychlorinated Biphenyls (PCBs)

PCBs are a class of chlorinated aromatic hydrocarbons. They were first available in the United States in 1929, and became widely distributed between 1957 and 1977, marketed under the trade name "Arochlor". At least nine different Arochlors were manufactured and designated by numbers such as 1221, 1242, 1254, and 1260, where the last two digits represent the percent by weight of chlorine.[2]

In human beings, high dose PCB exposure has been documented to produce a variety of toxic effects including chloracne, contact dermatitis, upper airway irritation, nausea and digestive disturbances, liver dysfunction, and dysfunction of sensory and motor nerves in the extremities.[3] Recently these compounds have been found to cause lower birth weight and smaller head circumference in newborns whose mothers ate PCB contaminated fish during pregnancy.[4]

1. Criteria for Occupational Exposure to PCBs

Based on the adverse reproductive and tumorigenic effects that PCBs have shown in experimental animals, and a concern that they may possibly cause cancer in humans, NIOSH recommends that occupational exposure to PCBs be controlled at or below a concentration of 1.0 ug/M^3 total PCBs determined as a TWA concentration for up to a 10-hour workday, 40-hour workweek.[2] The current OSHA standard for exposure to PCBs is 1000 ug/M^3 for PCB mixtures containing 42% chlorine, and 500 ug/M^3 for mixtures containing 54% chlorine as an 8-hour TWA concentration.[5] Background concentrations of airborne PCBs measured in commercial buildings have been reported to range from 0.11 to 0.24 ug/M^3.[6]

Laboratory experiments and industrial studies have documented cutaneous absorption of PCBs.[7,8] NIOSH recommends that exposure to PCBs through skin contact be minimized through the use of safe work practices and proper personal protective equipment. The OSHA PEL and the ACGIH TLV both include a "Skin" notation which refers to the potential contribution to overall exposure by the cutaneous route, including the mucous membranes and eyes, by either airborne or direct skin contact with PCBs.

2. Criteria for Surface Contamination/Decontamination of PCBs

While no specific federal criteria exist for surface PCB contamination, various decontamination guidelines have been proposed following PCB

transformer fires in office buildings. These include 1.0 ug/100cm^2 by the New York State Department of Health, 0.5 ug/100cm^2 by the New Mexico Expert Advisory Panel, and 1 ug/100cm^2 by the San Francisco Department of Health.[9,10,11] Surface concentrations of PCBs measured in non-manufacturing buildings during previous surveys have indicated background levels as high as 0.50 ug/100cm^2 and 0.72 ug/100 cm^2.[12,13] Due to the above background environmental levels of PCBs, a number of studies have demonstrated that PCBs can be found in the serum of most persons residing in the United States. These studies have reported serum PCB values from 0 to 42 parts per billion (ppb), with mean concentrations ranging from 2.1 to 24.4 ppb.[14]

VI. RESULTS

A. Air Sampling

The results of the air samples are presented in Tables 1 and 2, with the specific locations of sample collection identified in Diagrams 1 through 4. The PCB airborne concentrations are reported as micrograms per cubic meter of air sampled (ug/M^3).

1. Occupied Buildings

The results of the air samples collected in the occupied or "personnel" areas; i.e., locations where personnel may routinely be present due to production or related activities (Buildings I-1-20, I-1-12, I-1-3, I-1-2, and I-1-1), are presented in Table 1. Only one air sample contained PCBs above the limit of detection 0.05 micrograms per sample. This sample, collected in the office area, showed a concentration of 0.34 ug/M^3 of Arochlor 1242, which is below both the NIOSH recommended standard of 1 ug/M^3 for PCBs on a time weighted average (TWA) basis for up to a 10-hour workday, and the Occupational Safety and Health Administration (OSHA) standard of 1000 ug/M^3 as an 8-hour TWA for PCB mixtures containing 42% chlorine.

2. Unoccupied Buildings

Table 2 shows airborne concentrations of PCBs measured in the unoccupied or "restricted" areas; i.e., areas where personnel are not routinely allowed to enter (Buildings I-1-23 and I-1-23A). The sample collected in the boiler room, the one area where employees occasionally perform maintenance activities, revealed a TWA concentration of 0.66 ug/M^3 Arochlor 1242, which is also below both the NIOSH recommendation and the OSHA standard. Airborne concentrations in other areas of Buildings I-1-23 and I-1-23A ranged from 0.25 to 19.53 ug/M^3; however, under normal conditions no personnel would be expected to be in these areas of the buildings.

It should be noted that the airborne concentrations reported in Tables 1 and 2 reflect general "area" air samples as opposed to "personal" breathing zone samples. However, for the purposes of this evaluation they are considered to approximate the personal exposure for an employee remaining in the specified area over the duration of the workshift.

B. Surface (Wipe) Sampling

The results of the surface or "wipe" samples are presented in Tables 3 and 4. The surface concentrations of PCBs are expressed in micrograms of PCB per 100 square centimeters (ug/100cm^2).

1. Occupied Buildings

Table 3 presents the results of the wipe samples collected from surfaces in the occupied buildings. As evidenced by these data, levels of PCBs in wipe samples collected on the floor and other building surfaces were found to be below the limit of detection (LOD) of 0.5 micrograms per sample in all samples collected in the production areas. However, relatively low levels of PCBs were detected in wipe samples collected from the floors of the three buildings used for shipping, receiving, and storage (range: 1.2 to 3.2 ug/100cm^2, mean: 2.2 ug/100cm^2). While there are no official federal criteria for surface contamination of PCBs, these values are somewhat higher than the decontamination guidelines of 0.5 and 1.0 ug/100cm^2 which were presented in Section V of this report.

2. Unoccupied Buildings

Table 4 presents the results of the wipe samples collected from the unoccupied or "restricted" areas. Surface PCB contamination levels of 32 and 980 ug/100cm^2 were detected in samples collected in building I-1-23A, with lower levels of contamination (range: < LOD to 23 ug/100cm^2, mean 6.6 ug/100cm^2) present on surfaces in building I-1-23. The boiler room, the only section of this building in which personnel occasionally worked, showed surface PCB levels of 1.2 and 2.3 ug/100cm^2. Those areas with the highest levels of PCBs in the wipe samples had correspondingly high values for air samples collected in the same area. While the samples in the boiler room area were only slightly elevated above the decontamination guidelines presented in Section V, the other areas of Building I-1-23 and I-1-23A showed a much higher level of contamination.

VII. DISCUSSION AND CONCLUSIONS

The information collected during the time of the environmental survey indicates that no hazard from airborne exposure to PCBs existed for personnel working in the occupied portions of the facility. The air sample collected in the office area, the only personnel area where a detectable level of PCBs was found, was below the NIOSH criteria for PCBs.

The air sample collected in the boiler room showed an air concentration of 0.66 ug/M^3 which was also below the NIOSH recommended standard. Therefore, no airborne hazard would be expected to exist in this area for the employee(s) performing periodic maintenance duties.

Despite the lack of detectable quantities of PCBs in air samples, low levels of surface contamination were detected on the floor of the

shipping, receiving, and storage areas (Buildings I-1-1, I-1-2, and I-1-3). Based on the low levels of potential exposure in these areas and the low acute toxicity of PCBs, a significant human health risk is not likely to be associated with the PCB contamination present on these surfaces. However, because PCBs are possible human carcinogens, it would be prudent to take steps to further reduce surface contamination in order to reduce the potential for PCB exposure from all routes of entry as much as possible. This decontamination should also include the boiler room in Building I-1-23 where low-level PCB surface contamination was also found.

Since relatively high levels of PCBs were found in both air and wipe samples in portions of buildings I-1-23 and I-1-23A, access to these buildings should continue to be restricted. If the reoccupancy of these buildings for production operations is considered, it should not be allowed until such time as a thorough decontamination of these areas is achieved. Care should be taken to provide those involved in cleaning these areas with the proper respiratory and skin protection.

VIII. RECOMMENDATIONS

In order to reduce surface contamination to the lowest possible levels, a systematic cleaning of the floors should be conducted in Buildings I-1-1, I-1-2, I-1-3, as well as the floors and other surfaces of the boiler room in Building I-1-23. Initial efforts should be concentrated in those areas most heavily trafficked by employees, i.e., the shipping and receiving area of building I-1-3.

If a decision is made to reoccupy the more heavily contaminated areas of Building I-1-23 and I-1-23A, a more indepth approach to decontamination operations would be necessary. Initially, a preliminary assessment may be necessary in order to identify and select the cleanup method that would prove most effective and practical, given the nature and extent of the contamination. During implementation of the cleanup, the potential for employee exposure should be minimized through the use of proper work practices and protective equipment and clothing. The buildings should first be ventilated by opening doors and windows in order to reduce any airborne PCB levels which may have built up. In addition, the use of full facepiece respirators equipped with a high efficiency particulate air filter with an organic vapor cartridge would further minimize the potential for inhalation of airborne PCB. Disposable coveralls, gloves, and rubber boots should also be used during the cleanup phase to prevent skin contact. Provisions should be taken for suitable decontamination of personnel and equipment following work in the contaminated areas. Following completion, the appropriate testing should be conducted to document the adequacy of the decontamination effort. The EPA's Guide for Decontaminating Buildings, Structures, and Equipment at Superfund Sites provides detailed information for developing a decontamination strategy.[15]

Various methods for removing surface PCB contamination have been suggested. Organic solvents which are highly compatible with PCBs (such

as deodorized kerosene, methylene chloride, or a mixture of 1,1,1-trichloroethane and trichlorobenzenes) may effectively decontaminate certain nonporous surfaces[16,17]; however, problems associated with the toxicity of these solvents and the disposal of spent material do not make routine use of these solvents practical. The use of nonionic and alkaline synthetic detergents, which can be applied manually through power scrubbers, sprayers, or steam cleaners provide many advantages over organic solvents. In addition to not having a flash or fire point, such solutions can be easily picked up by wet vacuum cleaners and treated to remove all toxic materials before being released in the sanitary sewers.[16,17] Complete decontamination of porous surfaces, such as concrete and masonry surfaces, may not be possible; therefore, application of an elastomeric, abrasion- and flame-resistant sealant may be required.

Specific types of nonionic or alkaline solutions and cleaning methods which have been recommended for the removal of PCB surface contamination in a previous NIOSH health hazard evaluation are provided below.[18]

General surface cleaning can be done using a solution of a octyphenoxypolyethoxyethanol nonionic surfactant detergent in water, followed by a water rinse. An application strength of approximately 2% (volume-to-volume) should be adequate to remove the surface contamination. The addition of a mild caustic to the wash solution, such as trisodium phosphate, may help emulsify any thin grease deposits present. Commercially formulated nonionic surfactants include Triton X-100 (Rohm and Haas, Philadelphia, Pennsylvania) and Sterox NJ or NK (Monsanto, Saint Louis, Missouri). An alkaline-based cleaning agent that has also been effective in removing PCB surface contamination is Power Cleaner 155 (Penetone Corporation, Tenafly, New Jersey). Mention of company names or products does not constitute endorsement by the National Institute for Occupational Safety and Health. Other effective products may also be available.

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XI. DISTRIBUTION AND AVAILABILITY OF DETERMINATION REPORT

Copies of this Determination Report are currently available upon request from NIOSH, Division of Standards Development and Technology Transfer, Information Resources and Dissemination Section, 4676 Columbia Parkway, Cincinnati, Ohio 45226. After 90 days the report will be available through the National Technical Information Services (NTIS), Springfield, Virginia. Information regarding its availability through NTIS can be obtained from the NIOSH publications office at the Cincinnati, address. Copies of this report have been sent to the following:

A. Olin Corporation
B. U. S. Fish and Wildlife Service
C. U. S. Department of Labor, OSHA - Region V
D. NIOSH Regional Offices/Divisions

For the purpose of informing affected employees, copies of this report shall be posted by the employer in a prominent place accessible to the employees for a period of 30 calendar days.

TABLE 1
Area Concentrations of Airborne Polychlorinated Biphenyls (PCBs) in Occupied Buildings
Olin Corporation, Marion, Illinois; June 26 & 27, 1985

Sample Number	Building Number	Sample Location	Type of Activity	Sample Duration (minutes)	Sample Volume (liters)	TWA Concentration PCBs† (ug/m3)
A-1	I-1-20	Above mail sorter	Office	540	324	0.34
A-2	I-1-20	On conveyor	Production	537	322	< LOD*
A-3	I-1-20	On work table - Bay 2	Production	533	320	< LOD
A-4	I-1-12	On table - Bay 12A	Production	527	316	< LOD
A-5	I-1-12	On switch box Bay 8	Production	523	314	< LOD
A-6	I-1-12	On table - Bay 5	Production	517	310	< LOD
A-7	I-1-12	On extruder - Bay 1	Production	515	309	< LOD
A-8	I-1-3	On steel pallets	Shipping	505	303	< LOD
A-9	I-1-3	On palatted boxes	Storage	497	298	< LOD
A-10	I-1-1	On empty cardboard drum	Storage	494	296	< LOD
A-12	I-1-20	On window sill	Production	583	350	< LOD
A-13	I-1-12	On wall opposite Bay 6	Production	588	353	< LOD
A-14	I-1-2	On east side wall	Storage	584	350	< LOD
A-15	I-1-1	On east side wall	Storage	580	348	< LOD
A-16	I-1-3	On shipping desk	Shipping	574	344	< LOD
NIOSH Recommended Standard						1.0
OSHA Standard						1000

† Arochlor 1242 (Arochlors 1016, 1221, 1232, 1248, 1254 & 1260 were < LOD)
* < LOD - Less than the limit of detection of 0.05 micrograms per sample

TABLE 2

Area Concentrations of Airborne Polychlorinated Biphenyls (PCBs) in Nonoccupied Buildings
Olin Corporation, Marion, Illinois; June 26 & 27, 1985

Sample Number	Building Number	Sample Location	Type of Activity	Sample Duration (minutes)	Sample Volume (liters)	TWA Concentration PCBs† (ug/m3)
A-17	I-1-23	On shelf - boiler room	PM*	532	319	0.66
A-18	I-1-23a	On table - Bay 12	None	529	317	19.53
A-19	I-1-23	On shelf - Bay 11	None	528	317	3.79
A-20	I-1-23	On stool - Bay 7	None	526	316	0.86
A-21	I-1-12	On stool - Bay 1	None	526	316	0.25
NIOSH Recommended Standard						1.0
OSHA Standard						1000

† Arochlor 1242 (Arochlors 1016, 1221, 1232, 1248, 1254 & 1260 were < LOD of 0.05 ug/sample)
* PM - Preventive Maintenance occasionally performed in this area

TABLE 3
Analysis of Polychlorinated Biphenyls (PCBs) in Wipe Samples in Occupied Buildings
Olin Corporation, Marion, Illinois; June 26 & 27, 1985

Sample Number	Building Number	Sample Description	Type of Activity	Micrograms of PCB† per 100 Square cm* Surface Area
W-1	I-1-20	On top of mail distribution box	Office	< LOD**
W-2	I-1-20	Fluorescent light - above Link & Pack	Production	< LOD
W-3	I-1-20	Ledge - on north side of Bay 2	Production	< LOD
W-4	I-1-12	Wall - on a wall board in Bay 12	Production	< LOD
W-5	I-1-12	Control panel - on wall in Bay 8	Production	< LOD
W-6	I-1-12	Floor - north side of Bay 5	Production	< LOD
W-7	I-1-12	Machine control panel - in Bay 1	Production	< LOD
W-8	I-1-3	Floor - center of shipping area	Shipping	1.8
W-9	I-1-3	Floor - near storage pallets	Storage	1.2
W-10	I-1-1	Floor - center of building	Storage	2.4
W-17	I-1-2	Floor - center of east wall	Storage	3.2

† Arochlor 1254 (Arochlors 1016, 1221, 1232, 1242, 1248 & 1260 were below the limit of detection)
* cm = centimeters
** < LOD - Less than the limit of detection of 0.5 micrograms per sample

TABLE 4

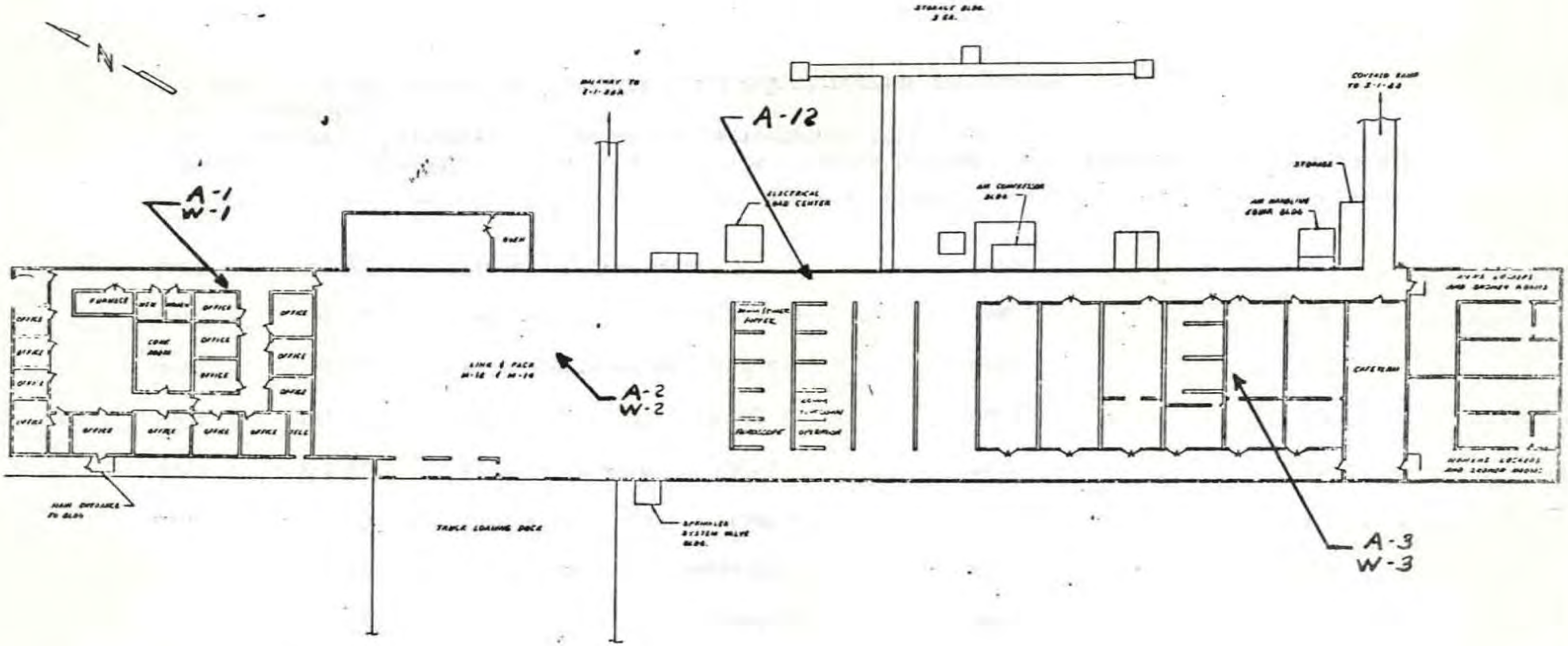
Analysis of Polychlorinated Biphenyls (PCBs) in Wipe Samples in Nonoccupied Buildings
Olin Corporation, Marion, Illinois: June 26 & 27, 1985

Sample Number	Building Number	Sample Description	Type of Activity	Micrograms of PCB† per 100 Square cm* Surface Area
W-16	I-1-23A	Floor - machine shop entrance	None	32
W-18	I-1-23	Light Fixture - Above Bay 5	None	2.0
W-19	I-1-23	Switch box - Boiler room wall	PM††	1.2
W-20	I-1-23	Floor - west end of Bay 1	None	11
W-21	I-1-23A	Floor - In center of Bay 12	None	980
W-22	I-1-23	Wall - between Bays 5 & 6	None	< LOD**
W-23	I-1-23	Floor - In center of Bay 11	None	23
W-24	I-1-23	Floor - Boiler room	PM††	2.3

† Arochlor 1254 (Arochlors 1016, 1221, 1232, 1242, 1248 & 1260 were less than the limit of detection)
†† PM - Preventive Maintenance occasionally performed in this area
* cm = centimeters
** < LOD - Less than the limit of detection of 0.5 micrograms per sample

HETA 85-334, Olin Corp.

DIAGRAM 1



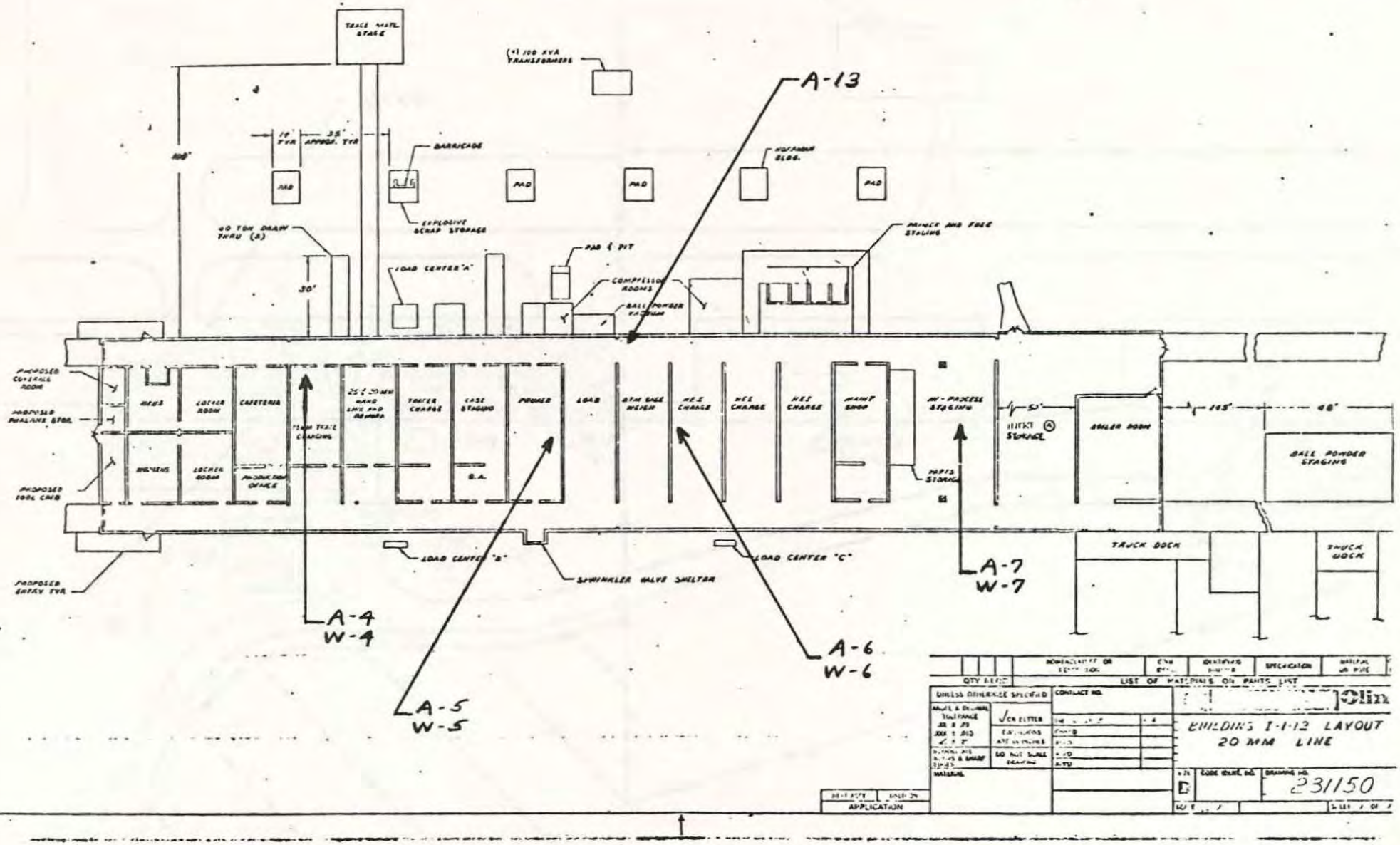
Olin

CLDS. 1-1-20 FACILITY LAYOUT

231152

HETA 85-334, Olin Corp.

DIAGRAM 2



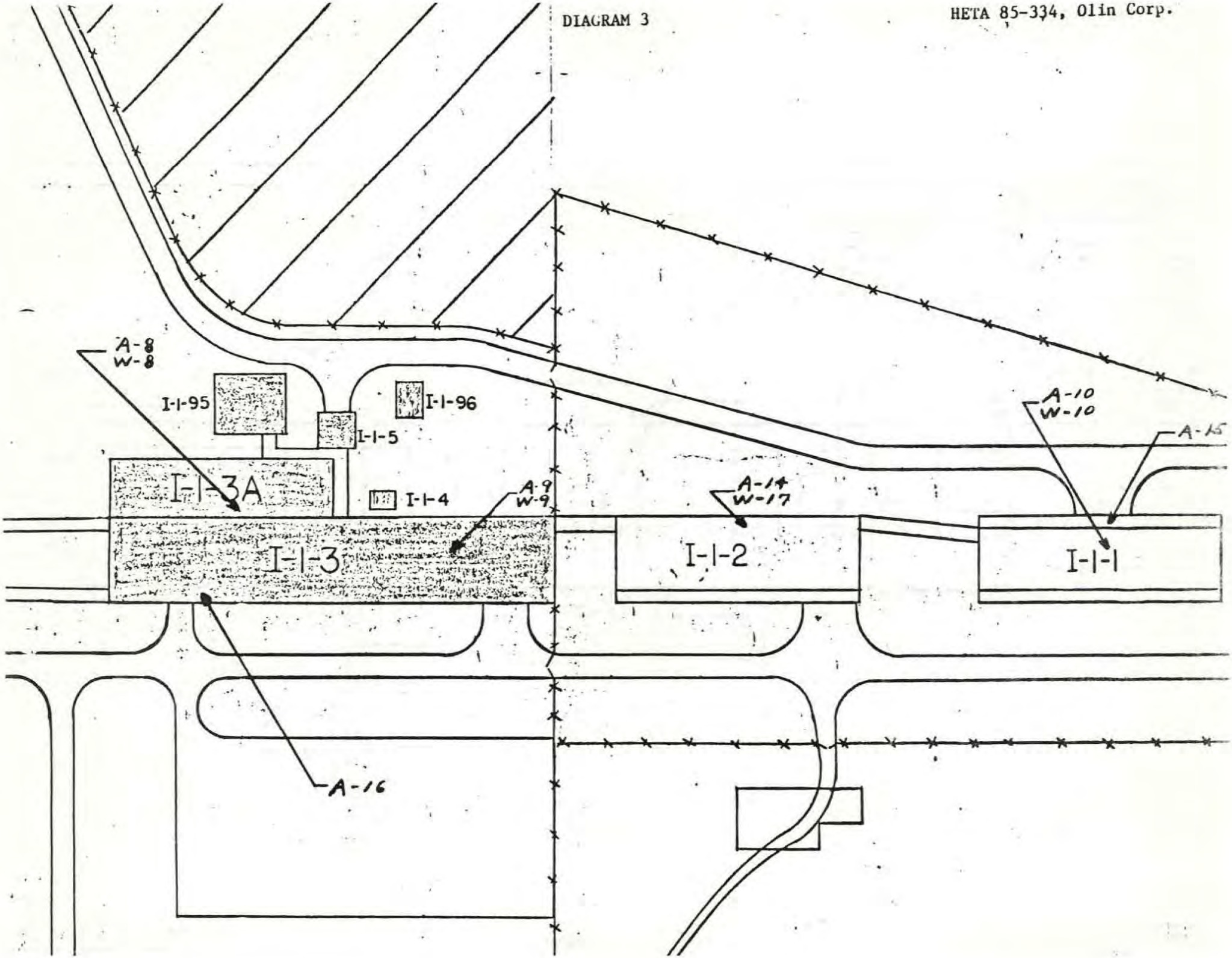
QTY REQ'D	DESCRIPTION OR IDENT NO.	CTR QTY	IDENTIFYING NUMBER	SPECIFICATION	MATERIAL OR SIZE
	LIST OF MATERIALS OR PARTS LIST				

UNLESS OTHERWISE SPECIFIED
CONTRACT NO.
ANGLE & DECIMAL TOLERANCE
.XX ± .01
.XXX ± .005
√ OR LETTER
EXCLUSIONS
ARE IN INCHES
DO NOT SCALE DRAWING
MATERIAL
APPLICATION

Olin

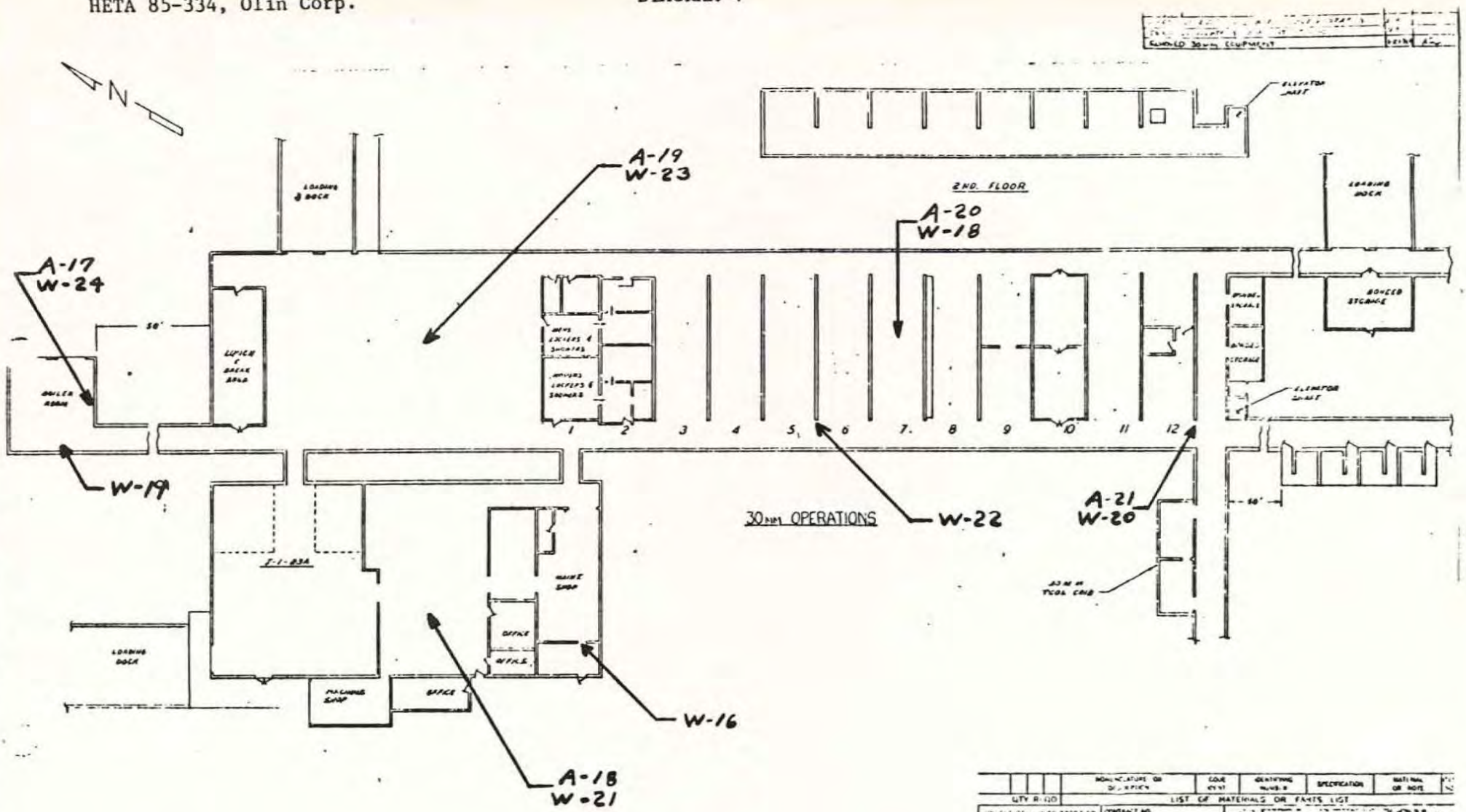
BUILDING I-1-12 LAYOUT
20 MM LINE

SIZE D | CODE IDENT. NO. | DRAWING NO. 231150


A-8
W-8
I-1-95
I-1-96
I-1-5
I-1-3A
I-1-4
A-9
W-9
I-1-3
A-14
W-17
I-1-2
A-10
W-10
A-15
I-1-1
A-16

HETA 85-334, Olin Corp.

DIAGRAM 4



Clin

BLDG. I-1-23 AND I-1-23A FACILITY LAYOUT

231151

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