CLOSURE PLAN

CLOSED LOOP REFINING & RECOVERY/CLOSED LOOP GLASS SOLUTIONS
2200 FAIRWOOD AVENUE
COLUMBUS, OHIO 43207

EPA ID NO. OHR000201145

EnSafe Project Number:
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Prepared for:

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1.0 INTRODUCTION

This Resource Conservation Recovery Act (RCRA) Closure Plan addresses closure of the Closed Loop Refining & Recovery/Closed Loop Glass Solutions (Closed Loop) facility (subject property) in Columbus, Ohio, as shown in Figure 1. This Closure Plan has been prepared pursuant to applicable rules in Title 40 of the Code of Federal Regulations (CFR), Part 265, Subpart G and Ohio Environmental Protection Agency (Ohio EPA) Rules 3745-66-11 through 3745-66-20 of the Ohio Administrative Code (OAC). This Closure Plan includes the following:

- Description of the facility
- Description of the closure area
- Description of the remedial technique, decontamination procedures, and cleanup goals
- Copy of the health and safety plan under which the Closure Plan will be performed
- Schedule for completion of the proposed work
- Cost estimate to complete closure activities
- An *Engineering Evaluation/Cost Analysis* report

1.1 General Description

The subject property is located within a warehouse facility currently owned by Olymbec USA LLC (Olymbec). Closed Loop leased the subject property (which will sometimes be referred to in this plan as the "Closed Loop facility" or the 2200 Fairwood Avenue warehouse) and accepted electronic waste (e-waste) at the facility. The lease commenced in January of 2015. Closed Loop ceased operations at the subject property in early 2016 and abandoned the facility and its contents. Closed Loop's principal operations involved the receipt, storage, and disassembling of cathode ray tube (CRT) containing materials. The subject property currently maintains containerized CRT-related materials, CRT demanufacturing areas, and residual lead dust contamination. Figure 2 shows the approximate layout of the subject property. Closed Loop operated under EPA Generator ID No. OHR0002011 (see Appendix B). Although the United States Environmental Protection Agency (U.S. EPA) RCRAInfo website does not indicate any waste types associated with the subject property, the U.S. EPA

RCRAInfo website identified lead waste (D008) materials as previously being generated at the Closed Loop facility on Watkins Road.

The lease for the subject property was signed by Closed Loop Refining & Recovery which is also the name of the entity at another location in Columbus, Ohio. It is believed that Closed Loop Refining & Recovery and/or Closed Loop Glass Solutions conducted a CRT glass "washing" process and other operations at the subject property. Additional information on the relationship between these two entities is not known. For the purposes of this RCRA Closure Plan, both entities (Closed Loop Refining & Recovery and Closed Loop Glass Solutions) will be referred to as "Closed Loop" unless otherwise specified. This RCRA Closure Plan includes an *Engineering Evaluation/Cost Analysis* report for compliance with 40 CFR Section 300.700 to facilitate cost recovery under the Comprehensive Environmental Response, Compensation and Liability Act. The *Engineering Evaluation/Cost Analysis* report is included as Appendix A.

1.2 Administrative Procedures

In accordance with OAC 3745-66-12(A), a copy of the approved Closure Plan and associated revisions to the Plan will be maintained at the 2200 Fairwood Avenue warehouse or at another location in Columbus, Ohio designated by Olymbec. These documents will be maintained until certification of closure has been approved by the Ohio EPA.

The approved Plan will be amended whenever there are unexpected events during closure that require plan modification. In accordance with OAC 3745-66-12(C)(2), any changes to the Plan will be requested in writing to the Ohio EPA no later than 30 days after an unexpected event has occurred which affects the Closure Plan.

2.0 FACILITY DESCRIPTION

Closed Loop operated a CRT-related material storage facility within the east portion of the warehouse at 2200 Fairwood Avenue in Columbus, Franklin County, Ohio. This warehouse is surrounded by commercial and industrial properties; a residential neighborhood is approximately 500 feet northwest of the warehouse. The Fairwood Avenue warehouse is a 257,767-square foot structure on a 14.494-acre parcel (Parcel ID: 010-035846), of which Closed Loop leased 130,652 square feet, approximately 50% of the warehouse structure. If this operation had been a legitimate recycling facility, the North American Industry Classification System for Closed Loop would be 42393, which includes recyclable material merchant wholesalers.

Available information indicates that the warehouse was constructed on former agricultural land in 1969. The 2007 Atwell-Hicks Development Consultants Phase I Environmental Site Assessment indicates that prior occupants of the warehouse include a tire distributor (Mohawk Tire [1970 to 1989], Yokohama Tire Corporation [1990 to 2002]), and American Signature furniture (2003 to at least 2007). It appears that Closed Loop began operations in the warehouse in late December 2014 and ceased operations/abandoned the subject property in early 2016.

2.1 Previous Investigations

2.1.1 2016 Ohio Environmental Protection Agency Letter

During March 2016, Ohio EPA performed a review of the Fairwood Avenue warehouse and issued a summary letter. This letter notes that the Fairwood Avenue warehouse had stopped washing processed glass when "the tumbler (which aids in the washing) at Fairwood broke in the summer of 2015…" A copy of Ohio EPA's April 11, 2016 letter is included in Appendix B.

2.1.2 2016 Olymbec USA LLC Interim Site Management Plan

During 2016, Olymbec developed an *Interim Site Management Plan* that detailed the history of Closed Loop operations at the subject property and described procedures for securing CRT-related materials at the subject property by Closed Loop; a copy of the *Interim Site Management Plan* is included in Appendix B. Olymbec agreed to secure two overhead doors that provided access to the Closed Loop warehouse from the west side of the warehouse to prevent access to the Closed Loop facility from the east side of the warehouse. Olymbec also agreed to perform additional measures to secure the subject property.

2.1.3 2017 EnSafe Inc. Industrial Hygiene Assessment Report

During July 2017, EnSafe Inc. performed an industrial hygiene assessment to evaluate the presence of lead in settled dust throughout the Closed Loop facility. The industrial hygiene assessment included collection of 16 wipe samples and two bulk samples of broken CRT glass.

The industrial hygiene report notes that approximately 90% of the Closed Loop lease space area was occupied by palletized cardboard boxes containing CRTs and/or CRT-glass stacked an average of three boxes high. Several boxes had fallen to the floor or collapsed against exterior warehouse walls and doors.

The assessment included collection of six wipe samples from elevated surfaces (e.g., roof support structures and elevated piping), five wipe samples from the warehouse floor, and five wipe samples from walls at an approximate height of 3 to 5 feet above the floor. Wipe sample analytical results are presented in the EnSafe report presented in Olymbec's January 31, 2018, *Interim Status Report No. 1*, which is included in Appendix B. A summary of the wipe and bulk samples analytical results indicates:

- Lead was detected in each elevated surface sample ranging from a concentration of 290 micrograms per 100 square centimeters (µg/100 cm^2) to 760 µg/100 cm^2, which exceed the Brookhaven National Laboratory non-lead operation area acceptable surface level criteria (Brookhaven screening criteria) of 40 µg/100 cm^2.

- Lead was detected in each floor sample ranging from 220 µg/100 cm^2 to 750 µg/100 cm^2, which exceed the Brookhaven screening criteria of 40 µg/100 cm^2.

- Two of five wall samples had lead screening values (59 µg/100 cm^2 and 130 µg/100 cm^2) exceeding the Brookhaven screening criteria of 40 µg/100 cm^2.

- The two bulk glass samples contained total lead at concentrations of 3,800 milligrams per kilogram (mg/kg) and 26,000 mg/kg, exceeding the Ohio Voluntary Action Program generic direct-contact residential/commercial child soil standard of 400 mg/kg and the generic direct--contact commercial or industrial land use soil standard of 800 mg/kg.

2.1.4 2017 Stericycle Removal Action

During July 2017, Stericycle performed a removal action at the Closed Loop CRT-glass "washing" area. Removal activities are documented in Olymbec's January 31, 2018, *Interim Status Report No. 1*, which is included in Appendix B. This removal action included the following activities:

- Removal and containerization of hydrofluoric acid from one vat into six 55-gallon drums
- Removal and containerization of solid sludge from a second vat and a 300-gallon tote into eight 55-gallon drums
- Transportation and offsite disposal of drummed hydrofluoric acid (D002), lead-bearing sludge (D008), and two empty hydrofluoric acid drums

2.1.5 2018 DEC Enviro Volume Estimate

During April 2018, DEC Enviro completed an inventory of CRT-related materials stored at the subject property. DEC Enviro's summary of the inventory assessment is included in Appendix B and indicates the following significant findings:

- The Fairwood Avenue warehouse has approximately 19,614 Gaylord containers and supersacks of CRT-related materials
- The Fairwood Avenue warehouse holds approximately 30,917,116 pounds of CRT-related materials, as summarized in Section 2.2.1.

2.2 Descriptions of Non-Processed Cathode Ray Tubes and Processed Cathode Ray Tube Glass

2.2.1 Accumulated Materials

As noted in Section 2.1, DEC Enviro performed an assessment of the inventory of containerized CRT-related materials at the subject property. Based on DEC Enviro's assessment, the following weight of material in the warehouse was estimated:

- CRT screens and other components ..... 924,267 pounds
- CRT crushed glass ..... 7,388,200 pounds
- Non-processed CRT units ..... 22,604,650 pounds

Estimated total weight ..... 30,917,116 pounds

2.2.2 Former Processing Area

The Closed Loop facility includes an approximately 1,600-square foot CRT-glass "washing" area (a single bay) that is defined by an epoxy-coated floor with approximately 1-inch high berm. The CRT-glass "washing" area contains two empty approximately 500-gallon open-top stainless steel vats that previously contained hydrofluoric acid and lead sludge, an empty 300-gallon tote that previously contained lead sludge, one empty 55-gallon drum with a hydrofluoric acid label, and three unlabeled 300-gallon totes (one empty, one containing approximately 75-gallons of low pH water, and one containing approximately 250-gallons of low pH water). The floor surrounding the two vats is covered with cardboard and portions of the epoxy-coated floor within the CRT-glass "washing" area and the cardboard are coated with a white crust.

Based on available information, this CRT-glass "washing" unit was utilized by Closed Loop for approximately one year or less. Hazardous wastes associated with this area are anticipated to include:

- Hydrofluoric acid — corrosive liquid (D002)
- Lead (D008)

2.2.3 Additional Materials

In addition to CRT-related materials and CRT-glass "washing" equipment, the 2200 Fairwood Avenue warehouse also includes non-CRT-related materials used to support the Closed Loop operations. These materials include, but are not limited to:

- Assorted metallic debris
- Assorted electronic equipment
- Assorted general trash including, paper, cardboard, household goods, and plastic

2.3 Physical Setting and Hydrogeology

The Closed Loop facility is situated within the warehouse structure located on property located on the southeast side of Columbus. The surface elevation for the subject property is between 760 and 770 feet above mean sea level and the topography is generally level.

Review of soil boring information obtained from the Ohio Department of Natural Resources Water Well Log Search website identified four water wells located within approximately 1,800 feet of the Fairwood Avenue property (copies are presented in Appendix B). The Fairwood Avenue property is likely underlain by clay soil (surface to approximately 12 feet below ground surface [bgs]), gravel (12 to 46 feet bgs), clayey sand and gravel (31 to 85 feet bgs), sand and gravel below 49 to 135 feet bgs, and shale bedrock at approximately 135 feet bgs. Groundwater was reported at 13 feet bgs in one of four wells.

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3.0 DESCRIPTION OF UNIT TO CLOSE

The Fairwood Avenue property includes a single warehouse structure. A description of the Closed Loop facility (including period of use, dimensions, construction details, and associated wastes) is presented in Section 2. Section 2 also includes a brief discussion of the hydrogeologic setting for the Fairwood Avenue warehouse property.

As described in Section 2, the Closed Loop facility includes containerized CRT-related materials consisting principally of non-processed CRTs and processed CRT glass and a former CRT-glass "washing" area. The interior of the Closed Loop facility is also contaminated with lead dust.

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4.0 TOPOGRAPHIC MAP

The approximate facility geographic coordinates of the Fairwood Avenue warehouse property are latitude 39°55'15.95" north and longitude 82°57'14.06" west. Figure 1 presents a copy of the United States Geological Survey 7.5 Minute Series topographic map for the facility and surrounding area.

A detailed facility map is described in Section 5.

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5.0 DETAILED DRAWING OF UNIT TO BE CLOSED

Figure 2 shows the layout of the Fairwood Avenue warehouse and an approximate delineation of accumulated CRT-related material and the former CRT-glass “washing” area.

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6.0 LIST OF HAZARDOUS WASTES

This section includes a summary of hazardous wastes that were previously transported offsite based on information provided in Section 2.2.2. Available information indicates that a removal action was performed at the Closed Loop facility. The following hazardous wastes were managed:

Chemical Name	United States Environmental Protection Agency Hazardous Waste Number	Chemical Abstracts Service Registry Number
Lead	D008	7439-92-1
Corrosive Liquid (Waste Hydrofluoric Acid)	D002	7664-39-3

Prior analytical testing by AECOM (2015) at the Closed Loop facility located on Watkins Street in Columbus, Ohio, indicates that the below hazardous constituents identified by Ohio EPA as potentially being present in CRT-related materials are not present at hazardous concentrations. As operations were conducted at the Closed Loop facility for approximately 1-year, compared with 4 years for the Watkins Street facility, the likelihood of higher concentrations is considered remote.

Chemical Name	United States Environmental Protection Agency Hazardous Waste Number	Chemical Abstracts Service Registry Number
Arsenic	D004	7440-38-2
Barium	D005	7440-39-3
Cadmium	D006	7440-43-9
Chromium	D007	7440-47-3
Mercury	D009	7439-97-6
Selenium	D010	7782-49-2

An inventory of CRT-related material and estimated quantities is presented in Section 2.2. Section 2.2 also includes a discussion of observed hazardous waste (D008) on the subject property.

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7.0 REMOVAL OF MATERIALS

This section describes the activities that will be performed to remove CRT-related material from the subject property. Following the removal of CRT-related material, the warehouse interior will be decontaminated. Decontamination efforts are described in Section 11. As applicable, Sections 7, 9, and 11 include a summary of the methods to be utilized to identify and manage hazardous waste, solid waste, and debris generated during the closure activities.

7.1 Closure Performance Standards

This Closure Plan has been prepared in general accordance with the closure performance standard specified in OAC 3745-66-11(A and B). Completion of this closure will accomplish the following:

- Minimize the need for further maintenance

- Control, minimize, or eliminate, to the extent necessary to protect human health and the environment, post closure escape of hazardous waste, hazardous constituents, leachate, contaminated run off, or hazardous waste decomposition products to the groundwater, surface waters, or the atmosphere

7.2 Method of Closure

Closure of the subject property will be accomplished by the removal of containerized CRT-related materials, demanufacturing equipment, and lead-containing dust. Upon completion of closure, the warehouse will be available for unrestricted use.

As previously discussed, the subject property includes almost exclusively containerized non-processed CRTs in Gaylord boxes or on pallets and containerized processed CRT-glass. This Plan anticipates two phases for removal of containerized CRT-related materials. Phase I includes establishment of a contamination reduction zone (CRZ) and a clean loading zone (CLZ). Following completion of Phase I activities, Phase II removal action activities will commence removal of processed and non-processed CRT glass and other e-waste materials. Phase III will consist of decontamination of the subject property pursuant to Section 11 of this Plan.

The following subsections describe the general processes for removing containerized materials from the subject property. A figure documenting the proposed CRZ, CLZ, and CRT-related material removal processing areas is included as Figure 3.

7.2.1 Contamination Reduction Zones and Clean Loading Zones

Prior to construction of the CRZ and CLZ structures, the interior warehouse area where these structures will be constructed will be cleared of CRT-related materials, and surrounding warehouse walls, flooring, or ceiling (including any doors, the former glass cleaning area, and other warehouse features) inside of these structures will be decontaminated in accordance with Section 11 of this Closure Plan, as applicable. The CRZ and CLZ will be equipped with PVC strip doors (between the warehouse and CRZ and between the CRZ and CLZ). A negative pressure air machine will operate in the CRZ to reduce the potential for airborne lead-containing dust to pass through the CRZ and into the CLZ. A physical barrier will be installed at the entrance of the CLZ from the CRZ to prevent tow motors from entering the CLZ.

To reduce the potential for lead dust migration from the subject property, the CRZ will be equipped with tow motors that will be restricted to the container processing area and the CRZ. To further reduce the potential for lead dust migration, the CLZ will be equipped with personnel and equipment (tow motors, handcarts, and related materials) that will be restricted to the CLZ. Equipment being used inside contaminated areas of the subject property will be restricted from entering the CLZ without being fully decontaminated in accordance with Sections 11 and 7.2.

A CRZ for personnel entering and leaving the warehouse will be constructed inside the southeast corner of the subject property in conjunction with construction of the CRZ and CLZ for containerized materials or will be established outside of the subject property warehouse. If constructed inside of the subject property, the personnel CRZ area will be decontaminated prior to construction of containment structures. If constructed outside of the subject property, the personnel CRZ area will be constructed with sufficient material to preclude transfer of lead containing dust from the subject property to areas beneath or beyond the limits of the personnel CRZ. Personal protective equipment will be donned and doffed in this area in accordance with the Site-Specific Health and Safety Plan (Section 11).

7.2.2 Containerized Material Transfer (Interior of Warehouses)

Containerized materials inside of the warehouse will be transferred to the container packaging area via forklift. To reduce the potential generation of dust, forklift travel areas will be cleaned using wet washing techniques in accordance with Section 7.2.6.

In rare instances, it is anticipated that the condition of Gaylord boxes will be such that a stack of boxes (box stack) will be unsafe to move and the box stack will be allowed to fall to the floor, will be

pushed over, or will be pulled down in a manner designed to protect site workers. When box stacks are collapsed, steps will be taken to reduce the potential for generation of dust and any spilled material will be promptly cleaned up, containerized, and the new container transferred to the CRT-related material packaging area via forklift. Damaged containers deemed unacceptable for further use will be managed in accordance with Section 7.2.3.

7.2.3 Container Processing

Containerized materials inside of the warehouse will be processed in a dedicated area prior to being transferred through the CRZ to the CLZ. The container processing area will be designed to standardize the inspection, cleaning, packaging, and documentation of containerized material prior to being transported offsite. The activities performed in the container processing area are summarized below:

- Containers will be inspected to assess if the container is in a condition suitable for offsite shipment. The inspection process will include evaluation of the structural integrity of the Gaylord box (if present) and wood pallet or supersack (as applicable), inspection of existing plastic stretch film or shrink wrap (plastic wrap) and banding, and an inspection for settled dust (on the exterior of the container, plastic wrap, and/or pallet).

- Visible dust on exterior surfaces of containers, plastic wrap, and pallets will be cleaned using a vacuum equipped with a high efficiency particulate air (HEPA) filter such that the exterior of the container, plastic wrap, and pallet are free of visible dust.

- The contents of damaged containers deemed unacceptable for transport will be transferred to new containers. The empty damaged container, plastic lining (if present), plastic wrap (if present), and pallet will be separated. The interiors of empty containers and separated pallets may be inspected for lead dust and CRT-related contamination; identified contamination may be cleaned with a vacuum equipped with a HEPA filter and the containers/pallets stored for offsite recycling. Containers, pallets, and plastic that are not cleaned will be containerized and managed as hazardous waste (D008).

- Containers deemed suitable for offsite transportation will be prepared for offsite shipment by:

    — Banding/rebanding Gaylord boxes, oversized CRTs, and other items as applicable to pallets

- Containers with damaged or missing plastic wrap will be wrapped where required for shipment per Department of Transportation (DOT) regulations

- Containers that are ready for shipment will be transferred to the scale where the total gross weight of each container (to the nearest pound) will be measured using a scale. The total gross weight will be recorded in a site log and on the container.

- Prior to offsite shipment, containers of CRT-related materials will be labeled as follows.

  - Containers destined for disposal as hazardous waste will be labeled and marked in accordance with OAC 3745-52-30 to 32.

  - Containers destined for recycling will be labeled in accordance with OAC 3745 51 39 (A)(2) with the following statements:

    - "Used Cathode Ray Tubes — Contain Leaded Glass" or "Leaded Glass From Televisions or Computers" and

    - "Do Not Mix With Other Glass Materials"

  - Containers destined for disposal as non-hazardous or construction and demolition debris will be labeled as non-hazardous waste with the site name and address.

7.2.4 Offsite Transportation

Properly packaged and labeled containers will be transferred from the container processing area, through the CRZ, and into the CLZ utilizing separate tow motors restricted to the container processing area and CRZ. These tow motors will not enter the CLZ. Tow motors restricted to the CLZ will take the containers into the CLZ chamber for temporary (generally less than 72 hour) storage or immediate transfer into trucks, as applicable.

Each truckload of CRT-related materials that will be transferred offsite for disposal at a Subtitle C (hazardous waste) landfill will utilize a uniform hazardous waste manifest (U.S. EPA Form 8700-22) and, if necessary, the continuation sheet (U.S. EPA Form 8700-22A) in accordance with OAC 3745-52-20, OAC 3745-52-21, and 40 CFR 262.21.

For truckloads of CRT-related materials that will be transferred offsite for recycling, a bill-of-lading with the following information will be utilized:

- Shipper information (Closed Loop EPA ID No., address, contact, and contact phone number)
- Receiver/destination information (business name, address, contact, and contact phone number)
- Transporter information with trailer numbers and trailer seal numbers
- Pick up date
- Number of packages with package content descriptions
- Shipping weight in pounds — net weight and total gross weight
- Shipper and transporter signatures
- A packing list with each container and individual container net weights

7.2.5 Offsite Material Management

Based on the available information, it is currently anticipated that containerized materials at the subject property will be managed as follows:

- Non-processed CRT-related materials . CRT processor, lead smelter or and solid waste landfill
- Processed CRT glass..... lead smelter or pretreatment and solid waste landfill
- Floor sweepings ..... hazardous waste or non-hazardous waste landfill
- Hazardous waste..... hazardous waste landfill
- Water from floor sweeping and facility washing..... City of Columbus sanitary sewer
- Decontaminated warehouse materials ..... construction and demolition debris landfill
- Decontaminated Gaylord boxes ..... cardboard recycling

7.2.6 Cleaning Activities to Reduce Lead Dust Generation

To reduce the potential for lead-dust generation, the following procedures will be performed on a daily (during operations where there is a potential to stir up lead-containing dust) basis, at a minimum, and on as needed basis, to control the transfer of lead-containing dust.

- Newly exposed floor areas (e.g., areas where containerized materials were removed during the prior day) will be cleaned with a wet sweeping method, or equivalent sweeping methods that utilize acceptable dust control measures.

- To reduce the potential generation of dust, forklift travel areas will also be cleaned with a wet sweeping method, or equivalent sweeping methods that utilize acceptable dust control measures.

- The floor of the CRZ will be cleaned using wet sweeping methods or equivalent sweeping methods that utilize acceptable dust control measures.

- The CLZ will be inspected daily for dust accumulation. If elevated dust accumulation is observed, the area will be cleaned using wet sweeping methods or equivalent sweeping methods that utilize acceptable dust control measures.

7.3 Closure Reporting

The qualified, independent, registered, professional engineer, or his representative, will be present during certain critical activities during closure. These critical activities include, but may not be necessarily limited to, removal of CRT-related material, decontamination of processing equipment, and decontamination of warehouse surfaces. The professional engineer, or his representative, will document observed field activities in a field notebook, as appropriate.

The professional engineer, or his representative will notify (either by telephone or email) Ohio EPA's facility inspector at least 5 days prior to implementation of significant site activities, as identified below:

- Initiation of offsite transportation of processed and non-processed CRT-related material

- Initiation of warehouse decontamination activities

Upon completion of closure activities, the warehouse closure activities will be certified by an Ohio registered professional engineer to meet the overall RCRA closure performance standard in OAC 3745-66-11(A and B), OAC 3745-66-14, and OAC 3745-66-15 (”clean closure”). Olymbec will submit a closure report to the Ohio EPA summarizing the closure activities and requesting concurrence that the former electronic waste storage area has been closed. At a minimum, the closure report will include the following information:

- The following certification statement:
  - "I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."
- Reference to the approved Closure Plan
- The volume of waste transported offsite
- Closure activity correspondence after Ohio EPA approval of the Closure Plan
- Details of sampling and analysis methods
- Laboratory records (including bench sheets if requested by Ohio EPA)
- A narrative describing closure activities
- Details of removal activities, including representative photographs
- Signature of Olymbec and of a qualified, independent, registered, professional engineer

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8.0 SCHEDULE FOR CLOSURE

The anticipated closure schedule is presented below. As shown, Olymbec will notify the Ohio EPA 30 days prior to the initiation of field activities. Significant activities are anticipated to require the following time frames, although COVID-19 related delays may impact the schedule.

- Removal of Processed and Non-Processed CRTs (up to 810 days) ..... **0 to 810** days
- Decontamination of Warehouse (180 days).....**810 to 1,035** days
- Closure Documentation (60 days following decontamination) ..... **1,035 to 1,095** days

Based on the above, it is anticipated that a closure report documenting CRT-related material removal and warehouse decontamination activities can be completed within approximately **1,095** days of Closure Plan approval and following any COVID-19 related schedule delays (as applicable).

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9.0 AIR EMISSIONS AND WASTEWATER

9.1 Air Emissions

As described in Section 7.2, this Plan incorporates steps that will be taken to reduce the potential for generation of fugitive dusts during CRT-related material removal and warehouse decontamination activities. These steps include, but may not be limited to, the following:

- Construction of negative-pressure isolation chambers where equipment, CRT-related material, and personnel enter and leave the warehouse
- HEPA vacuuming exteriors of containers prior to offsite transfer to reduce fugitive dust emissions during transportation
- Engineering controls inside of the warehouses to reduce dust emissions that may include wet washing of floors in equipment and personnel traffic areas
- Interior warehouse monitoring for dust
- Personnel lead monitoring
- Modification of proposed controls, as necessary, to limit dust generation

9.2 Wastewater

As described in Section 7.2, it is anticipated that activities performed as part of this Closure Plan will generate wastewater from the washing of floors and from the decontamination of warehouse surfaces.

This Plan envisions that wastewater generated during dust suppression and warehouse decontamination activities may contain lead at concentrations greater than 5 mg/L (e.g., would be considered a hazardous [D008] waste). The wastewater will either be containerized in portable tanks or totes pending offsite disposal or will be treated and discharged to the City of Columbus sanitary sewer system in accordance with the Clean Water Act, Ohio EPA water pollution control rules, and local industrial discharge requirements. Treatment of wastewater will include management in a temporary onsite wastewater treatment unit that incorporates the following elements:

- A wastewater discharge permit will be established with the City of Columbus

- Wastewater will be transferred into tanks for storage and batch treatment to reduce lead concentrations to levels acceptable for discharge to the City of Columbus.

- Prior to discharge, wastewater will be evaluated on a batch basis for the constituents required by the City of Columbus.

- Assuming batch wastewater meets City of Columbus industrial discharge requirements, the wastewater will be discharged to the sanitary sewer system and the volume of water recorded.

- In the event that wastewater does not meet discharge criteria, it will be retreated and retested or will be transferred offsite for additional treatment and/or disposal at a permitted facility.

- The Sampling and Analysis Plan (Appendix E) discusses waste analysis of wastewater and characterization of generated sludge, as applicable.

10.0 PERSONNEL SAFETY AND FIRE PROTECTION

In accordance with 29 CFR 1910.120 contractors working on the site will perform activities in accordance with the Site-Specific Health and Safety Plan. A copy of the Site-Specific Health and Safety Plan for contractors performing Phase I and II removal activities, contractors performing Phase III decontamination activities, engineering observation of site activities and sample collection, and visitors is presented in Appendix C. Contractors and visitors will either have to follow the health and safety plan in Appendix C or prepare a health and safety plan that is at least as stringent as the one in Appendix C.

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11.0 DECONTAMINATION EFFORTS

This section describes the activities that will be performed to decontaminate CRT-related material containers prior to offsite transportation; decontaminate warehouse floors, walls, ceilings, and structural elements containing lead-bearing dusts; and decontaminate reusable equipment. This section also includes a summary of the methods that will be utilized to identify and manage hazardous waste, solid waste, and debris that will be generated during the decontamination activities.

11.1 Cathode Ray Tube Related Materials

Prior to transporting existing Gaylord containers of CRT-related materials offsite, the containers, and associated wood pallets will be visually inspected and decontaminated of visible dust as described in Section 7.2. Dust and associated HEPA filters will be containerized in appropriate DOT-approved containers and considered hazardous for lead (D008) unless analytical testing demonstrates the material does not meet the hazardous characteristic criteria (i.e., the material is found to contain lead at less than 5.0 mg/L).

11.2 Cathode Ray Tube Demanufacturing Equipment

Demanufacturing equipment will be cleaned of settled dust using a vacuum equipped with a HEPA filter. Following removal of settled dust, the following additional activities will be performed:

- For demanufacturing equipment that will be managed as recyclable scrap metal, this equipment will be rendered unusable and placed into containers for transfer to an offsite recycling facility.

- For demanufacturing equipment that cannot be recycled (e.g., non-metallic equipment), this equipment will be placed in portable containers pending sampling, analysis, and offsite disposal. Containers will remain closed pending receipt of analytical results. If analytical testing demonstrates the equipment is considered hazardous (D008) for lead (i.e., the material is found to contain lead at greater than 5.0 mg/L), the equipment will be transported offsite as a hazardous waste. Otherwise, the equipment will be managed as a non-hazardous solid waste.

- The floor of the processing area will be washed and triple rinsed in accordance with Section 11.3.3 to address the former glass washing process and hydrofluoric acid usage. As this area may be used to transfer, stage, or temporarily stage CRT-related materials,

additional decontamination will be performed after CRT-related materials have been removed from the subject property.

11.3 Warehouse Elements

After removing equipment and debris from the decontamination area, settled dust including (but not limited to) debris, grime, dust, or any residual demolition debris will be removed from surface areas. The goal of this cleaning is to remove material that is easily mobilized and to facilitate final decontamination. These surfaces will include, but will not be limited to, warehouse roof support structures, columns, walls, floors, and any warehouse heating units.

Decontamination of warehouse elements will generally proceed from the warehouse ceilings and roof support structures to the floor to reduce the potential of recontaminating previously cleaned surfaces. During decontamination, methods that prevent the transport of any decontamination residues or wash waters outside the designated decontamination area will be employed. If pits, sumps, or trenches are identified in (or near) a decontamination area, these will be plugged during these activities. If the pits, sumps, or trenches are full of debris or sludge and the drains to these areas cannot be identified with any certainty, the following (minimum) precautions will be employed before generating any wastewater in the area:

- Remove standing water and settled dust from the pits, sumps, or trenches
- Install safety barriers as necessary to prevent risk to workers from the open pits, sumps or trenches
- Identify the location of any drainage connections
- Securely plug any drainage conveyance from the pits, sumps, or trenches

In adjacent areas, outside the area to be decontaminated, where pits, sumps, or trenches are present that have the potential to convey decontaminating residues or wash water away from the decontamination area, additional precautions will be employed to prevent decontamination residues from entering these conveyances. These precautions will include isolating the conveyances from the decontamination area by constructing barriers to prevent airborne or waterborne contamination from leaving the decontamination area. The barriers will be subject to the approval of the certifying professional engineer's representative. At a minimum, sheeting used for barriers will be secured to

the floor in a manner to prevent contamination from spreading to the conveyance. A second barrier will be placed over the conveyance. The barrier will be inspected on a daily basis until it is determined that the barrier is no longer needed.

Following completion of the work described in this Plan, sheeting materials used for barriers and other spent protective materials will be removed, placed into appropriate DOT-approved containers, tested, and properly disposed. Spent protective materials will be considered hazardous for lead (D008) unless representative analytical testing demonstrates the material does not meet the hazardous characteristic criteria (i.e., the material is found to contain lead at less than 5.0 mg/L).

11.3.1 Warehouse Ceiling

The contractor will use methods as necessary to prevent the transport of any decontamination materials outside of the designated decontamination area. If present, any floor drains or open pipes in the area during these activities will be temporarily plugged.

Prior to decontamination of the warehouse ceiling, insulation will be evaluated for asbestos content by an Ohio-certified Asbestos Hazard Evaluation Specialist. Any asbestos containing building materials will be removed and managed as asbestos containing wastes by appropriately licensed asbestos abatement personnel. Assuming that wall insulation does not contain asbestos, decontamination of exterior walls at the Fairwood Avenue warehouse will be performed by vacuuming the insulation and any adhered lead dust with a vacuum equipped with a HEPA filter into a portable container. Removal of insulation will be considered scarification and require no further evaluation or assessment.

Dust contaminated insulation will be containerized in appropriate DOT-approved containers and be considered hazardous for lead (D008) unless analytical representative testing demonstrates the material does not meet the hazardous characteristic criteria (i.e., the material is found to contain lead at less than 5.0 mg/L).

11.3.2 Warehouse Structural Elements

Warehouse structural elements include, but are not limited to, roof support structures, warehouse columns, any horizontal or vertical pipes, sky lights, ventilation ducting, and additional items, as applicable. The contractor will use methods as necessary to prevent the transport of any decontamination materials outside of the designated decontamination area. If present, any floor drains or open pipes in the area during these activities will be temporarily plugged.

To reduce the potential for cross contamination and to reduce the volume of wastewater generated, it is anticipated that following removal of settled dusts using a vacuum equipped with a HEPA filter, structural elements will be decontaminated by hand wiping with solvent-soaked launderable or disposable wipes. The solvent proposed for cleaning is Simple Green, or an approved equivalent that is orally non-toxic and readily biodegradable; a copy of the Simple Green product safety data sheet and technical specifications is presented in Appendix D. Wiping will be determined to be adequate when the area appears visually clean. Representative photographs documenting the results of cleaning activities will be collected and included in the project file.

The launderable wipes will be collected and managed in accordance with OAC 3745-51-06(A)(3)(e), including but not limited to the following:

- Wipes will be stored in containers labeled as containing “recyclable wipes”
- Wipes will be stored in containers that will have no free liquids
- Wipes will be transported to an offsite laundry or cleaning facility that is subject to regulation under Section 402 or Section 307(b) of the Clean Water Act

If used, disposable wipes will be placed in appropriate DOT-approved containers and be considered hazardous for lead (D008) unless analytical representative testing demonstrates the material does not meet the hazardous characteristic criteria (i.e., the material is found to contain lead at less than 5.0 mg/L).

11.3.3 Walls and Floors

Prior to decontamination of exterior walls, insulation will be evaluated for asbestos content by an Ohio-certified Asbestos Hazard Evaluation Specialist. Any asbestos containing building materials will be removed and managed as asbestos containing wastes by appropriately licensed asbestos abatement personnel. Assuming that wall insulation does not contain asbestos, decontamination of exterior walls at the Fairwood Avenue warehouse will be performed by vacuuming the insulation and any adhered lead dust with a vacuum equipped with a HEPA filter into a portable container. Removal of insulation will be considered scarification and require no further evaluation or assessment. Containerized wall insulation will be considered hazardous for lead (D008) unless analytical representative testing demonstrates the material does not meet the hazardous characteristic criteria

(i.e., the material is found to contain lead at less than 5.0 mg/L). Initial testing of wall insulation will be utilized to select appropriate DOT-approved containers.

The contractor will clean solid-surface walls and floors using methods as necessary to prevent the transport of any decontamination materials outside of the designated decontamination area. If present, any floor drains or open pipes in the area during these activities will be temporarily plugged. Further, prior to implementing any wet cleaning measures, the contractor will evaluate the surface to be cleaned and areas where cleaning fluids could be reasonably anticipated to migrate to confirm that decontamination fluids are retained inside the warehouse structure. In addition to pipes or open floor drains, potential features that could represent unacceptable transport pathways include (but are not limited to) the following:

- Open joints between the wall and concrete floor
- Loading dock levelers
- Doorways (man door or overhead doors)
- Ventilation openings
- Deteriorated concrete flooring that will not retain water
- Other areas, as determined by the certifying professional engineer or their representative

Depending on the nature of potential migration pathways present, wet cleaning methods may not be the best management practice. If wet cleaning methods are determined to not be the best management practice, then the procedures in Section 11.3.2 will be employed on painted wall section(s) and applicable floor section(s). For unfinished drywall surfaces, these surfaces will be cleaned using a vacuum equipped with a HEPA filter.

Following the physical removal of settled dust using a vacuum equipped with a HEPA filter, floors and walls will be cleaned using a triple wash/rinse procedure. The wash and rinse steps will include the following steps.

- Wash the surface with a detergent solution using a high pressure, low volume washer. The detergent proposed for cleaning is Simple Green, or an approved equivalent that is orally non-toxic and readily biodegradable. A copy of the Simple Green product safety data sheet and technical specifications is presented in Appendix D.

- The surface will be washed in sections from top to bottom (walls) and from adjoining clean areas towards areas not yet decontaminated, to reduce the potential for cross contamination.

- Following washing, each section will be rinsed thoroughly with water. Rinsing will be performed in three separate cycles.

- After each wash/rinse cycle, the decontamination fluids will be collected and containerized pending management as wastewater or as a hazardous (D008) waste.

- Subsequent to washing and rinsing, any remaining wet areas will be mopped or vacuumed and containerized.

Containerized decontamination fluids and rinsate will either be managed as wastewater or as hazardous for lead (D008) unless analytical representative testing demonstrates the material does not meet the hazardous characteristic criteria (i.e., the material is found to contain lead at less than 5.0 mg/L). If decontamination fluids and rinsate will be managed as a hazardous waste for lead (D008) the fluids will be containerized in appropriate DOT-approved containers.

11.3.4 Open Pipes and Drains, Cracked Flooring, or Flooring with Gaps

In the event that that open pipes and drains, cracked flooring, or flooring with significant gaps are encountered, these areas will be inspected to evaluate the potential for migration of lead bearing dusts below the warehouse floor. Prior to inspection, residual debris (if any) will be removed and the area cleaned using a vacuum equipped with a HEPA filter to remove any loose particles. The area will be visually inspected to assess the potential for vertical migration of contaminants considering the following:

- *Indications of the presence of water to transport dust particles into the open pipe or through the concrete flooring*. If vertical migration appears likely, then this Closure Plan will be amended so that the potential for vertical migration can be evaluated.

- *Ability to seal the open pipe or flooring to allow decontamination activities described in this plan to proceed*. If the opening can be sealed with an expandable plug (floor drains) or expandable foam to seal cracks and gaps, then the opening will be sealed and closure activities described in this plan will proceed. If sealing appears that it will be ineffective to control decontamination fluids, then this Closure Plan will be amended.

Dust and debris (if any) will be containerized in appropriate DOT-approved containers and be considered hazardous for lead (D008) unless analytical representative testing demonstrates the material does not meet the hazardous characteristic criteria (i.e., the material is found to contain lead at less than 5.0 mg/L).

11.4 Reusable Equipment

Prior to removing reusable equipment (e.g., hand tools and portable industrial vehicles) from the subject property, the equipment will be decontaminated. The specific protocol for decontaminating reusable equipment will depend on the equipment; however, it is anticipated that the following general procedures will be applicable.

Small hand tools, cameras, and other portable equipment will be decontaminated in the manner described for similar items within the Site-Specific Health and Safety Plan (Section 11).

Larger equipment will be decontaminated in an area where decontamination fluids can be collected and will not escape the warehouse. The general procedure for decontamination of this equipment will be the same as for walls and floors, as described in Section 11.3.3.

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12.0 REMEDIAL STANDARDS

The primary standard for decontamination activities associated with the subject property will be a performance-based standard.

Decontamination activities will be performed to a “clean debris surface.” As defined in OAC 3745-270-45, Table 1, a "clean debris surface" will be considered a surface that has been decontaminated and is free of visible dust. For warehouse components (e.g., walls, floors, and structural elements) where prior tenant activities may have caused discoloration of surfaces, a "clean debris surface" will be considered one that has been decontaminated and is free of visible dust or grime, except that residual staining consisting of light shadows, slight streaks, or minor discolorations, and dust in cracks, crevices, and pits may be present provided that such staining and dust in cracks, crevices, and pits must be limited to no more than 5% of each square inch of surface area.

In the event that the above standard proves to be impractical, Olymbec reserves the right to amend this Closure Plan. An amended Closure Plan may include performance of an alternative remedy or a proposal to use risk assessment to document that residual concentrations do not pose a threat to human health or the environment.

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13.0 SAMPLING AND ANALYSIS PLAN

Sampling and analysis of waste related materials will be performed to evaluate appropriate disposal requirements. At a minimum, initial waste characterization samples will be analyzed for the eight RCRA metals by the Toxicity Characteristic Leaching Procedure; subsequent samples may be reduced to lead only upon concurrence of the waste disposal facility. Additional analyses may also be performed as requested by the disposal facility receiving waste materials.

These activities will follow the Sampling and Analysis Plan found in Appendix E. The health and safety protocols described in Section 10 will also be followed.

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14.0 COST ESTIMATE

A written cost estimate for implementation of the activities described herein has been prepared and is summarized below with detailed costing backup presented in Attachment C of Appendix A. As shown, removal and offsite disposal/recycling of CRT-related material, decontamination of the subject property, and preparation of the closure report is anticipated to cost approximately $**5,058,849**. A summary of the estimated cost is provided in Appendix F. Additional post-closure costs are not anticipated.

- Removal of Processed and Non-Processed CRTs.....**$4,492,169**
- Decontamination of Warehouse.....**$526,680**
- Closure Documentation.....**$40,000**

Estimated Total Closure Cost: $5,058,849

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FIGURES

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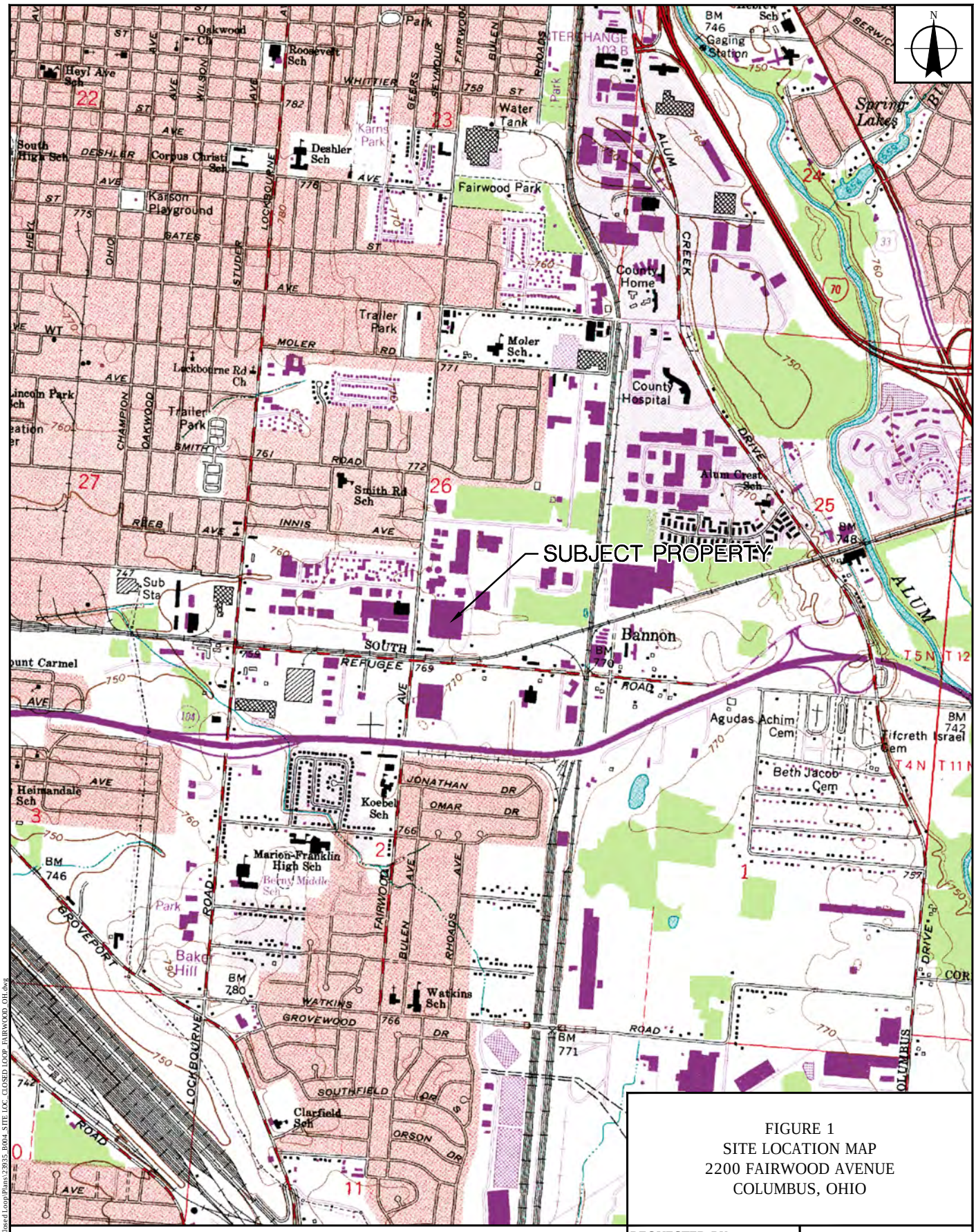

FIGURE 1
SITE LOCATION MAP
2200 FAIRWOOD AVENUE
COLUMBUS, OHIO

NAD 1983 STATE PLANE
UTM 17 NORTH

0 1,000 2,000
SCALE IN FEET

REQUESTED BY:	NB
DRAWN BY:	KMB
DATE:	11/14/2018
PROJECT:	0888823935

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DATA SOURCES: U.S. Geological Survey. Southeast Columbus Quadrangle, Ohio [Map]. Photorevised 1994. 1:24,000. 7.5 Minute Series.

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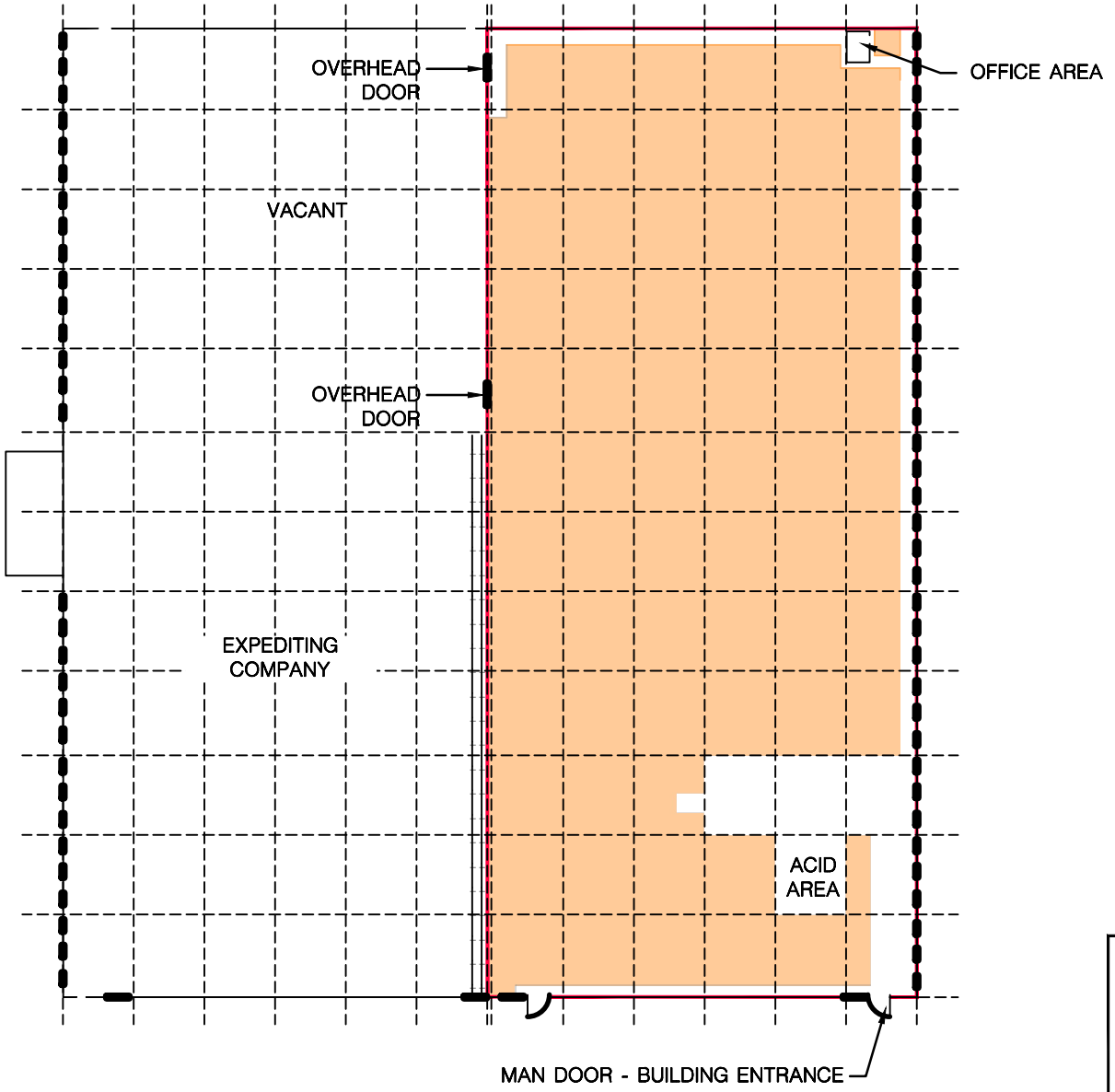

LEGEND

- CLOSED LOOP LEASE SPACE
- CRT - RELATED MATERIALS IN BOXES
- LOADING DOCK DOORS

NAD 1983 STATE PLANE
OHIO SOUTH FEET

0 50 100

SCALE IN FEET

FIGURE 2
SITE LAYOUT MAP
2200 FAIRWOOD AVENUE
COLUMBUS, OHIO

REQUESTED BY:	NB
DRAWN BY:	KMB
DATE:	11/15/2018
PROJECT:	0888823935

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DATA SOURCES: OLYMBEC

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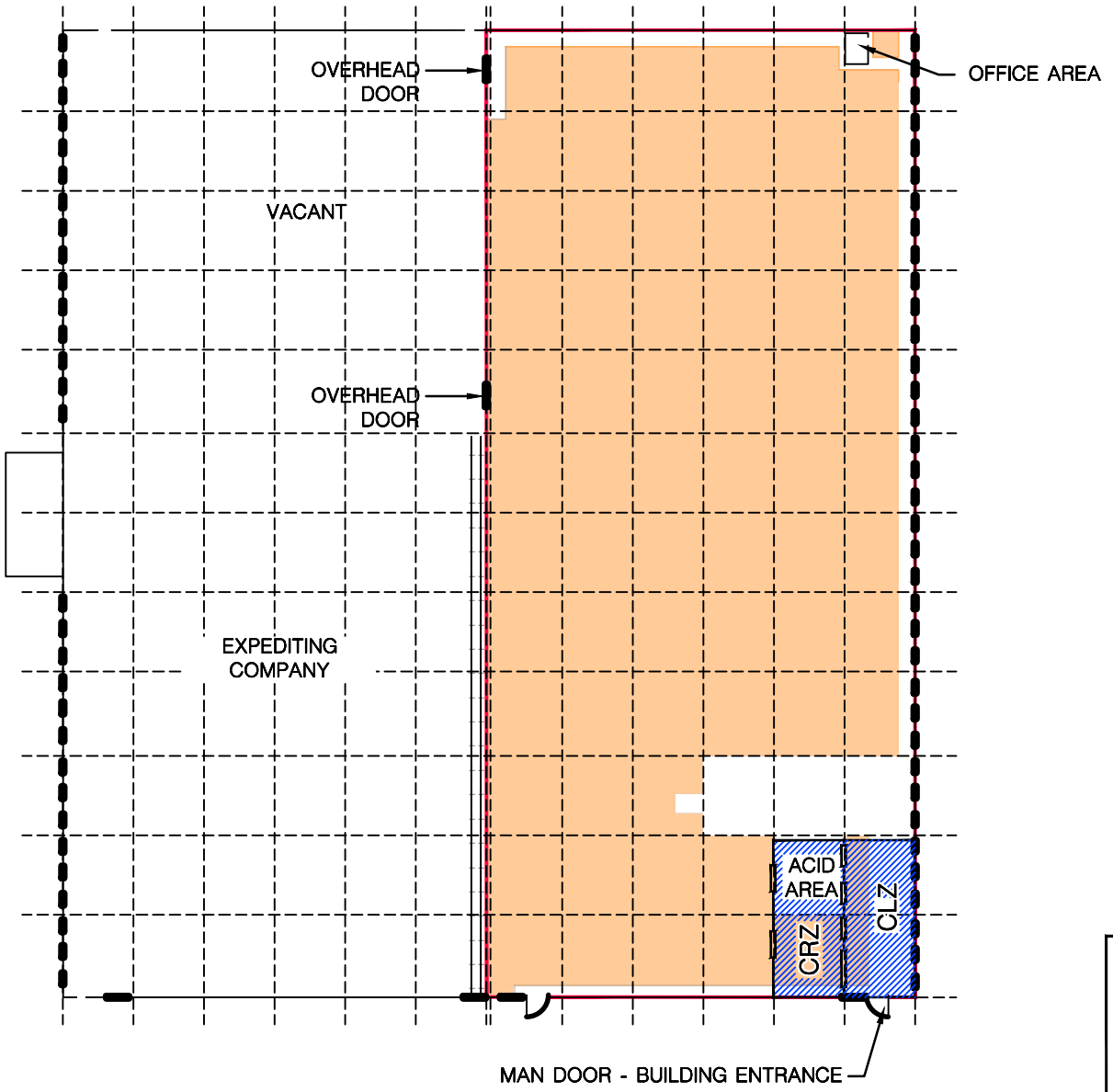

FIGURE 3
CONTAMINATION REDUCTION ZONE MAP
2200 FAIRWOOD AVENUE
COLUMBUS, OHIO

LEGEND
- CLOSED LOOP LEASE SPACE
- CRT - RELATED MATERIALS IN BOXES
- LOADING DOCK DOORS
- DOOR FOR TWO MOTORS WITH CLEAR PVC STRIP CURTAINS

CRZ CONTAMINATION REDUCTION ZONE
CLZ CLEAN LOADING ZONE

CRZ FITTED WITH NEGATIVE AIR MACHINES
INTERIOR OF CRZ AND CLZ TO BE FINISHED WITH PLYWOOD ON BOTTOM 4 FEET
CRZ 40'X80', CLZ SAME DIMENSIONS
PLASTIC CONTAINMENT TO GO TO CEILING

NAD 1983 STATE PLANE
OHIO SOUTH FEET

0 50 100
SCALE IN FEET

REQUESTED BY:	NB
DRAWN BY:	KMB
DATE:	5/19/2020
PROJECT:	0888823935

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DATA SOURCES: OLYMBEC

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Appendix A
Engineering Evaluation / Cost Analysis

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ENGINEERING EVALUATION/COST ANALYSIS

CLOSED LOOP REFINING & RECOVERY/CLOSED LOOP GLASS SOLUTIONS
2200 FAIRWOOD AVENUE
COLUMBUS, OHIO 43207

EPA ID NO. OHR000201145

EnSafe Project Number:
0888823935/007

Prepared for:

Olymbec USA LLC
1004 East Brooks Road
Memphis, Tennessee 38116

May 2020

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ATTACHMENTS

EXECUTIVE SUMMARY

This document presents the Engineering Evaluation/Cost Analysis (EE/CA) for a Non-Time-Critical Removal Action (NTCRA) for the Closed Loop Refining & Recovery/Closed Loop Glass Solutions (Closed Loop) facility (referred to herein as the "subject property" or the "Closed Loop facility") in Columbus, Ohio. Closed Loop accepted electronic waste (e-waste) at the subject property from late 2014 through early 2016, when it ceased operations and abandoned the subject property. Closed Loop's principal operations involved the receipt, storage, and disassembling of cathode ray tubes (CRTs), projection televisions, and other electronic waste (collectively referred to as "CRT-related materials"). Located at the subject property are containerized CRT-related materials (including processed CRT-glass), CRT demanufacturing areas, and residual lead dust contamination. The CRT-related materials and associated lead dust at the subject property present a human health hazard for lead exposure.

The purpose of this document is to present and evaluate the removal action alternatives to reduce lead exposure hazards at the subject property that will meet the remedial action objective of implementing "measures that will minimize contact with materials containing lead which presents an exposure hazard to construction workers, personnel, and visitors under current and future land use scenarios." The selected removal action based on this EE/CA will be a final action.

This EE/CA is being completed as part of a NTCRA as required by Title 40 Code of Federal Regulations Section 300.415(b)(4)(i) of the National Oil and Hazardous Substances Pollution Contingency Plan. Submittal of this document fulfills the requirements for NTCRAs defined by the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 and the Superfund Amendments and Reauthorization Act of 1986. This EE/CA follows the United States Environmental Protection Agency Office of Solid Waste and Emergency Response *Guidance on Conducting Non-Time-Critical Removal Actions Under CERCLA* PB93-963402 (1993).

To reduce the lead exposure hazard, the following three alternatives were identified and evaluated for potential implementation at the Closed Loop facility:

- Alternative 1 — no action
- Alternative 2 — CRT-related materials removal
- Alternative 3 — CRT-related materials removal and warehouse decontamination

Through a comparative analysis of the alternatives, Alternative 3 is the recommended removal action alternative for the Closed Loop facility. Alternative 3 provides the most protection to human health and the environment, fully meets the remedial action objective, and is the most permanent solution in the long-term. Alternative 3 reduces the toxicity, mobility, and volume of lead containing materials, which is not achieved under Alternatives 1 or 2. Alternative 3 is also the most implementable alternative since it is anticipated to be the most acceptable alternative to regulators and the community. The estimated cost of Alternative 3 is higher than Alternatives 1 and 2, but its overall value is higher since Alternative 3 provides the most protection and is a permanent solution since lead-containing materials, including lead-containing dust, will be physically removed from the subject property.

1.0 INTRODUCTION

The purpose of this Engineering Evaluation/Cost Analysis (EE/CA) is to present and evaluate removal action alternatives as part of a Non-Time-Critical Removal Action (NTCRA) at the Closed Loop Refining & Recovery/Closed Loop Glass Solutions (Closed Loop) facility (referred to herein as the "subject property" or the "Closed Loop facility") in Columbus, Ohio. Closed Loop accepted electronic waste (e-waste) at the subject property from late 2014 through early 2016, when it ceased operations and abandoned the subject property. Closed Loop's principal operations involved the receipt, storage, and disassembling of cathode ray tubes (CRTs), projection televisions, and other electronic waste (collectively referred to as "CRT-related materials"). Located at the subject property are containerized CRT-related materials (including processed CRT-glass), CRT demanufacturing areas, and residual lead dust contamination that will be addressed as part of this NTCRA. Removal of lead-containing materials is necessary to reduce potential exposure hazards to construction workers, personnel, and visitors under current and future land use scenarios.

1.1 General Description

This EE/CA provides the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) documentation to support a removal action at the Closed Loop facility. The purpose of the EE/CA is to present the property owner's (Olymbec USA LLC [Olymbec]) intent to reduce the exposure hazard to human health and environment from lead-containing materials (e.g., CRT-related materials and lead dust), and identify and evaluate removal alternatives to reduce this hazard for current and future uses of the subject property.

Submittal of this document fulfills the requirements for NTCRAs defined by CERCLA, the Superfund Amendments and Reauthorization Act (SARA), and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This EE/CA follows the United States Environmental Protection Agency (U.S. EPA) Office of Solid Waste and Emergency Response (OSWER) *Guidance on Conducting Non-Time-Critical Removal Actions Under CERCLA* PB93-963402 (1993).

The benefits of using the NTCRA process include promptly addressing health threats and accelerating sites more quickly through the CERCLA response process. The goals of an EE/CA are to identify the objectives of the removal action and to analyze effectiveness, implementability, and cost of various alternatives that may satisfy these objectives. An EE/CA documents the removal action alternatives and the evaluation and recommendation process.

An EE/CA serves an analogous function to, but is more streamlined than, the remedial investigation/feasibility study conducted for remedial actions. The results of an EE/CA and the selected removal alternative will be subsequently summarized in an Action Memorandum (AM) as discussed in *Use of Non-Time Critical Removal in Superfund Response Actions* (U.S. EPA 2000).

1.2 Regulatory Framework

This EE/CA is issued by Olymbec under Section 104 of CERCLA and SARA. Section 104 allows an authorized agency to remove the risk of hazardous substances, pollutants, or contaminants at any time, or to take other response measures consistent with the NCP as deemed necessary to protect public health or welfare and the environment. Olymbec is acting as the lead authority in the implementation of this NTCRA. The Ohio Environmental Protection Agency (Ohio EPA) has the lead role in regulatory oversight for this lead hazard abatement.

The NCP, Title 40 Code of Federal Regulations (CFR) Part 300, provides regulations for implementing CERCLA and SARA, and regulations specific to removal actions. The NCP defines a removal action as:

> *…cleanup or removal of released hazardous substances from the environment, such actions as may be necessary to monitor, assess, and evaluate the threat of release of hazardous substances; the disposal of removed material; or the taking of such other actions as may be necessary to prevent, minimize, or mitigate damage to the public health or welfare or to the environment, which may otherwise result from a release or threat of a release.*

This removal action is non-time-critical due to the availability of a 6-month planning period from the time the removal action is determined to be necessary (when AM comments are resolved) to the time of initiation of the action. Title 40 CFR Section 300.415 requires the lead agency to conduct an EE/CA when an NTCRA is planned for a site.

The removal action alternative to be implemented will be selected after fulfilling all community involvement requirements. A Community Relations Plan is included as Attachment A. Community involvement requirements for NTCRAs include making the EE/CA available for public review and comment for a period of 30 days. An announcement of the 30-day public comment period on the EE/CA is required in a local newspaper. Written responses to significant comments will be summarized in the AM and will be included in the Administrative Record.

2.0 SITE CHARACTERIZATION AND BACKGROUND

This section presents available information on the location; background; description; physical setting; land use; previous investigations; and source, nature, and extent of lead containing material at the Closed Loop facility.

2.1 Site Description and Background

Closed Loop operated a CRT-related material storage facility within the east portion of the warehouse structure at 2200 Fairwood Avenue in Columbus, Franklin County, Ohio, as shown on the U.S. Geological Quadrangle Map (Refer to Figure 1, showing the subject property and the surrounding area). The latitude and longitude for the Fairwood Avenue warehouse is 39.921098/-82.953906. This warehouse and the property on which it is situated is surrounded by commercial and industrial properties; a residential neighborhood is approximately 500 feet northwest of the warehouse. The Fairwood Avenue warehouse is a 257,767-square foot structure on a 14.494-acre parcel (Parcel ID: 010-035846), of which Closed Loop leased 130,652 square feet, approximately 50% of the warehouse structure. If this operation had been a legitimate recycling facility, the North American Industry Classification System for Closed Loop would be 42393, which includes recyclable material merchant wholesalers. Figure 2 shows the warehouse layout.

Available information indicates that the warehouse was constructed on former agricultural land in 1969. The 2007 Atwell-Hicks Development Consultants Phase I Environmental Site Assessment indicates that prior occupants of the Fairwood Avenue warehouse included a tire distributor (Mohawk Tire [1970 to 1989], Yokohama Tire Corporation [1990 to 2002]), and American Signature furniture [2003 to at least 2007]).

It appears that Closed Loop began operations in the Fairwood Avenue warehouse in late December 2014 and ceased operations/ abandoned the subject property in early 2016. The lease for the subject property was signed by Closed Loop Refining & Recovery. Closed Loop Glass Solutions, which is a related entity, may have operated a CRT glass “washing” process at the subject property. For the purposes of this EE/CA, both entities (Closed Loop Refining & Recovery and Closed Loop Glass Solutions) will be referred to as “Closed Loop” unless otherwise specified.

2.2 Previous Investigations and Removal Actions

A detailed description of prior investigations and site activities is presented in the May 2020 Resource Conservation Recovery Act (RCRA) Closure Plan to which this EE/CA is an addendum, and which is incorporated by reference. In general, prior activities have included the following:

- During March 2016, Ohio EPA performed a review of the subject property and issued a letter that notes that the Closed Loop facility had stopped "washing" processed glass when "the tumbler (which aids in the washing) at Fairwood broke in the summer of 2015…"

- During 2016, Olymbec developed an *Interim Site Management Plan* that detailed the history of Closed Loop operations at the subject property and described procedures for securing CRT-related materials left at the subject property by Closed Loop. Olymbec agreed to secure two overhead doors that provided access to the Closed Loop facility from the west side of the warehouse to prevent access to the Closed Loop facility from the east side of the warehouse. Olymbec also agreed to perform additional measures to secure the subject property. There have been no other prior removal actions at the subject property.

- During July 2017, EnSafe Inc. performed an industrial hygiene assessment of the Closed Loop facility to evaluate the presence of lead in settled dust. The industrial hygiene assessment included collection of 16 wipe samples and two bulk samples of broken CRT glass, as summarized below:

  — Lead ranged from 290 micrograms per 100 square centimeters (µg/100 cm^2) to 760 µg/100 cm^2 in the six elevated (roof support structures and elevated piping) wipe samples, exceeding the Brookhaven National Laboratory non-lead operation area acceptable surface level criteria (Brookhaven screening criteria) of 40 µg/100 cm^2.

  — Lead ranged from 220 µg/100 cm^2 to 750 µg/100 cm^2 in the five floor wipe samples, exceeding the Brookhaven screening criteria of 40 µg/100 cm^2.

  — Two of five wall wipe samples exceeded the Brookhaven screening criteria of 40 µg/100 cm^2 with reported lead concentrations of 59 µg/100 cm^2 and 130 µg/100 cm^2.

  — The two bulk glass samples contained total lead at concentrations of 3,800 milligrams per kilogram (mg/kg) and 26,000 mg/kg, exceeding the Ohio Voluntary Action Program generic direct-contact residential/commercial child soil standard of 400 mg/kg and the generic direct-contact commercial or industrial land use soil standard of 800 mg/kg.

- During July 2017, Stericycle performed a removal action on the Closed Loop "washing" area. Removal activities are documented in Olymbec's January 31, 2018 *Interim Status Report No. 1*. This removal action included the following activities:

  — Removal and containerization of hydrofluoric acid from one vat into six 55-gallon drums

  — Removal and containerization of solid sludge from a second vat and a 300-gallon tote into eight 55-gallon drums

  — Transportation and offsite disposal of drummed hydrofluoric acid (D002), lead-bearing sludge (D008), and two empty hydrofluoric acid drums

- During April 2018, DEC Enviro completed an inventory of CRT-related materials stored at the subject property. DEC Enviro's summary of the inventory assessment estimates that the subject property holds approximately 30,917,116 pounds (15,458 tons) of CRT-related materials, as follows:

  — Non-processed CRTs (complete units, screens and components) .. 23,528,917 pounds

  — CRT crushed glass ..... 7,388,200 pounds

  — Recyclable plastic, glass, and steel ..... 0 pounds

2.3 Source, Nature, and Extent of Contamination

The subject property includes 130,652 square feet of floor space in the warehouse that contains approximately 30,917,116 pounds (15,458 tons) of containerized CRT-related materials. The CRT-related materials contain lead. The subject property also includes a former glass "washing" area that utilized hydrofluoric acid. Past Closed Loop practices have caused the subject property and contents to become contaminated with lead-containing dust.

2.4 Streamlined Risk Evaluation

A streamlined risk evaluation summarizes the threats at a site by identifying the nature and extent of the contaminant release; the pertinent exposure pathways; and the receptors that may be exposed.

Nature and Extent of Release: As previously indicated, CRT-related materials are stored throughout the subject property and occupy approximately 90% of the floor space. The containers are constructed of cardboard and some are deteriorating, becoming unstable, and in some cases collapsing and blocking aisle ways.

In addition to the abundance of CRT-related materials, past Closed Loop operations have resulted in lead-containing dust coating the stored containers of CRT-related materials and warehouse surfaces. This dust has been documented to contain lead.

In addition to the presence of lead, a portion of the subject property was reported to be previously utilized by Closed Loop to "wash" CRT-glass using hydrofluoric acid. Although the liquid hydrofluoric acid has been removed, hydrofluoric acid residues are anticipated to remain on prior hydrofluoric acid containers and areas where spills occurred.

Pertinent Exposure Pathways: Based on current/future land use, the primary exposure pathways to lead-containing dusts are anticipated to be as summarized below:

- Personnel entering the subject property could be exposed to dust if they were to touch dust contaminated surfaces; further, the potential presence of airborne dusts in the subject property are a lead inhalation hazard.

- The volume of material makes it difficult to access interior portions of the warehouse; if a release of water were to occur inside of the warehouse, lead-containing materials could be released to the warehouse exterior.

- The condition of the containers makes it likely that containers could collapse in the future. If a container collapses against an exterior door, there could be a release of CRT-related materials and lead containing dust to the exterior of the warehouse.

- Skin exposure to surfaces that were previously in contact with hydrofluoric acid and that have not been decontaminated could be adversely impacted if skin moisture causes the corrosive material to go into solution.

Potential Receptors: Work within the warehouse poses a risk to maintenance workers, personnel, and visitors due to the potential for lead-containing dust exposure and a physical crushing hazard

due to collapsing boxes. Personnel entering the warehouse could be adversely exposed to surfaces with acid residues that have not been decontaminated. If CRT-related materials or lead containing dust were released to the warehouse exterior, there are additional hazards for exposure of site visitors, workers, and ecological receptors to storm water and sediment that could become contaminated with lead.

Based on the above information, Olymbec has determined that the removal action recommended in this EE/CA is justified by a number of the factors in Title 40 CFR Section 300.415(b)(2). This conclusion is further supported by Title 40 CFR Section 300.415(e)(7) and (8), which states that the treatment and disposal of hazardous substances are appropriate as removal actions where needed to reduce the likelihood of human, animal, or food chain exposure.

3.0 IDENTIFICATION OF REMOVAL ACTION OBJECTIVES

As discussed in Section 2, lead-containing materials and lead dust and surfaces previously in contact with hydrofluoric acid in the Closed Loop facility present an exposure hazard and threat to public health or welfare of the United States or the environment. Based on available information, evaluation of the hazard, and current/future use plans for the subject property, appropriate remedial action objectives (RAOs) have been developed for this NTCRA and are presented in this section. In addition, this section discusses the identification of Applicable or Relevant and Appropriate Requirements (ARARs), which are tabulated in Attachment B, and the removal action scope and schedule.

3.1 Statutory Limits on Removal Actions

The NCP (Title 40 CFR Section 300.415) dictates statutory limits of $2 million and 12 months of U.S. EPA fund-financed removal actions, with statutory exemptions for emergencies and actions consistent with the remedial action to be taken. This removal action will not be U.S. EPA fund-financed; therefore, there is no limit on the cost or duration of the removal action. However, cost-effectiveness is a recommended criterion for the evaluation of removal action alternatives.

3.2 Determination of Removal Scope

3.2.1 Development of Removal Action Objectives

General requirements of the NCP were considered in the development of RAOs. The NCP requires that the selected action be designed in an effort to ensure protection of human health and the environment and is consistent with current and future land use. The RAO for the Closed Loop facility was developed to reduce the potential for exposure to surfaces previously in contact with hydrofluoric acid and the lead exposure hazard associated with CRT-related materials and associated dust as described in Section 2. CERCLA EE/CA guidance provides that "alternatives that employ treatment and that yield permanent solutions be fully evaluated…" In this regard, where feasible and cost-effective, CRT-related materials will be recycled in keeping with the CRT conditional exclusion under RCRA and its Ohio state corollaries. Contractor bids, for example, were evaluated based in part on experience in the electronic waste recycling industry. Moreover, it is anticipated that whole CRT units that have not been damaged will be recycled in accordance with the RCRA CRT conditional exclusion and industry best practice. Site conditions, including dust accumulation, and the nature of Closed Loop's processing operations may preclude recycling of other categories of CRT-related materials at the subject property. Based on these considerations, the site-specific proposed RAO for the Closed Loop facility is:

Implement measures that will prevent or minimize contact with surfaces previously in contact with hydrofluoric acid as well as CRT-related materials and dust containing lead, which present a lead exposure hazard to construction workers, personnel, and visitors under current and future land use scenarios.

The NCP also requires that the selected action must also attain ARARs. The following section presents a summary of the identified ARARs.

3.2.2 Identification of Applicable or Relevant and Appropriate Requirements

The NCP specifies that response actions taken under CERCLA are to attain ARARs. The party performing the response action has primary responsibility for identifying potential ARARs at a site. The removal action taken at the subject property will, to the extent practicable, comply with ARARs under federal law and the laws of the State of Ohio. Summaries of potential related environmental regulations are tabulated in Attachment B.

ARAR evaluation is a two-step process: (1) determination of applicability, and (2) if not applicable, determination of relevance and appropriateness. Applicable requirements are those requirements specific to the conditions at the Closed Loop facility that satisfy all jurisdiction prerequisites of the law or requirement. Relevant and appropriate requirements are those that do not have jurisdiction authority over the particular circumstances at the Closed Loop facility but are meant to address similar situations and are thus suitable for use at the site. Only requirements that are both relevant and appropriate are considered ARARs. As outlined in Title 40 CFR Section 300.415(j), the lead agency may consider the urgency of the situation and the scope of the removal action to be conducted in determining whether compliance with ARARs is practicable. The final determination of federal ARARs will be made when the AM is issued.

The NCP (40 CFR Section 300.400(g)(2)) specifies the following criteria to be used in the determination of what requirements of environmental laws are relevant and appropriate:

- Purpose of the requirement in relation to the purpose of CERCLA
- Medium or media regulated or affected by the requirement
- Substance(s) regulated by the requirement
- Actions or activities regulated by the requirement

- Variances, waivers, or exemptions of the requirement
- Type of place regulated and the type of place affected by the release or CERCLA action
- Type and size of the facility or structure regulated by the requirement or affected by the release
- Consideration of the use or potential use of affected resources in the requirement

Under CERCLA, only substantive provisions of requirements are considered to be ARARs. Procedural or administrative requirements (e.g., permits) are not considered ARARs. The CERCLA exemption in Section 121(e)(1) [42 USC, Section 9621(e)(1)] states that "No Federal, State, or local permit shall be required for the portion of any removal or remedial action conducted entirely on-site, where such remedial action is selected and carried out in compliance with this section." This exemption applies to all administrative requirements, but substantive requirements of the permits must still be attained.

ARARs are divided into three classifications pursuant to U.S. EPA guidance on the ARAR determination process: chemical-specific, location-specific, and action-specific.

Chemical-specific ARARs are health or risk management-based criteria or methodologies applied to site-specific conditions that result in the establishment of a cleanup level. These requirements generally set protective cleanup concentrations for each of the chemicals of concern in the designated media or set safe concentrations of discharge for remedial activity. Because this action is intended to address exposure to surfaces previously in contact with hydrofluoric acid and address lead exposure hazards, chemical-specific ARARs are addressed as part of this EE/CA and are summarized in Attachment B (Table B-1).

Location-specific ARARs restrict remedial activities based on the characteristics of the surrounding environments. Location-specific ARARs may include restrictions on actions within wetlands or floodplains, the protection of known endangered species, or restrictions for protected waterways. Based on a review of Federal, Ohio, and City of Columbus regulations, location-specific ARARs are addressed as part of this EE/CA and are summarized in Attachment B (Table B-2).

Action-specific ARARs are requirements that define acceptable treatment and disposal procedures for CRT-related materials in an effort to ensure the protection of public health and safety. These requirements also define acceptable treatment and disposal procedures for surfaces previously

in contact with hydrofluoric acid. Federal and Ohio action-specific ARARs that may affect the procedural aspects of removal alternatives are summarized in Attachment B (Table B-3).

3.2.3 Removal Action Scope

The scope of the lead abatement activities for the Closed Loop facility will need to address the lead exposure hazard associated with CRT-related materials and other materials under current and future use scenarios. To reduce exposure risks, lead-containing materials should be removed.

Other important considerations in determining the removal action scope include:

- Selection of an efficient and cost-effective removal action approach;
- Implementation of safe and proven lead-waste response procedures;
- Implementation of safe and proven corrosive-waste response procedures; and
- Minimize impacts to surrounding communities (including tenants).

3.3 Determination of Removal Action Schedule

Upon finalization, the EE/CA will be submitted to the Ohio EPA and a notice of its availability for public review will be published in the local newspaper. The EE/CA will then be available for at least a 30-day public comment period. Following the public comment period, responses to significant comments will be prepared and incorporated into the AM.

This removal action is non-time-critical due to the availability of a 6-month planning period starting at the time the AM is finalized to the time of initiation of the action. Following the finalization of the AM and setting aside any COVID-19 related schedule delays (as applicable), the total project period is anticipated to span an estimated **1,095** days through completion of the after action reporting. This is an estimated schedule for project completion, should critical milestones not be met, the total project timeframe would be extended. Critical milestone periods related to the removal action schedule are summarized below:

- Removal of Processed and Non-Processed CRTs (up to 810 days) ..... **0 to 810** days
- Decontamination of Warehouse (180 days).....**810 to 1,035** days
- Closure Documentation (60 days following decontamination) ..... **1,035 to 1,095** days

4.0 IDENTIFICATION AND ANALYSIS OF REMOVAL ACTION ALTERNATIVES

4.1 Alternatives Description

Three removal action alternatives were identified for evaluation in this EE/CA to reduce the lead exposure hazard for current and future use scenarios at the Closed Loop facility. These alternatives include:

- Alternative 1 — no action
- Alternative 2 — CRT-related materials removal
- Alternative 3 — CRT-related materials removal and decontamination of warehouse

These alternatives were evaluated against meeting the site-specific RAO developed in Section 3 as well as NCP criteria of effectiveness, implementability, and cost. A description of each of these alternatives is provided in the following sections.

4.1.1 Alternative 1 — No Action

The no action alternative consists of no measures being taken to limit or prevent contact with lead containing materials in the Closed Loop facility. No administrative or engineering controls, or actions to reduce the toxicity, mobility, or volume of lead-containing materials would occur under this alternative. As required by CERCLA, the no action alternative is included in the analysis of removal action alternatives as a baseline for comparison.

4.1.2 Alternative 2 — CRT-Related Materials Removal

The CRT-related materials removal alternative would include the physical removal of CRT-related materials from the subject property. Removal activities would include offsite transportation and disposal or recycling of non-processed and processed CRT-related materials at authorized facilities:

The subject property layout and removal area is documented in Figure 3.

4.1.3 Alternative 3 — CRT-Related Materials Removal and Warehouse Decontamination

The CRT-related materials removal alternative would include the physical removal of CRT-related materials from the subject property followed by warehouse decontamination. Removal activities would include:

- Phase I field establishment of a contamination reduction zone and a clean loading zone

- Phase II field removal action activities, with offsite transportation and disposal or recycling of processed and non-processed CRT-glass and other e-waste materials at authorized facilities

- Phase III decontamination of the warehouse interior to remove lead contaminated dust and reduce the potential for impacts to future warehouse users and visitors

The Closure Plan accompanying this EE/CA provides more details on the actions included in Alternative 3 and is incorporated herein by reference. The subject property layout and removal area are documented in Figure 3.

4.2 Analysis of Removal Action Alternatives

Each of the three removal action alternatives were evaluated using the effectiveness, implementability, and cost criteria set forth in the NCP and the U.S. EPA guidance for conducting EE/CAs. Each evaluation criterion is described in Table 4-1.

Table 4-1
Evaluation Criteria

Effectiveness	
Protection of human health and the environment	The assessment describes how the action achieves and maintains protection of human health and the environment and achieves site-specific RAOs both during and after implementation.
Compliance with ARARs	An alternative is assessed in terms of its compliance with ARARs, or if a waiver is required, how it is justified.
Short-term effectiveness	An action is assessed in terms of its effectiveness in protecting human health and the environment during the implementation of a remedy before RAOs have been met. The duration of time until the RAOs are met is also factored into this criterion.
Long-term effectiveness and permanence	An action is assessed in terms of its long-term effectiveness in maintaining protection of human health and the environment after RAOs have been met. The magnitude of residual risk and adequacy and reliability of post-remedial site controls are taken into consideration.
Reduction of toxicity, mobility or volume	An action is assessed in terms of anticipated performance of the specific remedial technologies it employs. Factors such as the ability of the technology to reduce the principal threats posed by the CRT-related materials, including the extent to which the toxicity, mobility, or volume of the contaminants are reduced, and whether the alternative will satisfy the preference for treatment.
Implementability	
Technical feasibility	The ability of the technology to implement the remedy is evaluated.
Administrative feasibility	The administrative feasibility factor evaluates requirements for permits, zoning variances, and impacts on adjoining properties.
Availability of services and materials	The availability of offsite treatment, storage, and disposal capacity, personnel, services, and materials, and other resources necessary to implement the alternative will be evaluated.
State and community acceptance	The acceptability of an alternative to the state agency and the community will be evaluated.

Table 4-1 Evaluation Criteria	
Cost	
Direct capital costs	Includes direct capital costs for construction and packaging of CRT-related materials, transportation and disposal or recycling of CRT-related materials, analytical costs; warehouse decontamination, and contingency allowances.
Indirect capital costs	Include engineering and design expenses, legal fees, and permitting expenses

Notes:
ARAR = Applicable or Relevant and Appropriate Requirements
CRT = Cathode Ray Tube
RAO = Remedial Action Objective

4.2.1 Effectiveness

The effectiveness of an alternative refers to its ability to meet the objective within the scope of the removal action. Specifically, effectiveness is evaluated by the degree to which the alternative achieves the RAO, and the reliability and performance of the alternative over time, including protection of human health and the environment, compliance with ARARs to the extent practical, long-term effectiveness and permanence, and reduction in lead exposure effectiveness.

As described in Section 3, the site-specific RAO is to implement measures that will prevent or minimize exposure to materials that present a lead exposure hazard to construction workers, personnel, and visitors under current and future land use scenarios and to prevent a threat to public health or the environment. Levels of effectiveness were assessed based on the number of effectiveness criteria, summarized in Table 4-1, satisfied by each alternative. Table 4-2 provides the detailed analysis of each alternative by the effectiveness criteria.

Table 4-2
Detailed Analysis of Alternatives for Effectiveness

Criterion	Alternative 1: No Action	Alternative 2: CRT-Related Materials Removal	Alternative 3: CRT-Related Materials Removal and Warehouse Decontamination
Protection of human health and the environment	Does not provide protection of human health and the environment. Does not meet RAO.	Provides protection to human health by limiting access to CRT-related material. However, alternative does not meet RAO for future use and exposure to lead-containing dust.	Provides highest level of protection to human health and the environment by CRT-related material and lead dust removal. Meets RAO.
ARAR Compliance	Not compliant with hazardous waste ARARs as Ohio EPA has determined speculative accumulation of hazardous waste.	Not compliant with hazardous waste ARARs because the dust exceeds the characteristically hazardous concentration of 5.0 mg/L for lead and because dust removal is required by hazardous waste closure requirements.	Anticipated to be compliant with ARARs.

Table 4-2 Detailed Analysis of Alternatives for Effectiveness			
Criterion	**Alternative 1: No Action**	**Alternative 2: CRT-Related Materials Removal**	**Alternative 3: CRT-Related Materials Removal and Warehouse Decontamination**
Short-term effectiveness	Protective of human health and environment during implementation since no action taken.	Worker personnel protection would be addressed during implementation through use of qualified personnel and implementation of lead safety standards and procedures.	Worker personnel protection would be addressed during implementation through use of qualified personnel and implementation of lead safety standards and procedures.
Long-term effectiveness and permanence	Does not provide long-term effectiveness and permanence.	Does not provide long-term effectiveness and permanence.	Long-term effectiveness and permanence are provided by CRT-related material and lead dust removal.
Reduction of toxicity, mobility or volume	Does not reduce toxicity, mobility, or volume of CRT-related materials or lead dust.	Reduces toxicity, mobility, and volume of CRT-related materials by removal and offsite disposal. However, does not reduce toxicity, mobility, or volume of lead dust.	Reduces toxicity, mobility, and volume of CRT-related materials and lead dust by removal and offsite disposal.

Notes:
ARAR = Applicable or Relevant and Appropriate Requirements
CRT = Cathode Ray Tube
EPA = Environmental Protection Agency
RAO = Remedial Action Objective

4.2.2 Implementability

The ease of implementation of a technology refers to the availability of commercial services to support it, the constructability of the technology under specific site conditions, and the acceptability of the technology to all parties involved (e.g., regulators and community). These criteria include technical feasibility, administrative feasibility, availability of services, support agency acceptance, and community acceptance. Levels of implementability were assessed based on the number of implementability criteria, summarized in Table 4-1, satisfied by each alternative. Table 4-3 provides the detailed analysis of each alternative by the implementability criteria. Section 5.2 provides additional detail.

Table 4-3 Detailed Analysis of Alternatives for Implementability			
Criterion	**Alternative 1: No Action**	**Alternative 2: CRT-Related Materials Removal**	**Alternative 3: CRT-Related Materials Removal and Warehouse Decontamination**
Technical feasibility	Technically implementable.	Technically implementable.	Technically implementable.
Administrative feasibility	Administratively implementable.	Administratively implementable.	Administratively implementable.
Availability of services and materials	Available services and materials.	Available services and materials.	Available services and materials.

Table 4-3 Detailed Analysis of Alternatives for Implementability			
Criterion	**Alternative 1: No Action**	**Alternative 2: CRT-Related Materials Removal**	**Alternative 3: CRT-Related Materials Removal and Warehouse Decontamination**
State and community acceptance	Not evaluated at this time pending regulator and community review. However, anticipate acceptance is not likely.	Not evaluated at this time pending regulator and community review. However, anticipate acceptance is not likely.	Not evaluated at this time pending regulator and community review. However, anticipate acceptance.

Note:
CRT = Cathode Ray Tube

4.2.3 Cost

For the detailed cost analysis of alternatives, the expenditures required to complete each alternative were estimated in terms of capital costs based on contractor quotations and estimated volumes of material present. Capital costs include costs to complete removal activities. Indirect costs include engineering expenses. By combining the different costs associated with each alternative, a cost estimate for each alternative can be made for comparison.

The costs estimated for this section are provided to an accuracy of +50% and -30%. The alternative cost estimates are in present day dollars and are based on information from contractors. A summary of the estimated cost for each alternative is provided in Table 4-4. There are no costs associated with Alternative 1, no action.

Table 4-4 Summary of Alternative Present Worth Costs	
Alternative	**Estimated Cost**
Alternative 1 — No Action	$0
Alternative 2 — Cathode Ray Tube-Related Materials Removal	$4,532,169
Alternative 3 — Cathode Ray Tube-Related Materials Removal and Warehouse Decontamination	$5,058,849

To date, Olymbec has expended $108,918 to investigate, manage, and prepare for removal of containerized CRT-related materials (including processed CRT-glass), CRT demanufacturing areas, and residual lead dust contamination and include the following costs:

- Services provided by DEC Enviro and EnSafe, including inventory assessment, lead dust assessment, and services associated with soliciting bids for the e-waste removal and lead dust abatement

- A limited removal action completed by Stericycle (removal of hydroflouric acid and glass "washing" sludges left at the facility)

- EnSafe costs for preparation of closure plan documents, including the EE/CA

5.0 COMPARATIVE ANALYSIS OF ALTERNATIVES

This section provides a comparative evaluation of the removal action alternatives in terms of effectiveness, implementability, and cost.

5.1 Effectiveness

Based on analysis presented in Section 4, the overall effectiveness of Alternatives 1, 2, and 3 are low, moderate, and high, respectively. Alternative 1 provides no protection to human health and the environment and does not achieve the RAO. Alternative 2 reduces the threat to human health and the environment but does not satisfactorily eliminate that threat nor achieve the RAO, because it would leave lead-contaminated dust in the buildings. Alternative 3 provides protection to human health and the environment and achieves the RAO.

Alternatives 1 and 2 will not comply with ARARs. Alternative 3 is the only permanent and effective solution, and reduces the toxicity, mobility and volume of CRT-related materials and lead dust which is not achieved under Alternatives 1 or 2. Alternative 3 will achieve a complete facility cleanup.

5.2 Implementability

Based on analysis presented in Sections 4, 5.2.1, 5.2.2, 5.2.3, and 5.2.4, all three of the alternatives are implementable from a technical, administrative, and services/materials perspective. Alternative 3, however, is the most implementable alternative because it is anticipated to be the most acceptable alternative by regulators and the community, and because it is the most protective of health, community, and the environment, complies with ARARs, achieves the removal objectives, and avoids the necessity of additional remediation activities to effectuate completion.

5.2.1. Technical Feasibility

Alternative 1 does not require the use of technologies to implement the remedy. Alternatives 2 and 3 may require the use of CRT disassembly and processing technologies that are in common use by U.S. electronic waste recyclers and are therefore considered presumptive remedies. Alternative 3 may require the design and installation of a containment reduction zone, clean loading zone, and temporary onsite wastewater treatment unit, each of which involve relatively straightforward features and applications in use at similar sites with lead dust contamination. The effectiveness of these technologies will be routinely evaluated throughout the duration of the project.

Because Alternative 3 will remove all hazardous substances from the facility and decontaminate it, no remediation action will be necessary for the facility. Accordingly, Alternative 3 will not necessitate

a remediation action, nor will any five-year reviews under 4 U.S. Code Section 9621(c) be required. Alternative 3 also obviates the need for any operation and maintenance of a remedy.

5.2.2. Administrative Feasibility

As noted above, this removal action will not be U.S. EPA fund-financed; therefore, there are no statutory limits on the cost or duration of the removal action. Alterative 1 will not require coordination with other offices and agencies. In the event that non-processed CRTs are recycled under the RCRA CRT conditional exclusion and Ohio state corollaries, as applicable, Alternative 2 will require an allowance by Ohio EPA to manage, transport, process, and dispose/recycle CRT-containing materials, as applicable, as well as adherence to U.S. Department of Transportation, environmental and workplace safety laws, and existing import permits. As applicable, Alternative 2 also may require allowances under the RCRA CRT conditional exclusion from other states through which CRT-containing materials are transported and in which these materials will be disposed or recycled. Alternative 3 will require the same considerations as Alternative 2, as well as an industrial wastewater discharge permit from the City of Columbus, to the extent that onsite wastewater treatment is otherwise an economically and technically feasible option. None of these administrative obligations are anticipated to render Alternatives 2 or 3 infeasible.

5.2.3. Availability of Services and Materials

Alternative 1 will require no services or materials. For disposal, Alternatives 2 and 3 will require sufficient capacity at landfill(s). In the event materials are recycled, Alternatives 2 and 3 will require sufficient capacity at CRT processor(s) and lead smelter(s). Each of these outlets have been evaluated, and no capacity restrictions are anticipated to upset the project schedule. Nor are personnel constraints, transportation expenses, or laboratory testing capacity concerns anticipated to upset the project schedule or to increase costs beyond the present-worth costs estimated in Table 4-4 above.

5.2.4. Stakeholder Acceptance

Alternatives 1 and 2 are not likely to be acceptable to Ohio EPA and the community around the facility, because these alternatives would leave hazardous lead substances in the facility. The inability of these alternatives to comply with ARARs, including hazardous waste closure requirements, is anticipated to make these alternatives unacceptable to Ohio EPA. Alternative 3 will remove all hazardous substances, including lead-contaminated dust, and achieve the ARARs. Therefore, Alternative 3 is anticipated to be the only alternative acceptable to Ohio EPA and the community.

5.3 Cost

The present worth costs of each of the alternatives were summarized in Table 4-4. Alternative 3 is the costliest alternative but provides the most protection and is a permanent solution since CRT-related materials and lead dust will be physically removed from the subject property. Alternative 2 is less expensive than Alternative 3 but is not a permanent solution since lead dust would remain at the subject property.

As currently proposed, processed and non-processed CRT units and other e-waste materials stored in the Fairwood Avenue warehouse will be disposed as RCRA hazardous waste and will not be recycled under the RCRA CRT conditional exclusion and Ohio state corollaries. This decision is based on the $0.055 additional cost per pound to recycle CRT-related materials, which would increase the planned removal action cost for Alternatives 2 and 3 by approximately $1,700,000 or 35%. The reason for the increased cost is the way in which Closed Loop processed CRTs by mixing funnel glass with cover glass which generally increases lead smelting costs. In addition, removal of recyclable components from CRT units increases the processing costs for non-processed CRT units. In the event that whole CRT units are identified during removal action activities, then whole CRT units may be recycled.

6.0 RECOMMENDED REMOVAL ACTION ALTERNATIVE

This EE/CA was performed in accordance with current U.S. EPA guidance documents for an NTCRA under CERCLA. Three alternatives were analyzed based on evaluation of the effectiveness, implementability, and cost. The effectiveness evaluation included reviewing the protectiveness of human health and the environment, the short- and long-term effectiveness of the alternative, and its ability to meet the RAO and ARARs. Implementability included assessing the technical feasibility, administrative feasibility, availability of services/equipment, and state/community acceptance of the alternative. The evaluation of cost included a review of capital costs, operating costs, and present worth costs.

Alternative 3, CRT-related materials removal and warehouse decontamination is the recommended alternative. The following factors were used for making the recommendation:

- Alternative 3 provides the most protection to human health and the environment. Alternative 3 is the only alternative that fully meets the RAO. Only Alternative 3 will meet the ARARs and will be a permanent solution. Alternative 3 reduces the toxicity, mobility, and volume of CRT-related material and lead dust, which is not achieved under Alternatives 1 or 2.

- The three alternatives are implementable from a technical, administrative, and services/ materials perspective. However, Alternative 3 is the most implementable alternative since it is anticipated to be the most acceptable alternative to regulators and the community.

- The estimated cost of Alternative 3 is higher than Alternative 2, but its overall value is higher since Alternative 3 provides the most protection and is a permanent solution since CRT-related material and lead dust will be physically removed from the subject property. Alternative 2 is less expensive than Alternative 3 but is not a permanent solution since lead dust would remain at the subject property and the potential for further releases is not abated.

Implementation of this remedy will address the potential exposure to CRT-related material and lead dust containing materials at the Closed Loop facility. Removal activities will be performed in accordance with the Closure Plan accompanying this EE/CA and the on-site coordinator will be EnSafe.

7.0 REFERENCES

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FIGURES

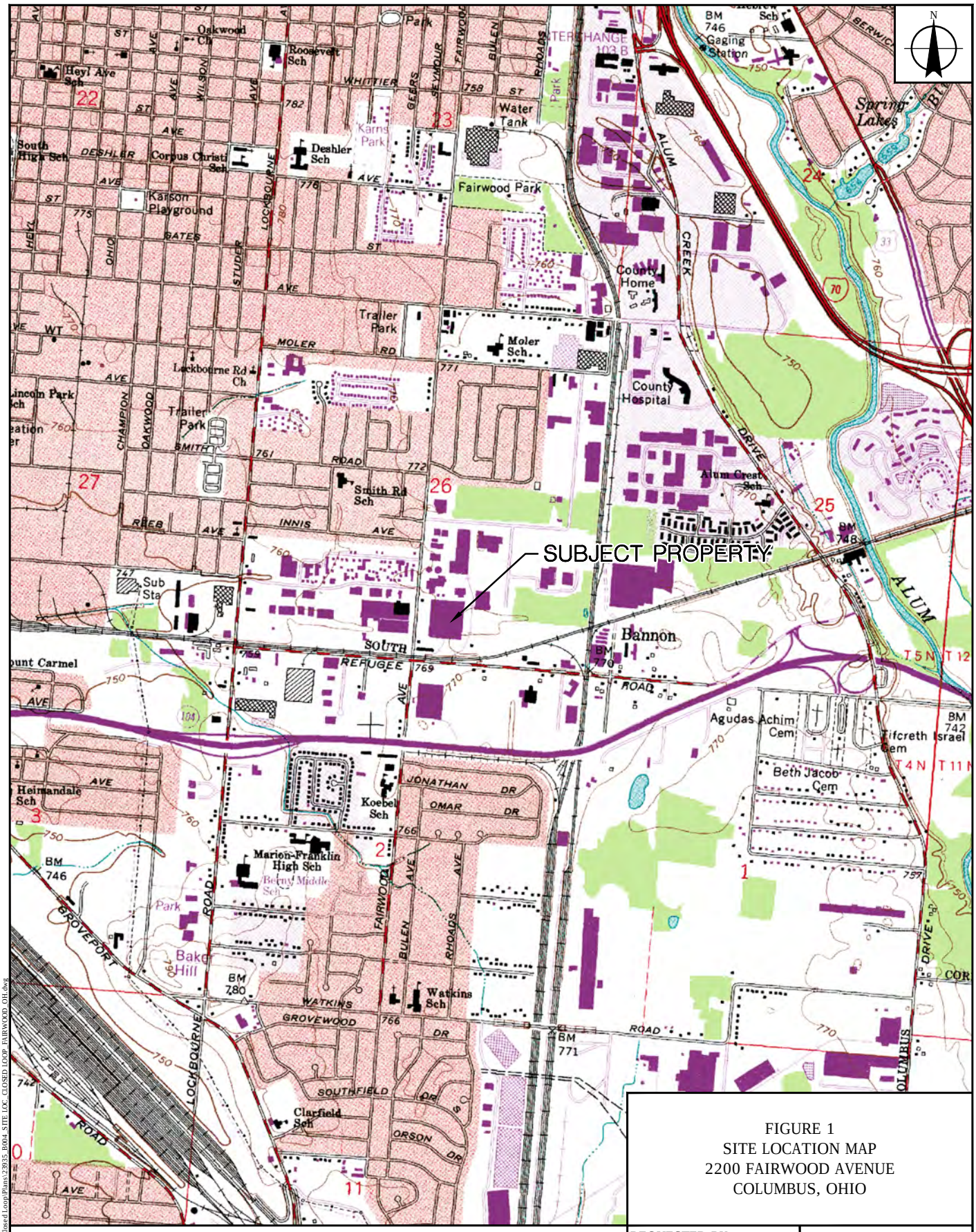

FIGURE 1
SITE LOCATION MAP
2200 FAIRWOOD AVENUE
COLUMBUS, OHIO

NAD 1983 STATE PLANE
UTM 17 NORTH

0 1,000 2,000
SCALE IN FEET

REQUESTED BY:	NB
DRAWN BY:	KMB
DATE:	11/14/2018
PROJECT:	0888823935

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DATA SOURCES: U.S. Geological Survey. Southeast Columbus Quadrangle, Ohio [Map]. Photorevised 1994. 1:24,000. 7.5 Minute Series.

I:\CAD PROJECTS\23935 Closed Loop\Plans\23935_R004_SITE LOC_CLOSED LOOP_FAIRWOOD_OH.dwg

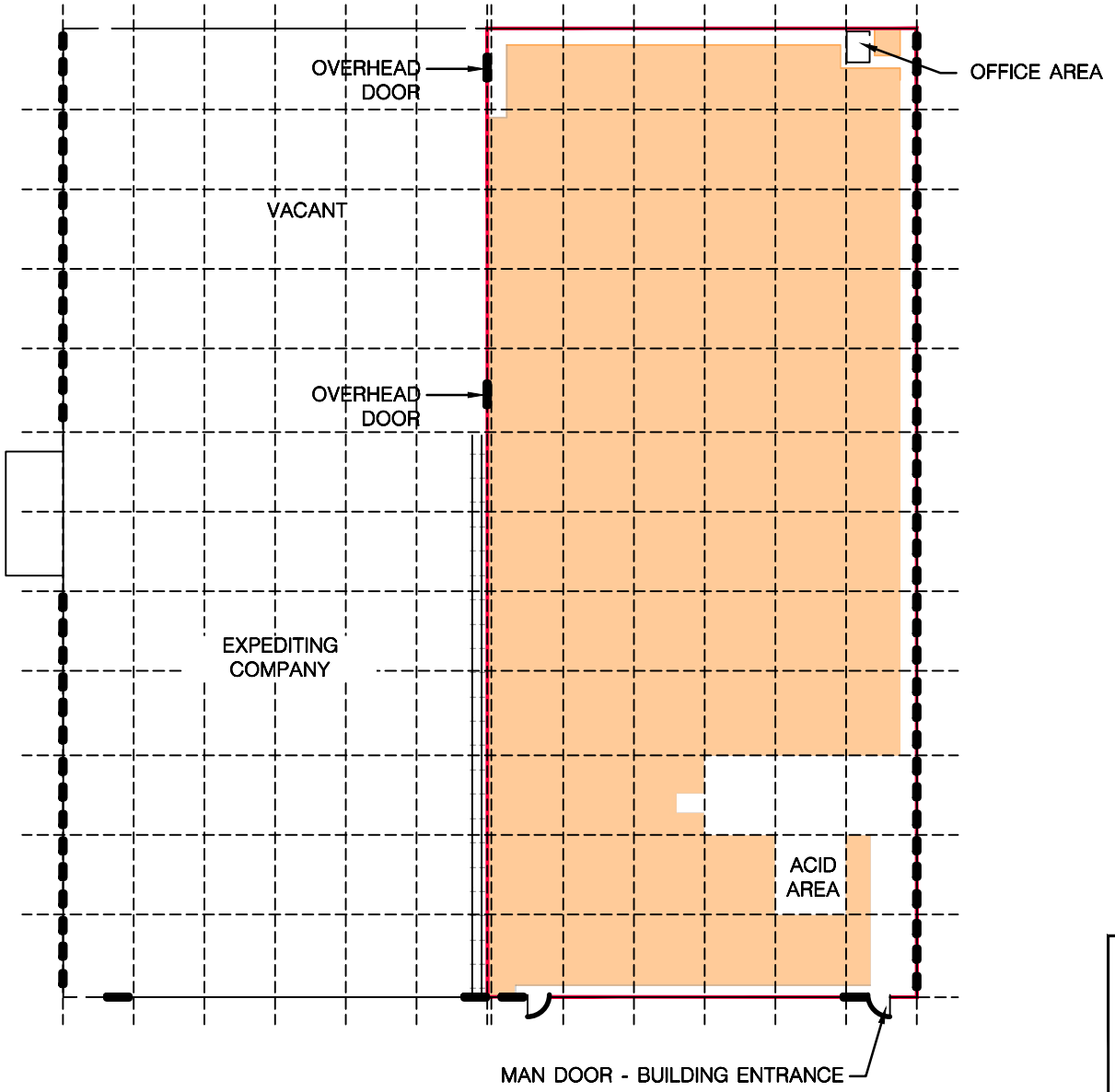

FIGURE 2
SITE LAYOUT MAP
2200 FAIRWOOD AVENUE
COLUMBUS, OHIO

LEGEND
- CLOSED LOOP LEASE SPACE
- CRT - RELATED MATERIALS IN BOXES
- LOADING DOCK DOORS

NAD 1983 STATE PLANE
OHIO SOUTH FEET

0 50 100
SCALE IN FEET

REQUESTED BY:	NB
DRAWN BY:	KMB
DATE:	11/15/2018
PROJECT:	0888823935

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DATA SOURCES: OLYMBEC

I:\CAD PROJECTS\23935 Closed Loop\Plans\23935_B005_SITE LAYOUT_2200 FAIRWOOD_OHIO.dwg

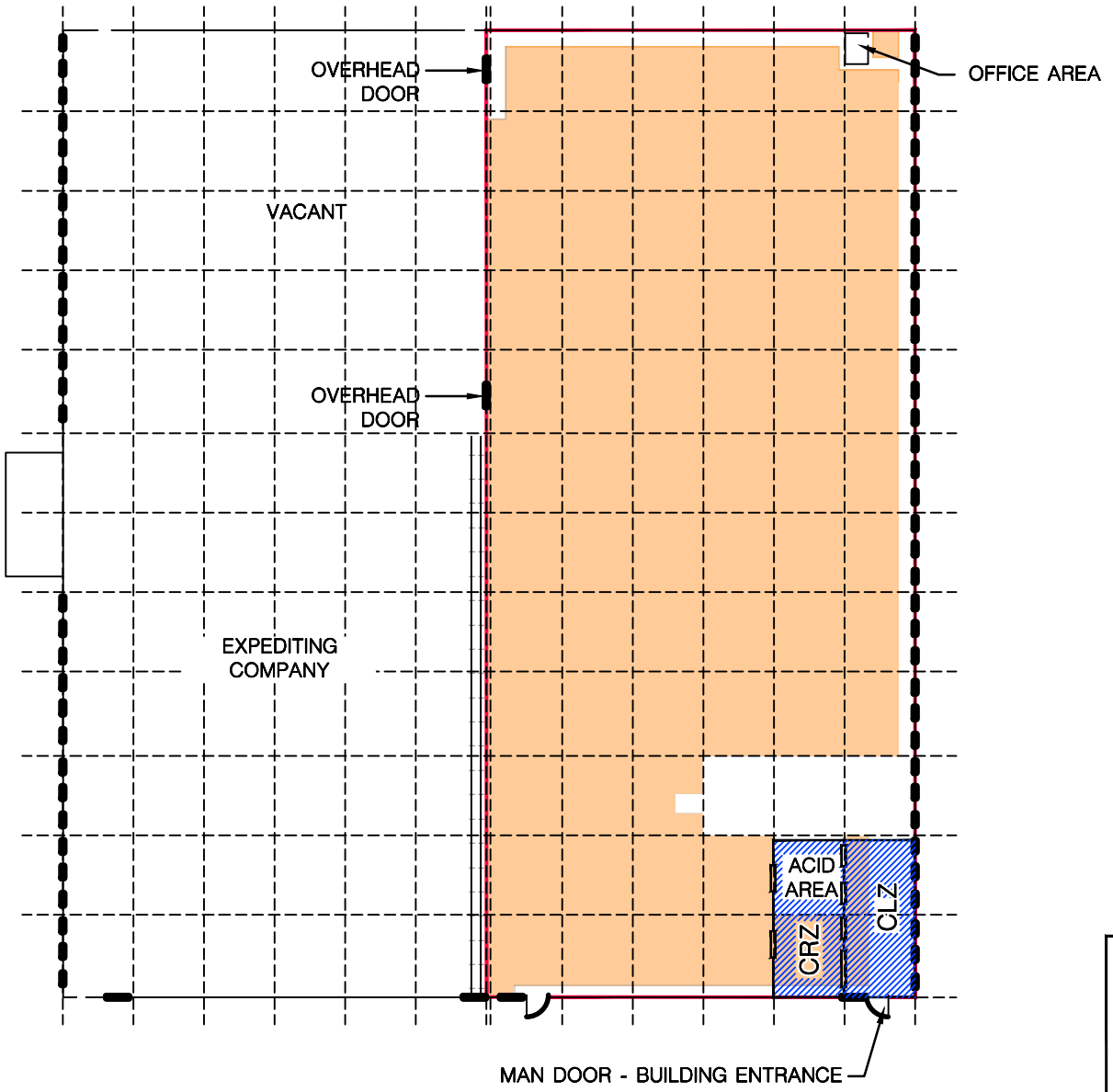

FIGURE 3
CONTAMINATION REDUCTION ZONE MAP
2200 FAIRWOOD AVENUE
COLUMBUS, OHIO

LEGEND
- CLOSED LOOP LEASE SPACE
- CRT - RELATED MATERIALS IN BOXES
- LOADING DOCK DOORS
- DOOR FOR TWO MOTORS WITH CLEAR PVC STRIP CURTAINS

CRZ CONTAMINATION REDUCTION ZONE
CLZ CLEAN LOADING ZONE

CRZ FITTED WITH NEGATIVE AIR MACHINES
INTERIOR OF CRZ AND CLZ TO BE FINISHED WITH PLYWOOD ON BOTTOM 4 FEET
CRZ 40'X80', CLZ SAME DIMENSIONS
PLASTIC CONTAINMENT TO GO TO CEILING

NAD 1983 STATE PLANE
OHIO SOUTH FEET

0 50 100
SCALE IN FEET

REQUESTED BY:	NB
DRAWN BY:	KMB
DATE:	5/19/2020
PROJECT:	0888823935

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DATA SOURCES: OLYMBEC

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Attachment A
Community Relations Plan

COMMUNITY RELATIONS PLAN

CLOSED LOOP REFINING & RECOVERY/CLOSED LOOP GLASS SOLUTIONS
2200 FAIRWOOD AVENUE
COLUMBUS, OHIO 43207

EPA ID NO. OHR000201145

EnSafe Project Number:
0888823935/004

Prepared for:

Olymbec USA LLC
1004 East Brooks Road
Memphis, Tennessee 38116

May 2020

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Cleveland, Ohio 44124
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For additional information, answers to questions, or to join the mailing list, please contact:

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1.0 INTRODUCTION

This Community Relations Plan (CRP) for the Closed Loop Refining & Recovery/Closed Loop Glass Solutions (Closed Loop) facility in Columbus, Ohio (referred to herein as the "subject property" or the "Closed Loop facility") describes a program for establishing community relations during implementation of the Engineering Evaluation/Cost Analysis (EE/CA). The EE/CA was prepared as a component of the Resource Conservation Recovery Act (RCRA) Closure Plan that describes removal actions for this property, as requested by the Ohio Environmental Protection Agency (Ohio EPA). The subject property is currently owned by Olymbec USA LLC (Olymbec). Closed Loop conducted operations at the subject property and accepted electronic waste (e-waste) at the facility from late 2014 through early 2016, when they ceased operations and abandoned the subject property. Closed Loop's principal operations involved the receipt, storage, and disassembling of cathode ray tube (CRT) containing materials. The subject property currently maintains containerized CRT-related materials, CRT demanufacturing areas, and residual lead dust contamination.

Olymbec's goal is to maintain community understanding and support, which are vital for implementing successful environmental activities at the Closed Loop facility. Effective communication and timely exchange of information with the community are essential for the environmental activities to be conducted at the Closed Loop facility. It is important that the Columbus community understand the entire cleanup process and have the opportunity to provide comments on certain proposed actions.

The purpose of this CRP is to outline activities and inform the public of planned or ongoing actions throughout the RCRA closure. It also outlines opportunities for the public to offer valuable input during implementation of removal actions.

The primary objectives of this CRP are to:

- Establish channels for the release of information about activities to the community
- Provide a way for the community to interact with Olymbec
- Assist in resolving issues of public interest and concern

The CRP encourages the involvement of Columbus area residents, as well as representatives from state and local agencies who are active in policy and decision-making processes.

This CRP is organized as follows:

1.0 — Introduction

2.0 — Closed Loop Facility Background

3.0 — Environmental Investigation and Remediation Process

4.0 — Community Background

5.0 — Community Relations Status and Objectives

6.0 — Community Relations Activities and Schedule

2.0 CLOSED LOOP FACILITY BACKGROUND

2.1 Description of the Closed Loop Facility

Closed Loop operated a CRT-related material storage facility within the east portion of the warehouse structure at 2200 Fairwood Avenue in Columbus, Franklin County, Ohio, as shown in Figure 1. This warehouse and the property on which it is situated is surrounded by commercial and industrial properties; a residential neighborhood is approximately 500 feet northwest of the warehouse. The Fairwood Avenue warehouse is a 257,767-square foot structure on a 14.494-acre parcel (Parcel ID: 010-035846), of which Closed Loop leased 130,652 square feet, approximately 50% of the warehouse structure. If this operation had been a legitimate recycling facility, the North American Industry Classification System for Closed Loop would be 42393, which includes recyclable material merchant wholesalers. Figure 2 shows the warehouse layout.

It appears that Closed Loop began operations in the Fairwood Avenue warehouse in late December 2014 and ceased operations/ abandoned the subject property in early 2016. The lease for the subject property was signed by Closed Loop Refining & Recovery. Closed Loop Glass Solutions, which is a related entity, may have operated a CRT glass "washing" process and other operations at the subject property. For the purposes of this EE/CA, both entities (Closed Loop Refining & Recovery and Closed Loop Glass Solutions) will be referred to as "Closed Loop" unless otherwise specified.

During July 2017, EnSafe Inc. performed an industrial hygiene assessment of the Closed Loop facility to evaluate the presence of lead in settled dust. The industrial hygiene assessment included collection of 16 wipe samples and two bulk samples of broken CRT glass, as summarized below:

- Lead was detected in each elevated surface sample ranging from a concentration of 290 micrograms per 100 square centimeters (µg/100 cm^2) to 760 µg/100 cm^2, which exceed the Brookhaven National Laboratory non-lead operation area acceptable surface level criteria (Brookhaven screening criteria) of 40 µg/100 cm^2.

- Lead was detected in each floor sample ranging from 220 µg/100 cm^2 to 750 µg/100 cm^2, which exceed the Brookhaven screening criteria of 40 µg/100 cm^2.

- Two of five wall samples had lead screening values (59 µg/100 cm^2 and 130 µg/100 cm^2) exceeding the Brookhaven screening criteria of 40 µg/100 cm^2.

- The two bulk glass samples contained total lead at concentrations of 3,800 milligrams per kilogram (mg/kg) and 26,000 mg/kg, exceeding the Ohio Voluntary Action Program generic direct-contact residential/commercial child exposure soil standard of 400 mg/kg and the generic direct-contact commercial or industrial land use soil standard of 800 mg/kg.

During July 2017, Stericycle performed a removal action on the Closed Loop CRT-glass "washing" area. Removal activities are documented in Olymbec's January 31, 2018, *Interim Status Report No. 1*. This removal action included the following activities:

- Removal and containerization of hydrofluoric acid from one vat into six 55-gallon drums
- Removal and containerization of solid sludge from a second vat and a 300-gallon tote into eight 55-gallon drums
- Transportation and offsite disposal of drummed hydrofluoric acid (D002), lead-bearing sludge (D008), and two empty hydrofluoric acid drums

There have been no other prior removal actions at the subject property.

During April 2018, DEC Enviro completed an inventory of CRT-related materials stored at the subject property. DEC Enviro's summary of the inventory assessment estimates that the subject property holds approximately 30,917,116 pounds (15,458 tons) of CRT-related materials, as follows:

- Non-processed CRTs (complete units, screens and components)..... 23,528,917 pounds
- CRT crushed glass..... 7,388,200 pounds
- Recyclable plastic, glass, and steel ..... 0 pounds

2.2 Regulatory Framework

This CRP is a component of the EE/CA issued under Section 104 of the Comprehensive Environmental Response, Compensation, and Liability Act and the Superfund Amendments and Reauthorization Act. Section 104 allows an authorized agency to remove the risk of hazardous substances, pollutants, or contaminants at any time, or to take other response measures consistent with the NCP as deemed

necessary to protect public health or welfare and the environment. Olymbec is acting as the lead authority in the implementation of this non-time-critical removal action. The Ohio EPA has the lead role in regulatory oversight for this lead hazard abatement.

The NCP, Title 40 Code of Federal Regulations (CFR) Part 300, provides regulations for implementing Comprehensive Environmental Response, Compensation, and Liability Act and Superfund Amendments and Reauthorization Act, and regulations specific to removal actions. The NCP defines a removal action as:

> *…cleanup or removal of released hazardous substances from the environment, such actions as may be necessary to monitor, assess, and evaluate the threat of release of hazardous substances; the disposal of removed material; or the taking of such other actions as may be necessary to prevent, minimize, or mitigate damage to the public health or welfare or to the environment, which may otherwise result from a release or threat of a release.*

This removal action is non-time-critical due to the availability of a six-month planning period from the time the removal action is determined to be necessary (when Action Memorandum comments are resolved) to the time of initiation of the action. Title 40 CFR Section 300.415 requires the lead agency to conduct an EE/CA when a non-time-critical removal action is planned for a site. Subsection (n) requires that the community be informed of removal actions; this CRP is intended to fulfill the requirements of Title 40 CFR Section 300.415(n).

2.3 Previous Environmental Documentation

Documents that describe historical investigations and interim remedial measures completed at the Closed Loop facility are identified below:

DEC Enviro. *Estimated Quantity*. (excerpted from *Inventory Assessment and Remedial Cost Estimate; Closed Loop Facility, 2200 Fairwood Avenue; Columbus, Ohio*. [2019]).

EnSafe Inc. *Industrial Hygiene Assessment Report; Olymbec USA LLC; 220 Fairwood Avenue; Columbus, Ohio 43207*. (2017).

Ohio Environmental Protection Agency. *Closed Loop Refining and Recovery, Inc.; Notice of Violation; NOV; RCRA C — Hazardous Waste; Franklin County; OHR000167718; Closed Loop Glass*

Solutions, LLC; Notice of Violation; NOV; RCRA C — Hazardous Waste; Franklin County; OHR000201145. (2016)

— *Closed Loop Refining and Recovery; Notice of Violation — NOV; RCRA C — Hazardous Waste; Franklin County; OHR000167718*. (2015).

Olymbec USA LLC. *Interim Site Management Plan; Closed Loop Facility; 2200 Fairwood Avenue; Columbus, Ohio.* (2016).

— *Interim Status Report No. 1*; *Closed Loop Facility; 2200 Fairwood Avenue; Columbus, Ohio.* (2018).

Once State of Ohio COVID-19 Stay-at-Home orders are lifted, copies of reports related to the subject property are available in the Information Repository at the following locations:

Columbus Metropolitan Library
Marion-Franklin Branch
2740 Lockbourne Road
Columbus, Ohio 43207

Ohio Environmental Protection Agency
50 West Town Street, Suite 700
Columbus, Ohio 43215

In the interim, an electronic library has been established at www.ensafe.com/ClosedLoop/Fairwood.

3.0 ENVIRONMENTAL INVESTIGATION AND REMEDIATION PROCESS

CRT-related materials removal will include the physical removal of CRT-related materials from the subject property followed by warehouse decontamination. Removal activities will include:

- Phase I field removal action activities, with offsite transportation and recycling or disposal of non-processed CRT-related materials at authorized facilities.

- Phase II field removal action activities, with offsite transportation and recycling or disposal of non-processed CRT-related materials and processed CRT-glass at authorized facilities.

- Phase III decontamination of the warehouse interior to remove lead-contaminated dust and reduce the potential for impacts to future warehouse users and visitors.

4.0 COMMUNITY BACKGROUND

The Closed Loop facility is in Columbus, Franklin County, Ohio. Columbus is the county seat of, and the largest city within, Franklin County, Ohio, United States. Franklin County encompasses 544 square miles. According to the 2017 census, the estimated population of the county was 1,291,981. Columbus, the state capital, county seat, and largest city in the county has a population of approximately 879,170. The subject property is located within ZIP code 43207, which comprises 23.29 square miles; the 2017 estimated population for ZIP code 43207 is 47,350.

Aerial photographs indicate that the general vicinity of the subject property was utilized for agricultural purposes until at least the 1950s, when areas of residential and commercial development started. By 1959, the Southfield Civic Association (renamed Marion-Franklin Area Civic Association in 1965), was founded to address issues of concern to homeowners.

5.0 COMMUNITY RELATIONS STATUS AND OBJECTIVES

5.1 Community Relations Objectives

The objectives of this CRP are described below.

5.1.1 Objective 1: Citizen Relations

This objective is designed to give residents the opportunity to comment on, and be involved throughout, the decision-making process for planned and ongoing removal actions at the Closed Loop facility. Residents are encouraged to participate in this process because the decisions made will have a long-term effect on their community. Achieving this objective will be accomplished using the following methods:

- Encouraging two-way communication between the community and decision-makers.
- Providing opportunities to receive formal and informal comments from community members on reports and plans and to communicate with individual citizens, area clubs, and groups when needed or requested.
- Placing information, studies, and reports in the Information Repository for public access and use.

5.1.2 Objective 2: Timely Communication

Local residents and facility workers, as well as state and local officials will be informed in a timely manner of major findings, recommendations, project status, and removal activities being conducted at the Closed Loop facility. Information will also be provided on additional actions under consideration and the reasons for those actions. Achieving this objective will be accomplished using the following methods:

- Maintaining a mailing list of local, state, and federal officials, and other interested individuals and groups. Additions to the mailing list will be made by contacting the Olymbec point of contact at 216-485-3221 or nbaker@ensafe.com.
- Making a copy of the closure plan available at www.ensafe.com/ClosedLoop/Fairwood.
- Providing a copy of the closure plan to the Ohio EPA's Central District Office and to a local public repository where copies of the plan can be made once COVID-19 restrictions are lifted.

- Announcing the availability of the closure plan and any public meetings (either in-person or virtual) through advertisements in The Columbus Dispatch newspaper, which is a newspaper of general circulation in the county in which the facility is located.

- Providing information about the public comment period to the Ohio EPA's Central District Office.

- Circulating fact sheets to the community when further detail is requested.

- Reviewing and responding to substantive comments received.

5.1.3 Objective 3: Conflict Resolution

Olymbec will focus on and resolve conflicts as they arise by using the following methods.

- Identifying conflict and develop a forum, if needed, for resolution

- Providing a forum, such as a public meeting, for community members to voice questions and concerns directly to decision-makers

- Providing experts to address questions about environmental response actions and alternatives

5.2 Status of Community Relations Activities

A number of community relations activities have been completed and are listed below.

5.2.1 Information Repositories

Once State of Ohio COVID-19 Stay-at-Home orders are lifted, information Repositories will be established and located at the addresses below.

Columbus Metropolitan Library
Marion-Franklin Branch
2740 Lockbourne Road
Columbus, Ohio 43207

Ohio Environmental Protection Agency
50 West Town Street, Suite 700
Columbus, Ohio 43215

Documents related to remedial activities at the Closed Loop facility are available to the public at these repositories and constitute the Administrative Record File for the project. The Administrative Record

File contains technical reports, findings, and other documents and correspondence specific to the subject property.

In the interim, an electronic library has been established at www.ensafe.com/ClosedLoop/Fairwood.

5.2.2 Mailing List

A mailing list of interested parties is maintained by Olymbec as Appendix A. Documents, such as fact sheets providing current information about site activities and meeting announcements, are mailed to everyone on the mailing list. Individuals may be added to the mailing list by contacting the Olymbec point of contact.

5.2.3 Public Notices

Public notices are published in The Columbus Dispatch newspaper to announce public meetings.

5.2.4 Public Meetings

Meetings (either in-person or virtual) will be scheduled if requested by citizens, local officials, or state officials. The location of such meetings will be announced in the public notices published per Section 5.2.3.

6.0 COMMUNITY RELATIONS ACTIVITIES AND SCHEDULE

All communication activities are designed to provide the public with current information and the opportunity for input during each phase of the environmental program and restoration. Community relations activities and their relationship to various stages of the environmental restoration program are described below.

Table 6-1
Community Relations Activities for Removal Actions

Cleanup Program Stage	Activities
Prior to Phase I and II Removal Actions	• Establish and public notice the availability of the Information Repository and Administrative Record File. Establish mailing list. • Designate community relations spokesperson. • Conduct community interviews. • Develop a CRP (this document). • Public notice the Closure Plan, EE/CA, and supporting documentation. The notice must describe the preferred alternative and the EE/CA results. • Provide for a 30-day comment period. • Prepare written response to significant public comments on Closure Plan and EE/CA. • Establish contact with local officials and community leaders to provide them with information about planned removal actions and to monitor community concerns.
During Phase I and II Removal Actions	• In the event of any significant changes to the RCRA Closure Plan, publish a notice in *The Columbus Dispatch* newspaper • Continue to update the community through the Information Repository and through public meetings, if requested • Fact sheets if applicable to provide further detail
During Phase III Building Decontamination	• In the event of any significant changes to the RCRA Closure Plan, publish a notice in *The Columbus Dispatch* newspaper • Continue to update the community through the Information Repository and through public meetings if requested • Fact sheets if applicable to provide further detail
Upon Completion of Building Decontamination	• Update Information Repository, as necessary.

Notes:
CRP = Community Relations Plan
EE/CA = Engineering Evaluation/Cost Analysis
RCRA = Resource Conservation Recovery Act

The steps outlined above are designed to achieve effective communication and a timely exchange of information with the public. Olymbec will monitor community responses to environmental activities and update this document as required. If necessary, additional interviews will be conducted with area residents and other affected parties and the results from these interviews will be included in updates to this CRP.

7.0 REFERENCES

DEC Enviro. *Estimated Quantity*. (excerpted from *Inventory Assessment and Remedial Cost Estimate; Closed Loop Facility, 2200 Fairwood Avenue; Columbus, Ohio*. [2019]).

EnSafe Inc. *Industrial Hygiene Assessment Report; Olymbec USA LLC; 220 Fairwood Avenue; Columbus, Ohio 43207*. 525 Vine Street Suite 1755; Cincinnati, Ohio. (2017).

Ohio Environmental Protection Agency. *Closed Loop Refining and Recovery, Inc.; Notice of Violation; NOV; RCRA C — Hazardous Waste; Franklin County; OHR000167718; Closed Loop Glass Solutions, LLC; Notice of Violation; NOV; RCRA C — Hazardous Waste; Franklin County; OHR000201145.* (2016)

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Olymbec USA LLC. *Interim Site Management Plan; Closed Loop Facility; 2200 Fairwood Avenue; Columbus, Ohio.* (2016).

— *Interim Status Report No. 1*; *Closed Loop Facility; 2200 Fairwood Avenue; Columbus, Ohio.* (2018).

U.S. Census Bureau. Census Information for ZIP Code 43207. Retrieved from: https://factfinder.census.gov/faces/affhelp/jsf/pages/geography.xhtml?lang=en&code=860&name=ZCTA5%2043207&src=geoAssist&log=t

FIGURES

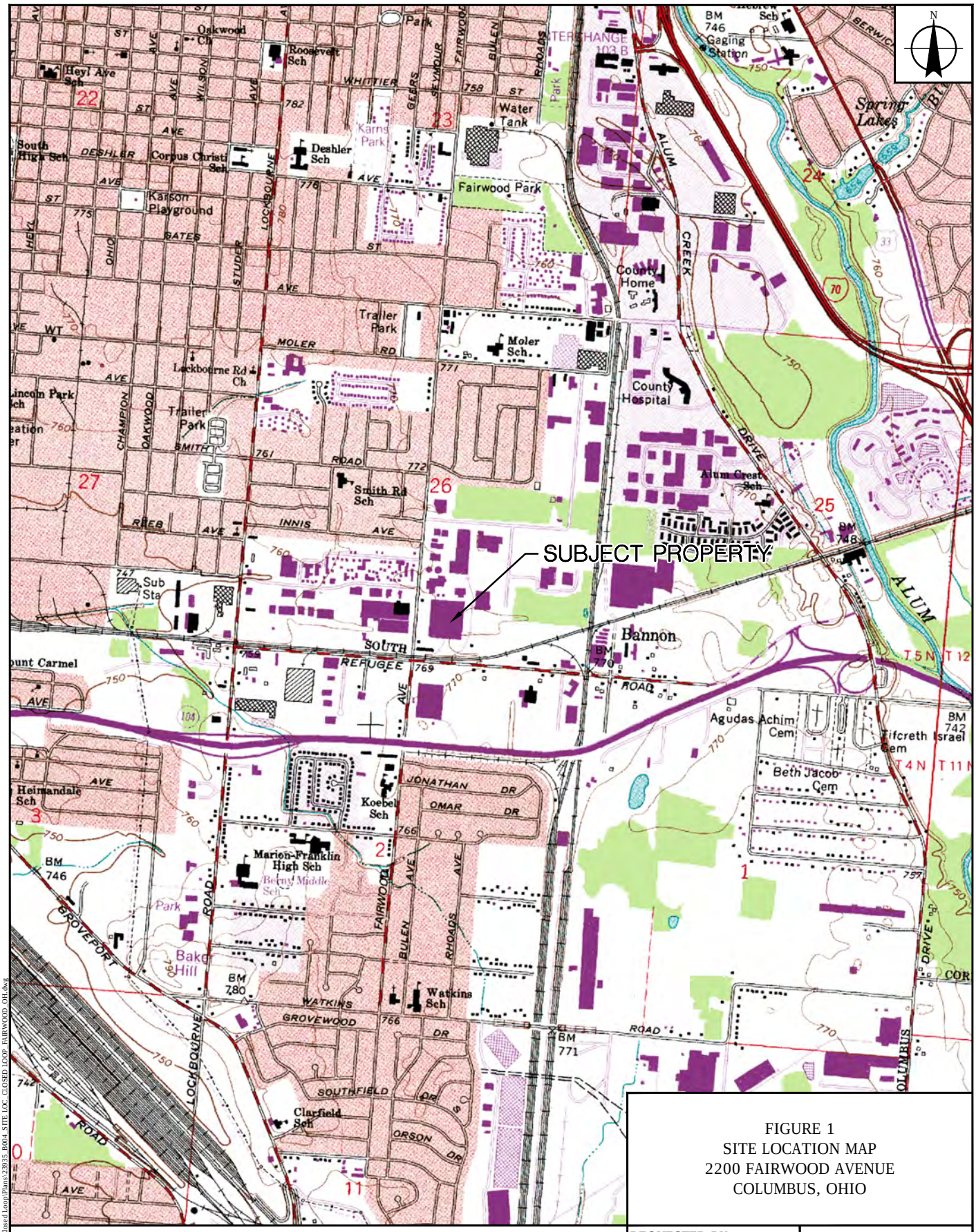

FIGURE 1
SITE LOCATION MAP
2200 FAIRWOOD AVENUE
COLUMBUS, OHIO

NAD 1983 STATE PLANE
UTM 17 NORTH

0 1,000 2,000
SCALE IN FEET

REQUESTED BY:	NB
DRAWN BY:	KMB
DATE:	11/14/2018
PROJECT:	0888823935

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DATA SOURCES: U.S. Geological Survey. Southeast Columbus Quadrangle, Ohio [Map]. Photorevised 1994. 1:24,000. 7.5 Minute Series.

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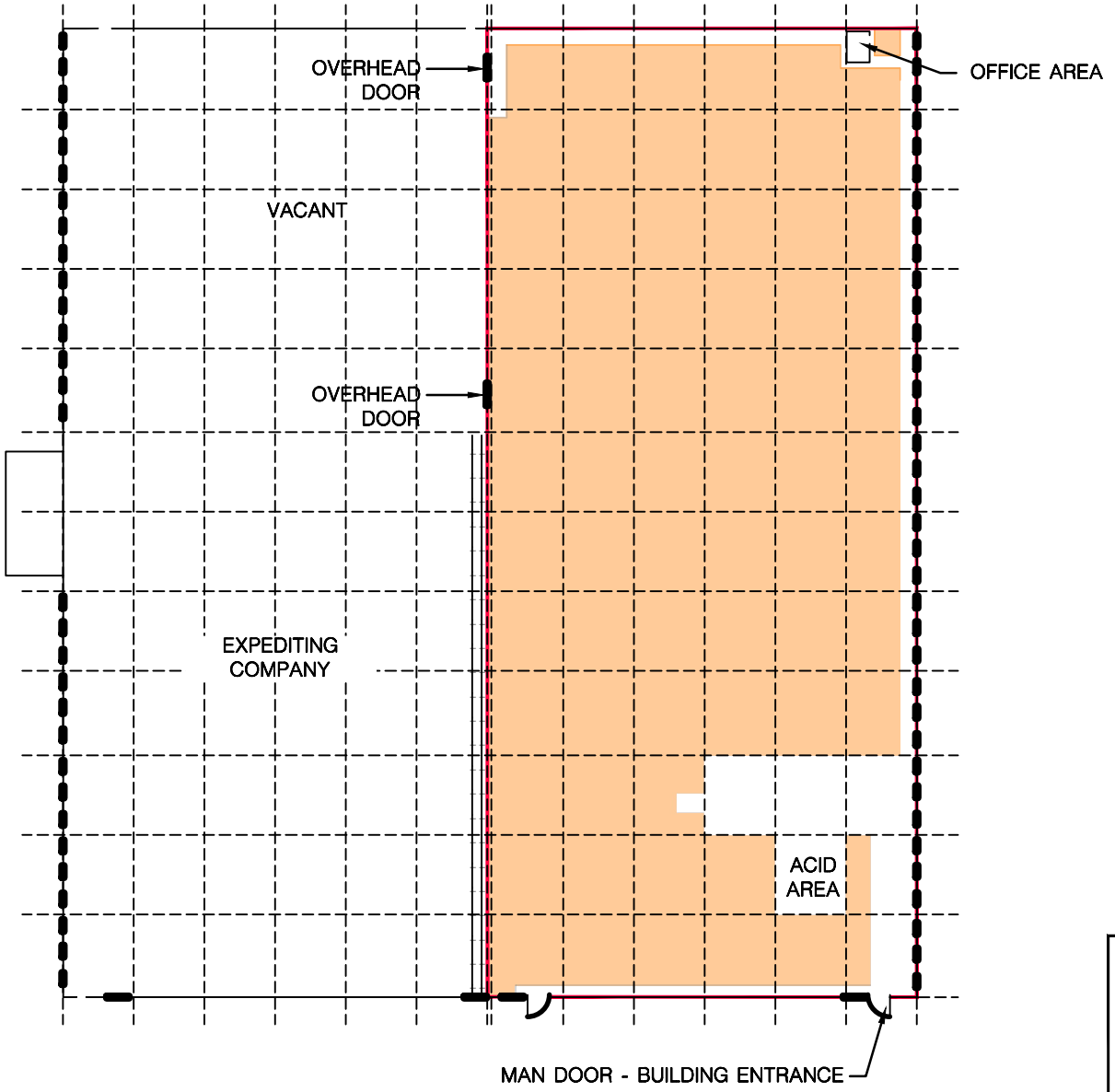

FIGURE 2
SITE LAYOUT MAP
2200 FAIRWOOD AVENUE
COLUMBUS, OHIO

LEGEND
- CLOSED LOOP LEASE SPACE
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- LOADING DOCK DOORS

NAD 1983 STATE PLANE
OHIO SOUTH FEET

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I:\CAD PROJECTS\23935 Closed Loop\Plans\23935_B005_SITE LAYOUT_2200 FAIRWOOD_OHIO.dwg

Appendix A
Community Mailing List
(To Be Expanded As Needed)

LOCAL OFFICIALS

Andrew J. Ginther
Mayor, City of Columbus
City Hall, 2nd Floor
90 West Broad Street
Columbus, Ohio 43215

Columbus Division of Fire
c/o Prevention Inspector 23 James Kennard
3639 Parsons Avenue
Columbus, Ohio 43207

Darrel Koerber, Deputy Director
Franklin County Emergency Management & Homeland Security
5300 Strawberry Farms Blvd.
Columbus, OH 43230-1049

Far South Columbus Area Commission
Neighborhood Liaison: Beth Fairman Kinney
280 Reeb Avenue
Columbus, Ohio 43207

Marion Franklin Civic Association
President: Robert Patterson
2664 Diane Place
Columbus, Ohio 43207

Alum Crest Acres Civic Association
President: Eileen Neale
2488 Liston Avenue
Columbus, Ohio 43207

Columbus Southside Area Commission
Neighborhood Liaison: Beth Fairman Kinney
280 Reeb Avenue
Columbus, Ohio 43207

Innis Gardens Village Civic Association
President: Brenda Cummings
1365 Eldoran Drive
Columbus, Ohio 43207

STATE OFFICIALS

Melissa Storch
Environmental Manager, Division of Environmental Response and Revitalization
50 West Town Street, Suite 700
Columbus, Ohio 43215

Andy Maneff
Environmental Specialist, Division of Environmental Response and Revitalization
50 West Town Street, Suite 700
Columbus, Ohio 43215

Attachment B
ARARS

Table B-1
Chemical-Specific ARARs

Action / Media	Requirement	Prerequisite	Citation(s)	Requirement Met In This Section
Permissible Exposure Limit: Employee Exposure to Lead	No employee shall be exposed to lead at concentrations greater than fifty micrograms per cubic meter of air (50 µg/m^3) averaged over an 8-hour period. When respirators are used to supplement engineering and work practice controls to comply with the PEL, employee exposure may be considered to be at the level provided by the protection factor of the respirator for those periods the respirator is worn.	If an employee is potentially exposed to surfaces or ambient conditions within the subject property this is **Applicable.**	29 CFR 1910.1025(c)(1-3) (*Lead Rule*)	Section 3.1 of the Health and Safety Plan (HASP)
Medical Surveillance Blood Lead Level Monitoring	Blood lead level shall be maintained below 40 µg/100 g of whole blood	If an employee is potentially exposed to surfaces or ambient conditions within the subject property this is **Applicable.**	29 CFR 1910.1025(j)(2) (*Lead Rule*)	Section 6.2 of the HASP
Closure Performance Standard	Decontamination activities (High Pressure Water Spray) will be performed to a "clean debris surface."	For warehouse structural elements where hand wiping with solvent-soaked launderable wipes cleaning is performed, this is **Applicable**.	OAC 3745-270-45 Treatment standards for hazardous debris. Table 1: Alternative Treatment Standards for Hazardous Debris	Section 11.3.2 of the Closure Plan
	Decontamination activities (High Pressure Water Spray) will be performed to a "clean debris surface."	For warehouse components (e.g., walls, floors, and structural elements) where high pressure water spray cleaning is performed, this is **Applicable**.	OAC 3745-270-45 Treatment standards for hazardous debris. Table 1: Alternative Treatment Standards for Hazardous Debris	Section 11.3.3 of the Closure Plan

Table B-2
Location-Specific ARARs

Action / Media	Requirement	Prerequisite	Citations	Requirement Met In This Section
Discharge of wastewater to local publicly owned treatment works	No person shall discharge, or cause to be discharged, directly or indirectly... any discharge containing toxic or poisonous substances in sufficient quantities to constitute a hazard to human beings or animals, or to create any hazard in the receiving waters... and/or any discharge of hazardous wastes as defined by RCRA, to a sanitary sewer, combined sewer or at a designated trucked waste disposal site.	If wastewater generated during CRT-related material removal or during building decontamination is discharged to the City of Columbus sewer system this is **Applicable.**	City of Columbus City Codes, Title 11, Chapter 1145.20 (*Water, Sewer, and Electricity Code — Prohibited Discharges*).	Section 9.2 of the Closure Plan

Table B-3
Action-Specific ARARs

Action / Media	Requirement	Prerequisite	Citation(s)	Requirement Met In This Section
Prohibited discharges to publicly owned treatment works	No industrial user shall discharge any pollutant in violation of applicable pretreatment standards.	If wastewater generated during CRT-related material removal or during building decontamination is discharged to the City of Columbus sewer system this is **Applicable.**	OAC 3745-3-04(A,C) (*Prohibited Discharges*)	Section 9.2 of the Closure Plan
Emissions restrictions for fugitive dusts	No person shall cause or permit any fugitive dust source to be operated; or any materials to be handled, transported, or stored; or a building or its appurtenances or a road to be used, constructed, altered, repaired, or demolished without taking or installing reasonably available control measures to prevent fugitive dust from becoming airborne.	If fugitive dusts emissions (non-stack) are uncontrolled, this is **Applicable.**	OAC 3745-17-08(B) (*Restriction of Emission of Fugitive Dust*)	Section 9.1 of the Closure Plan
Standards for asbestos waste handling	The part of the facility where a demolition or renovation operation will occur shall be thoroughly inspected by a certified asbestos hazard evaluation specialist, in accordance with Ohio Administrative Code (OAC) 3745-22-02(C) prior to the commencement of the demolition or renovation for the presence of asbestos, including category I and category II nonfriable asbestos-containing material.	If demolition of building materials will occur, this is **Applicable.**	OAC 3745-20-02 (*Standard for Demolition and Renovation, Facility Inspection, and Determination of Applicability*)	Prior to conducting demolition, building materials will be evaluated. No demoliton or building renovation is anticipated.
	Notice of intention to demolish or renovate shall be provided on a form and in manner prescribed by the director at least 10 working days before the beginning of any demolition operation, asbestos stripping or removal work, or any other activity including salvage activities and preparations that break up, dislodge or similarly disturb asbestos material.	If asbestos containing materials are identified in site building materials that will be demolished this is **Applicable.**	OAC 3745-20-03 (*Standard for Notification Prior to Demolition or Renovation*)	
	All regulated asbestos-containing material shall be removed from a facility being demolished or renovated before any activity begins that would break up, dislodge, or similarly disturb the materials or preclude access to the materials for subsequent removal in accordance with the procedures of OAC 3745-20-04.	If asbestos containing materials are identified in site building materials that will be demolished this is **Applicable.**	OAC 3745-20-04 (*Demolition and Renovation Procedures for Asbestos Emission Control*)	
	All asbestos-containing waste material shall be deposited as soon as is practical by the waste generator at an approved waste disposal site.	If asbestos containing materials are identified in site building materials that will be demolished this is **Applicable.**	OAC 3745-20-05 (*Standard for Asbestos Waste Handling*)	
Scrap metal recycling	Scrap metal is excluded from solid waste and hazardous waste regulations when recycling is used as final disposal.	If scrap metal is recycled as part of final disposition this is **Applicable**.	OAC 3745-51-06 (A)(3)(b) (*Requirements for Recyclable Materials*)	Section 11.2 of the Closure Plan
Recycling CRTs	Used, broken cathode ray tubes (CRTs) are not wastes if the CRTs are stored in a building with a roof, floor, and walls or placed in a container (i.e., a package or a vehicle) that is constructed, filled, and closed to minimize releases to the environment of CRT glass (including fine solid materials). Each container in which the used, broken CRT is contained shall be labeled or marked clearly with one of the following phrases: "Used cathode ray tubes- contain leaded glass" or "Leaded glass from televisions or computers." The container also shall be labeled "Do not mix with other glass materials." The used, broken CRTs shall be transported in an appropriate container that is properly labeled. Glass from used CRTs that is destined for recycling at a CRT glass manufacturer or a lead smelter after processing is not a waste unless such glass is "accumulated speculatively" as defined in OAC 3745-51-01(C)(8). Glass from used CRTs that is used in a manner constituting disposal shall comply with OAC 3745-266-20 to 3745-266-23 instead of this rule.	If used or broken CRTs are recycled this is **Applicable**.	OAC 3745-51-39(A)(1-4) (*Conditional Exclusion for Used, Broken CRTs and Processed CRT Glass Undergoing Recycling*)	Sections 7.2.3 and 7.2.4 of the Closure Plan
Exporting used CRTs for Recycling	Exporters of used, broken CRTs shall notify U.S. Environmental Protection Agency (EPA) of an intended export before the CRTs are scheduled to leave the United States, and shall comply with the notification requirements in 40 CFR §261.39(a)(5)(i) to (a)(5)(xi).	If used CRTs will be exported for recycling this is **Applicable**.	OAC 3745-51-39(A)(5) (*Conditional Exclusion for Used, Broken CRTs and Processed CRT Glass Undergoing Recycling*)	Sections 7.2.4 and 7.2.5 of the Closure Plan. Processed CRT glass may be shipped to to Canada and Korea per approved permits for recyclying. Export for recycling will comply with these rules.
	Used, intact cathode ray tubes (CRTs) exported for recycling are not wastes if such CRTs meet the notice and consent conditions of 40 CFR §261.39(a)(5), and if such CRTs are not "accumulated speculatively" as defined in OAC 3745-51-01(C)(8).	If used CRTs will be exported for recycling this is **Applicable**.	OAC 3745-51-40 (*Conditional Exclusion for Used, Intact CRTs Exported for Recyclin*g)	
	Any person wanting to export used, intact cathode ray tubes (CRTs) to a foreign country shall comply with 40 CFR §261.41.	If used CRTs will be exported for recycling this is **Applicable**.	OAC 3745-51-41 (*Notification and Recordkeeping for Used, Intact CRTs Exported for Reuse*)	

Table B-3
Action-Specific ARARs

Action / Media	Requirement	Prerequisite	Citation(s)	Requirement Met In This Section
Characterization of solid waste	A person who generates a solid waste, as defined in OAC 3745-51-02, must determine if that waste is a hazardous waste using the following method: a) first determine if the waste is excluded from regulation under OAC 3745-51-04; b) determine if the waste is listed as a hazardous waste under OAC 3745-51-30 to 3745-51-35; c) determine if the waste is identified under OAC 3745-51-20 to 3745-51-24 by either (1) testing in accordance with methods in 40 CFR §261 or (2) applying knowledge of the hazard characteristic of the waste in light of the materials or processes used.	If solid waste is to be discarded offsite this is **Applicable**.	OAC 3745-52-11(A-C) (*Hazardous Waste Determination*)	Sections 11.0 and 13.0 of the Closure Plan
	If the solid waste is determined to be hazardous, refer to OAC 3745-51, 3745-54 to 3745-57, 3745-65 to 3745-69, 3745-205, 3745-256, 3745-266, 3745-270, and 3745-273 for possible exclusions or restrictions pertaining to management of the specific waste.	If solid waste is determined to be hazardous waste this is **Applicable**.	OAC 3745-52-11(D) (*Hazardous Waste Determination*)	Section 11.0 of the Closure Plan
Disposal of solid waste	Establishes allowable methods of solid waste disposal; sanitary landfill incineration, composting. Prohibits management of solid wastes by open burning and open dumping.	If solid waste is disposed offsite this is **Applicable.**	OAC 3745-27-05 (*Hazardous Waste Determination*)	Section 7.2.5 of the Closure Plan
Contents of Closure Plan	The closure plan shall identify steps necessary to perform partial or final closure of the facility at any point during the active life of the facility in accordance with OAC 3745-66-11.	If a closure plan is created this is **Applicable**	OAC 3745-66-12 (*Closure plan and amendment of closure plan*)	Closure Plan complies with this requirement
Decontamination of equipment	During the partial and final closure periods, all contaminated equipment, structures, and soil must be properly disposed of, or decontaminated, unless otherwise specified in rule 3745-66-97, 3745-67-28, 3745-67-58, 3745-67-80, or 3745-68-10 of the Administrative Code.	If equipment is decontaminated this is **Applicable**	OAC 3745-66-14 (*Disposal or decontamination of equipment, structures and soils*)	Section 11.0 of the Closure Plan and Sections 10.1 and 10.3 of the HASP
Hazardous waste generator ID	A generator must not store, treat, dispose, or transport hazardous wastes without a generator number	If hazardous waste is generated this is **Applicable.**	OAC 3745-52-12 (*Generator Identification Number*)	Existing Closed-Loop generator identification number will be used.
Onsite transportation of hazardous waste	The manifesting requirements of OAC 3745-52-20 to 3745-52-57 and OAC 3745-52-32(B) do not apply to the transport of hazardous wastes on a public or private right-of-way within or along the border of contiguous property under the control of the same person, even if such contiguous property is divided by a public or private right-of-way.	If transporting hazardous waste between contiguous property, this is **Applicable**.	OAC 3745-52-20(F) (*General Requirements*)	This rule will apply when moving hazardous waste onsite between the two properties
Offsite transportation of hazardous waste	A generator who transports, or offers for transport a hazardous waste for offsite treatment, storage, or disposal must prepare a manifest ("OMB" control number 2050-0039) on U.S. EPA form 8700-22, and if necessary, U.S. EPA form 8700-22A (the continuation sheet), according to the instructions included in the appendix to OAC 3745-52. The generator must designate one facility which is permitted to handle the waste described on the manifest	If initiating shipment of hazardous waste offsite this is **Applicable**.	OAC 3745-52-20 (*Manifest - General Requirements*)	Hazardous waste management will comply with these rules.
	The manifest shall consist of at least the number of copies which will provide the generator, each transporter, and the owner or operator of the designated facility with one copy each for their records and another copy to be returned to the generator.	If initiating shipment of hazardous waste offsite this is **Applicable**.	OAC 3745-52-22 (*Manifest - Number of Copies*)	
	The generator shall sign the manifest certification by hand, obtain the handwritten signature of the initial transporter and date of acceptance on the manifest, and retain one copy, in accordance with OAC 3745-52-40(A). The generator shall give the transporter the remaining copies of the manifest.	If initiating shipment of hazardous waste offsite this is **Applicable**.	OAC 3745-52-23 (*Use of the Manifest*)	
	A generator who initiates a shipment of hazardous waste must certify to one of the waste minimization statements in item 15 of the uniform hazardous waste manifest.	If initiating shipment of hazardous waste offsite this is **Applicable**.	OAC 3745-52-27 (*Waste Minimization Certification*)	
	Before transporting hazardous wastes or offering hazardous wastes for transportation off-site, the generator shall package the waste in accordance with the applicable U.S. Department of Transportation (DOT) regulations on packaging, under 49 CFR §173, 49 CFR §178, and 49 CFR §179.	If initiating shipment of hazardous waste offsite this is **Applicable**.	OAC 3745-52-30 (*Packaging*)	
	Before transporting hazardous wastes or offering hazardous wastes for transportation off-site, the generator shall label each package of hazardous waste in accordance with the applicable U.S. DOT regulations on hazardous materials under 49 CFR §172.	If initiating shipment of hazardous waste offsite this is **Applicable**.	OAC 3745-52-31 (*Labeling*)	

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Action-Specific ARARs

Action / Media	Requirement	Prerequisite	Citation(s)	Requirement Met In This Section
Offsite transportation of hazardous waste (cont'd)	Before transporting hazardous wastes or offering hazardous wastes for transportation off-site, the generator must mark each package of hazardous wastes in accordance with the applicable U.S. DOT regulations on hazardous materials under 49 CFR §172. A generator must also mark each container of 119 gallons or less used in such transportation with the following words and information displayed in accordance with the requirements of 49 CFR 172.304: "Hazardous waste — Federal law prohibits improper disposal. If found, contact the nearest police or public safety authority, or the U.S. Environmental Protection Agency. Closed Loop 2200 Fairwood Avenue, Columbus, Ohio; OHR000201145; Manifest Document Number_____."	If initiating shipment of hazardous waste offsite this is **Applicable**.	OAC 3745-52-32 (*Marking*)	Hazardous waste management will comply with these rules.
	Before transporting hazardous wastes or offering hazardous wastes for transportation off-site, a generator must placard or offer the initial transporter the appropriate placards according to U.S. DOT regulations for hazardous materials under 49 CFR §172 Subpart F.	If initiating shipment of hazardous waste offsite this is **Applicable**.	OAC 3745-52-33 (*Placarding*)	
Temporary storage of hazardous waste onsite	A (*large quantity*) generator who generates greater than 1,000 kilograms of hazardous waste (1 quart of acutely hazardous waste) in a calendar month may, for 90 days or less accumulate or conduct treatment of hazardous waste that is generated on-site without an Ohio hazardous waste permit, provided that the generator complies with the remaining requirements of OAC 3745-52-34(A, B), as applicable.	If a generator generates greater than 1,000 kilograms of hazardous waste in a calendar month this is **Applicable**.	OAC 3745-52-34(A)(1)(a), (A)(2), (A)(3) (*Accumulation Time of Hazardous Waste*)	Temporary storage of newly generated hazardous waste will comply with these rules. It should be noted that existing materials in the warehouses have conditional exclusion for used Cathode Ray Tubes per OAC 3745 51 38.
	A generator may accumulate as much as 55 gallons of hazardous waste (1 quart of acutely hazardous waste) in containers at or near any point of generation where wastes initially accumulate, which is under the control of the operator of the process generating the waste provided the generator complies with OAC 3745-66-71, 3745-66-72, and 3745-66-73(A) and marks the containers either with the words "Hazardous Waste" or with other words that identify the contents of the containers. A generator who accumulates hazardous waste in excess of 55 gallons at or near any point of generation shall, with respect to that amount of excess waste, within 3 days move the waste to a hazardous waste storage area and mark the container holding the excess accumulation of hazardous waste with the date the excess amount began accumulating.	If a generator operates a satellite accumulation area this is **Applicable**.	OAC 3745-52-34(C) (*Accumulation Time of Hazardous Waste*)	
	A (*small quantity*) generator who generates greater than 100 kilograms but less than 1,000 kilograms of hazardous waste in a calendar month may, for 180 days or less, accumulate or conduct treatment of hazardous waste that is generated on-site without an Ohio hazardous waste permit, provided that the quantity of waste accumulated on-site never exceeds 6,000 kilograms; and the generator complies with the remaining requirements of OAC 3745-52-34(D, E, and F).	If a generator generates greater than 100 kilograms but less than 1,000 kilograms of hazardous waste in a calendar month this is **Applicable**.	OAC 3745-52-34(D) (*Accumulation Time of Hazardous Waste*)	
Hazardous waste recordkeeping	A small-quantity generator must keep the following records for a period of 3 years: a copy of each manifest; a copy of each land-disposal restriction notification; a copy of any exception reports; and records of any test results, waste analyses, or other waste determinations. A large quantity generator must retain the same records and also retain copies of training records and biennial reports.	If initiating shipment of hazardous waste offsite this is **Applicable**.	OAC 3745-52-40 (*Recordkeeping*)	Hazardous waste records will be maintained in accordance with this rule. Copies of these records will be included in the Project Completion Report.
Hazardous waste biennial report	A generator who ships any hazardous waste off-site shall prepare and submit to Ohio EPA the "Hazardous Waste Biennial Report" by March first of each even numbered year. The generator shall prepare the "Hazardous Waste Biennial Report" using Ohio EPA forms EPA 9027, EPA 9028, and EPA 9029 provided by the director upon the request of the generator.	If a generator is a large quantity generator of hazardous waste in any odd-numbered calendar year month this is **Applicable**.	OAC 3745-52-41 (*Biennial Report-Generator Standards*)	If hazardous wastes are removed in an odd-numbered year, a Hazardous Waste Biennial Report will be prepared and submitted in accordance with this rule.
Hazardous waste exception reporting	A large quantity generator of hazardous waste in a calendar month who does not receive a copy of the manifest with the handwritten signature of the owner or operator of the designated facility within 35 days after the date the waste was accepted by the initial transporter, must contact the transporter and/or the owner or operator of the designated facility to determine the status of the hazardous waste. An exception report must be submitted to Ohio EPA if a copy of the manifest with the handwritten signature of the owner or operator of the designated facility is not received within within 45 days after the date the waste was accepted by the initial transporter.	If initiating shipment of hazardous waste offsite as a large quantity generator of hazardous waste this is **Applicable**.	OAC 3745-52-42(A) (*Exception Report*)	If an exception report is necessary, it will be developed in accordance with these rules.

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Action / Media	Requirement	Prerequisite	Citation(s)	Requirement Met In This Section
Hazardous waste exception reporting (cont'd)	A small quantity generator of hazardous waste in a calendar month who does not receive a copy of the manifest with the handwritten signature of the owner or operator of the designated facility within 60 after the date the waste was accepted by the initial transporter must submit to Ohio EPA a legible copy of the manifest, with some indication that the generator has not received confirmation of delivery. [Comment: The submittal to Ohio EPA need only be a legible handwritten or typed note on the manifest itself, or on an attached sheet of paper, stating that the return copy was not received.]	If initiating shipment of hazardous waste offsite as a small quantity generator of hazardous waste this is **Applicable**.	OAC 3745-52-42(B) (*Exception Report*)	If an exception report is necessary, it will be developed in accordance with these rules.
Characterization of hazardous waste	Must obtain a detailed chemical and physical analysis of a representative sample of the wastes. At a minimum, the analysis must contain all the information which must be known to treat, store, or dispose of the waste in accordance with OAC 3745-65 to 3745-69, 3745-256, and 3745-270.	If hazardous waste treatment, storage, or disposal is occurring this is **Applicable**.	3745-65-13(A) (*General Waste Analysis*)	Section 2.1 of the Sampling and Analysis Plan
Hazardous waste personnel training requirements	Facility personnel shall successfully complete a program of classroom instruction or on-the-job training that ensures facility personnel are able to respond effectively to emergencies by familiarizing facility personnel with emergency procedures, emergency equipment, and emergency systems, including, where applicable: procedures for using, inspecting, repairing, and replacing facility emergency and monitoring equipment; communications or alarm systems; response to fires or explosions; and shutdown of operations. Facility personnel shall successfully complete the training program within 6 months after assignment to the facility, or to a new position at a facility, whichever is later and shall take part in an annual review of the initial training during each period from January 1 to December 31 and within 15 months after the previous review. Training records that document that the training or job experience has been given to, and completed by, facility personnel shall be kept for at least 3 years from the date the employee last worked at the facility.	If hazardous waste treatment, storage, or disposal is occurring this is **Applicable**.	3745-65-16 (*Personnel Training*)	Field personnel will comply with training requirements in accordance with this rule before the start of closure activities. Training records will be maintained in accordance with this rule and copies will be maintainained by contractors performing removal actions.
Hazardous waste facility required equipment	All facilities shall be equipped with an internal communications or alarm system capable of providing immediate emergency instruction (voice or signal) to facility personnel; a device, such as a telephone (immediately available at the scene of operations) or a hand-held two-way radio, capable of summoning emergency assistance from local police departments, fire departments, or local or Ohio EPA emergency response teams; portable fire extinguishers, fire control equipment, spill control equipment, and decontamination equipment; and water at adequate volume and pressure to supply water hose streams, or foam producing equipment, or automatic sprinklers, or water spray systems.	If hazardous waste treatment, storage, or disposal is occurring this is **Applicable**.	3745-65-32 (*Required Equipment*)	Waste accumulation areas will contain appropriate emergency response equipment. Fire Extinguisher (ABC Multi-Purpose Dry Chemical) and Spill Kit (containing absorbent pads, granular clay absorbent pellets, booms, gloves, googles, boot covers, disposal bags, and caution tapes) will be available in the waste accumulation areas. The specific location of waste accumulation areas will be determined based on the quantity of wastes in each building and the sequence of work. Site Maps will be updated to include the waste accumulation areas prior to closure activites and if areas are moved.
	All facility communications or alarm systems, fire protection equipment, spill control equipment, and decontamination equipment, where required, shall be tested and maintained as necessary to assure proper operation of the equipment in time of emergency. The owner or operator shall record the inspections in a log or summary.	If hazardous waste treatment, storage, or disposal is occurring this is **Applicable**.	3745-65-33 (*Testing and Maintenance of Equipment*)	
Hazardous waste facility required equipment (cont'd)	Whenever hazardous waste is being handled, all personnel involved in the operation shall have immediate access to an internal alarm or emergency communication device, either directly or through visual or voice contact with another employee, unless such a device is not required under OAC 3745-65-32.	If hazardous waste treatment, storage, or disposal is occurring this is **Applicable**.	3745-65-34 (*Access to Communications or Alarm System*)	
Hazardous waste facility aisle space	Maintain aisle space to allow the unobstructed movement of personnel, fire protection equipment, spill control equipment, and decontamination equipment to any area of facility operation in an emergency, unless aisle space is not needed for any of the above-mentioned purposes.	If hazardous waste treatment, storage, or disposal is occurring this is **Applicable**.	3745-65-35 (*Required Aisle Space*)	Waste accumulation areas will comply with this requirement.
Hazardous waste facility arrangements with local authorities	The owner or operator shall attempt to make arrangements to familiarize police, fire departments, and local emergency response teams with the layout of the facility, properties of hazardous waste handled at the facility and associated hazards, places where facility personnel would normally be working, entrances to roads inside the facility, and possible evacuation routes; arrangements with local emergency response teams, emergency response contractors, and equipment suppliers; and arrangements to familiarize local hospitals with the properties of hazardous waste handled at the facility and the types of injuries or illnesses which could result from fires, explosions, or releases of hazardous waste or hazardous waste constituents at the facility.	If hazardous waste treatment, storage, or disposal is occurring this is **Applicable**.	3745-65-37 (*Arrangements with local authorities*)	Arrangements will be made with local authorities prior to the start of closure activities.

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Action / Media	Requirement	Prerequisite	Citation(s)	Requirement Met In This Section
Hazardous waste contingency plan	The contingency plan shall: - describe the actions facility personnel shall take to respond to fires, explosions, or any unplanned sudden or non-sudden release of hazardous waste or hazardous waste constituents to air, soil, or surface water at the facility. - describe arrangements with local police departments, fire departments, hospitals, contractors, and state and local emergency response teams to coordinate emergency services, pursuant to OAC 3745-65-37. - list names, home addresses, and home or cellular telephone numbers of all persons qualified to act as emergency coordinator. - include an up to date list of all emergency equipment at the facility, where this equipment is required. - include an evacuation plan for facility personnel	If hazardous waste treatment, storage, or disposal is occurring this is **Applicable**.	3745-65-52 (*Content of Contingency Plan*)	A hazardous waste contingency plan will be developed prior to the start of closure activities.
	A copy of the updated contingency plan shall be maintained at the facility and submitted to all local police departments, fire departments, hospitals, and local emergency response teams described in the contingency plan pursuant to OAC 3745-65-52(C).	If hazardous waste treatment, storage, or disposal is occurring this is **Applicable**.	3745-65-53 (*Copies of Contingency Plan*)	
	The contingency plan must be reviewed, and immediately amended, if necessary, whenever applicable rules are revised; the contingency plan fails in an emergency; the facility changes - in its design, construction, operation, maintenance, or other circumstances - in a way that materially increases the potential for fires, explosions, or releases of hazardous waste or hazardous waste constituents, or changes the response necessary in an emergency; the list of emergency coordinators changes; or the list of emergency equipment changes.	If hazardous waste treatment, storage, or disposal is occurring this is **Applicable**.	3745-65-54 (*Amendment of Contingency Plan*)	
Hazardous waste facility emergency coordinator	At all times, there shall be at least one employee either on the facility premises or on call with the responsibility for assuming coordination of all internal emergency response measures. This emergency coordinator shall be thoroughly familiar with all aspects of the facility's contingency plan, all operations and activities at the facility, the location and characteristics of waste handled, the location of all records within the facility, and the facility layout. In addition, this person shall have the authority to commit the resources needed to implement the provisions of the contingency plan.	If hazardous waste treatment, storage, or disposal is occurring this is **Applicable**.	3745-65-55 (*Emergency Coordinator*)	A designated emergency coordinator will be identified prior to closure activities and he/she (or designee) will adhere to these rules.
Hazardous waste facility emergency procedures	Whenever there is an emergency situation consisting of imminent or actual harm or hazard to human health or the environment, the emergency coordinator (or designee) shall immediately activate internal facility alarms or communication systems, where applicable, to notify all facility personnel and notify the Ohio EPA "Emergency Response Unit" at 800-282-9378, and appropriate local authorities with designated response roles. The emergency coordinator shall also immediately identify the nature extent of any released materials; assess potential hazards to human health or the environment; notify appropriate authorities if assessment indicates that evacuation of local areas may be advisable; take all reasonable measures necessary to ensure that fires, explosions, and releases do not occur, recur, or spread; provide for treating, storing, or disposing of recovered waste, contaminated soil or surface water, or any other material that results from a release, fire, or explosion at the facility; and note in the operating record the time, date, and details of any incident that requires the contingency plan to be implemented.	If hazardous waste treatment, storage, or disposal is occurring this is **Applicable**.	3745-65-56 (*Emergency Procedures*)	
Closure of hazardous waste container storage area	The owner or operator must close the facility in a manner that: (a) minimizes the need for further maintenance; and (b) controls, minimizes or eliminates, to the extent necessary to protect human health and the environment, post-closure escape of hazardous waste, hazardous constituents, leachate, contaminated run-off, or hazardous waste decomposition products to the ground or surface waters or to the atmosphere; and (c) complies with the closure requirements of OAC 3745-66-10 to 3745-66-21, including, but not limited to, the requirements of OAC 3745-66-97, 3745-67-28, 3745-67-58, 3745-67-80, 3745-68-10, 3745-68-51, 3745-68-81, 3745-69-04, and 3745-256-102.	If hazardous waste is stored in a container storage area this is **Applicable**.	OAC 3745-66-11 (*Closure Performance Standards*)	Section 11.3 of the Closure Plan describes procedures for clean closure of the site building, including any less-than-90-day hazardous waste storage areas.

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Action / Media	Requirement	Prerequisite	Citation(s)	Requirement Met In This Section
Condition and management of hazardous waste containers	If a container holding hazardous waste is not in good condition, or if it begins to leak, the hazardous waste must be transferred from this container to a container that is in good condition.	If hazard waste is stored in containers this is **Applicable**.	OAC 3745-66-71 (*Condition of Containers*)	Hazardous waste materials will be managed in accordance with these rules.
	Must use a container made of or lined with materials which will not react with, and are otherwise compatible with, the hazardous waste to be stored, so that the ability of the container to contain the waste is not impaired.		OAC 3745-66-72 (*Compatibility of Waste with Container*)	
	Containers holding hazardous waste must always be closed during storage, except when it is necessary to add or remove waste. Containers holding hazardous waste must not be opened, handled, or stored in a manner which may rupture the container or cause it to leak.		OAC 3745-66-73 (*Management of Containers*)	
	At least once during each period from Sunday to Saturday, the owner or operator shall inspect areas where containers are stored. The owner or operator shall look for leaking containers and for deterioration of containers and the containment system caused by corrosion or other factors. The owner or operator shall record inspections in an inspection log or summary.		OAC 3745-66-74 (*Inspections - Containers*)	
	Incompatible materials shall not be placed in the same container, and hazardous waste shall not be placed in an unwashed container that previously held an incompatible waste. A storage container holding a hazardous waste that is incompatible with any other materials stored nearby shall be separated from the other materials or protected from the other materials by means of a dike, berm, wall, or other device.		OAC 3745-66-77 (*Special Requirements for Incompatible Wastes - Containers*)	
Management of hazardous waste	The generator must determine each EPA Hazardous Waste Number (waste code) applicable to the waste in order to determine the applicable treatment standards under OAC 3745-270-40 to 3745-270-49. This determination may be made concurrently with the hazardous waste determination required in OAC 3745-52-11.	If hazardous waste treatment is occurring this is **Applicable**.	OAC 3745-270-09(A) (*Special Rules Regarding Wastes that Exhibit a Characteristic*)	Hazardous waste materials will be identified and managed in accordance with these rules.
	If the waste displays a hazardous characteristic (and is not D001 non-wastewater treated by CMBST, RORGS, or POLYM in the OAC 3745-270-42 table), the generator shall determine "underlying hazardous constituents" (as defined in OAC 3745-270-02) in the characteristic waste.	If waste displays hazardous characteristic this is **Applicable**.	OAC 3745-270-09(A) (*Special Rules Regarding Wastes that Exhibit a Characteristic*)	
	The generator must determine if the waste has to be treated before it can be land disposed. This is done by determining if the hazardous waste meets the treatment standards in OAC 3745-270-40, 3745-270-45, or 3745-270-49. This determination can be made concurrently with the hazardous waste determination required in OAC 3745-52-11 in each two ways: testing the waste or using knowledge of the waste.	If hazardous waste is being land disposed this is **Applicable**.	OAC 3745-270-07(A) (*Testing, Tracking, and Recordkeeping Requirements for Generators, Treaters, and Disposal Facilities*)	
Waste specific prohibitions	The wastes specified in OAC 3745-51 as EPA hazardous waste numbers D004 to D011 that are newly identified (i.e. wastes or debris identified as hazardous by the toxic characteristic leaching procedure) are prohibited from land disposal unless the wastes meet the applicable treatment standards specified in OAC 3745-270-40 to 3745-270-49.	If characteristically hazardous metallic wastes are encountered this is **Applicable**.	OAC 3745-270-34(A, E) (*Waste Specific Prohibitions- Toxicity Characteristic Metal Waste*s)	Hazardous waste materials will be disposed in accordance with these rules.
	The wastes specified in OAC 3745-51-22 as D002, that are managed in systems other than those whose discharge is regulated under the clean water act(CWA), or that inject in Class I deep wells regulated under the safe drinking water act, or that are zero dischargers that engage in CWA-equivalent treatment before ultimate land disposal, are prohibited from land disposal. Wastes managed in Class V injection wells (40 CFR §144.6(e) and 40 CFR §146.6(e)) that do not engage in CWA-equivalent treatment before injection, are prohibited from land disposal.	If characteristically hazardous corrosive wastes are encountered this is **Applicable**.	OAC 3745-270-37	
Land disposal of hazardous wastes	Prohibited waste identified in the table “Treatment Standards for Hazardous Wastes” may be land disposed only if it meet the requirements found in the table. If the waste does not meet treatment standards, or if the generator chooses not to make the determination of whether the generator's waste shall be treated, with the initial shipment of waste to each treatment or storage facility, the generator shall send a one-time written notice to each treatment or storage facility receiving the waste, and place a copy in the generator's files.	If hazardous waste is going to be land disposed this is **Applicable**.	OAC 3745-270-40(A) (*Applicability-Treatment Standards*)	Hazardous waste materials will be disposed in accordance with these rules.

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Action / Media	Requirement	Prerequisite	Citation(s)	Requirement Met In This Section
Land disposal of hazardous wastes (cont'd)	All "underlying hazardous constituents" (as defined in OAC 3745-270-02) shall meet universal treatment standards in the table in OAC 3745-270-48 prior to "land disposal" (as defined in OAC 3745-270-02).	If characteristic hazardous waste is going to be land disposed this is **Applicable**.	OAC 3745-270-40(E) (*Applicability-Treatment Standards*)	Hazardous waste materials will be disposed in accordance with these rules.
	D002 wastes shall be treated using the technology or technologies specified in the table in this rule: - DEACT and meet universal treatment standards in OAC 3745-270-48	If hazardous waste is going to be land disposed this is **Applicable**.	OAC 3745-270-42 (*Treatment Standards Expressed as Specified Technologies*)	
Land disposal of hazardous debris	Hazardous debris must be treated prior to land disposal unless Ohio EPA determines under OAC 3745-51-03(F0(2) that the debris is no longer contaminated with hazardous waste or the debris is treated to the waste-specific treatment standard provided in OAC 3745-270-40 to 3745-270-49 for the waste contaminating the debris.	If land disposal of hazardous debris this is **Applicable**.	OAC 3745-270-45(A) (*Treatment Standards for Hazardous Debris*)	
Land disposal of hazardous wastes	The table in this rule identifies the hazardous constituents, along with the non-wastewater and wastewater treatment standard levels, that are used to regulate most prohibited hazardous wastes with numerical limits. For determining compliance with treatment standards for "underlying hazardous constituents" as defined in OAC 3745-270-02, these treatment standards may not be exceeded. Compliance with these treatment standards is measured by an analysis of grab samples, unless otherwise noted in the table in this rule.	If hazardous waste is going to be land disposed this is **Applicable**.	3745-270-48 (*Universal Treatment Standards*)	
Transportation of hazardous materials	Transportation of a hazardous material in commerce is subject to and must comply with all applicable provisions of the federal hazardous materials transportation law (49 U.S.C. 5101 et seq.) and hazardous materials regulations 49 CFR 171-180 related to marking, labeling, placarding, packaging, emergency response, etc.	If transporting hazardous material this is **Applicable**.	49 CFR 171.1(c) (*Transportation Functions*)	Hazardous waste materials will be transported in accordance with 49 CFR 171-180.

Attachment C
Cost Estimate Backup

Project	Estimated Weights and Costs					Estimate
Site Preparation and Lead Abatement[1]	**Description**	**Quantity**	**Units**	**Unit Cost**	**Cost**	$474,820
	Pre-Mobilization Documents	1	Lump Sum	1,200	1,200	
	Site Preparation/CRZ-CLZ construction	180	Day	165	29,700	
	H&S Monitoring	180	Day	125	22,500	
	Gaylord Cleaning	180	Day	2,225	400,500	
	Dispose of generated wastes	1	Lump Sum	9,460	9,460	
	Warehouse wall preparation	1	Lump Sum	9,460	9,460	
	Final Submittals	1	Lump Sum	2,000	2,000	
E-Waste Removal, Recycling, and Disposal[2]	**Material**	**Quantity**	**Units**	**Unit Cost**	**Cost**	$3,732,350
	Non-processed CRTs	22,604,650	Pounds	$0.125	$2,825,581	
	Non-processed CRTs with metal frames/crushed glass	924,267	Pounds	$0.125	$115,533	
	Projection Lamps and TVs	40,000	Pounds	$0.185	$7,400	
	Processed CRTs (Crushed CRT glass)	7,388,200	Pounds	$0.1055	$779,455	
	Misc. Removal	40,000	Pounds	$0.1095	$4,380	
Lead Abatement: Decontamination[3]	**Description**	**Quantity**	**Units**	**Unit Cost**	**Cost**	$479,180
	Pre-Mobilization Documents	1	Lump Sum	1250	1250	
	Mobilization/Site Preparation	1	Lump Sum	2000	2000	
	Decontamination Floors/Walls/Cielings	1	Lump Sum	388500	388500	
	Demolition/Disposal Wood Office	1	Lump Sum	9460	9460	
	Insulation Asbestos Evaluation	1	Lump Sum	3200	3200	
	Onsite Wastewater Treatment	35,000	Gallon	0.88	30800	
	Dispose of generated wastes	1	Lump Sum	12880	12880	
	Fill Cracks in Floor	1	Lump Sum	4200	4200	
	Equipment Decontamination/Demobilization	1	Lump Sum	8800	8800	
	Decontaminate/Dispose/Recycle CRT Glass Washing System	1	Lump Sum	16840	16840	
	Final Submittals	1	Lump Sum	1250	1250	
Project Management and Oversight	**Description**	**Quantity**	**Units**	**Unit Cost**	**Cost**	$372,499
	Site Preparation, Lead Abatement, and E-Waste Removal, Recycling, and Disposal	180	Days	1,583	284,999	
	Lead Abatement: Decontamination	30	Days	1,583	47,500	
	Closure Report	1	Lump Sum	40,000	40000	
TOTAL						**$5,058,849**

Notes:

[1] Contractors providing bids for this work included: Hepaco, Aztec, Enviroserv, and HEPA. To date, a contractor has not been formally selected.

[2] Contractors providing bids for this work included: Novotec, Hepaco, and URT. To date, a contractor has not been formally selected.

[3] Contractors providing bids for this work included: Hepaco, Aztec, Enviroserv, and HEPA. To date, a contractor has not been formally selected.

Appendix B
Prior Environmental Reports

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- **You are here:** EPA Home
- Envirofacts
- RCRAInfo
- Search Results

Search Results

Home

Multisystem Search

Topic Searches

System Data Searches

About the Data

Data Downloads

Widgets

Services

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Other Datasets

RCRAInfo Links

- Overview
- Search
- Model
- RCRAInfo Search User Guide
- Contact Us
- Office of Resource Conservation and Recovery Home

RCRAInfo

Data Disclaimer

RCRAInfo Facility Information

<< Return

CLOSED LOOP GLASS SOLUTIONS
Handler ID: OHR000201145
2200 FAIRWOOD AVE
COLUMBUS, OH 43207

County Name: FRANKLIN

Latitude: 39.92124
Longitude: -82.95592

Hazardous Waste Generator: Small Quantity Generator

Owner Name:

**You can navigate within the map with your mouse.*

No BIENNIAL REPORT data is available for the facility listed above.

LIST OF FACILITY CONTACTS

NAME	STREET	CITY	STATE	ZIP CODE	PHONE	TYPE OF CONTACT
ROBERT CRUZ	1675 WATKINS RD	COLUMBUS	OH	43207	614-295-8165	Public
ROBERT CRUZ	1675 WATKINS RD	COLUMBUS	OH	43207	614-295-8165	Permit

HANDLER / FACILITY CLASSIFICATION

Unspecified Universe for the facility listed above.

HANDLER TYPE
Small Quantity Generator

No PROCESS INFORMATION is available for the facility listed above.

No NAICS Codes are available for the facility listed above.

No Waste Codes are available for the facility listed above.

Go To Top Of The Page

Total Number of Facilities Retrieved: 1

Search Results

RCRAInfo Links

RCRAInfo

Data Disclaimer

RCRAInfo Facility Information

<< Return

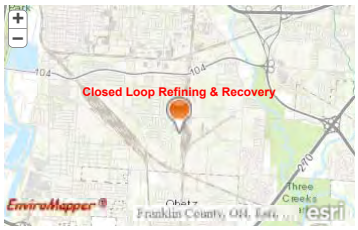
CLOSED LOOP REFINING & RECOVERY INC
Handler ID: OHR000167718
1675 WATKINS RD
COLUMBUS, OH 43207

County Name: FRANKLIN

Latitude: 39.9045
Longitude: -82.95048

Hazardous Waste Generator: Small Quantity Generator

Owner Name: CLOSED LOOP REFINING AND RECOVERY



**You can navigate within the map with your mouse.*

No BIENNIAL REPORT data is available for the facility listed above.

LIST OF FACILITY CONTACTS

NAME	STREET	CITY	STATE	ZIP CODE	PHONE	TYPE OF CONTACT
ROBERT CRUZ	1675 WATKINS RD	COLUMBUS	OH	43207	614-295-8165	Public
ERIC HOWELL	1675 WATKINS RD	COLUMBUS	OH	43207	614-295-8165	Permit
ROBERT CRUZ	1675 WATKINS RD	COLUMBUS	OH	43207	614-295-8165	Permit
DAVID CAUCHI	128 N NEVADA WAY	GILBERT	AZ	85233	602-502-1154	Permit

HANDLER / FACILITY CLASSIFICATION

Unspecified Universe for the facility listed above.

HANDLER TYPE
Small Quantity Generator

No PROCESS INFORMATION is available for the facility listed above.

LIST OF NAICS CODES AND DESCRIPTIONS

NAICS CODE	NAICS DESCRIPTION
42393	RECYCLABLE MATERIAL MERCHANT WHOLESALERS

LIST OF WASTE CODES AND DESCRIPTIONS

WASTE CODE	WASTE DESCRIPTION
D008	LEAD

Go To Top Of The Page

Total Number of Facilities Retrieved: 1

EPA United States Environmental Protection Agency

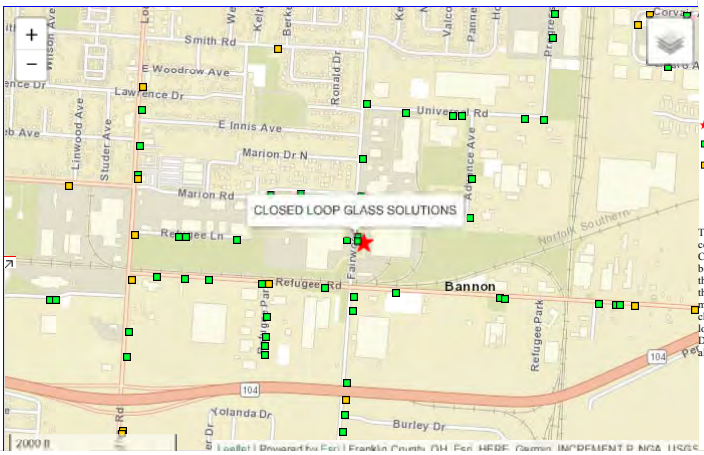
Related Topics: Envirofacts

FRS

FRS Facility Detail Report

CLOSED LOOP GLASS SOLUTIONS

EPA Registry Id: 110067546702
2200 FAIRWOOD AVE
COLUMBUS, OH 43207



Legend
- Selected Facility
- EPA Facility of Interest
- State/Tribe Facility of Interest

The facility locations displayed come from the FRS Spatial Coordinates tables. They are the best representative locations for the displayed facilities based on the accuracy of the collection method and quality assurance checks performed against each location. The North American Datum of 1983 is used to display all coordinates.

Facilty Registry Service Links:

- Facility Registry Service (FRS) Overview
- FRS Facility Query
- FRS Organization Query
- EZ Query
- FRS Physical Data Model
- FRS Geospatial Model

Report an Error

Environmental Interests

Information System	System Facility Name	Information System Id/Report Link	Environmental Interest Type	Data Source	Last Updated Date	Supplemental Environmental Interests:
RESOURCE CONSERVATION AND RECOVERY ACT INFORMATION SYSTEM	CLOSED LOOP GLASS SOLUTIONS	OHR000201145	SQG (Y)	RCRAINFO	04/13/2016	

Additional EPA Reports: MyEnvironment Enforcement and Compliance Site Demographics Facility Coordinates Viewer Environmental Justice Map Viewer Watershed Report

Standard Industrial Classification Codes (SIC)

No SIC Codes returned.

Facility Codes and Flags

EPA Region:	05
Duns Number:	
Congressional District Number:	03
Legislative District Number:	
HUC Code/Watershed:	05060001 / UPPER SCIOTO
US Mexico Border Indicator:	
Federal Facility:	NO
Tribal Land:	NO

Alternative Names

No Alternative Names returned.

Organizations

No Organizations returned.

National Industry Classification System Codes (NAICS)

No NAICS Codes returned.

Facility Mailing Addresses

Affiliation Type	Delivery Point	City Name	State	Postal Code	Information System
FACILITY MAILING ADDRESS	1675 WATKINS RD	COLUMBUS	OH	43207	RCRAINFO

Contacts

Affiliation Type	Full Name	Office Phone	Information System	Mailing Address
REGULATORY CONTACT	ROBERT CRUZ	614-295-8165	RCRAINFO	

Query executed on: NOV-05-2018

Last updated on September 24, 2015

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Ohio Environmental Protection Agency

John R. Kasich, Governor
Mary Taylor, Lt. Governor
Craig W. Butler, Director

April 11, 2016

Mr. Brent Benham
Closed Loop Refining and Recovery, Inc.
c/o Dennis L. Hall, Attorney, pllc
3033 North Central, Suite 810
Phoenix, Arizona 85012

Re: Closed Loop Refining and Recovery, Inc.
Notice of Violation
NOV
RCRA C - Hazardous Waste
Franklin County
OHR000167718

Re: Closed Loop Glass Solutions, LLC
Notice of Violation
NOV
RCRA C – Hazardous Waste
Franklin County
OHR000201145

Dear Mr. Benham:

Thank you for providing information via your attorney, Mr. Dennis L. Hall, to Ohio EPA on February 26, 2016, regarding the Closed Loop Refining and Recovery, Inc. (Closed Loop) operations at 1675 Watkins Road (Watkins Road Facility) and Closed Loop Glass Solutions, LLC (Glass Solutions) operations at 2200 Fairwood Avenue (Fairwood Avenue Facility), Columbus, Ohio. In a January 25, 2016 e-mail and follow-up letter dated February 26, 2016, we requested Closed Loop's and Glass Solutions' 2015 mass balance numbers for intact cathode ray tubes (CRTs) and processed CRT glass for review to determine if Closed Loop's and Glass Solutions' operations are complying with the speculative accumulation provisions as set forth in Ohio Administrative Code (OAC) rule 3745-51-01 and as required by the conditional exclusion for CRTs and processed CRT glass provided in OAC rule 3745-51-39.

On March 3, 2016 Ohio EPA received information regarding Closed Loop's tenancy at the 1675 and 1655 Watkins Road, Columbus, Ohio, locations and performed a site assessment on March 4, 2016.

As a result of the information provided on February 26, 2016 and gathered during the March 4, 2016 inspection, Ohio EPA has concluded that Glass Solutions is speculatively accumulating CRTs or CRT processed glass at the 2200 Fairwood Avenue Facility.

Information provided by Mr. Robert Cruz (Plant Manager) and Matt Strangle (Manager) on March 4, 2016 indicated that processed glass was being shipped from the Watkins Road Facility to Fairwood Avenue Facility for further recycling. According to Mr. Cruz, the recycling operations stopped in the summer of 2015 when the recycling operations broke. Since the recycling operations at the Fairwood Facility have ceased, Glass Solutions' Fairwood Avenue Facility is not a legitimate recycling facility because there is no feasible means of recycling there. Shipping records provided on March 4, 2016 indicate 28 shipments of leaded funnel glass have been sent from Closed Loop's Watkins Road Facility to Glass Solution's Fairwood Avenue Facility since October of 2015.

Based upon this information Closed Loop and Glass Solutions are in violation of the following Ohio hazardous waste laws and rules. In order to correct these violations you must do the following and send me the required information ***within 14 days of your receipt of this letter.***

Closed Loop's Watkins Road Facility

1. ***Hazardous Waste Treatment, Storage, and Disposal, Ohio Revised Code 3734.02(E)&(F):*** No person shall store, treat or dispose of hazardous waste without a permit. A generator of hazardous waste cannot store hazardous waste without a permit or an exemption from the director.

   Since approximately mid-2015, Closed Loop failed to demonstrate that processed CRT glass stored at Closed Loop's Watkins Road Facility was not speculatively accumulated because the receiving facility for processed CRT glass Closed Loop shipped to, Glass Solutions, did not have a feasible means of recycling. Therefore, the processed CRT glass is no longer excluded from Ohio's hazardous waste rules pursuant to the conditional exclusion for CRTs. Based upon this information, Ohio EPA has determined that Closed Loop has been storing, at a minimum, hazardous waste processed CRT glass, which is characteristically hazardous for toxicity (lead) as described in OAC rule 3745-51-24, in violation of ORC §3734.02(E) and (F).

   Since Closed Loop violated ORC §3734.02(E) and (F), Closed Loop is subject to all applicable general facility standards found in OAC chapters 3745-54 and 55. Additionally, at any time Ohio EPA may assert its right to have Closed Loop begin facility-wide cleanup pursuant to the Corrective Action process under Ohio law.

   Although no further action is being required by Ohio EPA at this time, be advised that due to the nature of the violation Ohio EPA may require closure pursuant to OAC rules 3745-55-11 through 3745-55-20 and OAC rules 3745-55-42 through 3745-55-47 at this site.

2. ***Hazardous Waste Treatment, Storage, and Disposal, Ohio Revised Code 3734.02(F):*** No person shall store, treat, or dispose of hazardous waste, or transport or cause to be transported any hazardous waste except at or to a hazardous waste facility operating under a permit.

   Glass Solutions Fairwood Avenue Facility is not a legitimate recycling facility. Since Closed Loop has been sending processed glass to Glass Solutions' Fairwood Avenue Facility since mid-2015 and the processed glass can no longer take advantage of the conditional exclusion for CRTs, you have illegally transported a hazardous waste under Ohio's hazardous waste laws to an unpermitted facility.

   Closed Loop must immediately cease the transportation of hazardous waste CRTs and processed glass from the Watkins Road facility to the Fairwood Avenue Facility unless Glass Solutions obtains a hazardous waste permit for that location.

3. ***Satellite Accumulation Area Requirements, OAC Rule 3745-52-34(C)(1)(b):*** Satellite containers must be marked with the words "hazardous waste" or other words identifying the contents.

   At the time of the March 4, 2016 inspection neither drum of hazardous waste from the dust collectors was labeled.

   In order to demonstrate compliance with this rule, Closed Loop needs to appropriately label the drums of hazardous waste and submit a photograph to Ohio EPA demonstrating that this has been done.

4. ***Use and Management of Containers, OAC Rule 3745-52-34(D)(2):*** The date upon which each period of accumulation begins must be clearly marked and visible for inspection on each container.

Two of the totes of hazardous waste being stored in the breaker accumulation area were not dated at the time of the March 4, 2016 inspection.

Closed Loop needs to determine the generation date of these totes, date them appropriately, and submit a photograph to Ohio EPA demonstrating that this has been done.

5. ***Use and Management of Containers, OAC Rule 3745-66-71:*** Hazardous waste must be stored in containers that are in good condition.

   At the time of the inspection, several gaylords of hazardous waste in the breaker room were crushed and deteriorating.

   Closed Loop needs to replace or repair the containers used to store hazardous waste and submit a photograph to Ohio EPA demonstrating that this has been done.

Comment: Please note that Closed Loop is operating as a small quantity generator (SQG) of hazardous waste at the Watkins Road location. However, it is unclear based on manifests and material shipping logs if the facility has generated more than 2,200 pounds of hazardous waste in any given calendar month. If Closed Loop generates more than 2,200 pounds of hazardous waste in any given calendar month, you would be a large quantity generator (LQG) of hazardous waste and subject to all applicable LQG standards. In addition, please note that SQGs cannot accumulate more than 6,000 kilograms (13,200 pounds) of hazardous waste on site at any one time without obtaining a hazardous waste permit.

Glass Solutions' Fairwood Avenue Facility

Hazardous Waste Treatment, Storage, and Disposal, Ohio Revised Code 3734.02(E)&(F): No person shall store, treat or dispose of hazardous waste without a permit. A generator of hazardous waste cannot receive a hazardous waste from offsite without a permit or an exemption from the director.

Since Glass Solutions is no longer recycling processed glass before it is shipped to a recycler which uses the processed glass as an ingredient in a product, Glass Solutions is not a legitimate recycling facility and the glass is no longer excluded under the conditional exclusion for CRTs. As such, Glass Solutions has received 28 shipments of hazardous waste from Closed Loop since mid-2015, thus unlawfully receiving and storing hazardous waste without a permit.

Since Glass Solutions violated ORC §3734.02(E) and (F), Glass Solutions is subject to all applicable general facility standards found in OAC chapters 3745-54 and 55. Additionally, at any time Ohio EPA may assert its right to have Glass Solutions begin facility-wide cleanup pursuant to the Corrective Action process under Ohio law.

Although no further action is being required by Ohio EPA at this time, be advised that due to the nature of the violation Ohio EPA may require closure pursuant to OAC rules 3745-55-11 through 3745-55-20 and OAC rules 3745-55-42 through 3745-55-47 at this site.

In addition, Closed Loop and Glass Solutions have been referred to Ohio EPA's Division of Materials and Waste Management's hazardous waste enforcement coordinator for enforcement consideration.

You can find Ohio's hazardous waste rules and other information on the division's web page at: http://www.epa.ohio.gov/dmwm/

Enclosed please find copies of the completed checklists. Should you have any further questions, please feel free to contact me at (614) 728-3884.

Sincerely,

Peter Maneff
Central District Office
Division of Materials and Waste Management

c: Dennis L. Hall, Attorney, pllc
Garrison Southfield Park LLC
Olymbec USA LLC, c/o CT Corporation System

e: Jeff Mayhugh, DMWM/CO
Mitch Mathews, DMWM/CO
Melissa Storch, DMWM/CDO
Todd Anderson, Legal

PM/cf Closed Loop April 2018

Photo 1. Closed Loop Refining and Recovery, 03-04-2016.

CRT storage at 1655 Watkins Rd.

Photo 2. Closed Loop Refining and Recovery, 03-04-2016.

CRT delivery at 1655 Watkins Rd.

Photo 3. Closed Loop Refining and Recovery, 03-04-2016.

CRT storage at 1655 Watkins Rd.

Photo 4. Closed Loop Refining and Recovery, 03-04-2016.

CRT storage at 1655 Watkins Rd.

Photo 5. Closed Loop Refining and Recovery, 03-04-2016.

CRT storage at 1655 Watkins Rd.

Photo 6. Closed Loop Refining and Recovery, 03-04-2016.

CRT storage at 1655 Watkins Rd.

Photo 7. Closed Loop Refining and Recovery, 03-04-2016.

CRT storage at 1655 Watkins Rd.

Photo 8. Closed Loop Refining and Recovery, 03-04-2016.

CRT storage at 1655 Watkins Rd.

Photo 9. Closed Loop Refining and Recovery, 03-04-2016.

CRT storage at 1655 Watkins Rd.

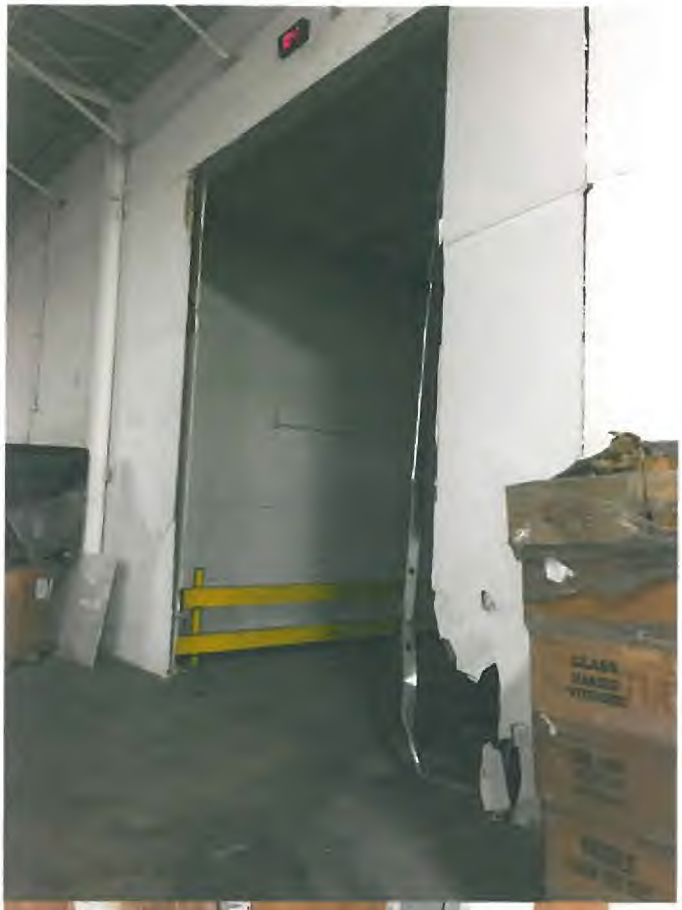

Photo 10. Closed Loop Refining and Recovery, 03-04-2016.

Cross through from 1655 Watkins Rd. to 1675 Watkins Rd.

Photo 11. Closed Loop Refining and Recovery, 03-04-2016.

CRT storage at 1655 Watkins Rd.

Photo 12. Closed Loop Refining and Recovery, 03-04-2016.

Processed CRT storage at 1675 Watkins Rd.

Photo 13. Closed Loop Refining and Recovery, 03-04-2016.

Processed CRT storage at 1675 Watkins Rd.

Photo 14. Closed Loop Refining and Recovery, 03-04-2016.

<180 day storage area at 1675 Watkins Rd. (empty)

Photo 15. Closed Loop Refining and Recovery, 03-04-2016.

<180 day storage area at 1675 Watkins Rd. (empty)

Photo 16. Closed Loop Refining and Recovery, 03-04-2016.

<180 day storage area at 1675 Watkins Rd. Dated 12-30-15 (empty)

Photo 17. Closed Loop Refining and Recovery, 03-04-2016.

<180 day storage area at 1675 Watkins Rd. Dated 12-30-15 (empty)

Photo 18. Closed Loop Refining and Recovery, 03-04-2016.

Debris

Photo 19. Closed Loop Refining and Recovery, 03-04-2016.

Unlabeled hazardous (D008) phosphor powder drum in breaker room.

Photo 20. Closed Loop Refining and Recovery, 03-04-2016.

Phosphor powder in breaker room.

Photo 21. Closed Loop Refining and Recovery, 03-04-2016.

Process CRT glass.

Photo 22. Closed Loop Refining and Recovery, 03-04-2016.

Unlabeled hazardous (D008) phosphor powder drum in breaker room.

Photo 23. Closed Loop Refining and Recovery, 03-04-2016.

Undated (D008) phosphor powder tote in breaker room. Note hazardous debris hanging from inside tote.

Photo 24. Closed Loop Refining and Recovery, 03-04-2016.

Inside tote.

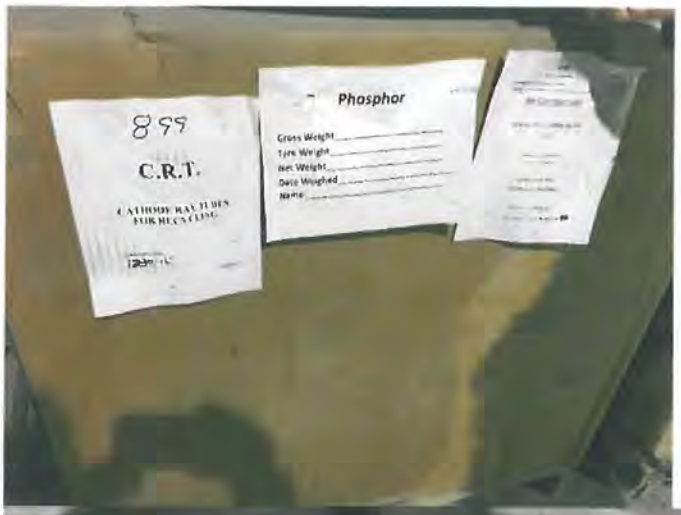

Photo 25. Closed Loop Refining and Recovery, 03-04-2016.

Unlabeled hazardous (D008) phosphor powder tote in breaker room.

Photo 26. Closed Loop Refining and Recovery, 03-04-2016.

Undated hazardous (D008) phosphor powder tote in breaker room.

Photo 27. Closed Loop Refining and Recovery, 03-04-2016.

<180 day accumulation area in breaker room. Note the gaylords of hazardous waste are crushed and breaking down.

Photo 28. Closed Loop Refining and Recovery, 03-04-2016.

Inside of hazardous waste tote in breaker room.

Photo 29. Closed Loop Refining and Recovery, 03-04-2016.

Undated hazardous (D008) phosphor powder tote in breaker room.

Photo 30. Closed Loop Refining and Recovery, 03-04-2016.

Debris in breaker room.

Photo 31. Closed Loop Refining and Recovery, 03-04-2016.

Labeled hazardous (D008) floor sweepings in 1675 Watkins rd.

Photo 32. Closed Loop Refining and Recovery, 03-04-2016.

Inside of floor sweepings tote in 1675 Watkins rd.

Photo 33. Closed Loop Refining and Recovery, 03-04-2016.

Tote of rework in 1675 Watkins Rd.

FIELD ACTIVITY REPORT

Date: 03/04/16
Time: 11:00 AM-1:00 PM
County: Franklin
Facility: Closed Loop Refining and Recovery
Location: 1655 and 1675 Watkins Rd., Columbus OH, 43207
Personnel: Robert Cruz (Plant Manager, on phone), Matt Strangle (Manager, on phone), Michelle Bruffy (Accounts Receivable), Angie (floor employee)
OhioEPA: Andy Maneff

Purpose of Visit: Complaint / Compliance Inspection

Background:

Closed Loop Refining and Recovery, 1675 Watkins Rd. Columbus 43207, is a glass recycling facility that accepts Cathode Ray Tubes (CRT, TV glass) which contain lead. This facility is a storage, and breaking plant for Closed Loop Glass Solutions located at 2200 Fairwood Avenue Columbus, Ohio. The storage facility is currently bringing in approximately 2 truckloads a day of CRTs. Closed Loop also runs a breaker for the CRTs which allow them to consolidate and store more feed stock onsite. They have been processing / breaking up to 350,000 pounds per week for continued storage. As part of this breaking process they are currently generating small quantity generator amounts of a phosphor powder (D008) from a wash process, baghouse dust (D008) from the air filtration system and lead dust / floorsweepings (D008) which are sent to Petro-Chem in Detroit, Michigan for hazardous waste disposal.

Findings:

On March 4, 2016 I arrived at Closed Loop Refining and Recovery to assess the company's compliance with Ohio's hazardous waste laws. Upon arrival I met with Michelle Bruffy who put me in contact with Robert Cruz (Plant Manager) and Matt Strangle (Manager) by phone. I first explained to Matt and then Robert separately that Ohio EPA had received notice from the property owner that Closed Loop was being served an eviction notice and that I was there to assess the current site conditions. Mr. Cruz informed me that Closed Loop was in a dispute with the property owner over delinquent rent and current lease negotiations. He claimed that Closed Loop was withholding rent because they were not paid for a job that they did for the landlord. I stated that that was not my concern and that I just needed to walk the facility to determine compliance with the CRT rules.

Mr. Strangle then granted me access and I was escorted around the facility by Angie. We first walked to the <180 accumulation area, which was empty, but lined with processed CRT glass stacked 3 high in gaylords. Next we headed to the breaker room

which was down for repairs. In here I observed 3 partially full gaylords of labeled hazardous waste (these were loosely covered with thin piece of cardboard and not all were dated) and numerous gaylords of phosphor powder covered debris. Angie stated that some of the material was rework but she was unsure of the other material. We then proceeded to walk through the remainder of 1675 Watkins Rd. observing the TV breakdown areas and several "satellite" gaylords of hazardous floor sweepings. Upon completing the walkthrough of 1675 we headed to the adjacent 1655 Watkins Rd. building.

As we arrived at 1655 Watkins Road the facility was actively receiving a truckload of CRTs. Angie stated that Closed Loop was receiving approximately 2 truckloads a day of CRTs. I asked about the space issue and she told me (and both Robert and Matt confirmed) that processed and unprocessed CRTs are also being shipped to Closed Loop Glass Solutions (2200 Fairwood Ave.) for additional storage. She also stated that Fairwood is no longer washing processed glass or being staffed (which was also confirmed by both Robert and Matt). Matt and Robert later explained that the tumbler (which aids in the washing) at Fairwood broke in the summer of 2015 and had not been repaired yet but that they were still shipping glass to a recycler via the Watkins Road facility.

I thanked Angie for the tour and headed back to the main office to review paperwork and speak with Robert Cruz before I left.

Shipping records show that Closed Loop Recycling (Watkins) has had 15 shipments of processed glass to a downstream recycler since 10/20/15 (after the tumbler broke on the wash line at Fairwood). Closed Loop Recycling also had one Gaylord packaged and scheduled for shipment from the Watkins Rd. facility on 3/04/16.

I also noted that they have had 28 shipments of leaded funnel glass to Closed Loop Glass Solutions (Fairwood) in that time.

I then reviewed the hazardous waste manifests and hazardous waste material logs that contain the start date for each container of hazardous waste. While Closed Loop is operating as a Small Quantity Generator of hazardous waste it appears based on the amount shipped and amount still on-site at the facility that they may be a large quantity generator of hazardous waste during some calendar months.

Start date 10-31-14	Ship date 12-18-14	D008	629 lbs
Start date 11-20-14	Ship date 12-18-14	D008	2020 lbs
Start date 11-21-14	Ship date 12-18-14	D008	907 lbs
Start date 12-19-14	Ship date 8-10-15	D008	1998 lbs

Start date 1-2-15	Ship date 8-10-15	D008	2064 lbs
Start date 2-7-15	Ship date 8-10-15	D008	2010 lbs
Start date 3-1-15	Ship date 8-10-15	D008	2127 lbs
Start date 4-6-15	Ship date 8-10-15	D008	2110 lbs
Start date 5-10-15	Ship date 8-10-15	D008	2052 lbs
Start date ?	Ship date 11-23-15	D008	4600 lbs

I informed Mr. Cruz of my findings and discussed setting up a time to inspect Fairwood and said that I would be in touch.

CONDITIONAL EXCLUSIONS FOR USED CATHODE RAY TUBES				
NOTE: This inspection checklist applies to CRT collectors and processors of used intact and used broken cathode ray tubes (CRTs) that are destined for recycling. It does not apply to companies who generate and store CRTs. Used, intact "CRTs" as defined in rule 3745-50-10 of the Administrative Code (and below) are not wastes within the United States unless they are disposed, or unless they are speculatively "accumulated speculatively" as defined in paragraph (C)(8) of rule 3745-51-01 of the Administrative Code by CRT collectors or glass processors.				
RECYCLERS RECEIVING BROKEN USED CRTS AND PROCESSED CRT GLASS UNDERGOING RECYCLING				
1.	Prior to processing,.			
	a.	Are used broken CRTs stored properly by: [3745-51-39(A)(1)] as follows: *(A used, broken CRT means glass removed from its housing or casing whose vacuum has been released)*		Yes ☒ No ☐ N/A ☐
		i.	Stored in a building with a roof, floor and walls? Or	Yes ☒ No ☐ N/A ☐
		ii.	Placed in a container such as a package or a vehicle constructed, filled, and closed to minimize releases to the environment of CRT glass?	Yes ☐ No ☒ N/A ☐
	b.	Is each container containing CRTs labeled or marked clearly with one of the following phrases "Used cathode ray tube(s) – containing leaded glass" or "Leaded glass from televisions or computers" and is each container also labeled "Do not mix with other glass materials"? [3745-51-39(A)(2)]		Yes ☒ No ☐ N/A ☐
	c.	Are CRTs transported in a container: [3745-51-39(A)(3)]		Yes ☒ No ☐ N/A ☐
		i.	Constructed, filled, and closed to minimize releases to the environment of CRT glass? And	Yes ☒ No ☐ N/A ☐
		ii.	Labeled or marked clearly with one of the following phrases "Used cathode ray tube(s) – containing leaded glass" or "Leaded glass from televisions or computers" and is each container also labeled "Do not mix with other glass materials"?	Yes ☒ No ☐ N/A ☐
	d.	If CRTs are accumulated speculatively or used in a manner constituting land disposal, does the owner or operator (o/o) of the recycling facility comply with the applicable requirements in 3745-266-20 to 3745-266-23? [3745-51-39(A)(4)]		Yes ☐ No ☐ N/A ☐
	e.	If the facility is an exporter of CRTs, does the o/o notify U.S. EPA of an intended exports before the CRTs are scheduled to leave the United States, based on the requirements in 40 CFR 261.39(a)(5)(i) to (a)(5)(ix)? [3745-51-39(A)(5)]		Yes ☐ No ☐ N/A ☒
2.	Are used, broken CRTs undergoing "CRT processing":			Yes ☒ No ☐ N/A ☐
	a.	Storage [3745-51-39(B)(1)] The processor is speculatively accumulating the CRTs undergoing processing or have been processed if either of the following questions is answered "No". If the processor is speculatively accumulating CRTs or processed CRT glass that is a hazardous waste they are storing a hazardous waste in violation of ORC § 3734.02(E) and (F). Can the processor demonstrate that the CRTs have a feasible means of being recycled; and During the calendar year, commencing January first, is the amount of material that is recycled, or transferred to a different site for recycling, equals at least seventy-five per cent by weight or volume of the amount of that material accumulated at the beginning of the calendar year.		Yes ☐ No ☐ N/A ☐ Yes ☒ No ☐ N/A ☐ Yes ☐ No ☒ N/A ☐
	b.	Processing		

		i.	Based on all activities specified in 3745-50-10(A)(25)(b) and (c) and the activities are performed in a building with a roof, floor, and walls? [3745-51-39(B)(2)]	Yes ☒ No ☐ N/A ☐
		ii.	With no activities that use temperatures high enough to volatilize lead from CRTs? [3745-51-39(B)(2)]	Yes ☒ No ☐ N/A ☐
NOTE: CRT processing activities defined in 3745-50-10(A)(25)(b) and (c) include "intentionally breaking intact CRTs or further breaking or separating broken CRTs" and "sorting or otherwise managing glass removed from CRT monitors."				
3.			Is glass from used, broken CRTs destined for recycling at a CRT glass manufacturer or a lead smelter after processing accumulated speculatively? [3745-51-39(C)]	Yes ☒ No ☐ N/A ☐
4.			If glass from used CRTs is used in a manner constituting disposal, does the o/o comply with 3745-266-20 to 3745-266-23? [3745-5139(D)]	Yes ☐ No ☐ N/A ☒
EXPORTS OF USED, INTACT CRTs				
NOTE: Used, intact CRTs exported for recycling are not wastes if they meet the notice and consent conditions of 40 CFR 261.39(a)(5) and if they are not accumulated speculatively. [3745-51-40]				
NOTE: Violations regarding exporting used, intact CETs foreign destinations should be referred to U.S. EPA Region 5 because the federal counterpart provisions are not delegable to states.				

DEFINITIONS:

"CRT" or "cathode ray tube" means a vacuum tube, composed primarily of glass, which is the visual or video display component of an electronic device. A used, intact CRT means a CRT whose vacuum has not been released. A used, broken CRT means glass removed from its housing or casing whose vacuum has been released. Used CRTs are "spent materials" as defined in rule 3745-51-01 of the Administrative Code.

"CRT collector" means a person who receives used, intact CRTs for recycling, repair, resale, or donation

"CRT processing" means conducting all of the following activities:
(a) Receiving broken or intact CRTs; and
(b) Intentionally breaking intact CRTs or further breaking or separating broken CRTs; and
(c) Sorting or otherwise managing glass removed from CRT monitors.

A material is "accumulated speculatively" if it is accumulated before being recycled. A material is not accumulated speculatively if the person accumulating the material can show that the material is potentially recyclable and has a feasible means of being recycled; and that during the calendar year, commencing January first, the amount of material that is recycled, or transferred to a different site for recycling, equals at least seventy-five per cent by weight or volume of the amount of that material accumulated at the beginning of the calendar year. In calculating the percentage of turnover, the seventy-five per cent requirement is to be applied to materials of the same type (e.g., slags from a single smelting process) that is recycled in the same way (i.e., from which the same material is recovered or that is used in the same way). Materials accumulated in units that would be exempt from regulation under paragraph (C) of rule 3745-51-04 of the Administrative Code shall not be included in the calculation. (Materials that are already defined as "wastes" also shall not be included in making the calculation.) Materials are no longer in this category once they are removed from accumulation for recycling.

SMALL QUANTITY GENERATOR REQUIREMENTS COMPLETE AND ATTACH A PROCESS, WASTE, P2 SUMMARY SHEET			
CESQG: ≤100Kg. (Approximately 25-30 gallons) of waste in a calendar month or < 1 Kg. of acutely hazardous waste. SQG: Between 100 and 1,000 Kg. (About 25 to under 300 gallons) of waste in a calendar month. LQG: ≥ 1,000 Kg. (~300 gallons) of waste in a calendar month or ≥1 Kg. of acutely hazardous waste in a calendar month. *NOTE: To convert from gallons to pounds: Amount in gallons x Specific Gravity x 8.345 = Amounts in pounds.*			
Safety Equipment Used:			
GENERAL REQUIREMENTS			
1.	Have all wastes generated at the facility been adequately evaluated? [3745-52-11]		Yes ☒ No ☐ N/A ☐
2.	Has the generator obtained a U.S. EPA I.D. number? [3745-52-12]		Yes ☒ No ☐ N/A ☐
3.	Has the generator transported or caused to be transported hazardous waste to **other** than a facility authorized to manage the hazardous waste? [ORC 3734.02 (F)] **Processed CRTs not meeting the conditional exclusion for used CRTs were transported to Closed Loop Glass Solutions**		Yes ☒ No ☐ N/A ☐
4.	Has the generator disposed of hazardous waste **on-site without a permit** or at another facility **other** than a facility authorized to dispose of hazardous waste? [ORC 3734.02 (E) & (F)]		Yes ☐ No ☒ N/A ☐
5.	Does the generator accumulate hazardous waste?		Yes ☐ No ☒ N/A ☐
NOTE: If the SQG does not accumulate or treat hazardous waste, it is not subject to 52-34 standards. All other requirements might still apply, e.g. manifest, marking, LDR, etc.			
6.	Has the generator accumulated hazardous wastes in excess of (180/270) days without a permit or an extension from the Director? [3745-52-34; ORC §3734-02(E)&(F)]		Yes ☐ No ☒ N/A ☐
NOTE: SQG's shipping waste to a facility greater than 200 miles away can accumulate on-site for 270 days. [3745-52-34 (E)]			
7.	Is the generator accumulating more than 6,000 kg on site? [3745-52-34(D)] **Shipping manifest indicate that the facility was near the 6,000kg limit but not at the time of the inspection.**		Yes ☐ No ☒ N/A ☐
NOTE: 6,000 kg = approximately 27, 55-gallon drums. If the facility is accumulating waste for greater than 180/270 days without an extension/permit or is accumulating greater than 6,000 kg on-site, it is classified as a storage facility and TSD standards apply. Complete applicable TSD checklists.			
8.	Does the generator treat hazardous waste in a:		
	a.	Container that meets 3745-66-70 to 3745-66-77?	Yes ☒ No ☐ N/A ☐
	b.	Tank that meets 3745-66-101?	Yes ☐ No ☐ N/A ☒
	c.	Drip pads that meet 3745-69-40 to 3745-69-45?	Yes ☐ No ☐ N/A ☒
	d.	Containment building that meets 3745-256-100 to 3745-256-102?	Yes ☐ No ☐ N/A ☒
NOTE: Complete appropriate checklist for each unit.			
NOTE: If waste is treated to meet LDRs, use LDR checklist.			
MANIFEST REQUIREMENTS			
9.	Are all hazardous wastes either reclaimed under a contractual agreement as defined in OAC rule 3745-52-20(E), or shipped off-site accompanied by		Yes ☒ No ☐ N/A ☐

	a manifest (U.S. EPA Form 8700-22)? [3745-52-20(A)(1)]		
10.	Are wastes reclaimed under a contractual agreement? If so: [3745-52-0(E)]		Yes ☐ No ☒ N/A ☐
	a.	Does the contractual agreement specify the type of waste and frequency of shipment?	Yes ☐ No ☐ N/A ☒
	b.	Is the transport vehicle owned and operated by the reclaimer?	Yes ☐ No ☐ N/A ☒
	c.	Is a copy of the reclamation agreement kept on-site for at least three years after termination/expiration of the agreement?	Yes ☐ No ☐ N/A ☒
NOTE: If wastes are reclaimed under a contractual agreement and an answer to questions 10(a) through 10(c) is no, the generator is in violation of 3745-52-20 (A) (B) & (D), 3745-52-22 and 3745-52-23. Even if the waste is being reclaimed under agreement, LDRs still apply. Complete LDR checklist.			
11.	Have items 1 through 20 of each manifest been completed? [3745-52-20(A)(1)] & [3745-52-27(A)]		Yes ☐ No ☐ N/A ☐
NOTE: U.S. EPA Form 8700-22(A) (the continuation form) may be needed in addition to Form 8700-22. In these situations, items (21) through (35) must also be complete. [3745-52-20(A)(1)]			
12.	Does each manifest designate at least one facility which is permitted to handle the waste? [3745-52-20(B)]		Yes ☒ No ☐ N/A ☐
NOTE: The generator may designate on the manifest one alternative facility to handle the waste in the event of an emergency which prevents the delivery of waste to the primary designated facility. [3745-52-20(C)]			
13.	If the transporter was unable to deliver a shipment of hazardous waste to the designated facility did the generator designate an alternative TSD facility or give the transporter instructions to return the waste? [3745-52-20(D)]		Yes ☒ No ☐ N/A ☐
14.	Have the manifests been signed by the generator and initial transporter? [3745-52-23 (A) (1) and (2)]		Yes ☒ No ☐ N/A ☐
NOTE: Remind the generator that the certification statement they signed indicates: 1) they have properly prepared the shipment for transportation and 2) they have made a good faith effort to minimize their waste generation.			
15.	If the generator received a rejected load or residue, did the generator:		
	a.	Sign item 20 of the new manifest or item 18c of the original manifest? [3745-52-23(F)(1)	Yes ☒ No ☐ N/A ☐
	b.	Provide the transporter a copy of the manifest? [3745-52-23(F)(2)]	Yes ☒ No ☐ N/A ☐
	c.	Send a copy of the manifest to the designated facility that returned the shipment with 30 days after delivery of the rejected shipment? [3745-52-23(F)(3)]	Yes ☒ No ☐ N/A ☐
16.	If the generator did not receive a return copy of each completed manifest within 60 days of being accepted by the transporter did the generator submit to Ohio EPA, a copy of the manifest with some indication that the generator has not received confirmation of delivery? [3745-52-42(B)]		Yes ☐ No ☐ N/A ☒
17.	Are signed copies of all manifests being retained for at least three years? [3745-52-40]		Yes ☐ No ☐ N/A ☒
NOTE: A generator who sends a shipment of hazardous waste to a TSD facility with the understanding that the TSD facility can accept and manage the waste and later receives that shipment back as a rejected load or residue may accumulate the waste on-site for <90 days or <180 days depending on the amount of hazardous waste on-site in that calendar month. [3745-52-34(M)]			
NOTE: Waste generated at one location and transported along a publicly accessible road for temporary consolidated storage or treatment on a contiguous property also owned by the same person is not considered "on-site" and manifesting and transporter requirements must be met. To transport "along" a public right-of-way the destination facility has to act as a transfer facility or have a permit because this is considered to be "off-site." For additional information see the definition of			

"on-site" in OAC rule 3745-50-10.			
PREPAREDNESS AND PREVENTION			
18.	Is an emergency coordinator available at all times (on-site or on-call)? [3745-52-34(D)(5)(a)]		Yes ☒ No ☐ N/A ☐
19.	Has the following been posted by the telephone: [3745-52-34(D)(5)(b)]		
	a.	Name and telephone number of emergency coordinator?	Yes ☒ No ☐ N/A ☐
	b.	Location of fire and spill control equipment, and, if present, fire alarm(s)?	Yes ☒ No ☐ N/A ☐
	c.	Telephone number of local fire department?	Yes ☒ No ☐ N/A ☐
20.	Are employees familiar with waste handling and emergency procedures? [3745-52-34(D)(5)(c)]		Yes ☒ No ☐ N/A ☐
21.	Has the facility properly responded to all fires and spills? [3745-52-34(D)(5)(d)]		Yes ☐ No ☐ N/A ☒
22.	Is the facility operated to minimize the possibility of fire, explosion, or any unplanned sudden or nonsudden release of hazardous waste? [3745-65-31]		Yes ☒ No ☐ N/A ☐
23.	Does the generator have the following equipment at the facility if it is required due to actual hazards associated with the waste:		
	a.	Internal Alarm system? [3745-65-32(A)]	Yes ☒ No ☐ N/A ☐
	b.	Emergency communication device? [3745-65-32(B)]	Yes ☒ No ☐ N/A ☐
	c.	Portable fire control, spill control and decon equipment? [3745-65-32(C)]?	Yes ☒ No ☐ N/A ☐
	d.	Water of adequate volume/pressure per documentation or facility rep? [3745-65-32(D)]	Yes ☒ No ☐ N/A ☐
24.	Is emergency equipment tested (inspected) as necessary to ensure its proper operation in time of emergency? [3745-65-33]		Yes ☐ No ☐ N/A ☒
	a.	Are inspections recorded in a log or summary? [3745-65-33]	Yes ☐ No ☐ N/A ☒
25.	Do personnel have immediate access to an internal alarm or emergency communication device when handling hazardous waste (*unless the device is not required under OAC 3745-65-32)? [3745-65-34(A)]*		Yes ☒ No ☐ N/A ☐
26.	If there is only one employee on the premises is there immediate access to a device (ex. phone, hand-held two-way radio) capable of summoning external emergency assistance (*unless not required under OAC 3745-65-32*)? [3745-65-34(B)]		Yes ☐ No ☐ N/A ☒
27.	Is adequate aisle space provided for unobstructed movement of emergency or spill control equipment? [3745-65-35]		Yes ☒ No ☐ N/A ☐
28.	Has the generator attempted to familiarize emergency authorities with possible hazards and facility layout? [3745-65-37(A)]		Yes ☐ No ☐ N/A ☒
29.	Where authorities have declined to enter into arrangements or agreements, has the generator documented such a refusal? [3745-65-37(B)]		Yes ☐ No ☐ N/A ☒
SATELLITE ACCUMULATION AREA REQUIREMENTS			
30.	Does the generator ensure that satellite accumulation area(s):		
	a.	Are at or near a point of generation? [3745-52-34(C)(1)]	Yes ☐ No ☐ N/A ☒

	b.	Are under the control of the operator of the process generating the waste? [3745-52-34(C)(1)]	Yes ☐ No ☐ N/A ☒
	c.	Do not exceed a total of 55 gallons of hazardous waste per waste stream? [3745-52-34(C)(1)]	Yes ☐ No ☐ N/A ☒
	d.	Do not exceed one quart of acutely hazardous waste at any one time? [3745-52-34(C)(1)]	Yes ☐ No ☐ N/A ☒
	e.	Containers are closed, in good condition and compatible with wastes stored in them? [3745-52-34(C)(1)(a)]	Yes ☐ No ☐ N/A ☒
	f.	Containers are marked with the words "Hazardous Waste" or other words identifying the contents? [3745-52-34(C)(1)(b)]	Yes ☐ No ☒ N/A ☐
31.	Is the generator accumulating hazardous waste(s) in excess of the amounts listed in the preceding question? If so:		Yes ☐ No ☐ N/A ☒
	a.	Did the generator comply with 3745-52-34(A)(1) through (4) or other applicable generator requirements within three days? [3745-52-34(C)(2)]	Yes ☐ No ☐ N/A ☒
	b.	Did the generator mark the container(s) holding the excess with the accumulation date when the 55 gallon (one quart) limit was exceeded? [3745-52-34(C)(2)]	Yes ☐ No ☐ N/A ☒

NOTE: The satellite accumulation area is limited to 55 gallons of hazardous waste accumulated from a distinct point of generation in the process under the control of the operator of the process generating the waste (less than 1 quart for acute hazardous waste). There could be individual waste streams accumulated in an area from different points of generation.

USE AND MANAGEMENT OF CONTAINERS

32.	Has the generator marked containers with the words "Hazardous Waste?" [3745-52-34(D)(4)]		Yes ☒ No ☐ N/A ☐
33.	Is the accumulation date on each container? [3745-52-34(D)(4)]		Yes ☐ No ☒ N/A ☐
34.	Are hazardous wastes stored in containers which are:		
	a.	Closed (except when adding/removing wastes)? [3745-66-73(A)]	Yes ☒ No ☐ N/A ☐
	b.	In good condition? [3745-66-71] **Gaylords of hazardous waste in the Breaker Room were partially crushed.**	Yes ☐ No ☒ N/A ☐
	c.	Compatible with wastes stored in them? [3745-66-72]	Yes ☒ No ☐ N/A ☐
	d.	Handled in a manner which prevents rupture/leakage? [3745-66-73(B)]	Yes ☒ No ☐ N/A ☐
NOTE: Record location on process summary sheets and photograph the area.			
35.	Is the container accumulation area(s) inspected at least once during the period from Sunday to Saturday? [3745-66-74]		Yes ☐ No ☐ N/A ☒
	a.	Are inspections recorded in a log or summary? [3745-66-74]	Yes ☐ No ☐ N/A ☒
36.	Are containers of incompatible wastes stored separately from each other by means of a dike, berm, wall or other device? [3745-66-77(C)]		Yes ☒ No ☐ N/A ☐
37.	If the generator places incompatible wastes, or incompatible wastes and materials in the same container, is it done in accordance with 3745-65-17(B)? [3745-66-77(A)]		Yes ☐ No ☐ N/A ☒
38.	If the generator places hazardous waste in an unwashed container that previously held an incompatible waste, is it done in accordance with 3745-		Yes ☐ No ☐ N/A ☒

	65-17(B)? [3745-66-77(B)]	
NOTE: OAC 3745-65-17(B) requires that the generator treat, store, or dispose of ignitable or reactive waste, and the mixture or commingling of incompatible wastes, or incompatible wastes and materials so that it does not create undesirable conditions or threaten human health or the environment.		
PRE-TRANSPORT REQUIREMENTS		
39.	Does each generator package/label its hazardous waste in accordance with the applicable DOT regulations? [3745-52-30, 3745-52-31 and 3745-52-32(A)]	Yes ☐ No ☐ N/A ☒
40.	Does each container ≤119 gallons have a completed hazardous waste label? [3745-52-32(B)]	Yes ☐ No ☐ N/A ☒
41.	Before off-site transportation, does the generator placard or offer the appropriate DOT placards to the initial transporter? [3745-52-33]	Yes ☐ No ☐ N/A ☒
NOTE: Continue with the generator LDR requirements on the next page.		

GENERATOR LDR CHECKLIST DOES NOT APPLY TO CESQGS			
GENERAL REQUIREMENTS			
1.	If LDRs do not apply, does the generator have a statement that lists how the HW was generated, why LDRs don't apply and where the HW went? [3745-270-07(A)(7)]		Yes ☐ No ☐ N/A ☒
2.	Did the generator determine if the HW/soil must be treated to meet the LDR treatment standard prior to disposal? Generator knowledge or testing may be used. [3745-270-07(A)(1)] If not,		Yes ☐ No ☒ N/A ☐
	a.	Did the generator send the waste to a permitted HW TREATMENT facility? [3745-270-07(A)(1)]	Yes ☒ No ☐ N/A ☐
NOTE: This is done by determining if the HW /soil contains levels of constituents greater than the levels given in its LDR treatment standard in 3745-270-40. However, if a specific treatment method is given in 3745-270-40 for the HW, no determination is required [3745-270-07(A)(1)(b)]. If soil, generator can choose to have soil treated to LDR levels given in 3745-270-49 (alternative treatment levels for soils).			
3.	Does the generator have documentation of how he determined whether the HW/soil meets or does not meet the LDR treatment standard in 2, above? [3745-270-07(A)(6)(a) or 3745-270-07(A)(6)(b)]		Yes ☐ No ☐ N/A ☒
4.	Does the generator keep the documentation required in #2, above, on-site for at least three years from the last date the HW/soil was sent on-site/off-site for treatment/disposal? [3745-270-07(A)(8)]		Yes ☒ No ☐ N/A ☐
5.	Does the generator generate a listed HW that exhibits a characteristic? If yes,		Yes ☐ No ☒ N/A ☐
	a.	Did the generator determine if the listed HW exhibits a characteristic that is not treated under the LDR treatment standard for the listed HW? [3745-270-09(A)]	Yes ☒ No ☐ N/A ☐
FOR EXAMPLE: F006 that exhibits the characteristic for silver or K062 that is corrosive, D002. Review LDR treatment standard in 3745-270-40 to determine what constituents the listed HW is treated for.			
6.	Did the generator determine if its characteristic HW contains underlying hazardous constituents that need to be treated? [3745-270-09(A)]		Yes ☒ No ☐ N/A ☐
NOTE: This is done by evaluating which underlying hazardous constituents (UHC) are in the HW at levels above the universal treatment standards given in 3745-270-48. This requirement does not apply to high total organic carbon (i.e., contains >10% TOC) D001 wastes or listed HWs.			
NOTE: Written documentation of this determination is not required.			
7.	Did the generator treat his HW /soil on-site to meet the LDR treatment		Yes ☐ No ☒ N/A ☐

	standard?			
NOTE: If "Yes" see question #16.				
8.	Did the generator send a one-time LDR notification form to the TSD with the first shipment to that facility? [3745-270-07(A)(2)]			Yes ☐ No ☒ N/A ☐
	a.	If the generator chose not to make the determination of whether his waste must be treated, did he send a notice to the TSD facility with each shipment? [3745-270-07(A)(2)] If so, did the notice include:		Yes ☒ No ☐ N/A ☐
		i	Applicable HW codes?	Yes ☒ No ☐ N/A ☐
		ii	Manifest number of the first shipment to the TSD?	Yes ☒ No ☐ N/A ☐
		iii	A statement that conveys that the HW may or may not be subject to the LDR treatment standards and the TSD must make that determination."?	Yes ☒ No ☐ N/A ☐
9.	Did the generator resubmit the LDR notification form to the TSD when the HW changed or the generator used a new TSD? [3745-270-07(A)(2)]			Yes ☒ No ☐ N/A ☐
10.	Does the generator have a copy of the LDR notification form/notice on file? [3745-270-07(A)(2)]			Yes ☒ No ☐ N/A ☐
	a.	Is the form/notice kept on file for three years after last HW shipped? [3745-270-07(A)(8)]		Yes ☒ No ☐ N/A ☐
NOTIFICATION FORM				
11.	Does the LDR Notification form contain the following information:			
	a.	Manifest number of the first waste shipment to the TSD? [3745-270-07(A)(2)]		Yes ☒ No ☐ N/A ☐
	b.	Applicable waste codes (includes characteristic codes for a listed HW if applicable)? [3745-270-07(A)(2)]		Yes ☒ No ☐ N/A ☐
	c.	A statement that conveys that the HW is subject to LDRs and must be treated to meet LDR treatment requirements? [3745-270-07(A)(2)]		Yes ☒ No ☐ N/A ☐
	d.	A designation whether the HW is a wastewater or non-wastewater? [3745-270-07(A)(2)]		Yes ☒ No ☐ N/A ☐
NOTE: A wastewater contains <1% by wt. total suspended solids(TSS) and <1% by wt. TOC. If you doubt the HW is a wastewater or non-wastewater, the HW can be tested using for example, Standard Methods (SM) 160.2 for TSS, SW-846 method 9060a for TOC.				
	e.	Designation of the waste subcategory when applicable? [3745-270-07(A)(2)]		Yes ☒ No ☐ N/A ☐
NOTE: Subcategories are found on the LDR treatment standards table under the applicable waste code. Not all HWs have subcategories				
	f.	A listing of the underlying hazardous constituents for which a characteristic waste must be treated? [3745-270-07(A)(2)]		Yes ☒ No ☐ N/A ☐
NOTE: Not required if the waste is high TOC D001 or the TSD tests its treatment residues for all underlying hazardous constituents.				
	g.	If the HW is F001-F005 or F039, did the generator note on the LDR form what solvents or constituents, respectively, the waste contains and must be treated for? [3745-270-07(A)(2)]		Yes ☐ No ☐ N/A ☒
NOTE: Not required if the TSD tests its treatment residues for all underlying hazardous constituents.				
PROHIBITED DILUTION				
12.	Is the HW treated by burning? If "No" go to #15.			Yes ☐ No ☒ N/A ☐

13.	Is the HW a metal-bearing HW?			Yes ☒ No ☐ N/A ☐
NOTE: Generally, metal-bearing HWs contain heavy metals above TCLP levels or were listed due to the presence of metals. A list of the restricted metal-bearing HWs are given in the Appendix to 3745-270-03.				
14.	a.	Metal-bearing HWs cannot be incinerated, combusted or, blended and burned for fuel unless **one** of the following conditions apply. [3745-270-03(c)]		
		i.	Contains > 1% TOC?	Yes ☐ No ☐ N/A ☒
		ii.	Contains organic constituents or cyanide at levels greater than the UTS levels?	Yes ☐ No ☐ N/A ☒
		iii.	Is made up of combustible material e.g., paper, wood, plastic?	Yes ☐ No ☐ N/A ☒
		iv.	Has a reasonable heating value (e.g., > 5000 Btu)?	Yes ☐ No ☐ N/A ☒
		v.	Co-generated with a HW that must be combusted?	Yes ☐ No ☐ N/A ☒
	b.	If all responses to 14 a.i. through 14 a.v. are "No", HW is being improperly treated by dilution, violation of 3745-270-03(C). Is HW being treated by dilution?		Yes ☐ No ☐ N/A ☒
15.	Was the HW treated by wastewater treatment?			Yes ☐ No ☒ N/A ☐
	a.	Is a LDR treatment method, other than DEACT or a numerical value, specified for the waste? [3745-270-03(B) and 3745-270-40(A)(3)]		Yes ☐ No ☐ N/A ☒
NOTE: If "Yes", HW is improperly being treated by dilution.				
	b.	Does the waste carry the D001 code and contain ≥10% TOC?		Yes ☐ No ☐ N/A ☒
	c.	Does the wastewater treatment process include a process to separate/recover the organic phase of the waste?		Yes ☐ No ☐ N/A ☒
NOTE: If the answers to b & c are "yes" and "no", respectively, waste is improperly being treated by dilution and generator is in violation of [3745-270-03(B)] and 3745-270-40(A)(3)].				
NOTE: A list of separation/recovery processes are given in 3745-270-42 under RORG.				
GENERATOR TREATMENT				
16.	Does the generator treat to meet LDRs on-site?			Yes ☐ No ☒ N/A ☐
	Did the generator treat his hazardous waste/soil on-site in a tank, container, drip pad or containment building to meet the LDR treatment standard?			Yes ☐ No ☐ N/A ☒
	If "Yes"...complete the rest of the checklist. If "No"...stop...you are done.			
	a.	Does the generator have a written waste analysis plan (WAP) that describes the procedures he will follow to treat the HW/soil to the LDR treatment standard? [3745-270-07(A)(5)]		Yes ☐ No ☐ N/A ☒
	b.	Did the generator use a detailed chemical and physical analysis of the HW/soil in order to develop the WAP? [3745-270-07(A)(5)(a)]		Yes ☐ No ☐ N/A ☒
NOTE: This is a laboratory analysis but it does not have to be kept by the generator.				
	c.	Does the WAP contain all information necessary to treat the HW/soil to the LDR treatment standard? [3745-270-07(A)(5)(a)]		Yes ☐ No ☐ N/A ☒
	d.	Does the WAP include the testing frequency of the treated HW/soil to demonstrate that the LDR treatment standard is being met? [3745-270-07(A)(5)(a)]		Yes ☐ No ☐ N/A ☒

	e.	Does the generator keep the WAP on-site? [3745-270-07(A)(5)(b)]			Yes ☐ No ☐ N/A ☒
	f.	Is the WAP available for the inspector's review during the inspection? [3745-270-07(A)(5)(b)]			Yes ☐ No ☐ N/A ☒
NOTIFICATION FORM FOR GENERATOR TREATMENT					
17.	a.	Contains all information in #11 a-g above and			Yes ☐ No ☐ N/A ☒
	b.	If the treated HW/soil is listed.....notification contains the following certification statement: "I certify under penalty of law that I personally have examined and am familiar with the waste, through analysis and testing or through knowledge of the waste, to support this certification that the waste complies with the treatment standards specified in rule 3745-270-40 to 3745-270-49 of the Administrative Code. I am aware that there are significant penalties for submitting a false certification, including the possibility of fine and imprisonment."			Yes ☐ No ☐ N/A ☒
	c.	If the treated HW/soil no longer exhibits a characteristic and is no longer a HW, did the generator:			
		i.	Prepare a one-time notification? [3745-270-09 (D)]		Yes ☐ No ☐ N/A ☒
		ii.	Maintain a copy of the notice onsite? [3745-270-09(D)]		Yes ☐ No ☐ N/A ☒
		iii.	Include in the notification: [3745-270-09(D)]		
			1.	Name & address of receiving landfill?	Yes ☐ No ☐ N/A ☒
			2.	Description of HW when generated?	Yes ☐ No ☐ N/A ☒
			3.	HW code when generated?	Yes ☐ No ☐ N/A ☒
			4.	Treatability group when generated?	Yes ☐ No ☐ N/A ☒
			5.	Underlying hazardous constituents present when generated?	Yes ☐ No ☐ N/A ☒
		iv.	Contain the certification statement as required by 3745-270-07(B)(4)?		Yes ☐ No ☐ N/A ☒

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INTERIM SITE MANAGEMENT PLAN

December 1, 2016

Closed Loop Facility
2200 Fairwood Avenue
Columbus, Ohio

INTRODUCTION

In December of 2013, Olymbec USA LLC ("Olymbec") purchased property located at 2200 Fairwood in Columbus, Ohio (the "Property"). The Property, consisting of approximately 14.5 acres, includes a warehouse structure consisting of approximately 257,767 square feet.

In December of 2014, Olymbec leased 130,652 square feet of the warehouse facility (approximately fifty percent (50%) of the warehouse facility) to Closed Loop Refining and Recovery, Inc. ("Closed Loop"). The leased area of the warehouse facility will be referred to hereafter as the "Closed Loop Facility" or the "Facility." At the outset of the lease, Olymbec understood, through discussions with the Olymbec brokerage team, that Closed Loop would use the Facility for a general office and for warehousing and distribution associated with a cathode ray tube recycling operation.

In January of 2016, Closed Loop failed to timely pay rent as required by the lease agreement. A letter was then sent to Closed Loop which notified Closed Loop that it had defaulted under the lease. On February 22, 2016, Olymbec filed an action against Closed Loop in the Franklin County Court of Common Pleas. That action is pending, and to date, Olymbec has not been granted possession of the property. By the end of March or early April, 2016, it appeared that Closed Loop ceased operations at the Closed Loop Facility, and Closed Loop's property and possessions (including the inventory of Cathode Ray Tubes (CRTs) and other materials) remain at the Facility.

Olymbec has learned that in January of 2015, at the commencement of the lease, the Ohio EPA conducted an inspection of the Closed Loop Facility. No violations of the hazardous waste laws were found as a result of the inspection. According to the inspection report, Closed Loop Glass Solutions was conducting a glass recycling operation at the Closed Loop Facility.[1] The Facility was apparently accepting "processed Cathode Ray Tubes (CRT, TV glass) which contained lead" from "its sister plant, Closed Loop Refining and Recovery" located at 1675 Watkins Road in Columbus. According to the inspection report, following some additional processing at the Closed Loop Facility, the recycled glass would be sent to another glass recycler/furnace.

In February of 2015, the Ohio EPA conducted a follow-up inspection of the Closed Loop Facility. As a result of the inspection, the Ohio EPA learned that no shipments of "processed/clean" glass had taken place. The inspector also learned that "many pallets of unbroken CRTs" were arriving at the Closed Loop Facility. The inspector was advised that the pallets were coming from Closed Loop's facility at 1655 Watkins Road (adjacent to the Closed

[1] Only Closed Loop Refining and Recovery, Inc. was a party to the lease agreement. Olymbec was not aware that any other entity, and particularly Closed Loop Glass Solutions, would be conducting any operation at the Facility.

Loop facility at 1675 Watkins) and that the "unprocessed" CRTs were being relocated to the Closed Loop Facility at the Property because the "rent was too high" at the facility on Watkins Road. The inspector requested that Closed Loop provide the Ohio EPA with copies of bills of lading for the "first shipment" of "cleaned/processed" glass from the Closed Loop Facility. Olymbec did not know that these inspections had taken place and was not advised of the results of the inspections or that the Ohio EPA had requested documentation evidencing future shipments of cleaned/processed glass.

In January of 2016, the Ohio EPA requested information from Closed Loop regarding operations at the Watkins Road facility (1675 Watkins) and the Closed Loop Facility at the Property. In February of 2016, Closed Loop responded with some of the requested information.

By a letter dated February 26, 2016 (a copy of which was sent to Olymbec), the Ohio EPA requested additional information regarding the inventory of unprocessed CRTs, processed CRT glass, and "cleaned" CRT glass during 2015 and shipments of "cleaned" CRT glass from the Closed Loop Facility during 2015. The information requested by the Ohio EPA, it appears, would aid the Ohio EPA in determining if Closed Loop's operations at the Property (and at the Watkins Road facility) were in compliance with the speculative accumulation provisions set forth in Ohio Administrative Code (OAC) Rule 3745-51-01 and as required by the conditional exclusion for CRTs and processed CRT glass as provided in OAC Rule 3745-051-39. Closed Loop's status as a recycling facility would enable Closed Loop to store, handle and manage materials (CRT's processed glass and clean glass) that would otherwise be subject to the hazardous waste regulations.

In this same letter the Ohio EPA warned that if Closed Loop cannot demonstrate that it has not speculatively accumulated intact CRTs, processed CRT glass or "cleaned processed" CRT glass at the Facility, the conditional exclusion for the recycling of CRTs would no longer apply to Closed Loop. The extent to which Closed Loop provided the information requested by the Ohio EPA is not known, but it appears that some information was provided to the Ohio EPA. Until the receipt of the letter dated February 26, 2015, Olymbec had no knowledge of any issue associated with Closed Loop's operations at the Facility.

By a letter sent to Closed Loop and dated March 3, 2016, Olymbec notified Closed Loop that it had received a copy of the letter from the Ohio EPA dated February 26, 2016. In the March 3 letter, Olymbec "reminded" Closed Loop of its obligations under the lease agreement to comply with all laws, rules and regulations, including the environmental rules and regulations. Olymbec also asked that it be provided with a copy of Closed Loop's response to the February 26 letter. To date, Olymbec has not received a response from Closed Loop.

As of the date of this plan, Closed Loop has not resumed operations at the Closed Loop Facility and its property and possessions (including the inventory of Cathode Ray Tubes (CRTs) and other glass materials) remain at the Facility. Olymbec has taken certain measures to secure access to the Facility.

As a result of discussions with the Ohio EPA, Olymbec has agreed to provide an interim plan for the Closed Loop Facility. This plan incorporates a number of specific tasks, including periodic inspections of the Facility to check on the status of Closed Loop's inventory of CRTs and other glass materials, realignment of some of the storage containers to facilitate such inspections, and the completion of an investigation for any documentation or other records of Closed Loop (including records indicating the sources of CRTs and other materials received by Closed Loop and stored at the Facility). The plan also reports an effort by Closed Loop to pursue legal action with an insurer over coverage for the potential claims and damages arising out of the condition of the Facility and the management of the inventory of CRTs and other materials at the Facility.

INTERIM SITE MANAGEMENT PLAN

CLOSED LOOP FACILITY
2200 Fairwood Avenue, Columbus, Ohio

A. Current Condition of the Facility and Inventory

The Facility is situated within a warehouse building located at 2200 Fairwood Avenue in Columbus, Ohio. A site map showing the layout of the warehouse property is attached as Exhibit A. Olymbec acquired the warehouse building and real property in late 2014. The Closed Loop Facility is located in the eastern half of the warehouse building and consists of approximately 130,652 square feet. A site drawing depicting the area of the warehouse building leased by Closed Loop is attached as Exhibit B. Also included as part of Exhibit B are photographs of the exterior of the warehouse building outside of the Closed Loop Facility.

The remainder of the warehouse building (the western half consisting of approximately 127,115 square feet) is occupied by The Expediting Co., Inc., an Ohio corporation (occupying approximately 89,131 square feet) with the remainder being currently vacant (as of June 30, 2016 when Superior Production LLC, an Ohio limited liability company, vacated the building).

There is access to the Closed Loop Facility space from the other tenant space (by means of two (2) roll-up doors. These access points will be locked or otherwise secured to limit internal access to the Closed Loop facility. The only access thereto is from the outside and all exterior doors are locked and secured. All dock doors and man doors are locked from the inside except for one man door that is locked from the outside. There is a fence around the perimeter of the real property on which the warehouse building is located.

At the present, the Closed Loop Facility is not occupied by Closed Loop, and to the best of Olymbec's information and knowledge, no operations are being conducted at the Facility by Closed Loop. Limited inspections of the Facility have been conducted by or on behalf of Olymbec. The inspections were conducted on May 29, 2016 and on June 23, 2016. Attached hereto as Exhibit C are photographs that were taken during inspections of the Facility on May 29 and June 23.

B. SECURING FACILITY AND INVENTORY OF CLOSED LOOP INVENTORY

a) Initial On-Site Inspection by Olymbec and its Representatives

Within thirty (30) days following approval of this Interim Site Management Plan, Olymbec personnel and any consultants or other representatives will conduct an inspection of the Facility. The purpose of the visit will be to determine what additional security measures should be taken (to limit the potential of vandalism and other

unlawful entrances to the Facility. This inspection will also permit Olymbec to determine the scope of work necessary to complete other tasks to be implemented under this Interim Plan. Olymbec will reposition inventory as noted in d) below to facilitate the inspection.

b) Secure Premises to the Extent not already secured

To the extent that the inspection indicates that additional security measures need to be taken, Olymbec will complete the implementation of such measures within thirty (30) days following the completion of the initial on-site inspection.

c) Prepare OSHA safety plan

Following the initial on-site inspection, an OSHA safety plan will be prepared. The plan will address steps to be taken for persons that access the Closed Loop Facility. That plan will be prepared within thirty (30) days following the completions of the initial on-site inspection.

d) Movement of Containers or other Materials to allow for Assessment of Inventory of CRTs and other Materials and Future Inspections

Previous inspections of the Closed Loop Facility have revealed that so many containers of CRTs and other materials are present that access throughout parts of the Facility is limited. Boxes containing CRTS are commonly stacked three high. As part of the initial on-site inspection, containers will be relocated so as to facilitate the inspection of the areas of the Facility where inspections have not occurred and to facilitate future inspections of the Facility.

e) Interim Response Actions

As a result of the initial on-site inspection, may be interim response actions may need to be undertaken. For example, broken CRTs or other unsecured waste or materials may need to be containerized and disposed. Efforts to assess any needed interim response actions will be completed within ten (10) days following the initial on-site inspection.

f) Complete an Inventory of CRT's and other Materials (by group of product)

Once access throughout the Facility is achieved, Olymbec and/or its representatives will complete an inventory of the CRTs and other Materials stored at the Facility by Closed Loop.

At the same time that the inventory of the CRTs and other Materials is being conducted, Olymbec personnel or other representatives of Olymbec will conduct a search for any records or other documentation at the Facility that would help identify the source of

CRTs and other materials stored by Closed Loop at the Facility; Olymbec has recovered some Closed Loop records and documentation in the area(s) of the Facility that are currently accessible, however, once access throughout the Facility is achieved, Olymbec will and/or its representatives will complete a search for any additional records and documentation. The search will focus on any shipping and receiving records and documentation. Once the records and documentation are compiled (and depending upon the scope and quality of the documentation), Olymbec will prepare a spreadsheet detailing information on inventory shipments to and from the Facility.

It is anticipated that the inventory of the CRT's and other materials and the search for any records or other documentation can be completed within forty-five (45) days following access throughout the Facility is achieved. It is anticipated that the spreadsheet of shipments to or from the Facility can be completed within twenty-one (21) business days following the completion of the search for records or other documentation.

C. PERIODIC INSPECTIONS OF THE FACILITY

Olymbec will conduct periodic inspections of the Closed Loop Facility on a periodic basis. These inspections will take place on at least a quarterly basis (and more frequently if the circumstances warrant).

Olymbec will retain a security company to provide "drive by" patrols of the warehouse property on a weekly basis. During the weekly patrols, inspections will be conducted to assess the external access points of the warehouse building—and particularly the access points to the Closed Loop Facility—and for evidence of any vandalism or the presence of any CRTs or CRT materials outside the warehouse building.

D. INSURANCE COVERAGE LITIGATION

a) Insurance Coverage

Pursuant to the lease agreement, Closed Loop was required to obtain and maintain insurance. One policy obtained and maintained by Closed Loop was a commercial general liability and environmental exposure policy issued by Aspen Specialty Insurance Company. Olymbec is an additional insured under that insurance policy.

Olymbec timely notified Aspen Specialty Insurance Company of its claim for coverage under the policy, and Aspen Specialty Insurance Company has denied coverage.

b) Insurance Coverage Litigation

On October 3, 2016, Olymbec initiated legal action against Aspen Specialty Insurance Company seeking a declaratory judgment and damages. The legal action is pending in the United States District Court for the Southern District of Ohio, Eastern Division (Docket Number 2:16-cv-948).

Significant developments in the insurance coverage litigation will be provided in the periodic reports submitted to the Ohio EPA.

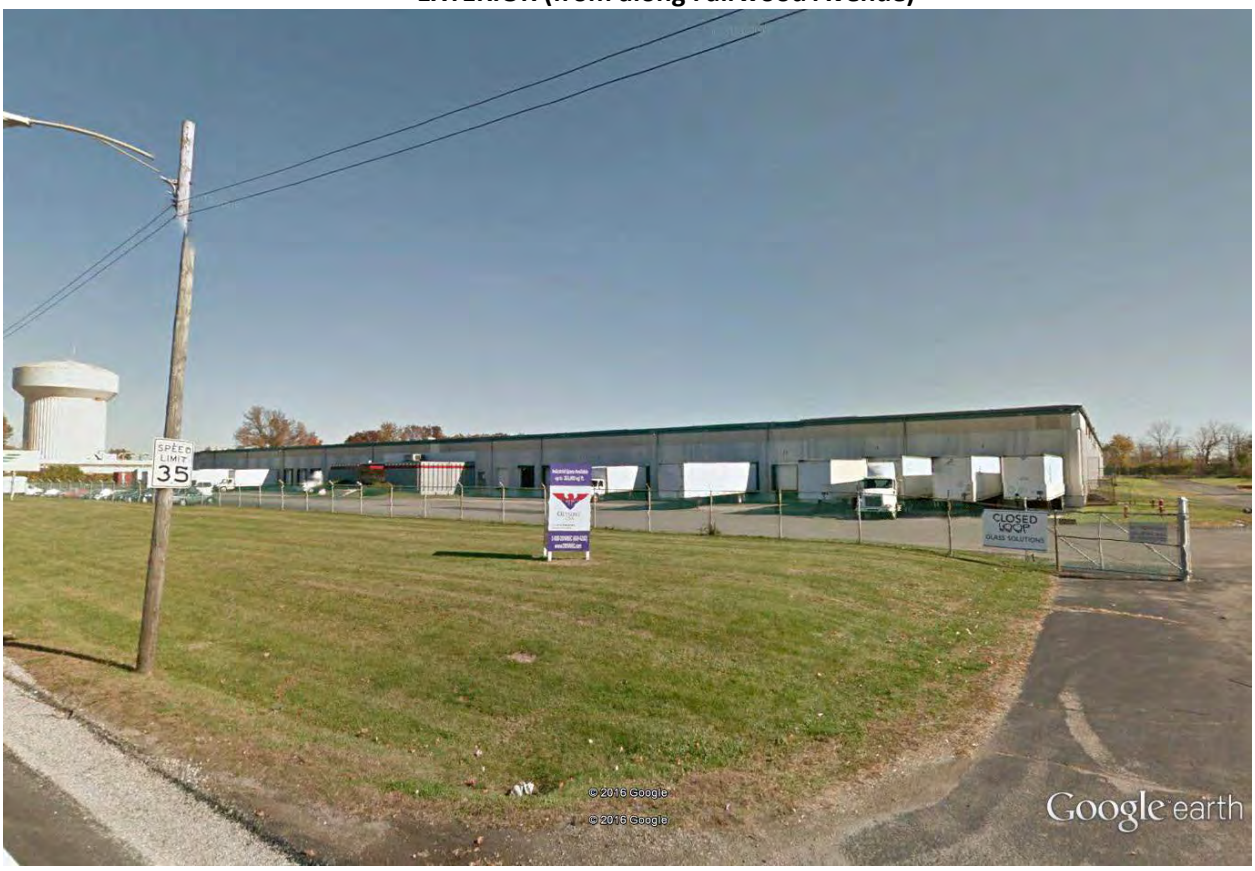
E. PROGRESS REPORTING

Following the initial on-site inspection, the completion of the inventory of CRTs and other materials, the search for shipping and receiving records or other documentation, and the completion of any interim response actions, Olymbec will provide a report to the Ohio EPA detailing the tasks performed and the findings. If any interim response actions are undertaken, documentation evidencing the response actions will be provided as part of that report. It is anticipated that a progress report will be submitted to the Ohio EPA within sixty (60) days following the completion of the tasks to be addressed in the initial progress report.

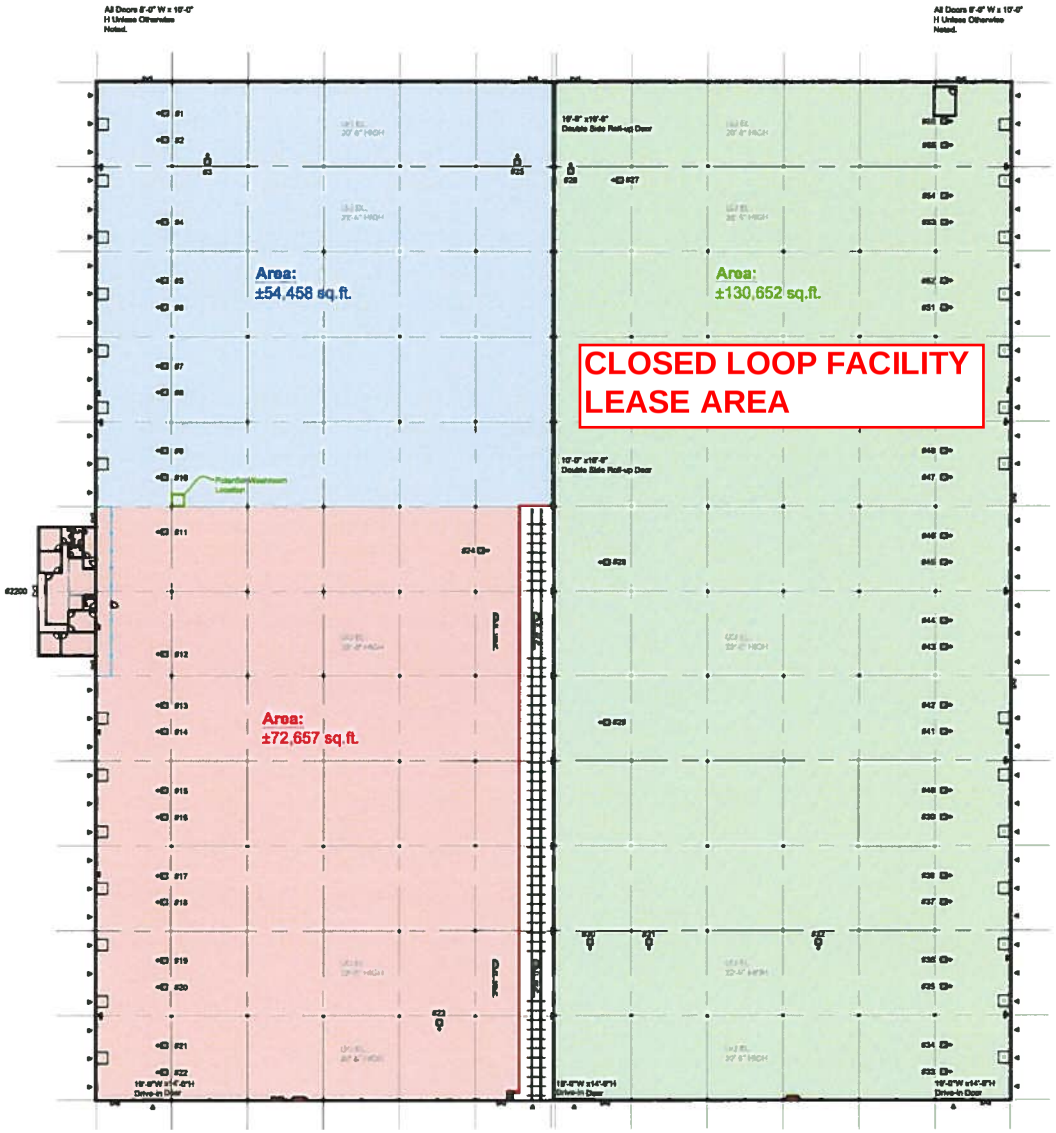
Subsequent progress reports will be provided at six (6) month intervals following the submission of the initial progress report.

EXHIBIT A

2200 FAIRWOOD AVENUE, COLUMBUS, OHIO
EXTERIOR (from along Fairwood Avenue)



AERIAL VIEW OF 2200 FAIRWOOD AVENUE, COLUMBUS, OHIO



▼ =Dock Level Garage Door

▽ =Drive-in Door

*Note That All Dimensions Are Approximate and subject to change without notice / Veuillez noter que les dimensions indiquées sont approximatives et peuvent changer sans avis

Legend:

no.	division/issue	date

Title/ Titre:

Floor Plan

Scale/Échelle: 1/64" = 1'-0"

Drawn By/ Dessiné par: JC

Date: 10.30.2014

Project Name and Location/ Nom et Localisation du Projet:

2200 Fairwood
Columbus, OH

Suite/Room #

OLYMBEC
333 Décarie
8th floor St. Laurent
Quebec H4N 3M9
Tel (514) 344-3334
WWW.OLYMBEC.COM

EXHIBIT B

EXHIBIT B

Closed Loop Facility
2200 Fairwood Avenue
Columbus, Ohio

PHOTOGRAPHS OF EXTERIOR


18

EXHIBIT C

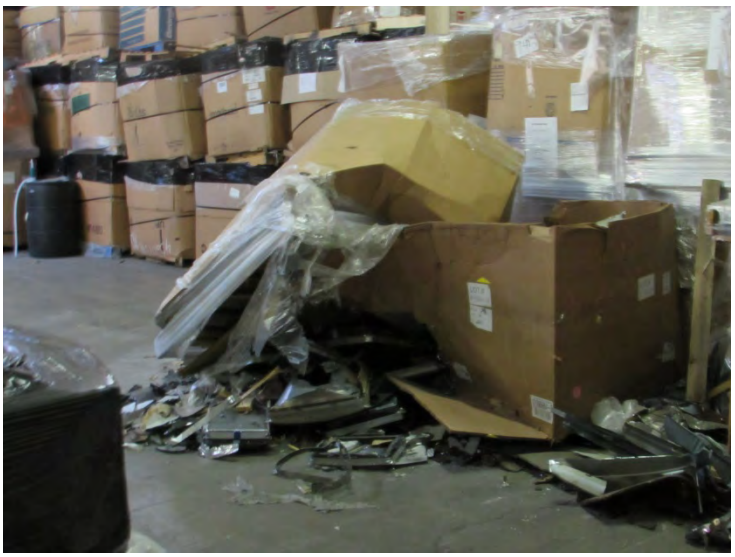
Closed Loop Facility
2200 Fairwood Avenue
Columbus, Ohio

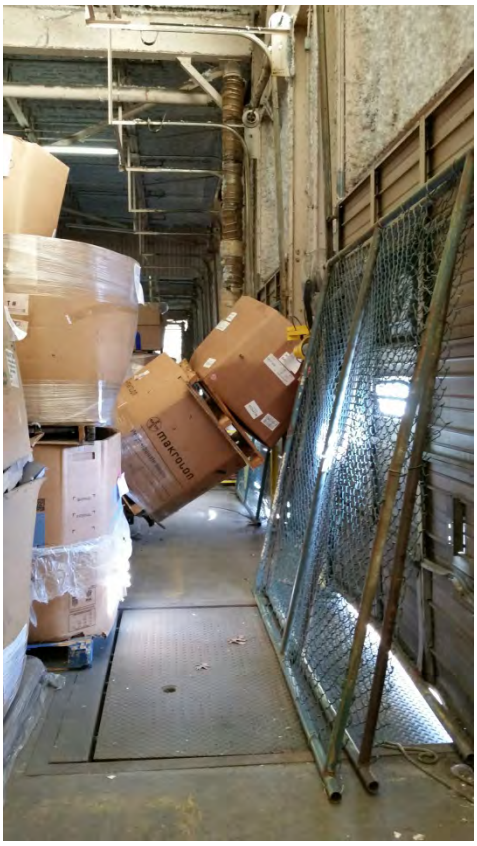
PHOTOGRAPHS OF INTERIOR


Ticona


PolyOne
UNILEVER
RETURNABLE - REUSABLE


867
905

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HYDROFLUORIC ACID
RQ, UN1790, HYDROFLUORIC ACID, 8, (6.1
UN-1790
CORROSIVE
8
RQ 100 LBS
HEALTH
FLAMMABILITY
REACTIVITY
PERSONAL PROTECTION
6

GLANKLER BROWN, PLLC
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FACSIMILE 901 525-2389
www.glankler.com

December 14, 2016

Ms. Andrea Smoktonowicz
Ohio EPA Senior Staff Attorney
Legal Office
50 W. Town Street, Suite 700
Columbus, Ohio 43215

Re: Closed Loop Refining and Recovery Facility (2200 Fairwood Avenue)

Dear Andrea:

Consistent with our recent conversation, I have enclosed a draft interim work plan that addresses steps our client, Olymbec USA LLC ("Olymbec"), is prepared to implement at the Closed Loop Refining and Recovery facility located at 2200 Fairwood Avenue.

By way of background, the property at 2200 Fairwood was acquired by Olymbec in December of 2013. The property, consisting of approximately 14.5 acres, includes a warehouse structure consisting of approximately 257,767 square feet. The Closed Loop Refining and Recovery facility occupies about fifty percent (50%) of the warehouse structure—consistent with the existing lease with Closed Loop Refining and Recovery, Inc. ("Closed Loop").

As the situation currently exists, Closed Loop is in default on the lease and has been so since early this year. To the best of Olymbec's knowledge, there have been no operations conducted at the facility by Closed Loop since early this year. Closed Loop's property and possessions (including the inventory of Cathode Ray Tubes (CRTs) and other glass materials) remain at the facility. Olymbec has taken certain measures to secure access to the facility.

By the submission of this interim plan, Olymbec is not acknowledging that it is responsible for the costs of securing the inventory of CRTs and other glass materials at the facility or the costs of recycling or disposal of the CRTs and other glass materials. In addition, by submitting this plan, Olymbec is not assuming such responsibility. In fact, Olymbec denies that it is liable for the costs associated with the inventory of CRTs and other glass materials that are now stored at the Closed Loop facility (including any necessary environmental response costs).

The intent of this plan is to provide a process to prepare a more in-depth and accurate inventory of CRTs, glass materials, or any other Closed Loop inventory; to secure such inventory; to facilitate a response to any conditions that merit immediate or near immediate attention; to assure that there will be periodic inspections of the facility and the inventory; and to

permit a search of records or other documentation that will used to develop a database of generator entities or suppliers that are responsible for the inventory of CRTs, other glass materials, and/or other materials at the facility.

Our client remains willing to work with the Ohio EPA. Hopefully, the Ohio EPA will agree that this interim plan provides the necessary assurance that, at least for the near future, the inventory at the Closed Loop facility will be secure. In addition, this plan should help provide opportunity and time for the parties to pursue other legal remedies that they may each have as to any responsible parties or other parties that may have some liability for conditions at the Closed Loop facility.

Please do not hesitate to contact either me or Jason Berger (Olymbec's Executive Vice President of U.S. Operations and U.S. General Counsel) if the Ohio EPA has any questions about the interim plan or if there are any other issues that we need to discuss.

Sincerely,
GLANKLER BROWN, PLLC

Randy B. Womack

Randall B. Womack

cc: Mr. Jason Berger, Olymbec USA LLC

GLANKLER BROWN, PLLC
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February 6, 2018

Ms. Andrea Smoktonowicz
Senior Staff Attorney
Ohio Environmental Protection Agency
Legal Office
50 W. Town Street, Suite 700
Columbus, Ohio 43215

Re: Closed Loop Recycling and Recovery, Inc. Facility
2200 Fairwood Avenue, Columbus, Ohio

Dear Andrea:

I have attached an interim status report on the Closed Loop facility located at 2200 Fairwood Avenue in Columbus, Ohio (the "Closed Loop Facility"). My client (Olymbec USA LLC), as you will recall, is the owner of the warehouse property where the Closed Loop Facility is located.

This report details a number of actions that have been undertaken during 2017 and early 2018. These actions included periodic inspections of the Closed Loop Facility, the removal of drums of hydrofluoric acid and a glass "washing" sludge from the Closed Loop Facility, and an assessment of dust within the Closed Loop Facility.

If you or anyone else at the Ohio EPA has any questions regarding this report, do not hesitate to contact me.

Sincerely,
GLANKLER BROWN, PLLC

Randy B. Womack

Randall B. Womack

cc: Mr. J. Fred Ingram, Associate Assistant Attorney General– Environmental Enforcement

INTERIM STATUS REPORT
NO. 1
January 31, 2018

CLOSED LOOP FACILITY
2200 FAIRWOOD AVENUE
COLUMBUS, OHIO

INTRODUCTION

In December of 2013, Olymbec USA LLC ("Olymbec") purchased property located at 2200 Fairwood in Columbus, Ohio (the "Property"). The Property, consisting of approximately 14.5 acres, includes a warehouse structure consisting of approximately 257,767 square feet.

In December of 2014, Olymbec leased 130,652 square feet of the warehouse facility (approximately fifty percent (50%) of the warehouse structure) to Closed Loop Refining and Recovery, Inc. ("Closed Loop"). The leased area of the warehouse structure will be referred to hereafter as the "Closed Loop Facility" or the "Facility." At the outset of the lease, Olymbec understood, through discussions with the Olymbec brokerage team, that Closed Loop would use the Facility for a general office and for warehousing and distribution associated with a cathode ray tube recycling operation.

In January of 2015, at the commencement of the lease, the Ohio EPA conducted an inspection of the Closed Loop Facility. No violations of the hazardous waste laws were identified as a result of the inspection. According to the inspection report, Closed Loop Glass Solutions was conducting a glass recycling operation at the Closed Loop Facility.[1] The Facility was apparently accepting "processed Cathode Ray Tubes (CRT, TV glass) which contained lead" from "its sister plant, Closed Loop Refining and Recovery" located at 1675 Watkins Road in Columbus. According to the inspection report, following some additional processing at the Closed Loop Facility, the recycled glass would be sent to another glass recycler/furnace. Olymbec was not aware that this inspection had taken place.

In February of 2015, the Ohio EPA conducted a follow-up inspection of the Closed Loop Facility. As a result of the inspection, the Ohio EPA learned that no shipments of "processed/clean" glass had taken place. The inspector also learned that "many pallets of unbroken CRTs" were arriving at the Closed Loop Facility. The inspector was advised that the pallets were coming from Closed Loop's facility at 1655 Watkins Road (adjacent to the Closed Loop facility at 1675 Watkins) and that the "unprocessed" CRTs were being relocated to the Closed Loop Facility at the Property because the "rent was too high" at the facility on Watkins Road. The inspector requested that Closed Loop provide the Ohio EPA with copies of bills of lading for the "first shipment" of "cleaned/processed" glass from the Closed Loop Facility. Olymbec did not know that these inspections had taken place and was not advised of the results of the inspections or that the Ohio EPA had requested documentation evidencing future shipments of cleaned/processed glass.

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[1] Only Closed Loop Refining and Recovery, Inc. was a party to the lease agreement. Olymbec was not aware that any other entity, and particularly Closed Loop Glass Solutions, would be conducting any operation at the Facility.

By a letter dated February 26, 2016 (a copy of which was sent to Olymbec), the Ohio EPA requested additional information regarding the inventory of unprocessed CRTs, processed CRT glass, and "cleaned" CRT glass during 2015 and shipments of "cleaned" CRT glass during 2015. The information requested by the Ohio EPA, it appears, would aid the Ohio EPA in determining if Closed Loop's operations at the Property (and at the Watkins Road facility) were in compliance with the speculative accumulation provisions set forth in Ohio Administrative Code (OAC) Rule 3745-51-01 and as required by the conditional exclusion for CRTs and processed CRT glass as provided in OAC Rule 3745-051-39. Closed Loop's status as a recycling facility would enable Closed Loop to store, handle and manage materials (CRT's processed glass and clean glass) that might otherwise be subject to the hazardous waste regulations.

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By the end of March or early April, 2016, it appeared that Closed Loop ceased operations at the Closed Loop Facility, and Closed Loop's property and possessions (including the inventory of Cathode Ray Tubes (CRTs) and other materials) remain at the Facility.

As of the date of this status report, Closed Loop has not resumed operations at the Closed Loop Facility and its property and possessions (including the inventory of Cathode Ray Tubes (CRTs) and other glass materials) remain at the Facility.

As a result of discussions with the Ohio EPA, Olymbec provided to the Ohio EPA an interim management plan for the Closed Loop Facility. The plan incorporates a number of specific tasks, including periodic inspections of the Facility to check on the status of Closed Loop's inventory of CRTs and other materials, the planned realignment of some of the storage containers to facilitate inspections and inventory activities, and the completion of an investigation for any documentation or other records of Closed Loop (including records indicating the sources of CRTs and other materials received by Closed Loop and stored at the Facility). The plan also reports an effort by Olymbec to pursue legal action with an insurer over coverage for the potential claims and damages arising out of the conditions at the Facility and

the management of the inventory of CRTs and other materials at the Facility. Olymbec was notified by the Ohio EPA's approval of that Plan by correspondence dated March 2, 2017.

This Interim Status Report is the first formal report of activities undertaken by Olymbec pursuant to the Interim Site Management Plan.

A. CURRENT CONDITION OF THE FACILITY AND INVENTORY

The Facility is situated within a warehouse building located at 2200 Fairwood Avenue in Columbus, Ohio. A site map showing the layout of the warehouse property is attached as Exhibit A. Olymbec acquired the warehouse building and real property in late 2014. The Closed Loop Facility is located in the eastern half of the warehouse building and consists of approximately 130,652 square feet. A site drawing depicting the area of the warehouse building leased by Closed Loop (the "Closed Loop Facility" or the "Facility") is attached as Exhibit B.

Limited inspections of the Facility interior have taken place on a number of occasions throughout 2017 and in January of 2018. The inspections were conducted on March 27, 2017, March 28, 2017, June 12, 2017, July 20, 2017, July 25, 2017, November 14, 2017, January 8, 2018 (as a result of a ruptured fire sprinkler line), January 9, 2018, and on January 11, 2018.

Except as noted below, there appears to have been no material change in the conditions that existed at the beginning of 2017.

B. SECURING FACILITY AND INVENTORY OF CLOSED LOOP INVENTORY

a) Initial On-Site Inspection by Olymbec and its Representatives

Not long after the approval of the Interim Site Management Plan, Olymbec personnel and consultants conducted an inspection of the Facility. The primary purpose of the inspection was to determine what waste removal actions should be taken and what other actions might be warranted.

b) Efforts to Better Secure the Facility and Premises

Olymbec has a maintenance engineer that is based in Dayton but inspects the exterior of the Closed Loop Facility (and other exterior areas of the Property) about once per week. A recent inspection revealed an exterior door that had fallen in disrepair and needed to be repaired or replaced. The conditions of the door were discovered on January 11, 2018, temporary measures have been taken to limit access to the facility through the door way, and steps are underway to replace the door.

c) Health and Safety Plan

A health and safety plan to facilitate activities at the Facility has been prepared by EnSafe Inc., an environmental consulting firm. The health and safety plan was prepared after EnSafe Inc. completed an assessment for the existence of lead contaminated dust at the Facility. A copy of the health and safety plan is attached as Exhibit C. This health and safety plan is intended to guide limited activities (such as inspections and minor maintenance) at the Facility. It does not cover activities of any contractors or any other parties conducting activities

at the Facility beyond an inspection of the Facility or minor maintenance activities. It is anticipated that contractors or other parties conducting any activities at the Facility (other than an inspection or minor maintenance) will be responsible for the preparation and implementation of their own health and safety plan.

Consistent with the health and safety plan, visitors to the facility are afforded masks, nitrile gloves and "booties" to wear while inside the facility. A waste disposal container (specially marked) is provided as a depository for used masks, gloves and "booties."

d) Movement of Containers or other Materials to allow for Assessment of Inventory of CRTs and other Materials and Future Inspections

There are so many containers of CRTs and other materials present that access throughout much of the Facility is restricted. The boxes (or gaylords) containing CRTS are commonly stacked three high. There has been no material rearrangement or relocation of boxes.

e) Interim Response Actions

As a result of inspections, it was discovered that there were drums containing or formerly containing hydrofluoric acid at the Facility. In addition, an open-top vat holding approximately 400 gallons of a dark brown liquid was located at the Facility. An adjoining vat contained what appeared to be approximately 100-gallons of dried sludge, and a nearby open-top tote contained approximately 150-gallons of dried sludge. Pictures evidencing drums, the vat, and the tote are attached hereto as Exhibit D.

Following discussions with the Ohio EPA, a limited waste removal action was undertaken. On July 25, 2017, Stericycle dispatched personnel and equipment to the facility. Six (6) drums of hydrofluoric acid were packed for transportation and disposal. Seven (7) drums were packed with a sludge material from the vat and the tote. The drums were transferred to the Petro Chemical Processing Group facility in Detroit, MI where the contents were characterized and, where possible, consolidated with like materials. The six (6) drums of hydroflouic acid were transferred to a TSD facility in Blainville, Québec (Stablex Canada) for stabilization and landfilling. The seven (7) drums of the sludge material were transferred to a treatment facility (EQ Detroit, Inc.) for stabilization. Following stabilization, the sludge material was landfilled.

An additional drum of "filter cake containing lead" was transferred to the Petro Chemical Processing Group facility in Detroit, MI where the contents were characterized and consolidated with like materials. The "filter cake" material was transferred to a treatment facility (EQ Detroit, Inc.) for stabilization. Following stabilization, the sludge material was landfilled.

Two (2) RCRA "empty" drums (formerly containing hydrofluoric acid) were transported to a drum recycler (Maxi Container, Inc.) in Michigan.

Waste manifests and other documentation (including waste profile documentation) evidencing the services performed by Stericycle are attached hereto as Exhibit E. Also included are "project reporting logs" that detail the work (performed by Stericycle's subcontractor, SWS Environmental Services) associated with the vats and the tote.

On July 20, 2017, EnSafe Inc. went to the Facility to perform an industrial hygiene assessment. The purpose of the assessment was to evaluate the presence of lead in settled dust throughout the Facility. Two (2) broken glass samples were collected. Sixteen (16) wipe samples were collected where dust had settled at the Facility. Laboratory analysis of the samples revealed the presence of lead. Laboratory analysis of thirteen (13) of the sixteen (16) wipe samples revealed the presence of lead above the Brookhaven National Laboratory housekeeping acceptable surface levels for lead. Laboratory analysis of the two (2) bulk samples (broken glass) were compared against Ohio Environmental Protection Agency generic direct-contact standards for lead in a commercial/industrial land use setting per Ohio Administrative Code 3745-300-08(C)(3)(f). Both samples exceeded those standards. A copy of a report evidencing EnSafe Inc.'s industrial hygiene assessment is attached hereto as Attachment 1 to Exhibit C.

f) Complete an Inventory of CRT's and other Materials (by group of product)

Olymbec has not completed a comprehensive inventory of the CRTs and other materials stored at the Facility by Closed Loop. However, preliminary assessments indicate that as much as 60 million pounds of CRTs and other electronic materials remain at the Facility.

After it was discovered that Closed Loop had ceased operations at the Facility, an inspection of the Facility resulted in the discovery of a limited number of shipping and receiving records, inventory records, and other documentation generated by Closed Loop. On June 12, 2017, Olymbec personnel or other representatives of Olymbec conducted a search for any additional records or other documentation. No other records or documentation were located. The Closed Loop records and other documentation initially recovered by Olymbec in have been provided to the Ohio Attorney General's Office.

Olymbec's legal counsel recently obtained copies of shipping and receiving records of Closed Loop that are being maintained by Closed Loop's landlord in Arizona. Those records need to be reviewed and compared with the records of Closed Loop that were discovered at the Facility by Olymbec.

C. PERIODIC INSPECTIONS OF THE FACILITY

See Section A for a discussion of inspections conducted at the Facility.

D. INSURANCE COVERAGE LITIGATION

a) Insurance Coverage

Pursuant to the lease agreement, Closed Loop was required to obtain and maintain insurance. One policy obtained and maintained by Closed Loop was a commercial general liability and environmental exposure policy issued by Aspen Specialty Insurance Company. Olymbec is an additional insured under that insurance policy.

Olymbec timely notified Aspen Specialty Insurance Company of its claim for coverage under the policy, and Aspen Specialty Insurance Company denied coverage.

b) Insurance Coverage Litigation

On October 3, 2016, Olymbec initiated legal action against Aspen Specialty Insurance Company ("Aspen") seeking a declaratory judgment and damages. The legal action is pending in the United States District Court for the Southern District of Ohio, Eastern Division (Docket Number 2:16-cv-948). Closed Loop is also a defendant in that legal action.

On January 5, 2017, Aspen filed a Rule 12(b)(6) motion to dismiss the legal action. By an Opinion and Order dated September 18, 2017, the Court denied Aspen's motion to dismiss. By this same Opinion and Order, the Court entered a default judgment against Closed Loop in favor of Olymbec on the matter of liability. No hearing is scheduled at this time on the damages to which Olymbec is entitled from Closed Loop.

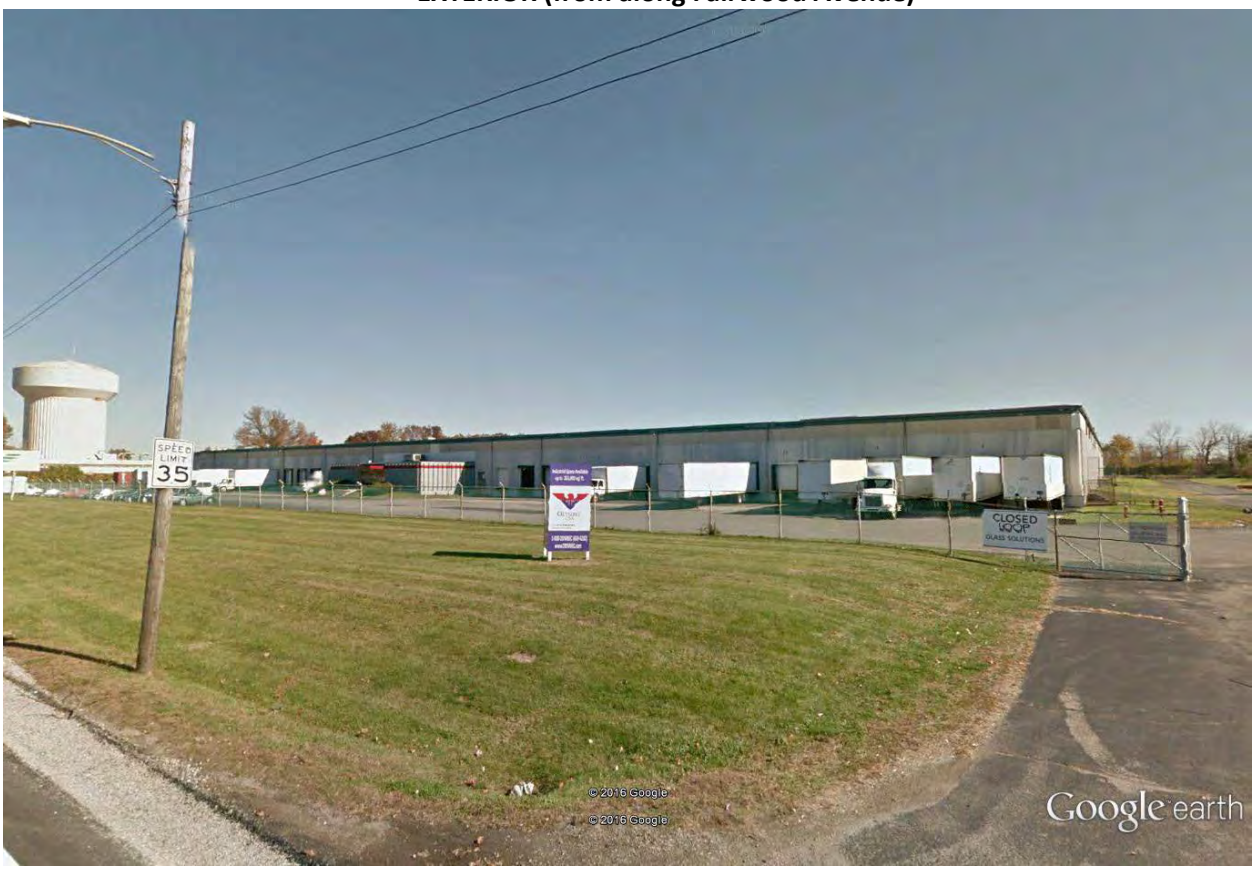
The Court has since entered a scheduling order. The trial of the legal action against Aspen is set for August 26, 2019.

E. PROGRESS REPORTING

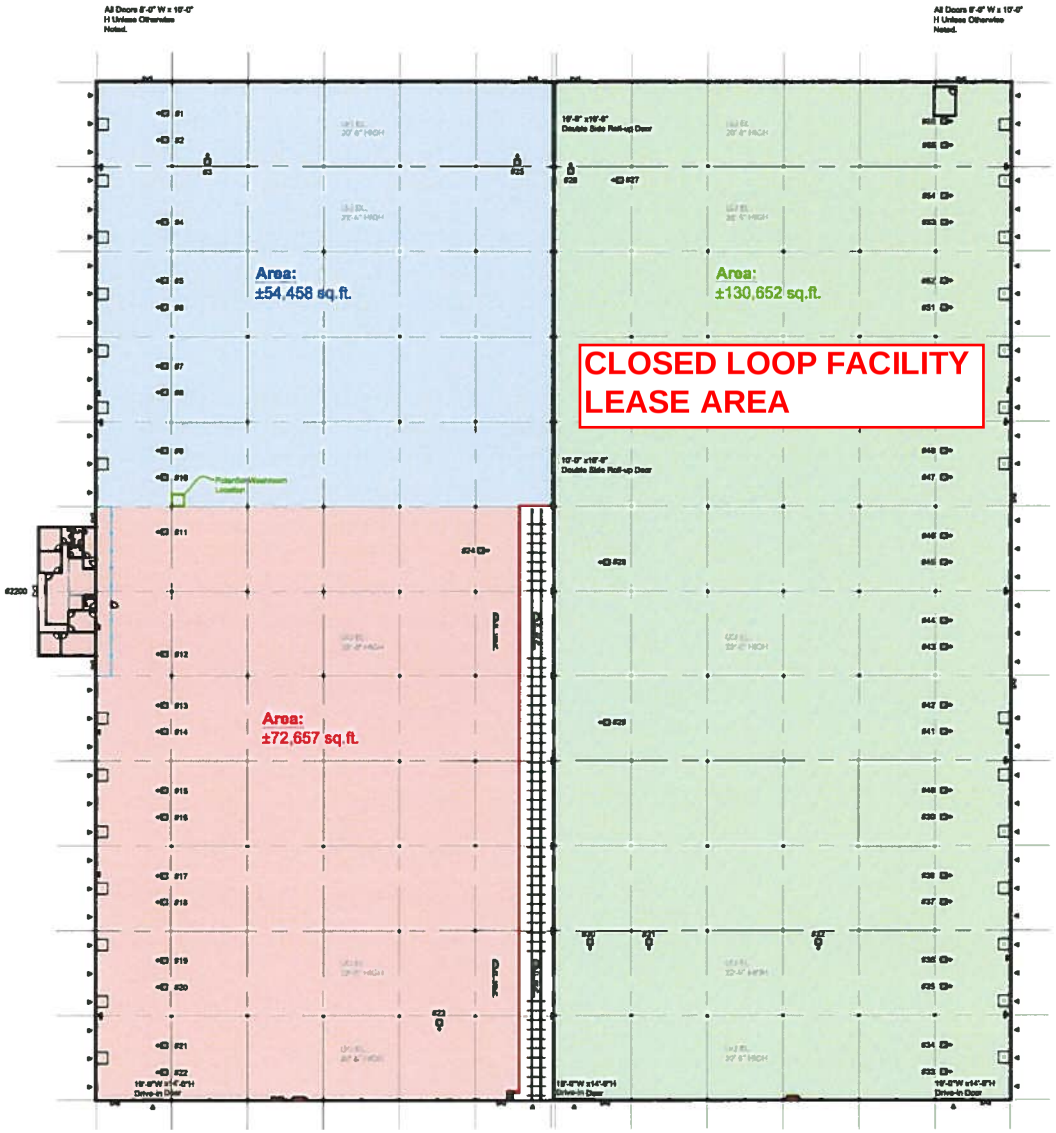
It is anticipated that the next interim status report will be submitted to the Ohio EPA on or about July 31, 2018.

EXHIBIT A

2200 FAIRWOOD AVENUE, COLUMBUS, OHIO
EXTERIOR (from along Fairwood Avenue)



AERIAL VIEW OF 2200 FAIRWOOD AVENUE, COLUMBUS, OHIO



▼ =Dock Level Garage Door

▽ =Drive-in Door

*Note That All Dimensions Are Approximate and subject to change without notice / Veuillez noter que les dimensions indiquées sont approximatives et peuvent changer sans avis

Legend:

no.	division/issue	date

Title/ Titre:

Floor Plan

Scale/Échelle: 1/64" = 1'-0"

Drawn By/ Dessiné par: JC

Date: 10.30.2014

Project Name and Location/ Nom et Localisation du Projet:

2200 Fairwood
Columbus, OH

Suite/Room #

OLYMBEC
333 Décarie
8th floor St. Laurent
Quebec H4N 3M9
Tel (514) 344-3334
WWW.OLYMBEC.COM

EXHIBIT B

EXHIBIT C

This Building Contains Dust From Past Cathode Ray Tube Recycling Operations That is Contaminated With Lead

For Your Protection – The Following Procedures Have Been Developed to Reduce Exposure to Lead-Containing Dust

NOTE:

THESE PROCEDURES ARE MINIMUM SUGGESTIONS FOR PROTECTION AGAINST LEAD DUST

THESE PROCEDURES ARE NOT INTENDED TO SUPPLANT SPECIFIC REQUIREMENTS OF 29 CFR §1910.1025 OR OTHER APPLICABLE REQUIREMENTS OF 29 CFR §1910.

CONTRACTORS ARE REQUIRED TO DEVELOP THEIR OWN SITE-SPECIFIC PROCEDURES TO REFLECT THE ACTIVITIES AND WORK PRACTICES THAT THEY WILL BE PERFORMING.

CFR – Code of Federal Regulations

1. Location

Former Closed Loop Refining and Recovery Inc.
2200 Fairwood Avenue
Columbus, Ohio 43207

2. Site History and Description

Olymbec USA LLC (Olymbec) owns the 257,767-square-foot warehouse structure at the above location. Closed Loop Refining and Recovery, Inc. (Closed Loop) leased 130,652 square feet of the building for warehousing and distribution as part of a cathode ray tube (CRT) recycling operation (subject property). Closed Loop subsequently ceased activities at the subject property without removing stored materials. Warehouse conditions include:

- Approximately 90 percent of the subject property floor space is occupied by palletized cardboard boxes containing CRTs and CRT glass stacked an average three boxes high.

- Several cardboard boxes have fallen to the floor, and broken CRTs and associated glass and other items have been observed near these boxes.

- Several cardboard boxes are leaning against or towards exterior warehouse walls and doors; these boxes preclude safe and efficient access around the stored boxes within the warehouse.

During July 2017, EnSafe Inc. performed a lead dust industrial hygiene assessment that included collection and analysis of wipe samples from 16 locations throughout the facility where dust had collected. Six samples were collected at elevated heights (from the top of suspended piping or structural building elements), five samples were collected from the concrete floor, and five samples were collected from the insulation covered walls. Two samples of broken CRT glass spilled from broken boxes were also collected.

Wipe sample results indicate that 13 of 16 wipe samples exceed Brookhaven National Laboratory non-lead operation area acceptable surface level criteria. Both broken CRT glass samples exceed Ohio Environmental Protection Agency's commercial/industrial land use generic direct contact standard per Ohio Administrative Code 3745-300-08(C)(3)(f). A copy of the industrial hygiene assessment report is included as Attachment 1.

The building can be accessed by a man-door at the southeast corner of the warehouse and an overhead door at the northwest corner. Approximately 4-foot wide paths are between the north, east, and west exterior walls of the building and stacked, palletized, cardboard boxes of CRTs and CRT glass. Several boxes have fallen against the east warehouse wall; accessing the north wall requires traversing one fallen box taking care to avoid glass poking through the box, box collapse, or additional boxes falling.

This plan is intended to notify contractors of the lead containing dust hazard pursuant to 29 Code of Federal Regulations (CFR) §1910.1025. Lead hazards within the warehouse include:

- Dust samples contain lead at concentrations between 16 and 750 µg/100 cm^2, which exceed the non-lead operation area acceptable surface level criteria of 40 µg/100 cm^2.

- The Occupational Safety and Health Administration permissible exposure limit and the American Conference of Governmental Industrial Hygienists Threshold Limit Value for lead is 0.050 mg/m^3.

- It is presumed that contractor activities within the building, including but not limited to, moving boxed materials, servicing building equipment (heaters, lights, etc.), and other activities that require more than visual assessment, **will have the potential to disturb dust and create airborne dust at concentrations greater than the Occupational Safety and Health Administration permissible exposure limit and the American Conference of Governmental Industrial Hygienists Threshold Limit Value for lead**. This assumption should be maintained until actual lead dust sampling has been performed.

3. Site Organization and Control

A.	Work Areas Identified:	☐	No	☒	Yes ***Contractor to define***
B.	Decontamination Areas Identified:	☐	No	☒	Yes ***Adjacent building entrance***
C.	Support Areas Established:	☐	No	☒	Yes ***Adjacent building entrance***
D.	Site Security Established:	☐	No	☒	Yes ***Doors are maintained locked***
E.	Sketch of Site Available:	☐	No	☒	Yes ***See Attachment 1***

4. Job Activities/Work Plans

This plan assumes that contractors will perform activities that have the potential to disturb lead containing dust. Specific activities will be documented in a Job Hazard Analysis (JHA) prepared by the contractor, or in a separate site specific health & safety plan that incorporates applicable elements of this plan.

This plan assumes that stacked cardboard boxes will not be climbed over. If a leaning box is encountered, contractors will assess if the leaning box poses an imminent falling hazard; if an imminent hazard is identified, and the leaning box cannot be safely passed, then the leaning box will not be passed. ***A site-specific health & safety plan or JHA that incorporates specific contractor procedures for removing/stabilizing leaning boxes is required.***

5. Education and Training

A. At a minimum, site workers must be trained pursuant to 29 CFR §1910.1025(l)

B. Site workers must be trained on site hazards pursuant to 29 CFR 1910.1200(h)

C. Additional training that may be required, includes, but is not limited to:

Confined Space Entry
Fall Protection
Lockout/Tagout
Special PPE Training
Other (Specify): _ _____

6. Medical Surveillance

A. Site workers may require medical surveillance pursuant to 29 CFR §1910.1025(j).

7. Ambient Field Monitoring

A. None required.

8. Levels of Protection

A. Job Activity: Contractor performing interior building maintenance or other activities that have the potential to disturb dust or create airborne dust

Level of Protection: Level C

List of Personal Equipment:

	No	Yes	
Air-Purifying Respirator	☐	☒	Cartridge: Half-face w/ P100 (or equal)
Boot Covers	☐	☒	
Chemical Protective Clothing	☐	☒	Model: ACM/Lead remediation suit
Gloves (Nitrile)	☐	☒	(Inner/Outer disposable)
Gloves (Specify:_____)	☐	☒	(If not nitrile; outer disposable)
Hard Hat	☐	☐	Depends on specific work activity
Safety Work Boot	☐	☒	Recommended
Safety Glasses	☐	☒	Recommended
High Visibility Vest	☐	☐	Depends on specific work activity

NOTE: PPE and Safety Equipment identified herein are minimum recommendations — and ***may not be applicable for all job activities*.**
CONTRACTOR IS RESPONSIBLE FOR SELECTING ACTIVITY APPROPRIATE PROTECTIVE EQUIPMENT FOR THEIR EMPLOYEES

9. Safety Equipment List

A. Safety Equipment (for lead dust protection only; additional equipment may be required depending on the project task.

	No	Yes	
Communications	☐	☒	(Cell phones)
Fall Protection System	☐	☐	Depends on specific work activity
Fire Extinguisher	☐	☐	Provided By: _____
First Aid Kit	☐	☒	
Full Body Entry Harness	☐	☐	Depends on specific work activity
Insulated Coveralls	☐	☐	Depends on specific work activity
Mechanical Retrieval	☐	☐	Depends on specific work activity
Other (Identify)	☐	☐	_____

EXHIBIT C

B. Decontamination Equipment:

	No	Yes	
Brushes	☐	☐	If tool decontamination required
Buckets	☐	☐	If tool decontamination required
Liquinox	☐	☐	If tool decontamination required
Water Source Available	☐	☒	(Containerized water required)
Chemical Wipes	☐	☒	(HexOff or similar to decontaminate small tools)
Other (Identify)	☐	☐	_____

C. Sanitation: ☐Latrines ☐Showers ☒ Hand Washing

10. Decontamination Procedures

A. Work Activity: Contractor performing interior building maintenance or other activities that have the potential to disturb dust or create airborne dust

Level of Protection: Level C

Decontamination Solutions: None

Procedures (by Station): Properly remove disposable PPE and discard in provided waste receptacle.

For non-disposable PPE (e.g., respirators) that can be decontaminated, see "B" (below).

For launderable PPE, follow procedures applicable to 29 CFR §1910.1025(g).

B. Work Activity: Reusable contractor equipment

Level of Protection: N/A

Decontamination Solutions: None (anticipated)

Procedures (by Station): Wipe tools with appropriate wipes and discard wipes in provided waste receptacle.

EXHIBIT C

11. Contingency Plans

A. Local Sources of Assistance:

1. Hospital: Ohio Health Grant Medical Center
   (address): 111 South Grant Avenue; Columbus, Ohio 43215
   (phone): (614) 566-9000
   - Directions:
     - Depart **Fairwood Avenue** (north);
     - Turn **right** onto **Frebis Avenue**;
     - Turn **left** onto **Alum Creek Drive**;
     - Turn **right** onto **US-33/E Livingston Avenue**;
     - Take ramp left and follow signs for **I-70 West**;
     - At **exit 101B**, take ramp **right** for **East Mound Street** toward Downtown;
     - Turn **right** onto **South Grant Avenue**
2. Ambulance (name and number): Columbus Division of Fire (911)
3. Fire Department (name and number): Columbus Division of Fire (911)
4. Police (name and number): Police 911
5. Site Phone Number: To be provided by contractor

B. National or Regional Sources of Assistance

1.	Olymbec USA LLC	1-901-398-2093
2.	CHEMTREC (24 hours)	1-800-424-9300
	The following may be reached through CHEMTREC:	
	• Chemical Manufacturer	
	• National Agricultural Chemical Association (NACA)	
	Pesticides Safety Team Network	
	• Energy Research and Development Administration (ERDA) (radioactive materials)	
3.	Association of American Railroads	1-202-293-4048
4.	Center for Disease Control (biological agents)	1-404-633-5313
5.	U.S. Department of Transportation, (USDOT) Office of Hazardous Materials Transportation	1-202-366-4488
6.	U.S. Environmental Protection Agency (USEPA Reg. 4)	1-800-241-1754
7.	National Response Center, (NRC) (oil and hazardous substances)	1-800-424-8802

EXHIBIT C

Attachment 1

EnSafe Inc.
Industrial Hygiene Assessment Report
October 12, 2017

EXHIBIT C

INDUSTRIAL HYGIENE ASSESSMENT REPORT

OLYMBEC USA LLC
2200 FAIRWOOD AVENUE
COLUMBUS, OHIO 43207

EnSafe Project Number:
0888821243/001

Prepared for:

OLYMBEC

Olymbec USA LLC
2200 Fairwood Avenue
Columbus, Ohio 43207

Sample Date: July 20, 2017
Draft Report Date: August 29, 2017
Final Report Date: October 12, 2017

525 Vine Street Suite 1755
Cincinnati, Ohio 45202
(513) 621-7233 | (513) 621-7234

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EXHIBIT C

INDUSTRIAL HYGIENE ASSESSMENT REPORT

OLYMBEC USA LLC
2200 FAIRWOOD AVENUE
COLUMBUS, OHIO 43207

EnSafe Project Number:
0888821243/001

Prepared for:

OLYMBEC
Olymbec USA LLC
2200 Fairwood Avenue
Columbus, Ohio 43207

Prepared by:

Michael Przybylski/Robert J. Goodman, CIH, CSP

August 28, 2017
Date

Reviewed by:

Edward B. Baker

October 12, 2017
Date

525 Vine Street Suite 1755
Cincinnati, Ohio 45202
(513) 621-7233 | (513) 621-7234

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EXHIBIT C

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EXECUTIVE SUMMARY

EnSafe Inc. performed an industrial hygiene assessment at the Olymbec USA LLC (Olymbec) owned facility in Columbus, Ohio, on July 20, 2017. The purpose and scope of the assessment was to evaluate the presence of lead in settled dust throughout a storage warehouse having been historically occupied by Closed Loop, a cathode ray tube recycler. At the time of inspection, the cathode ray tube materials and wastes associated with Closed Loop's operations were still present in the leased premises. Two bulk samples of broken cathode ray tube glass and sixteen wipe samples were collected.

Results of both broken glass bulk samples from the warehouse floor reveal the presence of lead. The bulk sample results exceed Ohio Environmental Protection Agency generic direct-contact standards for lead in a commercial/industrial land use.

In addition, current Occupational Safety and Health Administration standards for lead (29 Code of Federal Regulations 1910.1025(h)) require that "all surfaces shall be maintained as free as practicable of accumulations of lead." Results of the lead wipe samples reveal thirteen of the sixteen samples were above the Brookhaven National Laboratory housekeeping acceptable surface levels for lead.

EXHIBIT C

1.0 INTRODUCTION

Facility/Location:	Closed Loop Refining and Recovery Inc. 2200 Fairwood Avenue Columbus, Ohio
Facility Contact:	Mr. Mike Monnin, Maintenance Engineer
Monitoring Date:	July 20, 2017
Contaminants:	Lead
EnSafe Inc. Field Personnel:	Mr. Michael Przybylski and Mr. Kevin Losekamp
EnSafe Project Manager:	Mr. Edward B. Baker
Reason for Monitoring:	Specific Request

Olymbec USA LLC (Olymbec) owns a 257,767-square-foot warehouse structure at 2200 Fairwood Avenue in Columbus, Ohio. Closed Loop Refining and Recovery, Inc. (Closed Loop) leased 130,652 square feet of the building for warehousing and distribution as part of a cathode ray tube (CRT) recycling operation (subject property). During EnSafe's March 26, 2017, site visit, the warehouse conditions were as follows:

- Approximately 90 percent of the subject property floor space was occupied by palletized cardboard boxes containing CRTs and CRT glass stacked an average of three boxes high.
- Several cardboard boxes had historically fallen to the floor, and broken CRTs and associated glass were on the subject property floor near these boxes.
- Several cardboard boxes were leaning against or towards exterior warehouse walls and doors; these boxes precluded safe and efficient access around the stored boxes within the warehouse.

This industrial hygiene assessment was performed to assist Olymbec in evaluating the release or spill of pollutants or hazardous materials or substances because of the Closed Loop operations.

2.0 SAMPLING

Bulk

Two bulk samples of broken CRT glass spilled from broken boxes were collected. The sample locations were selected based upon EnSafe's March 2017 site visit. The following summarizes the bulk sample locations:

Sample Number	Sample Description
17-0187586	Glass Warehouse South
17-0187576	Glass Warehouse Mid

Wipe

Wipe samples were collected at sixteen locations where dust had collected throughout the facility. Six samples were collected at an elevated height (either from the tops of suspended piping or from structural building elements), five samples were collected from the concrete floor, and five samples were collected from the insulation covered walls. The following summarizes the wipe sample locations:

Sample Number	Sample Description
17-0187591	Elevated-1
17-0187590	Elevated-2
17-0187589	Elevated-3
17-0187588	Elevated-4
17-0187587	Elevated-5
17-0187585	Elevated-6
17-0187584	Floor-1
17-0187583	Floor-2
17-0187582	Floor-3
17-0187581	Floor-4
17-0187580	Floor-5
17-0187579	Wall-1
17-0187578	Wall-2
17-0187577	Wall-3
17-0187575	Wall-4
17-0187574	Wall-5

The approximate location of each sample, sample identification, laboratory identification, and result can be referenced in Figure 1.

3.0 METHODS AND MATERIALS

Bulk sampling for lead was conducted while wearing nitrile gloves and laboratory provided glass jars to collect broken glass on the floor. Wipe sampling was conducted using nitrile gloves, pre-moistened lead wipes, sample templates, and plastic vials. Wipe sampling was conducted inside a new 100-square centimeter template using pre-moistened wipes. Elevated wipe samples were accessed using a 24-foot extension ladder to sample areas accessible from the warehouse floor (e.g., were not blocked by stored boxes). Wall samples were generally collected between heights of approximately 3 to 5 feet above the floor from fibrous insulation.

Analysis of the samples was performed following modified Method SW846 3050B/6010C/OSHA 125G ICP BULK for the bulk samples, and modified SW846 3051A/3050B/6010C/NIOSH9102 ICP LD for the wipe samples, at the American Industrial Hygiene Association-accredited laboratory, SGS Galson Laboratories, East Syracuse, New York. The sampling media and templates were provided by SGS Galson Laboratories.

4.0 RESULTS

Information about each sample, including the sampling parameters, laboratory analytical results, analytical method, applicable exposure limit, and comments, is referenced in Attachment A. The laboratory analytical report is provided in Attachment B. Bulk sample results are reported in milligrams per kilogram, while wipe sample results are reported in micrograms per cubic centimeter in the laboratory analytical report. The wipe sample results were converted to micrograms per 100 cubic centimeters, as reported in Attachment A, to facilitate comparison against screening criteria.

The bulk sample results were compared against Ohio Environmental Protection Agency generic direct-contact standards for lead in a commercial/industrial land use setting per Ohio Administrative Code 3745-300-08(C)(3)(f).

The Occupational Safety and Health Administration standard (29 Code of Federal Regulations 1910.1025(h)) for lead requires "all surfaces shall be maintained as free as practicable of accumulations of lead." Wipe sample results were compared against the non-lead operational area acceptable surface levels, e.g., "areas where metals are not routinely handled and personal hygiene control practices are not in-place (e.g. eating and drinking are allowed; hand washing is not expected on exit of the area)" published by the Brookhaven National Laboratory, Surface Wipe Sampling Procedure Number IH75190 (Revision March 4, 2014).

Considering our observations, combined with the analytical results obtained from the collected samples, it is to our professional opinion that the lead dust detected in the wipe samples collected by EnSafe is the result of releases and/or spills resulting from the operations historically conducted by Closed Loop.

5.0 DISCLAIMER

This report is for the sole use of Olymbec and their legal representatives. Use of this report by any other party will be at such party's sole risk, and EnSafe disclaims liability for any such use or reliance by third parties. The results presented in this report are indicative of conditions at the time of the assessment. This study does not purport to include every safety or health hazard at this location, and only those areas and exposures specifically mentioned were evaluated. EnSafe disclaims liability for Olymbec's safety beyond the content of this report. EnSafe prepared this report based upon the direction and information provided by Olymbec, and shall not assume responsibility for misinformation that EnSafe could not reasonably determine was incorrect at the time of the performance of work.

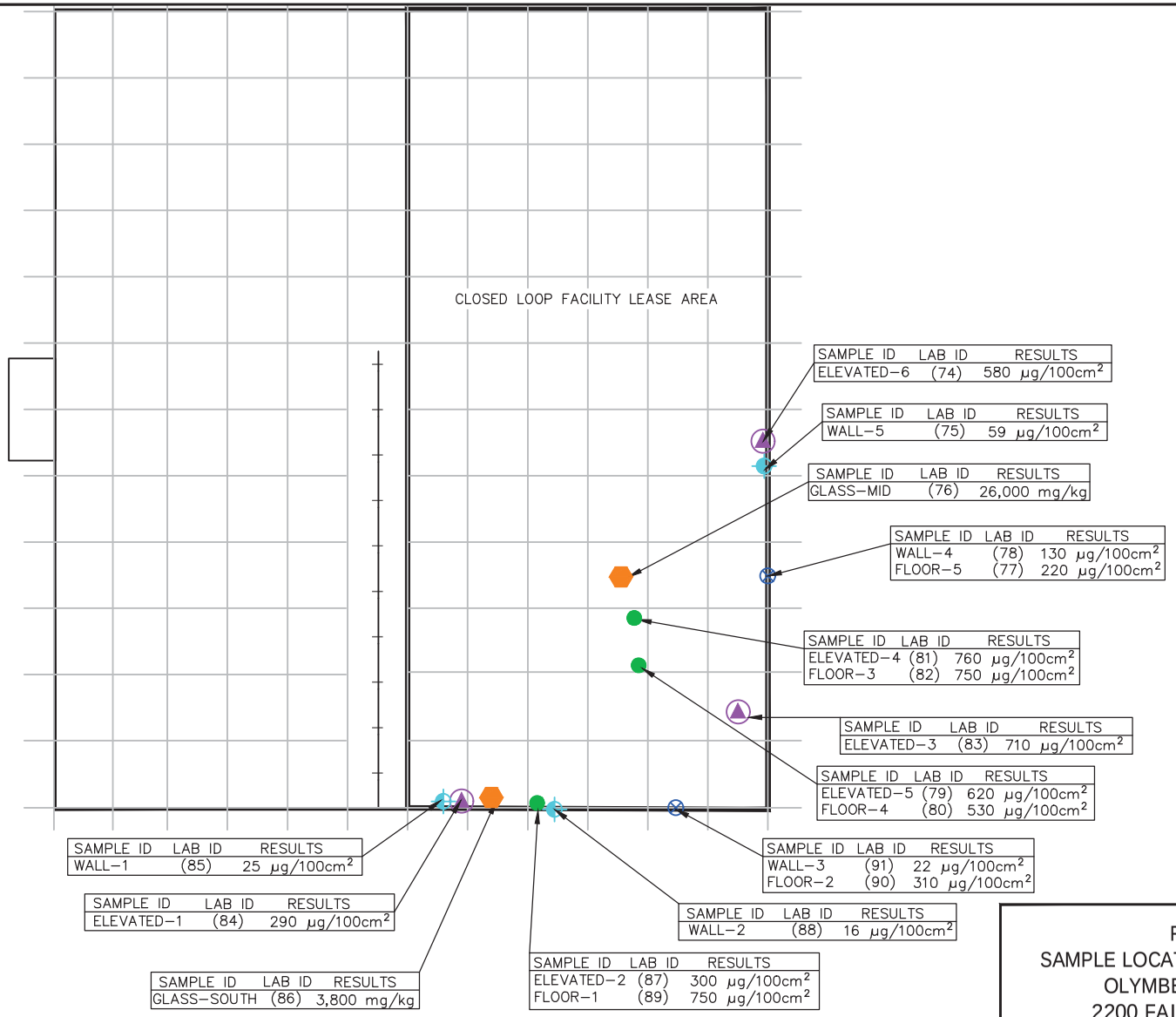

EXHIBIT C

FIGURE 1
SAMPLE LOCATIONS AND DATA MAP
OLYMBEC WAREHOUSE
2200 FAIRWOOD AVENUE
COLUMBUS, OHIO

LEGEND

- ELEVATED AND FLOOR WIPE SAMPLE LOCATION
- ELEVATED SAMPLE LOCATION
- BULK GLASS SAMPLE LOCATION
- BULK INSULATION AND FLOOR WIPE SAMPLE LOCATION
- BULK INSULATION SAMPLE LOCATION

mg/kg MILLIGRAMS PER KILOGRAMS
µg/100cm² MICROGRAMS PER 100 CENTIMETERS SQUARED
(88) LAB IDENTIFICATION NUMBER

REQUESTED BY:	KL
DRAWN BY:	KMB
DATE:	08/28/2017
PROJECT:	0888821243

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I:\CAD PROJECTS\21243 Olymbec Warehouse_Ohio\Plans\21243_B001_SAMPLE_DATA_OLYMBEC WAREHOUSE_OHIO.dwg 8/28/2017 5:22:18 PM

EXHIBIT C

Attachment A
Bulk and Wipe Sampling Results

EXHIBIT C

TABLE 1

SUMMARY OF ANALYTICAL RESULTS

OLYMBEC USA LLC
COLUMBUS, OHIO

Sample Description	Laboratory Sample ID	Screening Value	Sample Result	Units
Bulk Broken Glass on Floor				
Glass- Warehouse South	17-0187586	1,800	**3,800**	mg/kg
Glass- Warehouse Mid	17-0187576	1,800	**26,000**	mg/kg
Wipe Samples				
Elevated-1	17-0187584	40	**290**	µg/100 cm²
Elevated-2	17-0187587	40	**300**	µg/100 cm²
Elevated-3	17-0187583	40	**710**	µg/100 cm²
Elevated-4	17-0187581	40	**760**	µg/100 cm²
Elevated-5	17-0187579	40	**620**	µg/100 cm²
Elevated-6	17-0187574	40	**580**	µg/100 cm²
Floor-1	17-0187589	40	**750**	µg/100 cm²
Floor-2	17-0187590	40	**310**	µg/100 cm²
Floor-3	17-0187582	40	**750**	µg/100 cm²
Floor-4	17-0187580	40	**530**	µg/100 cm²
Floor-5	17-0187577	40	**220**	µg/100 cm²
Wall-1	17-0187585	40	25	µg/100 cm²
Wall-2	17-0187588	40	16	µg/100 cm²
Wall-3	17-0187591	40	22	µg/100 cm²
Wall-4	17-0187578	40	**130**	µg/100 cm²
Wall-5	17-0187575	40	**59**	µg/100 cm²

Notes:

Samples were collected by EnSafe Inc. and analyzed by SGS Galson Laboratories, East Syracuse, New York Broken glass bulk samples were analyzed according to modified Method SW846 3050B/6010C/OSHA 125G ICP BULK. Wipe samples were analyzed according to modified Method SW846 3051A/3050B/6010C/NIOSH9102 ICP LD.

Broken Glass Screening Value: Commercial/Industrial Land Use Generic Direct Contact Standard per Ohio Administrative Code 3745-300-08(C)(3)(f).

Wipe Sample Screening Value: Brookhaven National Laboratory non-lead operation area acceptable surface level criteria. Surface Wipe Sampling Procedure Number IH75190 (March 4, 2014)

mg/kg = milligrams per kilogram

µg/100 cm² = micrograms per 100 square centimeters

Boxed bold values = Exceeds screening criteria

EXHIBIT C

Attachment B
Laboratory Analytical Results

EXHIBIT C

SGS GALSON

Mr. Mike Przybylski
EnSafe, Inc.
525 Vine Street
Suite 1755
Cincinnati, OH 45202

July 28, 2017

DOH ELAP #11626
AIHA-LAP #100324

Account# 13497

Login# L413286

Dear Mr. Przybylski:

Enclosed are the analytical results for the samples received by our laboratory on July 21, 2017. All test results meet the quality control requirements of AIHA-LAP and NELAC unless otherwise stated in this report. All samples on the chain of custody were received in good condition unless otherwise noted.

Results in this report are based on the sampling data provided by the client and refer only to the samples as they were received at the laboratory. When possible, non-IOM samples will be retained for 14 days following the date of this report (unless an extension is specifically requested). IOM samples are retained for 7 days.

Current Scopes of Accreditation can be viewed at www.galsonlabs.com in the accreditations section under the "about Galson" tab.

Please contact Tonya Lancaster at (888) 432-5227, if you would like any additional information regarding this report. Thank you for using SGS Galson Laboratories.

Sincerely,

SGS Galson Laboratories

Lisa Swab
Laboratory Director

Enclosure(s)

Galson Laboratories, Inc. is now a part of SGS, the world's leading inspection, verification, testing, and certification company. As part of our transition to SGS, you will begin to see some formatting changes with reports that will improve the presentation of data and allow for the transition to the new logo.

SGS GALSON

6601 Kirkville Road
East Syracuse, NY 13057
(315) 432-5227
FAX: (315) 437-0571
www.galsonlabs.com

LABORATORY ANALYSIS REPORT

Client : EnSafe
Site : Olymbec Warehouse-Columbus, OH
Project No. : 0888821243-001
Date Sampled : 20-JUL-17
Date Received : 21-JUL-17

Account No.: 13497
Login No. : L413286
Date Analyzed : 26-JUL-17 - 27-JUL-17
Report ID : 1009499

Lead

Sample ID	Lab ID	Weight g	Total ug	Conc mg/kg
17-0187586	L413286-6	0.13	480	3800
17-0187576	L413286-16	0.12	3300	26000

EXHIBIT C

COMMENTS: Please see attached lab footnote report for any applicable footnotes.

Level of quantitation: 20. mg/kg
Analytical Method : mod. SW846 3050B/ 6010C/ OSHA 125G ICP BULK
OSHA PEL : NA
Collection Media : Bulk

Submitted by: SJW/JPA
Approved by : JJL/KEG
Date : 28-JUL-17
Supervisor: KEG

NYS DOH # : 11626
QC by: NDC

< -Less Than mg -Milligrams m3 -Cubic Meters kg -Kilograms NA -Not Applicable ND -Not Detected
> -Greater Than ug -Micrograms l -Liters NS -Not Specified ppm -Parts per Million

SGS GALSON

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East Syracuse, NY 13057
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FAX: (315) 437-0571
www.galsonlabs.com

LABORATORY ANALYSIS REPORT

Client : EnSafe
Site : Olymbec Warehouse-Columbus, OH
Project No. : 0888821243-001
Date Sampled : 20-JUL-17
Date Received : 21-JUL-17

Account No.: 13497
Login No. : L413286
Date Analyzed : 25-JUL-17
Report ID : 1009217

Lead

Sample ID	Lab ID	Area cm2	Total ug	Conc ug/cm2
17-0187591	L413286-1	100	22	0.22
17-0187590	L413286-2	100	310	3.1
17-0187589	L413286-3	100	750	7.5
17-0187588	L413286-4	100	16	0.16
17-0187587	L413286-5	100	300	3.0
17-0187585	L413286-7	100	25	0.25
17-0187584	L413286-8	100	290	2.9
17-0187583	L413286-9	100	710	7.1
17-0187582	L413286-10	100	750	7.5
17-0187581	L413286-11	100	760	7.6
17-0187580	L413286-12	100	530	5.3
17-0187579	L413286-13	100	620	6.2
17-0187578	L413286-14	100	130	1.3
17-0187577	L413286-15	100	220	2.2
17-0187575	L413286-17	100	59	0.59
17-0187574	L413286-18	100	580	5.8

COMMENTS: Please see attached lab footnote report for any applicable footnotes.

Level of quantitation: 1.3 ug
Analytical Method : mod. SW846 3051A/3050B/6010C/NIOSH9102 ICP LD
OSHA PEL : NA
Collection Media : Lead Wipe

Submitted by: SJW/JPA
Approved by : KEG
Date : 26-JUL-17
Supervisor: KEG

NYS DOH # : 11626
QC by: NDC

< -Less Than mg -Milligrams m3 -Cubic Meters kg -Kilograms NA -Not Applicable ND -Not Detected
> -Greater Than ug -Micrograms l -Liters NS -Not Specified ppm -Parts per Million

EXHIBIT C

SGS GALSON

6601 Kirkville Road
East Syracuse, NY 13057
(315) 432-5227
FAX: (315) 437-0571
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LABORATORY FOOTNOTE REPORT

Client Name : EnSafe
Site : Olymbec Warehouse-Columbus, OH
Project No. : 0888821243-001

Date Sampled : 20-JUL-17 Account No.: 13497
Date Received: 21-JUL-17 Login No. : L413286
Date Analyzed: 25-JUL-17 - 27-JUL-17

Unless otherwise noted below, all quality control results associated with the samples were within established control limits or did not impact reported results.

Note: The findings recorded within this report were drawn from analysis of the sample(s) provided to the laboratory by the Client (or a third party acting at the Client's direction). The laboratory does not have control over the sampling process. The findings herein constitute no warranty of the samples' representativeness of any sampled environment and strictly relate to the samples as they were presented to the laboratory.

Unrounded results are carried through the calculations that yield the final result and the final result is rounded to the number of significant figures appropriate to the accuracy of the analytical method. Please note that results appearing in the columns preceeding the final result column may have been rounded and therefore, if carried through the calculations, may not yield an identical final result to the one reported.

The stated LOQs for each analyte represent the demonstrated LOQ concentrations prior to correction for desorption efficiency (if applicable).

Unless otherwise noted below, reported results have not been blank corrected for any field blank or method blank.

L413286 (Report ID: 1009499):
Reported results reflect elemental analysis of the requested metals. Certain compounds may not be solubilized during digestion, resulting in data that is biased low.
SOPs: MT-SOP-9(32), MT-SOP-5(22)
Level of quantitation varies with actual sample mass used for preparation.
Samples are digested and analyzed as received unless specified otherwise.

L413286 (Report ID: 1009499):
Accuracy and mean recovery data presented below is based on a 95% confidence interval (k=2). The estimated accuracy applies to the media, technology, and SOP referenced in this report and does not account for the uncertainty associated with the sampling process. The accuracy is based solely on spike recovery data from internal quality control samples. Where N/A appears below, insufficient data is available to provide statistical accuracy and mean recovery values for the associated analyte.

Parameter	Accuracy	Mean Recovery
Lead	+/-9.5%	96.4%

L413286 (Report ID: 1009217):
Reported results reflect elemental analysis of the requested metals. Certain

< -Less Than mg -Milligrams m3 -Cubic Meters kg -Kilograms ppm -Parts per Million
> -Greater Than ug -Micrograms l -Liters NS -Not Specified ND -Not Detected NA -Not Applicable

EXHIBIT C

SGS GALSON

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East Syracuse, NY 13057
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FAX: (315) 437-0571
www.galsonlabs.com

LABORATORY FOOTNOTE REPORT

Client Name : EnSafe
Site : Olymbec Warehouse-Columbus, OH
Project No. : 0888821243-001

Date Sampled : 20-JUL-17 Account No.: 13497
Date Received: 21-JUL-17 Login No. : L413286
Date Analyzed: 25-JUL-17 - 27-JUL-17

L413286 (Report ID: 1009217):
compounds may not be solubilized during digestion, resulting in data that is biased low.
SOPs: MT-SOP-9(32), im-mwvleadwp(22)

L413286 (Report ID: 1009217):
Accuracy and mean recovery data presented below is based on a 95% confidence interval (k=2). The estimated accuracy applies to the media, technology, and SOP referenced in this report and does not account for the uncertainty associated with the sampling process. The accuracy is based solely on spike recovery data from internal quality control samples. Where N/A appears below, insufficient data is available to provide statistical accuracy and mean recovery values for the associated analyte.

Parameter	Accuracy	Mean Recovery
Lead	+/-22.4%	101%

EXHIBIT C

< -Less Than mg -Milligrams m3 -Cubic Meters kg -Kilograms ppm -Parts per Million
> -Greater Than ug -Micrograms l -Liters NS -Not Specified ND -Not Detected NA -Not Applicable

~~L413 3~~ GT 4413286

SGS GALSON

787244958705
Date:07/21/17
Shipper:FEDEX
Initials:KMS
Prep:UNKNOWN

Countertop

☐ New Client?

Report To*: Mike Przybylski / Kevin Losekamp / Ned Baker
EnSafe
525 Vine St ste1755
Cinti, OH 45202

Invoice To*: EnSafe

Client Account No.*:

Phone No.*: 513 621 7233

Cell No.:

Email Results To:

Email Address:

Phone No.:

Email:

Purchase Order No.:

Credit Card: ☐ Credit Card on File ☐ Call for Credit Card Info

☐ Samples submitted using the FreePumpLoan™ Program. ☐ Samples submitted using the FreeSamplingBadges™ Program.

Need Results By*:	(surcharge)
☒ Standard	0%
☐ 4 Business Days	35%
☐ 3 Business Days	50%
☐ 2 Business Days	75%
☐ Next Day by 6pm	100%
☐ Next Day by Noon	150%
☐ Same Day	200%

Site Name: Olymbec Warehouse - Columbus, OH Project: 0888821243-001 Sampled By: EnSafe

Comments:

List description of industry or process/interferences present in sampling area:

State samples were collected in (ex. NY): OH

Please indicate which OEL this data will be used for: ☐ OSHA PEL ☐ ACGIH TLV ☐ Cal OSHA ☐ MSHA ☐ Other (specify):

Sample Identification* (Maximum of 20 characters, ID's longer than 20 characters will be abbreviated.)	Date Sampled* (mm/dd/yy)	Collection Medium	Sample Volume, Sample Time, or Sample Area*	Sample Units*: L, ml, min., in2, cm2, ft2	Analysis Requested*	Method Reference^	Hexavalent Chromium Process (ex. welding, plating, painting, etc.)*
Example	01/01/11	2pc UW PVC	960	L	Hexavalent Chromium (Cr6)	mod. OSHA ID-215	Welding
17-0187591	7-20-17	wipe	100	cm2	Lead	SW846...	
90	↓	↓	↓	↓	↓	↓	
89							
88							
87							
86		Bulk	~	–			
85							
84							
83							
82	↓	↓	↓	↓	↓	↓	

^Galson Laboratories will substitute our routine/preferred method if it does not match the method listed on the COC unless this box is checked: ☐ Use method(s) listed on COC

For metals analysis: if requesting an analyte with the option of a lower LOQ please indicate if the lower LOQ is required (only available for certain analytes see SAG):

For crystalline silica: form(s) of silica needed must be indicated (Quartz, Cristobalite, and/or Tridymite)*:

Chain of Custody	Print Name/Signature	Date/Time		Print Name/Signature	Date/Time
Relinquished by:	MPrzybylski	7-20-17	Received by:	Kris Stone Kris Stone	7/21/17 11:34
Relinquished by:			Received by:		

Samples received after 3pm will be considered as next day's business.

*Required fields, failure to complete these fields may result in a delay in your samples being processed. Page 1 of 1

LAB ORIGINAL

EXHIBIT C

SGS GALSON

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East Syracuse, NY 13057-9672
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888-432-5227
Fax: 315-437-0571
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☐ New Client?

Report To* : | Invoice To* :

Client Account No.* : See Pg 1 | See Pg 1

Phone No.* : | Phone No. :

Cell No. : | Email :

Email Results To : | Purchase Order No. :

Email Address : | Credit Card : ☐ Credit Card on File ☐ Call for Credit Card Info

☐ Samples submitted using the FreePumpLoan™ Program. ☐ Samples submitted using the FreeSamplingBadges™ Program.

Need Results By*:	(surcharge)
☒ Standard	0%
☐ 4 Business Days	35%
☐ 3 Business Days	50%
☐ 2 Business Days	75%
☐ Next Day by 6pm	100%
☐ Next Day by Noon	150%
☐ Same Day	200%

Site Name : | Project : | Sampled By :

Comments:

List description of industry or process/interferences present in sampling area:

State samples were collected in (ex. NY):

Please indicate which OEL this data will be used for:
☐ OSHA PEL ☐ ACGIH TLV ☐ Cal OSHA
☐ MSHA ☐ Other (specify):

Sample Identification* (Maximum of 20 characters, ID's longer than 20 characters will be abbreviated.)	Date Sampled* (mm/dd/yy)	Collection Medium	Sample Volume, Sample Time, or Sample Area*	Sample Units*: L, ml, min., in2, cm2, ft2	Analysis Requested*	Method Reference^	Hexavalent Chromium Process (ex. welding, plating, painting, etc.)*
Example	01/01/11	2pc UW PVC	960	L	Hexavalent Chromium (Cr6)	mod. OSHA ID-215	Welding
17-0187581	7-20-17	wipe	100	cm2	Lead	SW846...	
80							
79							
78							
77							
76		Bulk					
75							
74							

^Galson Laboratories will substitute our routine/preferred method if it does not match the method listed on the COC unless this box is checked: ☐ Use method(s) listed on COC

For metals analysis: if requesting an analyte with the option of a lower LOQ please indicate if the lower LOQ is required (only available for certain analytes see SAG):

For crystalline silica: form(s) of silica needed must be indicated (Quartz, Cristobalite, and/or Tridymite)*:

Chain of Custody	Print Name/Signature	Date/Time		Print Name/Signature	Date/Time
Relinquished by :	[signature]	7-20-17	Received by:	Kris Stone [signature]	7/21/17 11:34
Relinquished by :			Received by:		

Samples received after 3pm will be considered as next day's business.
*Required fields, failure to complete these fields may result in a delay in your samples being processed.

Page 2 of 2

LAB ORIGINAL

EXHIBIT C

EXHIBIT C

Attachment 2

Driving Directions to Hospital

bing maps

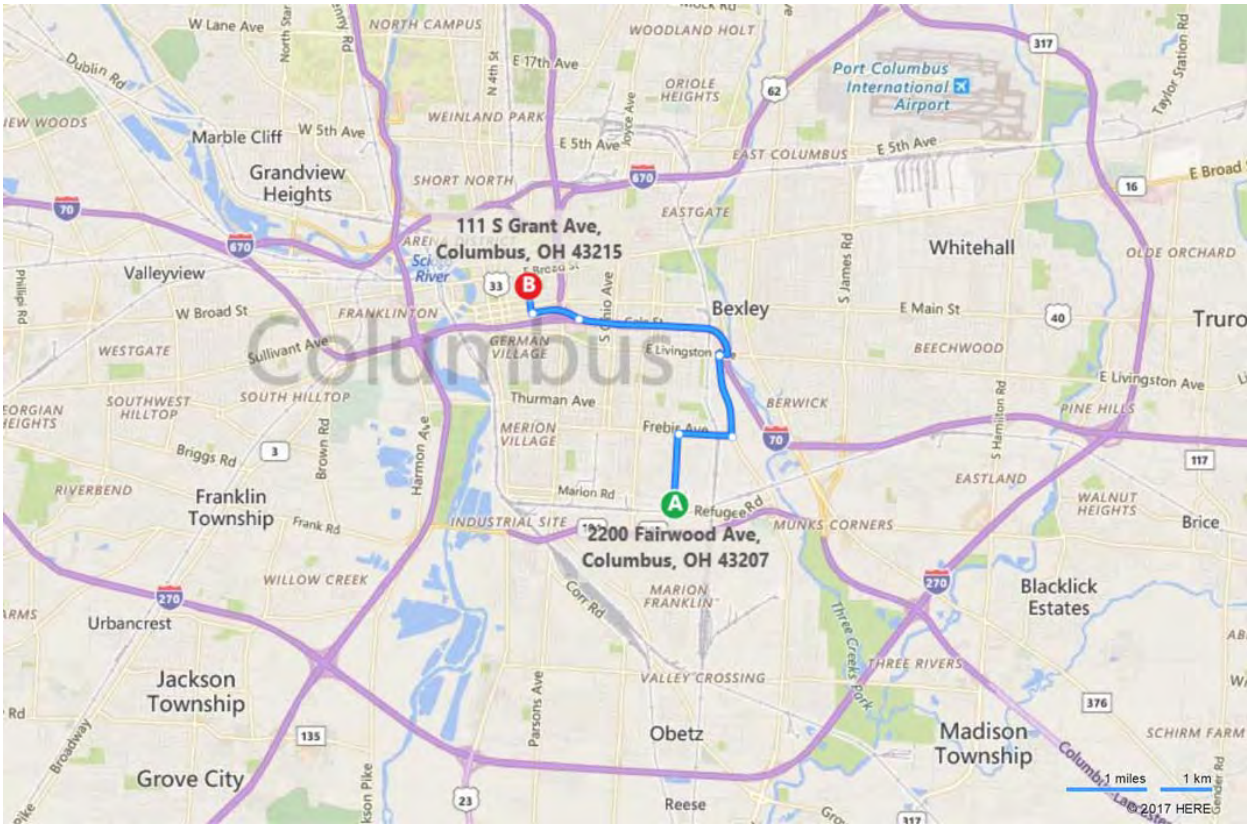
A 2200 Fairwood Ave, Columbus, OH 43207
B 111 S Grant Ave, Columbus, OH 43215

13 min, 5.8 mi
Light traffic (11 min without traffic)
Via Alum Creek Dr, I-70 W

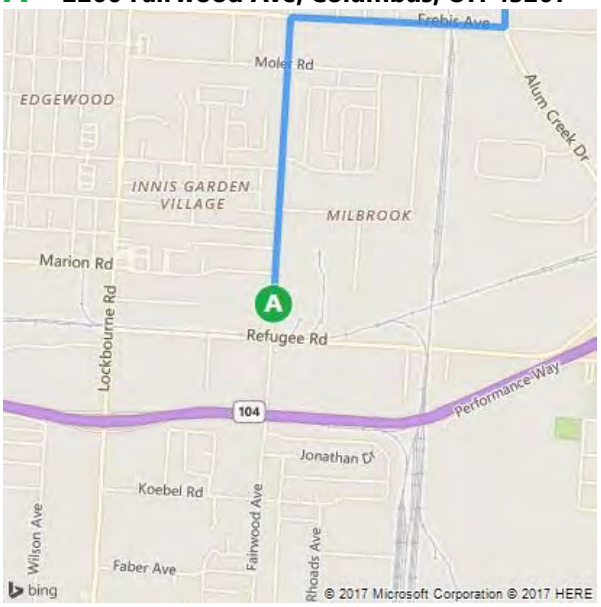
A 2200 Fairwood Ave, Columbus, OH 43207

↑	1.	Depart **Fairwood Ave** toward Marion Rd	0.9 mi
↱	2.	Turn **right** onto **Frebis Ave**	0.7 mi
↰	3.	Turn **left** onto **Alum Creek Dr**	1.0 mi
↱	4.	Turn **right** onto **US-33 / E Livingston Ave** Shell on the corner	0.1 mi
70	5.	Take ramp **left** and follow signs for **I-70 West** ▲ *Minor Congestion*	2.1 mi
↗	6.	At exit **101B**, take ramp **right** for **E Mound St** toward **Downtown**	0.6 mi
↱	7.	Turn **right** onto **S Grant Ave**	0.3 mi
	8.	Arrive at **S Grant Ave** The last intersection is Library Park S If you reach E State St, you've gone too far	

B 111 S Grant Ave, Columbus, OH 43215



A **2200 Fairwood Ave, Columbus, OH 43207**



B **111 S Grant Ave, Columbus, OH 43215**

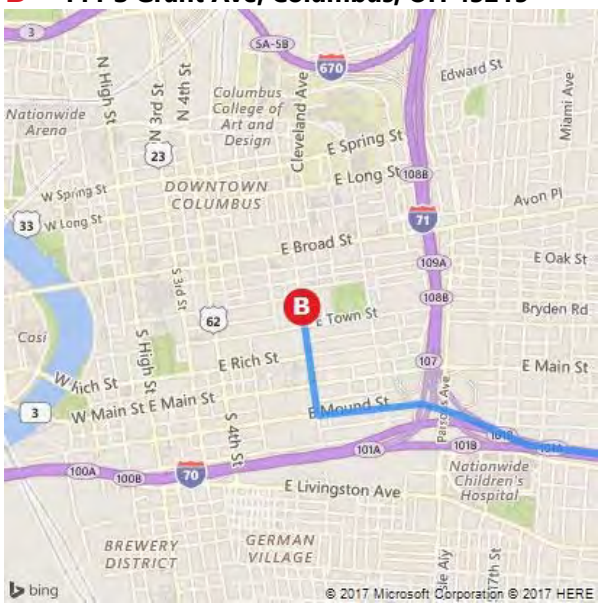


EXHIBIT C

Attachment 3

Plan Acknowledgement Forms

EXHIBIT C

PLAN ACKNOWLEDGEMENT FORM

INSTRUCTIONS: This form is to be completed by each person working on the project site and returned to the designated Olymbec project manager.

Contractor: _____

Project Name: _____

Contract Number: _____

I have read and understand the contents of the above plan and agree to perform my work in accordance with it.

SIGNATURE	**PRINT NAME/COMPANY/DATE**

Additional Notes:

EXHIBIT D

EXHIBIT D


HF 49%
LOT # 030915-27-9
HYDROFLUORIC ACID 49%
RQ, UN1790, HYDROFLUORIC ACID, 8, (6.1), PGII
PG II
UN-1790
CORROSIVE
8
RQ 100 LBS
HEALTH 3* 3
FLAMMABILITY 0 0
REACTIVITY 1 1
PERSONAL PROTECTION
FOR INDUSTRIAL USE ONLY
READ THE MSDS BEFORE USING THIS PRODUCT!
ACID PRODUCTS CO. INC. / 600 WEST 41ST ST. CHICAGO IL 60609 / 773-245-5222
6

EXHIBIT D

EXHIBIT D

EXHIBIT D

EXHIBIT E

Date 08/16/2017 **Page** 1

Order # 2845527

Ordered on 07/24/2017 **Business Segment** IWS **Location** 2520 **Zone #**

Job Started 07/24/2017 **Account Rep** 252 Pete Orlando

Generator (519396) Closed Loop Refining and Recov **Epa Id** OHR000201145
2200 Fairwood
Columbus,OH 43207 **Fax #**

Onsite Contact Name Jenny Cupp **Phone #** (901) 398-2093

Billing (91729) Olymbec USA LLC

Contact Name Kevin Donovan **Phone #** (450) 227-6177

Sales Coordinator : Wendy Jenuwine **PO #** 214535

Customer Notes:

Detailed Job Description

PICKING UP OF DRUMS. SITE PROJECT MANAGER CONTACT: MIKE MONNIN 937-409-1517 OR JENNY CUPP 901-398-2093 OR CELL: 901-212-1466. PLEASE CALL CONTACT 1 HOUR PRIOR TO ARRIVAL TO LET HER KNOW YOU ARE ON YOUR WAY TO THE SITE. ***** STERICYCLE HAS AN AGENT FOR LETTER ON FILE SO DRIVER PLEASE SIGN MANIFEST FOR GENERATOR.THANK YOU.

Manifests 593955-17, 615032-17, 622847-17 **Scheduled:**

Line	Item	Description	Container	Shipping	Billing
0001	STAB11	865188-00 - HYDROFLOURIC ACID 49% (TQ#:Book)	6.00 DF	280.0000 G	280.0000 G
0002	STAB02	865198-00 - FILTER CAKE CONTAINING LEAD	7.00 DF	1500.0000 P	1500.0000 P
0003	LBMANGST	Labor: Transfer Solids into drums, mob/demob, PPE and	0.00	1.0000 0	1.0000 0
0004	LBLABRST	Labor, Additional transfer of Solids into drums >6	0.00	4.0000 0	4.0000 0
0005	TRLTLMN1	Transportation, less than load (LTL), Zone 1, minimum rate	0.00	1.0000 R	1.0000 R
0006	STAB11	865188-00 - HYDROFLOURIC ACID 49% (TQ#:Book)	1.00 DF	55.0000 G	55.0000 G
0007	REC27	867503-00 - RCRA EMPTY DRUMS LAST CONTAINING	2.00 DF	40.0000 P	40.0000 P
0008	STAB02	865198-00 - FILTER CAKE CONTAINING LEAD	1.00 DM	0.0000 P	0.0000 P
0009	STAB02	865198-00 - FILTER CAKE CONTAINING LEAD (TQ#:P)	1.00 DF	211.0000 P	211.0000 P

EXHIBIT E

Date 08/07/2017 Page 2

Stericycle Environmental Solutions

Order # 2845527

DATE : 8/8/17 TIME IN : 10:45 TIME OUT : 11:15

DRIVER : Craig Godwin / Roger Sikes TRAILER# : _____

SUPPLIES DELIVERED : _____

NOTES : _____

GENERATOR SIGNATURE: _____

On Duty :	_____	Off Duty :	_____
Start Mileage :	_____	End Mileage :	_____
Load Start Time :	_____	End Time :	_____
Unload Start Time :	_____	End Time :	_____
Weight Gross :	_____	Net :	_____

MM00204018 8

MM00206372 1

END

** End Order 2845527 Form (pvQFormO) Printed 08/07/2017 at 15:43:43 by JENUWINW **

EXHIBIT E

Date 07/19/2017 Page 1

Stericycle Environmental Solutions

Order # 2845527

Ordered on 07/24/2017 **Business Segment** IWS **Location** 2520 **Zone #**

Job Started 07/24/2017 **Account Rep** 252 Pete Orlando

Generator (519396) Closed Loop Refining and Recov **Epa Id** OHR000201145
2200 Fairwood
Columbus,OH 43207 **Fax #**

Onsite Contact Name Jenny Cupp **Phone #** (901) 398-2093

Billing (91729) Olymbec USA LLC

Contact Name Tony Crowder **Phone #** (901) 834-9943

Sales Coordinator : Wendy Jenuwine **PO # 214535**

Customer Notes:

Detailed Job Description

PICKING UP OF DRUMS. SITE PROJECT MANAGER CONTACT: MIKE MONNIN 937-409-1517 OR JENNY CUPP 901-398-2093 OR CELL: 901-212-1466. PLEASE CALL CONTACT 1 HOUR PRIOR TO ARRIVAL TO LET HER KNOW YOU ARE ON YOUR WAY TO THE SITE. ***** STERICYCLE HAS AN AGENT FOR LETTER ON FILE SO DRIVER PLEASE SIGN MANIFEST FOR GENERATOR.THANK YOU.

Manifests 593955-17 **Scheduled:**

Line	Item	Description	Container	Shipping	Billing
0001	STAB11	865188-00 - HYDROFLOURIC ACID 49% (TQ#:Book)	7.00 DF	385.0000 G	385.0000 G
0002	STAB02	865198-00 - FILTER CAKE CONTAINING LEAD	3.00 DM	0.0000 P	0.0000 P
0003	LBMANGST	Labor: Transfer Solids into drums, mob/demob, PPE and	0.00	1.0000 0	1.0000 0
0004	LBLABRST	Labor, Additional transfer of Solids into drums >6	0.00	0.0000 0	0.0000 0
0005	TRLTLMN1	Transportation, less than load (LTL), Zone 1, minimum rate	0.00	1.0000 R	1.0000 R

DATE : 7/25/17 **TIME IN :** 1:00 **TIME OUT :** 2:45

DRIVER : Roger Silker **TRAILER# :** _____

SUPPLIES DELIVERED : 2 x 55 DF Open Top

NOTES : _____

GENERATOR SIGNATURE: _____

On Duty : _____ **Off Duty :** _____

Start Mileage : _____ **End Mileage :** _____

Load Start Time : _____ **End Time :** _____

Unload Start Time : _____ **End Time :** _____

Weight Gross : _____ **Net :** _____

MM0020401888

END

** End Order 2845527 Form (pvQFormO) Printed 07/19/2017 at 12:07:26 by JENUWINW **

EXHIBIT E

593955-17

2845527

Form Approved. OMB No. 2050-0039

Please print or type. (Form designed for use on elite (12-pitch) typewriter.)

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator ID Number: OHR000201145
2. Page 1 of: 1
3. Emergency Response Phone: (877) 577-2669
4. Manifest Tracking Number: 017482584 JJK

5. Generator's Name and Mailing Address
Closed Loop Refining and Recov ery, Inc.
2200 Fairwood
Columbus OH 43207
Generator's Phone: (514)793-2433

Generator's Site Address (if different than mailing address)
Closed Loop Refining and Recov
2200 Fairwood
Columbus OH 43207

6. Transporter 1 Company Name: STERICYCLE SPECIALTY WASTE SOLUTIONS INC
U.S. EPA ID Number: MNS000110924

7. Transporter 2 Company Name
U.S. EPA ID Number

8. Designated Facility Name and Site Address
PETRO CHEM PROCESSING GROUP OF
421 Lycaste St.
DETROIT, MI 48214 (313) 824-5840
Facility's Phone:
U.S. EPA ID Number: MID980615298

9a. HM	9b. U.S. DOT Description (including Proper Shipping Name, Hazard Class, ID Number, and Packing Group (if any))	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	13. Waste Codes
X	1. UN1790 WASTE HYDROFLUORIC ACID 8 (6.1) PGII 'TOXIC' RQ(D002=100)	006	DF	0330	G	D002
RQ	2. NA3077 HAZARDOUS WASTE, SOLID, N.O.S. (LEAD) 9 PGIII RQ(D008=1 LBS)	007	DF ~~DM~~ RS 7/25	1500	P	D008
	3. ~~Non DOT, Non RCRA regulated material (Empty Drum~~ RS 07/25	~~002~~ RS 07/25	~~DF~~ RS 07/25	~~0040~~ RS 07/25	~~P~~ RS 07/25	~~None~~
X	4. UN1760 Corrosive Liquids, N.O.S. (RCRA Empty Containers last Containing Hydrofluoric Acid, Water) 8 PG III	002	DF	0040	P	None

14. Special Handling Instructions and Additional Information
(1) 865188-00 - ERG(157) HYDROFLOURIC ACID 49 (2) 865198-00 - ERG(171) FILTER CAKE CONTAINI 3 x 55 DF
6 x 55 DF
(3) 867503-00 ERG (154) 2x55 DF
Mat 530156

15. GENERATOR'S/OFFEROR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations. If export shipment and I am the Primary Exporter, I certify that the contents of this consignment conform to the terms of the attached EPA Acknowledgment of Consent. I certify that the waste minimization statement identified in 40 CFR 262.27(a) (if I am a large quantity generator) or (b) (if I am a small quantity generator) is true. 0855R

Generator's/Offeror's Printed/Typed Name: Roger Sicker
Signature
Month 07 Day 25 Year 2017

16. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter signature (for exports only): Date leaving U.S.:

17. Transporter Acknowledgment of Receipt of Materials
Transporter 1 Printed/Typed Name: Roger Sicker
Signature
Month 07 Day 25 Year 2017
Transporter 2 Printed/Typed Name
Signature
Month Day Year

18. Discrepancy
18a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection
Manifest Reference Number:
U.S. EPA ID Number

18b. Alternate Facility (or Generator)
Facility's Phone:
18c. Signature of Alternate Facility (or Generator)
Month Day Year

19. Hazardous Waste Report Management Method Codes (i.e., codes for hazardous waste treatment, disposal, and recycling systems)
1. 2. 3. 4.

20. Designated Facility Owner or Operator: Certification of receipt of hazardous materials covered by the manifest except as noted in Item 18a
Printed/Typed Name
Signature
Month 7 Day 31 Year 17

EPA Form 8700-22 (Rev. 3-05) Previous editions are obsolete.

DESIGNATED FACILITY TO DESTINATION STATE (IF REQUIRED)

EXHIBIT E

Stericycle, Inc.

Page # 1
Date : 08/07/2017
Time : 11:42:44

Waste Receipt Container Check-In : DET-0855R

Date 07/31/2017 | Generator 519396 | Closed Loop Refining And Recov | SIC Code 423930 | Order 2845527
Govt No | Carrier STE106 | Stericycle Specialty Waste Solutions Inc | Benzene No
InBy | Bill To 91729 | Olymbec Usa Llc | Neshap No | Containers 15
Manifest 017482584JJK | Doc No. 593955-17 | CD Required None

Name M.C. | Date/Time Checked In 8-9-17 | Analyzed By

No.	PgL	Inter-Co #	Profile #	Waste Categories	Physical Description	Type	Quantity	U	IS	%Sol	Location	S/C
001	1		865188-00	STAB11	Hydroflouric Acid 49%	DF	55		0	0	167	
002	1		865188-00	STAB11	Hydroflouric Acid 49%	DF	55		0	0	168	
003	1		865188-00	STAB11	Hydroflouric Acid 49%	DF	55		0	0	169	
004	1		865188-00	STAB11	Hydroflouric Acid 49%	DF	55		0	0	160	
005	1		865188-00	STAB11	Hydroflouric Acid 49%	DF	55		0	0	148	
006	1		865188-00	STAB11	Hydroflouric Acid 49%	DF	55		0	0	177	
007	2		865198-00	STAB02	Filter Cake Containing Lead	DF	55		0	0	153	
008	2		865198-00	STAB02	Filter Cake Containing Lead	DF	55		0	0	250	
009	2		865198-00	STAB02	Filter Cake Containing Lead	DF	55		0	0	238	
010	2		865198-00	STAB02	Filter Cake Containing Lead	DF	55		0	0	196	
011	2		865198-00	STAB02	Filter Cake Containing Lead	DF	55		0	0	170	
012	2		865198-00	STAB02	Filter Cake Containing Lead	DF	55		0	0	185	
013	2		865198-00	STAB02	Filter Cake Containing Lead	DF	55		0	0	240	
014	4		867503-00	REC27	Rcra Empty Drums Last Containing Hydroflouric Acid	DF	55		0	0	21	
015	4		867503-00	REC27	Rcra Empty Drums Last Containing Hydroflouric Acid	DF	55		0	0	21	

** End Waste Receipt Container Check-In Form (pvWrcCif) Printed 08/07/2017 at 11:42:44 by SUTTONM

M.C. — E.T. Initials | 8-9-17 — Date | R.C. Initials | Date

EXHIBIT E

Operations Summary for Waste Receipt : DET-0855R

Sales Instructions Please do not invoice until final review of order is complete. A SF case will be submitted once ready for invoicing. Thank you.

Manifest Line	1 **Containers** 6
Profile/Status	865188-00 / Active
Waste Name	HYDROFLOURIC ACID 49%
DOT Proper Ship Name	WASTE HYDROFLUORIC ACID
Dangerous/Hazardous	Yes **Cercla** No
EPA Codes	D002
Waste Category	STAB11
Treatment Designation	DO NOT SAMPLE. CONTAINS HYDROFLUORIC ACID. <1% TOC, <10% SOLIDS/AQUEOUS MATRIX. NO DEBRIS
Outbound TSDF	STA101 - STABLEX CANADA INC.
Outbound Profile	22567-00 - (DET-STABLEX) ACIDS WITH FLUORIDE COMPOUNDS (HF)

Manifest Line	2 **Containers** 7
Profile/Status	865198-00 / Active
Waste Name	FILTER CAKE CONTAINING LEAD
DOT Proper Ship Name	HAZARDOUS WASTE, SOLID, N.O.S. (LEAD)
Dangerous/Hazardous	Yes **Cercla** No
EPA Codes	D008
Waste Category	STAB02
Treatment Designation	ALERT MM IF AQUEOUS/SUITABLE FOR WWT
Outbound TSDF	EQD100 - EQ DETROIT, INC.
Outbound Profile	B076122DET-00 - (DET-EQ) GENERIC METAL BEARING WASTE-LIQ/SOLID/SLUDGE

Manifest Line	4 **Containers** 2
Profile/Status	867503-00 / Active
Waste Name	RCRA EMPTY DRUMS LAST CONTAINING HYDROFL
DOT Proper Ship Name	CORROSIVE LIQUIDS, N.O.S. (RCRA EMPTY CONTAINERS LAST CONTAINING HYDROFLOURIC ACID, WATER)
Dangerous/Hazardous	No **Cercla** No
EPA Codes	
Waste Category	REC27
Treatment Designation	EMPTIES FOR RECYCLE
Outbound TSDF	MAX101 - Maxi Container, Inc.

EXHIBIT E

Analytical Sheet

Date: 08/11/17
Manifest#:
Trailer#: 530156
Waste Receipt#: 0855R
Page/Line#: P1 L2
Container#: 7-13
Process Code: STAB02

Drop Time:
Review By:
To/From Tank:
Generator: CLOSED LOOP REFINING & RECOVERY, INC.
Sampler: M.C.
Work Order#:
Gallons:

Analysis Required: (Please Check)

	Inbound		Outbound		Tank		Prequal		Other:

	RCRA Metals		SLC Metals		PCB's		Compatibility		Other:

Appearance: WHITE SOLID
Odor:

Parameter	Mass/Volume	Result	Repeat Mass/Vol	Repeat Result	Initials
BTU/lb					
Spike					
% Chloride					
Chloride Calculation=3.55 * dil * [Vol $AgNO_3$ (mL) – Blank (mL)] * 0.1/sample wt.					
%Water:					
pH:(50:50 Dilution w/H20 Yes or No)		7.44			3B
Specific Gravity(g/mL):		Wt/Gallon	Density * 8.33		
Compatibility:	H2O	MeoH	Chemfuel		
	Yes or No	Yes or No	Yes or No		
Layers:		1			3B
PCB'S (ppm):					
%Solids:					
Flash Point/Duplicate:			Boiling Point/Dup:		
% Benzene:					
% Acidity			% Alkalinity		
Isocyanate	Pos. or Neg.		Oxidizer	Pos. or Neg.	
Sulfide	Pos. or Neg.		Cyanide	Pos. or Neg.	

Comments:

EXHIBIT E

Stericycle Environmental Solutions

LAND DISPOSAL RESTRICTION NOTIFICATION CERTIFICATION FORM

Generator Name: Closed Loop Refining and Recov Generator EPA ID Number: OHR000201145

Manifest Number: 017482584JJK

The purpose of this form is to provide appropriate notification/certification, in accordance with the Land Disposal Restriction regulations set forth in 40 CFR Part 268, to the treatment, storage or disposal facility which receives the wastes referenced below. In accordance with the waste analysis and recordkeeping requirements specified in 40 CFR 268.7. I have indicated below the relevant information required to properly manage my waste(s) in compliance with the Land Disposal Restriction treatment standards found in 40 CFR 268.

Line 1 Profile: 865188-00 Treatability Group: Non-WasteWater UHC's: N Class Group: A

Waste Codes

D002 - Corrosive managed in a NONCWA system

Line 2 Profile: 865198-00 Treatability Group: Non-WasteWater UHC's: Y Class Group: A

Waste Codes

D008 - LEAD

Underlying Hazardous Constituents

LEAD

Line 4 Profile: 867503-00

Waste Codes: N/A

Underlying Hazardous constituents: N/A

See back for descriptions of classification groups and classification group certification statement.
I hereby certify that I believe that the information I submitted herein is true, accurate and complete.

Signature: _____ Title: ES III Date: 7/25/17

Rev. 12/14

EXHIBIT E

622847-17

2845527

Please print or type. (Form designed for use on elite (12-pitch) typewriter.)

Form Approved. OMB No. 2050-0039

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator ID Number: OHR000201145
2. Page 1 of: 1
3. Emergency Response Phone: (877) 577-2669
4. Manifest Tracking Number: 017482716 JJK

5. Generator's Name and Mailing Address
Closed Loop Refining and Recov ery, Inc.
2200 Fairwood
Columbus OH 43207
Generator's Phone: (514)793-2433

Generator's Site Address (if different than mailing address)
Closed Loop Refining and Recov
2200 Fairwood
Columbus OH 43207

6. Transporter 1 Company Name: STERICYCLE SPECIALTY WASTE SOLUTIONS INC
U.S. EPA ID Number: MNS000110924

7. Transporter 2 Company Name
U.S. EPA ID Number

8. Designated Facility Name and Site Address
PETRO CHEM PROCESSING GROUP OF
421 Lycaste St.
Facility's Phone: DETROIT, MI 48214 (313) 824-5840
U.S. EPA ID Number: MID980615298

9a. HM	9b. U.S. DOT Description (including Proper Shipping Name, Hazard Class, ID Number, and Packing Group (if any))	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	13. Waste Codes
RQ	1. NA3077 HAZARDOUS WASTE, SOLID, N.O.S. (LEAD) 9 PGIII RQ(D008=10 LBS) (1)	001	DF	0211	P	D008
	2.					
	3.					
	4.					

14. Special Handling Instructions and Additional Information
(1) 865198-00 - ERG(171) FILTER CAKE CONTAINI (1x55)

530165

15. GENERATOR'S/OFFEROR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations. If export shipment and I am the Primary Exporter, I certify that the contents of this consignment conform to the terms of the attached EPA Acknowledgment of Consent.
I certify that the waste minimization statement identified in 40 CFR 262.27(a) (if I am a large quantity generator) or (b) (if I am a small quantity generator) is true.

18582

Generator's/Offeror's Printed/Typed Name: Craig Godman
Signature:
Month Day Year: 08 08 2017

INT'L

16. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter signature (for exports only): Date leaving U.S.:

TRANSPORTER

17. Transporter Acknowledgment of Receipt of Materials

Transporter 1 Printed/Typed Name: Craig Godman
Signature:
Month Day Year: 08 08 2017

Transporter 2 Printed/Typed Name
Signature
Month Day Year

DESIGNATED FACILITY

18. Discrepancy

18a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

Manifest Reference Number:

18b. Alternate Facility (or Generator)
U.S. EPA ID Number
Facility's Phone:

18c. Signature of Alternate Facility (or Generator)
Month Day Year

19. Hazardous Waste Report Management Method Codes (i.e., codes for hazardous waste treatment, disposal, and recycling systems)

1.	2.	3.	4.

20. Designated Facility Owner or Operator: Certification of receipt of hazardous materials covered by the manifest except as noted in Item 18a

Printed/Typed Name: T. McCallum
Signature:
Month Day Year: 8 14 17

EPA Form 8700-22 (Rev. 3-05) Previous editions are obsolete.

DESIGNATED FACILITY TO DESTINATION STATE (IF REQUIRED)

EXHIBIT E

Stericycle, Inc.

Page # 1
Date : 08/11/2017
Time : 11:14:31

Waste Receipt Container Check-In : DET-1852R

Date 08/14/2017 | Generator 519396 | Closed Loop Refining And Recov | SIC Code 423930 | Order 2845527
Govt No | Carrier STE106 | Stericycle Specialty Waste Solutions Inc | Benzene No
InBy | Bill To 91729 | Olymbec Usa Llc | Neshap No | Containers 1
Manifest 017482716JJK | Doc No. 622847-17 | CD Required None

Name Jimmie Rogers Jr | Date/Time Checked In 8-21-17 | Analyzed By

No.	PgL	Inter-Co #	Profile #	Waste Categories	Physical Description	Type	Quantity	U	IS	%Sol	Location	S/C
001	1		865198-00	STAB02	Filter Cake Containing Lead	DF	55		0	0	215	

** End Waste Receipt Container Check-In Form (pvWrcCif) Printed 08/11/2017 at 11:14:31 by TWANDAM

JR — E.T. Initials | 8-21-17 — Date | R.C. Initials | Date

EXHIBIT E

Operations Summary for Waste Receipt : DET-1852R

Sales Instructions Please do not invoice until final review of order is complete. A SF case will be submitted once ready for invoicing. Thank you.

Manifest Line	1 **Containers** 1
Profile/Status	865198-00 / Active
Waste Name	FILTER CAKE CONTAINING LEAD
DOT Proper Ship Name	HAZARDOUS WASTE, SOLID, N.O.S.
Dangerous/Hazardous	Yes **Cercla** No
EPA Codes	D008
Waste Category	STAB02
Treatment Designation	ALERT MM IF AQUEOUS/SUITABLE FOR WWT
Outbound TSDF	EQD100 - EQ DETROIT, INC.
Outbound Profile	B076122DET-00 - (DET-EQ) GENERIC METAL BEARING WASTE-LIQ/SOLID/SLUDGE

EXHIBIT E

Analytical Sheet

Date: 08.23.17
Manifest#:
Trailer#: 530165
Waste Receipt#: 1852R
Page/Line#: P1 L1
Container#: 1
Process Code: STAB 01

Drop Time:
Review By:
To/From Tank:
Generator: CLOSED LOOP REFINING & RECOVERY, INC.
Sampler: J.R.
Work Order#:
Gallons:

Analysis Required: (Please Check)

	Inbound		Outbound		Tank		Prequal		Other:

	RCRA Metals		SLC Metals		PCB's		Compatibility		Other:

Appearance: BROWN SOLID
Odor:

Parameter	Mass/Volume	Result	Repeat Mass/Vol	Repeat Result	Initials
BTU/lb					
Spike					
% Chloride					
Chloride Calculation=3.55 * dil * [Vol $AgNO_3$ (mL) – Blank (mL)] * 0.1/sample wt.					
%Water:					
pH:(50:50 Dilution w/H20 Yes or No)		6.23			3B1
Specific Gravity(g/mL):		Wt/Gallon	Density * 8.33		
Compatibility:	H2O	MeoH	Chemfuel		
	~~Yes~~ or No	Yes or No	Yes or No		
Layers:		3			3B1
PCB'S (ppm):					
%Solids:					
Flash Point/Duplicate:			Boiling Point/Dup:		
% Benzene:					
% Acidity			% Alkalinity		
Isocyanate	Pos. or Neg.		Oxidizer	Pos. or Neg.	
Sulfide	Pos. or Neg.		Cyanide	Pos. or Neg.	

Comments:

EXHIBIT E

622847 17

2845527

Please print or type. (Form designed for use on elite (12-pitch) typewriter.)

Form Approved. OMB No. 2050-0039

UNIFORM HAZARDOUS WASTE MANIFEST	1. Generator ID Number OHR000201145	2. Page 1 of 1	3. Emergency Response Phone (877) 577-2663	4. Manifest Tracking Number 017482716 JJK

GENERATOR

5. Generator's Name and Mailing Address
Closed Loop Refining and Recovery, Inc.
2200 Fairwood
Columbus OH 43207
Generator's Phone: (614) 793-7411

Generator's Site Address (if different than mailing address)
Closed Loop Refining and Recov
2200 Fairwood
Columbus OH 43207

6. Transporter 1 Company Name: STERICYCLE SPECIALTY WASTE SOLUTIONS INC — U.S. EPA ID Number: MIS000110924

7. Transporter 2 Company Name — U.S. EPA ID Number

8. Designated Facility Name and Site Address
PETRO CHEM PROCESSING GROUP 02
421 Lycaste St.
Facility's Phone: DETROIT, MI 48214 (313) 824-5840 — U.S. EPA ID Number: MIED980615293

9a. HM	9b. U.S. DOT Description (including Proper Shipping Name, Hazard Class, ID Number, and Packing Group (if any))	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	13. Waste Codes
RQ	1. RA3077 HAZARDOUS WASTE, SOLID, N.O.S. (LEAD) 9 PGIII RQ(0003-10 LBS)	001	DF	00011	P	D008
	2.					
	3.					
	4.					

14. Special Handling Instructions and Additional Information
(1) 865198-06 ERG(171) FILTER CAKE CONTAINI(1855)

15. **GENERATOR'S/OFFEROR'S CERTIFICATION:** I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations. If export shipment and I am the Primary Exporter, I certify that the contents of this consignment conform to the terms of the attached EPA Acknowledgment of Consent. I certify that the waste minimization statement identified in 40 CFR 262.27(a) (if I am a large quantity generator) or (b) (if I am a small quantity generator) is true.

Generator's/Offeror's Printed/Typed Name: Craig Godman — Signature — Month: 08 — Day: 08 — Year: 20

INT'L

16. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter signature (for exports only): Date leaving U.S.:

TRANSPORTER

17. Transporter Acknowledgment of Receipt of Materials

Transporter 1 Printed/Typed Name: Craig Godman — Signature — Month: 08 — Day: 08 — Year: 20

Transporter 2 Printed/Typed Name — Signature — Month — Day — Year

DESIGNATED FACILITY

18. Discrepancy

18a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

Manifest Reference Number:

18b. Alternate Facility (or Generator) — U.S. EPA ID Number

Facility's Phone:

18c. Signature of Alternate Facility (or Generator) — Month — Day — Year

19. Hazardous Waste Report Management Method Codes (i.e., codes for hazardous waste treatment, disposal, and recycling systems)

1.	2.	3.	4.
H141			

20. Designated Facility Owner or Operator: Certification of receipt of hazardous materials covered by the manifest except as noted in Item 18a

Printed/Typed Name — Signature — Month — Day — Year

EPA Form 8700-22 (Rev. 3-05) Previous editions are obsolete.

GENERATOR'S INITIAL COPY

EXHIBIT E

Stericycle Environmental Solutions

LAND DISPOSAL RESTRICTION NOTIFICATION CERTIFICATION FORM

Generator Name: Closed Loop Refining and Recov Generator EPA ID Number: OHR000201145

Manifest Number: 017482716JJK

The purpose of this form is to provide appropriate notification/certification, in accordance with the Land Disposal Restriction regulations set forth in 40 CFR Part 268, to the treatment, storage or disposal facility which receives the wastes referenced below. In accordance with the waste analysis and recordkeeping requirements specified in 40 CFR 268.7. I have indicated below the relevant information required to properly manage my waste(s) in compliance with the Land Disposal Restriction treatment standards found in 40 CFR 268.

Line 1 Profile: 865198-00 Treatability Group: Non-WasteWater UHC's: Y Class Group: A

Waste Codes

D008 - LEAD

Underlying Hazardous Constituents

LEAD

See back for descriptions of classification groups and classification group certification statement.
I hereby certify that I believe that the information I submitted herein is true, accurate and complete.

Signature: _____ Title: Field Tech Date: 8/8/17

Rev. 12/14

EXHIBIT E

SWS ENVIRONMENTAL SERVICES

Project Reporting Log

Date:	**07/24/2019**	**SWS Environmental Service Rep**	**Bobby Bourne III**
Client:	**Stericycle**	**Rep**	**Wendy Jenuwine**
SWS Environmental Services Job #:	**FN3-707-1324**	**Client PO:**	**2845527**
Job Location:	**Columbus, OH**		
GPS Coordinates:		**Latitude:**	
Phone Number:		**Fax Number:**	

The following is a summary of the actions taken by SWS Environmental Services concerning the above incident:

07:00		B. Bourne (BB), E. Ridinger (ER) and L. Scott (LS) at shop. Load equipment into pickup 3294, pre-trip 4546 and prepare to mobe to site.
07:45		Mobe to site.
10:00		Onsite, meet with representative from plant. No Stericycle contact on site. Look at the job and we have 2 vats one with a 1' or 2' of liquid and a vat with about ½" of solids. Also, a 300-gallon tote ¾ full of solids to drum.
10:10		Stage stake bed truck at loading dock to unload and conducted safety meeting as well.
10:25		Begin setting up to begin vacuuming out liquids and drumming solids.
11:00		BB and LS begin suiting up to pump HF liquids from vat into closed top poly drums using small air compressor and diaphragm pump.
12:45		About 100 gallons pumped from vat into open top drums. Tote is half full and about 1' to 2' of sludge in vat containing the liquid. Note: We do not have enough drums or air to complete job.
12:55		BB and LS take a break. Looking up somewhere to buy a sawzall to cut tote down to make it easier. Going to leave sludge alone and hope it hardens by next time we come back.
13:00		Take a heat stress break. Also 2nd vat had less than 1" of solids, we scrapped and shoveled that out and drummed it. Called T. Pessefall (TP) SWS Service Center Manger about getting a sawzall to cut the tote in half. R. Bourne ok to purchase sawzall.
13:45		BB back to site. Get suited up to cut tote in half and shovel out solids into drums. Work on as much as we can with air we have left in bottles. Spoke with Pete with Stericycle and everything is good if we don't finish today. Will be back tomorrow to finish up.
15:30		Tote empty, 3 drums of solids from tote. Spoke with RB due to the heat, lack of air in bottles and having another 5 hours or so on site we have agreed to be back on 07/25/2017 at approximately 8:00 a.m. to complete job. This will consist of shoveling out sludge from vat as well as cleanup of area. So, the crew will cleanup and secure site for the night and return the following day to complete job.
16:20		Demobe to site.
18:30		At shop and unloaded tools and equipment. Finalize paperwork and load O2 bottles when LS gets to shop.
19:00		BB and ER off clock.
19:30		LS off clock.

EXHIBIT E

Project Reporting Log

Date:	**07/25/2019**	**SWS Environmental Service Rep**	**Bobby Bourne III**
Client:	**Stericycle**	**Rep**	**Wendy Jenuwine**
SWS Environmental Services Job #:	**FN3-707-1324**	**Client PO:**	**2845527**
Job Location:	**Columbus, OH**		
GPS Coordinates:		**Latitude:**	
Phone Number:		**Fax Number:**	

The following is a summary of the actions taken by SWS Environmental Services concerning the above incident:

07:00		B. Bourne (BB), L. Scott (LS), E. Ridinger (ER) at shop. Pre-trip vehicles and load tools and equipment.
07:30		Mobe to site with 3294 and 4546
09:30		On site and conducted safety meeting.
10:00		Setup airline and go over the plan of action to get the job done.
10:20		BR and LS suiting up to shovel out vat.
10:40		Begin shoveling out vat into poly drums.
11:40		Solids removed; about 20 gallons of soupy product left, we dumped a bag of biosorb in it to solidify it. Taking a break and let it react. Stericycle on site to get drums when we are complete.
12:15		Suit up., ER and LS to shovel reminder of vat.
12:35		LS and ER begin to shove vat out.
13:15		Vat shoveled out and drummed. Cleanup work area the best we can. Load tools and equipment into pickup truck 3294 and 4546A. Bag anything that many be contaminated to be washed.
13:45		The last drum we filled still reacting so we vented it and Stericycle will have to return to retrieve it. We leaving it open to finish reacting.
14:45		Demobe to shop.
15:00		Spoke with Bob about with an update.
17:30		At shop, unload pickup truck 3294 and finalize paperwork.
18:30		Off Clock.

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AVERAGE TONNAGE		
	GAYLORD OF CRT SCREENS - LBS	1,334
	GAYLORD CRUSHED GLASS - LBS**	3,400
	WHITE BAGS OF CRT + CRUSHED SCREENS - LI	1,849

BAY	DESCRIPTION	AMOUNT	TYPE	AVERAGE WEIGHT / GAYLORD
A1	Cardboard boxes with transparent or black plastic bags containing CRTs, stacked 3 high	207	CRT	276,236
A2	Cardboard boxes with transparent or black plastic bags containing CRTs, stacked 3 high	324	CRT	432,369
A3	Cardboard boxes with transparent or black plastic bags containing CRTs, stacked 3 high	324	CRT	432,369
A4	Cardboard boxes containing CRTs stacked 3 high	246	CRT	328,281
A5	Cardboard boxes containing CRTs stacked 3 high	236	CRT	314,936
A6	Cardboard boxes with transparent or black plastic bags containing CRTs, stacked 3 high	257	CRT	342,960
A7	Cardboard boxes with transparent or black plastic bags containing CRTs, stacked 3 high	225	CRT	300,257
A8	Cardboard boxes with transparent or black plastic bags containing CRTs, stacked 3 high	227	CRT	302,926
A9	Cardboard boxes with transparent bags containing CRT screens, stacked 3 high	258	CRT	344,294
A10	Cardboard boxes without bags, containing CRTs, stacked 2 or 3 high	22	CRT	29,358
	Carboard boxes with transparent bag containing CRTs, stacked 2 or 3 high	47	CRT	62,720
	Carboard boxes with black bags containing crushed glass, stacked 2 or 3 high	10	CRUSHED GLASS	34,000
	Box of cardboard and wood	1	OTHER	N/A
A11	Carboard boxes with transparent bag containing CRTs, piled 2 or 3 high	58	CRT	77,399
A12	Carboard boxes with transparent bag containing CRTs, stacked 2 or 3 high	43	CRT	57,382
	Pallet of cardboard	1	OTHER	N/A
B1	Cardboard boxes with transparent or black plastic bags containing CRTs, stacked 3 high	258	CRT	344,294
B2	Cardboard boxes with transparent or black plastic bags containing CRTs, stacked 4 high	302	CRT	403,011
B3	Cardboard boxes with transparent or black plastic bags containing CRTs, stacked 4 high	389	CRT	519,110
	White plastic bags containing CRTs and metal, crushed	10	CRT - BAGS	18,485
B4	Cardboard boxes containing CRTs stacked 3 high	359	CRT	479,076
B5	Cardboard boxes containing CRTs stacked 3 high	399	CRT	532,455
B6	Cardboard boxes with transparent or black plastic bags containing CRTs, stacked 3 high	323	CRT	431,035
B7	Cardboard boxes with transparent or black plastic bags containing CRTs, stacked 3 high	296	CRT	395,004
B8	Cardboard boxes with transparent or black plastic bags containing CRTs, stacked 3 high	323	CRT	431,035
B9	Cardboard boxes with black plastic bags containing crushed glass, stacked 3 high	101	CRUSHED GLASS	343,400
B10	Cardboard boxes with transparent bags containing CRTs, stacked 3 high	14	CRT	18,683
	Carboard boxes with black bags containing crushed glass, stacked 3 high	95	CRUSHED GLASS	323,000
B11	Cardboard boxes containing crushed glass, stacked 3 high	2	CRUSHED GLASS	6,800
B12	Cardboard boxes with transparent bags containing CRT screens, stacked 3 high	324	CRT	432,369
C1	Cardboard boxes with transparent or black plastic bags containing CRTs, stacked 3 high	298	CRT	397,673
C2	Cardboard boxes with transparent or black plastic bags containing CRTs, stacked 4 high	414	CRT	552,472
C3	Cardboard boxes with transparent or black plastic bags containing CRTs, stacked 4 high	400	CRT	533,789
C4	Cardboard boxes containing CRTs stacked 2 to 4 high	363	CRT	484,414
C5	Cardboard boxes containing CRTs stacked 3 to 4 high	338	CRT	451,052
C6	Cardboard boxes with transparent or black plastic bags containing CRTs, stacked 3 or 4 high	310	CRT	413,687
C7	Cardboard boxes with transparent or black plastic bags containing CRTs, stacked 3 or 4 high	306	CRT	408,349
C8	Cardboard boxes with transparent plastic bags containing CRTs, stacked 3 or 4 high	281	CRT	374,987
C9	Cardboard boxes with black plastic bags containing crushed glass, stacked 3 high	264	CRUSHED GLASS	897,600
C10	Cardboard boxes with transparent bags containing CRTs, stacked 3 high	59	CRT	78,734
	Carboard boxes with black bags containing crushed glass, stacked 3 high	180	CRUSHED GLASS	612,000
C11	White plastic bags, stacked 1 row high, containing CRT + metal frames, crushed	58	CRT- BAGS	107,215
	Cardboard boxes with transparent bags containing CRTs, stacked 3 high	45	CRT	60,051
C12	Cardboard boxes with transparent bags containing CRTs, stacked 3 high	284	CRT	378,991
D1	Cardboard boxes with transparent or black plastic bags containing CRTs, stacked 3 high	292	CRT	389,666
D2	Cardboard boxes with transparent or black plastic bags containing CRTs, stacked 4 high	429	CRT	572,489
D3	Cardboard boxes with transparent or black plastic bags containing CRTs, stacked 4 high	430	CRT	573,824
D4	Cardboard boxes containing CRTs	258	CRT	344,294
	White bags containing CRT + metal frames, crushed	64	CRT- BAGS	118,306
D5	Cardboard boxes with transparent or black plastic bags containing CRTs, stacked 2 or 3 high	200	CRT	266,895
D6	Cardboard boxes with transparent or black plastic bags containing CRTs, stacked 3 or 4 high	360	CRT	480,411
D7	Cardboard boxes with transparent or black plastic bags containing CRTs, stacked 3 or 4 high	380	CRT	507,100
D8	Cardboard boxes with transparent plastic bags containing CRTs, stacked 3 or 4 high	393	CRT	524,448
D9	Cardboard boxes with black plastic bags containing crushed glass, stacked 3 high	286	CRUSHED GLASS	972,400
D10	Cardboard boxes with transparent bags containing CRTs, stacked 3 high	37	CRT	49,376
	Carboard boxes with black bags containing crushed glass, stacked 3 high	83	CRUSHED GLASS	282,200
	Carboard boxes with transparent bags containing crushed glass, stacked 3 high	147	CRUSHED GLASS	499,800
D11	White plastic bags, stacked 1 row high, containing CRT + metal frames, crushed	106	CRT - BAGS	195,945
D12	Cardboard boxes with transparent bags containing CRTs, stacked 3 high	286	CRT	381,659
E1	Cardboard boxes with transparent or black plastic bags containing CRTs, stacked 3 high	240	CRT	320,274
E2	Cardboard boxes with transparent or black plastic bags containing CRTs, stacked 4 high	429	CRT	572,489
E3	Cardboard boxes with transparent or black plastic bags containing CRTs, stacked 4 high	431	CRT	575,158
E4	Cardboard boxes with transparent or black plastic bags containing CRTs, stacked 3 high	275	CRT	366,980
E5	Cardboard boxes with transparent or black plastic bags containing CRTs, stacked 3 high	250	CRT	333,618
E6	Cardboard boxes with transparent or black plastic bags containing CRTs, stacked 2 or 3 high	275	CRT	366,980
E7	Cardboard boxes with transparent or black plastic bags containing CRTs, stacked 2 or 3 high	200	CRT	266,895
E8	xes with transparent plastic bags containing CRTs, stacked 4 high, with a few boxes of crushed g	351	CRT	468,400
E9	Cardboard boxes with black plastic bags containing crushed glass, stacked 3 high	274	GLASS	931,600
E10	Cardboard boxes with transparent bags containing glass, stacked 3 high	208	GLASS	707,200
E11	White plastic bags, stacked 1 row high, containing CRT + metal frames, crushed	120	CRT - BAGS	221,824
E12	Cardboard boxes with transparent bags containing CRTs, stacked 2 or 3 high	268	CRT	357,639
F1	Cardboard boxes with transparent or black plastic bags containing CRTs, stacked 3 high	240	CRT	320,274
F2	Cardboard boxes with transparent or black plastic bags containing CRTs, stacked 4 high	373	CRT	497,759
F3	Cardboard boxes with transparent or black plastic bags containing CRTs, stacked 4 high	385	CRT	513,772
F4	Cardboard boxes with transparent or black plastic bags containing CRTs, stacked 3 high	297	CRT	396,339
F5	Cardboard boxes with transparent or black plastic bags containing CRTs, stacked 3 high	270	CRT	360,308
F6	es with transparent or black plastic bags containing CRTs, stacked 2 or 3 high, with a few boxes o	275	CRT	366,980
F7	Cardboard boxes with transparent or black plastic bags containing CRTs, stacked 2 or 3 high	270	CRT	360,308
F8	Cardboard boxes with CRTs stacked 3 or 4 high	176	CRT	234,867
	White plastic bags, mixed among the boxes, containing CRT + metal frames, crushed	52	CRT- BAGS	96,124
F9	Cardboard boxes with black plastic bags containing crushed glass, stacked 3 high	312	CRUSHED GLASS	1,060,800
F10	Cardboard boxes with transparent bags containing glass, stacked 3 high	176	CRUSHED GLASS	598,400
F11	Cardboard boxes with transparent bags containing glass, stacked 2 high	35	CRUSHED GLASS	119,000
	White plastic bags, stacked 1 row high, containing CRT + metal frames, crushed	90	CRT - BAGS	166,368
F12	Cardboard boxes with transparent bags containing CRT, stacked 3 or 4 high	310	CRT	413,687
			TOTAL # OF GAYLORDS & BAGS :	**19,614**
			TOTAL LBS OF GAYLORD & BAG CONTENT :	**30,917,116**
			SUB-TOTAL LBS OF CRT SCREENS (COMPLETE UNITS) :	**22,604,650**
			SUB-TOTAL LBS OF CRUSHED CRT GLASS :	**7,388,200**
			SUB TOTAL LBS OF CRT- BAGS (CRUSHED CRT SCREENS AND OTHER CRT COMPONENTS) :	**924,267**

ITEM	TOTAL LBS	$/LB *	TOTAL
HAZ MATS (CRUSHED GLASS & CRT BAGS)	8,312,467	$ 0.08270	$ 687,440.99
SOLID WASTES (CRT SCREENS)	22,604,650	$ 0.12150	$ 2,746,464.94
		TOTAL	$ 3,433,905.94

* PRICING BASED ON KUUSAKOSKI QUOTE DATED APRIL 13TH, 2018

** WEIGHT BASED ON KUUSAKOSKI ESTIMATED AVEC WEIGHT FOR CRUSHED GLASS

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OHIO WATER RESOURCES BOARD

Well Record No. 382 JJS

25 11
Co. Franklin Twp. Marion Sec.
Well Location 2137 Fairwood Ave. Size 6" x 30'
Map E. Columbus

Owner Herbert J. Waibel Address Columbus, Ohio
Driller R.H. Goodwin Date 4/10/48

Well Head Elev. or M. P.
Elev. of Ground at Well

Pumping Test: 3' D.D. ✓

Static Level 13' Date 4/10/48
Normal Pumpage

Quality Use

Adequacy of supply

Owner's Well No. or Other Designation

Source of Data Goodwin
Collected by mt Date Apr 1948

44958 STRATA	DEPTH From	DEPTH To
Yellow clay	0	6
Gray clay		12
Gray hardpan		23
Gravel		29

5

x = 1,872,000
y = 700,000-S

* Chief Aquifer

Loc.

WELL LOG AND DRILLING REPORT

ORIGINAL

State of Ohio
DEPARTMENT OF NATURAL RESOURCES
Division of Water
Columbus, Ohio

No 77225

County FRANKLIN Township MARION Section of Township or Lot Number

Owner ATLANTIC MOTOR FREIGHT TERMINAL Address 1651 REFUGEE RD.

Location of property BETWEEN LOCKBOURN & FAIRWOOD AVE ON REFUGEE RD.

CONSTRUCTION DETAILS

Casing diameter 5" Length of casing

Type of screen Length of screen

Type of pump

Capacity of pump

Depth of pump setting

PUMPING TEST

Pumping rate G.P.M. Duration of test hrs.

Drawdown ft. Date OCT 2 TO OCT 8-53

Developed capacity

Static level—depth to water ft.

Pump installed by

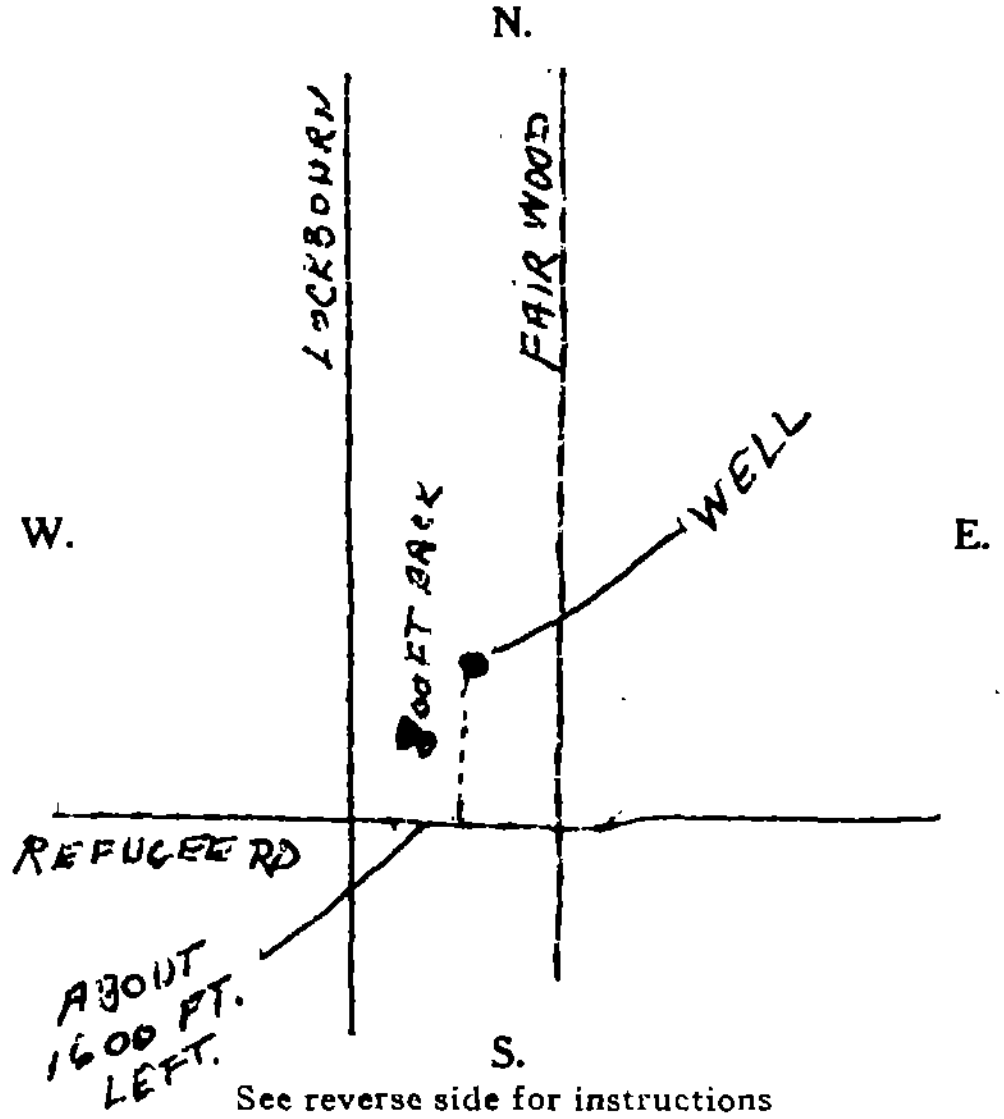
WELL LOG

Formations Sandstone, shale, limestone, gravel and clay	From	To
	0 Feet	Ft.
CLAY YELLOW		12
SOFT YELLOW CLAY	12	31
BLUE SANDY CLAY	31	90
QUICK SAND	90	135
SHALE	135	136

NO 1 WELL
DRY-HOLE

SKETCH SHOWING LOCATION

Locate in reference to numbered State Highways, St. Intersections, County roads, etc.



See reverse side for instructions

Drilling Firm R. H. Goodwin

Address 871 Miller Ave

Date Oct 27-1953

Signed

WELL LOG AND DRILLING REPORT

ORIGINAL

Loc

State of Ohio
DEPARTMENT OF NATURAL RESOURCES
Division of Water
Columbus, Ohio

No 77226

County FRANKLIN Township ~~FRANKLIN~~ Marion Section of Township or Lot Number

Owner ATLANTIC MOTOR FREIGHT TERMINAL Address 1651 REFUGEE RD.

Location of property BETWEEN LOCKBOURNE FAIRWOOD ON REFUGEE RD.

CONSTRUCTION DETAILS

Casing diameter 5" Length of casing

Type of screen Length of screen

Type of pump

Capacity of pump

Depth of pump setting

PUMPING TEST

Pumping rate G.P.M. Duration of test hrs.

Drawdown ft. Date

Developed capacity

Static level—depth to water ft.

Pump installed by

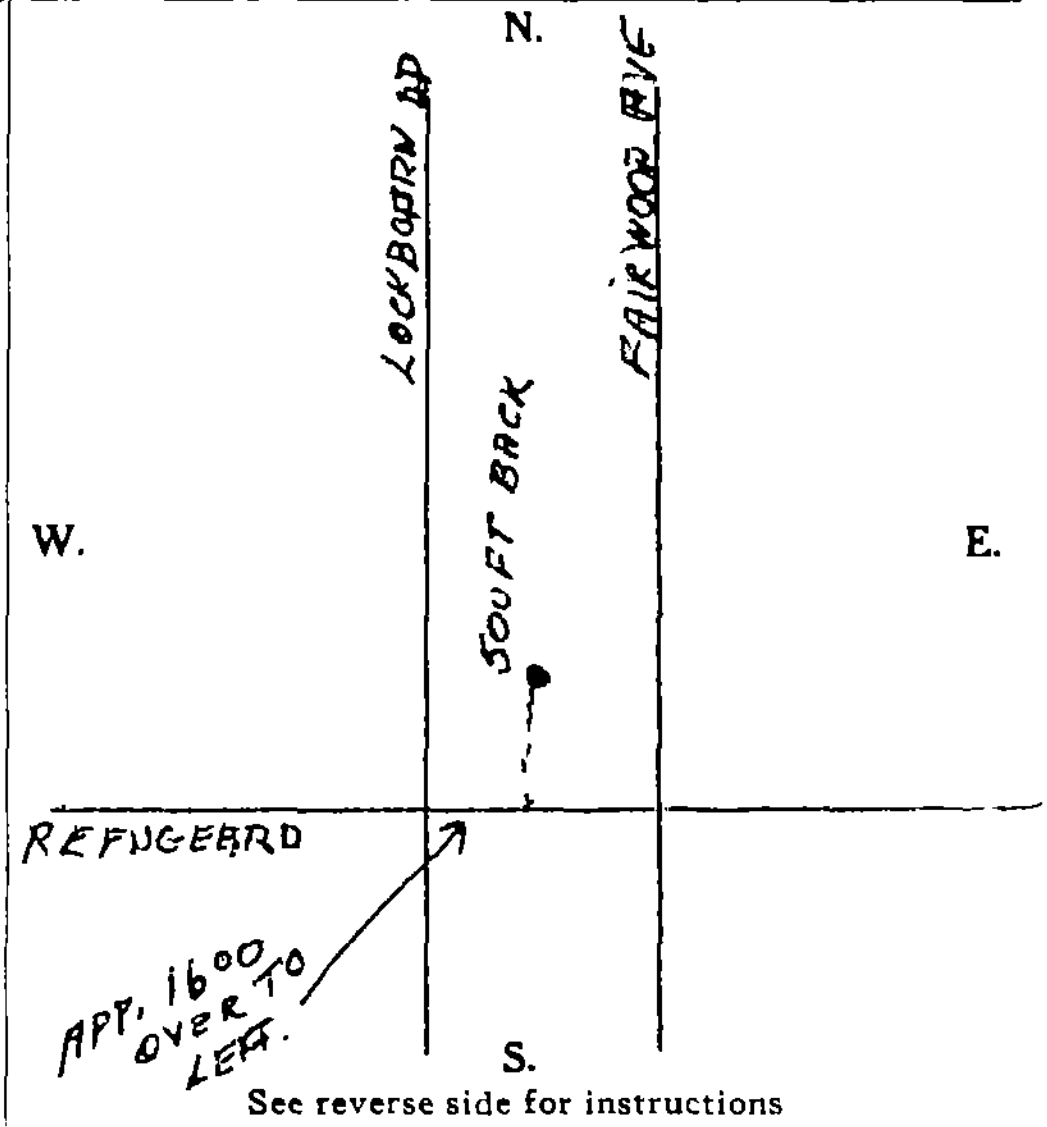
WELL LOG

Formations Sandstone, shale, limestone, gravel and clay	From	To
CLAY	0 Feet	9 Ft.
BLUE CLAY	9	30
DRY GRAVEL	30	40
BLUE SANDY CLAY	40	85
SILT SAND	85	90
QUICK SAND	90	105

NO. 2 WELL.
DRY HOLE

SKETCH SHOWING LOCATION

Locate in reference to numbered State Highways, St. Intersections, County roads, etc.



See reverse side for instructions

Drilling Firm R. H. Goodwin

Address 871 Miller Ave

Date Oct 27-1953

Signed

Locate

WELL LOG AND DRILLING REPORT

ORIGINAL

State of Ohio
DEPARTMENT OF NATURAL RESOURCES
Division of Water
Columbus, Ohio

No 77227

County FRANKLIN Township Marion FRMER Section of Township or Lot Number

Owner ATLANTIC MOTOR FREIGHT TERMINAL Address 1651 REFUGEE RD.

Location of property BETWEEN LOCKBOURN & FAIRMOR AVE. ON REFUGEE RD.

CONSTRUCTION DETAILS

Casing diameter 5" Length of casing

Type of screen Length of screen

Type of pump

Capacity of pump

Depth of pump setting

PUMPING TEST

Pumping rate G.P.M. Duration of test hrs.

Drawdown ft. Date

Developed capacity

Static level—depth to water ft.

Pump installed by

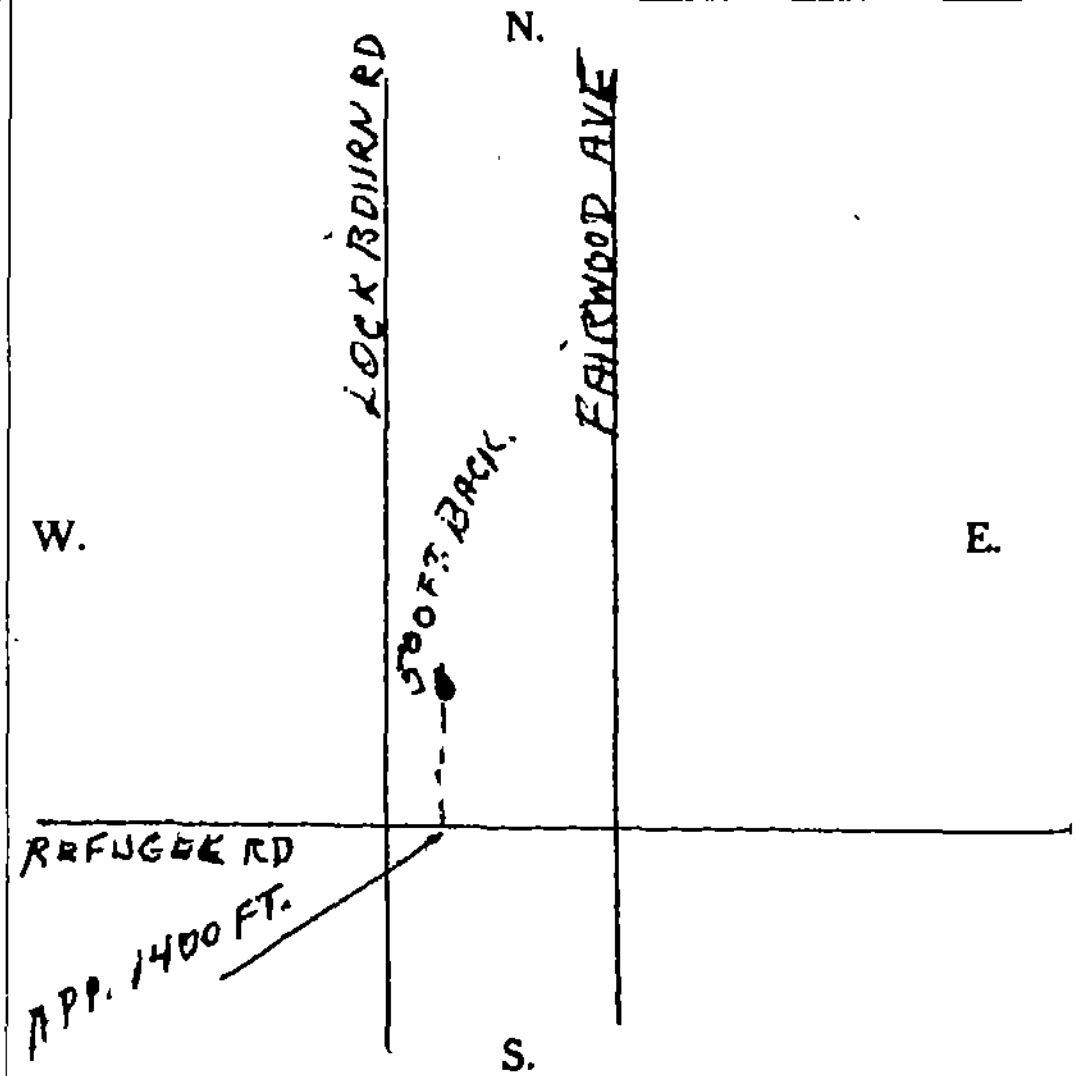
WELL LOG

Formations Sandstone, shale, limestone, gravel and clay	From	To
YELLOW CLAY.	0 Feet	12 Ft.
DRY GRAVEL & BLUE CLAY STREAKS	12	46
BLUE SANDY CLAY	46	49
COURSE GRAVEL (NO WATER)	49	51
DRY GRAVEL	51	66
SILT SAND	66	95

NO 3
DRY HOLE

SKETCH SHOWING LOCATION

Locate in reference to numbered State Highways, St. Intersections, County roads, etc.



See reverse side for instructions

Drilling Firm R. H. Goodwin Date Oct 27-1953

Address 871 Mullen Ave Columbus Signed

Appendix C
Health and Safety Plan

COVID-19 RIDER

Before on-site project activities commence, an addendum to the Health & Safety Plan will be prepared that incorporates guidance and best practices set forth in the attached OSHA *Guidance on Preparing Workplaces for COVID-19* (March 2020), the attached *CDC Interim Guidance for Businesses and Employers to Plan and Respond to Coronavirus Disease 2019 (COVID-19)* (March 2020), and other federal, state, and local government law and guidance related to COVID-19, which is current as of that time, as applicable, appropriate, updated, and amended.

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Centers for Disease Control and Prevention

Coronavirus Disease 2019 (COVID-19)

Interim Guidance for Businesses and Employers to Plan and Respond to Coronavirus Disease 2019 (COVID-19)

Plan, Prepare and Respond to Coronavirus Disease 2019

Older adults and people who have severe underlying chronic medical conditions like heart or lung disease or diabetes seem to be at higher risk for developing more serious complications from COVID-19 illness.
Find more information here.

Summary of Changes to the Guidance:

Below are changes as of March 21, 2020

- Updated cleaning and disinfection guidance
- Updated best practices for conducting social distancing
- Updated strategies and recommendations that can be implemented now to respond to COVID-19

CDC Industry Guidance

- Resources for Airlines
- Resources for the Ship Industry

OSHA/HHS Guidance

- Guidance on Preparing Workplaces for COVID-19

Purpose

This interim guidance is based on what is currently known about the coronavirus disease 2019 (COVID-19). COVID-19 is a respiratory illness that can spread from person to person. The outbreak first started in China, but the virus continues to spread internationally and in the United States. The Centers for Disease Control and Prevention (CDC) will update this interim guidance as additional information becomes available.

The following interim guidance may help prevent workplace exposures to COVID-19, in non-healthcare settings. (CDC has provided separate guidance for healthcare settings.) This guidance also provides planning considerations for community spread of COVID-19.

To prevent stigma and discrimination in the workplace, use only the guidance described below to determine risk of COVID-19 infection. Do not make determinations of risk based on race or country of origin and be sure to maintain confidentiality of people with confirmed coronavirus infection. There is much more to learn about the transmissibility, severity, and other features of COVID-19 and investigations are ongoing. Updates are available on CDC's web page.

Preparing Workplaces for a COVID-19 Outbreak

Businesses and employers can prevent and slow the spread of COVID-19. Employers should plan to respond in a flexible way to varying levels of disease transmission in the community and be prepared to refine their business response plans as needed. According to the Occupational Safety and Health Administration (OSHA), most American workers will likely experience low (caution) or medium exposure risk levels at their job or place of employment (see OSHA guidance for employers for more information about job risk classifications).

Businesses are strongly encouraged to coordinate with state and local health officials so timely and accurate information can guide appropriate responses. Local conditions will influence the decisions that public health officials make regarding community-level strategies. CDC has guidance for mitigation strategies according to the level of community transmission or impact of COVID-19.

All employers need to consider how best to decrease the spread of COVID-19 and lower the impact in their workplace. This may include activities in one or more of the following areas:

a. reduce transmission among employees,
b. maintain healthy business operations, and
c. maintain a healthy work environment.

Reduce Transmission Among Employees

Actively encourage sick employees to stay home:

- Employees who have symptoms (i.e., fever, cough, or shortness of breath) should notify their supervisor and stay home.
- Sick employees should follow CDC-recommended steps. Employees should not return to work until the criteria to discontinue home isolation are met, in consultation with healthcare providers and state and local health departments.
- Employees who are well but who have a sick family member at home with COVID-19 should notify their supervisor and follow CDC recommended precautions.

Identify where and how workers might be exposed to COVID-19 at work:

- See OSHA COVID-19 webpage for more information on how to protect workers from potential exposures and guidance for employers , including steps to take for jobs according to exposure risk.
- Be aware that some employees may be at higher risk for serious illness, such as older adults and those with chronic medical conditions. Consider minimizing face-to-face contact between these employees or assign work tasks that allow them to maintain a distance of six feet from other workers, customers and visitors, or to telework if possible.

Separate sick employees:

- Employees who appear to have symptoms (i.e., fever, cough, or shortness of breath) upon arrival at work or who become sick during the day should immediately be separated from other employees, customers, and visitors and sent home.
- If an employee is confirmed to have COVID-19 infection, employers should inform fellow employees of their possible exposure to COVID-19 in the workplace but maintain confidentiality as required by the Americans with Disabilities Act (ADA). The fellow employees should then self-monitor for symptoms (i.e., fever, cough, or shortness of breath).

Educate employees about how they can reduce the spread of COVID-19:

- Employees can take steps to protect themselves at work and at home. Older people and people with serious chronic medical conditions are at higher risk for complications.
- Follow the policies and procedures of your employer related to illness, cleaning and disinfecting, and work meetings and travel.
- Stay home if you are sick, except to get medical care. Learn what to do if you are sick.
- Inform your supervisor if you have a sick family member at home with COVID-19. Learn what to do if someone in your house is sick.
- Wash your hands often with soap and water for at least 20 seconds. Use hand sanitizer with at least 60% alcohol if soap and water are not available.
- Avoid touching your eyes, nose, and mouth with unwashed hands.
- Cover your mouth and nose with a tissue when you cough or sneeze or use the inside of your elbow. Throw used tissues in the trash and immediately wash hands with soap and water for at least 20 seconds. If soap and water are not

in the trash and immediately wash hands with soap and water for at least 20 seconds. If soap and water are not available, use hand sanitizer containing at least 60% alcohol. Learn more about coughing and sneezing etiquette on the CDC website.

- Clean AND disinfect frequently touched objects and surfaces such as workstations, keyboards, telephones, handrails, and doorknobs. Dirty surfaces can be cleaned with soap and water prior to disinfection. To disinfect, use products that meet EPA's criteria for use against SARS-CoV-2, the cause of COVID-19, and are appropriate for the surface.
- Avoid using other employees' phones, desks, offices, or other work tools and equipment, when possible. If necessary, clean and disinfect them before and after use.
- Practice social distancing by avoiding large gatherings and maintaining distance (approximately 6 feet or 2 meters) from others when possible.

Maintain Healthy Business Operations

Identify a workplace coordinator who will be responsible for COVID-19 issues and their impact at the workplace.

Implement flexible sick leave and supportive policies and practices.

- Ensure that sick leave policies are flexible and consistent with public health guidance and that employees are aware of and understand these policies.
- Maintain flexible policies that permit employees to stay home to care for a sick family member or take care of children due to school and childcare closures. Additional flexibilities might include giving advances on future sick leave and allowing employees to donate sick leave to each other.
- Employers that do not currently offer sick leave to some or all of their employees may want to draft non-punitive "emergency sick leave" policies.
- Employers should not require a positive COVID-19 test result or a healthcare provider's note for employees who are sick to validate their illness, qualify for sick leave, or to return to work. Healthcare provider offices and medical facilities may be extremely busy and not able to provide such documentation in a timely manner.
- Review human resources policies to make sure that policies and practices are consistent with public health recommendations and are consistent with existing state and federal workplace laws (for more information on employer responsibilities, visit the Department of Labor's and the Equal Employment Opportunity Commission's websites).
- Connect employees to employee assistance program (EAP) resources (if available) and community resources as needed. Employees may need additional social, behavioral, and other services, for example, to cope with the death of a loved one.

Assess your essential functions and the reliance that others and the community have on your services or products.

- Be prepared to change your business practices if needed to maintain critical operations (e.g., identify alternative suppliers, prioritize existing customers, or temporarily suspend some of your operations if needed).
- Identify alternate supply chains for critical goods and services. Some good and services may be in higher demand or unavailable.
- Talk with companies that provide your business with contract or temporary employees about the importance of sick employees staying home and encourage them to develop non-punitive leave policies.
- Talk with business partners about your response plans. Share best practices with other businesses in your communities (especially those in your supply chain), chambers of commerce, and associations to improve community response efforts.

Determine how you will operate if absenteeism spikes from increases in sick employees, those who stay home to care for sick family members, and those who must stay home to watch their children if dismissed from childcare programs and K-12 schools.

- Plan to monitor and respond to absenteeism at the workplace.
- Implement plans to continue your essential business functions in case you experience higher than usual absenteeism.
- Prepare to institute flexible workplace and leave policies.
- Cross-train employees to perform essential functions so the workplace can operate even if key employees are absent.

Consider establishing policies and practices for social distancing. Social distancing should be implemented if recommended by state and local health authorities. Social distancing means avoiding large gatherings and maintaining distance (approximately 6 feet or 2 meters) from others when possible (e.g., breakrooms and cafeterias). Strategies that business could use include:

- Implementing flexible worksites (e.g., telework)
- Implementing flexible work hours (e.g., staggered shifts)
- Increasing physical space between employees at the worksite
- Increasing physical space between employees and customers (e.g., drive through, partitions)
- Implementing flexible meeting and travel options (e.g., postpone non-essential meetings or events)
- Downsizing operations
- Delivering services remotely (e.g. phone, video, or web)
- Delivering products through curbside pick-up or delivery

Employers with more than one business location are encouraged to provide local managers with the authority to take appropriate actions outlined in their COVID-19 response plan based on local conditions.

Maintain a healthy work environment

Consider improving the engineering controls using the building ventilation system. This may include some or all of the following activities:

- Increase ventilation rates.
- Increase the percentage of outdoor air that circulates into the system.

Support respiratory etiquette and hand hygiene for employees, customers, and worksite visitors:

- Provide tissues and no-touch disposal receptacles.
- Provide soap and water in the workplace. If soap and water are not readily available, use alcohol-based hand sanitizer that is at least 60% alcohol. If hands are visibly dirty, soap and water should be chosen over hand sanitizer. Ensure that adequate supplies are maintained.
- Place hand sanitizers in multiple locations to encourage hand hygiene.
- Place posters that encourage hand hygiene to help stop the spread at the entrance to your workplace and in other workplace areas where they are likely to be seen.
- Discourage handshaking – encourage the use of other noncontact methods of greeting.
- Direct employees to visit the coughing and sneezing etiquette and clean hands webpage for more information.

Perform routine environmental cleaning and disinfection:

- Routinely clean and disinfect all frequently touched surfaces in the workplace, such as workstations, keyboards, telephones, handrails, and doorknobs.

  - If surfaces are dirty, they should be cleaned using a detergent or soap and water prior to disinfection.
  - For disinfection, most common EPA-registered household disinfectants should be effective. A list of products that are EPA-approved for use against the virus that causes COVID-19 is available here . Follow the manufacturer's instructions for all cleaning and disinfection products (e.g., concentration, application method and contact time, etc.).

- Discourage workers from using other workers' phones, desks, offices, or other work tools and equipment, when possible. If necessary, clean and disinfect them before and after use.
- Provide disposable wipes so that commonly used surfaces (for example, doorknobs, keyboards, remote controls, desks, other work tools and equipment) can be wiped down by employees before each use. To disinfect, use products that meet EPA's criteria for use against SARS-Cov-2 , the cause of COVID-19, and are appropriate for the surface.

Perform enhanced cleaning and disinfection after persons suspected/confirmed to have COVID-19 have been in the facility:

- If a sick employee is suspected or confirmed to have COVID-19, follow the CDC cleaning and disinfection recommendations.

Advise employees before traveling to take additional preparations:

- Check the CDC's Traveler's Health Notices for the latest guidance and recommendations for each country to which you will travel. Specific travel information for travelers going to and returning from countries with travel advisories, and information for aircrew, can be found on the CDC website.
- Advise employees to check themselves for symptoms of COVID-19 (i.e., fever, cough, or shortness of breath) before starting travel and notify their supervisor and stay home if they are sick.
- Ensure employees who become sick while traveling or on temporary assignment understand that they should notify their supervisor and promptly call a healthcare provider for advice if needed.
- If outside the United States, sick employees should follow company policy for obtaining medical care or contact a healthcare provider or overseas medical assistance company to assist them with finding an appropriate healthcare provider in that country. A U.S. consular officer can help locate healthcare services. However, U.S. embassies, consulates, and military facilities do not have the legal authority, capability, and resources to evacuate or give medicines, vaccines, or medical care to private U.S. citizens overseas.

Take care when attending meetings and gatherings:

- Carefully consider whether travel is necessary.
- Consider using videoconferencing or teleconferencing when possible for work-related meetings and gatherings.
- Consider canceling, adjusting, or postponing large work-related meetings or gatherings that can only occur in-person.
- When videoconferencing or teleconferencing is not possible, hold meetings in open, well-ventilated spaces.

Resources for more information:

CDC Guidance

- COVID-19 Website
- What You Need to Know About COVID-19
- What to Do If You Are Sick With COVID-19
- Interim US Guidance for Risk Assessment and Public Health Management of Persons with Potential Coronavirus Disease 2019 (COVID-19) Exposure in Travel-associated or Community Settings

- Health Alert Network
- Travelers' Health Website
- National Institute for Occupational Safety and Health's
- Small Business International Travel Resource Travel Planner
- Coronavirus Disease 2019 Recommendations for Ships
- Coronavirus Disease 2019 Recommendations for Airlines and Airline crew
- Persons at Higher Risk of Severe Illness

Other Federal Agencies and Partners

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Guidance on Preparing Workplaces for COVID-19

OSHA 3990-03 2020

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Occupational Safety and Health Act of 1970

"To assure safe and healthful working conditions for working men and women; by authorizing enforcement of the standards developed under the Act; by assisting and encouraging the States in their efforts to assure safe and healthful working conditions; by providing for research, information, education, and training in the field of occupational safety and health."

This guidance is not a standard or regulation, and it creates no new legal obligations. It contains recommendations as well as descriptions of mandatory safety and health standards. The recommendations are advisory in nature, informational in content, and are intended to assist employers in providing a safe and healthful workplace. The Occupational Safety and Health Act requires employers to comply with safety and health standards and regulations promulgated by OSHA or by a state with an OSHA-approved state plan. In addition, the Act's General Duty Clause, Section 5(a)(1), requires employers to provide their employees with a workplace free from recognized hazards likely to cause death or serious physical harm.

This information will be made available to sensory-impaired individuals upon request. Voice phone: (202) 693-1999; teletypewriter (TTY) number: 1-877-889-5627.

Guidance on Preparing Workplaces for COVID-19

U.S. Department of Labor
Occupational Safety and Health Administration

OSHA 3990-03 2020

U.S. Department of Labor

Contents

Introduction

Coronavirus Disease 2019 (COVID-19) is a respiratory disease caused by the SARS-CoV-2 virus. It has spread from China to many other countries around the world, including the United States. Depending on the severity of COVID-19's international impacts, outbreak conditions—including those rising to the level of a pandemic—can affect all aspects of daily life, including travel, trade, tourism, food supplies, and financial markets.

To reduce the impact of COVID-19 outbreak conditions on businesses, workers, customers, and the public, it is important for all employers to plan now for COVID-19. For employers who have already planned for influenza pandemics, planning for COVID-19 may involve updating plans to address the specific exposure risks, sources of exposure, routes of transmission, and other unique characteristics of SARS-CoV-2 (i.e., compared to pandemic influenza viruses). Employers who have not prepared for pandemic events should prepare themselves and their workers as far in advance as possible of potentially worsening outbreak conditions. Lack of continuity planning can result in a cascade of failures as employers attempt to address challenges of COVID-19 with insufficient resources and workers who might not be adequately trained for jobs they may have to perform under pandemic conditions.

The Occupational Safety and Health Administration (OSHA) developed this COVID-19 planning guidance based on traditional infection prevention and industrial hygiene practices. It focuses on the need for employers to implement engineering, administrative, and work practice controls and personal protective equipment (PPE), as well as considerations for doing so.

This guidance is intended for planning purposes. Employers and workers should use this planning guidance to help identify risk levels in workplace settings and to determine any appropriate control measures to implement. Additional guidance may be needed as COVID-19 outbreak conditions change, including as new information about the virus, its transmission, and impacts, becomes available.

The U.S. Department of Health and Human Services' Centers for Disease Control and Prevention (CDC) provides the latest information about COVID-19 and the global outbreak: www.cdc.gov/coronavirus/2019-ncov.

The OSHA COVID-19 webpage offers information specifically for workers and employers: www.osha.gov/covid-19.

This guidance is advisory in nature and informational in content. It is not a standard or a regulation, and it neither creates new legal obligations nor alters existing obligations created by OSHA standards or the *Occupational Safety and Health Act* (OSH Act). Pursuant to the OSH Act, employers must comply with safety and health standards and regulations issued and enforced either by OSHA or by an OSHA-approved State Plan. In addition, the OSH Act's General Duty Clause, Section 5(a)(1), requires employers to provide their employees with a workplace free from recognized hazards likely to cause death or serious physical harm. OSHA-approved State Plans may have standards, regulations and enforcement policies that are different from, but at least as effective as, OSHA's. Check with your State Plan, as applicable, for more information.

About COVID-19

Symptoms of COVID-19

Infection with SARS-CoV-2, the virus that causes COVID-19, can cause illness ranging from mild to severe and, in some cases, can be fatal. Symptoms typically include fever, cough, and shortness of breath. Some people infected with the virus have reported experiencing other non-respiratory symptoms. Other people, referred to as *asymptomatic cases*, have experienced no symptoms at all.

According to the CDC, symptoms of COVID-19 may appear in as few as 2 days or as long as 14 days after exposure.

How COVID-19 Spreads

Although the first human cases of COVID-19 likely resulted from exposure to infected animals, infected people can spread SARS-CoV-2 to other people.

The virus is thought to spread mainly from person-to-person, including:

- Between people who are in close contact with one another (within about 6 feet).
- Through respiratory droplets produced when an infected person coughs or sneezes. These droplets can land in the mouths or noses of people who are nearby or possibly be inhaled into the lungs.

Medium exposure risk jobs include those that require frequent and/or close contact with (i.e., within 6 feet of) other people who may be infected with SARS-CoV-2.

It may be possible that a person can get COVID-19 by touching a surface or object that has SARS-CoV-2 on it and then touching their own mouth, nose, or possibly their eyes, but this is not thought to be the primary way the virus spreads.

People are thought to be most contagious when they are most symptomatic (i.e., experiencing fever, cough, and/or shortness of breath). Some spread might be possible before people show symptoms; there have been reports of this type of asymptomatic transmission with this new coronavirus, but this is also not thought to be the main way the virus spreads.

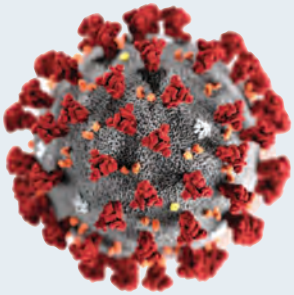
Although the United States has implemented public health measures to limit the spread of the virus, it is likely that some person-to-person transmission will continue to occur.

The CDC website provides the latest information about COVID-19 transmission: www.cdc.gov/coronavirus/2019-ncov/about/transmission.html.

How a COVID-19 Outbreak Could Affect Workplaces

Similar to influenza viruses, SARS-CoV-2, the virus that causes COVID-19, has the potential to cause extensive outbreaks. Under conditions associated with widespread person-to-person spread, multiple areas of the United States and other countries may see impacts at the same time. In the absence of a vaccine, an outbreak may also be an extended event. As a result, workplaces may experience:

- **Absenteeism.** Workers could be absent because they are sick; are caregivers for sick family members; are caregivers for children if schools or day care centers are closed; have at-risk people at home, such as immunocompromised family members; or are afraid to come to work because of fear of possible exposure.
- **Change in patterns of commerce.** Consumer demand for items related to infection prevention (e.g., respirators) is likely to increase significantly, while consumer interest in other goods may decline. Consumers may also change shopping patterns because of a COVID-19 outbreak. Consumers may try to shop at off-peak hours to reduce contact with other people, show increased interest in home delivery services, or prefer other options, such as drive-through service, to reduce person-to-person contact.
- **Interrupted supply/delivery.** Shipments of items from geographic areas severely affected by COVID-19 may be delayed or cancelled with or without notification.



This illustration, created at the Centers for Disease Control and Prevention (CDC), reveals ultrastructural morphology exhibited by the 2019 Novel Coronavirus (2019-nCoV). Note the spikes that adorn the outer surface of the virus, which impart the look of a corona surrounding the virion, when viewed electron microscopically. This virus was identified as the cause of an outbreak of respiratory illness first detected in Wuhan, China.

Photo: CDC / Alissa Eckert & Dan Higgins

Steps All Employers Can Take to Reduce Workers' Risk of Exposure to SARS-CoV-2

This section describes basic steps that every employer can take to reduce the risk of worker exposure to SARS-CoV-2, the virus that causes COVID-19, in their workplace. Later sections of this guidance—including those focusing on jobs classified as having low, medium, high, and very high exposure risks—provide specific recommendations for employers and workers within specific risk categories.

Develop an Infectious Disease Preparedness and Response Plan

If one does not already exist, develop an infectious disease preparedness and response plan that can help guide protective actions against COVID-19.

Stay abreast of guidance from federal, state, local, tribal, and/or territorial health agencies, and consider how to incorporate those recommendations and resources into workplace-specific plans.

Plans should consider and address the level(s) of risk associated with various worksites and job tasks workers perform at those sites. Such considerations may include:

- Where, how, and to what sources of SARS-CoV-2 might workers be exposed, including:
  - The general public, customers, and coworkers; and
  - Sick individuals or those at particularly high risk of infection (e.g., international travelers who have visited locations with widespread sustained (ongoing) COVID-19 transmission, healthcare workers who have had unprotected exposures to people known to have, or suspected of having, COVID-19).
- Non-occupational risk factors at home and in community settings.

- Workers' individual risk factors (e.g., older age; presence of chronic medical conditions, including immunocompromising conditions; pregnancy).
- Controls necessary to address those risks.

Follow federal and state, local, tribal, and/or territorial (SLTT) recommendations regarding development of contingency plans for situations that may arise as a result of outbreaks, such as:

- Increased rates of worker absenteeism.
- The need for social distancing, staggered work shifts, downsizing operations, delivering services remotely, and other exposure-reducing measures.
- Options for conducting essential operations with a reduced workforce, including cross-training workers across different jobs in order to continue operations or deliver surge services.
- Interrupted supply chains or delayed deliveries.

Plans should also consider and address the other steps that employers can take to reduce the risk of worker exposure to SARS-CoV-2 in their workplace, described in the sections below.

Prepare to Implement Basic Infection Prevention Measures

For most employers, protecting workers will depend on emphasizing basic infection prevention measures. As appropriate, all employers should implement good hygiene and infection control practices, including:

- Promote frequent and thorough hand washing, including by providing workers, customers, and worksite visitors with a place to wash their hands. If soap and running water are not immediately available, provide alcohol-based hand rubs containing at least 60% alcohol.
- Encourage workers to stay home if they are sick.
- Encourage respiratory etiquette, including covering coughs and sneezes.

- Provide customers and the public with tissues and trash receptacles.
- Employers should explore whether they can establish policies and practices, such as flexible worksites (e.g., telecommuting) and flexible work hours (e.g., staggered shifts), to increase the physical distance among employees and between employees and others if state and local health authorities recommend the use of social distancing strategies.
- Discourage workers from using other workers' phones, desks, offices, or other work tools and equipment, when possible.
- Maintain regular housekeeping practices, including routine cleaning and disinfecting of surfaces, equipment, and other elements of the work environment. When choosing cleaning chemicals, employers should consult information on Environmental Protection Agency (EPA)-approved disinfectant labels with claims against emerging viral pathogens. Products with EPA-approved emerging viral pathogens claims are expected to be effective against SARS-CoV-2 based on data for harder to kill viruses. Follow the manufacturer's instructions for use of all cleaning and disinfection products (e.g., concentration, application method and contact time, PPE).

Develop Policies and Procedures for Prompt Identification and Isolation of Sick People, if Appropriate

- Prompt identification and isolation of potentially infectious individuals is a critical step in protecting workers, customers, visitors, and others at a worksite.
- Employers should inform and encourage employees to self-monitor for signs and symptoms of COVID-19 if they suspect possible exposure.
- Employers should develop policies and procedures for employees to report when they are sick or experiencing symptoms of COVID-19.

- Where appropriate, employers should develop policies and procedures for immediately isolating people who have signs and/or symptoms of COVID-19, and train workers to implement them. Move potentially infectious people to a location away from workers, customers, and other visitors. Although most worksites do not have specific isolation rooms, designated areas with closable doors may serve as isolation rooms until potentially sick people can be removed from the worksite.
- Take steps to limit spread of the respiratory secretions of a person who may have COVID-19. Provide a face mask, if feasible and available, and ask the person to wear it, if tolerated. Note: A face mask (also called a surgical mask, procedure mask, or other similar terms) on a patient or other sick person should not be confused with PPE for a worker; the mask acts to contain potentially infectious respiratory secretions at the source (i.e., the person's nose and mouth).
- If possible, isolate people suspected of having COVID-19 separately from those with confirmed cases of the virus to prevent further transmission—particularly in worksites where medical screening, triage, or healthcare activities occur, using either permanent (e.g., wall/different room) or temporary barrier (e.g., plastic sheeting).
- Restrict the number of personnel entering isolation areas.
- Protect workers in close contact with (i.e., within 6 feet of) a sick person or who have prolonged/repeated contact with such persons by using additional engineering and administrative controls, safe work practices, and PPE. Workers whose activities involve close or prolonged/repeated contact with sick people are addressed further in later sections covering workplaces classified at medium and very high or high exposure risk.

Develop, Implement, and Communicate about Workplace Flexibilities and Protections

- Actively encourage sick employees to stay home.
- Ensure that sick leave policies are flexible and consistent with public health guidance and that employees are aware of these policies.
- Talk with companies that provide your business with contract or temporary employees about the importance of sick employees staying home and encourage them to develop non-punitive leave policies.
- Do not require a healthcare provider's note for employees who are sick with acute respiratory illness to validate their illness or to return to work, as healthcare provider offices and medical facilities may be extremely busy and not able to provide such documentation in a timely way.
- Maintain flexible policies that permit employees to stay home to care for a sick family member. Employers should be aware that more employees may need to stay at home to care for sick children or other sick family members than is usual.
- Recognize that workers with ill family members may need to stay home to care for them. See CDC's Interim Guidance for Preventing the Spread of COVID-19 in Homes and Residential Communities: www.cdc.gov/coronavirus/2019-ncov/hcp/guidance-prevent-spread.html.
- Be aware of workers' concerns about pay, leave, safety, health, and other issues that may arise during infectious disease outbreaks. Provide adequate, usable, and appropriate training, education, and informational material about business-essential job functions and worker health and safety, including proper hygiene practices and the use of any workplace controls (including PPE). Informed workers who feel safe at work are less likely to be unnecessarily absent.

- Work with insurance companies (e.g., those providing employee health benefits) and state and local health agencies to provide information to workers and customers about medical care in the event of a COVID-19 outbreak.

Implement Workplace Controls

Occupational safety and health professionals use a framework called the "hierarchy of controls" to select ways of controlling workplace hazards. In other words, the best way to control a hazard is to systematically remove it from the workplace, rather than relying on workers to reduce their exposure. During a COVID-19 outbreak, when it may not be possible to eliminate the hazard, the most effective protection measures are (listed from most effective to least effective): engineering controls, administrative controls, safe work practices (a type of administrative control), and PPE. There are advantages and disadvantages to each type of control measure when considering the ease of implementation, effectiveness, and cost. In most cases, a combination of control measures will be necessary to protect workers from exposure to SARS-CoV-2.

In addition to the types of workplace controls discussed below, CDC guidance for businesses provides employers and workers with recommended SARS-CoV-2 infection prevention strategies to implement in workplaces: www.cdc.gov/coronavirus/2019-ncov/specific-groups/guidance-business-response.html.

Engineering Controls

Engineering controls involve isolating employees from work-related hazards. In workplaces where they are appropriate, these types of controls reduce exposure to hazards without relying on worker behavior and can be the most cost-effective solution to implement. Engineering controls for SARS-CoV-2 include:

- Installing high-efficiency air filters.
- Increasing ventilation rates in the work environment.
- Installing physical barriers, such as clear plastic sneeze guards.

- Installing a drive-through window for customer service.
- Specialized negative pressure ventilation in some settings, such as for aerosol generating procedures (e.g., airborne infection isolation rooms in healthcare settings and specialized autopsy suites in mortuary settings).

Administrative Controls

Administrative controls require action by the worker or employer. Typically, administrative controls are changes in work policy or procedures to reduce or minimize exposure to a hazard. Examples of administrative controls for SARS-CoV-2 include:

- Encouraging sick workers to stay at home.
- Minimizing contact among workers, clients, and customers by replacing face-to-face meetings with virtual communications and implementing telework if feasible.
- Establishing alternating days or extra shifts that reduce the total number of employees in a facility at a given time, allowing them to maintain distance from one another while maintaining a full onsite work week.
- Discontinuing nonessential travel to locations with ongoing COVID-19 outbreaks. Regularly check CDC travel warning levels at: www.cdc.gov/coronavirus/2019-ncov/travelers.
- Developing emergency communications plans, including a forum for answering workers' concerns and internet-based communications, if feasible.
- Providing workers with up-to-date education and training on COVID-19 risk factors and protective behaviors (e.g., cough etiquette and care of PPE).
- Training workers who need to use protecting clothing and equipment how to put it on, use/wear it, and take it off correctly, including in the context of their current and potential duties. Training material should be easy to understand and available in the appropriate language and literacy level for all workers.

Safe Work Practices

Safe work practices are types of administrative controls that include procedures for safe and proper work used to reduce the duration, frequency, or intensity of exposure to a hazard. Examples of safe work practices for SARS-CoV-2 include:

- Providing resources and a work environment that promotes personal hygiene. For example, provide tissues, no-touch trash cans, hand soap, alcohol-based hand rubs containing at least 60 percent alcohol, disinfectants, and disposable towels for workers to clean their work surfaces.
- Requiring regular hand washing or using of alcohol-based hand rubs. Workers should always wash hands when they are visibly soiled and after removing any PPE.
- Post handwashing signs in restrooms.

Personal Protective Equipment (PPE)

While engineering and administrative controls are considered more effective in minimizing exposure to SARS-CoV-2, PPE may also be needed to prevent certain exposures. While correctly using PPE can help prevent some exposures, it should not take the place of other prevention strategies.

Examples of PPE include: gloves, goggles, face shields, face masks, and respiratory protection, when appropriate. During an outbreak of an infectious disease, such as COVID-19, recommendations for PPE specific to occupations or job tasks may change depending on geographic location, updated risk assessments for workers, and information on PPE effectiveness in preventing the spread of COVID-19. Employers should check the OSHA and CDC websites regularly for updates about recommended PPE.

All types of PPE must be:

- Selected based upon the hazard to the worker.
- Properly fitted and periodically refitted, as applicable (e.g., respirators).

- Consistently and properly worn when required.
- Regularly inspected, maintained, and replaced, as necessary.
- Properly removed, cleaned, and stored or disposed of, as applicable, to avoid contamination of self, others, or the environment.

Employers are obligated to provide their workers with PPE needed to keep them safe while performing their jobs. The types of PPE required during a COVID-19 outbreak will be based on the risk of being infected with SARS-CoV-2 while working and job tasks that may lead to exposure.

Workers, including those who work within 6 feet of patients known to be, or suspected of being, infected with SARS-CoV-2 and those performing aerosol-generating procedures, need to use respirators:

- National Institute for Occupational Safety and Health (NIOSH)-approved, N95 filtering facepiece respirators or better must be used in the context of a comprehensive, written respiratory protection program that includes fit-testing, training, and medical exams. See OSHA's Respiratory Protection standard, 29 CFR 1910.134 at www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.134.
- When disposable N95 filtering facepiece respirators are not available, consider using other respirators that provide greater protection and improve worker comfort. Other types of acceptable respirators include: a R/P95, N/R/P99, or N/R/P100 filtering facepiece respirator; an air-purifying elastomeric (e.g., half-face or full-face) respirator with appropriate filters or cartridges; powered air purifying respirator (PAPR) with high-efficiency particulate arrestance (HEPA) filter; or supplied air respirator (SAR). See CDC/NIOSH guidance for optimizing respirator supplies at: www.cdc.gov/coronavirus/2019-ncov/hcp/respirators-strategy.

- Consider using PAPRs or SARs, which are more protective than filtering facepiece respirators, for any work operations or procedures likely to generate aerosols (e.g., cough induction procedures, some dental procedures, invasive specimen collection, blowing out pipettes, shaking or vortexing tubes, filling a syringe, centrifugation).
- Use a surgical N95 respirator when both respiratory protection and resistance to blood and body fluids is needed.
- Face shields may also be worn on top of a respirator to prevent bulk contamination of the respirator. Certain respirator designs with forward protrusions (duckbill style) may be difficult to properly wear under a face shield. Ensure that the face shield does not prevent airflow through the respirator.
- Consider factors such as function, fit, ability to decontaminate, disposal, and cost. OSHA's Respiratory Protection eTool provides basic information on respirators such as medical requirements, maintenance and care, fit testing, written respiratory protection programs, and voluntary use of respirators, which employers may also find beneficial in training workers at: www.osha.gov/SLTC/etools/respiratory. Also see NIOSH respirator guidance at: www.cdc.gov/niosh/topics/respirators.
- Respirator training should address selection, use (including donning and doffing), proper disposal or disinfection, inspection for damage, maintenance, and the limitations of respiratory protection equipment. Learn more at: www.osha.gov/SLTC/respiratoryprotection.
- The appropriate form of respirator will depend on the type of exposure and on the transmission pattern of COVID-19. See the NIOSH "Respirator Selection Logic" at: www.cdc.gov/niosh/docs/2005-100/default.html or the OSHA "Respiratory Protection eTool" at www.osha.gov/SLTC/etools/respiratory.

Follow Existing OSHA Standards

Existing OSHA standards may apply to protecting workers from exposure to and infection with SARS-CoV-2.

While there is no specific OSHA standard covering SARS-CoV-2 exposure, some OSHA requirements may apply to preventing occupational exposure to SARS-CoV-2. Among the most relevant are:

- OSHA's Personal Protective Equipment (PPE) standards (in general industry, 29 CFR 1910 Subpart I), which require using gloves, eye and face protection, and respiratory protection. See: www.osha.gov/laws-regs/regulations/standardnumber/1910#1910_Subpart_I.
  - When respirators are necessary to protect workers or where employers require respirator use, employers must implement a comprehensive respiratory protection program in accordance with the Respiratory Protection standard (29 CFR 1910.134). See: www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.134.
- The General Duty Clause, Section 5(a)(1) of the Occupational Safety and Health (OSH) Act of 1970, 29 USC 654(a)(1), which requires employers to furnish to each worker "employment and a place of employment, which are free from recognized hazards that are causing or are likely to cause death or serious physical harm." See: www.osha.gov/laws-regs/oshact/completeoshact.

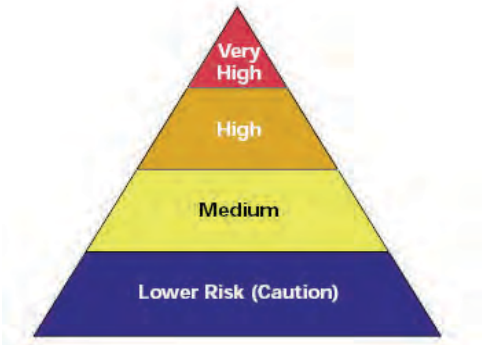
OSHA's Bloodborne Pathogens standard (29 CFR 1910.1030) applies to occupational exposure to human blood and other potentially infectious materials that typically do not include respiratory secretions that may transmit SARS-CoV-2. However, the provisions of the standard offer a framework that may help control some sources of the virus, including exposures to body fluids (e.g., respiratory secretions) not covered by the standard. See: www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.1030.

The OSHA COVID-19 webpage provides additional information about OSHA standards and requirements, including requirements in states that operate their own OSHA-approved State Plans, recordkeeping requirements and injury/illness recording criteria, and applications of standards related to sanitation and communication of risks related to hazardous chemicals that may be in common sanitizers and sterilizers. See: www.osha.gov/SLTC/covid-19/standards.html.

Classifying Worker Exposure to SARS-CoV-2

Worker risk of occupational exposure to SARS-CoV-2, the virus that causes COVID-19, during an outbreak may vary from very high to high, medium, or lower (caution) risk. The level of risk depends in part on the industry type, need for contact within 6 feet of people known to be, or suspected of being, infected with SARS-CoV-2, or requirement for repeated or extended contact with persons known to be, or suspected of being, infected with SARS-CoV-2. To help employers determine appropriate precautions, OSHA has divided job tasks into four risk exposure levels: very high, high, medium, and lower risk. The Occupational Risk Pyramid shows the four exposure risk levels in the shape of a pyramid to represent probable distribution of risk. Most American workers will likely fall in the lower exposure risk (caution) or medium exposure risk levels.

Occupational Risk Pyramid for COVID-19



Very High Exposure Risk

Very high exposure risk jobs are those with high potential for exposure to known or suspected sources of COVID-19 during specific medical, postmortem, or laboratory procedures. Workers in this category include:

- Healthcare workers (e.g., doctors, nurses, dentists, paramedics, emergency medical technicians) performing aerosol-generating procedures (e.g., intubation, cough induction procedures, bronchoscopies, some dental procedures and exams, or invasive specimen collection) on known or suspected COVID-19 patients.
- Healthcare or laboratory personnel collecting or handling specimens from known or suspected COVID-19 patients (e.g., manipulating cultures from known or suspected COVID-19 patients).
- Morgue workers performing autopsies, which generally involve aerosol-generating procedures, on the bodies of people who are known to have, or suspected of having, COVID-19 at the time of their death.

High Exposure Risk

High exposure risk jobs are those with high potential for exposure to known or suspected sources of COVID-19. Workers in this category include:

- Healthcare delivery and support staff (e.g., doctors, nurses, and other hospital staff who must enter patients' rooms) exposed to known or suspected COVID-19 patients. (Note: when such workers perform aerosol-generating procedures, their exposure risk level becomes *very high.*)
- Medical transport workers (e.g., ambulance vehicle operators) moving known or suspected COVID-19 patients in enclosed vehicles.
- Mortuary workers involved in preparing (e.g., for burial or cremation) the bodies of people who are known to have, or suspected of having, COVID-19 at the time of their death.

Medium Exposure Risk

Medium exposure risk jobs include those that require frequent and/or close contact with (i.e., within 6 feet of) people who may be infected with SARS-CoV-2, but who are not known or suspected COVID-19 patients. In areas without ongoing community transmission, workers in this risk group may have frequent contact with travelers who may return from international locations with widespread COVID-19 transmission. In areas where there *is* ongoing community transmission, workers in this category may have contact with the general public (e.g., schools, high-population-density work environments, some high-volume retail settings).

Lower Exposure Risk (Caution)

Lower exposure risk (caution) jobs are those that do not require contact with people known to be, or suspected of being, infected with SARS-CoV-2 nor frequent close contact with (i.e., within 6 feet of) the general public. Workers in this category have minimal occupational contact with the public and other coworkers.

Jobs Classified at Lower Exposure Risk (Caution): What to Do to Protect Workers

For workers who do not have frequent contact with the general public, employers should follow the guidance for "Steps All Employers Can Take to Reduce Workers' Risk of Exposure to SARS-CoV-2," on page 7 of this booklet and implement control measures described in this section.

Engineering Controls

Additional engineering controls are not recommended for workers in the lower exposure risk group. Employers should ensure that engineering controls, if any, used to protect workers from other job hazards continue to function as intended.

Administrative Controls

- Monitor public health communications about COVID-19 recommendations and ensure that workers have access to that information. Frequently check the CDC COVID-19 website: www.cdc.gov/coronavirus/2019-ncov.
- Collaborate with workers to designate effective means of communicating important COVID-19 information.

Personal Protective Equipment

Additional PPE is not recommended for workers in the lower exposure risk group. Workers should continue to use the PPE, if any, that they would ordinarily use for other job tasks.

Jobs Classified at Medium Exposure Risk: What to Do to Protect Workers

In workplaces where workers have medium exposure risk, employers should follow the guidance for "Steps All Employers Can Take to Reduce Workers' Risk of Exposure to SARS-CoV-2," on page 7 of this booklet and implement control measures described in this section.

Engineering Controls

- Install physical barriers, such as clear plastic sneeze guards, where feasible.

Administrative Controls

- Consider offering face masks to ill employees and customers to contain respiratory secretions until they are able leave the workplace (i.e., for medical evaluation/care or to return home). In the event of a shortage of masks, a reusable face shield that can be decontaminated may be an acceptable method of protecting against droplet transmission. See CDC/NIOSH guidance for optimizing respirator supplies, which discusses the use of surgical masks, at: www.cdc.gov/coronavirus/2019-ncov/hcp/respirators-strategy.

- Keep customers informed about symptoms of COVID-19 and ask sick customers to minimize contact with workers until healthy again, such as by posting signs about COVID-19 in stores where sick customers may visit (e.g., pharmacies) or including COVID-19 information in automated messages sent when prescriptions are ready for pick up.
- Where appropriate, limit customers' and the public's access to the worksite, or restrict access to only certain workplace areas.
- Consider strategies to minimize face-to-face contact (e.g., drive-through windows, phone-based communication, telework).
- Communicate the availability of medical screening or other worker health resources (e.g., on-site nurse; telemedicine services).

Personal Protective Equipment (PPE)

When selecting PPE, consider factors such as function, fit, decontamination ability, disposal, and cost. Sometimes, when PPE will have to be used repeatedly for a long period of time, a more expensive and durable type of PPE may be less expensive overall than disposable PPE. Each employer should select the combination of PPE that protects workers specific to their workplace.

Workers with medium exposure risk may need to wear some combination of gloves, a gown, a face mask, and/or a face shield or goggles. PPE ensembles for workers in the medium exposure risk category will vary by work task, the results of the employer's hazard assessment, and the types of exposures workers have on the job.

High exposure risk jobs are those with high potential for exposure to known or suspected sources of COVID-19.

Very high exposure risk jobs are those with high potential for exposure to known or suspected sources of COVID-19 during specific medical, postmortem, or laboratory procedures that involve aerosol generation or specimen collection/handling.

In rare situations that would require workers in this risk category to use respirators, see the PPE section beginning on page 14 of this booklet, which provides more details about respirators. For the most up-to-date information, visit OSHA's COVID-19 webpage: www.osha.gov/covid-19.

Jobs Classified at High or Very High Exposure Risk: What to Do to Protect Workers

In workplaces where workers have high or very high exposure risk, employers should follow the guidance for "Steps All Employers Can Take to Reduce Workers' Risk of Exposure to SARS-CoV-2," on page 7 of this booklet and implement control measures described in this section.

Engineering Controls

- Ensure appropriate air-handling systems are installed and maintained in healthcare facilities. See "Guidelines for Environmental Infection Control in Healthcare Facilities" for more recommendations on air handling systems at: www.cdc.gov/mmwr/preview/mmwrhtml/rr5210a1.htm.
- CDC recommends that patients with known or suspected COVID-19 (i.e., person under investigation) should be placed in an airborne infection isolation room (AIIR), if available.
- Use isolation rooms when available for performing aerosol-generating procedures on patients with known or suspected COVID-19. For postmortem activities, use autopsy suites or other similar isolation facilities when performing aerosol-generating procedures on the bodies of people who are known to have, or suspected of having, COVID-19 at the time of their death. See the CDC postmortem guidance at: www.cdc.gov/coronavirus/2019-ncov/hcp/guidance-postmortem-specimens.html. OSHA also provides guidance for postmortem activities on its COVID-19 webpage: www.osha.gov/covid-19.

- Use special precautions associated with Biosafety Level 3 when handling specimens from known or suspected COVID-19 patients. For more information about biosafety levels, consult the U.S. Department of Health and Human Services (HHS) "Biosafety in Microbiological and Biomedical Laboratories" at www.cdc.gov/biosafety/publications/bmbl5.

Administrative Controls

If working in a healthcare facility, follow existing guidelines and facility standards of practice for identifying and isolating infected individuals and for protecting workers.

- Develop and implement policies that reduce exposure, such as cohorting (i.e., grouping) COVID-19 patients when single rooms are not available.
- Post signs requesting patients and family members to immediately report symptoms of respiratory illness on arrival at the healthcare facility and use disposable face masks.
- Consider offering enhanced medical monitoring of workers during COVID-19 outbreaks.
- Provide all workers with job-specific education and training on preventing transmission of COVID-19, including initial and routine/refresher training.
- Ensure that psychological and behavioral support is available to address employee stress.

Safe Work Practices

- Provide emergency responders and other essential personnel who may be exposed while working away from fixed facilities with alcohol-based hand rubs containing at least 60% alcohol for decontamination in the field.

Personal Protective Equipment (PPE)

Most workers at high or very high exposure risk likely need to wear gloves, a gown, a face shield or goggles, and either a face mask or a respirator, depending on their job tasks and exposure risks.

Those who work closely with (either in contact with or within 6 feet of) patients known to be, or suspected of being, infected with SARS-CoV-2, the virus that causes COVID-19, should wear respirators. In these instances, see the PPE section beginning on page 14 of this booklet, which provides more details about respirators. For the most up-to-date information, also visit OSHA's COVID-19 webpage: www.osha.gov/covid-19.

PPE ensembles may vary, especially for workers in laboratories or morgue/mortuary facilities who may need additional protection against blood, body fluids, chemicals, and other materials to which they may be exposed. Additional PPE may include medical/surgical gowns, fluid-resistant coveralls, aprons, or other disposable or reusable protective clothing. Gowns should be large enough to cover the areas requiring protection. OSHA may also provide updated guidance for PPE use on its website: www.osha.gov/covid-19.

NOTE: Workers who dispose of PPE and other infectious waste must also be trained and provided with appropriate PPE.

The CDC webpage "Healthcare-associated Infections" (www.cdc.gov/hai) provides additional information on infection control in healthcare facilities.

Workers Living Abroad or Travelling Internationally

Employers with workers living abroad or traveling on international business should consult the "Business Travelers" section of the OSHA COVID-19 webpage (www.osha.gov/covid-19), which also provides links to the latest:

- CDC travel warnings: www.cdc.gov/coronavirus/2019-ncov/travelers
- U.S. Department of State (DOS) travel advisories: travel.state.gov

Employers should communicate to workers that the DOS cannot provide Americans traveling or living abroad with medications or supplies, even in the event of a COVID-19 outbreak.

As COVID-19 outbreak conditions change, travel into or out of a country may not be possible, safe, or medically advisable. It is also likely that governments will respond to a COVID-19 outbreak by imposing public health measures that restrict domestic and international movement, further limiting the U.S. government's ability to assist Americans in these countries. It is important that employers and workers plan appropriately, as it is possible that these measures will be implemented very quickly in the event of worsening outbreak conditions in certain areas.

More information on COVID-19 planning for workers living and traveling abroad can be found at: www.cdc.gov/travel.

For More Information

Federal, state, and local government agencies are the best source of information in the event of an infectious disease outbreak, such as COVID-19. Staying informed about the latest developments and recommendations is critical, since specific guidance may change based upon evolving outbreak situations.

Below are several recommended websites to access the most current and accurate information:

- Occupational Safety and Health Administration website: www.osha.gov
- Centers for Disease Control and Prevention website: www.cdc.gov
- National Institute for Occupational Safety and Health website: www.cdc.gov/niosh

OSHA Assistance, Services, and Programs

OSHA has a great deal of information to assist employers in complying with their responsibilities under OSHA law. Several OSHA programs and services can help employers identify and correct job hazards, as well as improve their safety and health program.

Establishing a Safety and Health Program

Safety and health programs are systems that can substantially reduce the number and severity of workplace injuries and illnesses, while reducing costs to employers.

Visit www.osha.gov/safetymanagement for more information.

Compliance Assistance Specialists

OSHA compliance assistance specialists can provide information to employers and workers about OSHA standards, short educational programs on specific hazards or OSHA rights and responsibilities, and information on additional compliance assistance resources.

Visit www.osha.gov/complianceassistance/cas or call 1-800-321-OSHA (6742) to contact your local OSHA office.

No-Cost On-Site Safety and Health Consultation Services for Small Business

OSHA's On-Site Consultation Program offers no-cost and confidential advice to small and medium-sized businesses in all states, with priority given to high-hazard worksites. On-Site consultation services are separate from enforcement and do not result in penalties or citations.

For more information or to find the local On-Site Consultation office in your state, visit www.osha.gov/consultation, or call 1-800-321-OSHA (6742).

Under the consultation program, certain exemplary employers may request participation in OSHA's **Safety and Health Achievement Recognition Program (SHARP)**. Worksites that receive SHARP recognition are exempt from programmed inspections during the period that the SHARP certification is valid.

Cooperative Programs

OSHA offers cooperative programs under which businesses, labor groups and other organizations can work cooperatively with OSHA. To find out more about any of the following programs, visit www.osha.gov/cooperativeprograms.

Strategic Partnerships and Alliances

The OSHA Strategic Partnerships (OSP) provide the opportunity for OSHA to partner with employers, workers, professional or trade associations, labor organizations, and/or other interested stakeholders. Through the Alliance Program, OSHA works with groups to develop compliance assistance tools and resources to share with workers and employers, and educate workers and employers about their rights and responsibilities.

Voluntary Protection Programs (VPP)

The VPP recognize employers and workers in the private sector and federal agencies who have implemented effective safety and health programs and maintain injury and illness rates below the national average for their respective industries.

Occupational Safety and Health Training

OSHA partners with 26 OSHA Training Institute Education Centers at 37 locations throughout the United States to deliver courses on OSHA standards and occupational safety and health topics to thousands of students a year. For more information on training courses, visit www.osha.gov/otiec.

OSHA Educational Materials

OSHA has many types of educational materials to assist employers and workers in finding and preventing workplace hazards.

All OSHA publications are free at www.osha.gov/publications and www.osha.gov/ebooks. You can also call 1-800-321-OSHA (6742) to order publications.

Employers and safety and health professionals can sign-up for *QuickTakes*, OSHA's free, twice-monthly online newsletter with the latest news about OSHA initiatives and products to assist in finding and preventing workplace hazards. To sign up, visit www.osha.gov/quicktakes.

OSHA Regional Offices

Region 1
Boston Regional Office
(CT*, ME*, MA, NH, RI, VT*)
JFK Federal Building
25 New Sudbury Street, Room E340
Boston, MA 02203
(617) 565-9860 (617) 565-9827 Fax

Region 2
New York Regional Office
(NJ*, NY*, PR*, VI*)
Federal Building
201 Varick Street, Room 670
New York, NY 10014
(212) 337-2378 (212) 337-2371 Fax

Region 3
Philadelphia Regional Office
(DE, DC, MD*, PA, VA*, WV)
The Curtis Center
170 S. Independence Mall West, Suite 740 West
Philadelphia, PA 19106-3309
(215) 861-4900 (215) 861-4904 Fax

Region 4
Atlanta Regional Office
(AL, FL, GA, KY*, MS, NC*, SC*, TN*)
Sam Nunn Atlanta Federal Center
61 Forsyth Street, SW, Room 6T50
Atlanta, GA 30303
(678) 237-0400 (678) 237-0447 Fax

Region 5
Chicago Regional Office
(IL*, IN*, MI*, MN*, OH, WI)
John C. Kluczynski Federal Building
230 South Dearborn Street, Room 3244
Chicago, IL 60604
(312) 353-2220 (312) 353-7774 Fax

Region 6
Dallas Regional Office
(AR, LA, NM*, OK, TX)
A. Maceo Smith Federal Building
525 Griffin Street, Room 602
Dallas, TX 75202
(972) 850-4145 (972) 850-4149 Fax

Region 7
Kansas City Regional Office
(IA*, KS, MO, NE)
Two Pershing Square Building
2300 Main Street, Suite 1010
Kansas City, MO 64108-2416
(816) 283-8745 (816) 283-0547 Fax

Region 8
Denver Regional Office
(CO, MT, ND, SD, UT*, WY*)
Cesar Chavez Memorial Building
1244 Speer Boulevard, Suite 551
Denver, CO 80204
(720) 264-6550 (720) 264-6585 Fax

Region 9
San Francisco Regional Office
(AZ*, CA*, HI*, NV*, and American Samoa,
Guam and the Northern Mariana Islands)
San Francisco Federal Building
90 7th Street, Suite 2650
San Francisco, CA 94103
(415) 625-2547 (415) 625-2534 Fax

Region 10
Seattle Regional Office
(AK*, ID, OR*, WA*)
Fifth & Yesler Tower
300 Fifth Avenue, Suite 1280
Seattle, WA 98104
(206) 757-6700 (206) 757-6705 Fax

*These states and territories operate their own OSHA-approved job safety and health plans and cover state and local government employees as well as private sector employees. The Connecticut, Illinois, Maine, New Jersey, New York and Virgin Islands programs cover public employees only. (Private sector workers in these states are covered by Federal OSHA). States with approved programs must have standards that are identical to, or at least as effective as, the Federal OSHA standards.

Note: To get contact information for OSHA area offices, OSHA-approved state plans and OSHA consultation projects, please visit us online at www.osha.gov or call us at 1-800-321-OSHA (6742).

How to Contact OSHA

Under the Occupational Safety and Health Act of 1970, employers are responsible for providing safe and healthful workplaces for their employees. OSHA's role is to help ensure these conditions for America's working men and women by setting and enforcing standards, and providing training, education and assistance. For more information, visit www.osha.gov or call OSHA at 1-800-321-OSHA (6742), TTY 1-877-889-5627.

For assistance, contact us.
We are OSHA. We can help.

OSHA®
www.osha.gov

U.S. Department of Labor

For more information:

OSHA® Occupational Safety and Health Administration

www.osha.gov (800) 321-OSHA (6742)

HEALTH AND SAFETY PLAN

CLOSED LOOP REFINING AND RECOVERY/CLOSED LOOP GLASS SOLUTIONS
2200 FAIRWOOD AVENUE
COLUMBUS, OHIO 43207

EPA ID NO. OHR000201145

EnSafe Project Number:
0888823935/004

Prepared for:

Olymbec USA LLC
1004 East Brooks Road
Memphis, Tennessee 38116

May 2020

P.O. Box 24261
Cleveland, Ohio 44124
216-274-0112 | 800-588-7962
www.ensafe.com

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FIGURES

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APPENDICES

Table 1A Emergency Response Telephone Roster		
PERSONNEL	**Office**	**Cell**
EnSafe Inc.		
Project Manager: Edward "Ned" B. Baker	216-485-3221	216-924-2437
Site Manager: Venky Venkatesh	513-259-2396	216-235-8613
Health and Safety Coordinator: Venky Venkatesh	513-259-2396	216-235-8613
Health and Safety Manager: Scott Campbell	901-937-4255	504-377-2619
Olymbec USA LLC (Property and Building Owner)		
Regional Building Manager: Chad King	937-637-6426	678-995-2618
Alternate (Kevin Donovan; DEC Enviro)	450-227-6177	450-227-6177
EMERGENCY RESPONSE AGENCIES	911	
Hospital: Grant Medical Center	911 or 614-566-9000	
Fire Department: Columbus Fire Station 22	911 or 614-221-3132	
Police Department: Columbus Police	911 or 614-645-4545	
Health Department: Franklin County Health & Wellness Center	911 or 614-645-3131	
Ambulance Service: Life Medical Response	911 or 614-469-8300	
Other:		
OTHER EMERGENCY ASSISTANCE	911	
CHEMTREC (24 Hours)	800-424-9300	
National Response Center (Oil and Chemical Spills)	800-424-8802	
Poison Control Center	614-228-1323	
U.S. Department of Transportation (Office of Hazardous Materials Transportation)	202-366-4488	
U.S. Environmental Protection Agency (Region 5)	312-353-2000	
Ohio Environmental Protection Agency (Central District Office)	614-644-2270	

Notes:
CHEMTREC = Chemical Transportation Emergency Center
U.S. = United States

Table 1B
Emergency Services Instructions

For Emergency Medical Incidents, Emergency Fire Response, or Hazardous Materials Incidents

Emergency Telephone Numbers

- Hospital: 911
- Police: 911
- Fire Department: 911

1. **Remember to speak SLOWLY and CLEARLY. Do NOT hang up first: let the dispatcher conclude the call.**

2. Provide the following information:
   a. Your location: 2200 Fairwood Avenue, Columbus, Ohio
   b. Your name and phone number

3. Describe nature of Incident:
   a. Emergency Medical Incident
      i. How many victims
      ii. Type of incident - physical injury, etc.
      iii. Assessment of victims' condition if known (whether victim is conscious/unconscious, breathing/not breathing, pulse/no pulse, nature of injuries, first aid measures used, etc.)
      iv. Where incident occurred

   b. Fire:
      i. Location of Fire
      ii. Injured or Trapped On-site Personnel

   c. Hazardous Materials Incident:
      i. This is a hazardous materials incident requiring dispatch of HAZMAT unit
      ii. Type of incident (fire, explosion, spill, etc.)
      iii. Type of material (specific chemicals or general description)
      iv. Whether there is also a Medical Emergency

4. Give your location at the site

Note: Security, site supervisor, or designee must meet the emergency personnel at the staging area to brief them on the situation.

Table 1C Personal Protective Equipment — Selection					
	Level of Protection Required				
Site Task Descriptions	**A**	**B**	**C**	**Mod D**	**D**
Site Inspection/Testing and Visitors	☐	☐	☒	☐	☐
Site Maintenance	☐	☐	☒	☐	☐
Cathode Ray Tube Material Removal	☐	☐	☒	☐	☐
Equipment Removal	☐	☐	☒	☐	☐
Building Remediation	☐	☐	☒	☐	☐

Site-specific personal protective equipment, based on potential exposure hazards, has been determined to be Level C for all personnel entering the Exclusion Zone.

Level C Protection: Inclusive of Level D (modified) protection plus negative pressure half face respiratory protection with appropriate cartridges, i.e., particulate P100 or equivalent; chemical protective coveralls in lieu of general coveralls; use of inner and outer sets of hand protection.

Site-specific personal protective equipment and onsite supply requirements are detailed in the following Table 1D.

Table 1D Project Specific Personal Protective Equipment and Supplies							
Equipment	**Req**	**Rec**	**NA**	**Equipment**	**Req**	**Rec**	**NA**
Steel-Toe Boots	☒	☐	☐	SCBA	☐	☐	☒
Outer Disposable Boots	☒	☐	☐	Full-face Airline Resp.	☐	☐	☒
Long Sleeve Shirt and Pants	☒	☐	☐	Full Face Negative Pressure Resp.	☐	☐	☒
Flame Retardant Coveralls	☐	☐	☒	**Half Face Negative Pressure Respirator with P100 Cartridge (or equivalent)**	☒	☐	☐
Tyvek Suit (or equivalent)	☒	☐	☐	Powered Air Purifying Resp	☐	☐	☒
Poly-coated Tyvek/Saranex Suit	☐	☐	☒	**First Aid Kit**	☒	☐	☐
Fully Encapsulated Chemical Suit	☐	☐	☒	**Fire Extinguisher**	☒	☐	☐
Hearing Protection	☐	☒	☐	**Communication (cell phones or walkie talkies)**	☒	☐	☐
Task Appropriate Gloves Work Gloves, Impact Gloves, etc.	☒	☐	☐				
Inner Chemical Gloves Latex or nitrile	☐	☒	☐	**Eye Wash (e.g., portable bottle)**	☒	☐	☐
Outer Chemical Gloves Latex or Nitrile	☒	☐	☐	**Water or Other Fluid Replenishment**	☒	☐	☐
Hard Hat	☒	☐	☐	Sunscreen	☐	☐	☒
Safety Glasses with Side Shields	☒	☐	☐	Insect Repellent	☐	☐	☒
Vented (Splash proof) Goggles	☐	☐	☒	**Personal Fall Arrest System, Full Body Harness with Self-Retracting Lanyard (Task Specific)**	☒	☐	☐
High Visibility Clothing	☒	☐	☐				

Notes:
Req = Required
Rec = Recommended
NA = Not Applicable
SCBA = Self-contained breathing apparatus

Figure 1
Route Description and Map to Hospital

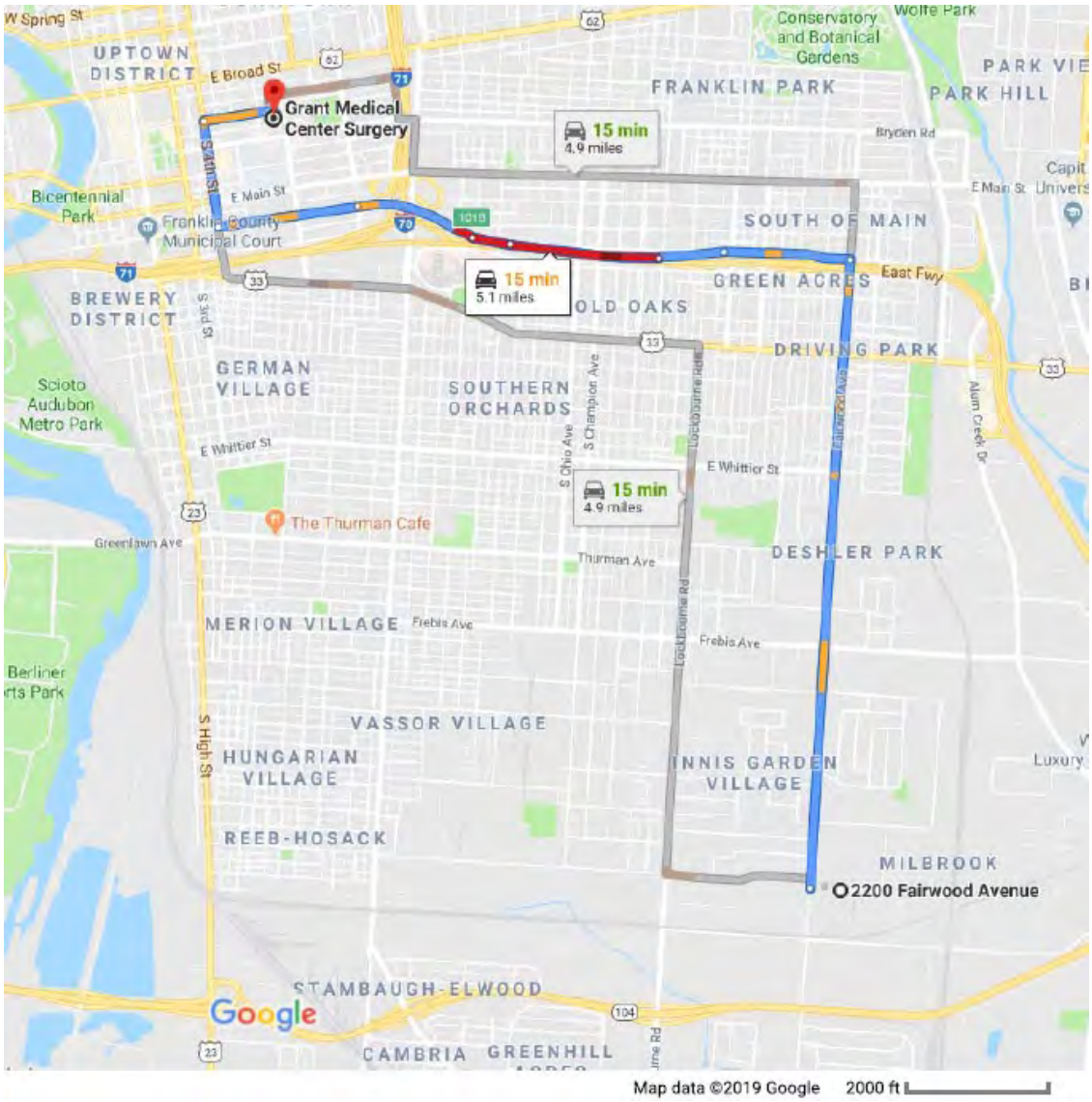
Hospital Information

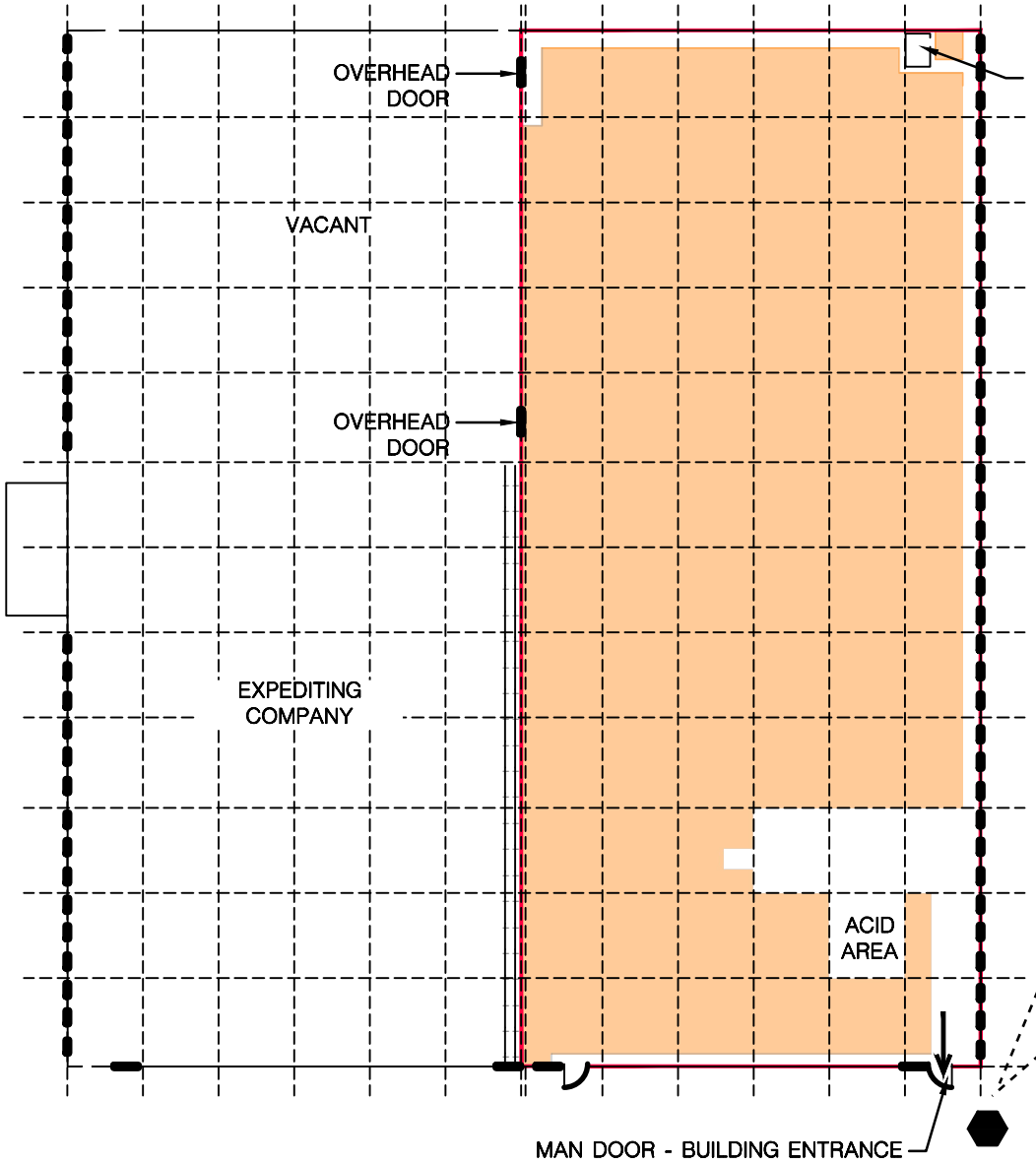
Hospital Name: **Grant Medical Center**
Hospital Address: **111 South Grand Avenue, Columbus, Ohio**
Hospital Phone Number: **614-566-9000**

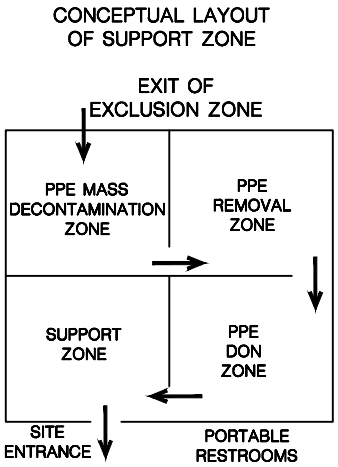
Directions to Area Hospital:

- Head North on Fairfield Avenue toward Marion Road — go 2.2 mi
- Turn Left onto Cole Street — go 0.7 mi
- Use Left lane to Take I-70 West toward Downtown — go 0.2 mi
- Take exit 101B toward Hospital/Downtown — go 2.6 mi
- Continue onto East Mound Street — go 0.2 mi
- Turn right onto South Grant Avenue — go 0.4 mi

End: 111 South Grant Avenue, Columbus, OH (Destination will be on the left)







LEGEND

- CLOSED LOOP LEASE SPACE
- CRT - RELATED MATERIALS IN BOXES
- LOADING DOCK DOORS
- RALLY POINT

NAD 1983 STATE PLANE OHIO SOUTH FEET

0 50 100

SCALE IN FEET

FIGURE 2
SUPPORT ZONE AND RALLY POINT DRAWING
2200 FAIRWOOD AVENUE
COLUMBUS, OHIO

REQUESTED BY:	NB
DRAWN BY:	KMB
DATE:	1/22/2020
PROJECT:	0888823935

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DATA SOURCES: OLYMBEC

I:\CAD PROJECTS\23935 Closed Loop\Plans\23935_B006_SUPPORT ZONE_2200 FAIRWOOD_OHIO.dwg

HEALTH AND SAFETY PLAN REVIEW AND APPROVAL

The Health and Safety Plan (HASP) presented herein has been prepared on behalf of Olymbec USA LLC (Olymbec) for the sole purpose to protect those individuals (i.e., EnSafe Inc., Olymbec contractors, subcontractors, and visitors) associated in the performance of cathode ray tube-related material removal, building remediation, and site-specific tasks (i.e., site inspection, site maintenance, and site stabilization) for the Former Closed Loop facility and premises located at 2200 Fairwood Avenue, Franklin County, Columbus, Ohio.

By signing below, it is acknowledged that this HASP identifies the activities that are anticipated to be performed at the site. In addition, this HASP identifies the personal protective and monitoring equipment that may be necessary to be onsite. It is also understood that the provisions of this HASP will be updated if there is a change of a task and/or the addition of tasks and will be approved by the individuals listed below or their designee.

Edward B. Baker *Project Manager*	_____ Signature	_____ Date
Venky Venkatesh *Site Manager*	_____ Signature	_____ Date
Venky Venkatesh *Health and Safety Coordinator*	_____ Signature	_____ Date
Scott Campbell *Health and Safety Manager*	_____ Signature	_____ Date

HEALTH AND SAFETY PLAN ACKNOWLEDGEMENT SIGNATURES

All project personnel must sign indicating they have read and understand the Health and Safety Plan. Signing of this sheet attests that the Health and Safety Plan has been made available and reviewed by the individual prior to entry to the site. All contractors and subcontractors must comply with applicable federal, state, and local regulations. Insert additional signature pages as needed.

Name / Job Title	Company	Date	Signature

1.0 INTRODUCTION

This Health and Safety Plan (HASP) was prepared to inform all personnel (i.e., EnSafe Inc.; Olymbec USA LLC [Olymbec]; consultants, contractors, and visitors thereof) associated with work activities at the former Closed Loop Refining & Recovery/Closed Loop Glass Solutions (Closed Loop) facility of known or reasonably anticipated potential hazards and safety concerns for the Closed Loop facility located at 2200 Fairwood Avenue, Franklin County, Columbus, Ohio ("subject property," "site," "Closed Loop facility"). All personnel participating in onsite activities must be trained in the general and specific hazards unique to the job they are performing and, if applicable, meet all required medical examination and/or training requirements identified in this HASP and their employer's criteria. All associated personnel shall follow the guidelines, rules, and procedures contained in this site-specific HASP. All personnel shall contact the project manager if unexpected conditions are encountered at the site, including but not limited to new processes; changes in operation, products, services; additional or changes in the chemicals of concern; and/or unsafe conditions are encountered which were not previously addressed in this HASP.

All personnel participating in onsite activities shall be expected to review and understand the hazards, risks, and control methods (including emergency procedures) as outlined in this HASP and sign off on the HASP acknowledging a copy of this HASP has been provided to them and its conditions and requirements are understood (Section 14).

Relevant contractor or subcontractor information regarding the identification of hazards and appropriate control strategies for the hazards associated with their particular work activities should be communicated to EnSafe or Olymbec representatives prior to beginning onsite activities. Any additional site-specific HASPs prepared by contractors or subcontractors must be equally as stringent as this HASP. Copies of site-specific HASPs prepared by contractors or subcontractors must be provided to EnSafe and/or Olymbec for review and approval prior to starting work at the site. Each contractor or subcontractor must assume direct responsibility for its own personnel health and safety.

A copy of this HASP will be kept onsite for review and reference during all site activities. Upon completion of the project, the finalized and signed copy of the HASP will be placed in the project file.

When retaining and working with subcontractors, the following minimum requirements shall be met:

- A properly executed Contractor/Subcontractor Terms and Conditions agreement in place prior to commencing work onsite

- Insurance policies and limits are acceptable to all parties involved and all applicable Insurance Certificates are properly executed (i.e., Olymbec being named as additionally insured under such policies, including Professional and Pollution Liability, if applicable)

- The roles and responsibilities of the subcontractor have been established, including the naming of the health and safety point of contact

1.1 Site Description

Closed Loop operated a CRT-related material storage facility within the east portion of the warehouse at 2200 Fairwood Avenue in Columbus, Franklin County, Ohio. This warehouse is surrounded by commercial and industrial properties; a residential neighborhood is approximately 500 feet northwest of the warehouse. The Fairwood Avenue warehouse is a 257,767-square foot structure on a 14.494-acre parcel (Parcel ID: 010-035846), of which Closed Loop leased 130,652 square feet, approximately 50% of the warehouse structure. If this operation had been a legitimate recycling facility, the North American Industry Classification System for Closed Loop would be 42393, which includes recyclable material merchant wholesalers.

1.2 Site History

Available information indicates that the warehouse was constructed on former agricultural land in 1969. The 2007 Atwell-Hicks Development Consultants Phase I Environmental Site Assessment indicates that prior occupants of the warehouse include a tire distributor (Mohawk Tire [1970 to 1989], Yokohama Tire Corporation [1990 to 2002]), and American Signature furniture (2003 to at least 2007). It appears that Closed Loop began operations in the warehouse in late December 2014 and ceased operations or abandoned the subject property in 2016.

1.3 Scope and Applicability

This HASP addresses activities to be conducted at the site to remove unprocessed CRTs, partially processed CRT (crushed CRT glass), CRT-related materials, and decontamination of the building interiors. If necessary, addendums will be added to this HASP to address activities at the site as they develop in the future.

EnSafe views the implementation of a site-specific HASP as a critical management tool necessary to the safety, health, and well-being of all associated site personnel and the community. Site operations will be performed in such a manner as to minimize the possibility of serious injury or accidents to site personnel, fire, explosion, or any unplanned or sudden release of contaminants into the environment

that could adversely affect local receptors. This HASP is intended to comply with all applicable state, federal, and local regulations and is consistent with EnSafe's commitment to health and safety.

The HASP identifies potential hazards associated with the activities being conducted during activities at the site, establishes the procedural and equipment requirements to protect onsite personnel from potential hazards, and requires that onsite activities are conducted in a manner consistent with both accepted professional practice and applicable regulations. It also describes measures to minimize accidents and injuries that may occur during normal daily activities or during adverse conditions.

The HASP is based upon current available information regarding the site and specific work activities anticipated to be completed at the time this HASP was prepared. Operating conditions could potentially change as the work progresses, requiring some modification of the HASP. Any permanent modifications to the HASP, including changes necessary to correct any potential health and safety issues at the site, will be made only with permission by those individuals listed in Section 1 of this HASP. Approved changes will be added to the HASP as Addendums.

Applicability of this HASP extends to all site personnel and visitors to the site. All personnel participating in onsite activities shall be expected to review and understand the hazards, risks, and control methods (including emergency procedures) as outlined in this HASP and sign off on the HASP acknowledging a copy of this HASP has been provided to them and its conditions and requirements are understood.

1.4 Project Specific Work Activities

The onsite project specific work activities include the removal of CRT materials and the remediation of the buildings. These activities have been divided into three separate phases of site work. Phase I includes establishment of a contamination reduction zone (CRZ) and a clean loading zone (CLZ), followed by removal of hydrofluoric acid (HF) processing equipment and removal of non-processed CRT-related materials. Phase II consists of the removal of processed CRT glass. Phase III consists of the decontamination activities associated with the building.

1.4.1 Phase I and II — Removal of Cathode Ray Tube Materials

The principal components of the onsite activities associated with both Phase I and Phase II are as follows:

- Task 1 — Construction of CRZ and CLZ

- Task 2 — Decontamination of Hydrofluoric Acid Area
- Task 3 — Movement and Relocation of CRT Materials
- Task 4 — Evaluation of CRT Material Container Condition
- Task 5 — Decontamination of CRT Material Containers
- Task 6 — Preparation of CRT Material Containers for Shipping
- Task 7 — Transfer of CRT Materials to the Designated Loading Zone for Shipment
- Task 8 — Daily Cleaning of Work Areas

Each of these tasks are further described as follows:

Task 1 — Construction of Dust Control Containment Structures

This task includes the construction of CRZ and CLZ structures in the southeast corner of the subject property. Prior to construction of the CRZ and CLZ structures, the interior warehouse area where these structures will be constructed will be cleared of CRT-related materials, and surrounding warehouse walls, flooring, or ceiling (including any doors, the former glass cleaning area, and other warehouse features) inside of these structures will be decontaminated in accordance with Section 11 of this Closure Plan, as applicable. The CRZ and CLZ will be equipped with polyvinyl chloride strip doors (between the warehouse and CRZ and between the CRZ and CLZ). The construction activities associated with this task will include the construction of temporary containment structure walls, the installation of plastic sheeting and plywood, the use of forklifts, scissor lifts, and/or elevated platforms, and installation of negative air machines.

Refer to the applicable Job Hazard Analysis (JHA) included in Appendix A; established guidelines, procedures, protocols and methods of the Standard Operation Procedure 1.0 (SOP 1.0) contained in Appendix B; and applicable sections of the Closure Plan.

Task 2 — Decontamination of Hydrofluoric Acid Area

This task includes removal of de-manufacturing equipment and decontamination of the floor to reduce the potential exposure to HF residues during subsequent CRT-related removal activities. This task includes, but is not limited to, the following:

- Forklift operation and movement of CRT containers and materials
  - Forklift inspections
  - Safe operation of forklifts
  - Forklift violations
- High Efficiency Particulate Air (HEPA) vacuuming lead-containing dust off of containers, exposed CRT materials, stretch film wrapped CRT materials, and wood pallets
- HEPA vacuum maintenance and filter/dust disposal
- Decontamination of floors and structural supports (to a height of approximately 6 feet)
- Containerizing decontamination wastes
- Waste characterization

Refer to the applicable JHAs included in Appendix A; established guidelines, procedures, protocols and methods of the SOP 1.0 contained in Appendix B; and applicable sections of the Closure Plan.

Task 3 — Movement and Relocation of Cathode Ray Tube Gaylord Containers

This task includes the relocation and movement of CRT materials and CRT containers along with the safe operation of forklifts. This task includes, but is not limited to, the following:

- Forklift operation and movement of CRT containers and materials
  - Forklift inspections
  - Safe operation of forklifts
  - Forklift violations
- Relocation of Gaylord containers in poor condition or near collapse

Refer to the applicable JHAs included in Appendix A; established guidelines, procedures, protocols and methods of the SOP 1.0 contained in Appendix B; and applicable sections of the Closure Plan.

Task 4 — Evaluation of Cathode Ray Tube Material Container Condition

This task includes the inspection of the condition of CRT material containers for shipping, re-packaging, and the disposal of emptied unusable Gaylord containers. This task includes, but is not limited to, the following:

- Inspection of CRT material containers
- Repackaging of CRT materials in new Gaylord containers
- Disposal of emptied, unusable Gaylord containers

Refer to the applicable JHAs included in Appendix A; established guidelines, procedures, protocols and methods of the SOP 1.0 contained in Appendix B; and applicable sections of the Closure Plan.

Task 5 — Decontamination of Cathode Ray Tube Material Containers

This task includes the cleaning of CRT material containers with CRT materials or palletized CRT materials wrapped in stretch film to be shipped offsite for recycling and/or disposal. The inspection and cleaning of accumulated dust on containers shall be completed in designated processing areas for cleaning and re-packaging. This task includes, but is not limited to, the following:

- Inspection for accumulated dust on CRT containers and their contents
- HEPA vacuuming lead-containing dust off containers, exposed CRT materials, stretch film wrapped CRT materials, and wood pallets
- HEPA vacuum maintenance and filter/dust disposal

Refer to the applicable JHAs included in Appendix A; established guidelines, procedures, protocols and methods of the SOP 1.0 contained in Appendix B; and applicable sections of the Closure Plan.

Task 6 — Preparation of Cathode Ray Tube Material Containers for Shipping

This task includes preparing CRT material containers and/or palletized CRT materials for shipping offsite for recycling and/or disposal in accordance with Ohio Administrative Code (OAC)

3745-51-39(A)(3). The steps presented below shall be completed after CRT material containers or palletized CRT materials have been thoroughly cleaned of dust. The steps outlined in this section shall be completed in designated processing areas for shipment preparation. This task includes, but is not limited to, the following:

- Stretch film wrapping and banding
- Weighing and labeling CRT materials for shipping

Refer to the applicable JHAs included in Appendix A; established guidelines, procedures, protocols and methods of the SOP 1.0 contained in Appendix B; and applicable sections of the Closure Plan.

Task 7 — Transfer of Cathode Ray Tube Materials to the Designated Loading Zone for Shipment

This task includes transferring CRT material containers and/or palletized CRT materials into the CRZ chamber and restricted CLZ chamber to load trucks for offsite recycling and/or disposal. This task includes, but is not limited to, the following:

- Loading trucks through CRZ and CLZ chambers
- Double stacking of CRT Gaylord containers

Refer to the applicable JHAs included in Appendix A; established guidelines, procedures, protocols and methods of the SOP 1.0 contained in Appendix B; and applicable sections of the Closure Plan.

Task 8 — Daily Cleaning of Work Areas

This task includes the periodic cleaning of work areas throughout the removal of CRT materials from the site. Periodic cleaning is to be completed on a daily basis to reduce dust contamination from becoming airborne and spreading throughout the interior of the buildings. This task includes, but is not limited to, the following:

- Cleaning of dust and debris in work areas
- Disposal of collected dust and debris

Refer to the applicable JHAs included in Appendix A; established guidelines, procedures, protocols and methods of the SOP 1.0 contained in Appendix B; and applicable sections of the Closure Plan.

1.4.2 Phase III — Closed Loop Building Decontamination

Phase III activities will be completed after all CRT materials and CRT-related materials have been removed from the buildings. Phase III consists of building decontamination activities.

Task 9 — Building Decontamination

This task includes the decontamination of lead dust throughout the interior of the buildings. This task includes, but is not limited to, the following:

- Decontamination of surfaces inside the building including ceilings, walls, floors, structural supports, roof supports, heating units, utility piping, lighting, etc.
- Containerizing decontamination wastes
- Waste characterization
- Removal of decontamination wastes for offsite disposal

Phase III work activities will utilize industrial tools, forklifts, platform lifts and decontamination equipment. The decontamination processes will include, but not be limited to, HEPA vacuuming, wet cleaning methods, hand cleaning with solvent-soaked launderable or disposable wipes, and the use of high pressure/low volume pressure washing.

Refer to the applicable JHAs included in Appendix A; established guidelines, procedures, protocols and methods of the SOP 1.0 contained in Appendix B; and applicable sections of the Closure Plan.

1.5 Applicable Standards

The methods and procedures prescribed in this HASP are intended to conform to established professional practices and applicable federal, state, and local occupational safety and health protection standards based on information that is currently available. Regulations serving as the technical compliance basis for this document may include but are not limited to the following:

- United States (U.S.) Department of Labor, Occupational Safety and Health Administration (OSHA) Standards for Construction (29 Code of Federal Regulations [CFR] 1926)

  - Hazardous Waste Operations and Emergency Response (29 CFR 1926.65)
  - Hearing Protection (29 CFR 1926.101 and 29 CFR 1926.52)
  - Eye and Face Protection (29 CFR 1926.102)
  - Respiratory Protection (29 CFR 1926.103)
  - Working Over or Near Water (29 CFR 1926.106)
  - Material Handling Equipment (29 CFR 1926.602)

- U.S. Department of Labor, OSHA Standards for General Industry (29 CFR 1910)
  - Hazardous Waste Operations and Emergency Response (29 CFR 1910.120)
  - Personal Protective Equipment (PPE) General Requirements (29 CFR 1910.132)
  - Eye and Face Protection (29 CFR 1910.133)
  - Respiratory Protection (29 CFR 1910.134)
  - Head Protection (29 CFR 1910.135)
  - Foot Protection (29 CFR 1910.136)
  - Hand Protection (29 CFR 1910.138)
  - Medical Services and First Aid (29 CFR 1910.151)
  - Portable Fire Extinguishers (29 CFR 1910.157)
  - Hazard Communication Standard (29 CFR 1910.1200)

- U.S. Department of Labor, Recording and Reporting Occupational Injuries and Illnesses, (29 CFR 1904)

The following technical documents may have been utilized as references in the preparation of this HASP. However, the citation of these technical documents does not imply compliance with all aspects of these documents. The purpose of these citations is to aid in the interpretation of conflicting issues that may arise during the performance of site activities. The following technical documents may include but are not limited to:

- National Institute for Occupational Safety and Health (NIOSH)/OSHA/United States Coast Guard/U.S. Environmental Protection Agency, Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities (October 1985)

- U.S. Department of Health and Human Services (DHHS), NIOSH Sampling and Analytical Methods, DHHS (NIOSH) Publication 84-100

- American National Standards Institute (ANSI), Emergency Eyewash and Shower Equipment, Z358.1 (1981)

- ANSI, Protective Footwear, Z41.1 (1983)

- ANSI, Practice for Occupational and Educational Eye and Face Protection, Z87.1 (1979)

- ANSI, Protective Headgear for Industrial Workers - Requirements, Z89.1 (1986)

2.0 IDENTIFICATION OF KEY PERSONNEL

An efficient onsite operation requires that all key personnel be identified and that their roles and responsibilities be clearly defined. Below is a discussion of the management structure for this project.

2.1 Project Organization

EnSafe (or Olymbec appointed representatives) will serve as the project coordinator for the site. The project coordinator is responsible for monitoring activities conducted by all site personnel, contractors, and subcontractors at the site. The project coordinator is responsible for monitoring compliance with this HASP. As part of EnSafe' role as project coordinator, EnSafe will check that all site workers are aware of the HASP and its requirements.

Any additional site-specific HASPs prepared by contractors or subcontractors must be equally as stringent as this HASP. Copies of site-specific HASPs prepared contractors or subcontractors must be provided to EnSafe and/or Olymbec for review and approval, prior to starting work at the site.

2.2 EnSafe Personnel

EnSafe project team members are defined in Table 2.

Table 2
Personnel Contact Information

Company/Title	Personnel	Office	Cell
EnSafe Project Manager	Ned Baker	216-485-3221	216-924-2437
EnSafe Site Manager	Venky Venkatesh	513-259-2396	216-235-8613
EnSafe Health and Safety Coordinator	Venky Venkatesh	513-259-2396	216-235-8613
EnSafe Health and Safety Director	Scott Campbell	901-937-4255	504-377-2619
Olymbec Building Manager	Chad King	937-637-6426	678-995-2618
Olymbec Alternate Contact	Kevin Donovan	450-227-6177	450-227-6177

Note:
TBD = To be determined

The applicable responsibilities for these individuals are as follows.

2.2.1 Health and Safety Coordinator

The health and safety coordinator (HSC) is responsible for the development of the site-specific hazard assessments and control mechanisms. The HSC will be consulted with any changes/ modifications/additions that may need to occur to the HASP. The HSC will make all final decision regarding questions on the hazard assessment and/or the control mechanisms.

Furthermore, responsibilities will include the overall coordination of site activities with respect to the protocols outlined under this HASP. The HSC has overall accountability and responsibility for monitoring compliance with this HASP and for monitoring compliance with the approved work plans. The HSC will recommend or provide disciplinary action, as appropriate, if non-compliances occur. For HASP related items, the HSC will also provide the focal point for communications between the regulatory authorities; state and local community, onsite contractors, and project staff. This liaison activity will provide a clear line of communication between all parties to minimize the chance for misconceptions concerning project tasks and HASP compliance.

Any and all recommended revisions or changes to the HASP will be reviewed by the site managers (SMs) prior to final approval by the HSC. In the event of an emergency, the HSC will also function as the emergency response coordinator and will implement, and coordinate emergency response procedures described in this HASP.

2.2.2 Site Manager

The site manager (SM) is responsible for overseeing day-to-day site activities performed by all site workers, contractors, and subcontractors. The principal responsibility of the SM will be to coordinate and document all onsite work necessary to fulfill approved tasks.

The SM reports to the HSC. The SM is responsible for monitoring compliance with all aspects of the HASP which include, but are not limited to, safe work practices, site access controls, work safety zones, proper PPE, review planned site activities, implement safety procedures necessary to complete work safely, perform daily safety briefings, assist in onsite emergencies, and act as technical liaison to the HSC. The SM will report all site-related injuries to the HSC and to any other necessary authorities. The SM will check that all site personnel understand their respective emergency response duties. In the instance of any emergency or non-emergency incidents concerning site personnel, the SM will be contacted and will be responsible for communicating any information regarding site safety conditions to rescue or emergency personnel. The SM will ensure that all activities at the site comply with the approved HASP.

Any person working onsite has the authority to **stop work** if any operation threatens the health and safety of onsite workers or the surrounding community. In the event that such a situation occurs, the SM shall be notified immediately. At that time, the SM will update the HSC and all project-related health and safety issues as they arise.

As deemed appropriate, the SM will be certified in first aid and cardiopulmonary resuscitation (CPR) by the American Red Cross, or equivalent. Furthermore, the SM will be Hazardous Waste Operations and Emergency Response (HAZWOPER) trained for site work in accordance with applicable regulations and participate in a medical surveillance program.

2.2.3 Other Personnel

If needed, all contractors and subcontractors shall prepare their own company HASP which shall specifically govern the work performed by its personnel. The contractor or subcontractor's HASP shall conform with the EnSafe HASP.

All subcontractors will also provide an appointed health and safety officer, per employer policy, who will assist the SM. It is the employer's responsibility to ensure that their personnel have received appropriate health and safety training and are participating in a medical surveillance program per the employer's criteria.

3.0 HAZARD EVALUATION

The project hazard analysis below identifies the hazards anticipated to be encountered by project personnel based on the tasks presented in Section 1.4.

Table 3
Project Hazard Analysis

Chemical Hazards Present: ☐ None	☒ Flammable/combustible ☒ Compressed gas ☐ Explosive ☐ Organic peroxide ☐ Oxidizer ☐ Water reactive ☐ Unstable reactive ☒ Dust/Fumes/Particulates	☒ Corrosive (Hydrofluoric acid) ☒ Toxic ☐ Highly Toxic ☒ Irritant ☐ Sensitizer ☒ Carcinogen ☐ Mutagen ☐ Other:
Physical Hazards Present: ☐ None	☒ Heat ☒ Cold ☒ Walking/working surfaces ☒ Visible Dust ☒ Traffic/Vehicles ☒ Noise ☐ Other:	☐ Ionizing radiation ☐ Non-ionizing radiation ☒ Electricity ☐ Severe Weather ☒ Poor lighting ☒ Overhead Hazards
Environmental/Mechanical Hazards Present: ☐ None	☐ Heavy machinery/ Drill Rigs ☐ Trenching/excavation ☐ Docks-marine operations ☒ Docks-loading ☐ Drilling ☒ Forklifts ☐ Operations on Water ☒ Elevated heights (includes fall protection) ☐ Overhead/Underground utilities ☐ Confined spaces ☒ Power tools	☐ Cranes/Hoists/Rigging ☒ Ladders ☐ Scaffolding ☒ Manlifts ☒ Gas cylinders ☐ Roadway work ☐ Railroad work ☒ Energized equipment (LO/TO) ☒ Pressurized equipment (LO/TO) ☒ Drums and containers ☒ Others: Steam Cleaning
Biological Hazards Present: ☒ None	☐ Animal/human fluids or blood ☐ Animal/human tissue(s) ☐ Poisonous/irritating plants ☐ Other:	☐ Contaminated needles ☐ Live bacterial cultures ☐ Insects/rodents/snakes ☐ Other:
Ergonomics Hazards Present: ☐ None	☒ Repetitive motion ☒ Awkward position ☒ Heavy Lifting ☒ Frequent Lifting	☐ Limited movement ☒ Forceful exertions ☐ Vibration ☐ Other:
Personal Safety/Security: ☒ None	☐ Personal safety ☐ Security issue ☐ Project site in isolated area ☐ Personnel working alone ☐ Wild/Feral Animals	☐ Personnel working early/late ☐ Potentially dangerous wildlife ☐ Guard or stray dogs in area ☐ No/limited cell phone service ☐ Other:

Site Specific Chemicals of Concern

During July 2017, EnSafe performed an industrial hygiene assessment to evaluate the presence of lead in settled dust throughout the Closed Loop facility. The industrial hygiene assessment included collection of 16 wipe samples and two bulk samples of broken CRT glass.

The industrial hygiene report notes that approximately 90% of the Closed Loop lease space area was occupied by palletized cardboard boxes containing CRTs and/or CRT-glass stacked an average of three boxes high. Several boxes had fallen to the floor or collapsed against exterior warehouse walls and doors.

The assessment included collection of six wipe samples from elevated surfaces (e.g., roof support structures and elevated piping), five wipe samples from the warehouse floor, and five wipe samples from walls at an approximate height of 3 to 5 feet above the floor. A summary of the wipe and bulk samples analytical results indicates:

- Lead was detected in each elevated surface sample ranging from a concentration of 290 micrograms per 100 square centimeters (µg/100 cm^2) to 760 µg/100 cm^2, which exceed the Brookhaven National Laboratory non-lead operation area acceptable surface level criteria (Brookhaven screening criteria) of 40 µg/100 cm^2.

- Lead was detected in each floor sample ranging from 220 µg/100 cm^2 to 750 µg/100 cm^2, which exceed the Brookhaven screening criteria of 40 µg/100 cm^2.

- Two of five wall samples had lead screening values (59 µg/100 cm^2 and 130 µg/100 cm^2) exceeding the Brookhaven screening criteria of 40 µg/100 cm^2.

- The two bulk glass samples contained total lead at concentrations of 3,800 milligrams per kilogram (mg/kg) and 26,000 mg/kg, exceeding the Ohio Voluntary Action Program generic direct-contact residential/commercial child soil standard of 400 mg/kg and the generic direct-contact commercial or industrial land use soil standard of 800 mg/kg.

Prior analytical testing by AECOM (2015) at the Closed Loop facility located on Watkins Street in Columbus, Ohio, indicates that the below hazardous constituents identified by Ohio Environmental Protection Agency as potentially being present in CRT-related materials are not present at hazardous concentrations. As operations were conducted at the Closed Loop facility for approximately 1-year, compared with 4 years for the nearby Watkins Street facility, the likelihood of higher concentrations is considered remote.

Chemical Name	United States Environmental Protection Agency Hazardous Waste Number	Chemical Abstracts Service Registry Number
Arsenic	D004	7440-38-2
Barium	D005	7440-39-3
Cadmium	D006	7440-43-9
Chromium	D007	7440-47-3
Mercury	D009	7439-97-6
Selenium	D010	7782-49-2

Based on the aforementioned analytical results, lead (Pb) has been identified as the only chemical of concern known to be present onsite exceeding the Ohio Voluntary Action Program standards and characteristically hazardous concentration limits.

In addition to lead, a small approximately 1,600-square-foot portion of the subject property was used to "wash" glass with HF. Although HF liquids have been removed from the subject property, equipment formerly containing HF, and staining on the floor surrounding this equipment, suggest the potential for HF residues to remain at the site. Based on this, there is a potential corrosivity hazard in the former glass "washing" area of the subject property.

Lead is a transitional or heavy metal at room temperature and pressure. Lead, as a basic element, can combine with various other substances to form numerous lead compounds. Occupational lead exposure is most commonly absorbed into the body by inhalation. When workers breathe in lead as a dust, fume, or mist, their lungs and upper respiratory tract absorb it into their body. While inorganic lead does not readily enter the body through the skin, it can enter the body through accidental ingestion.

The OSHA standard establishes limits of exposure to lead for workers, i.e., the permissible exposure level (PEL) and an Action Level (AL). The OSHA PEL and NIOSH Recommended Exposure Limit (EL) set the maximum worker exposure to lead at 50 micrograms per cubic meter ($\mu g/m^3$), averaged over an 8-hour work day. The required OSHA PEL AL for lead in general industry and the construction industry is an airborne concentration of 30 $\mu g/m^3$, averaged over an 8-hour work day. The PEL is reduced for shifts longer than 8 hours by the equation PEL = 400 hours worked.

Potential pathways for exposure to lead dust is inhalation and ingestion. Symptoms of exposure to lead include gastrointestinal effects, anemia, kidney disease, high blood pressure, nervous system and neurobehavioral effects, and cognitive dysfunction later in life.

Table 4 presents the affected media, known concentration, the PEL or Threshold Limit Value, and the AL for inorganic lead. In addition, Appendix C contains specific hazardous property information for commonly encountered chemical hazards.

Table 4
Chemical of Concern

Chemical	Environmental Media[1]	Highest Measured Site Concentrations	PEL/TLV	PEL AL
Lead (Pb), inorganic	A	15,000 mg/kg (non-airborne solid) 220 mg/L (non-airborne TCLP)	50 µg/m^3	30 µg/m^3

Notes:
[1] Codes for environmental media: A = Air
PEL = permissible exposure limit
TLV = Threshold Limit Value
AL = Action Level
µg/m^3 = micrograms per cubic meter
mg/kg = milligrams per kilogram
mg/L = milligrams per liter

4.0 HAZARD CONTROLS

In order to conduct a task in the safest possible manner, the hazard(s) associated with a task needs to be identified so that appropriate hazard control(s) can be implemented and used by personnel conducting these task(s). This process is called a "Job Hazard Analysis" or "Job Safety Analysis". To aid in the JHA/Job Safety Analysis process, the associated task(s) (as outlined in Section 1.4) are correlated against the anticipated hazards. A "Relative Hazard/Risk Rating" is also provided in order to identify which hazards pose the greatest risk to personnel but more importantly, what hazard controls should be implemented. Hazard Controls B1 through B15 identified below are further detailed in Appendix D. Applicable JHAs for project tasks are included in Appendix A.

Table 5
Control of Hazards Summary

Task Numbers from Section 1.4	Hazards	Relative Hazard/Risk Rating*	Hazard Controls Appendix D and/or HASP Section
1, 2, 3, 4, 5, 6, 7, 8, 9	Chemical	NA☐ Low☐ Medium☐ High☒	B1
1, 2, 3, 4, 5, 6, 7, 8, 9	Physical	NA☐ Low☐ Medium☐ High☒	B2
NA	Railroad Safety	NA☒ Low☐ Medium☐ High☐	B3
1, 2, 3, 5, 8, 9	Electrical Hazards/ Safety	NA☐ Low☒ Medium☐ High☐	B4
1, 2, 3, 4, 5, 6, 7, 8, 9	Fire/Explosion	NA☐ Low☒ Medium☐ High☐	B5
1, 2, 3, 4, 5, 6, 7, 8, 9	Heat Stress	NA☐ Low☐ Medium☒ High☐	B6
NA	Cold Stress	NA☒ Low☐ Medium☐ High☐	B7
NA	Insects, Spiders, Snakes	NA☒ Low☐ Medium☐ High☐	B8
NA	Poisonous Plants	NA☒ Low☐ Medium☐ High☐	B9
NA	Personal Safety	NA☒ Low☐ Medium☐ High☐	B10
1, 2, 3, 4, 5, 6, 7, 8, 9	Working Alone	NA☐ Low☐ Medium☒ High☐	B11
NA	Severe Weather	NA☒ Low☐ Medium☐ High☐	B12
1, 2, 3, 4, 5, 6, 7, 8, 9	Material Handling/Ergonomics	NA☐ Low☐ Medium☒ High☐	B13
1, 2, 5, 6, 8, 9	Power Tools	NA☐ Low☐ Medium☒ High☐	B14
1, 2, 5, 6, 7, 8, 9	Vehicle Use	NA☐ Low☐ Medium☒ High☐	B15
NA	Confined Space	NA☒ Low☐ Medium☐ High☐	Section 9
NA	Spills	NA☒ Low☐ Medium☐ High☐	Section 10

Notes:
* Relative Hazard/Risk Rating: See Table 6
HASP = Health and Safety Plan
NA = Not applicable

When evaluating a task against a specific hazard, the evaluator should:

- Determine how frequently you will be conducting the task and generally be exposed to the hazard while onsite
- Determine the duration (i.e., the amount of time) you will spend conducting the task
- Determine the severity that the task/hazard may cause using Table 6. When assessing the severity, assume the hypothetical injury was a result of the task being conducted improperly and that PPE was not being worn:
  - Minimal Severity would require first aid and/or the property/equipment damage is limited to minor wear and tear, scratches, dents (still functional)
  - Moderate Severity requires professional medical attention and/or the property/ equipment damage necessitates repair but not replacement
  - High Severity requires immediate medical attention/life threatening and/or the property/equipment damage is significant and requires replacement

Note: A single hazard may be listed under several tasks. In this case, use the highest severity ranking of the task evaluated as the overall ranking.

Table 6
Relative Risk Rating Decision Table

The Hazard	Has No Severity	Has Minimal Severity	Has Moderate Severity	Has High Severity
Is Not Present (i.e., 0% of your onsite time does not expose you to this hazard)	NA	NA	NA	NA
Is Rarely Present (i.e., <25% of your onsite time exposes you to this hazard)	NA	LOW	LOW	MED
Is Sometimes Present (i.e., 25% — <50% of your time exposes you to this hazard)	NA	LOW	MED	HIGH
Is Frequently to Constantly Present (i.e., 50% to 100% of your time exposes you to this hazard)	NA	MED	HIGH	HIGH

Notes:
NA = Not applicable

4.1 General Site Safety

All activities will be conducted in a manner that minimizes hazards and personal exposures to such hazards. The following are some general safety rules that must be followed while on the site premises:

- All personnel who perform onsite operations with the potential for exposure to hazardous substances are required to comply with this HASP's personnel training and medical monitoring requirements and meet their employer's personnel training and medical monitoring requirements.

- All hazardous substances and other residues shall be handled, transported, labeled, and disposed of in accordance with accepted material handling procedures.

- Personnel will wear PPE as required.

- All work onsite will be planned and supervised by the appropriate personnel to prevent injuries.

- All injuries and accidents will be reported.

- Supervisors are required confirm that all personnel observe and obey all safety rules and regulations required for the safe conduct of work.

- Alcoholic beverages and illegal drugs will not be allowed onsite. Possession of either will be grounds for disciplinary actions.

- No person will be assigned to a task without first having been instructed on proper methods of carrying out the task.

- All posted safety signs will be obeyed.

- Space around onsite emergency and fire-fighting equipment will be kept clear.

- All trash and discarded materials will be staged in an orderly fashion and regularly removed from the site in accordance with the Closure Plan.

- Approval to perform work operations alone must be preapproved by the site SMs and a communication plan must be established.

- Smoking, eating, drinking, and chewing gum or tobacco will not be permitted within the contaminated work zones. Personnel will follow applicable decontamination procedures prior to eating, drinking, smoking, and/or and chewing gum or tobacco outside of these areas, where permitted.

- Personnel should keep track of weather conditions and wind direction to the extent they could affect potential exposure.

- Personnel should be alert to any abnormal behavior on the part of other workers that might indicate distress, disorientation, or other ill effects.

- Personnel should never ignore symptoms that could indicate potential exposure to chemical contaminants. These should be immediately reported to their supervisor, SMs, or the site HSC.

- Visible indicators of potentially immediate danger to life and health (IDLH) conditions include:

  — Large containers and tanks that must be entered

  — Enclosed spaces or trenches that must be entered

  — Potentially explosive or flammable situations (indicated by bulging drums, effervescence, gas generation, or instrument readings)

  — Extremely hazardous materials (such as cyanide, phosgene, or radiation sources)

  — Visible vapor clouds

  — Areas where biological indicators such as dead animals or vegetation are located

4.1.1 Phase I and II — Removal of Cathode Ray Tube Materials

The onsite project specific work activities include the removal of CRT materials and the remediation of the buildings. Phase I consists of the removal of unprocessed CRTs and CRT-related materials

located at the site. Phase II consists of the removal of partially processed CRTs (crushed CRT glass) located at the site.

The principal components of the onsite activities associated with both Phase I and Phase II are as follows:

- Task 1 — Construction of Dust Control Containment Structures
- Task 2 — Decontamination of Hydrofluoric Acid Area
- Task 3 — Movement and Relocation of CRT Materials
- Task 4 — Evaluation of CRT Material Container Condition
- Task 5 — Decontamination of CRT Material Containers
- Task 6 — Preparation of CRT Material Containers for Shipping
- Task 7 — Transfer of CRT Materials to the Designated Loading Zone for Shipment
- Task 8 — Daily Cleaning of Work Areas

Refer to SOP 1.0 contained in Appendix B for established guidelines, procedures, protocols and methods for the removal of CRT materials from the 2200 Fairwood Avenue buildings. JHAs for project specific work activities have been prepared. Refer to Appendix A for JHAs applicable to project specific work activities and associated physical hazards, environmental hazards, and chemical hazards.

4.1.2 Phase III — Closed Loop Equipment Removal and Building Decontamination

Phase III activities will be completed after all CRT materials and CRT-related materials have been removed from the buildings.

- Task 9 — Building Remediation

Phase III work activities will utilize industrial tools, forklifts, platform lifts and decontamination equipment. The decontamination processes will include, but not be limited to the following: HEPA vacuuming, wet cleaning methods, hand cleaning with solvent-soaked launderable or disposable wipes, high pressure/low volume pressure washing, containerizing and disposing of debris, wash and rinsate water, and the demolition and removal of select building materials.

JHAs for project specific work activities have been prepared. Refer to Appendix A for JHAs applicable to project specific work activities and associated physical hazards, environmental hazards, and chemical hazards.

5.0 PERSONNEL TRAINING REQUIREMENTS

All personnel performing onsite operations with the potential for exposure to hazardous substances or health hazards will meet the personnel training requirements set forth in this HASP, by their employer, and in accordance with applicable regulations. The training policies and procedures will ensure that personnel can recognize hazards, understand emergency response procedures, and have the knowledge necessary to enable them to perform their assigned jobs in a manner that ensures personal and public safety. It is the responsibility of all contractors and subcontractors to complete all appropriate health and safety training and participate in medical surveillance in accordance with their employer's policy prior to gaining access to onsite areas other than the Support Zone (Figure 2). If deemed appropriate, training shall include, but not be limited to, initial 40-hour health and safety training, 8-hours of annual refresher training, first aid training, and CPR certification.

5.1 Initial Training

Basic Health and Safety Training

- All personnel engaged in CRT material handling, CRT removal, and equipment and building remediation activities (all work areas excluding the Support Zone — Figure 2) will have the following training (or equivalent):

  — 40-hours of HAZWOPER training in accordance with OSHA standard 29 CFR Part 1910.120.

  — Hazard Communication training in accordance with OHSA standard 29 CFR Part 1910.1200.

  — Respiratory Protection training in accordance with OSHA standard 29 CFT Part 1910.134.

  — Lead Awareness training in accordance with OSHA standard 29 CFT 1926.62.

Health and Safety Coordinator Training

- All HSC's will be trained to a level required by their job function and responsibility. This will include training in implementation of HASPs and compliance with applicable health and safety requirements.

First Aid and Cardiopulmonary Resuscitation Training

- ALL HSC's and SM's will maintain first aid and CPR training as certified by the American Heart Association (or equivalent) to render first aid and CPR. Additionally, all onsite remediation contractor or subcontractor supervisors will maintain first aid and CPR training as certified by the American Heart Association (or equivalent) to render first aid and CPR.

5.2 Refresher Training

All personnel who have received 40-hours of initial health and safety training will receive 8-hours of refresher training annually, as specified in accordance with applicable regulations. Topics to be covered in this training program will include those specified in the initial 40-hour health and safety training and/or those specified in the supervisory training course, as well as a critique of incidents that could serve as training examples.

5.3 Onsite Training

Site-specific onsite training will be provided each day that work activities are to be conducted and when the project scope or hazards change.

Daily Site Safety Briefings

- Site safety briefings will be conducted prior to the start of each workday or work shift for personnel to discuss health and safety issues, project procedures, exposure incidents, potential up-coming changes in operations, or site conditions not accounted for in this HASP and/or more stringent contractor or subcontractor HASPs associated with this project.

- Prior to each change in operation, the briefings will address PPE use and maintenance, physical safety hazards, chemical hazards, environmental hazards, decontamination procedures, and specific safety requirements associated with the new operations. If deemed appropriate, onsite personnel qualified to perform first aid and CPR will be identified. All changes in the HASP will be reviewed during the safety briefings.

- A record of the daily site safety briefings will be written and signed by all participants per Section 14 of this HASP.

Visitor's Briefing

- Visitors will not be permitted to enter areas other than the Support Zone unless training, as described above, has been completed and deemed satisfied by the SMs and HSC. All visitors will be provided with applicable site-specific information, including but not limited to, hazard

recognition, personnel hygiene, site safety rules, use of PPE, emergency response procedures, this HASP, and any site-specific hazard awareness prior to entry into the site, as applicable. Visitors requesting onsite access to areas other than the Support Zone will be required to review and sign off on the HASP to ensure understanding and compliance with the provisions in the HASP. Individuals refusing to sign off will not be allowed into areas other than the Support Zone.

5.4 Hazard Communication

The following procedures related to hazard communication are applicable to this site. All persons will be briefed on this program.

Compliance with the Hazard Communication Standard is required for work at this site. Personnel shall receive training for the identification of hazards associated with the materials in use and the safe use of these materials, as applicable. Any hazardous chemical products brought to the site (other than standard fuels) for use during the specified site tasks must be reviewed by the SM or HSC. Contractors and subcontractors are responsible for having their own hazard communication program.

In addition, it is the contractor or subcontractors responsibility to identify any person who is or is expected to be directly involved with contaminated media, or materials that could reasonably lead to chemical exposure, which are subject to appropriate training and standards, including but not limited to 40-hour HAZWOPER (and 8-hour refresher training), respiratory protection, first aid, and CPR training per their employer's policy.

5.4.1 Container Labeling

All containers received onsite by outside contractors in completion of site-specific duties will be inspected to check for the following: (1) All containers will be clearly labeled as to the contents; (2) the appropriate hazard warnings; and (3) the name and address of the manufacturer.

All containers of waste or CRT materials for recycling or disposal must be properly labeled. Containers of CRT-related materials will be labeled as follows:

- Containers destined for recycling will be labeled in accordance with OAC 3745-51-39 (A)(2) with the following statements:

— "Used Cathode Ray Tubes — Contain Leaded Glass" or "Leaded Glass from Televisions or Computers" and

— "Do Not Mix with Other Glass Materials"

Containers destined for disposal as hazardous waste will be labeled and marked in accordance with OAC 3745-52-30 to 32.

Containers destined for disposal as non-hazardous or construction and demolition debris will be labeled as non-hazardous waste with the site name and address.

5.4.2 Personal Training and Information

Prior to starting work, each person will attend an onsite health and safety orientation and will receive information and training on the following:

- An overview of the requirements contained in this HASP and the Hazard Communication Standard
- Hazardous chemicals present onsite and in their workplace operations
- Location and availability of the HASP and the hazard communication program
- How to read labels to obtain appropriate hazard information
- Locations of hazardous chemical inventory lists
- Physical and health effects of the hazardous chemicals
- Methods and observation techniques used to determine the presence or release of hazardous chemicals
- How to lessen or prevent exposure to these hazardous chemicals through usage of control/ work practices and PPE
- Emergency procedures to follow if they are exposed to these chemicals

All contractors or subcontractors shall inform EnSafe and Olymbec of all hazardous chemicals brought onsite to perform site specific duties.

5.5 Disciplinary Actions

In the event that personnel do not follow the HASP safety rules or conduct themselves in any way that is hazardous to themselves or their fellow persons, disciplinary actions will be implemented in accordance with EnSafe and Olymbec employer policies.

5.6 Incident Reporting

Each contractor and subcontractor are responsible for maintaining their own personnel injury and illness records in accordance with applicable regulations. With respect to incidents, the following types of environmental health and safety incidents are to be recorded and reported to the SMs and/or HSC:

- All personal injuries and illnesses that include first aid and/or doctor or hospital visits which may or may not involve restricted work and/or lost time
- Environmental incidents and exposures, such as spills or other unplanned releases to the environment or nonconformance to operating procedures
- All evacuations (false or real)
- Property damage
- Near miss incidents which could have resulted in an injury, an accident, environmental impact, or significant loss of facilities
- Public/third party liability incidents that involve injury, illness, or property damage due to the actions of any non-EnSafe and Olymbec personnel arising out of, or in connection with, the contracted scope of work, operations, products, or premises

As a rule of thumb, all of the incident types outlined above MUST be communicated to either the SMs and the HSC immediately following the incident, either in person or via phone, email, or text messaging. The contacted person will then ensure that the other core project members are informed either in person or via phone, email, or text messaging, regardless of time of day. As soon as possible after the incident, but no later than 72-hours after the event, the first page of the Incident

Investigation Report form will be completed by the appropriate personnel (e.g., HSC) or his/her designee, and sent the core project members (i.e., the SMs, HSC), for preliminary root cause analysis. The root cause analysis will NOT be deemed complete until input from all individuals involved in the incident, applicable witnesses, and input from the core team has been obtained. Similarly, the implementation of any corrective/preventive actions will NOT be implemented until input from the HSC (and others as necessary) has been obtained.

A copy of an Incident, Accident, Exposure report is included in Appendix H. However, a contractor or subcontractor Incident Report of equal detail may also be used.

6.0 MEDICAL SURVEILLANCE AND RECORDKEEPING

The goals of a medical surveillance program are to monitor the health of potentially exposed personnel through the use of medical examinations and diagnostic laboratory testing, to provide medical care for occupational injury or illness, to keep accurate records for future reference and to confirm the selection of personnel are physically able to safely perform the work assigned. The medical surveillance program supports and monitors the effectiveness of the primary health and safety goal of controlling worker exposure to hazardous substances. Medical examinations will be performed by or under the supervision of a licensed physician, preferably one knowledgeable in occupational medicine.

In general, all persons who may be exposed to hazardous substances above the permissible limits; who wear a respirator; or who are injured, become ill, or develop signs or symptoms due to possible overexposure to hazardous substances from hazardous waste operations must be medically monitored. It is the responsibility of the individual's employer to implement such a medical surveillance program to ensure the health and safety of their personnel.

6.1 Baseline Medical Examinations

The baseline medical examination serves two major purposes: (1) it determines the individual's fitness for duty, including the ability to work while wearing a respirator and other associated project specific PPE; and (2) it provides baseline data for comparison with future medical data. The baseline medical examination will include, at a minimum, the following:

- Complete occupational and medical history
- Physical examination
- Blood count and chemistry profile
- Urinalysis with microscopic review
- Chest x-ray
- Pulmonary function tests
- Resting electrocardiogram (EKG)

- Cardiac stress test (at physician's discretion)

It is the responsibility of the employer to extend clearance to the fitness of personnel for duty and ability to wear PPE beyond onsite areas other than the Support Zone.

6.2 Lead Exposure Medical Surveillance

In addition to the baseline medical examination requirements discussed above in Section 6.1, all personnel working in the Exclusion Zone will require medical surveillance for lead exposure. This will include an initial examination for lead prior to the individual starting work at the site, periodic examinations during the course of the project (depending on the individual's duration at the site), and a final examination upon completion of the individual's duties at the site.

Medical surveillance for lead exposure will adhere to the following OSHA standard:

- Part Number: 1910
- Part Number Title: Occupational Safety and Health Standards
- Subpart: 1910 Subpart Z
- Standard Number: 1910.1025 App C
- Title: Medical surveillance guidelines

Under the occupational health standard for inorganic lead, a program of biological monitoring and medical surveillance is to be made available to all employees exposed to lead above the AL of 30 ug/m^3 time-weighted average for more than 30 days each year. This program consists of periodic blood sampling and medical evaluation to be performed on a schedule as indicated above and which is defined by previous laboratory results, worker complaints or concerns, and the clinical assessment of the examining physician.

Under this OSHA standard, the blood lead level of all employees who are exposed to lead above the AL of 30 ug/m^3 must be tested prior to (within 2 weeks of) the individual starting work and then again at least every 2 months for the first 6 months and every 6 months thereafter, during the course of their work. This project also requires a final examination for lead upon completion of the

individual's duties at the site. All lead medical surveillance results should be reported to the SMs or HSC.

The frequency for testing is increased to every 2 months for employees whose last blood lead level was at or above 40 micrograms per deciliter (µg/dl), and at least monthly while an employee is removed from exposure due a previously detected elevated blood lead level.

For an employee removed from exposure to lead due to a blood lead level at or above 50 µg/dl, the employer may return that employee to former job status when two consecutive blood sampling tests indicate that the employee's blood lead level is below 40 µg/dl.

A copy of this standard has been provided as Appendix E of this HASP.

Employees or former employees, their designated representatives, and OSHA must have access to exposure and medical records in accordance with 29 CFR 1910.1020.

6.3 Special Medical Examinations

Special medical examinations or consultations will be arranged for personnel exposed in an emergency situation to hazardous substances at concentrations above the PELs without adequate protection. This will be done as soon as possible after the potential overexposure has been determined by the SM, in consultation with the HSC.

Special medical examinations shall also be arranged upon notification by the individual that he/she has developed signs or symptoms indicating a possible overexposure to hazardous substances, or if the examining physician determines that a more frequent medical examination is necessary.

6.4 Special Circumstances

Any individual, who is on a medication that may interfere with the ability to perform his/her job function, or who may require special medical attention, must notify the SM or HSC of these circumstances prior to commencing work at the site.

6.5 Health and Safety Records

It is the responsibility of the employer to record and file all personnel training, medical clearances, fit testing results, and applicable monitoring, per the employer's policy. Copies of these records along with all medical surveillance results shall be provided to the SMs or HSC regularly.

7.0 PERSONAL PROTECTIVE EQUIPMENT

This section of the site HASP is a reference of selection for different levels of PPE. The protective equipment will be selected based on the contaminant type(s), concentration(s) in air (if any), standing liquid (if any), or other applicable matrix, and the known route(s) of entry into the human body. In situations where the type of materials, their concentrations, or exposure potentials are unknown, a decision based on professional judgment regarding the assignment of PPE will be made by the HSC.

7.1 Selection of Personal Protective Equipment

The selected PPE should be able to resist degradation, penetration, and permeation by the contaminants present at the site. In selecting the appropriate protective material, the following should be considered: chemical resistance; tear and puncture resistance; flexibility; thermal stress; cleanability; and durability.

PPE will be selected, used and maintained in accordance with applicable regulations.

Levels of Personal Protective Equipment

The four levels of PPE are Levels A, B, C, and D, with Level A providing the highest available level of respiratory, skin, and eye protection. A summary of the basic PPE ensemble for Levels A, B, C, and D is provided below. PPE selection for operations at the site will be tailored to address specific task conditions.

Level A

Level A PPE provides the maximum degree of respiratory, skin, and eye protection. A Level A PPE ensemble should include:

- Full-face piece self-contained breathing apparatus (SCBA) or full-face piece supplied air respirator with escape SCBA;
- Fully encapsulating, chemical-resistant suit, safety boots and inner gloves; and
- Hard hat (if overhead or bump hazards exist).

Level B

Level B PPE provides the maximum level of respiratory protection. Since chemical-resistant clothing is not considered gas, vapor, or particulate tight, Level B PPE does not provide the maximum skin protection. However, a good quality, hooded, chemical-resistant one-piece garment with taped wrists

and ankles provides a reasonable degree of protection against splashes of liquids and lower concentrations of chemicals in ambient air. It is the minimum level recommended for confined space entries and initial site entries until the hazards have been further identified. Level B PPE should be used when any one of the following criteria is met:

- The type and atmospheric concentration of substances have been identified and require a high level of respiratory protection but less skin protection — this includes atmospheres with IDLH concentrations of specific substances that do not represent a severe skin hazard or atmospheres that do not meet the criteria for use of air-purifying respirators (APRs);
- Atmosphere contains less than 19.5% oxygen; or
- Presence of incompletely identified vapors or gases is indicated by air monitoring instruments but vapors and gases are not suspected of containing high levels of chemicals harmful to skin or capable of being absorbed through the intact skin.

Level C

Level C PPE provides the same level of skin protection as Level B PPE, but a lower level of respiratory protection. APRs can be used only if the substance has adequate warning properties; the individual passes a qualitative fit-test for the mask; an appropriate cartridge/canister is used and its service limit concentration is not exceeded; and site operations are not likely to generate unknown compounds or excessive concentrations of already identified substances. Level C PPE can be used when all of the following conditions are met:

- Oxygen concentrations are not less than 19.5%;
- Atmospheric contaminants, liquid splashes, or other direct contact will not adversely affect any exposed skin;
- Types of air contaminants have been identified, concentrations measured, and a cartridge or canister is available that can remove the contaminant;
- Atmospheric contaminant concentrations do not exceed IDLH levels; and
- Job functions do not require SCBAs.

Modified Level D

Modified Level D PPE provides minimal skin protection (i.e., hand/glove protection along with standard work clothes with optional coveralls) and no respiratory protection. Modified Level D PPE can be used when the following conditions are met:

- Atmosphere contains no known hazard;
- Oxygen concentrations are not less than 19.5%;
- Work functions include minimal contact with contaminated media (e.g., soil, water, groundwater) and preclude splashes, immersion, or the potential for unexpected inhalation of or contact with hazardous levels of any chemicals.

Level D

Level D PPE provides no skin protection other than standard work clothes and no respiratory protection. Work functions are limited to non-hazardous environments and preclude contact with media that may be potentially contaminated at hazardous levels for any type of chemical.

7.2 Respirator Fit Test

It is the responsibility of the employer to conduct fit tests on all site personnel who will perform work operations in areas other than the onsite Support Zone. Prior to the initiation of any fit testing, personnel must be certified as medically able to wear a respirator. The respirator fit test is conducted to ensure proper face piece-to-face seal. A secure fit is important with positive-pressure equipment and is essential to the safe functioning of negative-pressure equipment, such as most APRs. Personnel will receive a brief onsite tutorial on proper wear and maintenance of the respirator. However, is the responsibility of the employer to assure all personnel are properly trained in the use and care of required PPE.

Qualitative fit tests should be conducted annually in accordance with the ANSI Practices for Respiratory Protection, Z88.2-1989. All personnel are responsible in conducting their own negative and positive fit check each time such personnel dons the APR. Employers are responsible for the documentation of annual respirator fit tests per employer policy.

7.2.1 Negative and Positive Fit Check

The negative and positive pressure fit check shall be performed each time a person dons the APR. The negative pressure fit check involves closing off the inlet openings to the APR cartridges by

covering with the palms of the hands. If an inward leakage of air is detected, the APR should be checked for material defects and refitted or replaced with another APR.

The positive pressure fit check is performed by placing the palm of hand over the exhalation valve and gently exhaling for 10 seconds to create positive pressure inside the face piece. If an outward air leak is detected, the APR should be readjusted. If after readjustment leakage still occurs, another APR should be used.

7.3 Personal Protective Equipment Inspection Checklist and Maintenance

PPE inspections are the responsibility of the user and shall be conducted upon receipt of PPE from the factory or distributor; when it is issued to workers; after use or training; and prior to maintenance. Periodic inspections of stored equipment shall be conducted routinely, whenever a question arises concerning the appropriateness of the selected equipment, or when problems with similar equipment arise. At a minimum, PPE inspection should include the following:

- Clothing

  Before use:

  - Determine that the clothing material is correct for the specified task
  - Visually inspect for:
    - Imperfect seams
    - On-uniform coatings
    - Tears
    - Malfunctioning Closures
  - Hold up to light and check for pinholes
  - Flex product:
    - Observe for cracks

- Observe for other signs of shelf deterioration

– If the product has been used previously, inspect inside and out for signs of chemical breakthrough or deterioration, such as:

- Discoloration
- Swelling
- Stiffness

– During the work task, periodically inspect for:

- Evidence of chemical attack such as discoloration, swelling, stiffening, and softening. Keep in mind that chemical permeation can occur without any visible effects.
- Closure failure
- Tears
- Punctures
- Seam discontinuities

- Gloves

  Before use of chemical resistant glove (nitrile or equivalent), pressurize glove to check for pinholes. Blow into glove, then roll gauntlet towards fingers or inflate glove and hold under water. In either case, no air should escape. Non-chemical resistant gloves should be checked regularly and free of damage or deterioration.
- Respirators

  – SCBA/supplied air/air-purifying:

- Inspect SCBA/supplied air/APRs before and after each use, at least monthly when in storage and during cleaning. APRs should be inspected before each use to be sure they have been adequately cleaned.

- Check all connections for tightness, inspect air lines prior to each use for cracks, kinks, cuts, frays, and weak areas.

- Check for proper setting and operation of regulators and valves (according to manufacturer's recommendations) and check operation of alarms.

- Check material conditions for:

  - Signs of pliability
  - Signs of deterioration
  - Signs of distortion

- Check face shields and lenses for:

  - Cracks
  - Crazing
  - Fogginess

- Examine cartridges or canisters to ensure that:

  - They are the proper type for the intended use
  - The expiration date has not passed
  - They have not been opened or used previously

7.4 Task Specific Personal Protective Equipment

This section of the site HASP is used for the selection of the appropriate PPE. The protective equipment will be selected based on the contaminant type(s), concentration(s) in air (if any), standing liquid (if any), or other applicable matrix (e.g., soil, sludge, sediment, etc.) and the known route(s) of entry into the human body. Table 7 presents the general level of protection to be used for each task that is anticipated to be conducted onsite.

Table 7
Task Specific Personal Protective Equipment

Task Description as Discussed in Section 1.4		Level of Protection				
		A	B	C	Mod D	D
Phase I and Phase II	Task 1 — Construction of Dust Control Containment Structures	☐	☐	☒	☐	☐
	Task 2 — Decontamination of Hydrofluoric Acid Area	☐	☐	☒	☐	☐
	Task 3 — Movement and Relocation of CRT Materials	☐	☐	☒	☐	☐
	Task 4 — Evaluation of CRT Material Container Condition	☐	☐	☒	☐	☐
	Task 5 — Decontamination of CRT Material Containers	☐	☐	☒	☐	☐
	Task 6 — Preparation of CRT Material Containers for Shipping	☐	☐	☒	☐	☐
	Task 7 — Transfer of CRT Materials to the Designated Loading Zone for Shipment	☐	☐	☒	☐	☐
	Task 8 — Daily Cleaning of Work Areas	☐	☐	☒	☐	☐
Phase III	Task 9 — Building Decontamination	☐	☐	☒	☐	☐

Notes:
Site-specific personal protective equipment, based on potential exposure hazards, has been determined to be Level C for all personnel entering the building, excluding the Support Zone.
* Clothing made of natural fibers shall be worn when a shock or arc flash hazard exists.

Level D	=	Long sleeve shirt*, long pants*, hard hat, eye protection, hearing protection, and safety shoes
Level D Modified	=	Level D protection plus protective coveralls, as required; and appropriate hand protection
Level C	=	Level D (Modified) protection plus negative pressure respiratory protection with appropriate cartridges (minimum half face negative pressure respirator with P100 cartridge); chemical protective coveralls in lieu of general coveralls; use of inner and outer sets of hand protection
Level B	=	Level C protection plus pressure-demand supplied air respirator with escape bottle in lieu of negative pressure respirator; chemical resistant coveralls with hood; chemical resistant boots
Level A	=	Level B protection plus fully encapsulating (gas tight) chemically resistant suit
CRT	=	cathode ray tube

Table 8 identifies the specific PPE items that are required or recommended to be used on this project. This includes identifying the specific type of hand and body protection (as applicable) for the chemicals that may be encounter while conducting the tasks outlined in this HASP.

Table 8
Project Personal Protective Equipment and Supplies

Equipment	Req	Rec	NA	Equipment	Req	Rec	NA
Steel-Toe Boots	☒	☐	☐	SCBA	☐	☐	☒
Outer Disposable Boots	☒	☐	☐	Full-face Airline Resp.	☐	☐	☒
Long Sleeve Shirt and Pants	☒	☐	☐	Full Face Negative Pressure Resp.	☐	☐	☒
Flame Retardant Coveralls	☐	☐	☒	Half Face Negative Pressure Respirator with P100 Cartridge (or equivalent)	☒	☐	☐
Tyvek Suit (or equivalent)	☒	☐	☐	Powered Air Purifying Resp.	☐	☐	☒
Poly-coated Tyvek/Saranex Suit	☐	☐	☒	First Aid Kit	☒	☐	☐
Fully Encapsulated Chemical Suit	☐	☐	☒	Fire Extinguisher	☒	☐	☐
Hearing Protection	☐	☒	☐	Communication (cell phones or walkie talkies)	☒	☐	☐
Task Appropriate Gloves (work gloves, impact gloves, etc.)	☒	☐	☐				
Inner Chemical Gloves (latex or nitrile)	☐	☒	☐	Eye Wash (e.g., portable bottle)	☒	☐	☐
Outer Chemical Gloves (latex or nitrile)	☒	☐	☐	Water or Other Fluid Replenishment	☒	☐	☐
Hard Hat	☒	☐	☐	Sunscreen	☐	☐	☒
Safety Glasses with Side Shields	☒	☐	☐	Insect Repellent	☐	☐	☒
Vented (splash proof) Goggles	☐	☐	☒	Personal Fall Arrest System, Full Body Harness with Self-Retracting Lanyard (task specific)	☒	☐	☐
High Visibility Clothing	☒	☐	☐				

Notes:
Req = Required
Rec = Recommended
NA = Not Applicable
SCBA = Self-contained breathing apparatus

8.0 AIR MONITORING/SAMPLING PROCEDURES

Air samples may be collected during the project to identify and quantify airborne contaminants in order to delineate areas where PPE is needed; determine the level of PPE necessary; document onsite personnel exposures; assess the potential health effects of exposure; determine the need to implement engineering controls or evacuate the work zone or site; and determine the need for specific medical monitoring. Some commonly used devices include the following:

- Personal Air Monitoring — Quantitative air sampling for nuisance dust, metals, organic and inorganic compounds. Samples are collected using personal air sampling pumps and the appropriate sampling media. All personnel samples will be collected in the breathing zone over the duration of the work shift. The specific methods to be utilized for the collection of personal air samples may require the involvement of a certified industrial hygienist if this type of sampling will be conducted.

- Combustible Gas Indicator — Examples include O2/lower explosive limit meter. A combustible gas indicator measures the concentration of a combustible gas or vapor. Its accuracy is, in part, dependent upon on the difference between the calibrations and sampling temperatures; oxygen-deficient atmospheres also affect accuracy; filament can be damaged by silicones, halides, and tetraethyl lead; and the sensitivity is a function of the difference in the chemical and physical properties between the calibration gas and the unknown.

- Flame Ionization Detector — Examples include Organic Vapor Analyzers. Depending on mode, it may detect many organic gases and vapors. A flame ionization detector will not detect inorganic gases and vapors; has reduced reliability in high humidity conditions; and should not be used when temperatures are below 40°F (4.4°C).

- Ultraviolet Photo Ionization Detector — Examples include HNU. Detects a number of organic and some inorganic gases and vapors. A photo ionization detector does not detect methane; does not detect a compound if the probe used has a lower energy than the compound's ionization potential; does not readily ionize fully chlorinated materials; high humidity affects readings; low humidity affects operation; response is sensitive to dust or moisture on the lamp; and responses will fluctuate when gases are mixed.

- Infrared Spectrophotometer — Examples include Miran. Measures concentrations of many gases and vapors in the air but designed to quantify one- or two-component mixtures. Not

approved for use in hazardous conditions; must make repeated passes to achieve reliable results; and somewhat bulky/heavy.

- Direct-Read Colorimetric Tubes — Examples include Drager. The compound reacts with the indicator chemical in the tube, producing a stain whose length is proportional to the compounds' concentration. Results are affected by temperature, pressure, and humidity; many similar compounds interfere with results.

8.1 Using Monitoring Devices

Conducting an applicable task may necessitate using one or more monitoring devices as listed in Table 9, particularly if gases, vapors, explosion hazards and/or oxygen deficient atmosphere can occur or are expected. Table 10 below provides monitoring information for common and/or anticipated hazards. All monitoring results must be recorded, and copies of the monitoring results provided to the SM and/or HSC. The recorded monitoring results must include the following information:

- Instrument name and serial number
- Date of calibration
- Frequency/duration of monitoring
- The monitoring results
- And the actions taken based on the results, even if "no actions are required to be taken"

Table 9
Monitoring Devices Available

A	Photo Ionization Detector (10.6 eV)	G	Dust Monitoring
B	Photo Ionization Detector (11.7 eV)	H	Summa Canister
C	Flame Ionization Detector	I	Heat Stress Monitor
D	Organic Vapor Analyzer	J	Radiation Detector
E	Combustible Gas Indicator/Lower Explosive Limit	K	Gas Multimeter
F	Colorimetric Indicator Tubes	L	Other Device:

Table 10 Monitoring Information				
Monitoring Scenarios	**Constituent**	**Task(s)**	**Trigger (Action Level)**	**Monitoring Instrument Required**
If monitoring is necessary to identify that a risk is at or above tolerable limits and/or is used in controlling a risk onsite, document the task and the maximum allowable exposure or trigger, and the monitoring instrument required to be used.	Oxygen	NA	NA	NA
	Carbon Monoxide	NA	NA	NA
	H_2S	NA	NA	NA
	C_2S	NA	NA	NA
	CH_4	NA	NA	NA
	VOCs: Total	NA	NA	NA
	Semi-VOCs:	NA	NA	NA
	Lead	1 to 11*	25 µg/m^3	Dust Monitor
	Others:	NA	NA	NA
	Others:	NA	NA	NA

Notes:
* See Sections 8.2.2.1 and 8.2.2.2 below
NA = Not anticipated at this time
H_2S = Hydrogen sulfide
C_2S = Carbon disulfide
CH_4 = Methane
VOC = volatile organic compound
µg/m^3 = micrograms per cubic meter

8.2 Action Level Guidance

In general, this HASP addresses site-specific chemicals as noted in Table 4. However, there are chemicals commonly encountered in the workplace that may not be a chemical targeted for sampling but nonetheless will have adverse health effects. These chemicals are listed in Table 11 below, with additional chemical hazards property information presented in Appendix C.

Table 11 Action Levels for Commonly Encountered Compounds	
Compound	**Action Level**
VOC (as Benzene)	0.5 ppm maximum
CH_4	0.5% maximum or 5000 ppm
CO_2	0.25% OR 2500 ppm maximum
CO	25 ppm maximum
H_2S	5 ppm maximum
O_2	19% minimum — 23.5% maximum

Notes:
VOC = volatile organic compound
CH_4 = Methane
CO_2 = Carbon dioxide
CO = Carbon monoxide
H_2S = Hydrogen sulfide
O_2 = Oxygen
ppm = parts per million

8.2.1 Dusts

The PELs for total and respirable dusts are 15 and 5 milligrams per cubic meter (mg/m^3), respectively. In general, at these concentrations you will not be able to read the face of a wristwatch (with your arm extended) when the "Total Dust" concentration reaches 15 mg/m^3. Particles of dust in the respirable size range cannot be seen without the aid of a microscope but in aggregate, may be perceived as a haze. More importantly and with few exceptions, when dust is noticeable in the air, more respirable particles will exist than larger particles.

To determine the likelihood of exposure from dusts, a theoretical "Total Dust" concentration in mg/m^3 can be calculated to estimate the total dust concentration in which the concentration of the contaminant could equal and/or exceed its' established EL. This equation is as follows:

Total Dust (mg/m^3) = (10^6 mg/kg) (**EL** mg/m^3) / (Conc. of contaminant mg/kg) (**SF**).

Where:

EL = Exposure Limit of the contaminant of concern (e.g., its' PEL or Threshold Limit Value in mg/m^3); and **SF** = Safety Factor, a number between 1 and 10. Used to account for the degree of confidence in the characterization data (a 10 would represent a poor degree of confidence, for example only one sample was collected/analyzed to characterize the site).

The SF is based upon the following assumptions: 1) the concentration of the contaminant in the airborne dust is the same as its' concentration in the sample matrix; 2) the soil data depicts a representative "worst-case" scenario; 3) the monitoring instrument used, accurately measures the ambient concentration of particulate matter in the air; and 4) a single contaminant of concern is present.

As an example, assume that Lead (with an EL of 0.05 mg/m^3) is the contaminant of concern and a bulk sample concentration of 25,000 mg/kg has been identified. Depending on the SF used, the theoretical total dust concentration will range between 2 to 0.2 mg/m^3. This means that when the in-situ particulate monitoring device is registering a concentration within 2 to 0.2 mg/m^3 range, there is a high probability that this dust contains enough lead to equal and/or exceed the EL. Hence, the level of PPE used would be increased until engineering controls are determined to be effective as documented by personal monitoring.

8.2.2 Phase I and Phase II — Removal of Cathode Ray Tube Materials

During Phase I and II of this project, air monitoring for lead will be required and shall consist of the following:

- Personal Air Monitoring — Worker Exposure by Significant Task
  - Significant tasks associated with Phase I and Phase II work activities include the following at a minimum: 1) forklift operators moving CRT materials, 2) technicians working in the Exclusion Zone cleaning or packaging CRT materials for removal, 3) technicians working in the Exclusion Zone completing wet sweeping and bulk dust cleaning in work areas, and 4) support staff in the Exclusion Zone monitoring or overseeing operations.
- Building Exterior Environmental Air Monitoring — Upgradient
- Building Exterior Environmental Air Monitoring — Downgradient

8.2.2.1 Personal Air Monitoring

Personal Air Monitoring shall consist of an initial worker exposure assessment. The initial monitoring associated with the initial worker exposure assessment may be limited to a representative sample of workers exposed to the greatest concentrations of airborne lead for each significant project task. Representative exposure sampling is permitted when there are a number of employees performing the same job, with lead exposure of similar duration and level, under essentially the same conditions. For employees engaged in similar work, OSHA standards require that the members of the group reasonably expected to have the highest exposure levels be monitored. This result is then attributed to the other employees of the group.

The contractor or subcontractors must establish and maintain an accurate record documenting the nature and relevancy of exposure data. If applicable, instead of performing initial monitoring, the employer may in some cases rely on objective data that demonstrate that a particular lead containing material or product cannot result in employee exposure at or above the AL when it is processed, used, or handled.

For this project it is anticipated that the AL for lead in dust generated inside the building during the Phase I and Phase II work activities will be exceeded; hence the PPE requirements referenced Section 7. Following the personal air monitoring associated with the initial exposure assessment by

significant project task, periodic personal air monitoring consistent with the exposure assessment monitoring, shall be completed at least once every 2 months throughout the completion of the contractor's or subcontractor's duties for the project.

8.2.2.2 Building Exterior Environmental Air Monitoring (Upgradient and Downgradient)

Building exterior environmental air monitoring for lead, both upgradient (upwind) and downgradient (downwind) of the buildings will be completed for Phase I and Phase II work. The purpose of this activity is to monitor exterior conditions for potential releases of lead dust outside the buildings in association with the project work activities.

Prior to Phase I and Phase II work activities occurring at the site, an initial exterior environmental air monitoring event (upgradient and downgradient) shall be completed to establish baseline conditions. Throughout the course of the project periodic exterior environmental air monitoring events (upgradient and downgradient) shall be completed at least once a month. Upgradient exterior air monitoring shall be completed on the upgradient side of the buildings in areas representative of up wind conditions. Downgradient exterior air monitoring shall be completed on the downgradient side of the buildings in areas representative of down wind conditions and in areas most likely to be resulting in a potential release (i.e. near loading dock areas being used to load out CRT materials).

All personal air monitoring results and exterior environmental air monitoring results shall be provided regularly to the SMs or HSC.

8.2.3 Phase III — Closed Loop Equipment Removal and Building Decontamination

During Phase III of this project, air monitoring for lead will be required and shall consist of the following:

- Personal Air Monitoring — Worker Exposure by Significant Task
  - Significant tasks associated with Phase III work activities include the following at a minimum: 1) technicians disassembling and decontaminating Closed Loop equipment, 2) forklift operators moving Closed Loop equipment, (3) technicians working in the Exclusion Zone performing select demolition activities and building decontamination activities (HEPA vacuuming, wet wiping, pressure washing), and 4) support staff in the Exclusion Zone monitoring or overseeing operations.

- Building Exterior Environmental Air Monitoring — Upgradient

- Building Exterior Environmental Air Monitoring — Downgradient

8.2.3.1 Personal Air Monitoring

Personal Air Monitoring shall consist of an initial worker exposure assessment. The initial monitoring associated with the initial worker exposure assessment may be limited to a representative sample of workers exposed to the greatest concentrations of airborne lead for each significant project task. Representative exposure sampling is permitted when there are a number of employees performing the same job, with lead exposure of similar duration and level, under essentially the same conditions. For employees engaged in similar work, OSHA standards require that the members of the group reasonably expected to have the highest exposure levels be monitored. This result is then attributed to the other employees of the group.

The contractor or subcontractors must establish and maintain an accurate record documenting the nature and relevancy of exposure data. If applicable, instead of performing initial monitoring, the employer may in some cases rely on objective data that demonstrate that a particular lead containing material or product cannot result in employee exposure at or above the AL when it is processed, used, or handled.

For this project it is anticipated that the AL for lead in dust generated inside the building during the Phase III work activities will be exceeded; hence the PPE requirements referenced Section 7. Following the personal air monitoring associated with the initial exposure assessment by significant project task, periodic personal air monitoring consistent with the exposure assessment monitoring, shall be completed at least once every 2 months throughout the completion of the contractor's or subcontractor's duties for the project.

8.2.3.2 Building Exterior Environmental Air Monitoring (Upgradient and Downgradient)

Building exterior environmental air monitoring for lead, both upgradient (upwind) and downgradient (downwind) of the buildings will be completed for Phase III work. The purpose of this activity is to monitor exterior conditions for potential releases of lead dust outside the buildings in association with the project work activities.

Prior to Phase III work activities occurring at the site, an initial exterior environmental air monitoring event (upgradient and downgradient) shall be completed to establish baseline conditions.

Throughout the course of the project periodic exterior environmental air monitoring events (upgradient and downgradient) shall be completed at least once a month. Upgradient exterior air monitoring shall be completed on the upgradient side of the buildings in areas representative of up wind conditions. Downgradient exterior air monitoring shall be completed on the downgradient side of the buildings in areas representative of down wind conditions and in areas most likely to be resulting in a potential release (i.e. near loading dock areas being used to load out materials and wastes).

All personal air monitoring results and exterior environmental air monitoring results shall be provided regularly to the SMs or HSC.

9.0 CONFINED SPACE ENTRY

OSHA defines a confined space as space that is 1) large enough and so configured that an employee can bodily enter it; 2) has limited or restricted means for entry and exit; and 3) is not designed for continuous employee occupancy.

This HASP prohibits unauthorized entry into confined spaces.

In the event that entry into a confined space is required, prior to entering a confined space, the personnel must be properly trained. Without confined space training, entry into confined spaces is prohibited. In addition, entry authorization will only be given after the SMs or HSC have reviewed the nature of the confined space, the hazards present, measures needed to complete safe entry, and copies of the personnel's confined space safety training certification.

10.0 SPILL RESPONSE

If spills of chemicals, petroleum products, or other hazardous substances occur as part of this project, the SMs and HSC shall be notified immediately. If warranted, before any spill cleanup work is initiated at the site, applicable local, state, and/or federal emergency response authorities will be identified and contacted by either the client contact and/or HSC personnel.

10.1 Reporting and Initial Personnel Safety

Upon discovery of a hazardous substance spill, personnel are to:

- Immediately summon help by notifying the SMs, HSC and/or the client contact
- Take action to coordinate and establish the safety of nearby personnel
- Proceed to a safe location
- If anyone is seriously injured, immediately contact emergency medical services
- Keep unauthorized personnel out of the area

10.2 Initial Spill Reaction

Factors that limit the person's response at the site of a spill are:

- Level of training
- Personal safety
- Available PPE
- Knowledge of the substance

Personnel should limit their actions to shutting off equipment or pumps and closing valves if possible, feasible, and safe to do so.

10.3 Spill Response Evaluation

The identity and hazards of the spilled material should be determined before decisions regarding spill containment and control are made. The client contact and SM should evaluate the hazards regarding

the spill and decide whether project personnel or external response organizations should conduct the cleanup.

The contractor or subcontractor must contact the SMs and HSC to discuss the spill incident for further input on deciding how the cleanup can be conducted, including:

- Levels of PPE and safety procedures
- Safety and work zones
- All steps of the response activities
- Most effective procedures or methods for cleanup
- Means of containment
- Leak of spill control
- Decontamination procedures (including emergency decontamination)

11.0 DECONTAMINATION

All decontamination activities shall be completed in accordance with the Closure Plan for this project and all applicable federal, state, and local regulations.

11.1 Cathode Ray Tube Materials and Building

Decontamination involves the orderly controlled removal of contaminants.

11.1.1 Phase I and Phase II — Removal of Cathode Ray Tube Materials

These phases of work will include the construction of CRZ and CLZ structures inside designated portions of the buildings to reduce the potential for lead dust migration from the subject property buildings.

CRT materials to be transported offsite will be decontaminated per Section 7.2 and Section 11 of the Closure Plan. Visible dust on exterior surfaces of containers, plastic wrap, and pallets will be cleaned using a vacuum equipped with a HEPA filter such that the exterior of the containers, plastic wraps, and pallets are free of visible dust.

To reduce the potential for lead-dust generation, the following procedures will be performed on a daily basis, at a minimum, and on as needed basis, to control the transfer of lead-containing dust.

- Work areas and areas of newly exposed floor areas (e.g., areas where containerized materials were removed during the prior day) will be cleaned with a wet sweeping method, or equivalent sweeping methods that utilize acceptable dust control measures.

- To reduce the potential generation of dust, forklift travel areas will also be cleaned with a wet sweeping method, or equivalent sweeping methods that utilize acceptable dust control measures.

- The floor of the CRZ will be cleaned using wet sweeping methods or equivalent sweeping methods that utilize acceptable dust control measures.

Upon completion of the work, all onsite contractor equipment that is used inside the Exclusion Zone or used to move CRT materials will be decontaminated (in a designated decontamination area) prior to leaving the Exclusion Zone and the site. The decontamination requirements also include any and all equipment that must be removed from the Exclusion Zone during the project for maintenance.

The specific protocol for decontaminating reusable equipment will depend on the equipment; however, the equipment decontamination process will include the removal of dusts using a vacuum equipped with a HEPA filter, hand wiping with solvent-soaked launderable or disposable wipes, and/or wash the equipment with a detergent solution using a high pressure, low volume washer. Following the decontamination activities, the SMs, HSC, or third-party vendor providing project monitoring must inspect the decontaminated equipment and tools before they can be removed from the Exclusion Zone.

The solvent for the launderable or disposal wipes and the detergent proposed for cleaning is Simple Green, or an approved equivalent that is orally non-toxic and readily biodegradable. A copy of the Simple Green product safety data sheet and technical specifications is presented in Appendix F.

All contractors and subcontractors will be responsible for decontamination of their own equipment used during onsite operations, as well as disposal of the decontamination fluids, launderable materials or wastes generated. Launderable wipes must be collected and managed in accordance with OAC 3745-51-06(A)(3)(e). Decontamination fluids and wastes must be properly containerized and managed per the project Closure Plan; contractors and subcontractors, should coordinate disposal with the professional engineer (or representative).

Phase I and Phase II work activities will utilize industrial tools, forklifts, platform lifts and decontamination equipment. Refer to the applicable JHAs included in Appendix A.

11.1.2 Phase III — Closed Loop Equipment Removal and Building Decontamination

This phase of work will include utilization of the CRZ and CLZ structures inside designated portions of the buildings to reduce the potential for lead dust migration from the subject property buildings.

To reduce the potential for lead-dust generation, the following procedures will be performed on a daily basis, at a minimum, and on as needed basis, to control the transfer of lead-containing dust.

- Work areas and areas of newly exposed floor areas (e.g., areas where equipment was removed during the prior day) will be cleaned with a wet sweeping method, or equivalent sweeping methods that utilize acceptable dust control measures.

- The floor of the CRZ will be cleaned using wet sweeping methods or equivalent sweeping methods that utilize acceptable dust control measures.

Building Decontamination

Per the project Closure Plan, after removing CRT Materials, Closed Loop equipment and debris from the buildings, gross contamination including (but not limited to) debris, grime, dust, or any residual demolition debris will be removed from the buildings. The goal of this cleaning is to remove material which is easily mobilized and to facilitate final building decontamination.

The building decontamination process will include the removal of dusts using a vacuum equipped with a HEPA filter, hand wiping with solvent-soaked launderable or disposable wipes, and/or wash the impacted surfaces and building components with a detergent solution using a high pressure, low volume washer. The solvent for the launderable or disposal wipes and the detergent proposed for cleaning is Simple Green, or an approved equivalent that is orally non-toxic and readily biodegradable. A copy of the Simple Green safety data sheet and technical specifications is presented in Appendix F.

The contractor will use methods as necessary to prevent the transport of any decontamination materials outside of the building decontamination areas. If present, any floor drains or open pipes in the area during these activities will be temporarily plugged. Further, prior to implementing any wet cleaning measures, the contractor will evaluate the surface to be cleaned and areas where cleaning fluids could be reasonably be anticipated to migrate to confirm that decontamination fluids are retained inside the buildings. Such additional pathways include, but are not limited to, the following:

- Open joints between the wall and concrete floor
- Loading dock levelers
- Doorways (man door or overhead doors)
- Ventilation openings
- Deteriorated concrete flooring that will not retain water
- Other areas, as determined by the SMs, HSC, or third-party vendor providing project monitoring

Launderable wipes must be collected and managed in accordance with OAC 3745-51-06(A)(3)(e). Decontamination fluids and wastes must be properly containerized and managed per the project

Closure Plan. Containerized decontamination fluids and rinsate will either be managed as wastewater or as hazardous for lead (D008) unless analytical representative testing demonstrates the material does not meet the hazardous characteristic criteria. If decontamination fluids and rinsate will be managed as a hazardous waste for lead (D008), the fluids will be containerized in appropriate Department of Transportation-approved containers.

Upon completion of the work, all onsite contractor equipment that is used inside the Exclusion Zone or used to move CRT materials will be decontaminated (in a designated decontamination area) prior to leaving the Exclusion Zone and the site. The decontamination requirements also include any and all equipment that must be removed from the Exclusion Zone during the project for maintenance.

The specific protocol for decontaminating reusable equipment will depend on the equipment; however, the equipment decontamination process will include the removal of dusts using a vacuum equipped with a HEPA filter, hand wiping with solvent-soaked launderable or disposable wipes, and/or wash the equipment with a detergent solution using a high pressure, low volume washer. Following the decontamination activities, the SMs, HSC, or third-party vendor providing project monitoring must inspect the decontaminated equipment and tools before they can be removed from the Exclusion Zone.

All contractors and subcontractors will be responsible for decontamination of their own equipment used during onsite operations, as well as disposal of the decontamination fluids, launderable materials or wastes generated. Launderable wipes must be collected and managed in accordance with OAC 3745-51-06(A)(3)(e). Decontamination fluids and wastes must be properly containerized per the project Closure Plan; contractors and subcontractors, should coordinate disposal with the professional engineer (or representative).

Phase III work activities will utilize industrial tools, forklifts, platform lifts and decontamination equipment. Refer to the applicable JHAs included in Appendix A.

11.2 Personnel Decontamination

All associated site personnel should minimize contact with contaminants (e.g., lead dust). At a minimum, the gross removal of contaminants from PPE shall occur in designated areas. See Figure 2 — Support Zones and Rally Point for gross removal and PPE removal areas.

All disposable PPE must be containerized in portable containers (including disposable respirators or respirator cartridges, gloves, chemical resistant suits, etc.) pending sampling, analysis, and offsite

disposal. Containers will remain closed pending receipt of analytical results. If analytical testing demonstrates the materials are considered hazardous (D008) for lead, the PPE must be transported offsite as a hazardous waste. Otherwise, the disposable PPE may be managed as a non-hazardous solid waste.

Non-disposal PPE (i.e. hard hats, safety glasses, etc.) must be decontaminated. Any PPE that cannot be decontaminated should be disposed of along with the disposable PPE referenced above. Personnel must wash their hands, face, and any areas of potential exposure during work activities or during the removal of PPE immediately after exiting the PPE removal zone and prior to eating, drinking, smoking and/or applying cosmetics. The decontamination methods will be as follows:

Level C Personnel Decontamination

Personnel involved in activities that require the use of Level C PPE will observe the following decontamination guidelines:

- Place tools, instruments, and trash at an appropriate location. These areas should be clean and dry, and at a minimum contain plastic bags for trash. Waste PPE will not be placed in the same containers as general trash.

- Inspect equipment, and if applicable, tools that are to be removed from the Exclusion Zone for signs of residual amounts of contamination or excessive dust buildup. If present, dust and contamination must be completely cleaned off of equipment and tools prior to removal from the decontamination areas. Personnel will visually check themselves for signs of excessive dust and possible contamination. If observed, dust and contamination will be completely removed before further decontamination is performed.

- Un-tape wrists and ankles

- Remove outer work gloves and place them in an appropriate container specified for waste PPE

- Remove outer Tyvek coveralls and place them in an appropriate container specified for waste PPE

- Wipe off and remove hard hat and safety glasses

- Wipe off and remove respirator mask (also goggles if worn)

- Remove inner protective gloves and place them in an appropriate container specified for waste PPE

- Wash hands, face, and any areas of potential exposure using soap and water (separate from other decontamination cleaners/solutions)

During emergencies, the need to quickly respond to an accident or injury must be weighed against the risk to the injured party from chemical exposure. It may be that the time lost decontaminating an individual may cause greater harm to the individual than from the potential for chemical exposure, particularly if the injury is life-threatening. In these instances, a non-injured person needs to inform responding emergency personnel of the potential for chemical contamination on the victim, specifically mentioning the type and expected concentrations.

12.0 EMERGENCY RESPONSE PLAN

The Emergency Response Plan (ERP) describes contingencies and emergency response procedures. The ERP defines the responsibilities of key personnel in planning, prevention, and response to emergency situations, and identifies agency contacts and medical care procedures. Emergency contact and procedure information is included in Appendix G.

The ERP addresses measures to prevent and respond to emergency situations, such as fire or explosion; spill or release of hazardous material; personnel injury or illness; or other adverse events. General emergency guidelines are as follows:

12.1 Stop Work Authority

Any person working onsite has the authority to stop work if any operation threatens the health and safety of onsite workers, the surrounding community, or if there are concerns and/or questions regarding health and safety controls that are not clearly established or are not understood. Management is responsible for creating a culture where Stop Work authority is exercised freely and without fear of retribution or intimidation.

When an unsafe condition is identified, a Stop Work intervention will be initiated and treated as a "near miss". In the event that such a situation occurs, the SM shall be notified immediately. At that time, the SM will update the HSC and all project-related health and safety issues as they arise. When an unsafe condition is identified, an "incident report" will be generated to document the unsafe condition allowing for review, corrective actions, and preventative measures to be implemented, as applicable.

These actions will be coordinated by the SM, with support from the HSC, and all affected personnel will be notified of the Stop Work issue. No work will resume until all Stop Work issues and concerns have been adequately addressed. Most issues can be resolved in a timely manner at the site, but occasionally additional investigation and/or corrective actions may be required. Work may resume when it is safe to do so.

12.2 Personnel Involved in Emergency Response

Key personnel involved in site emergency response include the HSC, SM, and associated contractors. Clear lines of authority have been established for implementing emergency response procedures and for managing safety compliance. See Section 12.3. All emergencies and personal injuries will be immediately reported to SM. The SM will immediately report the incident to the SMs and HSC.

12.3 Emergency Response Telephone Roster

The Emergency Response Telephone Roster consists of persons and organizations both onsite and offsite who would be involved in the ERP. This roster, provided as Table 1A, will be kept onsite and provided to all contractors and subcontractors, along with a list of onsite personnel who are trained in first aid and CPR. All site personnel will be familiar with the Emergency Response Telephone Roster and will understand the proper chain of command. A listing of onsite and offsite emergency contacts and key personnel and their alternates will be posted in the onsite Support Zone.

12.4 Emergency Communications

The external communication system between onsite and offsite emergency response personnel is necessary to report and coordinate emergency response. Personnel cell phones will be the primary means of external communication and will be used to notify offsite emergency response agencies and to request assistance.

12.5 Emergency Medical Care and Treatment

Every injury and exposure must be reported per Section 5.6. Every injury and exposure must be reported to the employee's supervisor immediately and to the SMs or HSC within 24 hours, regardless of whether the incident appears to be serious or not, or whether any adverse health effects or symptoms are apparent after the exposure.

12.6 Life-Threatening Emergency Response

Incidents are possible that would result in emergencies beyond the onsite emergency response capabilities. Such incidents might include:

- Life-threatening injuries or injuries/exposures requiring medical treatment
- Fires progressing beyond incipient stage

12.7 Evacuation Routes and Procedures

During site operations and in the event of an evacuation, a safe location (Rally Point, Figure 2) has been identified. As part of the site orientation, all onsite personnel will be informed of the evacuation plan and rally points.

If evacuation is necessary, personnel will determine wind direction. Whenever possible, evacuation should be in the direction perpendicular to the wind direction without passing through the plume of smoke and/or spilled material, if applicable. Personnel will report to their designated rally point.

In the event that a workers' evacuation route to their primary rally point is hindered by emergency conditions, workers shall evacuate to a secondary rally point. If the onsite SM is not involved in emergency response activities, he/she will assist first responders in accounting for all site personnel; otherwise their designated back-up will account for all personnel and will report this information to the SM and first responders.

12.8 Training

All site personnel will review the information in this HASP on the emergency response procedures, and the location and use of onsite emergency equipment, and will have received emergency response training. During the site orientation and/or site safety briefings, site personnel will be trained in emergency response procedures, onsite communication systems and evacuation routes, as stated in this HASP. Visitors will be briefed on hazard recognition, safe work practices and basic emergency procedures by the SM or HSC.

12.9 First Aid Procedures

If associated personnel are injured, general first aid will be administered. If safety concerns or hazardous conditions are still present (e.g., incipient fire, falling debris), the individual shall be moved to avoid further injury or risk. In the event that personnel are injured in a contaminated area, general first aid will be administered and then the person will be moved to the PPE removal zone for decontamination (if applicable), additional first aid, and preparation for transportation, giving due consideration to which risk will be greater; the spread of contamination or the health/safety of the individual.

First aid kits will be maintained onsite. The type of first aid kit to be maintained will be for minor emergencies, such as cuts and skin abrasions. Where applicable, first aid supplies will be stored in a waterproof container. The SM or designated person will ensure that adequate first aid supplies (listed below) are maintained.

Minimum List of First Aid Supplies			
(1)	First Aid Guide	(6)	Burn treatment applications
(1)	Absorbent Compress >4"x8"	(4)	3"x3" Sterile gauze pads
(16)	1"x3" Adhesive bandages	(2)	Pair medical exam gloves
(1)	Adhesive tape 2.5yard roll	(1)	Triangular bandage >40"x40"x56"
(10)	Antiseptic treatment applications	(6)	Antibiotic ointment applications
(2)	Eye/face wash		
Recommended List of First Aid Supplies			
Analgesic (oral, non-drowsy)		Hand sanitizer	
Bandage compress >2"x2"		Eye covering >1/4" thick	
Breathing barrier, single use		Roller bandage >2"x4yards	
Cold pack >4"x5"			

The contents of the first aid kits shall be checked before placed onsite and at least weekly to ensure that expended items are replaced. Where the eyes or body of any personnel may be exposed to injurious corrosive materials, suitable facilities for quick drenching or flushing of the eyes and body shall be available for use.

13.0 SANITARY FACILITIES AND LIGHTING REQUIREMENTS

Potable Water

An adequate supply of potable water must be provided on the site. Portable containers used to dispense drinking water shall be capable of being tightly closed and equipped with a tap. Any container used to distribute drinking water shall be clearly marked as the nature of its contents and not used for any other purposes. Where disposable single service cups are supplied, both a sanitary container for the unused cups and a receptacle for disposing of the used cups shall be provided.

Sanitary/Toilet Facilities

Provisions must be made so that no less than one toilet facility is available. Toilet facilities for men and women are accessible inside the building, adjacent to the Support Zone and outside of the Exclusion Zone. See Figure 2 — Support Zones and Rally Point.

Lighting Requirements

Work is anticipated to be completed indoors and during daylight hours. Adequate lighting must be provided inside the buildings. If work will extend beyond daylight hours, adequate lighting must also be provided outside the buildings near exterior loading dock areas and/or employee access areas.

14.0 DAILY SITE SAFETY MEETINGS AND CHECKLISTS

14.1 Daily Site Safety Meeting Record

All personnel participating in the project must receive initial onsite health and safety orientation. Thereafter, daily site safety meetings (tailgate meetings) are required prior to the start of each work day or work shift for personnel to discuss health and safety issues, project procedures, exposure incidents, potential up-coming changes in operations, or site conditions not accounted for in this HASP and/or more stringent contractor or subcontractor HASPs associated with this project. All site personnel must acknowledge attendance of the daily site safety meetings by signing the Daily Site Safety Meeting Record. A copy of the Daily Site Safety Meeting Record and a Site Safety Meeting Checklist are included in Appendix I.

14.2 Site Safety Meeting Checklist

As part of the daily site safety meetings, contractor's supervisor should consider reviewing a site safety checklist, if needed. A copy of a Site Safety Meeting Checklist is included in Appendix I. Completed site safety checklists, if used, should be recorded and maintained with the Daily Site Safety Meeting Records.

14.3 Equipment Pre-Operation Inspections

To prevent injuries and protect onsite personnel against hazards associated with equipment operations and materials handling, only properly trained and authorized personnel will be allowed to operate heavy equipment. All material-handling heavy equipment will be maintained in a safe operating condition and inspected daily prior to use.

Additional heavy equipment safety requirements include, but are not limited to:

- Prior to operating any heavy equipment, the authorized operator must conduct a pre-operation inspection to confirm that the heavy equipment is in safe operating condition
- All mobile equipment shall be equipped with an audible back-up alarm
- All equipment must be maintained and operated in accordance with the manufacturer's specifications

Additionally, all small tools, equipment, and power tools must be inspected prior to use and maintained and operated in accordance with the manufacturer's specifications.

A copy of the heavy equipment Pre-Operation Inspection Form is included in Appendix I. This form must be completed on a daily basis prior to heavy equipment operation. A copy of the completed form must be provided to and maintained by the contractor's supervisor.

FIGURES

Appendix A
Job Hazard Assessments

Job Hazard Analysis (JHA)

Activity/Work Task: General Work Hazards	Overall Risk Assessment Code (RAC) (Use highest code)	Rev.0	M
Project Name: Former Closed Loop Facility 1655 and 1675 Watkins Road Columbus, Ohio	**Risk Assessment Code (RAC) Matrix**		
Contract Number:	**Severity** / **Probability**		
Date Prepared: 11/25/2018			
Prepared by (Name/Title): Karl Primdahl			
Reviewed by (Name/Title): Michael Koenig, Site Manager			
Notes: (Field Notes, Review Comments, etc.)			

Severity	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal	H	M	M	L	L
Negligible	M	L	L	L	L

Step 1: Review each **"Hazard"** with identified safety **"Controls"** and determine RAC (See above)

"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.

"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible

Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on JHA. Annotate the overall highest RAC at the top of JHA.

RAC Chart

- E = Extremely High Risk
- H = High Risk
- M = Moderate Risk
- L = Low Risk

Job Steps	Hazards	Controls	RAC
General Work Area	Slip / trip / fall	Designated pathways cleared of debris. Establish adequate lighting prior to the start of operations.	M
General Work Area – lifting	Sprain / Strain	Stage equipment to minimize long distance carrying. Split heavy loads into smaller loads. Request assistance for heavy or awkward loads. Lift with legs- not back. Keep heavy loads in front of the torso; avoid overreaching and extension of arms.	M
Break time	Ingestion	Follow decontamination procedures, thoroughly wash hands and face before eating, drinking or smoking.	L
Use of hand tools	Pinch points Strain-sprain	Use proper holding and supporting techniques when turning wrenches, screw-drivers, and other torque-enhancing tools	M

	Difficult positions Cut-hazards	Ensure proper direction and grip on hammers and all other manual demolition hand tools prior to use. Ensure use of full body weight for counterbalance – use proper footing stance.	
Noise Control	Hazardous Noise	Equipment may exceed 85 dbA. As a general "rule of thumb" – if you must raise your voice in order to be heard – hearing protection should be used.	**L**
Stairway/ladder use to access work area	Slip / trip / fall	Maintain 3-point contact on installed all installed ladders and stairways. Stay within cat-walk/handrail protected areas if available.	**M**
Use of ladders	Slip / trip / fall	Maintain 3- point contact. Extension ladders must extend 3 ft. from landing and be secured. A-Frame ladders must be fully extended, do not stand on top two rungs of the ladder.	**M**
Hand Held Power Tools, electrical equipment.	Electrical Shock	All electrical equipment must be GFCI protected. Plug all hand held tools into a GFCI. Temporary electrical panels must be installed by a qualified electrician.	**M**

Personal Protective Equipment to be Used
• **Steel Toed Boots** • **Hard Hat** • **Safety Glasses** • **Gloves appropriate for the task (chemical protective, work gloves, impact gloves, etc.)** • **Chemical Resistant Suit** • **Respirator** • **Other (per HASP task specific)**

	PRINT	SIGNATURE	
Supervisor Name:			**Date/Time:**
Safety Specialist Name:			**Date/Time:**
Employee Name(s):			**Date/Time:**
			Date/Time:
			Date/Time:
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Job Hazard Analysis (JHA)

Activity/Work Task: Working while Wearing a Respirator	Overall Risk Assessment Code (RAC) (Use highest code)	Rev.0	M
Project Name: Former Closed Loop Facility 1655 and 1675 Watkins Road Columbus, Ohio	**Risk Assessment Code (RAC) Matrix**		
AKT Peerless Project Number: 13753O	**Severity** / **Probability**		
Date Prepared: 11/25/2018			
Prepared by (Name/Title): Karl Primdahl			
Reviewed by (Name/Title):			
Notes: (Field Notes, Review Comments, etc.)			

Severity	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal	H	M	M	L	L
Negligible	M	L	L	L	L

Step 1: Review each **"Hazard"** with identified safety **"Controls"** and determine RAC (See above)

"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.

"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible

Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on JHA. Annotate the overall highest RAC at the top of JHA.

RAC Chart

- **E = Extremely High Risk**
- **H = High Risk**
- **M = Moderate Risk**
- **L = Low Risk**

Job Steps	Hazards	Controls	RAC
Donning the Respirator	Exposure to hazardous atmospheres and substances by wearing a respirator or using cartridges that are not compatible with the product. Exposure to hazardous substances by wearing a cracked, broken or otherwise faulty respirator Exposure to hazardous substances by not properly donning the respirator. Induced medical condition by the wearer if unable to safely wear a respirator as determined by a MPLCP	All persons wearing a respirator must have a medical clearance and current fit test prior to wearing a respirator during the cleanup of hazardous substances. Personnel must be trained in the use and care of their respirator. Employees wearing respirators must perform a negative pressure test when first donning the respirator to ensure that a tight seal and good fit is achieved. Cartridge compatibility charts should be consulted prior to selecting a cartridge to use during cleanup operations to ensure that the cartridge selected is appropriate for the chemical.	L
Performing work while wearing the respirator	Experiencing shortness of breath or fatigue	Be sure that all persons wearing a respirator have passed a pulmonary function test and are fit for duty and cleared to wear a respirator while working.	M

Performing work while wearing the respirator - continued	Limited vision which might allow trips and falls or being struck by various vehicles or equipment in the work area. Experiencing a panic attack due to claustrophobia or other mental stress	Workers wearing respirators should be evaluated for their ability to safely wear a respirator prior to beginning work. It may be necessary to have someone “suit up” before going into a work area to see how they react and ensure that they remain calm and in control. Keep the work area free of unnecessary trip hazards; make sure all persons are aware of any trip hazards that remain in the area. Keep all non-essential vehicles and equipment out of the work area; equipment operators are ultimately responsible for the operation of the machine and should give ground workers the right-of-way.	**M**
Doffing the respirator after completion of the work.	Contamination to personnel and to clothing from contact with any potential contamination of the respirator. Future exposure hazards when wearing a respirator which was not properly decontaminated after exposure and/or use.	Employees should properly doff all PPE; 1. Remove out gloves by peeling them inside out. 2. Remove Tyvek or other protective suit by peeling it down and exposing the inside of the suit. 3. Remove any masks, goggles, face shields, etc. 4. Remove 2nd pair of gloves. Provide appropriate decon solution or mild dish detergent for workers to clean and decon respirators after each use.	**L**

Personal Protective Equipment to be Used

- **Steel Toed Boots**
- **Hard Hat**
- **Chemical Resistant Suit**
- **Chemical Resistant Gloves**
- **Chemical Resistant Boot Covers**
- **Hearing Protection such as Ear Plugs or Ear Muffs, as applicable**
- **Safety Glasses**
- **Respirator**
- **Other (per HASP task specific)**

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Job Hazard Analysis (JHA)

Activity/Work Task: Working while wearing a "Tyvek" suit	Overall Risk Assessment Code (RAC) (Use highest code)	Rev.0	M
Project Name: Former Closed Loop Facility 1655 and 1675 Watkins Road Columbus, Ohio	**Risk Assessment Code (RAC) Matrix**		
AKT Peerless Project Number: 13753O	**Severity** / **Probability**		
Date Prepared: 11/25/18		Frequent / Likely / Occasional / Seldom / Unlikely	
Prepared by (Name/Title): Karl Primdahl	Catastrophic	E / E / H / H / M	
	Critical	E / H / H / M / L	
Reviewed by (Name/Title): Mike Koenig, Site Manager	Marginal	H / M / M / L / L	
	Negligible	M / L / L / L / L	
Notes: (Field Notes, Review Comments, etc.)	Step 1: Review each **"Hazard"** with identified safety **"Controls"** and determine RAC (See above)		
	"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.	**RAC Chart**	
	"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible	**E = Extremely High Risk**	
		H = High Risk	
	Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on JHA. Annotate the overall highest RAC at the top of JHA.	**M = Moderate Risk**	
		L = Low Risk	

Job Steps	Hazards	Controls	RAC
1. Donning proper PPE	Contamination to personnel from wearing improper or damaged PPE. Contamination to personnel by improper donning of Tyvek suits	Always wear proper PPE when working with hazardous materials substances; this may include all various types of Tyvek Suits. Inspect all suits prior to use to ensure that there are no rips, holes or tears. Ensure that all seams are intact and that all zippers are functional. Be sure that all personnel wearing a Tyvek suit have been trained on proper procedures for putting on and taking off the Tyvek suit.	L
2. Cleaning up hazardous materials	Contamination to personnel by splashing materials on exposed skin. Contamination of tools used to clean up materials, resulting in contamination to other personnel.	Ensure that all exposed skin is covered when working with hazardous materials where the potential for skin contact exists. Clean all tools using an approved cleaner or decontamination solution. Cleaning should be performed while wearing appropriate PPE to avoid cross contamination.	M

2. Cleaning up hazardous materials - continued		Ensure that personnel picking up bags and debris use caution when lifting and loading the bags; keep the bags away from the body when lifting them.	**M**
3. Doffing PPE upon completion of work	Contamination to personnel and to clothing from contact with the contaminant.	Employees should properly doff all PPE; 1. Remove outer gloves by peeling them inside out. 2. Remove Tyvek or other protective suit by peeling it down and exposing the inside of the suit. 3. Remove any masks, goggles, faceshields, etc. 4. Remove 2nd pair of gloves. Consider all PPE to be contaminated and dispose of as applicable.	**L**

Personal Protective Equipment to be Used
• **Steel Toed Boots** • **Hard Hat** • **Safety Glasses** • **Chemical Resistant Suit** • **Gloves appropriate for the task (chemical protective, work gloves, impact gloves, etc.)** • **Other (per HASP task specific)**

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Job Hazard Analysis (JHA)

Activity/Work Task: Working around mobile equipment	Overall Risk Assessment Code (RAC) (Use highest code)	Rev.0	H
Project Name: Former Closed Loop Facility 1655 and 1675 Watkins Road Columbus, Ohio	**Risk Assessment Code (RAC) Matrix**		
Contract Number:			
Date Prepared: 11/25/2018			
Prepared by (Name/Title): Karl Primdahl			
Reviewed by (Name/Title): Michael Koenig, Site Manager			
Notes: (Field Notes, Review Comments, etc.)			

Severity	Probability				
	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal	H	M	M	L	L
Negligible	M	L	L	L	L

Step 1: Review each **"Hazard"** with identified safety **"Controls"** and determine RAC (See above)

"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.

"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible

Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on JHA. Annotate the overall highest RAC at the top of JHA.

RAC Chart
E = Extremely High Risk
H = High Risk
M = Moderate Risk
L = Low Risk

Job Steps	Hazards	Controls	RAC
1. Approaching the machine while it is being operated	Being hit by the machine because the operator did not see you Nearby personnel being struck by the equipment as it is being operated.	Always approach the machine from the front, never from the rear. Make eye contact, verbal contact or radio contact with the operator and let them know you plan to approach the machine. This can be done by making hand gestures or motions or by verbal communication. Wait until the machine has come to a complete stop before approaching. Make sure the operator applies the safety brake on the machine and that his/her hands are not on the controls Do not approach the machine until the brake is on and the operator's hands are off the controls Keep non-essential personnel out of the work area. The use of safety chains, caution tape or other types of barricades to keep people out of the red zone (active work area).	H

2. Working near the bucket, forks or other attachments on the machine	Being struck by the bucket, forks or the machine when doing any type of work near the attachments. Taking samples, pushing freight onto forks, rigging for a lift, etc. Getting hands and fingers caught in pinch points near the attachments	Be sure that the operator has the brake set and his hands are off the controls when personnel are working near the attachments Keep hands and fingers out of obvious pinch points, especially when trying to rig something for a lift of when trying to push freight onto the forks of a tow motor. Wear appropriate gloves such as impact gloves.	**H**

Personal Protective Equipment to be Used
• **Steel Toed Boots** • **Hard Hat** • **Safety Glasses** • **Chemical Resistant Suit** • **Gloves appropriate for the task (chemical protective, work gloves, impact gloves, etc.)** • **Other (per HASP task specific)**

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Job Hazard Analysis (JHA)

Activity/Work Task: Forklift Operations	Overall Risk Assessment Code (RAC) (Use highest code)	Rev.0	H
Project Name: Former Closed Loop Facility 1655 and 1675 Watkins Road Columbus, Ohio	**Risk Assessment Code (RAC) Matrix**		
AKT Peerless Project Number: 13573O	**Severity** / **Probability**		
Date Prepared: 11/25/2018		Frequent / Likely / Occasional / Seldom / Unlikely	
Prepared by (Name/Title): Karl Primdahl	Catastrophic	E / E / H / H / M	
	Critical	E / H / H / M / L	
Reviewed by (Name/Title): Mike Koenig, Site Manager	Marginal	H / M / M / L / L	
	Negligible	M / L / L / L / L	
Notes: (Field Notes, Review Comments, etc.)	Step 1: Review each **"Hazard"** with identified safety **"Controls"** and determine RAC (See above)		
	"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.	**RAC Chart**	
	"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible	**E = Extremely High Risk**	
		H = High Risk	
	Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on JHA. Annotate the overall highest RAC at the top of JHA.	**M = Moderate Risk**	
		L = Low Risk	

Job Steps	Hazards	Controls	RAC
1. Operator must have Forklift Operator certification before operating the equipment.	Improper training or lack of training can result in injury to personnel or property damage and can create unsafe environments for all personnel in the area.	Equipment operators must be familiar with the equipment and be able to operate the equipment in a safe manner. Facility or client sites may require proof of training.	L
2. Perform a walk around of the machine and complete a daily equipment inspection checklist.	Slip or trip hazards could be present, and the equipment may not be in a safe operating condition. A fall hazard is always present when getting on and off the machine. Operating damaged or faulty equipment can result in severe personal injury or property damage.	Stop & Think and assess for hazards prior to the inspection, then check for leaks, equipment damage, loose wires and fittings and torn or loose belts. Ensure 3-point contact is used when getting on or off the machine.	L

3. Operate the machine in the designated area	Congestion of trucks, bins and other equipment in the operating area can lead to injury to nearby personnel or property damage. Swinging the forks and loads over nearby personnel puts those personnel under a suspended load and puts them in the line of fire of the bucket and arm. Having a load fall off the forks when traveling down an incline Loads falling off the forks when going over bump Hitting people or property when operating the forklift with an obstructed view due to a large load.	Assess the area; be aware of the surroundings and maintain communication with all personnel and moving equipment. Some facilities or clients may require a "red zone" barricade around the operating area of the machine and do not let personnel enter the area while the unit is operating Always back down and incline when there is a load on the forks Travel in reverse when your view is obstructed from a large load Travel over bumps and uneven surfaces in a diagonal pattern.	**H**
4. Once task is completed, park the machine in the designated area, lower the forks and apply the park brake	Nearby personnel and equipment can hit raised equipment when passing by. Raised attachments can cause stress on the hydraulics and if they fail they can hit nearby personnel or property or damage the equipment.	Ground all forks and attachments and assess the designated parking area for other hazards. Always park equipment on flat and level surfaces.	**L**

Personal Protective Equipment to be Used
• **Steel Toed Boots** • **Hard Hat** • **Safety Glasses** • **Seat Belt** • **Other (per HASP task specific)**

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Job Hazard Analysis (JHA)

Activity/Work Task: Aerial Platform Work	Overall Risk Assessment Code (RAC) (Use highest code)				Rev.0	**M**
Project Name: Former Closed Loop Facility 1655 and 1675 Watkins Road Columbus, Ohio	**Risk Assessment Code (RAC) Matrix**					
Contract Number:	**Severity**	**Probability**				
Date Prepared: 11/25/2018		Frequent	Likely	Occasional	Seldom	Unlikely
Prepared by (Name/Title): Karl Primdahl	Catastrophic	**E**	**E**	**H**	**H**	**M**
	Critical	**E**	**H**	**H**	**M**	**L**
Reviewed by (Name/Title): Michael Koenig, Site Manager	Marginal	**H**	**M**	**M**	**L**	**L**
	Negligible	**M**	**L**	**L**	**L**	**L**
Notes: (Field Notes, Review Comments, etc.)	Step 1: Review each **"Hazard"** with identified safety **"Controls"** and determine RAC (See above)					
	"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.	**RAC Chart**				
	"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible	**E = Extremely High Risk**				
		H = High Risk				
	Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on JHA. Annotate the overall highest RAC at the top of JHA.	**M = Moderate Risk**				
		L = Low Risk				

Job Steps	Hazards	Controls	RAC
1. Set up exclusion zone	Physical injury from moving Vehicles Strike pedestrian/unauthorized personnel in work area	Use appropriate traffic control measures. Utilize fencing/delineators/cones and caution tape to rope off area of work.	**L**
2. Ensure fire protection	Fire	Place ABC fire extinguishers within 25' of work zone(s) entrance.	**L**
3. Perform equipment inspection	Lift failure Pinch	Inspect and conduct functional test to operating controls, safety devices, fall protection; air, hydraulic and fuel system leaks, cables and wiring harness; missing parts; tires and wheels; outriggers, stabilizers, extendable axles and other structures; and guardrail system. Identify all potential pinch /shear points before operation and ensure they are labelled or guarded.	**L**

4. Equipment operation	Unsafe operation Pinch Points	Lift controls shall be tested in accordance with the manufacturers or instructions prior to use to determine that such controls are in safe working condition. Only authorized persons shall operate an aerial device. Authorized person shall be named in the HASP. Employees shall not sit or climb on the edge of the basket or use planks, ladders or other devices to gain greater working height. Signal person shall be in full view of equipment operator. Employees / support personnel shall not go over, under, behind, or between operating equipment.	**M**
5. Establish clear path	Injury to personnel Getting lift stuck Tipping over/driving off path Overhead utilities	Inspect the entire area where aerial platform is to be used. Ensure there are no drop-offs or holes; bumps and ground obstructions; debris; overhead obstructions and high voltage conductors; hazardous locations Maintain safe distance from energized electric utilities, ensure swing radius and path do not contact any overhead utilities or obstructions.	**L**
6. Don fall protection prior to operating.	Falls	Shall be secured to manufacturer's anchor point. Body harness with Self Retracting Lanyard- or fixed lanyard <4' long.	**L**
7. Lift operation	Pinch points Overhead utilities Personnel struck by equipment Unsafe rigging / Lift failure Unsafe operation	Keep feet and hands clear of moving/suspended materials and equipment. Beware of contact points. Identify all energized utilities. Maintain safe distance (minimum 10 feet) from energized electric utilities, ensure swing radius and path do not	**M**

7. Lift operation - continued		contact any overhead utilities or obstructions. Lift to be operated only by qualified /authorized operator. All non essential personnel will be evacuated from the immediate area during any lifting or unloading of materials. At no time will personnel be permitted to pass beneath or cross patch of a load in transit. Calculate load weight and distance using standard charts prior to pick. Getting off or on any equipment while it is in motion is prohibited.	**M**

Personal Protective Equipment to be Used
• **Steel Toed Boots** • **Hard Hat** • **Safety Glasses** • **Gloves appropriate for the task (chemical protective, work gloves, impact gloves, etc.)** • **Fall Protection** • **Chemical Resistant Suits** • **Respirator** • **Other (per HASP task specific)**

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Appendix B
Standard Operating Procedure 1.0

STANDARD OPERATING PROCEDURE

CLOSED LOOP REFINING AND RECOVERY/CLOSED LOOP GLASS SOLUTIONS
2200 FAIRWOOD AVENUE
COLUMBUS, OHIO 43207

EPA ID NO. OHR000201145

EnSafe Project Number:
0888823935/004

Prepared for:

Olymbec USA LLC
1004 East Brooks Road
Memphis, Tennessee 38116

May 2020

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Cleveland, Ohio 44124
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TABLE OF CONTENTS

1.0 INTRODUCTION

The purpose of this Standard Operating Procedure (SOP) is to provide a general guideline for the handling, moving, cleaning, packaging/repackaging, weighing, labeling, loading, and record keeping of cathode-ray tube (CRT) materials and hazardous wastes to be removed from the former Closed Loop facility located at 2200 Fairwood Avenue for offsite disposal and/or recycling.

All workers involved with completing these tasks inside the building must comply with the current Health and Safety Plan (HASP) prepared for the project. No workers can enter the warehouse space (Exclusion Zone) without complying with the HASP. Tasks associated with this work shall be completed in accordance with the Closure Plan, associated HASP, and applicable Job Hazard Assessments included in the HASP. CRTs being transported offsite for recycling shall be managed in accordance with 40 Code of Federal Regulations (CFR) Section 261.4(a)(22), 40 CFR Section 261.39, and Ohio Administrative Code (OAC) 3745-51-39. Hazardous waste removed from the facility shall be transported in accordance with 40 CFR Section 263 and OAC 3745-53.

2.0 MOVEMENT AND RELOCATION OF CATHODE-RAY TUBE MATERIALS

2.1 Forklift Operation and Movement of Gaylord Containers

The purpose of this instruction is to establish guidelines and methods for the safe operation of forklifts. This section covers forklift inspections, training, safe operating procedures, and violations.

2.1.1 Forklift Inspection

Forklifts will be inspected at least once per shift. Additional procedures shall be followed:

1. If maintenance work is required, the forklift operator shall notify the shift supervisor. The forklift will be locked out and tagged out until the maintenance work is complete.

2. The shift supervisor shall coordinate maintenance work.

3. If a forklift working in the Exclusion Zone (contaminated warehouse area) must be removed from the Exclusion Zone for maintenance, the forklift must first be decontaminated per Section 10.1 of this SOP and the Closure Plan. See Section 10.3 of this SOP for equipment load out procedures from the Exclusion Zone.

2.1.2 Safe Operation of Forklift

Forklifts will only be utilized by properly trained/qualified operators with a full understanding of the design, stability, controls, and instruments of the forklift. The following procedures will be followed:

1. Keep forks no more than 6” off the floor when moving with or without a load.

2. Always sound the horn when backing up.

3. Slow down at intersections and sound the horn.

4. A forklift is capable of going 10 miles per hour but should be operated no more than a fast walk.

5. Check the load before lifting and moving to ensure that it is stable.

6. Vehicle wheels should be chocked before loading or unloading.

7. There should be no “horseplay” on the forklift at any time.

8. All accidents are to be reported immediately to the shift supervisor.

9. Do not use unsafe or damaged forklifts. Report them immediately to the shift supervisor.

10. Keep forks on the ground or as low as possible when the truck is not in use.

11. At no time shall an operator lift a load that exceeds the forklift's rated lifting capacity.

12. Pay special attention to other forklifts, workers, and falling objects when operating a lift.

13. When propane tanks need to be changed, the tanks shall be changed by properly trained forklift operators. Before empty tanks from forklifts operating in the Exclusion Zone (contaminated warehouse area) can be removed from the Exclusion area for re-filling, the tank must first be decontaminated. See Sections 10.1 and 10.3 for decontamination and equipment load out procedures.

2.1.3 Forklift Violations

Forklift operator privileges shall be revoked or suspended for a minimum amount of time based on the incident and as deemed appropriate by management. The following reasons may constitute reasons for privileges being revoked/suspended:

1. If an operator has acquired a total of three violations in a 2-month period

2. Failure to report all accidents, injury and property damage to the shift supervisor

3. Not being certified on the forklift they are operating

4. Forklift operating privileges shall be suspended until retraining requirements are fulfilled

2.2 Relocating Elevated Cathode-Ray Tube Material Containers and Gaylord Containers in Poor Condition or Nearing Collapse

Elevated CRT material containers or Gaylord containers (i.e. containers stacked two or three high) that are in poor condition or nearing collapse shall be moved in a safe manner. Where such conditions exist in the facility, the forklift operator shall coordinate the movement of the Gaylord containers with the shift supervisor. If the elevated Gaylord containers cannot be moved or lifted in a safe manner

with a forklift, the elevated Gaylord containers should be allowed to fall to the floor, pushed over, or pulled down in a safe manner designed to protect site worker safety.

The contents of collapsed/fallen Gaylord containers shall be cleaned up and properly re-packaged in new Gaylord containers suitable for shipment for recycling and/or disposal. See Section 3.2 for repackaging instructions.

3.0 EVALUATION OF CATHODE-RAY TUBE MATERIAL CONTAINER CONDITIONS

The purpose of this instruction is to establish guidelines and methods for the inspection of CRT material containers for shipping, re-packaging, and the disposal of emptied unusable Gaylord containers.

3.1 Inspection of Cathode-Ray Tube Material Containers Conditions

Each CRT material container removed from current storage areas shall be inspected by properly trained personnel to determine if the container is in a condition suitable for offsite shipment to a recycling facility or disposal location. The inspection process shall include an evaluation of the structural integrity of the container, inspection of existing stretch film or shrink wrap, inspection of banding, and inspection of the wood pallet.

If a CRT material container is determined to be in good condition and acceptable for shipping, the container and materials shall be moved to the designated processing areas for cleaning, weighing, and labeling. See Sections 4 and 5.

If a CRT material container is determined to be damaged or unsuitable for shipping, the container and materials shall be repaired (if possible) or emptied and re-packaged, per Section 3.2.

3.2 Repackaging Cathode-Ray Tube Materials in New Containers and/or Gaylord Containers

Prior to any repairs or re-packaging, the exterior of a damaged material container must be cleaned to remove lead-containing dust residue on the exterior of the container, on the wood pallet or on top of the container's contents. See Section 4 for lead-containing dust cleaning procedures.

If during container inspection, it is determined that minimal damage exists, repairs should be made to ready the container for shipment (i.e. replacing banding, re-wrapping the container with stretch film, replacing damaged pallets, etc.). Once the container has been repaired to a condition suitable for shipping, the container shall be moved to the designated processing areas for cleaning, weighing, and labeling. See Sections 4 and 5.

If existing containers are damaged beyond repair, the contents shall be emptied and re-packaged into new containers or the contents shall be organized on wood pallets and wrapped in stretch film in a manner acceptable for shipping purposes. Once the materials are re-containerized to a condition suitable for shipping, the container or palletized materials shall be moved to the designated processing areas for cleaning, weighing, and labeling. See Sections 4 and 5.

3.3 Disposal of Emptied, Unusable, Cathode-Ray Tube Material Containers

If during the container inspection process, it is determined that a container and/or wood pallet is damaged beyond repair, the emptied container (cardboard, stretch fill, plastic liner, wood pallet, etc.) should be moved to the designated storage area within the Exclusion Zone for disposal. The container, existing stretch film (if any), interior plastic liner (if any), and wood pallet shall be decontaminated and disposed of as non-hazardous solid waste or properly recycled.

If the materials cannot be decontaminated, the materials will be containerized in appropriate Department of Transportation (DOT) approved containers and considered hazardous for lead (D008) unless analytical testing demonstrates the material does not meet the hazardous characteristic criteria (i.e., a Toxicity Characteristic Leachate Procedure [TCLP] test determines that the material contains less than 5.0 milligrams/liter [mg/L] lead).

If TCLP analytical testing demonstrates the materials are considered hazardous (D008) for lead (i.e., the material contains greater than 5.0 mg/L lead), the materials must be recleaned and resampled, or transported offsite as a hazardous waste.

4.0 DECONTAMINATION OF CATHODE-RAY TUBE MATERIAL CONTAINERS

The purpose of this instruction is to establish guidelines and methods for the cleaning of Gaylord containers with CRT materials or palletized CRT materials wrapped in stretch film to be shipped offsite for disposal or recycling. The inspection and cleaning of accumulated lead-containing dust on containers shall be completed in designated processing areas for cleaning and re-packaging.

4.1 Inspection for Accumulated Dust on Cathode-Ray Tube Material Containers and Their Contents

Each CRT material container or palletized CRT materials wrapped in stretch film shall be inspected by properly trained personnel for the presence of bulk lead-containing dust contamination on the exterior of the cardboard Gaylord container, wood pallet, exterior of palletized stretched film materials, and on the contents of CRT materials in open-top containers. Observed accumulations of lead-containing dust shall be cleaned per Section 4.2.

4.2 High-Efficiency Particulate Air Vacuuming Lead-Containing Dust

Accumulated lead-containing dust on the exterior of CRT material containers, including the exterior of stretch film wrapped CRT materials and wood pallets, shall be cleaned using a High-Efficiency Particulate Air (HEPA) vacuum certified to filter particles as small as 0.3 microns to 99.97% efficiency of the equipment's designed air flow. Accumulated lead-containing dust observed on the top of sealed containers and/or on the contents of open top containers shall be cleaned using a HEPA vacuum. The cleaning shall be thorough and effective to render the exterior of the containers free of dust.

Once lead-containing dust has been removed from the exterior of the containers, the CRT materials shall be moved to the designated processing areas for weighing, stretch film wrapping, and labeling. See Section 5.

4.3 High-Efficiency Particulate Air Vacuum Maintenance and Filter/Dust Disposal

HEPA vacuums shall be used and maintained in accordance with manufacturer's specifications. Filters shall be cleaned and/or replaced in accordance with manufacturer's specifications. HEPA vacuums and filters shall be checked on a regular basis to ensure they are operating correctly. Spent filters and collected lead-containing dust, which require disposal, shall be containerized in appropriate DOT-approved containers and considered hazardous for lead (D008) unless analytical testing demonstrates the materials do not meet the hazardous characteristic criteria (i.e., TCLP testing determines that the material contains less than 5.0 mg/L lead).

If TCLP analytical testing demonstrates the materials are considered hazardous (D008) for lead (i.e., the material contains greater than 5.0 mg/L lead), the materials must be recleaned and resampled, or transported offsite as a hazardous waste.

5.0 PREPARATION OF CATHODE-RAY TUBE MATERIAL CONTAINERS FOR SHIPPING

The purpose of this instruction is to establish guidelines and methods for preparing CRT material containers (Gaylord containers) and/or palletized CRT materials for shipping offsite for disposal or recycling. The steps presented below shall be completed after Gaylord containers or palletized CRT materials have been thoroughly cleaned of lead-containing dust as described in Section 4. The steps outlined in this section shall be completed in designated processing areas for shipment preparation.

Containers that are ready for shipment will be transferred to the scale where the total gross weight of each container (to the nearest pound) will be measured using a scale. The total gross weight will be recorded in a site log and on the container. The tare weight of each container will be estimated based on the container type. The tare weight for a container consisting of a standard wood pallet, cardboard Gaylord container, banding, and stretch film wrap is estimated to be 75 pounds. The tare weight for a container consisting of a standard wood pallet and stretch film wrap is estimated to be 40 pounds. The measured total gross weight and estimated net and tare weights will be labeled on each container.

Prior to offsite shipment, containers of CRT-related materials will be labeled as follows.

1. Containers destined for disposal as hazardous waste will be labeled and marked in accordance with OAC 3745-52-30 to 32.

2. Containers destined for recycling will be labeled in accordance with OAC 3745 51 39 (A)(2) with the following statements:

    a. "Used Cathode Ray Tubes — Contain Leaded Glass" or "Leaded Glass From Televisions or Computers" and

    b. "Do Not Mix With Other Glass Materials"

3. Containers destined for disposal as non-hazardous or construction and demolition debris will be labeled as non-hazardous waste with the site name and address.

6.0 TRANSFERRING CATHODE-RAY TUBE MATERIALS TO DESIGNATED LOADING ZONE FOR SHIPPING

The purpose of this instruction is to establish guidelines and methods for transferring Gaylord container containers with CRT materials and/or palletized CRT materials into the restricted Contaminant Reduction Zone (CRZ) and Clean Loading Zone (CLZ) chambers for loading trucks and offsite shipping.

6.1 Loading Trucks Through Contaminant Reduction Zone and Clean Loading Zone Chambers

To prevent lead-containing dust from exiting the building and impacting trucks, restricted access CRZ and CLZ chambers will be constructed in the loading dock areas to be utilized for loading trucks. Prior to construction of the CRZ and CLZ chambers, the interior portions of the existing building to be utilized as the CRZ and CLZ chamber areas will be cleaned and decontaminated from lead-containing dust. This includes walls, floors, ceilings, and building components in the designated areas. The CLZ chamber will be constructed on the inside of the building adjacent to the loading docks to be used. The CLZ chamber will be outfitted with negative air machines to maintain negative pressure in the CLZ chamber during truck loading activities.

As a second layer of protection, a CRZ chamber will be constructed on the interior of the building adjacent to the CLZ chamber. The CRZ chamber will be outfitted with negative air machines to maintain negative pressure in the CRZ chamber during truck loading activities. The wall of the CRZ chamber adjacent to the open warehouse space will be include PVC strip doors for forklifts to drive through and enter the CRZ chamber. Additionally, the wall of the CLZ chamber that connects it to the CRZ chamber will be include PVC strip doors for the transferring of CRT materials into the restricted CLZ chamber. To prevent forklifts that are working in the Exclusion Zone from entering the restricted CLZ chamber, 2”x4” wood stops (or similar) will be bolted to the concrete floor at the threshold of the PVC strip doors separating the CRZ chamber from the CLZ chamber.

To prevent lead-containing dust from being tracked into the CLZ chamber, forklifts and personnel working in the Exclusion Zone are restricted to operating in the warehouse and the CRZ chamber. Forklifts and personnel working in the CLZ chamber to load trucks are restricted to only working in the CLZ chamber. Once containers are ready for loading, forklifts restricted to working in the Exclusion Zone and CRZ chamber will transport containers from the designated processing areas inside the warehouse to the CRZ chamber. These forklifts will pass containers ready for loading through the PVC strip doors and into the CLZ chamber. These forklifts are restricted from entering the CLZ chamber. Forklifts inside the CLZ chamber will then move the containers into trucks.

CRT materials are to be loaded into trucks safely. Trucks shall not be loaded beyond the truck' maximum carrying capacity per DOT regulations.

6.2 Double Stacking of Cathode-Ray Tube Material Containers

Some containerized materials to be removed from the facility are light weight. Such materials may be able to be double stacked within truck trailers to maximize shipping efficiency. Heavy containers shall not be double stacked on top of lighter weight containers. Containers that are double stacked within a truck trailer shall be double stacked in a stable manner suitable for transportation in accordance with applicable OSHA and DOT regulations.

7.0 CATHODE-RAY TUBE MATERIAL SHIPMENT RECORDKEEPING

The purpose of this instruction is to establish minimum guidelines and requirements for recordkeeping associated with the removal of CRT materials and hazardous wastes removed from the buildings.

7.1 Cathode-Ray Tube Materials Shipped for Recycling

In accordance with applicable United States Environmental Protection Agency (U.S. EPA) and DOT regulations, accurate shipping records will be prepared for all CRT materials removed from the buildings and transported offsite for recycling. At a minimum this will include a Bill of Lading (BOL) for each truck load. Each BOL shall include the following:

1. Shipper information (business name, address, contact, and contact phone number),

2. Receiver/destination information (business name, address, contact, and contact phone number),

3. Carrier information with trailer numbers and trailer seal numbers

4. Pick up date,

5. Number of packages with package content descriptions,

6. Shipping weight in pounds — net weight, tare weight, and total gross weight,

7. Shipper and carrier signatures, and

8. A packing list that lists each container with individual container net and tare weights.

A copy of each BOL will remain with the shift supervisor. At the end of each workday, additional copies of all BOLs will be provided to the third-party vendor providing project monitoring and project coordination services.

Recordkeeping procedures will be completed in accordance with applicable portions of 40 CFR Section 261 and OAC 3745-51-39.

7.2 Cathode-Ray Tube Materials Shipped for Landfill Disposal

Each truckload of CRT-related materials that will be transferred offsite for disposal at a Subtitle C (hazardous waste) landfill will utilize a uniform hazardous waste manifest (U.S. EPA Form 8700 22) and, if necessary, the continuation sheet (U.S. EPA Form 8700 22A) in accordance with OAC 3745 52 20, OAC 3745 52 21, and 40 CFR 262.21.

Before transporting hazardous waste offsite, each container of hazardous waste must be labeled and marked in accordance with 40 CFR 262.31 and 40 CFR 262.32, respectively. Additionally, the shipper/ generator must placard the waste or offer placards to the initial transporter, per 40 CFR 262.33.

Universal hazardous waste manifest and continuation sheets, if necessary, will be prepared for containers and/or truck loads of hazardous waste to be removed from the site for disposal. The universal hazardous waste manifests and continuation sheets will be completed in accordance with U.S. EPA regulations.

A copy of each hazardous waste manifest will remain with the shift supervisor. At the end of each workday, additional copies of all hazardous waste manifests will be provided to the third-party vendor providing project monitoring and project coordination services.

All hazardous waste removed from the facility shall be transported in accordance with 40 CFR Section 263.

7.3 Cathode-Ray Tube Materials Exported for Recycling

In the event that CRT materials will be exported for recycling, the relevant procedures relevant to exporting CRT materials detailed in Attachment B (Applicable or Relevant and Appropriate Requirements) of Appendix A of the Closure Plan to which this HASP is associated will be followed.

7.4 Hazardous Wastes Shipped for Disposal

Other materials determined to be hazardous wastes (items including, but not limited to, containers of lead-containing dust, lead-contaminated unusable Gaylord containers, lead contaminated unusable stretch wrap, lead contaminated PPE, lead contaminated floor sweepings, etc.) shall be placed in clean DOT-approved containers suitable for hazardous waste disposal.

Each truckload of material that will be transferred offsite for disposal at a Subtitle C (hazardous waste) landfill will utilize a uniform hazardous waste manifest (U.S. EPA Form 8700 22) and, if

necessary, the continuation sheet (U.S. EPA Form 8700-22A) in accordance with OAC 3745 52 20, OAC 3745 52 21, and 40 CFR 262.21.

Before transporting hazardous waste offsite, each container of hazardous waste must be labeled and marked in accordance with 40 CFR 262.31 and 40 CFR 262.32, respectively. Additionally, the shipper/ generator must placard the waste or offer placards to the initial transporter, per 40 CFR 262.33.

Universal hazardous waste manifest and continuation sheets, if necessary, will be prepared for containers and/or truck loads of hazardous waste to be removed from the site for disposal. The universal hazardous waste manifests and continuation sheets will be completed in accordance with U.S. EPA regulations.

A copy of each hazardous waste manifest will remain with the shift supervisor. At the end of each workday, additional copies of all hazardous waste manifests will be provided to the third-party vendor providing project monitoring and project coordination services.

All hazardous waste removed from the facility shall be transported in accordance with 40 CFR Section 263.

8.0 DAILY CLEANING OF WORK AREAS

The purpose of this instruction is to establish guidelines and methods associated with the daily cleaning of work areas throughout the removal of CRT materials from the site, as needed. The cleaning is to be completed on a daily basis, as needed, to reduce lead-containing dust contamination from becoming airborne and spreading throughout the interior of the buildings.

8.1 Cleaning of Dust and Debris in Work Areas

Prior to the start of CRT removal activities, existing open floor spaces shall be cleaned using wet sweeping methods or equivalent sweeping methods that utilize acceptable lead-containing dust control measures. Throughout the CRT removal process additional open floor space will be exposed. On a daily basis, new exposed floor areas shall be inspected for elevated lead-containing dust accumulation. Areas with elevated lead-containing dust accumulation shall be cleaned using wet sweeping methods or equivalent sweeping methods that utilize acceptable lead-containing dust control measures. Additionally, on an as needed or daily basis, high traffic areas that contain elevated lead-containing dust accumulation shall be cleaned using wet sweeping methods or equivalent sweeping methods that utilize acceptable lead-containing dust control measures.

On a daily basis, or as needed, the CRZ and CLZ chambers shall be inspected for elevated lead-containing dust accumulation. If elevated lead-containing dust accumulation is observed, the elevated lead-containing dust accumulation shall be cleaned using wet sweeping methods or equivalent sweeping methods that utilize acceptable lead-containing dust control measures.

Cleaning equipment utilized to clean work areas in the Exclusion Zone is restricted to cleaning activities in the Exclusion Zone only. Cleaning equipment used in the Exclusion Zone is prohibited from being used in the CLZ chamber.

8.2 Disposal of Collected Dust and Debris

Lead-containing dust, debris, and water from wet sweeping collected as part of daily periodic cleaning efforts must be placed in appropriate DOT-approved containers and be considered hazardous for lead (D008) unless analytical representative testing demonstrates the material does not meet the hazardous characteristic criteria (i.e., TCLP testing determines that the material contains less than 5.0 mg/L lead).

If TCLP analytical testing demonstrates the materials are considered hazardous (D008) for lead (i.e., the material contains greater than 5.0 mg/L lead), the materials must be recleaned and resampled, or transported offsite as a hazardous waste.

9.0 MEDICAL MONITORING

Throughout the CRT removal process, personnel working in the Exclusion Zone and CLZ chamber shall participate in medical monitoring as detailed in the current HASP for the project. See the HASP for the medical monitoring requirements.

10.0 FINAL DECONTAMINATION OF EQUIPMENT (TOW MOTORS, SWEEPERS, SCALES, HIGH-EFFICIENCY PARTICULATE AIR VACUUMS, STRETCH WRAP STATIONS, ETC.)

The purpose of this instruction is to establish guidelines and methods associated with the decontamination of equipment utilized in the Exclusion Zone, prior to the equipment being removed from the site.

10.1 Decontamination Procedures

Prior the removal of equipment or tools from the Exclusion Zone, the equipment and tools must be thoroughly decontaminated to remove contaminated lead-containing dust. The specific protocol for decontaminating reusable equipment will depend on the equipment. However, the equipment decontamination process will include the removal of lead-containing dusts using a vacuum equipped with a HEPA filter, hand wiping with solvent-soaked launderable or disposable wipes, and/or wash the equipment with a detergent solution using a high pressure, low volume washer. Following the decontamination activities, the shift supervisor and third part vendor providing project monitoring must inspect the equipment and tools before they can be removed from the Exclusion Zone.

10.2 Disposal of Decontamination Wastes

Decontamination wastes (i.e. collected lead-containing dust, wipes, water, etc.) generated as part of decontamination activities shall be containerized, labeled, and disposed of properly. Launderable wipes must be transported an offsite laundry or cleaning facility that is subject to regulation under Section 402 or Section 307(b) of the Clean Water Act.

If used, disposable wipes must be placed in appropriate DOT-approved containers and be considered hazardous for lead (D008) unless analytical representative testing demonstrates the material does not meet the hazardous characteristic criteria (i.e., TCLP testing determines that the material contains less than 5.0 mg/L lead).

Containerized decontamination fluids and rinsate must either be managed as wastewater or as hazardous for lead (D008) unless analytical representative testing demonstrates the material does not meet the hazardous characteristic criteria (i.e., TCLP testing determines that the material contains less than 5.0 mg/L lead). If decontamination fluids and rinsate will be managed as a hazardous waste for lead (D008) the fluids must be containerized in appropriate DOT-approved containers.

10.3 Equipment Load Out

Following the proper decontamination of equipment and tools, the equipment and tools shall be transferred from the Exclusion Zone to the CLZ chamber. At the threshold of the CLZ chamber the tires of wheeled equipment must be cleaned to prevent potentially tracking lead-containing dust from the CRZ chamber into the CLZ chamber. During the equipment load out, the shift supervisor and the third-party vendor providing project monitoring must inspect the equipment and tools before they can be transferred into the CLZ chamber.

11.0 THIRD PARTY MONITORING AND REPORTING

A third-party vendor retained by the current building/property owner will serve as the on-scene coordinator (OSC) and provide monitoring, coordination, administration, and advisory services. Prior to CRT removal activities occurring at the site, the OSC or designee shall monitor and coordinate the construction of the CRZ and CLZ chambers. Throughout the CRT material removal activities, the OSC or designee will monitor and assist with the coordination of the CRT material removal activities. As part of the monitoring and coordination activities, the third-party vendor will provide the following services:

1. Monitor, document, and ensure compliance with the project HASP;

2. Monitor, document, and ensure compliance with the project Closure Plan;

3. Complete and document periodic indoor air sampling, testing, and reporting;

4. Monitor and document daily periodic cleaning activities and effectiveness;

5. Monitor and document the integrity and condition of the CRZ and CLZ chambers;

6. Monitor and document the operation and maintenance of negative air machines used to maintain negative pressure in the CRZ and CLZ chambers;

7. Monitor, document, and provide coordination/advisory assistance with the shift supervisor for CRT materials to be moved, cleaned, re-packaged (if necessary), and loaded into trucks for offsite recycling and disposal;

8. Monitor and document the activities which may generate hazardous wastes and the disposal of hazardous waste from the site;

9. Review and obtain copies of BOLs and waste manifests to ensure compliance with applicable regulations;

10. Assist with troubleshooting unforeseen conditions;

11. Evaluate the need for modifications to the project's SOP and/or HASP;

12. Provide necessary observation, documentation, and recordkeeping services to support closure activities, post-closure reporting, and fiduciary responsibilities;

13. Provide weekly progress/status reports and compliance confirmation to the building/property owner; and

14. Provide periodic confirmation of downstream CRT material recycler's receipt of materials and proper recycling of CRT materials removed from the site.

Appendix C
Chemical Information

Hazardous Property Information									
Check if Present	**Material (CAS #)**	**Water Solubility[a]**	**Specific Gravity**	**Flash Point (°F)[c]**	**Vapor Pressure[d]**	**LEL/UEL**	**Cal/OSHA PEL — TWA[f]**	**IDLH Level[h]**	**Odor Threshold Geometric Mean[i] (ppm)**
Volatile Organic Compounds									
☐	Acetic acid (64-19-7)	Miscible	1.05	103	11 mm	4.0% 19.9%	10 ppm	50 ppm	0.074 (d)
☐	Acetone (67-64-1)	Miscible	0.79	0	180 mm	2.5% 12.8%	250 ppm	2,500 ppm	62 (d) 130 (r)
☐	Acrolein (107-02-8)	40%	0.84	-15	210 mm	2.8% 31%	C 0.1 ppm Skin	2 ppm	1.8 (d)
☐	Acrylonitrile (107-13-1)	7%	0.81	30	83 mm	3% 17%	2 ppm Skin	85 ppm Ca	1.6 (d)
☐	Benzene (71-43-2)	0.07%	0.88	12	75 mm	1.2% 7.8%	1 ppm Skin	500 ppm Ca	61 (d) 97 (r)
☐	Bromodichloro-methane (75-27-4)	4500 mg/l	1.98	--	50 mm	Non-flam	None established	None determined	--
☐	Bromoform (75-25-2)	0.10%	2.89	--	5 mm	Non-flam	0.5 ppm Skin	850 ppm	1.3[j]
☐	Bromomethane (74-83-9)	2%	1.73	--	1.9 atm	10% 16.0%	1 ppm Skin	250 ppm Ca	80[j]
☐	Carbon Tetrachloride (56-23-5)	0.05%	1.59	--	91 mm	Non-flam	2 ppm Skin	200 ppm Ca	252 (d)
☐	Chlorobenzene (108-90-7)	0.05%	1.11	82	9 mm	1.3% 9.6%	10 ppm	1000 ppm	1.3 (d)
☐	2-Chloroethyl-vinyl Ether (110-75-8)	0.02%	1.05	61	27 mm	--	None established	None determined	--
☐	Chloroethane (75-00-3)	0.60%	0.92	-58	1000 mm	3.8% 15.4%	100 ppm Skin	3800 ppm	4.2[j]
☐	Chloroform (67-66-3)	0.50%	1.48	--	160 mm	Non-flam	2 ppm	500 ppm Ca	192 (d)
☐	Chloromethane (74-87-3)	0.50%	0.92	--	5 atm	8.1% 17.4%	50 ppm	2000 ppm Ca	10[j]
☐	Dibromo-chloromethane (124-48-1)	2700 mg/l	2.5	--	76 mm	--	None established	None determined	--
☐	Dibutyl phthalate (84-74-2)	0.001% (77°F)	1.05	315	0.00007 mm	0.5% --	5 mg/m^3	4,000 mg/m^3	--
☐	1,2-Dichlorobenzene (95-50-1)	0.01%	1.3	151	1 mm	2.2% 9.2%	25 ppm Skin	200 ppm	--
☐	1,1-Dichloroethane (75-34-3)	0.60%	1.18	2	182 mm	5.4% 11.40%	100 ppm	3,000 ppm	--
☐	1,1-Dichloroethylene (DCE) (75-35-4)	0.04%	1.21	-2	500 mm	6.5% 15.5%	1 ppm	None determined	190[j]
☐	1,2-Dichloroethane (107-06-2)	0.90%	1.24	56	64 mm	6.2% 16%	1 ppm	50 ppm Ca	26 (d) 87 (r)
☐	1,2-Dichloroethylene (540-59-0)	0.40%	1.27	36-39	180-265 mm	5.6% 12.8%	200 ppm	1,000 ppm	17 — 170[k]

Hazardous Property Information									
Check if Present	**Material (CAS #)**	**Water Solubility[a]**	**Specific Gravity**	**Flash Point (°F)[c]**	**Vapor Pressure[d]**	**LEL/UEL**	**Cal/OSHA PEL — TWA[f]**	**IDLH Level[h]**	**Odor Threshold Geometric Mean[i] (ppm)**
☐	1,2-Dichloropropane (78-87-5)	0.30%	1.16	60	40 mm	3.4% 14.5%	75 ppm	400 ppm Ca	0.26 (d) 0.52 (r)
☐	1,3-Dichloropropene (542-75-6)	0.20%	1.21	77	28 mm	5.3% 14.5%	1 ppm Skin	None determined Ca	1[j]
☐	Bis-(2-Ethylhexyl)-phthalate (DEHP) (117-81-7)	0.00%	0.99	420	<0.01 mm	0.3% --	5 mg/m^3	5,000 mg/m^3 Ca	--
☐	Diethyl phthalate (84-66-2)	0.10%	1.12	322	0.002 mm	0.7% --	5 mg/m^3	None determined	--
☐	Dinitrotoluene (DNT) (25321-14-6)	Insoluble	1.32	404	1 mm	-- --	0.15 mg/m^3 Skin	50 mg/m^3 Ca	--
☐	Endrin (72-20-8)	Insoluble	1.7	--	0.00001 mm low	--	0.1 mg/m^3 Skin	2 mg/m^3	--
☐	Ethyl benzene (100-41-4)	0.01%	0.87	55	7 mm	0.8% 6.7%	100 ppm	800 ppm	2.3[j]
☐	Hydrazine (302-01-2)	Miscible	1.01	99	10 mm	2.9% 98%	0.01 ppm Skin	50 ppm Ca	3.7 (d)
☐	Methyl ethyl ketone (MEK) (78-93-3)	28%	0.81	16	78 mm	1.4% 11.4%	200 ppm	3000 ppm	16 (d) 17 (r)
☐	Methyl tert-butyl ether (MTBE) (1634-04-4)	5.1 g/100 ml	0.7	-18	245 mm	1.6% 8.4%	40 ppm	None determined	0.32 — 0.47mg/m^3[l]
☐	Methylene chloride (75-09-2)	2%	1.33	--	350 mm	13% 23%	25 ppm	2,300 ppm Ca	160 (d) 230 (r)
☐	Phenol (108-95-2)	9% (77°F)	1.06	175	0.4 mm	1.8% 8.6%	5 ppm Skin	250 ppm	0.06 (d)
☐	1,1,2,2-Tetrachloroethane (79-34-5)	0.30%	1.59	--	5 mm	Non-flam	1 ppm Skin	100 ppm Ca	7.3 (d)
☐	Tetrachloroethylene (PCE) (127-18-4)	0.02%	1.62	--	14 mm	Non-flam	25 ppm	150 ppm Ca	47 (d) 71 (r)
☐	Toluene (108-88-3)	0.07% (74°F)	0.87	40	21 mm	1.1% 7.1%	10 ppm Skin	500 ppm	1.6 (d) 11 (r)
☐	1,1,1-Trichloroethane (71-55-6)	0.40%	1.34	--	100 mm	7.5% 12.5%	350 ppm	700 ppm	390 (d) 710 (r)
☐	1,1,2-Trichloro-ethane (79-00-5)	0.40%	1.44	--	19 mm	6% 15.5%	10 ppm Skin	100 ppm Ca	--
☐	1,2,4-Trichlorobenzene (120-82-1)	0.003%	1.45	222	1 mm	2.5% 6.6% (302°F)	C 5 ppm	None determined	3[j]
☐	Trichloroethylene (TCE) (79-01-6)	0.1% (77°F)	1.46	--	58 mm	8% 10.5%	25 ppm	1,000 ppm Ca	82 (d) 110 (r)
☐	Trichlorofluoromethane (75-69-4)	0.1% (75°F)	1.47	--	690 mm	Non-flam	C 1,000 ppm	2000 ppm	--
☐	1,1,2-Trichloro-1,2,2-trifluoroethane (76-13-1)	0.02%	1.56	--	285 mm	-- --	1,000 ppm	2,000 ppm	--

Hazardous Property Information									
Check if Present	**Material (CAS #)**	**Water Solubility[a]**	**Specific Gravity**	**Flash Point (°F)[c]**	**Vapor Pressure[d]**	**LEL/UEL**	**Cal/OSHA PEL — TWA[f]**	**IDLH Level[h]**	**Odor Threshold Geometric Mean[i] (ppm)**
☐	1,2,4-Trimethylbenzene (95-63-6)	0.006%	0.88	112	1 mm	0.9% 6.4%	25 ppm	None determined	2.4 (d)
☐	Vinyl Chloride (75-01-4)	0.1% (77°F)	0.91	--	3.3 atm	3.6% 33%	1 ppm Skin	None determined Ca	--
☐	Xylene (o, p, m, mix) (1330-20-7)	Slightly soluble	0.86-0.88	81-90	7-9 mm	0.9% 7%	100 ppm	900 ppm	20 (d) 40 (r)
Metals									
☐	Aluminum metal and oxide (as Al)	[b]	2.7	--	0 mm	[e]	10 mg/m³ (respirable)	None determined	--
☐	Antimony (7440-36-0)	[b]	6.69	--	0 mm	[e]	0.5 mg/m³	50 mg/m³	--
☐	Arsenic (inorganic compounds, as As)	[b]	5.73	--	0 mm	[e]	0.010 mg/m³	5 mg/m³ Ca	--
☐	Arsenic (organic compounds, as As)	Properties vary depending upon the specific organic arsenic compound.					0.2 mg/m³	None determined	--
☐	Barium chloride (as Ba) (10361-37-2)	38%	3.86	--	low	Non-flam	0.5 mg/m³	50 mg/m³	--
☐	Barium nitrate (as Ba) (10022-31-8)	9%	3.24	--	low	[e]	0.5 mg/m³	50 mg/m³	--
☐	Beryllium and compounds (as Be)	[b]	1.85	--	0 mm	[e]	0.0002 mg/m³	4 mg/m³ Ca	--
☐	Cadmium dust (as Cd)	[b]	8.65	--	--	[e]	0.005 mg/m³	9 mg/m³ Ca	--
☐	Chromium (III) compounds (as Cr)	[b]	Properties vary depending upon the specific compound.				0.5 mg/m³	25 mg/m³	--
☐	Cobalt metal dust and fume (as Co) (7440-48-4)	Insoluble	8.92	--	0 mm	[e]	0.02 mg/m³	20 mg/m³	--
☐	Copper dust and mist (as Cu)	[b]	8.94	--	0 mm	[e]	1 mg/m³	100 mg/m³	--
☒	Lead	Insoluble	11.34	--	0 mm	[e]	0.05 mg/m³	100 mg/m³	--
☐	Manganese, Fume and compounds (as Mn) (7439-96-5)	Insoluble	7.2	--	0 mm	Com-bustible	0.2 mg/m³	500 mg/m³	--
☐	Mercury compounds (as Hg) Except alkyl compound	[b]	13.6	--	0.0012 mm	[e]	0.025 mg/m³ Skin	10 mg/m³	--
☐	Molybdenum (7439-98-7)	Insoluble	10.28	--	0 mm	Com-bustible	10 mg/m³ 3 mg/m³ (respirable)	5,000 mg/m³	--
☐	Nickel and other compounds (as Ni)	Insoluble	8.9	--	0 mm	[e]	1 mg/m³	10 mg/m³ Ca	--
☐	Selenium (7782-49-2)	Insoluble	4.28	--	0 mm	Com-bustible	0.2 mg/m³	1 mg/m³	--

Hazardous Property Information									
Check if Present	**Material (CAS #)**	**Water Solubility[a]**	**Specific Gravity**	**Flash Point (°F)[c]**	**Vapor Pressure[d]**	**LEL/UEL**	**Cal/OSHA PEL — TWA[f]**	**IDLH Level[h]**	**Odor Threshold Geometric Mean[i] (ppm)**
☐	Silver, metal dust, and soluble compounds (as Ag)	[b]	10.49	--	0 mm	[e]	0.01 mg/m^3	10 mg/m^3	--
☐	Thallium (soluble compounds, as Ti)	[b]	Properties vary depending upon the specific compound.				0.1 mg/m^3 Skin	15 mg/m^3	--
☐	Vanadium pentoxide dust and Fume (1314-62-1)	0.8%	3.36	--	0 mm	[e]	0.05 mg/m^3 (respirable)	35 mg/m^3	--
☐	Zinc oxide (1314-13-2)	[b]	5.61	--	0 mm	[e]	5 mg/m^3	500 mg/m^3	--
Miscellaneous									
☐	Ammonia (7664-41-7)	34%	--	--	8.5 atm	15% 28%	25 ppm	300 ppm	17 (d)
☐	Asbestos (1332-21-4)	Insoluble	--	--	0 mm	Non-flam	0.1 fibers/cc	None determined	--
☐	Chromic Acid and chromates (1333-82-0)	63%	2.7	--	very low	Non-flam	0.005 mg/m^3	15 mg/m^3 Ca	--
☐	Cyanide (as CN)	--	--	--	--	Non-flam	5 mg/m^3 Skin	--	--
☐	DDT (50-29-3)	Insoluble	0.99	162-171	0.0000002 mm	--	1 mg/m^3 Skin	500 mg/m^3 Ca	--
☐	Diesel Fuel #2 (68476-34-6)	Insoluble	0.81-0.90	130	--	0.6-1.3 6-7.5	None established	None determined	--
☐	Fluorides, as F	--	--	--	--	--	2.5 mg/m^3	None determined	--
☐	Gasoline (8006-61-9)	Insoluble	0.72-0.76	-45	38-300 mm	1.4% 7.6%	300 ppm	Ca None determined	--
☒	Hydrofluoric Acid (Insert)	Miscible	1.00 (liquid at 67°F)	--	783 mm	Non-flam	3 ppm	30 ppm	--
☐	Kerosene (8008-20-6)	Insoluble	0.81	100-162	5 (100°F)	0.7% 5.0%	200 mg/m^3[g] Skin	None determined	--
☐	Naphthalene (91-20-3)	0.003%	1.15	174	0.08 mm	0.9% 5.9%	10 ppm	250 ppm	0.038 (d)
☐	PCB (42% chlorine) (53469-21-9)	Insoluble	1.39	--	0.001 mm	Non-flam	1 mg/m^3 Skin	5 mg/m^3 Ca	--
☐	PCB (54% chlorine) (11097-69-1)	Insoluble	1.38	--	0.00006 mm	Non-flam	0.5 mg/m^3 Skin	5 mg/m^3 Ca	--
☐	Phosphorus (yellow) (7723-14-0)	0.0003%	1.82	--	0.03 mm	-- --	0.1 mg/m^3	5 mg/m^3	--
☐	Polycyclic Aromatic Hydrocarbons (PAH)	Properties vary depending upon the specific compound. Listed in NIOSH as Coal Tar Pitch Volatiles.					0.2 mg/m^3	80 mg/m^3 Ca	--
SITE-SPECIFIC SUBSTANCES (Add hazardous property information on any substances that are of concern at the site but are not listed above.)									

Notes:

[a] Water solubility is expressed in different terms in different references. Many references use the term "insoluble" for materials that will not readily mix with water, such as gasoline. However, most of these materials are water soluble at the part per million or part per billion level. Gasoline, for example, is insoluble in the gross sense, and will be found as a discrete layer on top of the ground water. But certain gasoline constituents, such as benzene, toluene, and xylene, will also be found in solution in the ground water at the part per million or part per billion levels.

[b] Solubility of metals depends on the compound in which they are present.

[c] Several chlorinated hydrocarbons exhibit no flash point in a conventional sense, but will burn in the presence of high energy ignition source or will form explosive mixtures at temperatures above 200°F.

[d] Expressed as mm Hg under standard conditions.

[e] Explosive concentrations of airborne dust can occur in confined areas.

[f] Cal/OSHA TWA PELs except where noted in g. The substances designated by "Skin" in the PEL column may be absorbed into the bloodstream through the skin, the mucous membranes and/or the eye, and contribute to the overall exposure. "C" notation indicates the number given is a ceiling value.

[g] TLV-TWA adopted by the ACGIH. Currently, there is no Cal/OSHA PEL.

[h] The substances with a "Ca" notation in the IDLH column are considered to be potential occupational carcinogens by NIOSH.

[i] Odor thresholds values extracted from "ODOR THRESHOLDS for Chemicals with established Occupational Health Standards", American Industrial Hygiene Association, 1997.
(d) Odor detection threshold: Lowest concentration at which a stimulus is being detected.
(r) Odor recognition threshold: Lowest concentration at which a definite odor character is detected.

[j] Values extracted from the United States Environmental Protection Agency Technology Transfer Network, Air Toxics website. URL: www.epa.gov/ttn/atw/, 2006

[k] Value extracted from "HESIS Guide to Solvent Safety" California Department of Health Services, 2004. URL: http://www.dhs.ca.gov/ohb/HESIS/solv_cht.htm

[l] Value extracted from "Chemical Summary for Methyl-Tert-Butyl Ether", United States Environmental Protection Agency, Office of Pollution Prevention and Toxics, August 1994. URL: http://www.epa.gov/chemfact/s_mtbe.txt

NIOSH	=	National Institute for Occupational Safety and Health
TLV	=	Threshold limit value
LEL	=	Lower explosive limit
CAS	=	Chemical Abstract Service
mg/l	=	milligrams per liter
ml	=	milliliter
mm	=	millimeter
Hg	=	mercury
atm	=	atmosphere
--	=	no applicable value
UEL	=	Upper explosive limit
CAL/OSHA	=	California Occupational Health and Safety
PEL	=	Permissible Exposure Limit
TWA	=	Time-weighted Average
ppm	=	parts per million
mg/m^3	=	milligrams per cubic meter
cc	=	cubic centimeter
IDHL	=	Immediately Dangerous to Health or Life
ACGIH	=	American Conference of Governmental Industrial Hygienist

Appendix D
Control Mechanisms

The following control mechanisms and methods should be implemented for Hazards that were identified as part of the tasks that will be conducted for this project.

D1 Chemical Hazards

All personnel performing work activities within the Exclusion Zone shall wear appropriate personal protective equipment (PPE) while performing site activities. At a minimum, equipment shall include safety glasses, steel-toed boots, hard hats, chemical resistant gloves, chemical resistant clothing (Tyvek or equivalent), and a half-face negative pressure respirator with P100 cartridge (or equivalent). Additional PPE requirements are outlined in this Health and Safety Plan (see Table 1D and Table 8) and all personnel shall familiarize themselves with the appropriate health and safety responses for exposure to known onsite chemicals prior to beginning work at the site. See Attachment A for chemical safety data. Personal air monitoring shall be completed in accordance with Section 8.

D2 Physical Hazards

Hazards from floor and wall openings, careless movements, protruding objects, building contents (stockpiled cathode ray tube materials), debris, spills, placement of materials on paths or foot traffic areas, present a problem with regards to slips, trips, falls, and puncture wounds.

All personnel shall minimize the risk of slips, trips, and falls by keeping the work area clear of excess equipment and cleaning up wet surfaces as soon as possible. In addition, the floor of every workroom shall be maintained in a clean and, as much as possible, a dry condition. Personnel should avoid walking through/on wet and/or cluttered surfaces and be conscious of the fact the wet surfaces could be slippery and could cause injury. Spilled materials should be cleaned up immediately.

Personnel should stay alert at all times and if tired or distracted, take this into account when working at the site. To minimize the possibility of injury:

- Wear sturdy steel toed work boots with good tread
- Do not run
- Slide feet when walking on slick/wet surfaces
- Don’t walk on debris
- Don’t carry items that block your vision

- Use handrails/grips when available and maintain 3-point contact whenever possible
- Don't jump down from equipment and look down before you step down
- Use appropriate fall protection when working at elevation
- Report any floor openings that are not clearly marked and/or guarded
- Don't use ladders/scaffolds during high winds or when ice or snow is on the rungs/work surface
- Don't use ladder substitutes like a box or forklift, and don't use a ladder or scaffolding that is not in good condition
- Keep paths and work areas clear of tools, equipment, boxes, cords, etc. Tape or secure cords, wires, etc. to minimize trip/fall hazard.
- If a protruding object cannot be moved, make sure the object can be easily seen or guard/pad the object if possible
- Use ancillary lighting such as flashlights and headband lights when necessary

Sufficient illumination should be provided in all areas at all times. Personnel should notify the responsible person of conditions where there is an absence of sufficient natural and/or permanent artificial light.

Emergency exit doors will be kept free of any obstacles at all times. Any person finding an emergency door blocked should immediately report the condition and correct it when possible. Exit lights and signs will also be maintained in proper condition at all times and immediately reported if deficient.

Noise monitoring may be conducted as required. If noise levels exceed 85 decibels, A-weighted scale, then hearing protection with a United States Environmental Protection Agency noise reduction rating of at least 20 decibels, A-weighted scale must be used. Hearing protection is mandatory for all employees in noise hazardous areas, such as around heavy equipment. As a general rule, sound levels that cause speech interference at normal conversation distance should require the use of hearing protection.

D3 Railroads

- The hazards of working near and/or adjacent to railroads will be included in job briefings prior to work activity commencing and subsequently when the activity changes

- Mounting, dismounting, or crossing over moving locomotives or cars is prohibited

- Personnel will be alert for the movement of cars, locomotives, or equipment at any time, in either direction, on any track and will remain at least 25 feet (8 meters) from the end of standing cars, equipment, or locomotives, except when proper protection is provided (e.g., a flagman is present or the track is taken out of service by the proper authority, prior to starting any work on or about the tracks)

- Personnel will not cross over coupled, moving freight cars; take refuge under any car, equipment, or locomotive; attempt to mount, dismount, or cross over moving equipment

D4 Electrical Hazards

Electricity may pose a particular hazard to site workers due to the use of portable electrical equipment. If wiring or other electrical work is needed, a qualified electrician must perform it.

Properly ground all electrical equipment. Avoid standing in water when operating electrical equipment. Ground fault outlets or adapters shall be used for any electrical equipment. Apparatus, tools, equipment, and machinery will not be repaired while in operation. Lockout/Tagout procedures will be implemented when necessary. If equipment must be connected by splicing wires, electrical work must be performed by a licensed and competent electrician.

General electrical safety requirements include:

- All electrical wiring and equipment must be a type listed by Underwriters Laboratories, Factory Mutual Engineering Corporation, or other recognized testing or listing agency.

- All portable generators or other portable internal combustion type devices used onsite will be grounded. All grounds will be validated twice daily with a multimeter to confirm a resistance of less than 10 ohms.

- All installations must comply with the National Electrical Safety Code, the National Electrical Code, or United States Coast Guard regulations.

- Portable and semiportable tools and equipment must be grounded by a multiconductor cord having an identified grounding conductor and a multi-contact polarized plug-in receptacle.

- Tools protected by an approved system of double insulation, or its equivalent, need not be grounded. Double-insulated tools must be distinctly marked and listed by Underwriters Laboratories or Factory Mutual Engineering Corporation.

- Live parts of wiring or equipment must be guarded to prevent persons or objects from touching them.

- Electric wire or flexible cord passing through work areas must be covered or elevated to protect it from damage by foot traffic, vehicles, sharp corners, projections, or pinching.

- All circuits must be protected from overload.

- Temporary power lines, switchboxes, receptacle boxes, metal cabinets, and enclosures around equipment must be marked to indicate the maximum operating voltage.

- Plugs and receptacles must be kept out of water unless of an approved submersible construction.

- All extension cord outlets must be equipped with ground-fault-circuit interrupters.

- Attachment plugs or other connectors must be equipped with a cord grip and be constructed to endure rough treatment.

- Extension cords or cables must be inspected prior to each use and replaced if worn or damaged.

- Cords and cables must not be fastened with staples, hung from nails, or suspended by bare wire.

- Flexible cords must be used only in continuous lengths without splice, with the exception of molded or vulcanized splices made by a qualified electrician.

D5 Fire and Explosion Hazards

The presence of petroleum and/or solvent products or contaminated material presents a potential fire hazard. Smoking and use of open flame will be prohibited. The use of non-sparking tools and

equipment will be implemented if conditions warrant. Where the potential of fire exists, portable fire extinguishers must be provided. Where applicable, all fire extinguishers shall be mounted no higher and no lower than 4 feet (1.22 meters) from the floor and/or shall be readily accessible for use. All fire extinguishers shall be maintained as follows:

- Fully charged and in operable condition
- Clean and free of defects
- Readily accessible at all times

Fire prevention and protection measures include elimination of ignition sources, where feasible, identification of combustion sources and atmospheres, and early detection and rapid response to fire/explosion situations. In addition to standard operating procedures, the following safe work practices will be implemented:

- Site activities will comply with National Electric Code and explosion proof criteria
- Smoking will only be allowed in designated areas
- Appropriate air monitoring procedures will be conducted, when necessary
- Welding, open flame or spark-producing operations will not be allowed onsite (if welding/ cutting with torches is conducted, a job hazard analysis will need to be prepared for this activity)
- Solvents with a flash point of less than or equal to 100°F will not be used for cleaning purposes
- Fire extinguishers shall be kept in all work vehicles
- Extinguishers must:
    - Be maintained in a fully charged and operable condition
    - Be visually inspected each month
    - Undergo a maintenance check each year

All fires and visible smoke that are detected at the site will be dealt with immediately by the individual recognizing the fire and/or smoke. In the event of visible smoke, fire or explosion, the following emergency response procedures will be implemented:

- Immediately cease operations
- In all emergency situations contact the site manager or health and safety coordinator and emergency services

For small fires, personnel may attempt to extinguish the fire, if safe to do so and they have been trained. One fire extinguisher ONLY may be used to fight the fire. After one fire extinguisher is depleted, personnel must evacuate the area. For larger fires, perform site evacuation.

D6 Heat Stress

Heat stress can be a significant hazard, especially for workers wearing protective clothing. Depending on the ambient conditions and the work being performed, heat stress can occur very rapidly, within as little as 15 minutes. Site personnel will be instructed in the identification of a heat stress victim, the first-aid treatment procedures for the victim and in the prevention of heat stress incidents.

Workers will be encouraged to immediately report any heat-related problems that they experience or observe in fellow workers. Any worker exhibiting signs of heat stress and exhaustion should be made to rest in a cool location and drink plenty of water. Emergency help by a medical professional is required immediately for anyone exhibiting symptoms of heat stroke, such as red, dry skin, confusion, delirium, or unconsciousness. Heat stroke is a life-threatening condition that must be treated by competent medical authority.

American Conference of Governmental Industrial Hygienist screening criteria for heat stress exposure in degrees Celsius for an 8-hour workday, 5 days per week, with conventional breaks will be used in determining safe exposure for acclimatized and un-acclimatized personnel.

Allocation of Work in a Work/ Rest Cycle	Acclimatized				Action Limit (Un-acclimatized)			
	Light	Moderate	Heavy	Very Heavy	Light	Moderate	Heavy	Very Heavy
75-100%	31.0 (87.8°F)	28.0 (82.4°F)	--	--	28.0 (82.4°F)	25.0 (77°F)	--	--
50-75%	31.0 (87.8°F)	29.0 (84.2°F)	27.5 (81.5)	--	28.5 (83.3°F)	26.0 (78.8°F)	24.0 (75.2°F)	--
25-50%	32.0 (89.6°F)	30.0 (86°F)	29.0 (84.2°F)	28.0 (82.4°F)	29.5 (85.1°F)	27.0 (80.6°F)	25.5 (77.9)	24.5 (76.1°F)
0-25%	32.5 (90.5°F)	31.5 (88.7°F)	30.5 (86.9°F)	30.0 (86°F)	30.0 (86°F)	29.0 (84.2°F)	28.0 (82.4°F)	27.0 (80.6°F)

Heat Stress Prevention

If necessary and where/when appropriate, engineering controls should be utilized to protect workers from heat related hazards. For example, isolation from the heat source, ventilation such as open windows, fans or other methods of creating air flow, and heat shielding such as awnings or umbrellas.

Appropriate work practices can also lessen the chances of heat related hazards. Some of these include:

- Water intake should be about equal to the amount of sweat produced (i.e., drinking 5-7 ounces of water every 15-20 minutes). Electrolyte fluids may also be necessary.

- Whenever possible, gradual exposure to heat is preferred to allow the body's internal temperature to actuate to the working conditions.

- Whenever possible, adjust the work schedule to reduce risk of heat stress. For example, postpone nonessential or heavier work to the cooler part of the day and perform work in the shade if portable.

- Rotate personnel to reduce the amount of time spent working in direct sun and heat.

- Increase the number and/or duration of rest breaks, and whenever possible, rest break areas should be in a cool area and as close to the work area as is feasible.

Wear appropriate PPE when necessary, such as thermally conditioned clothing, self-contained air conditioning in a backpack, and plastic jackets/vests with pockets that can be filled with dry ice or ice. However, based on the type of work being done, where work is being performed, or other required PPE, these options may be prohibited or make the use of this PPE impossible or impractical.

Heat-Related Illnesses

Heat Stress

This is the mildest heat-related illness, but prompt action may prevent it from turning into a more severe heat-related illness. Symptoms include irritability, lethargy, significant sweating, headache, or nausea. The following guidance can be used in the identification and treatment of heat related illness.

Heat Stress First Aid

- Take victim to a protected (e.g., shaded, cool) area, remove any excess protective clothing, and provide cool fluids.

- If an air-conditioned spot is available, this is an ideal break location.

- Once the victim shows improvement, he/she may resume working; however, the work pace and practices (e.g., does fluid intake need to be increased) should be moderated to prevent recurrence of the symptoms.

Heat Exhaustion

Usually begins with muscular weakness, dizziness, nausea, and a staggering gait. Symptoms include pale, clammy skin, and profuse sweating, vomiting, and the bowels may move involuntarily. The pulse is weak and fast, breathing is shallow. Fainting can occur.

Heat Exhaustion First Aid

- Immediately remove the victim from the work area to a shady or cool area with good air circulation (avoid drafts or sudden chilling — you do not want the victim to shiver)

- Call a physician or emergency service or transport the victim to medical care

- Remove all protective outerwear

- If the victim is conscious, it may be helpful to give him/her sips of water

Heat Stroke

Heat stroke is a severe medical condition requiring first aid and emergency treatment by a medical professional as death can occur without appropriate care. Heat Stroke represents the collapse of the body's cooling mechanisms. As a result, body temperatures often rise to between 105 — 110°F. As the victim progresses toward heat stroke symptoms include hot and usually dry, red and spotted skin, headache, dizziness, nausea, mental confusion, delirium, possible convulsions and loss of consciousness.

Heat Stroke First Aid

- Immediately remove the victim from the work area to a shady or cool area with good air circulation (avoid drafts or sudden chilling — you do not want the victim to shiver).

- Summon emergency medical help to provide onsite treatment and transportation to a medical facility.

- Remove all protective outerwear and loosen personal clothing.

- Apply cool wet towels, ice bags, etc. to the head, armpits, and thighs. Sponge off the bare skin with cool water or even place the victim in a tub of cool water.

Skin Hazards

Sunburn and prickly heat are both symptoms of skin irritation/damage produced through exposure to sunlight and operating in hot work environments.

- In sunny work areas protect exposed skin with an appropriate sunscreen. A sunscreen with a sun protection factor of 15 or greater is required for work in the sun with reapplication at breaks and lunch.

- Heat rash, also known as prickly heat, can be prevented by the application of a hydrophobic, water repellent barrier cream such as Kerodex 71.

D7 Cold Stress

The four environmental conditions that cause cold-related stress are low temperatures, high/cool winds (wind chill), dampness, and cold water. One or any combination of these factors can cause cold-related hazards. Cold stress, including frostbite and hypothermia, can result in severe health effects.

A dangerous situation of rapid heat loss may arise for any individual exposed to high winds and cold temperatures. Major risk factors for cold-related stresses include:

- Wearing inadequate or wet clothing increases the effects of cold on the body.

- Taking certain drugs or medications such as alcohol, nicotine, caffeine, and medication that inhibits the body's response to the cold or impairs judgment.

- Having a cold or certain disease, such as diabetes, heart, vascular, and thyroid problems, may make a person more susceptible to the winter elements.

- Being male increases a person's risk to cold-related stresses. Men experience far greater death rates due to cold exposure than women, perhaps due to inherent risk-taking activities, body-fat composition, or other physiological differences.

- Becoming exhausted or immobilized, especially due to injury or entrapment, may speed up the effects of cold weather.

- Aging — the elderly is more vulnerable to the effects of harsh winter weather.

TABLE 2. Cooling Power or Wind on Exposed Flesh Expressed as Equivalent Temperature (under calm conditions)*

Estimated Wind Speed (in mph)	Actual Temperature Reading (°F)											
	50	40	30	20	10	0	−10	−20	−30	−40	−50	−60
	Equivalent Chill Temperature (°F)											
calm	50	40	30	20	10	0	−10	−20	−30	−40	−50	−60
5	48	37	27	16	6	−5	−15	−26	−36	−47	−57	−68
10	40	28	16	4	−9	−24	−33	−46	−58	−70	−83	−95
15	36	22	9	−5	−18	−32	−45	−58	−72	−85	−99	−112
20	32	18	4	−10	−25	−39	−53	−67	−82	−96	−110	−121
25	30	16	0	−15	−29	−44	−59	−74	−88	−104	−118	−133
30	28	13	−2	−18	−33	−48	−63	−79	−94	−109	−125	−140
35	27	11	−4	−20	−35	−51	−67	−82	−98	−113	−129	−145
40	26	10	−6	−21	−37	−53	−69	−85	−100	−116	−132	−148
(Wind speeds greater than 40 mph have little additional effect.)	LITTLE DANGER In < hr with dry skin. Maximum danger of false sense of security				INCREASING DANGER Danger from freezing of exposed flesh within one minute.				GREAT DANGER Flesh may freeze within 30 seconds.			
	Trenchfoot and immersion foot may occur at any point on this chart.											

*Developed by U.S. Army Research Institute of Environmental Medicine, Natick, MA.

Equivalent chilll temperature requiring dry clothing to maintain core body tempearture above 36°C (96.8°F) per cold stress TLV

Cold Stress Prevention

Engineering controls should be utilized whenever possible to protect workers from cold related hazards. For example, onsite heat sources, heated shelters, work areas shielded from drafty or windy conditions, and the use of thermal insulating material on equipment handles.

Effects arising from cold exposure will be minimized by the following control measures:

- Personnel will be trained to recognize cold stress symptoms
- Field activities will be curtailed or halted if the equivalent chill temperature is below 20°F
- As much as possible, work that exposes personnel to the cold will be done during the warmest hours of the day
- Inactivity in cold conditions will be kept to a minimum
- Frequent short breaks in warm, dry shelters will be taken

- Vehicles will be equipped with supplies in case the vehicle becomes inoperable (e.g., blanket, dry clothing, water, food, a shovel, etc.

The following PPE should be provided during work in cold environments:

- Workers will be provided with insulated dry clothing when the equivalent chill temperature is less the 30°F

- Feet, hands, the face, and the head should be protected (40% of the body's heat can be lost when the head is exposed)

- Foot and hand wear may also need to be waterproof

- Clothing should be layered so that adjustments can be made to changing environmental temperatures and conditions. For example, an outer layer to break the wind, a middle layer that will absorb sweat and retain insulation when wet, and an inner layer that allows ventilation.

Cold-Related Illness

Hypothermia

Hypothermia occurs when the body temperature falls to a level where normal muscular and cerebral functions are impaired. Although it usually occurs in freezing air and water temperatures, it can occur in any climate if a person's internal body temperature falls below normal. Symptoms should not be ignored, and a supervisor should be notified as soon as hypothermia is suspected.

Initially, symptoms may include shivering, an inability to do complex motor functions, sluggishness and mild confusion as the body temperature drops to around 95°F. As the body temperature falls, speech may become slurred, and behavior may be irrational, simple motor functions may be difficult to do and a state of "dazed consciousness" may exist. In severe state (below 90°F), heart rate, blood flow, and breathing will slow. Unconsciousness and full heart failure can occur.

Hypothermia First Aid

- Call for emergency, and then help move the victim (unless other injuries prohibit their being moved) to a warm, dry area and replace wet clothing with warm, dry clothing or a blanket. Move the person carefully because movement can increase the irritability of the heart.

- If the person is conscious and lucid, warm liquids can be provided, but never alcohol or caffeinated drinks. If possible, have them to move their arms and legs to create muscle heat.

- If the person is unconscious or unable to assist, place warm bottles/packs in the person's arm pits, groin, neck, and head areas.

- Do not rub the person's body or place them in warm water.

Frostbite

Frostbite occurs when the skin literally freezes, and deep frostbite can affect deeper tissues such as tendons and muscles. Frostbite usually occurs when temperatures drop below 30°F, but wind chill effects can cause frostbite at above-freezing temperatures. The ears, fingers, toes, cheeks, and nose are the most commonly affected body parts. Initially, symptoms include an uncomfortable sensation of coldness. Tingling, stinging or an aching feeling of the exposed area is followed by numbness. Frostbitten areas appear white and cold to the touch and with deeper frostbite, the area becomes numb, painless, and hard, and can turn black.

Frostbite First Aid

- Seek medical attention as soon as possible and treat any existing hypothermia first

- Warm liquid can be provided, but not alcohol or caffeinated drinks such as tea and coffee

- Do not rub the affected areas, but cover them with dry, sterile gauze or soft, clean bandages

- Do not try rewarming the affected area if you have not been specifically trained to do so and/ or if there is a chance the affected area will get cold again

D8 Insects and Spiders

Care will be taken by all site workers to avoid stinging or biting insects such as spiders, bees, wasps, hornets, and yellow jackets. Workers allergic to any particular insect sting or bite should seek medical attention if stung or bitten and may need to carry emergency medicine prescribed by their doctor.

Care should always be taken to avoid these insects and increased vigilance is necessary during high infestation seasons, when opening protective casings of monitoring wells, and when walking through areas of heavy vegetation or areas known to be infested.

To minimize the chance of bites/stings:

- Wear appropriate PPE such as light-colored clothing so you can see insects, long pants tucked into boots, long sleeves when possible, a hat, and gloves if you are cutting brush or need to handle or move vegetation.

- Check your body and clothing for insects, shower after work and wash/dry clothes at as high temperature as possible.

- Don't swat at insects and don't eat in areas where there are insects.

- Avoid sweet smelling personal hygiene products and, unless contradicted by the work being performed (e.g., sampling, data collection), wear Environmental Protection Agency approved repellants such as those containing DEET.

Black Widow Spider

Brown Recluse Spider

Spider bites generally cause only localized reactions such as swelling, pain, and redness. However, bites from a Black Widow or Brown Recluse, or if you are allergic to spiders, can cause symptoms that are more serious.

First Aid for Spider Bites

- Clean the bite area with soap and water and place a cold pack over the bite area to reduce swelling.

- Monitor for allergic reactions. If victim has more than minor pain, or if nausea, vomiting, difficulty breathing, or swallowing occurs, medical attention should be sought immediately.

Bees and wasps belong to the phylum Arthropod family, and they are crucially important to the pollination of plants, specifically flowers, fruits, and vegetables. A sting from a bee or wasp will cause itching, irritation, redness and/or swelling at the sting site.

First Aid for Bee Stings

- Remove the stinger as quickly as possible — venom continues to enter the skin from the stinger for 45 to 60 seconds following a sting — using a flat dull object, like a credit card. Slid the flat object in the opposite direction of the stinger to remove it from the skin.

- Wash the wound using soap and water

- Apply ice for swelling and pain

- A topical hydrocortisone cream, antihistamine, or local anesthetic may be of value in reducing itching

- If the sting occurs on the neck or mouth, seek medical attention immediately, swelling in these areas may cause suffocation

A small percentage of people are allergic to stings and a sting can be fatal, caused by a disruption to breathing and circulatory systems called anaphylactic shock. If the sting is followed by severe symptoms, seek medical attention immediately. Allergic people should never be alone for outdoor activities since help may be needed for prompt emergency treatment. Allergic people should have an identification bracelet as well as carry something like an “EpiPen” for immediate treatment for anaphylactic shock.

D9 Poisonous Plants

Plants poison on contact, through ingestion, or by absorption or inhalation. They cause painful skin irritations upon contact and can cause internal poisoning when eaten.

First Aid for Poisonous Plants

- Wash exposed areas with cold running water as soon as you can
- When possible, wash your clothing
- Relieve itching by taking cool showers and applying topical anti-itch medications or hydrocortisone
- The rash is often arranged in streaks or lines where you brushed against the plant
- In a few days, the blisters become crusted and take 10 days or longer to heal
- If the reaction is severe or worsens, seek medical attention

D10 Personal Safety

If it is deemed that a work site is in an area where personal safety may be at risk from potential criminal acts, wild animals, etc. the risks will be evaluated, and implementation of preventative measures will be taken to minimize the risk. Informational resources such as the client, local law enforcement officials, Park or Wildlife Service, and Animal Control could be utilized to assess the risk and to ensure the safest possible work environment. For example, local law enforcement can be made present or make frequent drive-bys while work is being done, outside security can be hired, and work can occur only during certain times of the day or work may not proceed at all. Some general guidelines are provided here, but each situation is different, and actions must be taken based on the specifics of each.

In areas of risk, personnel will communicate via cell phones or 2-way radios and will check-in at predetermined times throughout each workday. If personnel do not call in to the project manager or designated representative, the team will be contacted, and if unsuccessful, local law enforcement will be notified.

If you see wild animals while driving, stay in your vehicle. Never get out for a photo or a closer look. Keep windows up and don't try to keep the animal from crossing a road with your vehicle. If you see a wild animal while on foot, never approach the animal. If the animal has not seen you, go back the way you came. Do NOT turn your back and run which could invoke their natural predator instinct. Instead, keep facing the animal and back away at a steady pace. Let it know you are human by talking in a low voice and waving your hands slowly. If you are near a car or building, get inside. In addition, in areas of higher risk (i.e., contacted officials have indicated that wild animals are a nuisance), personnel may want to consider carrying "pepper spray".

If, while on the project site, and despite any precautions set forth, if any person feels that their safety is at risk, they shall cease work, leave the work area and immediately report their concerns so that appropriate steps can be taken.

D11 Working Alone and Working in Isolated Areas

Site personnel will assess the risk of working alone and whenever possible, personnel will not work alone or within isolated areas.

Communicating through cell phones or 2-way radios will be utilized whenever possible. If necessary, personnel will check-in at predetermined times throughout each workday and as the risk rating increases, personnel will check-in more frequently. If personnel do not call in to their supervisor, the team member will attempt to be contacted and located. If contacting the team member is unsuccessful, the appropriate authorities will be notified. In addition, and especially if communication is not possible during the day, the planned start and estimated finish times for the day will be communicated, and personnel will check in at the beginning and end of the workday.

If personnel will be moving from isolated area to isolated area, there will be established beginning and ending locations, planned start and estimated finish times, and planned routes that will be followed throughout the day. Personnel will not deviate from this schedule without first contacting the appropriate personnel.

If this is not possible to complete work during day light hours, personnel will wear appropriate reflective apparel and have appropriate lighting, such as portable lighting, flashlights, or headlamps as appropriate for the activity being conducted. Personal security will be assessed, and measures taken as discussed above, if appropriate.

D12 Severe Weather

Severe weather conditions include high winds, electrical storms, and heavy rain. At a minimum, all work outdoors will cease during these events. When lightning is spotted, site personnel working outdoors should use the following steps to avoid injury:

- Workers should note the flash-boom ratio (i.e., count the seconds after the lightning was seen until the thunder was heard).

- By counting the seconds between seeing lightning and hearing thunder and dividing by 5, you can estimate your distance from the storm (in miles or kilometers). If the storm is 6 miles (9.6 kilometers) away or less (30 seconds between when lightning was seen and thunder was heard) workers must stop work and take shelter.

- If the storm is more than 6 miles (9.6 kilometers) away (greater than 30 seconds between lightning and thunder), the personnel's supervisor should monitor the storm and be prepared to cease work if the storm approaches an unsafe distance. Since storms can travel at varying speeds and the amount of time at takes to cease and secure operations will also vary, prudent judgment should be exercised when storms are in the vicinity and/or developing (e.g., darkening skies, increasing wind speeds, etc.).

- Workers should not stay in exposed areas (outdoors on the ground, on a roof, in an aerial lift, on a steel truss, on an ungrounded steel structure, in a golf cart, un-sided building, etc.) after lightning has been witnessed. All personnel must move to a safe location.

- Workers should wait 30 minutes from the last sight of lightning or sound of thunder before returning to work.

- Those required to travel from one building to another during the 30-minute wait time should do so only by enclosed vehicle.

- Once the 30-minute wait time has elapsed and no additional lightning or thunder has been seen or heard, individuals may resume normal work.

D13 Material Handling/Ergonomics

Handling and moving materials involve diverse operations such as hoisting with a crane, driving a truck loaded with materials, carrying bags or materials manually, and stacking materials. When moving materials manually, and if appropriate and feasible, personnel should attach handles or holders to loads in addition to wearing appropriate PPE and using proper lifting techniques.

Personnel should seek help when handling loads that are too bulky to grasp or lift, when personnel cannot see around or over a load, or when they cannot safely handle a load for any other reason. PPE should be worn when moving materials to prevent needless injuries. Hand and forearm protection, such as gloves should be worn when working with loads that have sharp or rough edges. Blocking materials can be used to manage and move loads, but ensure the materials are large and strong enough to support the load safely.

When mechanical equipment is used to move materials, allow the weight, shape and size of the material to dictate the type of equipment used to move it, based on its rated capacity and making sure not to overload. Equipment-rated capacity should be displayed on each piece of equipment in use. When picking up items with a powered truck, center the load as close to the mast as possible, avoid overloading and do not put extra weight on the rear to counterbalance the equipment, adjust

the load to the lowest possible safe position when traveling, and always follow the manufacturer's operational instructions.

Lifting, carrying and lowering objects represent a potential physical hazard to personnel. Therefore, it is every person's responsibility to realistically evaluate the object to determine if the weight and size exceeds the person's ability to lift, lower, or carry it. To eliminate or minimize the risk of lifting hazards, utilize proper techniques, such as keeping the back straight and legs bent. Objects should always be lifted, lowered and carried as close to the body as possible. If the equipment cannot be lifted in this manner, it is too heavy to lift alone. Call other personnel or use a mechanical device for aid in lifting. Mechanical aids like hand trucks and carts or the buddy system should be used to move heavy objects, objects with poor handgrips or large bulky objects. Some other things to consider:

- Evaluate the object for the presence of any physical hazards such as pinch points, sharp or jagged edges, burrs or rough and slippery surfaces.

- The route in which the object will be moved should be free from obstructions, which could cause difficulty in moving the object.

- Asses other hazards such as stairs before you move the object and consider smaller loads with multiple trips as a safe alternative.

- If an object is stored at a level higher than 5 feet, or on the floor, an appropriate mechanical device may be necessary to move the object.

- Recognized lifting hazards should be designed out of the work process, whenever possible.

Proper lifting and lowering techniques should be followed even if the object or material to be lifted is of lighter weight. Keep the objects as close to the body as possible and:

- Establish a firm footing with feet at approximately shoulder width and one foot slightly ahead of the other. This posture will aid in keeping good balance and will establish a stable lifting base.

- Always bend at the knees, not at the waist when lifting or lowering an object.

- Obtain a good secure grip on the object.

- When beginning to lift, tighten your stomach muscles and use your les to lift the object, as leg muscles are generally stronger than back muscles.

- Lift slowly and smoothly.

- If you need to turn as you lift, do not twist at the waist, but instead pivot with the feet.

When lowering the object, reverse the procedure.

D14 Power Tools

Tools can be hazardous when improperly used since these types of tools utilize energy: electric, liquid fuel, hydraulic, pneumatic, and powder actuated. The following precautions will be taken by personnel to prevent injury:

- Power tools will always be operated within their design limitations, and only by personnel who have been appropriately trained in the use, operation, and proper handling of such tools.

- Guards are not to be removed or rendered inoperative.

- Eye protection, gloves, and safety footwear are recommended during operation.

- Store tools in an appropriate dry location when not in use.

- Work only in well illuminated locations.

- Tools will not be carried by the cord or hose, and cords or hoses will not be yanked to disconnect it from the receptacle.

- Cords and hoses will be kept away from heat, oils, and sharp edges or any other source that could result in damage.

- Tools will be disconnected when not in use, before servicing, and when changing accessories such as blades, bits, and cutters.

- Observers will be kept at a safe distance at all times from the work area.

- Tools will be maintained in a clean manner, and properly maintained in accordance with the manufacturer's guidelines. Periodic inspection of hand and portable power tools should occur.

- Ensure that the work area is kept clean to maintain proper footing and good balance.

- Ensure that proper apparel is worn. Loose clothing, ties, or jewelry can become caught in moving parts.

- Tools that are damaged will be removed from service immediately and tagged "Do Not Use".

D15 Vehicle Use

Work areas and site conditions must be considered when designating and selecting a vehicle for use. The vehicle shall be maintained in safe working order as required by the manufacturer. This would include a routine preventive maintenance schedule for servicing and checking of safety-related equipment.

Special-use vehicles (e.g., all-terrain vehicles, snowmobiles, etc.) are vehicles with a light engine or electric motor, other than construction equipment, and are not intended and/or allowed for highway use. These vehicles may not have seat belts or do not have substantial roll protection (i.e., rollover protection system, falling object protection system, steel roll-cage, etc.).

The following general practices will be followed for operating vehicles:

- All vehicles will be operated in accordance with the manufacturer's requirements and specifications

- Drivers should use prudent judgment and proceed cautiously

- Operators of special-use vehicles shall be trained by a competent person. At a minimum, training will be hands-on by a competent person and the operator shall demonstrate of basic skills. All individuals are required meet all training aspects before use.

- All vehicles shall remain on flat surfaces at all times and shall not be operated on slopes steeper than a 30% grade

- Daily inspections of vehicles for safety and maintenance will be required (i.e., fluid leaks/levels, tire pressure, tire surfaces, lights, fuel levels, brakes, etc.)

- Safe speed limits shall be maintained to safe operating speeds

- Make sure the engine is turned OFF before dismounting the vehicle

- Avoid driving over debris or extreme obstacles
- Watch for workers and other vehicles
- Do not carry passengers
- Slow down before coming to a stop
- Shut engine down prior to refueling
- Each driver will have a valid driver's license

Forklifts Operations

Forklift Inspection

- Forklift inspection shall be done at least once per shift.
- If maintenance work is required, the forklift operator shall notify the shift supervisor. The forklift will be locked out and tagged out until the maintenance work is complete.
- The shift supervisor shall coordinate all maintenance work.
- If a forklift working in the Exclusion Zone (contaminated warehouse area) must be removed from the Exclusion Zone for maintenance, the forklift must first be decontaminated.

Safe Operation of Forklifts

- Keep forks no more than 6" off the floor when moving with or without a load
- Always sound the horn when backing up
- Slow down at intersections and sound the horn
- A forklift is capable of going 10 miles per hour but should be operated no more than a fast walk
- Check the load before lifting and moving to ensure that it is stable
- All wheels on the forklift should be checked before loading or unloading

- There should be no “horseplay” on the forklift at any time
- All accidents are to be reported immediately to the shift supervisor
- Do not use unsafe or damaged forklifts. Report them immediately to the shift supervisor.
- Keep forks on the ground or as low as possible when the truck is not in use
- At no time shall an operator lift a load that exceeds the forklift’s rated lifting capacity
- Pay special attention to other forklifts, workers, and falling objects when operating a lift
- When propane tanks need to be changed, the tanks shall be changed by properly trained forklift operators. Before empty tanks from forklifts operating in the Exclusion Zone (contaminated warehouse area) can be removed from the Exclusion area for re-filling, the tank must first be decontaminated. See Sections 10.1 and 10.3 for decontamination and equipment load out procedures.

Vehicle or Forklift Violations

- Vehicle and forklift operator privileges shall be revoked or suspended for a minimum amount of time based on the incident and as deemed appropriate by management. The following reasons may constitute reasons for privileges being revoked/suspended:
  - If an operator has acquired a total of three violations in a 2-month period
  - Failure to report all accidents, injury, or property damage to the shift supervisor
  - Not being certified, licensed, or properly trained on the forklift or vehicle they are operating
  - Vehicle and forklift operating privileges shall be suspended until retraining requirements are fulfilled

Appendix E
29 CFR 1910.1025 — Medical Monitoring

By Standard Number / 1910.1025 App C - Medical surveillance guidelines

- **Part Number:** 1910
- **Part Number Title:** Occupational Safety and Health Standards
- **Subpart:** 1910 Subpart Z
- **Subpart Title:** Toxic and Hazardous Substances
- **Standard Number:** 1910.1025 App C
- **Title:** Medical surveillance guidelines
- **GPO Source:** e-CFR

INTRODUCTION

The primary purpose of the Occupational Safety and Health Act of 1970 is to assure, so far as possible, safe and healthful working conditions for every working man and woman. The occupational health standard for inorganic lead(1) was promulgated to protect workers exposed to inorganic lead including metallic lead, all inorganic lead compounds and organic lead soaps.

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Footnote(1) The term inorganic lead used throughout the medical surveillance appendices is meant to be synonymous with the definition of lead set forth in the standard.

Under this final standard in effect as of March 1, 1979, occupational exposure to inorganic lead is to be limited to 50 ug/m(3) (micrograms per cubic meter) based on an 8 hour time-weighted average (TWA). This level of exposure eventually must be achieved through a combination of engineering, work practice and other administrative controls. Periods of time ranging from 1 to 10 years are provided for different industries to implement these controls. The schedule which is based on individual industry considerations is given in Table 1. Until these controls are in place, respirators must be used to meet the 50 ug/m(3) exposure limit.

The standard also provides for a program of biological monitoring and medical surveillance for all employees exposed to levels of inorganic lead above the action level of 30 ug/m(3) (TWA) for more than 30 days per year.

The purpose of this document is to outline the medical surveillance provisions of the standard for inorganic lead, and to provide further information to the physician regarding the examination and evaluation of workers exposed to inorganic lead.

Section 1 provides a detailed description of the monitoring procedure including the required frequency of blood testing for exposed workers, provisions for medical removal protection (MRP), the recommended right of the employee to a second medical opinion, and notification and recordkeeping requirements of the employer. A discussion of the requirements for respirator use and respirator monitoring and OSHA's position on prophylactic chelation therapy are also included in this section.

Section 2 discusses the toxic effects and clinical manifestations of lead poisoning and effects of lead intoxication on enzymatic pathways in heme synthesis. The adverse effects on both male and female reproductive capacity and on the fetus are also discussed.

Section 3 outlines the recommended medical evaluation of the worker exposed to inorganic lead including details of the medical history, physical examination, and recommended laboratory tests, which are based on the toxic effects of lead as discussed in Section 2.

Section 4 provides detailed information concerning the laboratory tests available for the monitoring of exposed workers. Included also is a discussion of the relative value of each test and the limitations and precautions which are necessary in the interpretation of the laboratory results.

TABLE 1

Permissible airborne lead levels by industry (ug/m(3)(1)	Effective date: Mar 1, 1979	Mar 1, 1980	Mar 1, 1981	Mar 1, 1982	Mar 1, 1984	Mar 1, 1989 (final)
1. Primary lead protection..	200	200	200	100	100	50
2. Secondary lead protection.....	200	200	200	100	50	50
3. Lead-acid battery manufacturing.....	200	200	100	100	50	50
4. Nonferrous foundries.....	200	100	100	100	50	50
5. Lead pigment manufacturing.....	200	200	200	100	50	50
6. All other industries.....	200	50	50	50	50	50

Footnote(1) Airborne levels to be achieved without reliance or respirator protection through a combination of engineering, work practice and other administrative controls. While these controls are being implemented respirators must be used to meet the 50 ug/m(3) exposure limit.

I. MEDICAL SURVEILLANCE AND MONITORING REQUIREMENTS FOR WORKERS EXPOSED TO INORGANIC LEAD

Under the occupational health standard for inorganic lead, a program of biological monitoring and medical surveillance is to be made available to all employees exposed to lead above the action level of 30 ug/m(3) TWA for more than 30 days each year. This program consists of periodic blood sampling and medical evaluation to be performed on a schedule which is defined by previous laboratory results, worker complaints or concerns, and the clinical assessment of the examining physician.

Under this program, the blood lead level of all employees who are exposed to lead above the action level of 30 ug/m(3) is to be determined at least every six months. The frequency is increased to every two months for employees whose last blood lead level was between 40 ug/100 g whole blood and the level requiring employee medical removal to be discussed below. For employees who are removed from exposure to lead due to an elevated blood lead, a new blood lead level must be measured monthly. A zinc protoporphyrin (ZPP) is required on each occasion that a blood lead level measurement is made.

An annual medical examination and consultation performed under the guidelines discussed in Section 3 is to be made available to each employee for whom a blood test conducted at any time during the preceding 12 months indicated a blood lead level at or above 40 ug/100 g. Also, an examination is to be given to all employees prior to their assignment to an area in which airborne lead concentrations reach or exceed the action level. In addition, a medical examination must be provided as soon as possible after notification by an employee that the employee has developed signs or symptoms commonly associated with lead intoxication, that the employee desires medical advice regarding lead exposure and the ability to procreate a healthy child, or that the employee has demonstrated difficulty in breathing during a respirator fitting test or during respirator use. An examination is also to be made available to each employee removed from exposure to lead due to a risk of sustaining material impairment to health, or otherwise limited or specially protected pursuant to medical recommendations.

Results of biological monitoring or the recommendations of an examining physician may necessitate removal of an employee from further lead exposure pursuant to the standard's medical removal protection (MRP) program. The object of the MRP program is to provide temporary medical removal to workers either with substantially elevated blood lead levels or otherwise at risk of sustaining material health impairment from continued substantial exposure to lead. The following guidelines which are summarized in Table 2 were created under the standard for the temporary removal of an exposed employee and his or her subsequent return to work in an exposure area.

TABLE 2

	Effective date				
	Mar. 1, 1979	Mar. 1, 1980	Mar. 1, 1981	Mar. 1, 1982	Mar. 1, 1983 (final)
A. Blood lead level requiring employee medical removal. (Level must be confirmed with second follow-up blood lead level within two weeks of first report.	>than or = to 80 ug/100 g	>than or = to 70 ug/100 g	>than or = to 60 ug/100 g	>than or = to 60 ug/100 g	>than or = to 60 ug/100 g or average of last three blood samples or all blood samples over previous 6 months (whichever is over a longer time period) is 50 ug/100 g or greater unless last blood sample is 40 ug/100 g or less.
B. Frequency which employees exposed to action level of lead (30					

ug/m(3) TWA) must have blood lead level checked (ZPP is also required in each occasion that a blood lead is obtained.):					
1. Last blood lead level less than 40 ug/100 g	Every 6 months	Every 6 months	Every 6 months	Every 6 months	Every 6 months.
2. Last blood lead level between 40 ug/100 g and level requiring medical removal (see A above)....	Every 2 months	Every 2 months	Every 2 months	Every 2 months	Every 2 months.
3. Employees removed from exposure to lead because of an elevated blood lead level.....	Every 1 months	Every 1 months	Every 1 months	Every 1 months	Every 1 months.
C. Permissible airborne exposure limit for workers removed from work due to an elevated blood lead level (without	100 ug/m(3) 8 hr TWA.	50 ug/m(3) 8 hr TWA.	30 ug/m(3) 8 hr TWA.	30 ug/m(3) 8 hr TWA.	30 ug/m(3) 8 hr TWA.

regard to respirator protection).					
D. Blood lead level confirmed with a second blood analysis, at which employee may return to work. Permissible exposure without regard to respirator protection is listed by industry in Table 1.	.60 ug/100 g	.50 ug/100 g	.40 ug/100 g	.40 ug/100 g	.40 ug/100 g

NOTE: When medical opinion indicates that an employee is at risk of material impairment from exposure to lead, the physician can remove an employee from exposures exceeding the action level (or less) or recommended special protective measures as deemed appropriate and necessary. Medical monitoring during the medical removal period can be more stringent than noted in the table above if the physician so specifies. Return to work or removal of limitations and special protections is permitted when the physician indicates that the worker is no longer at risk of material impairment.

Under the standard's ultimate worker removal criteria, a worker is to be removed from any work having any eight hour TWA exposure to lead of 30 ug/m(3) or more whenever either of the following circumstances apply: (1) a blood lead level of 60 ug/100 g or greater is obtained and confirmed by a second follow-up blood lead level performed within two weeks after the employer receives the results of the first blood sampling test, or (2) the average of the previous three blood lead determinations or the average of all blood lead determinations conducted during the previous six months, whichever encompasses the longest time period, equals or exceeds 50 ug/100 g, unless the last blood sample indicates a blood lead level at or below 40 ug/100 g in which case the employee need not be removed. Medical removal is to continue until two consecutive blood lead levels are 40 ug/100 g or less.

During the first two years that the ultimate removal criteria are being phased in, the return criteria have been set to assure that a worker's blood lead level has substantially declined during the period of removal. From March 1, 1979 to March 1, 1980, the blood lead level requiring employee medical removal is 80 ug/100 g.

Workers found to have a confirmed blood lead at this level or greater need only be removed from work having a daily 8 hour TWA exposure to lead at or above 100 ug/m(3). Workers so removed are to be returned to work when their blood lead levels are at or below 60 ug/100 g of whole blood. From March 1, 1980 to March 1, 1981, the blood lead level requiring medical removal is 70 ug/100 g. During this period workers need only be removed from jobs having a daily 8 hour TWA exposure to lead at or above 50 ug/m(3) and are to be returned to work when a level of 50 ug/100 g is achieved. Beginning March 1, 1981, return depends on a worker's blood lead level declining to 40 ug/100 g of whole blood.

As part of the standard, the employer is required to notify in writing each employee whose blood lead level exceeds 40 ug/100 g. In addition each such employee is to be informed that the standard requires medical removal with MRP benefits, discussed below, when an employee's blood lead level exceeds the above defined limits.

In addition to the above blood lead level criteria, temporary worker removal may also take place as a result of medical determinations and recommendations. Written medical opinions must be prepared after each examination pursuant to the standard. If the examining physician includes a medical finding, determination or opinion that the employee has a medical condition which places the employee at increased risk of material health impairment from exposure to lead, then the employee must be removed from exposure to lead at or above the action level. Alternatively, if the examining physician recommends special protective measures for an employee (e.g., use of a powered air purifying respirator) or recommends limitations on an employee's exposure to lead, then the employer must implement these recommendations. Recommendations may be more stringent than the specific provisions of the standard. The examining physician, therefore, is given broad flexibility to tailor special protective procedures to the needs of individual employees. This flexibility extends to the evaluation and management of pregnant workers and male and female workers who are planning to raise children. Based on the history, physical examination, and laboratory studies, the physician might recommend special protective measures or medical removal for an employee who is pregnant or who is planning to conceive a child when, in the physician's judgment, continued exposure to lead at the current job would pose a significant risk. The return of the employee to his or her former job status, or the removal of special protections or limitations, depends upon the examining physician determining that the employee is no longer at increased risk of material impairment or that special measures are no longer needed.

During the period of any form of special protection or removal, the employer must maintain the worker's earnings, seniority, and other employment rights and benefits (as though the worker had not been removed) for a period of up to 18 months. This economic protection will maximize meaningful worker participation in the medical surveillance program, and is appropriate as part of the employer's overall obligation to provide a safe and healthful workplace. The provisions of MRP benefits during the employee's removal period may, however, be conditioned upon participation in medical surveillance.

On rare occasions, an employee's blood lead level may not acceptably decline within 18 months of removal. This situation will arise only in unusual circumstances, thus the standard relies on an individual medical examination to determine how to protect such an employee. This medical determination is to be based on both laboratory values, including lead levels, zinc protoporphyrin levels, blood counts, and other tests felt to be warranted, as well as the physician's judgment that any symptoms or findings on physical examination are a result of lead toxicity. The medical determination may be that the employee is incapable of ever safely returning to his or her former job status. The medical determination may provide additional removal time past 18 months for some employees or specify special protective measures to be implemented.

The lead standard provides for a multiple physician review in cases where the employee wishes a second opinion concerning potential lead poisoning or toxicity. If an employee wishes a second opinion, he or she can make an appointment with a physician of his or her choice. This second physician will review the findings,

recommendations or determinations of the first physician and conduct any examinations, consultations or tests deemed necessary in an attempt to make a final medical determination. If the first and second physicians do not agree in their assessment they must try to resolve their differences. If they cannot reach an agreement then they must designate a third physician to resolve the dispute.

The employer must provide examining and consulting physicians with the following specific information: a copy of the lead regulations and all appendices, a description of the employee's duties as related to exposure, the exposure level to lead and any other toxic substances (if applicable), a description of personal protective equipment used, blood lead levels, and all prior written medical opinions regarding the employee in the employer's possession or control. The employer must also obtain from the physician and provide the employee with a written medical opinion containing blood lead levels, the physician's opinion as to whether the employee is at risk of material impairment to health, any recommended protective measures for the employee if further exposure is permitted, as well as any recommended limitations upon an employee's use of respirators.

Employers must instruct each physician not to reveal to the employer in writing or in any other way his or her findings, laboratory results, or diagnoses which are felt to be unrelated to occupational lead exposure. They must also instruct each physician to advise the employee of any occupationally or non-occupationally related medical condition requiring further treatment or evaluation.

The standard provides for the use of respirators where engineering and other primary controls have not been fully implemented. However, the use of respirator protection shall not be used in lieu of temporary medical removal due to elevated blood lead levels or findings that an employee is at risk of material health impairment. This is based on the numerous inadequacies of respirators including skin rash where the facepiece makes contact with the skin, unacceptable stress to breathing in some workers with underlying cardiopulmonary impairment, difficulty in providing adequate fit, the tendency for respirators to create additional hazards by interfering with vision, hearing, and mobility, and the difficulties of assuring the maximum effectiveness of a complicated work practice program involving respirators. Respirators do, however, serve a useful function where engineering and work practice controls are inadequate by providing supplementary, interim, or short-term protection, provided they are properly selected for the environment in which the employee will be working, properly fitted to the employee, maintained and cleaned periodically, and worn by the employee when required.

In its final standard on occupational exposure to inorganic lead, OSHA has prohibited prophylactic chelation. Diagnostic and therapeutic chelation are permitted only under the supervision of a licensed physician with appropriate medical monitoring in an acceptable clinical setting. The decision to initiate chelation therapy must be made on an individual basis and take into account the severity of symptoms felt to be a result of lead toxicity along with blood lead levels, ZPP levels, and other laboratory tests as appropriate. EDTA and penicillamine which are the primary chelating agents used in the therapy of occupational lead poisoning have significant potential side effects and their use must be justified on the basis of expected benefits to the worker. Unless frank and severe symptoms are present, therapeutic chelation is not recommended given the opportunity to remove a worker from exposure and allow the body to naturally excrete accumulated lead. As a diagnostic aid, the chelation mobilization test using CA-EDTA has limited applicability. According to some investigators, the test can differentiate between lead-induced and other nephropathies. The test may also provide an estimation of the mobile fraction of the total body lead burden.

Employers are required to assure that accurate records are maintained on exposure monitoring, medical surveillance, and medical removal for each employee. Exposure monitoring and medical surveillance records must be kept for 40 years or the duration of employment plus 20 years, whichever is longer, while medical removal records must be maintained for the duration of employment. All records required under the standard must be made available upon request to the Assistant Secretary of Labor for Occupational Safety and Health and the Director of the National Institute for Occupational Safety and Health. Employers must also make

environmental and biological monitoring and medical removal records available to affected employees and to former employees or their authorized employee representatives. Employees or their specifically designated representatives have access to their entire medical surveillance records.

In addition, the standard requires that the employer inform all workers exposed to lead at or above the action level of the provisions of the standard and all its appendices, the purpose and description of medical surveillance and provisions for medical removal protection if temporary removal is required. An understanding of the potential health effects of lead exposure by all exposed employees along with full understanding of their rights under the lead standard is essential for an effective monitoring program.

II. ADVERSE HEALTH EFFECTS OF INORGANIC LEAD

Although the toxicity of lead has been known for 2,000 years, the knowledge of the complex relationship between lead exposure and human response is still being refined. Significant research into the toxic properties of lead continues throughout the world, and it should be anticipated that our understanding of thresholds of effects and margins of safety will be improved in future years. The provisions of the lead standard are founded on two prime medical judgments: first, the prevention of adverse health effects from exposure to lead throughout a working lifetime requires that worker blood lead levels be maintained at or below 40 g/100 g and second, the blood lead levels of workers, male or female, who intend to parent in the near future should be maintained below 30 ug/100 g to minimize adverse reproductive health effects to the parents and developing fetus. The adverse effects of lead on reproduction are being actively researched and OSHA encourages the physician to remain abreast of recent developments in the area to best advise pregnant workers or workers planning to conceive children.

The spectrum of health effects caused by lead exposure can be subdivided into five developmental stages: normal, physiological changes of uncertain significance, pathophysiological changes, overt symptoms (morbidity), and mortality. Within this process there are no sharp distinctions, but rather a continuum of effects. Boundaries between categories overlap due to the wide variation of individual responses and exposures in the working population. OSHA's development of the lead standard focused on pathophysiological changes as well as later stages of disease.

1. Heme Synthesis Inhibition. The earliest demonstrated effect of lead involves its ability to inhibit at least two enzymes of the heme synthesis pathway at very low blood levels. Inhibition of delta aminolevulinic acid dehydrase (ALA-D) which catalyzes the conversion of delta-aminolevulinic acid (ALA) to protoporphyrin is observed at a blood lead level below 20 ug/100 g whole blood. At a blood lead level of 40 ug/100 g, more than 20% of the population would have 70% inhibition of ALA-D. There is an exponential increase in ALA excretion at blood lead levels greater than 40 ug/100 g.

Another enzyme, ferrochelatase, is also inhibited at low blood lead levels. Inhibition of ferrochelatase leads to increased free erythrocyte protoporphyrin (FEP) in the blood which can then bind to zinc to yield zinc protoporphyrin. At a blood lead level of 50 ug/100 g or greater, nearly 100% of the population will have an increase in FEP. There is also an exponential relationship between blood lead levels greater than 40 ug/100 g and the associated ZPP level, which has led to the development of the ZPP screening test for lead exposure.

While the significance of these effects is subject to debate, it is OSHA's position that these enzyme disturbances are early stages of a disease process which may eventually result in the clinical symptoms of lead poisoning. Whether or not the effects do progress to the later stages of clinical disease, disruption of these enzyme processes over a working lifetime is considered to be a material impairment of health.

One of the eventual results of lead-induced inhibition of enzymes in the heme synthesis pathway is anemia which can be asymptomatic if mild but associated with a wide array of symptoms including dizziness, fatigue, and tachycardia when more severe. Studies have indicated that lead levels as low as 50 ug/100 g can be

associated with a definite decreased hemoglobin, although most cases of lead-induced anemia, as well as shortened red-cell survival times, occur at lead levels exceeding 80 ug/100 g. Inhibited hemoglobin synthesis is more common in chronic cases whereas shortened erythrocyte life span is more common in acute cases.

In lead-induced anemias, there is usually a reticulocytosis along with the presence of basophilic stippling, and ringed sideroblasts, although none of the above are pathognomonic for lead-induced anemia.

2. Neurological Effects. Inorganic lead has been found to have toxic effects on both the central and peripheral nervous systems. The earliest stages of lead-induced central nervous system effects first manifest themselves in the form of behavioral disturbances and central nervous system symptoms including irritability, restlessness, insomnia and other sleep disturbances, fatigue, vertigo, headache, poor memory, tremor, depression, and apathy. With more severe exposure, symptoms can progress to drowsiness, stupor, hallucinations, delirium, convulsions and coma.

The most severe and acute form of lead poisoning which usually follows ingestion or inhalation of large amounts of lead is acute encephalopathy which may arise precipitously with the onset of intractable seizures, coma, cardiorespiratory arrest, and death within 48 hours.

While there is disagreement about what exposure levels are needed to produce the earliest symptoms, most experts agree that symptoms definitely can occur at blood lead levels of 60 ug/100 g whole blood and therefore recommend a 40 ug/100 g maximum. The central nervous system effects frequently are not reversible following discontinued exposure or chelation therapy and when improvement does occur, it is almost always only partial.

The peripheral neuropathy resulting from lead exposure characteristically involves only motor function with minimal sensory damage and has a marked predilection for the extensor muscles of the most active extremity. The peripheral neuropathy can occur with varying degrees of severity. The earliest and mildest form which can be detected in workers with blood lead levels as low as 50 ug/100 g is manifested by slowing of motor nerve conduction velocity often without clinical symptoms. With progression of the neuropathy there is development of painless extensor muscle weakness usually involving the extensor muscles of the fingers and hand in the most active upper extremity, followed in severe cases by wrist drop or, much less commonly, foot drop.

In addition to slowing of nerve conduction, electromyographical studies in patients with blood lead levels greater than 50 ug/100 g have demonstrated a decrease in the number of acting motor unit potentials, an increase in the duration of motor unit potentials, and spontaneous pathological activity including fibrillations and fasciculations. Whether these effects occur at levels of 40 ug/100 g is undetermined.

While the peripheral neuropathies can occasionally be reversed with therapy, again such recovery is not assured particularly in the more severe neuropathies and often improvement is only partial. The lack of reversibility is felt to be due in part to segmental demyelination.

3. Gastrointestinal. Lead may also affect the gastrointestinal system producing abdominal colic or diffuse abdominal pain, constipation, obstipation, diarrhea, anorexia, nausea and vomiting. Lead colic rarely develops at blood lead levels below 80 ug/100 g.

4. Renal. Renal toxicity represents one of the most serious health effects of lead poisoning. In the early stages of disease nuclear inclusion bodies can frequently be identified in proximal renal tubular cells. Renal function remains normal and the changes in this stage are probably reversible. With more advanced disease there is progressive interstitial fibrosis and impaired renal function. Eventually extensive interstitial fibrosis ensues with sclerotic glomeruli and dilated and atrophied proximal tubules; all represent end stage kidney disease. Azotemia can be progressive, eventually resulting in frank uremia necessitating dialysis. There is occasionally associated hypertension and hyperuricemia with or without gout.

Early kidney disease is difficult to detect. The urinalysis is normal in early lead nephropathy and the blood urea

nitrogen and serum creatinine increase only when two-thirds of kidney function is lost. Measurement of creatinine clearance can often detect earlier disease as can other methods of measurement of glomerular filtration rate. An abnormal Ca-EDTA mobilization test has been used to differentiate between lead-induced and other nephropathies, but this procedure is not widely accepted. A form of Fanconi syndrome with aminoaciduria, glycosuria, and hyperphosphaturia indicating severe injury to the proximal renal tubules is occasionally seen in children.

5. Reproductive effects. Exposure to lead can have serious effects on reproductive function in both males and females. In male workers exposed to lead there can be a decrease in sexual drive, impotence, decreased ability to produce healthy sperm, and sterility. Malformed sperm (teratospermia), decreased number of sperm (hypospermia), and sperm with decreased motility (asthenospermia) can all occur. Teratospermia has been noted at mean blood lead levels of 53 ug/100 g and hypospermia and asthenospermia at 41 ug/100 g. Furthermore, there appears to be a dose-response relationship for teratospermia in lead exposed workers.

Women exposed to lead may experience menstrual disturbances including dysmenorrhea, menorrhagia and amenorrhea. Following exposure to lead, women have a higher frequency of sterility, premature births, spontaneous miscarriages, and stillbirths.

Germ cells can be affected by lead and cause genetic damage in the egg or sperm cells before conception and result in failure to implant, miscarriage, stillbirth, or birth defects.

Infants of mothers with lead poisoning have a higher mortality during the first year and suffer from lowered birth weights, slower growth, and nervous system disorders.

Lead can pass through the placental barrier and lead levels in the mother's blood are comparable to concentrations of lead in the umbilical cord at birth. Transplacental passage becomes detectable at 12-14 weeks of gestation and increases until birth.

There is little direct data on damage to the fetus from exposure to lead but it is generally assumed that the fetus and newborn would be at least as susceptible to neurological damage as young children. Blood lead levels of 50-60 ug/100 g in children can cause significant neurobehavioral impairments and there is evidence of hyperactivity at blood levels as low as 25 ug/100 g. Given the overall body of literature concerning the adverse health effects of lead in children, OSHA feels that the blood lead level in children should be maintained below 30 ug/100 g with a population mean of 15 ug/100 g. Blood lead levels in the fetus and newborn likewise should not exceed 30 ug/100 g.

Because of lead's ability to pass through the placental barrier and also because of the demonstrated adverse effects of lead on reproductive function in both the male and female as well as the risk of genetic damage of lead on both the ovum and sperm, OSHA recommends a 30 ug/100 g maximum permissible blood lead level in both males and females who wish to bear children.

6. Other toxic effects. Debate and research continue on the effects of lead on the human body. Hypertension has frequently been noted in occupationally exposed individuals although it is difficult to assess whether this is due to lead's adverse effects on the kidney or if some other mechanism is involved. Vascular and electrocardiographic changes have been detected but have not been well characterized. Lead is thought to impair thyroid function and interfere with the pituitary-adrenal axis, but again these effects have not been well defined.

III. MEDICAL EVALUATION

The most important principle in evaluating a worker for any occupational disease including lead poisoning is a high index of suspicion on the part of the examining physician. As discussed in Section 2, lead can affect numerous organ systems and produce a wide array of signs and symptoms, most of which are non-specific and

subtle in nature at least in the early stages of disease. Unless serious concern for lead toxicity is present, many of the early clues to diagnosis may easily be overlooked.

The crucial initial step in the medical evaluation is recognizing that a worker's employment can result in exposure to lead. The worker will frequently be able to define exposures to lead and lead containing materials but often will not volunteer this information unless specifically asked. In other situations the worker may not know of any exposures to lead but the suspicion might be raised on the part of the physician because of the industry or occupation of the worker. Potential occupational exposure to lead and its compounds occur in at least 120 occupations, including lead smelting, the manufacture of lead storage batteries, the manufacture of lead pigments and products containing pigments, solder manufacture, shipbuilding and ship repair, auto manufacturing, construction, and painting.

Once the possibility for lead exposure is raised, the focus can then be directed toward eliciting information from the medical history, physical exam, and finally from laboratory data to evaluate the worker for potential lead toxicity.

A complete and detailed work history is important in the initial evaluation. A listing of all previous employment with information on work processes, exposure to fumes or dust, known exposures to lead or other toxic substances, respiratory protection used, and previous medical surveillance should all be included in the worker's record. Where exposure to lead is suspected, information concerning on-the-job personal hygiene, smoking or eating habits in work areas, laundry procedures, and use of any protective clothing or respiratory protection equipment should be noted. A complete work history is essential in the medical evaluation of a worker with suspected lead toxicity, especially when long term effects such as neurotoxicity and nephrotoxicity are considered.

The medical history is also of fundamental importance and should include a listing of all past and current medical conditions, current medications including proprietary drug intake, previous surgeries and hospitalizations, allergies, smoking history, alcohol consumption, and also non-occupational lead exposures such as hobbies (hunting, riflery). Also known childhood exposures should be elicited. Any previous history of hematological, neurological, gastrointestinal, renal, psychological, gynecological, genetic, or reproductive problems should be specifically noted.

A careful and complete review of systems must be performed to assess both recognized complaints and subtle or slowly acquired symptoms which the worker might not appreciate as being significant. The review of symptoms should include the following:

General-weight loss, fatigue, decreased appetite.

Head, Eyes, Ears, Nose, Throat (HEENT)-headaches, visual disturbances or decreased visual acuity, hearing deficits or tinnitus, pigmentation of the oral mucosa, or metallic taste in mouth.

Cardio-pulmonary-shortness of breath, cough, chest pains, palpitations, or orthopnea.

Gastrointestinal-nausea, vomiting, heartburn, abdominal pain, constipation or diarrhea.

Neurologic-irritability, insomnia, weakness (fatigue), dizziness, loss of memory, confusion, hallucinations, incoordination, ataxia, decreased strength in hands or feet, disturbances in gait, difficulty in climbing stairs, or seizures.

Hematologic-pallor, easy fatigability, abnormal blood loss, melena.

Reproductive (male and female and spouse where relevant)-history of infertility, impotence, loss of libido, abnormal menstrual periods, history of miscarriages, stillbirths, or children with birth defects.

Musculo-skeletal-muscle and joint pains.

The physical examination should emphasize the neurological, gastrointestinal, and cardiovascular systems. The worker's weight and blood pressure should be recorded and the oral mucosa checked for pigmentation characteristic of a possible Burtonian or lead line on the gingiva. It should be noted, however, that the lead line may not be present even in severe lead poisoning if good oral hygiene is practiced.

The presence of pallor on skin examination may indicate an anemia, which if severe might also be associated with a tachycardia. If an anemia is suspected, an active search for blood loss should be undertaken including potential blood loss through the gastrointestinal tract.

A complete neurological examination should include an adequate mental status evaluation including a search for behavioral and psychological disturbances, memory testing, evaluation for irritability, insomnia, hallucinations, and mental clouding. Gait and coordination should be examined along with close observation for tremor. A detailed evaluation of peripheral nerve function including careful sensory and motor function testing is warranted. Strength testing particularly of extensor muscle groups of all extremities is of fundamental importance.

Cranial nerve evaluation should also be included in the routine examination.

The abdominal examination should include auscultation for bowel sounds and abdominal bruits and palpation for organomegaly, masses, and diffuse abdominal tenderness.

Cardiovascular examination should evaluate possible early signs of congestive heart failure. Pulmonary status should be addressed particularly if respirator protection is contemplated.

As part of the medical evaluation, the lead standard requires the following laboratory studies:

1. Blood lead level

2. Hemoglobin and hematocrit determinations, red cell indices, and examination of the peripheral blood smear to evaluate red blood cell morphology

3. Blood urea nitrogen

4. Serum creatinine

5. Routine urinalysis with microscopic examination.

6. A zinc protoporphyrin level.

In addition to the above, the physician is authorized to order any further laboratory or other tests which he or she deems necessary in accordance with sound medical practice. The evaluation must also include pregnancy testing or laboratory evaluation of male fertility if requested by the employee.

Additional tests which are probably not warranted on a routine basis but may be appropriate when blood lead and ZPP levels are equivocal include delta aminolevulinic acid and coproporphyrin concentrations in the urine, and dark-field illumination for detection of basophilic stippling in red blood cells.

If an anemia is detected further studies including a careful examination of the peripheral smear, reticulocyte count, stool for occult blood, serum iron, total iron binding capacity, bilirubin, and, if appropriate, vitamin B12 and folate may be of value in attempting to identify the cause of the anemia.

If a peripheral neuropathy is suspected, nerve conduction studies are warranted both for diagnosis and as a basis to monitor any therapy.

If renal disease is questioned, a 24 hour urine collection for creatinine clearance, protein, and electrolytes may

be indicated. Elevated uric acid levels may result from lead-induced renal disease and a serum uric acid level might be performed.

An electrocardiogram and chest x-ray may be obtained as deemed appropriate.

Sophisticated and highly specialized testing should not be done routinely and where indicated should be under the direction of a specialist.

IV. LABORATORY EVALUATION

The blood lead level at present remains the single most important test to monitor lead exposure and is the test used in the medical surveillance program under the lead standard to guide employee medical removal. The ZPP has several advantages over the blood lead level. Because of its relatively recent development and the lack of extensive data concerning its interpretation, the ZPP currently remains an ancillary test.

This section will discuss the blood lead level and ZPP in detail and will outline their relative advantages and disadvantages. Other blood tests currently available to evaluate lead exposure will also be reviewed.

The blood lead level is a good index of current or recent lead absorption when there is no anemia present and when the worker has not taken any chelating agents. However, blood lead levels along with urinary lead levels do not necessarily indicate the total body burden of lead and are not adequate measures of past exposure. One reason for this is that lead has a high affinity for bone and up to 90% of the body's total lead is deposited there. A very important component of the total lead body burden is lead in soft tissue (liver, kidney, and brain). This fraction of the lead body burden, the biologically active lead, is not entirely reflected by blood lead levels since it is a function of the dynamics of lead absorption, distribution, deposition in bone and excretion. Following discontinuation of exposure to lead, the excess body burden is only slowly mobilized from bone and other relatively stable body stores and excreted. Consequently, a high blood lead level may only represent recent heavy exposure to lead without a significant total body excess and likewise a low blood lead level does not exclude an elevated total body burden of lead.

Also due to its correlation with recent exposures, the blood lead level may vary considerably over short time intervals.

To minimize laboratory error and erroneous results due to contamination, blood specimens must be carefully collected after thorough cleaning of the skin with appropriate methods using lead-free blood containers and analyzed by a reliable laboratory. Under the standard, samples must be analyzed in laboratories which are approved by the Center for Disease Control (CDC) or which have received satisfactory grades in proficiency testing by the CDC in the previous year. Analysis is to be made using atomic absorption spectrophotometry, anodic stripping voltammetry or any method which meets the accuracy requirements set forth by the standard.

The determination of lead in urine is generally considered a less reliable monitoring technique than analysis of whole blood primarily due to individual variability in urinary excretion capacity as well as the technical difficulty of obtaining accurate 24 hour urine collections. In addition, workers with renal insufficiency, whether due to lead or some other cause, may have decreased lead clearance and consequently urine lead levels may underestimate the true lead burden. Therefore, urine lead levels should not be used as a routine test.

The zinc protoporphyrin test, unlike the blood lead determination, measures an adverse metabolic effect of lead and as such is a better indicator of lead toxicity than the level of blood lead itself. The level of ZPP reflects lead absorption over the preceding 3 to 4 months, and therefore is a better indicator of lead body burden. The ZPP requires more time than the blood lead to read significantly elevated levels; the return to normal after discontinuing lead exposure is also slower. Furthermore, the ZPP test is simpler, faster, and less expensive to perform and no contamination is possible. Many investigators believe it is the most reliable means of monitoring chronic lead absorption.

Zinc protoporphyrin results from the inhibition of the enzyme ferrochelatase which catalyzes the insertion of an iron molecule into the protoporphyrin molecule, which then becomes heme. If iron is not inserted into the molecule then zinc, having a greater affinity for protoporphyrin, takes the place of the iron, forming ZPP.

An elevation in the level of circulating ZPP may occur at blood lead levels as low as 20-30 ug/100 g in some workers. Once the blood lead level has reached 40 ug/100 g there is more marked rise in the ZPP value from its normal range of less than 100 ug/100 ml. Increases in blood lead levels beyond 40 ug/100 g are associated with exponential increases in ZPP.

Whereas blood lead levels fluctuate over short time spans, ZPP levels remain relatively stable. ZPP is measured directly in red blood cells and is present for the cell's entire 120 day life-span. Therefore, the ZPP level in blood reflects the average ZPP production over the previous 3-4 months and consequently the average lead exposure during that time interval.

It is recommended that a hematocrit be determined whenever a confirmed ZPP of 50 ug/100 ml whole blood is obtained to rule out a significant underlying anemia. If the ZPP is in excess of 100 ug/100 ml and not associated with abnormal elevations in blood lead levels, the laboratory should be checked to be sure that blood leads were determined using atomic absorption spectrophotometry anodic stripping voltammetry, or any method which meets the accuracy requirements set forth by the standard by a CDC approved laboratory which is experienced in lead level determinations. Repeat periodic blood lead studies should be obtained in all individuals with elevated ZPP levels to be certain that an associated elevated blood lead level has not been missed due to transient fluctuations in blood leads.

ZPP has a characteristic fluorescence spectrum with a peak at 594 nm which is detectable with a hematofluorimeter. The hematofluorimeter is accurate and portable and can provide on-site, instantaneous results for workers who can be frequently tested via a finger prick.

However, careful attention must be given to calibration and quality control procedures. Limited data on blood lead-ZPP correlations and the ZPP levels which are associated with the adverse health effects discussed in Section 2 are the major limitations of the test. Also it is difficult to correlate ZPP levels with environmental exposure and there is some variation of response with age and sex. Nevertheless, the ZPP promises to be an important diagnostic test for the early detection of lead toxicity and its value will increase as more data is collected regarding its relationship to other manifestations of lead poisoning.

Levels of delta-aminolevulinic acid (ALA) in the urine are also used as a measure of lead exposure. Increasing concentrations of ALA are believed to result from the inhibition of the enzyme delta-aminolevulinic acid dehydrase (ALA-D). Although the test is relatively easy to perform, inexpensive, and rapid, the disadvantages include variability in results, the necessity to collect a complete 24 hour urine sample which has a specific gravity greater than 1.010, and also the fact that ALA decomposes in the presence of light.

The pattern of porphyrin excretion in the urine can also be helpful in identifying lead intoxication. With lead poisoning, the urine concentrations of coproporphyrins I and II, porphobilinogen and uroporphyrin I rise. The most important increase, however, is that of coproporphyrin III; levels may exceed 5,000 ug/1 in the urine in lead poisoned individuals, but its correlation with blood lead levels and ZPP are not as good as those of ALA. Increases in urinary porphyrins are not diagnostic of lead toxicity and may be seen in porphyria, some liver diseases, and in patients with high reticulocyte counts.

Summary. The Occupational Safety and Health Administration's standard for inorganic lead places significant emphasis on the medical surveillance of all workers exposed to levels of inorganic lead above the action level of 30 ug/m(3) TWA. The physician has a fundamental role in this surveillance program, and in the operation of the medical removal protection program.

Even with adequate worker education on the adverse health effects of lead and appropriate training in work practices, personal hygiene and other control measures, the physician has a primary responsibility for evaluating potential lead toxicity in the worker. It is only through a careful and detailed medical and work history, a complete physical examination and appropriate laboratory testing that an accurate assessment can be made. Many of the adverse health effects of lead toxicity are either irreversible or only partially reversible and therefore early detection of disease is very important.

This document outlines the medical monitoring program as defined by the occupational safety and health standard for inorganic lead. It reviews the adverse health effects of lead poisoning and describes the important elements of the history and physical examinations as they relate to these adverse effects. Finally, the appropriate laboratory testing for evaluating lead exposure and toxicity is presented.

It is hoped that this review and discussion will give the physician a better understanding of the OSHA standard with the ultimate goal of protecting the health and well-being of the worker exposed to lead under his or her care.

[56 FR 24686, May 31, 1991; 60 FR 52856, Oct. 11, 1995]

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Lead in Construction

OSHA 3142-12R 2004

Employers are responsible for providing a safe and healthy workplace for their employees. OSHA's role is to promote the safety and health of America's working men and women by setting and enforcing standards; providing training, outreach and education; establishing partnerships; and encouraging continual improvement in workplace safety and health.

This publication provides a general overview of a particular standards-related topic. This publication does not alter or determine compliance responsibilities which are set forth in OSHA standards, and the *Occupational Safety and Health Act of 1970*. Moreover, because interpretations and enforcement policy may change over time, for additional guidance on OSHA compliance requirements the reader should consult current OSHA administrative interpretations and decisions by the Occupational Safety and Health Review Commission and the courts.

This information is available to sensory impaired individuals upon request. Voice phone: (202) 693-1999; teletypewriter (TTY) number: (877) 889-5627.

Lead in Construction

U.S. Department of Labor

Occupational Safety and Health Administration

OSHA 3142-12R
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Contents

Health Hazards of Lead Exposure

Pure lead (Pb) is a heavy metal at room temperature and pressure. A basic chemical element, it can combine with various other substances to form numerous lead compounds.

Lead has been poisoning workers for thousands of years. Lead can damage the central nervous system, cardiovascular system, reproductive system, hematological system, and kidneys. When absorbed into the body in high enough doses, lead can be toxic.

In addition, workers' lead exposure can harm their children's development.

Short-term (acute) overexposure–as short as days--can cause acute encephalopathy, a condition affecting the brain that develops quickly into seizures, coma, and death from cardiorespiratory arrest. Short-term occupational exposures of this type are highly unusual but not impossible.

Extended, long-term (chronic) overexposure can result in severe damage to the central nervous system, particularly the brain. It can also damage the blood-forming, urinary, and reproductive systems. There is no sharp dividing line between rapidly developing acute effects of lead and chronic effects that take longer to develop.

SYMPTOMS OF CHRONIC OVEREXPOSURE

Some of the common symptoms include:

- Loss of appetite;
- Constipation;
- Nausea;
- Excessive tiredness;
- Headache;
- Fine tremors;
- Colic with severe abdominal pain;
- Metallic taste in the mouth;
- Weakness;
- Nervous irritability;
- Hyperactivity;

- Muscle and joint pain or soreness;
- Anxiety;
- Pallor;
- Insomnia;
- Numbness; and
- Dizziness.

REPRODUCTIVE RISKS

Lead is toxic to both male and female reproductive systems. Lead can alter the structure of sperm cells and there is evidence of miscarriage and stillbirth in women exposed to lead or whose partners have been exposed. Children born to parents who were exposed to excess lead levels are more likely to have birth defects, mental retardation, or behavioral disorders or to die during the first year of childhood.

Workers who desire medical advice about reproductive issues related to lead should contact qualified medical personnel to arrange for a job evaluation and medical followup--particularly if they are pregnant or actively seeking to have a child. Employers whose employees may be exposed to lead and who have been contacted by employees with concerns about reproductive issues must make medical examinations and consultations available.

CHELATING AGENTS

Under certain limited circumstances, a physician may prescribe special drugs called chelating agents to reduce the amount of lead absorbed in body tissues. Using chelation as a preventive measure--that is, to lower blood level but continue to expose a worker--is prohibited and therapeutic or diagnostic chelations of lead that are required must be done under the supervision of a licensed physician in a clinical setting, with thorough and appropriate medical monitoring. The employee must be notified in writing before treatment of potential consequences and allowed to obtain a second opinion.

Worker Exposure

Lead is most commonly absorbed into the body by inhalation. When workers breathe in lead as a dust, fume, or mist, their lungs and upper respiratory tract absorb it into the body. They can also absorb lead through the digestive system if it enters the mouth and is ingested.

A significant portion of the lead inhaled or ingested gets into the bloodstream. Once in the bloodstream, lead circulates through the body and is stored in various organs and body tissues. Some of this lead is filtered out of the body quickly and excreted, but some remains in the blood and tissues. As exposure continues, the amount stored will increase if the body absorbs more lead than it excretes. The lead stored in the tissue can slowly cause irreversible damage, first to individual cells, then to organs and whole body systems.

Construction Workers and Lead Exposure

HOW LEAD IS USED

In construction, lead is used frequently for roofs, cornices, tank linings, and electrical conduits. In plumbing, soft solder, used chiefly for soldering tinplate and copper pipe joints, is an alloy of lead and tin. Soft solder has been banned for many uses in the United States. In addition, the Consumer Product Safety Commission bans the use of lead-based paint in residences. Because lead-based paint inhibits the rusting and corrosion of iron and steel, however, lead continues to be used on bridges, railways, ships, lighthouses, and other steel structures, although substitute coatings are available.

Construction projects vary in their scope and potential for exposing workers to lead and other hazards. Projects such as removing paint from a few interior residential doors may involve limited exposure. Others projects, however, may involve removing or stripping substantial quantities of lead-based paints on large bridges and other structures.

MOST VULNERABLE WORKERS

Workers potentially at risk for lead exposure include those involved in iron work; demolition work; painting; lead-based paint

abatement; plumbing; heating and air conditioning maintenance and repair; electrical work; and carpentry, renovation, and remodeling work. Plumbers, welders, and painters are among those workers most exposed to lead. Significant lead exposures also can arise from removing paint from surfaces previously coated with lead-based paint such as bridges, residences being renovated, and structures being demolished or salvaged. With the increase in highway work, bridge repair, residential lead abatement, and residential remodeling, the potential for exposure to lead-based paint has become more common.

Workers at the highest risk of lead exposure are those involved in:

- Abrasive blasting and
- Welding, cutting, and burning on steel structures.

Other operations with the potential to expose workers to lead include:

- Lead burning;
- Using lead-containing mortar;
- Power tool cleaning without dust collection systems;
- Rivet busting;
- Cleanup activities where dry expendable abrasives are used;
- Movement and removal of abrasive blasting enclosures;
- Manual dry scraping and sanding;
- Manual demolition of structures;
- Heat-gun applications;
- Power tool cleaning with dust collection systems; and
- Spray painting with lead-based paint.

OSHA's Lead Standard

OSHA's Lead Standard for the Construction Industry, Title 29 Code of Federal Regulations 1926.62, covers lead in a variety of forms, including metallic lead, all inorganic lead compounds, and organic lead soaps.

EXPOSURE LIMITS

The standard establishes maximum limits of exposure to lead for all workers covered, including a permissible exposure limit (PEL) and action level (AL).

The PEL sets the maximum worker exposure to lead: 50 micrograms of lead per cubic meter of air (50µg/m3) averaged over an eight-hour period. If employees are exposed to lead for more than eight hours in a workday, their allowable exposure as a TWA for that day must be reduced according to this formula:

Employee exposure (in µg/m3) = 400 divided by the hours worked in the day.

The AL, regardless of respirator use, is an airborne concentration of 30µg/m3, averaged over an eight-hour period. The AL is the level at which an employer must begin specific compliance activities outlined in the standard.

APPLICABILITY TO CONSTRUCTION

OSHA's lead in construction standard applies to all construction work where an employee may be exposed to lead. All work related to construction, alteration, or repair, including painting and decorating, is included. Under this standard, construction includes, but is not limited to:

- Demolition or salvage of structures where lead or materials containing lead are present;
- Removal or encapsulation of materials containing lead;
- New construction, alteration, repair, or renovation of structures, substrates, or portions or materials containing lead;
- Installation of products containing lead;
- Lead contamination from emergency cleanup;
- Transportation, disposal, storage, or containment of lead or materials containing lead where construction activities are performed; and
- Maintenance operations associated with these construction activities.

Employer Responsibilities

WORKER PROTECTIONS

Employers of construction workers are responsible for developing and implementing a worker protection program. At a minimum, the employer's worker protection program for employees exposed to lead above the PEL should include:

- Hazard determination, including exposure assessment;
- Medical surveillance and provisions for medical removal;
- Job-specific compliance programs;
- Engineering and work practice controls;
- Respiratory protection;
- Protective clothing and equipment;
- Housekeeping;
- Hygiene facilities and practices;
- Signs;
- Employee information and training; and
- Recordkeeping.

Because lead is a cumulative and persistent toxic substance and health effects may result from exposure over prolonged periods, employers must use these precautions where feasible to minimize employee exposure to lead.

The employer should, as needed, consult a qualified safety and health professional to develop and implement an effective, site-specific worker protection program. These professionals may work independently or may be associated with an insurance carrier, trade organization, or on-site consultation program.

ELEMENTS OF A COMPLIANCE PROGRAM

For each job where employee exposure exceeds the PEL, the employer must establish and implement a written compliance program to reduce employee exposure to the PEL or below. The compliance program must provide for frequent and regular inspections of job sites, materials, and equipment by a competent person. Written programs, which must be reviewed and updated at least every six months, must include:

- A description of each activity in which lead is emitted (such as equipment used, material involved, controls in place, crew size, employee job responsibilities, operating procedures, and maintenance practices);
- The means to be used to achieve compliance and engineering plans and studies used to determine the engineering controls selected where they are required;
- Information on the technology considered to meet the PEL;
- Air monitoring data that document the source of lead emissions;
- A detailed schedule for implementing the program, including copies of documentation (such as purchase orders for equipment, construction contracts);
- A work practice program;
- An administrative control schedule, if applicable; and
- Arrangements made among contractors on multi-contractor sites to inform employees of potential lead exposure.

Hazard Assessment

An employer is required to conduct an initial employee exposure assessment of whether employees are exposed to lead at or above the AL based on:

- Any information, observation, or calculation that indicates employee exposure to lead;
- Any previous measurements of airborne lead; and
- Any employee complaints of symptoms attributable to lead exposure.

Objective data and historical measurements of lead may be used to satisfy the standard's initial monitoring requirements.

INITIAL EMPLOYEE EXPOSURE ASSESSMENT

Initial monitoring may be limited to a representative sample of those employees exposed to the greatest concentrations of airborne lead. Representative exposure sampling is permitted when there are a number of employees performing the same job, with

lead exposure of similar duration and level, under essentially the same conditions. For employees engaged in similar work, the standard requires that the members of the group reasonably expected to have the highest exposure levels be monitored. This result is then attributed to the other employees of the group.

The employer must establish and maintain an accurate record documenting the nature and relevancy of previous exposure data. Instead of performing initial monitoring, the employer may in some cases rely on objective data that demonstrate that a particular lead-containing material or product cannot result in employee exposure at or above the action level when it is processed, used, or handled.

BIOLOGICAL MONITORING TESTS

Analysis of blood lead samples must be conducted by an OSHA-approved lab and be accurate (to a confidence level of 95 percent) within plus or minus 15 percent, or 6 µg/dl, whichever is greater. If an employee's airborne lead level is at or above the AL for more than 30 days in any consecutive 12 months, the employer must make biological monitoring available on the following schedule:

- At least every two months for the first six months and every six months thereafter for employees exposed at or above the action level for more than 30 days annually;
- At least every two months for employees whose last blood sampling and analysis indicated a blood lead level at or above 40 µg/dl; and
- At least monthly while an employee is removed from exposure due an elevated blood lead level.

PENDING EMPLOYEE EXPOSURE ASSESSMENT

Until the employer performs an exposure assessment and documents that employees are not exposed above the PEL, OSHA requires some degree of interim protection for employees. This means providing respiratory protection, protective work clothing and equipment, hygiene facilities, biological monitoring, and training—as specified by the standards—for certain tasks prone to produce high exposure. These include:

- Manual demolition of structures such as dry wall, manual scraping, manual sanding, and use of a heat gun where lead-containing coatings or paints are present;
- Power tool cleaning with or without local exhaust ventilation;
- Spray painting with lead-containing paint;
- Lead burning;
- Use of lead-containing mortar;
- Abrasive blasting, rivet busting, welding, cutting, or torch-burning on any structure where lead-containing coatings or paint are present;
- Abrasive blasting enclosure movement and removal;
- Cleanup of activities where dry expendable abrasives are used; and
- Any other task the employer believes may cause exposures in excess of the PEL.

TEST RESULTS SHOWING NO OVEREXPOSURES

If the initial assessment indicates that no employee is exposed above the AL, the employer may discontinue monitoring. Further exposure testing is not required unless there is a change in processes or controls that may result in additional employees being exposed to lead at or above the AL, or may result in employees already exposed at or above the AL being exposed above the PEL. The employer must keep a written record of the determination, including the date, location within the work site, and the name and social security number of each monitored employee.

EMPLOYEE NOTIFICATION OF MONITORING RESULTS

The employer must notify each employee in writing of employee exposure assessment results within five working days of receiving them. Whenever the results indicate that the representative employee exposure, without the use of respirators, is above the PEL, the employer must include a written notice stating that the employee's exposure exceeded the PEL and describing corrective action taken or to be taken to reduce exposure to or below the PEL.

Medical Surveillance

When an employee's airborne exposure is at or above the AL for more than 30 days in any consecutive 12 months, an immediate medical consultation is required when the employee notifies the employer that he or she:

- Has developed signs or symptoms commonly associated with lead-related disease;
- Has demonstrated difficulty in breathing during respirator use or a fit test;
- Desires medical advice concerning the effects of past or current lead exposure on the employee's ability to have a healthy child; and
- Is under medical removal and has a medically appropriate need.

MEDICAL EXAMS

The best indicator of personal lead exposure is through a blood test to indicate elevated blood lead levels. A medical exam must also include:

- Detailed work and medical histories, with particular attention to past lead exposure (occupational and nonoccupational), personal habits (smoking and hygiene), and past gastro-intestinal, hematologic, renal, cardiovascular, reproductive, and neurological problems;
- A thorough physical exam, with particular attention to gums, teeth, hematologic, gastrointestinal, renal, cardiovascular, and neurological systems; evaluation of lung function if respirators are used;
- A blood pressure measurement;
- A blood sample and analysis to determine blood lead level;

  • Hemoglobin and hematocrit determinations, red cell indices, and an exam of peripheral smear morphology; and

  • Zinc protopor-phyrin; blood urea nitrogen; and serum creatinine;
- A routine urinalysis with microscopic exam; and
- Any lab or other test the examining physician deems necessary.

INFORMATION FOR THE EXAMINING PHYSICIAN

The employer must provide all examining physicians with a copy of the lead in construction standard, including all appendices, a description of the affected employee's duties as they relate to the employee's exposure, the employee's lead exposure level or anticipated exposure level, a description of personal protective equipment used or to be used, prior blood lead determinations, and all prior written medical opinions for the employee.

WHEN MONITORING SHOWS EMPLOYEE EXPOSURES ABOVE THE AL

Employers must make available, at no cost to the employee, initial medical surveillance for employees exposed to lead on the job at or above the action level on any one day per year. This initial medical surveillance consists of biological monitoring in the form of blood sampling and analysis for lead and zinc protoporyrin (ZPP) levels. In addition, a medical surveillance program with biological monitoring must be made available to any employee exposed at or above the action level for more than 30 days in any consecutive 12 months.

AFTER THE MEDICAL EXAMINATION

Employers must obtain and provide the employee a copy of a written opinion from each examining or consulting physician that contains only information related to occupational exposure to lead and must include:

- Whether the employee has any detected medical condition that would increase the health risk from lead exposure;
- Any special protective measures or limitations on the worker's exposure to lead,
- Any limitation on respirator use; and
- Results of the blood lead determinations.

In addition, the written statement may include a statement that the physician has informed the employee of the results of the consultation or medical examination and any medical condition that may require further examination or treatment.

The employer must instruct the physician that findings, including lab results or diagnoses unrelated to the worker's lead exposure, must not be revealed to the employer or included in the written opinion to the employer. The employer must also instruct the physician to advise employees of any medical condition, occupational or non-occupational, that necessitates further evaluation or treatment. In addition, some states also require laboratories and health care providers to report cases of elevated blood lead concentrations to their state health departments.

Medical Removal Provisions

Temporary medical removal can result from an elevated blood level or a written medical opinion. More specifically, the employer is required to remove from work an employee with a lead exposure at or above the AL each time periodic and follow-up (within two weeks of the periodic test) blood sampling tests indicate that the employee's blood level is at or above 50 µg /dl. The employer also must remove from work an employee with lead exposure at or above the AL each time a final medical determination indicates that the employee needs reduced lead exposure for medical reasons. If the physician who is implementing the employer's medical program makes a final written opinion recommending the employee's removal or other special protective measures, the employer must implement the physician's recommendation.

For an employee removed from exposure to lead at or above the AL due to a blood lead level at or above 50 µg/dl, the employer may return that employee to former job status when two consecutive blood sampling tests indicate that the employee's blood lead level is below 40 µg /dl. For an employee removed from exposure to lead due to a final medical determination, the employee must be returned when a subsequent final medical determination results in a medical finding, determination, or opinion that the employee no longer has a detected medical condition that places the employee at increased risk of lead exposure.

The employer must remove any limitations placed on employees or end any special protective measures when a subsequent final

medical determination indicates they are no longer necessary. If the former position no longer exists, the employee is returned consistent with whatever job assignment discretion the employer would have had if no removal occurred.

WORKER PROTECTIONS AND BENEFITS

The employer must provide up to 18 months of medical removal protection (MRP) benefits each time an employee is removed from lead exposure or medically limited. As long as the position/job exists, the employer must maintain the earnings, seniority, and other employment rights and benefits as though the employee had not been removed from the job or otherwise medically limited. The employer may condition medical removal protection benefits on the employee's participation in followup medical surveillance.

If a removed employee files a worker's compensation claim or other compensation for lost wages due to a lead-related disability, the employer must continue medical removal protection benefits until the claim is resolved. However, the employer's MRP benefits obligation will be reduced by the amount that the employee receives from these sources. Also, the employer's MRP benefits obligation will be reduced by any income the employee receives from employment with another employer made possible by virtue of the employee's removal.

RECORDS REQUIREMENTS INVOLVING MEDICAL REMOVAL

In the case of medical removal, the employer's records must include:

- The worker's name and social security number,
- The date of each occasion that the worker was removed from current exposure to lead,
- The date when the worker was returned to the former job status,
- A brief explanation of how each removal was or is being accomplished, and
- A statement indicating whether the reason for the removal was an elevated blood lead level.

Recordkeeping

EMPLOYER REQUIREMENTS

The employer must maintain any employee exposure and medical records to document ongoing employee exposure, medical monitoring, and medical removal of workers. This data provides a baseline to evaluate the employee's health properly. Employees or former employees, their designated representatives, and OSHA must have access to exposure and medical records in accordance with 29 CFR 1910.1020. Rules of agency practice and procedure governing OSHA access to employee medical records are found in 29 CFR 1913.10.

EXPOSURE ASSESSMENT RECORDS

The employer must establish and maintain an accurate record of all monitoring and other data used to conduct employee exposure assessments as required by this standard and in accordance with 29 CFR 1910.1020. The exposure assessment records must include:

- The dates, number, duration, location, and results of each sample taken, including a description of the sampling procedure used to determine representative employee exposure;
- A description of the sampling and analytical methods used and evidence of their accuracy;
- The type of respiratory protection worn, if any;
- The name, social security number, and job classification of the monitored employee and all others whose exposure the measurement represents; and
- Environmental variables that could affect the measurement of employee exposure.

MEDICAL SURVEILLANCE RECORDS

The employer must maintain an accurate record for each employee subject to medical surveillance, including:

- The name, social security number, and description of the employee's duties;
- A copy of the physician's written opinions;

- The results of any airborne exposure monitoring done for the employee and provided to the physician; and
- Any employee medical complaints related to lead exposure.

In addition, the employer must keep or ensure that the examining physician keeps the following medical records:

- A copy of the medical examination results including medical and work history;
- A description of the laboratory procedures and a copy of any guidelines used to interpret the test results; and
- A copy of the results of biological monitoring.

The employer or physician or both must maintain medical records in accordance with 29 CFR 1910.1020.

DOCUMENTS FOR EMPLOYEES SUBJECT TO MEDICAL REMOVAL

The employer must maintain--for at least the duration of employment–an accurate record for each employee subject to medical removal, including:

- The name and social security number of the employee;
- The date on each occasion that the employee was removed from current exposure to lead and the corresponding date which the employee was returned to former job status;
- A brief explanation of how each removal was or is being accomplished; and
- A statement about each removal indicating whether the reason for removal was an elevated blood level.

EMPLOYER REQUIREMENTS RELATED TO OBJECTIVE DATA

The employer must establish and maintain an accurate record documenting the nature and relevancy of objective data relied on to assess initial employee exposure in lieu of exposure monitoring. The employer must maintain the record of objective data relied on for at least 30 years.

DOCUMENTS FOR OSHA AND NIOSH REVIEW

The employer must make all records--including exposure monitoring, objective data, medical removal, and medical records--

available upon request to affected employees, former employees, and their designated representatives and to the OSHA Assistant Secretary and the Director of the National Institute for Occupational Safety and Health (NIOSH) for examination and copying in accordance with 29 CFR 1910.1020.

WHEN CLOSING A BUSINESS

When an employer ceases to do business, the successor employer must receive and retain all required records. If no successor is available, these records must be sent to the Director of NIOSH.

Exposure Reduction and Employee Protection

The most effective way to protect workers is to minimize their exposure through engineering controls, good work practices and training, and use of personal protective clothing and equipment, including respirators, where required. The employer needs to designate a competent person capable of identifying existing and predictable lead hazards and who is authorized to take prompt corrective measures to eliminate such problems. The employer should, as needed, consult a qualified safety and health professional to develop and implement an effective worker protection program. These professionals may work independently or may be associated with an insurance carrier, trade organization, or on-site consultation program.

Engineering Controls

Engineering measures include local and general exhaust ventilation, process and equipment modification, material substitution, component replacement, and isolation or automation. Examples of recommended engineering controls that can help reduce worker exposure to lead are described as follows.

EXHAUST VENTILATION

Equip power tools used to remove lead-based paint with dust collection shrouds or other attachments so that paint is exhausted

through a high-efficiency particulate air (HEPA) vacuum system. For operations such as welding, cutting/burning, or heating, use local exhaust ventilation. Use HEPA vacuums during cleanup operations.

For abrasive blasting operations, build a containment structure that is designed to optimize the flow of clean ventilation air past the workers' breathing zones. This will help reduce the exposure to airborne lead and increase visibility. Maintain the affected area under negative pressure to reduce the chances that lead dust will contaminate areas outside the enclosure. Equip the containment structure with an adequately sized dust collector to control emissions of particulate matter into the environment.

ENCLOSURE OR ENCAPSULATION

One way to reduce the lead inhalation or ingestion hazard posed by lead-based paint is to encapsulate it with a material that bonds to the surface, such as acrylic or epoxy coating or flexible wall coverings. Another option is to enclose it using systems such as gypsum wallboard, plywood paneling, and aluminum, vinyl, or wood exterior siding. Floors coated with lead-based paint can be covered using vinyl tile or linoleum.

The building owner or other responsible person should oversee the custodial and maintenance staffs and contractors during all activities involving enclosed or encapsulated lead-based paint. This will minimize the potential for an inadvertent lead release during maintenance, renovation, or demolition.

SUBSTITUTION

Choose materials and chemicals that do not contain lead for construction projects. Among the options are:

- Use zinc-containing primers covered by an epoxy intermediate coat and polyurethane topcoat instead of lead-containing coatings.
- Substitute mobile hydraulic shears for torch cutting under certain circumstances.
- Consider surface preparation equipment such as needle guns with multiple reciprocating needles completely enclosed within an adjustable shroud, instead of abrasive blasting under certain

conditions. The shroud captures dust and debris at the cutting edge and can be equipped with a HEPA vacuum filtration with a self-drumming feature. One such commercial unit can remove lead-based paint from flat steel and concrete surfaces, outside edges, inside corners, and pipes.

- Choose chemical strippers in lieu of hand scraping with a heat gun for work on building exteriors, surfaces involving carvings or molding, or intricate iron work. Chemical removal generates less airborne lead dust. (Be aware, however, that these strippers themselves can be hazardous and that the employer must review the material safety data sheets (MSDSs) for these stripping agents to obtain information on their hazards.)

COMPONENT REPLACEMENT

Replace lead-based painted building components such as windows, doors, and trim with new components free of lead-containing paint. Another option is to remove the paint off site and then repaint the components with zinc-based paint before replacing them.

PROCESS OR EQUIPMENT MODIFICATION

When applying lead paints or other lead-containing coatings, use a brush or roller rather than a sprayer. This application method introduces little or no paint mist into the air to present a lead inhalation hazard. (Note that there is a ban on the use of lead-based paint in residential housing.)

Use non-silica-containing abrasives such as steel or iron shot/grit sand instead of sand in abrasive blasting operations when practical. The free silica portion of the dust presents a respiratory health hazard.

When appropriate for the conditions, choose blasting techniques that are less dusty than open-air abrasive blasting. These include hydro- or wet-blasting using high-pressure water with or without an abrasive or surrounding the blast nozzle with a ring of water, and vacuum blasting where a vacuum hood for material removal is positioned around the exterior of the blasting nozzle.

When using a heat gun to remove lead-based paints in residential housing units, be sure it is of the flameless electrical softener

type. Heat guns should have electronically controlled temperature settings to allow usage below 700 degrees F. Equip heat guns with various nozzles to cover all common applications and to limit the size of the heated work area.

When using abrasive blasting with a vacuum hood on exterior building surfaces, ensure that the configuration of the heads on the blasting nozzle match the configuration of the substrate so that the vacuum is effective in containing debris.

Ensure that HEPA vacuum cleaners have the appropriate attachments for use on unusual surfaces. Proper use of brushes of various sizes, crevice and angular tools, when needed, will enhance the quality of the HEPA-vacuuming process and help reduce the amount of lead dust released into the air.

ISOLATION

Although it is not feasible to enclose and ventilate some abrasive blasting operations completely, it is possible to isolate many operations to help reduce the potential for lead exposure. Isolation consists of keeping employees not involved in the blasting operations as far away from the work area as possible, reducing the risk of exposure.

Housekeeping and Personal Hygiene

Lead is a cumulative and persistent toxic substance that poses a serious health risk. A rigorous housekeeping program and the observance of basic personal hygiene practices will minimize employee exposure to lead. In addition, these two elements of the worker protection program help prevent workers from taking lead-contaminated dust out of the worksite and into their homes where it can extend the workers' exposures and potentially affect their families' health.

HOUSEKEEPING PRACTICES

An effective housekeeping program involves a regular schedule to remove accumulations of lead dust and lead-containing debris. The schedule should be adapted to exposure conditions at a particular worksite. OSHA's Lead Standard for Construction requires

employers to maintain all surfaces as free of lead contamination as practicable. Vacuuming lead dust with HEPA-filtered equipment or wetting the dust with water before sweeping are effective control measures. Compressed air may not be used to remove lead from contaminated surfaces unless a ventilation system is in place to capture the dust generated by the compressed air.

In addition, put all lead-containing debris and contaminated items accumulated for disposal into sealed, impermeable bags or other closed impermeable containers. Label bags and containers as lead-containing waste. These measures provide additional help in controlling exposure.

PERSONAL HYGIENE PRACTICES

Emphasize workers' personal hygiene such as washing their hands and face after work and before eating to minimize their exposure to lead. Provide and ensure that workers use washing facilities. Provide clean change areas and readily accessible eating areas. If possible, provide a parking area where cars will not be contaminated with lead. These measures:

- Reduce workers' exposure to lead and the likelihood that they will ingest lead,
- Ensure that the exposure does not extend beyond the worksite,
- Reduce the movement of lead from the worksite, and
- Provide added protection to employees and their families.

CHANGE AREAS

The employer must provide a clean change area for employees whose airborne exposure to lead is above the PEL. The area must be equipped with storage facilities for street clothes and a separate area with facilities for the removal and storage of lead-contaminated protective work clothing and equipment. This separation prevents cross-contamination of the employee's street and work clothing.

Employees must use a clean change area for taking off street clothes, suiting up in clean protective work clothing, donning respirators before beginning work, and dressing in street clothes after work. No lead-contaminated items should enter this area.

Work clothing must not be worn away from the jobsite. Under no circumstances should lead-contaminated work clothes be laundered at home or taken from the worksite, except to be laundered professionally or for disposal following applicable federal, state, and local regulations.

SHOWERS AND WASHING FACILITIES

When feasible, showers must be provided for use by employees whose airborne exposure to lead is above the permissible exposure limit so they can shower before leaving the worksite. Where showers are provided, employees must change out of their work clothes and shower before changing into their street clothes and leaving the worksite. If employees do not change into clean clothing before leaving the worksite, they may contaminate their homes and automobiles with lead dust, extending their exposure and exposing other members of their household to lead.

In addition, employers must provide adequate washing facilities for their workers. These facilities must be close to the worksite and furnished with water, soap, and clean towels so employees can remove lead contamination from their skin.

Contaminated water from washing facilities and showers must be disposed of in accordance with applicable local, state, or federal regulations.

PERSONAL PRACTICES

The employer must ensure that employees do not enter lunchroom facilities or eating areas with protective work clothing or equipment unless surface lead dust has been removed. HEPA vacuuming and use of a downdraft booth are examples of cleaning methods that limit the dispersion of lead dust from contaminated work clothing.

In all areas where employees are exposed to lead above the PEL, employees must observe the prohibition on the presence and consumption or use of food, beverages, tobacco products, and cosmetics. Employees whose airborne exposure to lead is above the PEL must wash their hands and face before eating, drinking, smoking, or applying cosmetics.

END-OF-DAY PROCEDURES

Employers must ensure that workers who are exposed to lead above the permissible exposure limit follow these procedures at the end of their workday:

- Place contaminated clothes, including work shoes and personal protective equipment to be cleaned, laundered, or disposed of, in a properly labeled closed container.
- Take a shower and wash their hair. Where showers are not provided, employees must wash their hands and face at the end of the workshift.
- Change into street clothes in clean change areas.

Protective Clothing and Equipment

EMPLOYER REQUIREMENTS

Employers must provide workers who are exposed to lead above the PEL or for whom the possibility of skin or eye irritation exists with clean, dry protective work clothing and equipment that are appropriate for the hazard. Employers must provide these items at no cost to employees. Appropriate protective work clothing and equipment used on construction sites includes:

- Coveralls or other full-body work clothing;
- Gloves, hats, and shoes or disposable shoe coverlets;
- Vented goggles or face shields with protective spectacles or goggles;
- Welding or abrasive blasting helmets; and
- Respirators.

Clean work clothing must be issued daily for employees whose exposure levels to lead are above 200 µg/m3, weekly if exposures are above the PEL but at or below 200 µg/m3 or where the possibility of skin or eye irritation exists.

HANDLING CONTAMINATED PROTECTIVE CLOTHING

Workers must not be allowed to leave the worksite wearing lead-contaminated protective clothing or equipment. This is an essential

step in reducing the movement of lead contamination from the workplace into the worker's home and provides added protection for employees and their families.

Disposable coveralls and separate shoe covers may be used, if appropriate, to avoid the need for laundering. Workers must remove protective clothing in change rooms provided for that purpose.

Employers must ensure that employees leave the respirator use area to wash their faces and respirator facepieces as necessary. In addition, employers may require their employees to use HEPA vacuuming, damp wiping, or another suitable cleaning method before removing a respirator to clear loose particle contamination on the respirator and at the face-mask seal.

Place contaminated clothing that is to be cleaned, laundered, or disposed of by the employer in closed containers. Label containers with the warning: "Caution: Clothing contaminated with lead. Do not remove dust by blowing or shaking. Dispose of lead-contaminated wash water in accordance with applicable local, state, or federal regulations."

Workers responsible for handling contaminated clothing, including those in laundry services or subcontractors, must be informed in writing of the potential health hazard of lead exposure. At no time shall lead be removed from protective clothing or equipment by brushing, shaking, or blowing. These actions disperse the lead into the work area.

PREVENTING HEAT STRESS

Workers wearing protective clothing, particularly in hot environments or within containment structures, can face a risk from heat stress if proper control measures are not used.

Heat stress is caused by several interacting factors, including environmental conditions, type of protective clothing worn, the work activity required and anticipated work rate, and individual employee characteristics such as age, weight, and fitness level. When heat stress is a concern, the employer should choose lighter, less insulating protective clothing over heavier clothing, as long as

it provides adequate protection. Other measures the employer can take include: discussing the possibility of heat stress and its signs and symptoms with all workers; using appropriate work/rest regimens; and providing heat stress monitoring that includes measuring employees' heart rates, body temperatures, and weight loss. Employers must provide a source of water or electrolyte drink in a non-contaminated eating and drinking area close to the work area so workers can drink often throughout the day. Workers must wash their hands and face before drinking any fluid if their airborne exposure is above the PEL.

Respiratory Protection

Although engineering and work practice controls are the primary means of protecting workers from exposure to lead, source control at construction sites sometimes is insufficient to control exposure. In these cases, airborne lead concentrations may be high or may vary widely. Respirators often must be used to supplement engineering controls and work practices to reduce worker lead exposures below the PEL. When respirators are required, employers must provide them at no cost to workers.

The standard requires that respirators be used during periods when an employee's exposure to lead exceeds the PEL, including

- Periods necessary to install or implement engineering or work practice controls, and
- Work operations for which engineering and work practice controls are insufficient to reduce employee exposures to or below the PEL.

Respirators also must be provided upon employee request. A requested respirator is included as a requirement to provide increased protection for those employees who wish to reduce their lead burden below what is required by the standard, particularly if they intend to have children in the near future. In addition, respirators must be used when performing previously indicated high exposure or "trigger" tasks, before completion of the initial assessment.

PROVIDING ADEQUATE RESPIRATORY PROTECTION

Before any employee first starts wearing a respirator in the work environment, the employer must perform a fit test. For all employees wearing negative or positive pressure tight-fitting facepiece respirators, the employer must perform either qualitative or quantitative fit tests using an OSHA-accepted fit testing protocol. In addition, employees must be fit tested whenever a different respirator facepiece is used, and at least annually thereafter.

Where daily airborne exposure to lead exceeds 50 µg/m3, affected workers must don respirators before entering the work area and should not remove them until they leave the high-exposure area or have completed a decontamination procedure. Employers must assure that the respirator issued to the employee is selected and fitted properly to ensure minimum leakage through the facepiece-to-face seal.

RESPIRATORY PROTECTION PROGRAMS

When respirators are required at a worksite, the employer must establish a respiratory protection program in accordance with the OSHA standard on respiratory protection, 29 CFR 1910.134. At a minimum, an acceptable respirator program for lead must include:

- Procedures for selecting respirators appropriate to the hazard;
- Fit testing procedures;
- Procedures for proper use of respirators in routine and reasonably foreseeable emergency situations, including cartridge change schedules;
- Procedures and schedules for cleaning, disinfecting, storing, inspecting, repairing, discarding, and otherwise maintaining respirators;
- Training of employees in the respiratory hazard to which they are potentially exposed during routine and emergency situations;
- Training of employees in the proper use of respirators, including putting on and removing them, any limitations of their use, and their maintenance;

- Procedures for regularly evaluating the effectiveness of the program;
- Procedures to ensure air quality when supplied air is used;
- A written program and designation of a program administrator; and
- Recordkeeping procedures.

In addition, the construction industry lead standard stipulates medical evaluations of employees required to use respirators.

If an employee has difficulty in breathing during a fit test or while using a respirator, the employer must make a medical examination available to that employee to determine whether he or she can wear a respirator safely.

SELECTING A RESPIRATOR

The employer must select the appropriate respirator from Table 1 of the lead standard, 29 CFR 1926.62(f)(3)(i). The employer must provide a powered air-purifying respirator when an employee chooses to use this respirator and it will provide the employee adequate protection. A NIOSH-certified respirator must be selected and used in compliance with the conditions of its certification. In addition, if exposure monitoring or experience indicates airborne exposures to contaminants other than lead such as silica, solvents, or polyurethane coatings, these exposures must be considered when selecting respiratory protection.

Select type CE respirators approved by NIOSH for abrasive blasting operations. Currently, there are two kinds of CE respirators with the following assigned protection factors (APFs): a continuous-flow respirator with a loose-fitting hood, APF 25; and a full facepiece supplied-air respirator operated in a positive-pressure mode, APF 2,000. (Note: OSHA recognizes Bullard Helmets, Models 77 and 88 (1995); Clemco Appollo, Models 20 and 60 (1997); and 3M Model 8100 (1998) as having APFs of 1,000.)

For any airline respirator, it is important to follow the manufacturer's instructions regarding air quality, air pressure, and inside diameter and length of hoses. Be aware that using longer hoses or smaller inside diameter hoses than the manufacturer specifies or

hoses with bends or kinks may reduce or restrict the airflow to a respirator.

Employee Information and Training

The employer must inform employees about lead hazards according to the requirement of OSHA's Hazard Communication standard for the construction industry, 29 CFR 1926.59, including--but not limited to--the requirements for warning signs and labels, material safety data sheets (MSDSs), and employee information and training. (Refer to 29 CFR 1910.1200.)

PROGRAM REQUIREMENTS

Employers must institute an information and training program and ensure that all employees subject to exposure to lead or lead compounds at or above the action level on any day participate. Also covered under information and training are employees who may suffer skin or eye irritation from lead compounds. Initial training must be provided before the initial job assignment. Training must be repeated at least annually and, in brief summary, must include:

- The content of the OSHA lead standard and its appendices;
- The specific nature of operations that could lead to lead exposure above the action level;
- The purpose, proper selection, fit, use, and limitations of respirators;
- The purpose and a description of the medical surveillance program, and the medical removal protection program;
- Information concerning the adverse health effects associated with excessive lead exposure;
- The engineering and work practice controls associated with employees' job assignments;
- The contents of any lead-related compliance plan in effect;
- Instructions to employees that chelating agents must not be used routinely to remove lead from their bodies and when necessary only under medical supervision and at the direction of a licensed physician; and

- The right to access records under "Access to Employee Exposure and Medical Records," 29 CFR 1910.1020.

All materials relating to the training program and a copy of the standard and its appendices must be made readily available to all affected employees.

WARNING SIGNS

Employers are required to post these warning signs in each work area where employee exposure to lead is above the PEL:

- WARNING
- LEAD WORK AREA
- POISON
- NO SMOKING OR EATING

All signs must be well lit and kept clean so that they are easily visible. Statements that contradict or detract from the signs' meaning are prohibited. Signs required by other statutes, regulations, or ordinances, however, may be posted in addition to, or in combination with, this sign.

OSHA Assistance

OSHA can provide extensive help through a variety of programs, including technical assistance about effective safety and health programs, state plans, workplace consultations, voluntary protection programs, strategic partnerships, training and education, and more. An overall commitment to workplace safety and health can add value to your business, to your workplace and to your life.

SAFETY AND HEALTH PROGRAM MANAGEMENT GUIDELINES

Effective management of employee safety and health protection is a decisive factor in reducing the extent and severity of work-related injuries and illnesses and their related costs. In fact, an effective safety and health program forms the basis of good employee protection can save time and money, increase productivity, reduce employee injuries, illnesses and related workers' compensation costs.

To assist employers and employees in developing effective safety and health programs, OSHA published recommended Safety and Health Program Management Guidelines (54 Federal Register (16): 3904-3916, January 26, 1989). These voluntary guidelines apply to all places of employment covered by OSHA.

The guidelines identify four general elements critical to the development of a successful safety and health management system:

- Management leadership and employee involvement,
- Worksite analysis,
- Hazard prevention and control, and
- Safety and health training.

The guidelines recommend specific actions, under each of these general elements, to achieve an effective safety and health program. The Federal Register notice is available online at www.osha.gov.

STATE PROGRAMS

The Occupational Safety and Health Act of 1970 (OSH Act) encourages states to develop and operate their own job safety and health plans. OSHA approves and monitors these plans. Twenty-four states, Puerto Rico, and the Virgin Islands currently operate approved state plans: 22 cover both private and public (state and local government) employment; Connecticut, New Jersey, New York and the Virgin Islands cover the public sector only. States and territories with their own OSHA-approved occupational safety and health plans must adopt standards identical to, or at least as effective as, the Federal OSHA standards.

CONSULTATION SERVICES

Consultation assistance is available on request to employers who want help in establishing and maintaining a safe and healthful workplace. Largely funded by OSHA, the service is provided at no cost to the employer. Primarily developed for smaller employers with more hazardous operations, the consultation service is delivered by state governments employing professional safety and health

consultants. Comprehensive assistance includes an appraisal of all mechanical systems, work practices and occupational safety and health hazards of the workplace and all aspects of the employer's present job safety and health program. In addition, the service offers assistance to employers in developing and implementing an effective safety and health program. No penalties are proposed or citations issued for hazards identified by the consultant. OSHA provides consultation assistance to the employer with the assurance that his or her name and firm and any information about the workplace will not be routinely reported to OSHA enforcement staff.

Under the consultation program, certain exemplary employers may request participation in OSHA's Safety and Health Achievement Recognition Program (SHARP). Eligibility for participation in SHARP includes receiving a comprehensive consultation visit, demonstrating exemplary achievements in workplace safety and health by abating all identified hazards, and developing an excellent safety and health program.

Employers accepted into SHARP may receive an exemption from programmed inspections (not complaint or accident investigation inspections) for a period of one year. For more information concerning consultation assistance, see the OSHA website at www.osha.gov.

VOLUNTARY PROTECTION PROGRAMS

Voluntary Protection Programs and on-site consultation services, when coupled with an effective enforcement program, expand employee protection to help meet the goals of the OSH Act. The VPPs motivate others to achieve excellent safety and health results in the same outstanding way as they establish a cooperative relationship between employers, employees and OSHA.

For additional information on VPP and how to apply, contact the OSHA regional offices listed at the end of this publication.

STRATEGIC PARTNERSHIP PROGRAM

OSHA's Strategic Partnership Program, the newest member of OSHA's cooperative programs, helps encourage, assist and recognize the efforts of partners to eliminate serious workplace

hazards and achieve a high level of employee safety and health. Whereas OSHA's Consultation Program and VPP entail one-on-one relationships between OSHA and individual worksites, most strategic partnerships seek to have a broader impact by building cooperative relationships with groups of employers and employees. These partnerships are voluntary, cooperative relationships between OSHA, employers, employee representatives and others (e.g., trade unions, trade and professional associations, universities and other government agencies).

For more information on this and other cooperative programs, contact your nearest OSHA office, or visit OSHA's website at www.osha.gov.

ALLIANCE PROGRAM

Through the Alliance Program, OSHA works with groups committed to safety and health, including businesses, trade or professional organizations, unions and educational institutions, to leverage resources and expertise to develop compliance assistance tools and resources and share information with employers and employees to help prevent injuries, illnesses and fatalities in the workplace.

Alliance program agreements have been established with a wide variety of industries including meat, apparel, poultry, steel, plastics, maritime, printing, chemical, construction, paper and telecommunications. These agreements are addressing many safety and health hazards and at-risk audiences, including silica, fall protection, amputations, immigrant workers, youth and small businesses. By meeting the goals of the Alliance Program agreements (training and education, outreach and communication, and promoting the national dialogue on workplace safety and health), OSHA and the Alliance Program participants are developing and disseminating compliance assistance information and resources for employers and employees such as electronic assistance tools, fact sheets, toolbox talks, and training programs.

OSHA TRAINING AND EDUCATION

OSHA area offices offer a variety of information services, such

as compliance assistance, technical advice, publications, audiovisual aids and speakers for special engagements. OSHA's Training Institute in Arlington Heights, IL, provides basic and advanced courses in safety and health for Federal and state compliance officers, state consultants, Federal agency personnel, and private sector employers, employees and their representatives.

The OSHA Training Institute also has established OSHA Training Institute Education Centers to address the increased demand for its courses from the private sector and from other federal agencies. These centers include colleges, universities and nonprofit training organizations that have been selected after a competition for participation in the program.

OSHA also provides funds to nonprofit organizations, through grants, to conduct workplace training and education in subjects where OSHA believes there is a lack of workplace training. Grants are awarded annually. Grant recipients are expected to contribute 20 percent of the total grant cost.

For more information on grants, training and education, contact the OSHA Training Institute, Directorate of Training and Education, 2020 South Arlington Heights Road, Arlington Heights, IL 60005, (847) 297-4810 or see Training on OSHA's website at www.osha.gov. For further information on any OSHA program, contact your nearest OSHA regional office listed at the end of this publication.

INFORMATION AVAILABLE ELECTRONICALLY

OSHA has a variety of materials and tools available on its website at www.osha.gov. These include electronic compliance assistance tools, such as *Safety and Health Topics Pages, eTools, Expert Advisors;* regulations, directives, publications and videos; and other information for employers and employees. OSHA's software programs and compliance assistance tools walk you through challenging safety and health issues and common problems to find the best solutions for your workplace.

A wide variety of OSHA materials, including standards, interpretations, directives, and more can be purchased on CD-ROM from the U.S. Government Printing Office, Superintendent of Documents, toll-free phone (866) 512-1800.

OSHA PUBLICATIONS

OSHA has an extensive publications program. For a listing of free or sales items, visit OSHA's website at www.osha.gov or contact the OSHA Publications Office, U.S. Department of Labor, 200 Constitution Avenue, NW, N-3101, Washington, DC 20210. Telephone (202) 693-1888 or fax to (202) 693-2498.

CONTACTING OSHA

To report an emergency, file a complaint or seek OSHA advice, assistance or products, call (800) 321-OSHA or contact your nearest OSHA regional or area office listed at the end of this publication. The teletypewriter (TTY) number is (877) 889-5627.

Written correspondence can be mailed to the nearest OSHA Regional or Area Office listed at the end of this publication or to OSHA's national office at: U.S. Department of Labor, Occupational Safety and Health Administration, 200 Constitution Avenue, N.W., Washington, DC 20210.

By visiting OSHA's website at www.osha.gov, you can also:

- File a complaint online,
- Submit general inquiries about workplace safety and health electronically, and
- Find more information about OSHA and occupational safety and health.

OSHA Regional Offices

Region I
(CT,* ME, MA, NH, RI, VT*)
JFK Federal Building, Room E340
Boston, MA 02203
(617) 565-9860

Region II
(NJ,* NY,* PR,* VI*)
201 Varick Street, Room 670
New York, NY 10014
(212) 337-2378

Region III
(DE, DC, MD,* PA,* VA,* WV)
The Curtis Center
170 S. Independence Mall West
Suite 740 West
Philadelphia, PA 19106-3309
(215) 861-4900

Region IV
(AL, FL, GA, KY,* MS, NC,* SC,* TN*)
61 Forsyth Street, SW, Room 6T50
Atlanta, GA 30303
(404) 562-2300

Region V
(IL, IN,* MI,* MN,* OH, WI)
230 South Dearborn Street, Room 3244
Chicago, IL 60604
(312) 353-2220

Region VI
(AR, LA, NM,* OK, TX)
525 Griffin Street, Room 602
Dallas, TX 75202
(972) 850-4145

Region VII
(IA,* KS, MO, NE)
Two Pershing Square
2300 Main Street, Suite 1010
Kansas City, MO 64108-2416
(816) 283-8745

Region VIII
(CO, MT, ND, SD, UT,* WY*)
1999 Broadway, Suite 1690
PO Box 46550
Denver, CO 80202-5716
(720) 264-6550

Region IX
(AZ,* CA,* HI, NV,* and American Samoa, Guam
and the Northern Mariana Islands)
90 7th Street, Suite 18-100
San Francisco, CA 94103
(415) 625-2547

Region X
(AK,* ID, OR,* WA*)
1111 Third Avenue, Suite 715
Seattle, WA 98101-3212
(206) 553-5930

* These states and territories operate their own OSHA-approved job safety and health programs and cover state and local government employees as well as private sector employees. The Connecticut, New Jersey, New York and Virgin Islands plans cover public employees only. States with approved programs must have standards that are identical to, or at least as effective as, the Federal OSHA standards.

Note: To get contact information for OSHA Area Offices, OSHA-approved State Plans and OSHA Consultation Projects, please visit us online at www.osha.gov or call us at 1-800-321-0SHA.


OSHA®
www.osha.gov

Occupational Safety and Health Administration

U.S. Department of Labor

www.osha.gov

Appendix F
Safety Data Sheet

Section 1: IDENTIFICATION

Product Name: Simple Green® All-Purpose Cleaner
Additional Names:

Manufacturer's Part Number: **Please refer to Section 16*

Recommended Use: Cleaner & Degreaser for water tolerant surfaces.
Restrictions on Use: Do not use on non-rinsable surfaces.

Company: Sunshine Makers, Inc.
15922 Pacific Coast Highway
Huntington Beach, CA 92649 USA
Telephone: 800-228-0709 ● 562-795-6000 *Mon – Fri, 8am – 5pm PST*
Fax: 562-592-3830
Email: info@simplegreen.com
Emergency Phone: Chem-Tel 24-Hour Emergency Service: 800-255-3924

Section 2: HAZARDS IDENTIFICATION

This product has been assessed in accordance to 2012 OSHA Hazard Communication Standards (29 CFR 1910.1200) and has been determined to not be classifiable as hazardous.

OSHA HCS 2012
Label Elements
Signal Word: None **Hazard Symbol(s)/Pictogram(s):** None required

Hazard Statements: None
Precautionary Statements: None
Hazards Not Otherwise Classified (HNOC): None
Other Information: None Known

Section 3: COMPOSITION/INFORMATION ON INGREDIENTS

Ingredient	CAS Number	Percent Range
Water	7732-18-5	> 84.8%*
C9-11 Alcohols Ethoxylated	68439-46-3	< 5%*
Sodium Citrate	68-04-2	< 5%*
Sodium Carbonate	497-19-8	< 1%*
Tetrasodium Glutamate Diacetate	51981-21-6	< 1%*
Citric Acid	77-92-9	< 1%*
Methylchloroisothiazolinone	26172-55-4	< 0.002%*
Methylisothiazolinone	2682-20-4	< 0.001%*
Fragrance	Proprietary Mixture	< 1%*
Liquitint Colorant	Proprietary Mixture	< 1%*

**specific percentages of composition are being withheld as a trade secret*

Section 4: FIRST-AID MEASURES

Inhalation: Not expected to cause respiratory irritation. If adverse effect occurs, move to fresh air.
Skin Contact: Not expected to cause skin irritation. If adverse effect occurs, rinse skin with water.
Eye Contact: Not expected to cause eye irritation. If adverse effect occurs, flush eyes with water.
Ingestion: May cause upset stomach. Drink plenty of water to dilute. See section 11.

Most Important Symptoms/Effects, Acute and Delayed: None known.

Indication of Immediate Medical Attention and Special Treatment Needed, if necessary: Treat symptomatically

Section 5: FIRE-FIGHTING MEASURES

Suitable & Unsuitable Extinguishing Media: Use Dry chemical, CO2, water spray or "alcohol" foam. Avoid high volume jet water.
Specific Hazards Arising from Chemical: In event of fire, fire created carbon oxides may be formed.
Special Protective Actions for Fire-Fighters: Wear positive pressure self-contained breathing apparatus; Wear full protective clothing.

This product is non-flammable. See Section 9 for Physical Properties.

Section 6: ACCIDENTAL RELEASE MEASURES

Personal Precautions, Protective Equipment and Emergency Procedures: *For non-emergency and emergency personnel:* See section 8 – personal protection. Avoid eye contact. Safety goggles suggested.

Environmental Precautions: Do not allow into open waterways and ground water systems.

Methods and Materials for Containment and Clean Up: Dike or soak up with inert absorbent material. See section 13 for disposal considerations.

Section 7: HANDLING AND STORAGE

Precautions for Safe Handling: Ensure adequate ventilation. Keep out of reach of children. Keep away from heat, sparks, open flame and direct sunlight. Do not pierce any part of the container. Do not mix or contaminate with any other chemical. Do not eat, drink or smoke while using this product.

Conditions for Safe Storage including Incompatibilities: Keep container tightly closed. Keep in cool dry area. Avoid prolonged exposure to sunlight. Do not store at temperatures above 109°F (42.7°C). If separation occurs, mix the product for reconstitution.

Section 8: EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure Limit Values: No components listed with TWA or STEL values under OSHA or ACGIH.

Appropriate Engineering Controls: Showers, eyewash stations, ventilation systems

Individual Protection Measures / Personal Protective Equipment (PPE)
Eye Contact: Use protective glasses or safety goggles if splashing or spray-back is likely.
Respiratory: Use in well ventilated areas or local exhaust ventilations when cleaning small spaces.
Skin Contact: Use protective gloves (any material) when used for prolonged periods or dermally sensitive.
General Hygiene Considerations: Wash thoroughly after handling and before eating or drinking.

Section 9: PHYSICAL AND CHEMICAL PROPERTIES

Appearance:	Green Liquid	**Partition Coefficient: n-octanol/water:**	Not determined
Odor:	Added sassafras odor	**Autoignition Temperature:**	Non-flammable
Odor Threshold:	Not determined	**Decomposition Temperature:**	42.7°C (109°F)
pH ASTM D-1293**:**	8.5 – 9.2	**Viscosity:**	Like water
Freezing Point ASTM D-1177**:**	0-3.33°C (32-38°F)	**Specific Gravity** ASTM D-891**:**	1.01 – 1.03
Boiling Point & Range ASTM D-1120**:**	101°C (213.8°F)	**VOCs:**	***Water & fragrance exemption in calculation**
Flash Point ASTM D-93**:**	> 212°F	SCAQMD 304-91 / EPA 24:	0 g/L | 0 lb/gal | 0%
Evaporation Rate ASTM D-1901**:**	½ Butyl Acetate @ 25°C	CARB Method 310**:	2.5 g/L | 0.021 lb/gal | 0.25%
Flammability (solid, gas):	Not applicable	SCAQMD Method 313:	Not tested
Upper/Lower Flammability or Explosive Limits:	Not applicable	**VOC Composite Partial Pressure:**	Not determined
Vapor Pressure ASTM D-323**:**	0.60 PSI @77°F, 2.05 PSI @100°F	**Relative Density** ASTM D-4017**:**	8.42 – 8.59 lb/gal
Vapor Density:	Not determined	**Solubility:**	100% in water

Section 10: STABILITY AND REACTIVITY

Reactivity: Non-reactive.
Chemical Stability: Stable under normal conditions 70°F (21°C) and 14.7 psig (760 mmHg).
Possibility of Hazardous Reactions: None known.
Conditions to Avoid: Excessive heat or cold.
Incompatible Materials: Do not mix with oxidizers, acids, bathroom cleaners, or disinfecting agents.
Hazardous Decomposition Products: Normal products of combustion - CO, CO2.

Section 11: TOXICOLOGICAL INFORMATION

Likely Routes of Exposure:
Inhalation - Overexposure may cause headache.
Skin Contact - Not expected to cause irritation, repeated contact may cause dry skin.
Eye Contact - Not expected to cause irritation.
Ingestion - May cause upset stomach.

Symptoms related to the physical, chemical and toxicological characteristics: no symptoms expected under typical use conditions.
Delayed and immediate effects and or chronic effects from short term exposure: no symptoms expected under typical use conditions.
Delayed and immediate effects and or chronic effects from long term exposure: headache, dry skin, or skin irritation may occur.
Interactive effects: Not known.

Numerical Measures of Toxicity

Acute Toxicity:
Oral LD_{50} (rat) > 5 g/kg body weight
Dermal LD_{50} (rabbit) > 5 g/kg body weight
Calculated via OSHA HCS 2012 / Globally Harmonized System of Classification and Labelling of Chemicals

Skin Corrosion/Irritation: Non-irritant per Dermal Irritection® assay modeling. No animal testing performed.
Eye Damage/Irritation: Non/Minimal irritant per Ocular Irritection® assay modeling. No animal testing performed.
Germ Cell Mutagenicity: Mixture does not classify under this category.
Carcinogenicity: Mixture does not classify under this category.
Reproductive Toxicity: Mixture does not classify under this category.
STOT-Single Exposure: Mixture does not classify under this category.
STOT-Repeated Exposure: Mixture does not classify under this category.
Aspiration Hazard: Mixture does not classify under this category.

Section 12: ECOLOGICAL INFORMATION

Ecotoxicity: Volume of ingredients used does not trigger toxicity classifications under the Globally Harmonized System of Classification and Labelling of Chemicals.
Aquatic: Aquatic Toxicity - Low, based on OECD 201, 202, 203 + Microtox: EC_{50} & IC_{50} ≥100 mg/L. Volume of ingredients used does not trigger toxicity classifications under the Globally Harmonized System of Classification and Labelling of Chemicals.
Terrestrial: Not tested on finished formulation.

Persistence and Degradability: Readily Biodegradable per OCED 301D, Closed Bottle Test. Reaches 100% biodegradability within 1 year or less.
Bioaccumulative Potential: No data available.
Mobility in Soil: No data available.
Other Adverse Effects: No data available.

Section 13: DISPOSAL CONSIDERATIONS

Unused or Used Liquid: May be considered hazardous in your area depending on usage and tonnage of disposal – check with local, regional, and or national regulations for appropriate methods of disposal.

Empty Containers: May be offered for recycling.

Never dispose of used degreasing rinsates into lakes, streams, and open bodies of water or storm drains.

Section 14: TRANSPORT INFORMATION

U.N. Number: Not applicable
U.N. Proper Shipping Name: Cleaning Compound, Liquid NOI
Transport Hazard Class(es): Not applicable
Packing Group: Not applicable
Environmental Hazards: Marine Pollutant - NO
Transport in Bulk (according to Annex II of MARPOL 73/78 and IBC Code): Unknown.
Special precautions which user needs to be aware of/comply with, in connection with transport or conveyance either within or outside their premises: None known.

U.S. (DOT) / Canadian TDG: Not Regulated for shipping.
IMO / IDMG: Not classified as Hazardous
ICAO/ IATA: Not classified as Hazardous
ADR/RID: Not classified as Hazardous

Section 15: REGULATORY INFORMATION

All components are listed on: TSCA and DSL Inventory.

SARA Title III: Sections 311/312 Hazard Categories – Not applicable.
Sections 313 Superfunds Amendments and Reauthorizations Act of 1986 – Not applicable.
Sections 302 – Not applicable.

Clean Air Act (CAA): Not applicable
Clean Water Act (CWA): Not applicable

State Right To Know Lists: No ingredients listed
California Proposition 65: No ingredients listed
Texas ESL:

Ethoxylated Alcohol	68439-46-3	60 µg/m³ long term	600 µg/m³ short term
Sodium Citrate	68-04-2	5 µg/m³ long term	50 µg/m³ short term
Sodium Carbonate	497-19-8	5 µg/m³ long term	50 µg/m³ short term
Citric Acid	77-92-9	10 µg/m³ long term	100 µg/m³ short term

This product has been classified as "not classifiable as hazardous" in accordance with Consumer Product Safety Commission (16 CFR Chapter 2), and labelled and packaged accordingly.

Section 16: OTHER INFORMATION

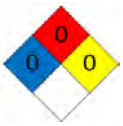
Size	UPC	Size	UPC
2 fl. oz.	043318131035	67.6 fl. oz.	043318130144
4 fl. oz.	043318130014	67.6 fl. oz.	043318000393
16 fl. oz.	043318130021	1 gallon	043318000799
22 fl. oz.	043318130229	1 gallon	043318130052
24 fl. oz.	043318130137	1 gallon	043318004957
32 fl. oz.	043318002557	1 gallon w/ dilution bottle	043318480492
32 fl. oz.	043318130335	140 fl. oz. w/ dilution bottle	043318001468
32 fl. oz.	043318000652	2.5 gallon	043318004889

USA items listed only. Not all items listed. USA items may not be valid for international sale.

Section 16: OTHER INFORMATION - continued

NFPA:

Health – None
Flammability – Non-flammable
Stability – Stable
Special - None



Acronyms

NTP	National Toxicology Program	IARC	International Agency for Research on Cancer
OSHA	Occupational Safety and Health Administration	CPSC	Consumer Product Safety Commission
TSCA	Toxic Substances Control Act	DSL	Domestic Substances List

Prepared / Revised By: Sunshine Makers, Inc., Regulatory Department.
This SDS has been revised in the following sections: Clarification on hazards in section 2, expanded transparency in section 3, revised layout in section 9, 14 & 16, added statement in section 15.

DISCLAIMER: The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

Appendix G
Emergency Contact and Procedure Information

Table 1A Emergency Response Telephone Roster		
PERSONNEL	**Office**	**Cell**
EnSafe Inc.		
Project Manager: Edward “Ned” B. Baker	216-485-3221	216-924-2437
Site Manager: Venky Venkatesh	513-259-2396	216-235-8613
Health and Safety Coordinator: Venky Venkatesh	513-259-2396	216-235-8613
Health and Safety Manager: Scott Campbell	901-937-4255	504-377-2619
Olymbec USA LLC (Property and Building Owner)		
Regional Building Manager: Chad King	937-637-6426	678-995-2618
Alternate (Kevin Donovan; DEC Enviro)	450-227-6177	450-227-6177
EMERGENCY RESPONSE AGENCIES	911	
Hospital: Grant Medical Center	911 or 614-566-9000	
Fire Department: Columbus Fire Station 22	911 or 614-221-3132	
Police Department: Columbus Police	911 or 614-645-4545	
Health Department: Franklin County Health & Wellness Center	911 or 614-645-3131	
Ambulance Service: Life Medical Response	911 or 614-469-8300	
Other:		
OTHER EMERGENCY ASSISTANCE	911	
CHEMTREC (24 Hours)	800-424-9300	
National Response Center (Oil and Chemical Spills)	800-424-8802	
Poison Control Center	614-228-1323	
U.S. Department of Transportation (Office of Hazardous Materials Transportation)	202-366-4488	
U.S. Environmental Protection Agency (Region 5)	312-353-2000	
Ohio Environmental Protection Agency (Central District Office)	614-644-2270	

Notes:
CHEMTREC = Chemical Transportation Emergency Center
U.S. = United States

Table 1B
Emergency Services Instructions

For Emergency Medical Incidents, Emergency Fire Response, or Hazardous Materials Incidents

Emergency Telephone Numbers

- Hospital: 911
- Police: 911
- Fire Department: 911

1. **Remember to speak SLOWLY and CLEARLY. Do NOT hang up first: let the dispatcher conclude the call.**

2. Provide the following information:
   - c. Your location: 2200 Fairwood Avenue, Columbus, Ohio
   - d. Your name and phone number

3. Describe nature of Incident:
   - d. Emergency Medical Incident
     - v. How many victims
     - vi. Type of incident - physical injury, etc.
     - vii. Assessment of victims' condition if known (whether victim is conscious/unconscious, breathing/not breathing, pulse/no pulse, nature of injuries, first aid measures used, etc.)
     - viii. Where incident occurred
   - e. Fire:
     - iii. Location of Fire
     - iv. Injured or Trapped On-site Personnel
   - f. Hazardous Materials Incident:
     - v. This is a hazardous materials incident requiring dispatch of HAZMAT unit
     - vi. Type of incident (fire, explosion, spill, etc.)
     - vii. Type of material (specific chemicals or general description)
     - viii. Whether there is also a Medical Emergency

4. Give your location at the site

Note: Security, site supervisor, or designee must meet the emergency personnel at the staging area to brief them on the situation.

Figure 1
Route Description and Map to Hospital

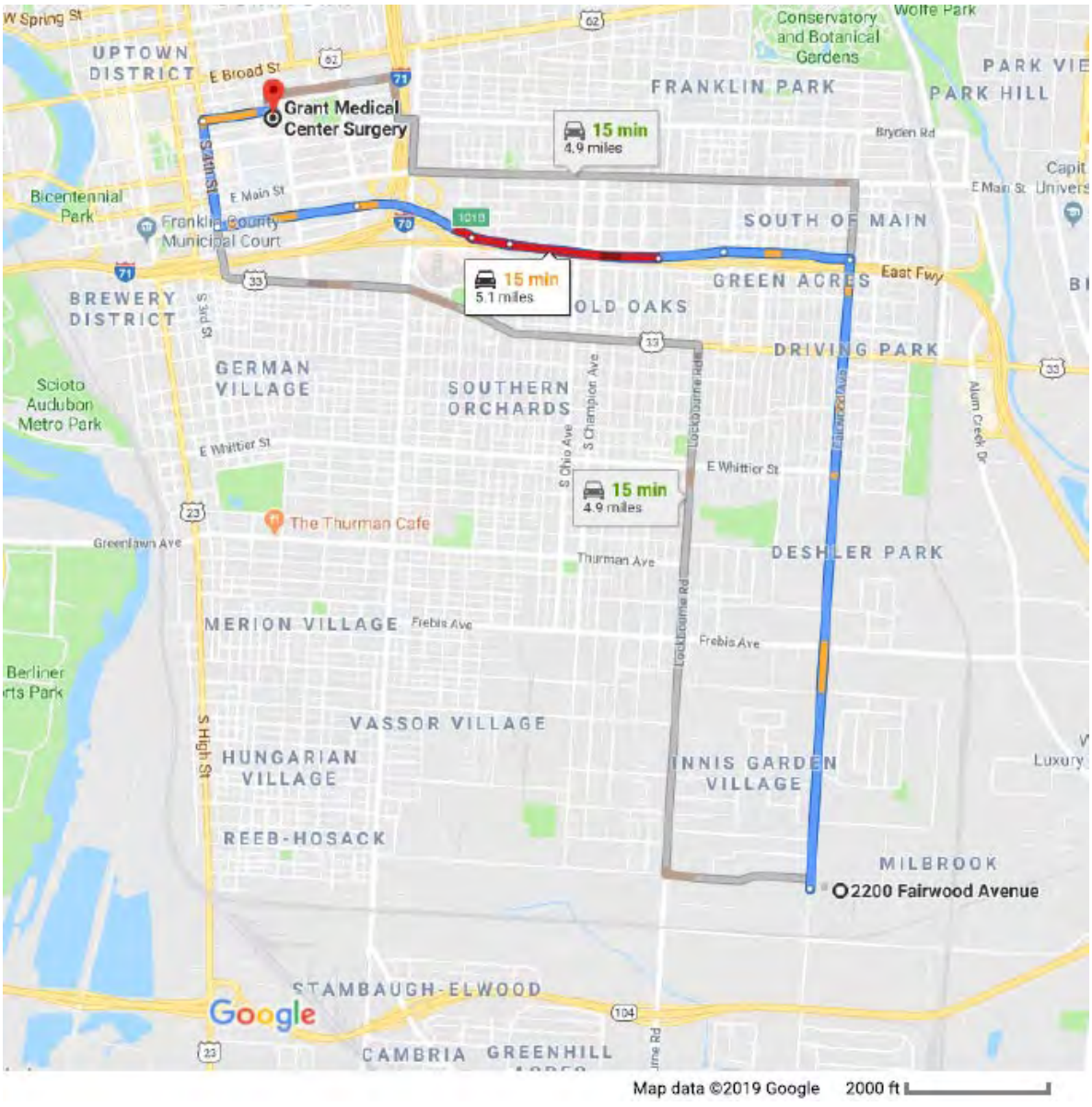
Hospital Information

Hospital Name: **Grant Medical Center**
Hospital Address: **111 South Grand Avenue, Columbus, Ohio**
Hospital Phone Number: **614-566-9000**

Directions to Area Hospital:

• Head North on Fairfield Avenue toward Marion Road	go 2.2 mi
• Turn Left onto Cole Street	go 0.7 mi
• Use Left lane to Take I-70 West toward Downtown	go 0.2 mi
• Take exit 101B toward Hospital/Downtown	go 2.6 mi
• Continue onto East Mound Street	go 0.2 mi
• Turn right onto South Grant Avenue	go 0.4 mi

End: 111 South Grant Avenue, Columbus, OH (Destination will be on the left)



Appendix H
EnSafe Near Miss / Incident / Event / Illness Investigation Report Form

EnSafe Near Miss/Incident/Event/Illness Investigation Report

1. Dates		
Of Accident/Incident/Event/Illness	Investigation Started	Investigation Completed

2. Location	3. Time

4. Employees		
Injured	Involved	Witnesses

5. Others		
Injured	Involved	Witnesses

6. Injured					
Name	Length of time with firm	Job Title or Occupation	Department	How long assigned to job	Nature and Extent of Injury

7. Equipment/Tools/Vehicles Involved
Item: Damage: Ownership:

8. Description
Events leading up to:

EnSafe Near Miss/Incident/Event/Illness Investigation Report

8. Description — continued

Accident/Incident/Event/Illness:

Contributing Factors:

9. Cause

Immediate Cause:

Root Cause:

10. Policy, Work Rule, Regulation, Standard

Applicable:

Violations:

11. Recommendations

To Prevent Recurrence:

Additional Training:

EnSafe Near Miss/Incident/Event/Illness Investigation Report

12. Investigation Team	
Leader: Signature: Date:	Members:

13. Review		
Reviewed by	Signature	Date
Comments:		

14. Corrective Action		
Action	Date	Signature
1		
2.		
3.		
4.		
5.		
6.		

Appendix I

Daily Site Safety Meeting Record Form

Site Safety Meeting Checklist

Weekly Contractor Equipment Evaluation Form

Daily Site Safety Meeting Record

All personnel participating in the project must receive initial onsite health and safety orientation. Thereafter, daily site safety briefings (tailgate meetings) are required prior to the start of each work day or work shift for personnel to discuss health and safety issues, project procedures, exposure incidents, potential up-coming changes in operations, or site conditions not accounted for in this Health and Safety Plan and/or more stringent contractor or subcontractor Health and Safety Plans associated with this project. All site personnel must acknowledge attendance of the daily site safety briefings by signing below. Insert additional pages as necessary.

Date	Topics	Name of Attendee	Firm Name	Signature

Safety Meeting Checklist

The site manager should consider discussing the following topics with all personnel conducting work as part of this Health and Safety Plan (HASP), as applicable.

Date and Time of Meeting:_____

Conducted By:_____

CHECK TOPIC(S) DISCUSSED:

HASP Content

- ☐ Chemicals of Concern
- ☐ Tasks to be Performed
- ☐ Location of Tasks
- ☐ Hazards/Risks of Tasks
- ☐ Site Limitations (e.g., cell phone use)

First Aid

- ☐ Facilities
- ☐ Reporting and Records
- ☐ Treatment of _____

Personal Protective Equipment

- ☐ Glasses, Goggles, and Shields
- ☐ Hard Hats
- ☐ Respirators
- ☐ Gloves
- ☐ Other _____

Emergency Procedures

- ☐ Communications
- ☐ Primary Rally Point:
- ☐ Secondary Rally Point:
- ☐ Headcount
- ☐ Hospital Location/Route
- ☐ Personal Protective Equipment/Decontamination
- ☐ Other _____

Special Tools/Equipment

- ☐ Other _____
- ☐ Other _____

HASP Content

- ☐ Personnel Onsite (introductions)
- ☐ Responsibilities
- ☐ Monitoring equipment
- ☐ Other _____
- ☐ Other _____

Industrial Sanitation and Hygiene

- ☐ Drinking water
- ☐ Restrooms/Porta toilets
- ☐ Personal Cleanliness

Housekeeping

- ☐ Waste Containers
- ☐ Waste Materials
- ☐ Other _____

Fire Prevention

- ☐ Extinguisher Locations
- ☐ Designated Smoking Areas
- ☐ Hot Work
- ☐ Flammable Liquids Present
- ☐ Explosives Present
- ☐ Other _____

Vehicles/Heavy Equipment

- ☐ Transportation of Personnel
- ☐ Operation and Inspection
- ☐ Preventative Maintenance
- ☐ Other _____

Discussion_____

_____

_____

_____

Equipment Pre-Operation Inspection Form

A manufactures equipment specific checklist can be used in lieu of this form. Completed copies of this form must be provided to and maintained by the contractor's supervisor.

Date:	Hours Start:
Equipment:	Hours End:
Operator:	Shift:

Check Before Operating	OK	NR	Comments
Seat Belts			
Back-up Alarm			
Brakes			
Pins			
Steering Components			
Speedometer			
Tires (Air Pressure, Lug Nuts)			
Fluid Leaks			
Fluid Levels			
Lights (head, tail, brake, clearance, hazard, panel)			
Fire Extinguisher			
Glass/Mirrors			
Horn Operable			
Grab Irons/Handles/Steps/Ladders			
Operators Seat			
Suspension			
Doors			
Exhaust System			
Air Cleaners			
Hoist Cylinders			
Canopy/Guards			
Gauges and All Other warning Devices			
Starter			
Switches			
Wiring			
Other:			
Other:			
Other:			

Appendix D
Safety Data Sheets

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Section 1: IDENTIFICATION

Product Name: Simple Green® All-Purpose Cleaner
Additional Names:

Manufacturer's Part Number: **Please refer to Section 16*

Recommended Use: Cleaner & Degreaser for water tolerant surfaces.
Restrictions on Use: Do not use on non-rinsable surfaces.

Company: Sunshine Makers, Inc.
15922 Pacific Coast Highway
Huntington Beach, CA 92649 USA
Telephone: 800-228-0709 ● 562-795-6000 *Mon – Fri, 8am – 5pm PST*
Fax: 562-592-3830
Email: info@simplegreen.com
Emergency Phone: Chem-Tel 24-Hour Emergency Service: 800-255-3924

Section 2: HAZARDS IDENTIFICATION

This product has been assessed in accordance to 2012 OSHA Hazard Communication Standards (29 CFR 1910.1200) and has been determined to not be classifiable as hazardous.

OSHA HCS 2012
Label Elements
Signal Word: None **Hazard Symbol(s)/Pictogram(s):** None required

Hazard Statements: None
Precautionary Statements: None
Hazards Not Otherwise Classified (HNOC): None
Other Information: None Known

Section 3: COMPOSITION/INFORMATION ON INGREDIENTS

Ingredient	CAS Number	Percent Range
Water	7732-18-5	> 84.8%*
C9-11 Alcohols Ethoxylated	68439-46-3	< 5%*
Sodium Citrate	68-04-2	< 5%*
Sodium Carbonate	497-19-8	< 1%*
Tetrasodium Glutamate Diacetate	51981-21-6	< 1%*
Citric Acid	77-92-9	< 1%*
Methylchloroisothiazolinone	26172-55-4	< 0.002%*
Methylisothiazolinone	2682-20-4	< 0.001%*
Fragrance	Proprietary Mixture	< 1%*
Liquitint Colorant	Proprietary Mixture	< 1%*

**specific percentages of composition are being withheld as a trade secret*

Section 4: FIRST-AID MEASURES

Inhalation: Not expected to cause respiratory irritation. If adverse effect occurs, move to fresh air.
Skin Contact: Not expected to cause skin irritation. If adverse effect occurs, rinse skin with water.
Eye Contact: Not expected to cause eye irritation. If adverse effect occurs, flush eyes with water.
Ingestion: May cause upset stomach. Drink plenty of water to dilute. See section 11.

Most Important Symptoms/Effects, Acute and Delayed: None known.

Indication of Immediate Medical Attention and Special Treatment Needed, if necessary: Treat symptomatically

Section 5: FIRE-FIGHTING MEASURES

Suitable & Unsuitable Extinguishing Media: Use Dry chemical, CO2, water spray or "alcohol" foam. Avoid high volume jet water.
Specific Hazards Arising from Chemical: In event of fire, fire created carbon oxides may be formed.
Special Protective Actions for Fire-Fighters: Wear positive pressure self-contained breathing apparatus; Wear full protective clothing.

This product is non-flammable. See Section 9 for Physical Properties.

Section 6: ACCIDENTAL RELEASE MEASURES

Personal Precautions, Protective Equipment and Emergency Procedures: *For non-emergency and emergency personnel:* See section 8 – personal protection. Avoid eye contact. Safety goggles suggested.

Environmental Precautions: Do not allow into open waterways and ground water systems.

Methods and Materials for Containment and Clean Up: Dike or soak up with inert absorbent material. See section 13 for disposal considerations.

Section 7: HANDLING AND STORAGE

Precautions for Safe Handling: Ensure adequate ventilation. Keep out of reach of children. Keep away from heat, sparks, open flame and direct sunlight. Do not pierce any part of the container. Do not mix or contaminate with any other chemical. Do not eat, drink or smoke while using this product.

Conditions for Safe Storage including Incompatibilities: Keep container tightly closed. Keep in cool dry area. Avoid prolonged exposure to sunlight. Do not store at temperatures above 109°F (42.7°C). If separation occurs, mix the product for reconstitution.

Section 8: EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure Limit Values: No components listed with TWA or STEL values under OSHA or ACGIH.

Appropriate Engineering Controls: Showers, eyewash stations, ventilation systems

Individual Protection Measures / Personal Protective Equipment (PPE)
Eye Contact: Use protective glasses or safety goggles if splashing or spray-back is likely.
Respiratory: Use in well ventilated areas or local exhaust ventilations when cleaning small spaces.
Skin Contact: Use protective gloves (any material) when used for prolonged periods or dermally sensitive.
General Hygiene Considerations: Wash thoroughly after handling and before eating or drinking.

Section 9: PHYSICAL AND CHEMICAL PROPERTIES

Appearance:	Green Liquid	**Partition Coefficient: n-octanol/water:**	Not determined
Odor:	Added sassafras odor	**Autoignition Temperature:**	Non-flammable
Odor Threshold:	Not determined	**Decomposition Temperature:**	42.7°C (109°F)
pH ASTM D-1293**:**	8.5 – 9.2	**Viscosity:**	Like water
Freezing Point ASTM D-1177**:**	0-3.33°C (32-38°F)	**Specific Gravity** ASTM D-891**:**	1.01 – 1.03
Boiling Point & Range ASTM D-1120**:**	101°C (213.8°F)	**VOCs:**	***Water & fragrance exemption in calculation**
Flash Point ASTM D-93**:**	> 212°F	SCAQMD 304-91 / EPA 24:	0 g/L | 0 lb/gal | 0%
Evaporation Rate ASTM D-1901**:**	½ Butyl Acetate @ 25°C	CARB Method 310**:	2.5 g/L | 0.021 lb/gal | 0.25%
Flammability (solid, gas):	Not applicable	SCAQMD Method 313:	Not tested
Upper/Lower Flammability or Explosive Limits:	Not applicable	**VOC Composite Partial Pressure:**	Not determined
Vapor Pressure ASTM D-323**:**	0.60 PSI @77°F, 2.05 PSI @100°F	**Relative Density** ASTM D-4017**:**	8.42 – 8.59 lb/gal
Vapor Density:	Not determined	**Solubility:**	100% in water

Section 10: STABILITY AND REACTIVITY

Reactivity: Non-reactive.
Chemical Stability: Stable under normal conditions 70°F (21°C) and 14.7 psig (760 mmHg).
Possibility of Hazardous Reactions: None known.
Conditions to Avoid: Excessive heat or cold.
Incompatible Materials: Do not mix with oxidizers, acids, bathroom cleaners, or disinfecting agents.
Hazardous Decomposition Products: Normal products of combustion - CO, CO2.

Section 11: TOXICOLOGICAL INFORMATION

Likely Routes of Exposure:
Inhalation - Overexposure may cause headache.
Skin Contact - Not expected to cause irritation, repeated contact may cause dry skin.
Eye Contact - Not expected to cause irritation.
Ingestion - May cause upset stomach.

Symptoms related to the physical, chemical and toxicological characteristics: no symptoms expected under typical use conditions.
Delayed and immediate effects and or chronic effects from short term exposure: no symptoms expected under typical use conditions.
Delayed and immediate effects and or chronic effects from long term exposure: headache, dry skin, or skin irritation may occur.
Interactive effects: Not known.

Numerical Measures of Toxicity

Acute Toxicity:
Oral LD_{50} (rat) > 5 g/kg body weight
Dermal LD_{50} (rabbit) > 5 g/kg body weight
Calculated via OSHA HCS 2012 / Globally Harmonized System of Classification and Labelling of Chemicals

Skin Corrosion/Irritation: Non-irritant per Dermal Irritection® assay modeling. No animal testing performed.
Eye Damage/Irritation: Non/Minimal irritant per Ocular Irritection® assay modeling. No animal testing performed.
Germ Cell Mutagenicity: Mixture does not classify under this category.
Carcinogenicity: Mixture does not classify under this category.
Reproductive Toxicity: Mixture does not classify under this category.
STOT-Single Exposure: Mixture does not classify under this category.
STOT-Repeated Exposure: Mixture does not classify under this category.
Aspiration Hazard: Mixture does not classify under this category.

Section 12: ECOLOGICAL INFORMATION

Ecotoxicity: Volume of ingredients used does not trigger toxicity classifications under the Globally Harmonized System of Classification and Labelling of Chemicals.
Aquatic: Aquatic Toxicity - Low, based on OECD 201, 202, 203 + Microtox: EC_{50} & IC_{50} ≥100 mg/L. Volume of ingredients used does not trigger toxicity classifications under the Globally Harmonized System of Classification and Labelling of Chemicals.
Terrestrial: Not tested on finished formulation.

Persistence and Degradability: Readily Biodegradable per OCED 301D, Closed Bottle Test. Reaches 100% biodegradability within 1 year or less.
Bioaccumulative Potential: No data available.
Mobility in Soil: No data available.
Other Adverse Effects: No data available.

Section 13: DISPOSAL CONSIDERATIONS

Unused or Used Liquid: May be considered hazardous in your area depending on usage and tonnage of disposal – check with local, regional, and or national regulations for appropriate methods of disposal.

Empty Containers: May be offered for recycling.

Never dispose of used degreasing rinsates into lakes, streams, and open bodies of water or storm drains.

Section 14: TRANSPORT INFORMATION

U.N. Number: Not applicable
U.N. Proper Shipping Name: Cleaning Compound, Liquid NOI
Transport Hazard Class(es): Not applicable
Packing Group: Not applicable
Environmental Hazards: Marine Pollutant - NO
Transport in Bulk (according to Annex II of MARPOL 73/78 and IBC Code): Unknown.
Special precautions which user needs to be aware of/comply with, in connection with transport or conveyance either within or outside their premises: None known.

U.S. (DOT) / Canadian TDG: Not Regulated for shipping.
IMO / IDMG: Not classified as Hazardous
ICAO/ IATA: Not classified as Hazardous
ADR/RID: Not classified as Hazardous

Section 15: REGULATORY INFORMATION

All components are listed on: TSCA and DSL Inventory.

SARA Title III: Sections 311/312 Hazard Categories – Not applicable.
Sections 313 Superfunds Amendments and Reauthorizations Act of 1986 – Not applicable.
Sections 302 – Not applicable.

Clean Air Act (CAA): Not applicable
Clean Water Act (CWA): Not applicable

State Right To Know Lists: No ingredients listed
California Proposition 65: No ingredients listed
Texas ESL:

Ethoxylated Alcohol	68439-46-3	60 µg/m³ long term	600 µg/m³ short term
Sodium Citrate	68-04-2	5 µg/m³ long term	50 µg/m³ short term
Sodium Carbonate	497-19-8	5 µg/m³ long term	50 µg/m³ short term
Citric Acid	77-92-9	10 µg/m³ long term	100 µg/m³ short term

This product has been classified as "not classifiable as hazardous" in accordance with Consumer Product Safety Commission (16 CFR Chapter 2), and labelled and packaged accordingly.

Section 16: OTHER INFORMATION

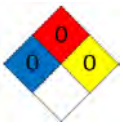
Size	UPC	Size	UPC
2 fl. oz.	043318131035	67.6 fl. oz.	043318130144
4 fl. oz.	043318130014	67.6 fl. oz.	043318000393
16 fl. oz.	043318130021	1 gallon	043318000799
22 fl. oz.	043318130229	1 gallon	043318130052
24 fl. oz.	043318130137	1 gallon	043318004957
32 fl. oz.	043318002557	1 gallon w/ dilution bottle	043318480492
32 fl. oz.	043318130335	140 fl. oz. w/ dilution bottle	043318001468
32 fl. oz.	043318000652	2.5 gallon	043318004889

USA items listed only. Not all items listed. USA items may not be valid for international sale.

Section 16: OTHER INFORMATION - continued

NFPA:

Health – None
Flammability – Non-flammable
Stability – Stable
Special - None



Acronyms

NTP	National Toxicology Program	IARC	International Agency for Research on Cancer
OSHA	Occupational Safety and Health Administration	CPSC	Consumer Product Safety Commission
TSCA	Toxic Substances Control Act	DSL	Domestic Substances List

Prepared / Revised By: Sunshine Makers, Inc., Regulatory Department.
This SDS has been revised in the following sections: Clarification on hazards in section 2, expanded transparency in section 3, revised layout in section 9, 14 & 16, added statement in section 15.

DISCLAIMER: The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

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Appendix E
Sampling and Analysis Plan

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SAMPLING AND ANALYSIS PLAN

CLOSED LOOP REFINING & RECOVERY/CLOSED LOOP GLASS SOLUTIONS
2200 FAIRWOOD AVENUE
COLUMBUS, OHIO 43207

EPA ID No. OHR000201145

EnSafe Project Number:
0888823935/007

Prepared for:

Olymbec USA LLC
1004 East Brooks Road
Memphis, Tennessee 38116

May 2020

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Cleveland, Ohio 44124
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TABLE OF CONTENTS

FIGURES

TABLES

ATTACHMENTS

1.0 INTRODUCTION

The purpose of this Sampling and Analysis Plan (SAP) is to present the procedures for conducting and documenting sample collection and analytical procedures for the Closed Loop Refining & Recovery/Closed Loop Glass Solutions (Closed Loop) facility in Columbus, Ohio (referred to herein as the "subject property" or the "Closed Loop facility"), as shown in Figure 1. Closed Loop accepted electronic waste (e-waste) at the subject property from late 2014 through early 2016, when they ceased operations and abandoned the subject property. As an e-waste recycler, Closed Loop's principal operations involved the receipt, storage, and disassembling cathode ray tubes (CRTs) and other electronic waste (collectively referred to as "CRT-related materials"). The subject property currently maintains containerized CRT-related materials (including processed CRT-glass), CRT demanufacturing areas, and residual lead dust contamination that will be addressed as part of the Resource Conservation Recovery Act (RCRA) Closure Plan associated with this SAP. This SAP also fulfills the requirements for sampling and analysis plans for Comprehensive Environmental Response, Compensation and Liability Act removal actions under Title 40 Code of Federal Regulations Section 300.415.

A description of the facility history, previous investigation results, and the removal/decontamination activities proposed for the Closed Loop facility may be found in the RCRA Closure Plan to which this work plan is attached. Figure 2 shows the layout of the facility warehouse and an approximate delineation of accumulated e-waste, associated processing areas, anticipated decontamination areas, and anticipated shipping areas.

As described in the RCRA Closure Plan, available information indicates that the Closed Loop facility previously generated lead-containing and corrosive materials as D008 and D002 hazardous wastes, respectively.

As summarized in the RCRA Closure Plan, remaining RCRA metals are not anticipated to be present in waste materials associated with the subject property.

2.0 SAMPLING PROTOCOLS

This section describes field methods for sample collection, sample preservation, sample shipment, sample analysis, and documentation requirements. These protocols are designed to achieve the program objectives without introducing cross contamination artifacts into the process. Table 1 provides the sampling activities anticipated for this project. Changes to sampling scope or analyte lists may require amendment of this SAP.

Table 1
Anticipated Sampling Activities

Monitoring Activity/ Classification	Parameter	Sampling Method	Number of Locations/ Samples	Field Quality Control Samples
Waste characterization (offsite analysis)	Waste characterization parameters (see Table 2)	Waste stream sampling	Based on subject property reconnaissance and waste inventory	None planned
Wastewater Confirmation Sampling (offsite analysis)	Wastewater characterization parameters (see Table 2)	Containerized processed wastewater sampling	100% of containerized processed wastewater prior to discharge	None planned

Field measurements collected to assess personnel safety during invasive sampling activities are documented in the Site-Specific Health and Safety Plan (SSHP).

Data quality objectives (DQOs) for sampling activities are presented in Section 3. Detailed sampling procedures for field activities are outlined in the RCRA Closure Plan and the standard operating procedures included as Attachment A. Detailed standard operating procedures include:

- Making entries in the site logbook
- Field equipment decontamination
- Sample collection
- Packing and shipping environmental samples

2.1 Waste Characterization Sampling

During the Phase I and Phase II removal actions and subsequent Phase III decontamination, solid and liquid waste materials will be collected and containerized pending offsite disposal.

Prior to offsite disposal, these materials will be characterized to determine the appropriate management method.

It is currently anticipated that solid materials will consist of the following materials:

- Dust and fine grained materials stored in 55-gallon drums or Gaylord containers
- Solid wastes contaminated with lead-containing dust
- Insulation contaminated with lead containing dust
- Settled solids and filter media associated with treatment of wastewater prior to discharge to the City of Columbus sanitary sewer system. The wastewater treatment system is anticipated to include a settling tank to remove solids and a storage tank to retain treated water for testing prior to discharge. Depending on the efficacy of the above system, a sand filter to remove fines and a carbon canister to remove dissolved lead may also be required.

It is currently anticipated that liquid materials will consist of treated decontamination fluids that will be disposed via an anticipated City of Columbus industrial discharge permit; these liquids may be stored in 55-gallon drums, totes, or larger portable containers prior to discharge.

Representative samples of waste will be collected to determine the appropriate disposal methodology. The specific sampling methods selected will be dependent on the nature of the waste, its container, and its location. Only trained personnel will perform sampling. To the extent possible, disposable sampling tools will be used for sampling waste material.

Characterization samples will be analyzed for the eight RCRA metals. Analytical results will be compared against the hazardous waste regulatory levels specified in Table 5 to determine appropriate waste management. If one or more analytes exceed regulatory standards for hazardous waste, the waste will be managed as hazardous for the analytes that exceed regulatory standards. If analytical results do not meet regulatory criteria, the waste will be managed as non-hazardous.

2.2 Closure Performance Sampling

During the Phase III decontamination, portions of the subject property will be washed and triple rinsed. As stated in the RCRA Closure Plan, decontamination activities will be performed to a "clean debris surface;" therefore, closure performance sampling will not be required.

2.3 Wastewater System Sampling

During the Phase I and Phase II removal actions and subsequent Phase III decontamination liquid wastewater with suspended solids will be collected and containerized pending appropriate waste management. It is currently anticipated that wastewater management will include onsite treatment to remove lead with subsequent verification analysis and disposal in the City of Columbus sanitary sewer system.

In the event that wastewater will be managed by disposal to the City of Columbus sanitary sewer system, untreated wastewater may be stored in 55-gallon drums, 500-gallon totes, or large portable containers (more than 1,000 gallons). Treated wastewater pending disposal in the City of Columbus sanitary sewer system will be stored in portable frac tanks up to approximately 20,000 gallons in capacity pending wastewater characterization analysis and subsequent disposal. The actual size of tanks and containers will depend on the volume of generated wastewater and treatment capacity.

Analytical results will be compared against the City of Columbus industrial discharge pretreatment standards in an effort to ensure that analytes are below regulatory limits and the wastewater can be discharged in compliance with the anticipated industrial discharge permit. If analytical results do not meet regulatory criteria, the wastewater will be retreated, or will be transported offsite for disposal as a wastewater at a commercial disposal facility, in accordance with the analytical results.

In addition to wastewater samples, accumulated solids and filter media associated with wastewater treatment, may be sampled and analyzed in accordance with Section 2.1, prior to offsite transportation and disposal.

2.4 Health and Safety Sampling

Health and safety precautions including personnel protective equipment and air monitoring to be implemented while sampling will be in accordance with procedures specified in the SSHP.

3.0 QUALITY ASSURANCE/QUALITY CONTROL

The overall quality assurance objective for this project is to develop and implement procedures for field sampling, chain-of-custody (COC), laboratory analysis, and reporting that will provide results that are scientifically valid at levels that are sufficient to meet DQOs. Specific procedures for sampling, COC, laboratory analysis, data reporting, internal quality control, preventive maintenance of field equipment, and corrective action are described in other sections of this SAP.

In combination, quality assurance/quality control (QA/QC) represents a set of procedures designed to produce analytical data of known and measurable quality. A useful distinction between QA and QC can be made as follows: QC represents the set of measurement procedures (spikes, blanks, replicates, calibration, etc.) used to provide overall evidence of the quality of a particular analytical batch; QA represents the set of procedures used to evaluate and, if necessary, to qualify the data quality.

3.1 Data Quality Objectives

The QA objectives during closure of the warehouse will be in an effort to ensure that the data meet the DQOs in Table 2.

3.2 Measurement Performance Criteria

Performance criteria selected for the analytical measurement systems will be in an effort to ensure the project objectives in Section 2.1 are met. The analytical data will be evaluated to achieve an acceptable level of confidence in the decisions derived from the data. The methods and the procedures used to implement and achieve the DQOs are described throughout this SAP. Data quality indicators are qualitative and quantitative descriptors used to interpret the degree of acceptability or usability of data. The five principal data quality indicators are (1) precision, (2) accuracy, (3) representativeness, (4) comparability, and (5) completeness, as described in Table 3.

Table 2
Data Quality Objectives

1. Problem Statement	2. Decision Statement	3. Data Needs and Inputs	4. Decision Rule	5. Limits on Decision Error	6. Optimize Sample Design
Waste characterization sampling will be performed when characterization is required for disposal. Results will be used to assess proper waste identification and will be evaluated against applicable regulatory disposal criteria in Table 5.	Does material exhibit hazardous characteristics or contain contaminants at levels above associated regulatory levels provided in Table 5?	Hazardous substance sampling for definitive waste characterization will be conducted in an effort to ensure proper disposal is completed. By identifying the contaminants present in the waste streams, proper waste identification and subsequent disposal can be completed. Decision inputs needed for definitive waste characterization include samples from materials intended for offsite disposal, laboratory results for each analyte, and chain-of-custody (COC) information. Each sample will be labeled with a distinctive sample identification before shipment for laboratory for analysis.	Initial waste characterization (generator knowledge or analytical testing) will be performed on each waste stream; subsequent analyses will be performed to identify containers that may be managed as non-hazardous waste.[1] Analytical results will be compared with the appropriate regulatory levels identified in Table 5 and as discussed in Section 2. • **IF** analytical results exceed regulatory levels, **then** waste will be identified by the appropriate waste code associated with the analyte. • Results will be reported to the Project Coordinator (or designee) and the disposal contractor who will discuss proper disposal options with field staff. **Null Hypothesis** Waste concentration of each analyte is less than associated regulatory levels. H0: Waste Concentration ≤ Waste Concentration listed in Table 5 H1: Waste Concentration > Waste Concentration listed in Table 5	A false positive decision may cause inappropriate rejection of the null hypothesis and the inappropriate cost of waste disposal. A false negative is the release of pollutants due to improper disposal activities.	Waste sampling locations will be selected to obtain a representative sample of the entire waste stream.

Table 2
Data Quality Objectives

1. Problem Statement	2. Decision Statement	3. Data Needs and Inputs	4. Decision Rule	5. Limits on Decision Error	6. Optimize Sample Design
Wastewater sampling will be performed in an effort to ensure that wastewater meets discharge criteria. Results will be evaluated against applicable regulatory discharge criteria in Table 5.	Does material contain contaminants at levels above associated regulatory levels provided in Table 5?	Wastewater sampling will be conducted in an effort to ensure proper disposal is completed. By identifying the contaminants and associated concentrations present in wastewater before discharge, compliance with the wastewater discharge permit will be maintained. Decision inputs needed for definitive wastewater sampling include wastewater sample, laboratory results for each analyte, and COC information. Each sample will be labeled with a distinctive sample identification before shipment for laboratory for analysis.	Wastewater sampling will be performed on treated wastewater prior to discharge to the City of Columbus sanitary sewer system.[2] Analytical results will be compared with the regulatory discharge criteria identified in Table 5 and as discussed in Section 2. • **IF** the analytical results exceed regulatory levels, **then** wastewater will be retreated and retested or will be managed for offsite disposal pursuant to analytical results. • Results will be reported to the Project Coordinator (or designee) and the disposal contractor who will discuss disposal options with field staff. **Null Hypothesis** Waste concentration of each individual analyte is less than associated regulatory levels for each analyte. H0: Waste Concentration ≤ Waste Concentration listed in Table 5 H1: Waste Concentration > Waste Concentration listed in Table 5	A false positive decision may cause inappropriate rejection of the null hypothesis and the inappropriate cost of waste disposal. A false negative is the release of pollutants due to improper disposal activities.	Wastewater sample locations will be selected to obtain a representative sample of the entire wastewater batch.

Notes:
[1] Each waste stream will be characterized following Title 40 Code of Federal Regulations Sections 261.21 through 261.24, as described in Table 5.
[2] Wastewater samples will be characterized following Title 40 Code of Federal Regulations Part 136 and amendments thereto, as described in Table 5.
Samples will be submitted to a laboratory certified under the National Environmental Laboratory Accreditation Program or an Ohio Voluntary Action program Certified Laboratory.
H0 = Null hypothesis
H1 = Alternative hypothesis

Table 3
Data Quality Indicators

Precision measures the reproducibility of measurements and methods and is defined for qualitative data as a group of values' variability compared with its average value. Precision will be assessed by comparing the laboratory duplicate results and results between matrix spike and MS. The RPD will be calculated for each pair of duplicate analysis using the following equation:

$$RPD = \frac{(S - D)}{(S + D)/2} x100$$

Where:

S = sample result
D = duplicate result

Accuracy is the degree to which a given result agrees with the true value. The accuracy of an entire measurement system is an indication of any bias that exists. Spiked sample results provide information needed to assess the accuracy of analyses. Specifically, MS, and LCS %Rs are used to assess accuracy. Five percent of samples analyzed are spiked with target chemicals for the MS. If the calculated %Rs for the known spike concentrations are within defined control limits set by each method, the reported sample concentrations are considered accurate. Accuracy is calculated using the following equation.

$$\%R = \frac{(SSR - SR)}{SA} x100$$

Where:

SSR = spike sample recovery
SR = sample recovery
SA = concentration of spike added

Representativeness expresses the degree to which data accurately and precisely represents a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition. Representativeness is a qualitative parameter that is dependent upon the proper design of the sampling program and proper laboratory protocol. The sampling approach was designed to provide data representative of site conditions. During development of this approach, consideration was given to past waste disposal practices, existing analytical data, physical setting, and facility processes. Representativeness will be satisfied by ensuring that the RCRA Closure Plan, this sampling & analysis plan, and proper sampling techniques are used, proper analytical procedures are followed, and holding times of the samples are not exceeded by the laboratory.

Comparability expresses the confidence with which one data set can be compared to another. Comparability is also dependent on similar QA objectives. Comparability is dependent upon the proper design of the sampling program and will be satisfied by ensuring proper sampling techniques are used.

The objective of this plan is to produce a high level of comparability between data sets. Heterogeneous investigative samples make it difficult to obtain consistently high comparability values. However, the use of standard methods for sampling and analysis, reporting data in standard units, and using standard and comprehensive reporting formats will optimize the potential for high levels of data comparability.

Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount expected to be obtained under correct normal conditions. It is expected that 100% of the planned sampling points will be collected. Sampling locations at the facility are expected to be accessible. Laboratory analysis for this project will have a completeness goal greater than 95% to account for unanticipated results that may be rejected. Completeness can be calculated using the following equation:

$$\%Completeness = \frac{No.\ of\ Valid\ Tests}{Total\ Tests\ Taken} x100$$

Sensitivity is the ability of an analytical method to detect the analyte of concern and other target compounds at the level of interest. Analytical methods will be selected that have the ability to meet regulatory levels of detection.

Notes:

%R = Percent Recovery
LCS = Laboratory Control Sample
MS = Matrix Spike Sample
QA = Quality Assurance
RCRA = Resource Conservation Recovery Act
RPD = Relative Percent Difference

To evaluate if field or laboratory conditions may be impacting analytical sample results, reusable equipment blank and duplicate samples will be collected during closure performance (Section 2.2) sampling activities.

Duplicate Samples

Duplicate samples are used to assess the precision of the laboratory. Parameters from both the original and duplicate set will be collected at the same time. When a duplicate sample is collected, one-half of the sampling container yield will be used to fill sample containers, while the second half of the sampling container will be used to fill the container for the same parameter in the duplicate set. One duplicate sample may be collected for every 20 wastewater samples collected.

3.3 Quality Control

Data quality indicators (precision, accuracy, representativeness, comparability, completeness, and sensitivity) are presented in Table 3. The fundamental QA objective with respect to accuracy, precision, and sensitivity of analytical data is to achieve the QC acceptance criteria of the analytical protocols. The laboratory will be the primary reviewer of quality control results and they will document these finding in the data package case narrative. Accuracy will be assessed by evaluating surrogate spike, matrix spike, and laboratory control sample percent recoveries. Precision will be assessed by evaluating the results of the laboratory duplicate and matrix spike duplicate results. Duplicate samples are not planned but may be collected to assess sampling and analytical reproducibility; if collected, duplicate locations will be determined based on field conditions. Measurement performance criteria for precision and accuracy, presented in Table 5, are based on laboratory statistically-derived control limits that are updated annually.

The QA objectives are that measurements be representative of the medium or operation being tested and that data resulting from sampling and analysis be comparable. Representativeness and comparability will be satisfied by adhering to the DQOs in Table 2 and ensuring that proper sampling techniques are used and proper analytical procedures are followed. Laboratory analysis for this project will have a completeness goal greater than 95% to account for unanticipated results that may be rejected due to elevated detection limits or severe matrix interference (which potentially may inhibit valid measurements). Sensitivity requirements are the regulatory limits presented in Table 5.

4.0 SAMPLE MANAGEMENT

4.1 Sample Handling

Samples will generally be collected in certified, pre-cleaned, pre-preserved (if applicable) containers provided by the contracted analytical laboratory. To the extent possible, disposable sampling tools will be used for sampling waste material. Table 4 shows the sample containers, holding times, and preservation requirements for samples collected during this sampling effort.

Table 4
Sample Containers, Holding Times, and Preservation Requirements

Analyte	Analytical Method	Sample Volume, Container	Holding Time	Preservation
Waste Characterization Sampling				
TCLP Metals	1311/6010D/ 7470A	150 grams; plastic or glass	180 days from collection to TCLP extraction; 180 days from TCLP extraction to analysis	Cool to 0-6°C
TCLP Mercury	1311/7470A	150 grams; plastic or glass	28 days from collection to TCLP extraction; 28 days from TCLP extraction to analysis	Cool to 0-6°C
pH	9045D	20 grams; plastic or glass	As soon as possible	Cool to 0-6°C
Wastewater Sampling				
Total Lead	E200.7	500 ml plastic	180 days	Cool to 0-6°C

Notes:
°C = Degrees Celsius
TCLP = Toxicity Characteristic Leaching Procedure
mL = Milliliter

4.2 Sample Identification

Samples collected during this project will be identified by a unique sample identification code. That identification code will be recorded on the sample label affixed to the sample container, in the field log and on the analytical COC form. The sample identification code will be used to track each sample as well as cross-reference sample data with other activities.

Sample identification nomenclature will include the matrix code and container identification/sample number. Matrix codes may be found at the bottom of the EnSafe COC and the following matrix codes may be applicable for this project:

- LH = Liquid Waste
- SC = Cement/Concrete

- SL = Sludge
- SN = Miscellaneous Solid/Building Materials
- SQ = Soil/Solid QC Matrix
- ST = Solid Waste
- WQ = Water QC Matrix
- WW = Wastewater

Sample identification code examples:

- LH01 = Indicates a liquid waste sample collected at container identification number 1
- ST15 = Indicates a solid waste sample collected at container identification number 15

An example sample label is shown on Figure 3.

4.3 Packaging Samples

Samples must be packed to avoid breakage during transport and prevent cross-contamination. A clean shipping container in good condition will be used. Samples will be wrapped in bubble wrap or other suitable packaging materials to prevent breakage. Sample containers will be placed inside the cooler so that they do not touch each other and cooling material (e.g., bagged ice) will be placed around and between the samples to chill them to 0-6° Celsius. Any remaining space will be filled with additional inert packaging material. A COC record describing the contents of each container will be placed in a plastic bag and placed in each container. The container will be sealed with tape and custody seals so that it cannot be opened without breaking the seal.

4.4 Sample Custody

Custody is one of several factors necessary for the admissibility of environmental data as evidence in a court of law. Custody procedures help to satisfy the two major requirements for admissibility: relevance and authenticity. Sample custody is addressed in three parts: field sample collection,

laboratory analysis, and final project files. Final project files, including originals of each laboratory report and purge file, are maintained under document control in a secure area.

A sample or project file is under your custody if:

- The item is in actual possession of a person
- The item is in the view of the person after being in actual possession of the person
- The item was in actual physical possession but is locked up to prevent tampering
- The item is in a designated and identified secure area

4.5 Field-Specific Custody Procedures

The field sampling team will be responsible for the care and custody of the collected samples until they are properly dispatched. The field team leader will review field activities in an effort to ensure/confirm that proper custody procedures are followed during the field activities. Field staff will complete a COC form to accompany each container shipped from the field to the laboratory. The following sections describe the specific field custody procedures.

4.5.1 Initiation of Chain-of-Custody Field Procedures

The laboratory, which is the source of the custody train, will provide pre-cleaned containers in accordance with United States Environmental Protection Agency (U.S. EPA) cleaning requirements. Bottle lot documentation, in the form of bar codes or sample tags, is affixed to each bottle and is traceable throughout the lifespan of the containers. Laboratory-supplied containers are sent into the field with COC documentation, which is kept with the containers during field efforts. The containers will remain in the custody of EnSafe during sampling and will be sent to the laboratory using the COC procedures described in this section. The sampler will keep a written record of the sampling operation and the samples' identities. The sample packaging and shipment procedures summarized below will be performed in an effort to ensure that the samples will arrive at the laboratory with the COC intact.

- The field sampler is personally responsible for the care and custody of the samples until they are transferred or properly dispatched. As few people as possible should handle the samples.

- Sample containers will be identified by use of sample labels or tags with sample numbers, sampling locations, date/time of collection, and type of analysis. Sample labels/tags are to be completed for each sample using waterproof ink unless prohibited by weather conditions. The label/tag must remain legible and attached to the sample container, even when wet.

- Samples are accompanied by a properly completed COC form. The sample numbers and locations will be listed on the COC form. When transferring the possession of samples, the individuals relinquishing and receiving will sign, date, and note the time on the record. This record documents transfer of custody of samples from the sampler to another person, to the permanent laboratory, or to/from a secure storage area.

- Samples will be properly packaged (Section 4.3) and dispatched to the appropriate laboratory for analysis, with a separate signed custody record enclosed in each sample container. The original COC form will accompany the shipment. At least one copy of the form will be retained by the sampler. Shipping containers will be locked and secured with strapping/ packaging tape and custody seals for shipment to the laboratory.

- Ideally, samples will be transported to the laboratory the same day the samples are collected in the field. In some instances, samples may be retained by the sampler beyond the sample collection day. In these instances, the samples will be sent and the laboratory will be informed, if necessary, so that sample holding times will not be exceeded.

Official custody of samples must be maintained and documented from collection until completion of analysis. The COC will be documented. The COC procedures can provide an accurate record to trace a sample's possession and handling. Sampling personnel will record the following minimum information on the COC form:

- Sample identification number and location

- Signatures of any individuals with control over samples

- Date and time of collection

- Any preservatives used in the samples

- Additional comments (e.g., shipping information, turnaround time requirements)
- Total number of sample containers and the required analysis

Example COC forms and custody seals are shown in Figures 4 and 5, respectively.

4.5.2 Laboratory Chain-of-Custody Procedures

The laboratory sample custodian shall inspect the samples and record any problems encountered on the COC form or internal laboratory "discrepancy report." The sample custodian shall inspect and record the following:

- Condition of shipping container
- Temperature of shipping container
- Condition of sample containers
- Condition (including presence or absence) of custody seals on shipping containers
- Presence or absence of COC records
- Conflicting COC and sample container information
- Preservation
- Resolution of problems or discrepancies (e.g., missing documents, conflicting information, broken custody seals, broken/leaking samples, etc.)

The sample custodian shall sign COC forms and discrepancy reports. The laboratory will contact the samplers and/or Project Coordinator to resolve any discrepancies and/or problems upon sample receipt. Samples will be properly identified, logged in, and assigned the correct analyses. In addition, the sample COC will be maintained during the sample receiving and analytical processes.

The laboratory will have a specific method for maintaining identification of samples while they are in the laboratory, including sample containers, extraction/digestion vessel, and sample extract/digestate

containers. The laboratory identifier shall be cross-referenced with the field sample identifier on the laboratory reports. Samples will be maintained in a secure location and will be stored in appropriate areas to maintain proper preservation requirements. Analytical data is to be kept secured and released to authorized personnel only.

4.6 Final Project File Custody Procedure

The final project file will be the central repository for documents that document relevant sampling and analysis activities as described in this SAP. The Project Coordinator (or designee) will be the custodian of the project file and will maintain the contents of project files for the subject property, including relevant records, reports, logs, field notebooks, pictures, subcontractor reports, and data reviews. The project file will be kept in a secured, limited access area that is under EnSafe custody. The final project file will include at a minimum:

- Field logbooks and other field records
- Field data and data deliverables
- Photographs
- Drawings
- Laboratory data deliverables
- Data assessment reports
- Progress reports, QA reports, interim project reports, and other reports generated
- Custody documentation (forms, airbills, etc.)
- Correspondence and other records relevant to the project

5.0 ANALYTICAL PROCEDURES

Table 5 provides analytical methods anticipated to be used for this project. Changes to sampling scope or analyte lists may require amendment of this SAP. Samples will be submitted to a laboratory certified under the National Environmental Laboratory Accreditation Program or an Ohio Voluntary Action program certified laboratory. This laboratory will be required to meet the DQOs specified in this plan. The precision and accuracy criteria required will be followed and documented in accordance with laboratory standard operating procedures. The laboratory will be responsible for the final disposition of any sample residuals.

Field measurements, collected to assess personnel safety during invasive sampling activities, are documented in the SSHP.

Table 5
Analytes, Regulatory Levels, and Measurement Performance Criteria

Analyte	Analytical Method	Regulatory Levels[1,2]	Laboratory Method Detection Limit	Laboratory Reporting Limit	Units	LCS Accuracy (%R)	MS Accuracy (%R)	Surrogate Accuracy (%R)	LCS Precision (%RPD)	MS Precision (RPD)
Waste Characterization: TCLP Metals										
Arsenic	1311/6010D	5.0	0.316	2.00	mg/L	50-150	75-125	—	20	20
Barium	1311/6010D	100.0	0.362	20.0	mg/L	50-150	75-125	—	20	20
Cadmium	1311/6010D	1.0	0.0480	0.500	mg/L	50-150	75-125	—	20	20
Chromium	1311/6010D	5.0	0.151	1.00	mg/L	50-150	75-125	—	20	20
Lead	1311/6010D	5.0	0.282	1.00	mg/L	50-150	75-125	—	20	20
Mercury	1311/7470A	0.2	0.000130	0.0330	mg/L	80-120	80-120	—	20	20
Selenium	1311/6010D	1.0	0.469	1.00	mg/L	50-150	75-125	—	20	20
Silver	1311/6010D	5.0	0.0810	0.500	mg/L	50-150	75-125	—	20	20
Waste Characterization: Resource Conservation and Recovery Act Characteristics										
Corrosivity (pH)	9045D	≤2 or ≥12.5	—	0.100	pH units	—	—	—	—	—
Wastewater Characterization: Total Metals										
Lead	E200.7	4.0	0.010	0.100	mg/L	50-150	75-125	—	20	20

Notes:
[1] Waste characterization regulatory Levels were obtained from Title 40 Code of Federal Regulations Sections 261.21 through 261.24.
[2] Wastewater regulatory Levels were obtained from Rules and Regulations No. 02-2013 of The City of Columbus Department of Public Utilities.
Waste characterization and closure performance analyses will be performed according to *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods Compendium, SW-846 Update VI*. (U.S. EPA 2018).
Wastewater analyses will be performed according to *Selected Analytical Methods for Environmental Remediation and Recovery (SAM) 2017*. (U.S. EPA 2017).
Laboratory method detection and reporting limits and measurement performance criteria are statistically-derived by the laboratory and are updated annually.
Laboratory method detection and reporting limits may vary due to sample volume, matrix interferences, or necessary sample dilutions to quantify results.
Changes or additions to the analyte list may require amendment of this Plan.

TCLP = Toxicity Characteristic Leaching Procedure
LCS = Laboratory control sample
MS = Matrix spike
%R = Percent recovery
%RPD = Relative percent difference
Surr = Surrogate
mg/L = Milligrams per liter
— = Not available/not applicable

6.0 FIELD INSTRUMENTATION

6.1 Equipment Testing, Inspection, and Maintenance

The field equipment detailed in the SSHP will be used to assess personnel safety during invasive sampling activities.

Field equipment will be checked for operation in accordance with the manufacturer's specifications. This includes battery checks and routine replacement of parts. Equipment will be inspected when first handed out and when returned from use for damage. Field personnel will be responsible for inspecting equipment before use and they will follow the manufacturer's instructions for assembly, operation, and maintenance. If a field instrument proves faulty, the equipment will be taken out-of-service until corrective action can be performed to return the unit to working order. If appropriate, a substitute unit will be delivered to the site in an effort to ensure that the integrity of the work is not compromised.

The preventive maintenance of field equipment is described in detail in the associated manufacturer's equipment manuals. Records of equipment maintenance will be maintained in the field logbook or on field forms. Maintenance records for leased equipment must be kept by the vendor and made available upon request.

Laboratory preventive maintenance will be implemented in accordance with the Laboratory's QA Manual. At a minimum, major instrumentation will have associated records and logbooks, including schedules and criteria for maintenance.

6.2 Instrument/Equipment Calibration and Frequency

Calibration is the process by which the correlation between instrument response and actual value of a measured parameter is determined. The laboratory will calibrate analytical instruments in accordance with the U.S. EPA's published methods, the Laboratory QA Manual, and associated procedures.

Field equipment will be calibrated according to manufacturer's specifications. Field personnel will verify that the calibration requirements have been met for instruments used and that equipment is in proper working condition prior to use. They will document acceptable calibration and calibration verification for each instrument unit and field test or analysis, linking this record with affected sample measurements. Instruments may also be re-calibrated during the day if field personnel consider it

necessary. Instrument calibration will be recorded in the field logbook or on project-specific calibration forms.

Whenever field measurements fall outside acceptance limits, corrective action should be taken to bring the analysis back into control. The corrective action should include: (1) finding the cause of the problem, (2) correcting the problem, including replacing equipment, (3) demonstrating the problem has been corrected by reanalyzing appropriate laboratory reference samples, if necessary, and (4) repeating the analyses of any investigative samples that may have been affected by the control problem, if necessary. Any preventative or corrective maintenance completed will be documented in the field logbook or on project-specific calibration forms.

6.3 Inspection/Acceptance of Supplies and Consumables

Supplies and consumables will be inspected upon receipt and prior to use. Consumables such as baggies, plastic sheeting, aluminum foil, gloves, tape, etc., are expected to be used during the sampling efforts. No special requirements are needed or expected for consumables or rental equipment/supplies. If used, disposable sampling tools will be decontaminated prior to disposal or added to the waste stream sent to the offsite disposal facility. Consumables such as standards needed for field calibrations will be used only if the shelf-life has not expired. The laboratory's procedures incorporate procedures for critical supplies and consumables, including standard supply sources and acceptance criteria for tracking and retrieving these materials.

6.4 Non-Direct Measurements

No data or information from non-measurement sources are expected to be used for this project.

7.0 DATA MANAGEMENT

Data for this project will be produced in two locations: onsite and at the contracted laboratory.

Planned field measurements, collected to assess personnel safety during sampling activities, are documented in the SSHP. Data collected onsite will be recorded on field data worksheets and/or into field logbooks, if practical for the instrument used. When recorded, this field data will become a part of the project file.

Laboratory data management procedures are outlined in their procedures and the Laboratory QA Manual. Laboratory data will be submitted by the contracted laboratory within 28 calendar days of the laboratory's receipt of the samples. Field records and the analytical report will be submitted to the Project Coordinator (or designee) who will be responsible for ensuring the analytical report meets the RCRA Closure Plan. The procedures identified in previous sections describe recording measurements onto field forms/logbooks and COC forms. This section discusses the monitoring and controls established to track field data through field logbook completion, electronic data management, and error detection and correction.

7.1 Field Forms/Logbook Completion

Specific information to be included in the field forms/logbook includes:

- Date, time, and description of site conditions
- Date, time, and description of work activities
- Names of team members present
- Names, time of arrival, and time of departure of any visitors
- Number, type, date, time, and identification of any samples collected
- Health and safety data and any deviation from established standard operating procedures
- Any unusual circumstances, occurrences or SAP deviations

Procedures and instructions included in this SAP provide the guidance necessary to record information and data in field forms/logbooks and COC forms for data collection activities. Upon completion, field data and analytical sampling paperwork will be reviewed for accuracy, completeness, and legibility. Technical personnel will document and review their own work and are accountable for its correctness. Review is performed in an effort to ensure that forms are complete and legible. The Project Coordinator (or designee) will evaluate that the following has been done:

- Forms were completed using a ballpoint pen or indelible marker. Sample labels were completed with an indelible marker.
- If an error was made on any form, it was struck with a single line, the correct value written in close proximity to the old value, and the correction initialed and dated. The incorrect value was not written over or obliterated in any way.
- If any sample shipment or paperwork errors occur, they were documented on the field form/logbook or laboratory receipt documentation.

In addition, the Project Coordinator (or designee) will also evaluate that:

- The correct sample numbers were used
- The correct number and types of sample bottles were used
- Preservation was specified (where necessary)
- Corrections were dated and initialed
- COC forms were relinquished by the sampler with the correct date and time noted

7.2 Electronic Data Management

A systematic approach to data management that saves time, reduces transcription errors, and decreases hard copy analytical data to a more manageable level will be used. After the samples are analyzed, the laboratory produces electronic analytical data files that are loaded into the project database. After data are loaded and checked, they can be accessed for final report preparation.

After project-completion, the database also serves as an archive for analytical data. The project database will be located on a secure network, which will be backed-up routinely.

7.3 Error Detection and Correction

The Project Coordinator (or designee) will review field forms/logbooks. If any document completion errors are found during the review, the incorrect form will be sent to the individual best suited to correct the error. Errors on field forms are struck through with a single line, the correct value inserted, and the correction initialed and dated. The incorrect value will not be written over or obliterated in any way. After the form has been corrected, it will become the final version of the document, suitable for report usage. The laboratory's procedures for error detection and correction are documented in their procedures and QA Manual. Laboratory failures and subsequent actions will be reported in the final laboratory data package.

Electronic data entered into the database are spot-checked for completeness/correctness against the data package submittal. If errors are found between the data package and electronic data, either during the data loading process or during data verification/validation, the laboratory will be contacted and asked to correct and resubmit the data.

8.0 DATA EVALUATION

8.1 Data Review

Data generated by project activities will be reviewed against the DQOs cited in Table 2 and the QA/QC practices cited in Section 3.3. Data will be separated into three categories:

- Category 1 — Data meeting each DQO,
- Category 2 — Data failing to meet precision or recovery criteria, and
- Category 3 — Data failing to meet accuracy criteria.

Data meeting each DQO, but with failures of QA/QC practices (Category 2), will be set aside until the impact of the failure on data quality is determined. Once determined, the data will be moved into either Category 1 or Category 3.

Data meeting each DQO (Category 1) is considered usable by the project. Data failing to meet accuracy criteria (Category 3) is considered not usable. Data failing to meet precision or recovery criteria (Category 2) will have aspects assessed. If sufficient evidence is found supporting data quality for use in this project, Category 2 data will be moved to Category 1, but will be flagged as estimated (with a J-flag) as per U.S. EPA guidelines. The Project Coordinator (or designate) will evaluate the cause of the data failures and make the decision whether to discard the data or re-sample.

8.2 Verification and Validation Methods

The field data package will include logbooks, field records, and measurements obtained onsite. The package will be verified by conducting:

- A review of the field data compiled on sampling logs for completeness. Failure in this area may result in the data being invalidated for the intent of the project.

- A review of the COC forms for proper completion, signatures of field personnel, and the laboratory sample custodian, and dates. Failure in this area may result in the data being invalid for the purpose of the project.

The field team leader will review/validate the field data and any problems identified during this process will be reported to the Project Coordinator (or designate), who will include this information in the management report, as necessary. The contracted laboratory will review/validate the

laboratory data according to its procedures. Any problems identified during this process will be reported in the analytical data report.

The laboratory procedures for data reduction, validation, and reporting are included in the laboratory's Quality Assurance Project Plan. Data reduction, validation, and reporting by the laboratory will meet the criteria needed for internal data evaluation.

The analytical laboratory will provide a data package that meets Ohio EPA Tier I validation criteria and includes a summary documenting any data quality issues. Data may be reviewed externally from the laboratory, if warranted. If data review is performed, the analytical data package will be assessed by the Project Coordinator (or designate). The review will evaluate any out-of-control data points and data omissions and will interact with the laboratory to correct data deficiencies. Decisions to repeat sample collection and analyses may be made by the Project Coordinator based on the extent of the deficiencies and their importance in the overall context of the project. The analytical data package review includes, but is not limited to, review of the following:

- Data completeness
- Holding times
- Instrument tuning
- Calibrations
- Blanks
- Matrix spike or spike/lab duplicates
- Field duplicate precision
- Internal standard performance

Data review also includes:

- Comparison of the data package to the Regulatory Levels (Table 5) to confirm completeness.
- Comparison of sampling dates and analysis dates to check that samples were analyzed within the proper holding times.
- Review of laboratory blanks to evaluate possible contamination sources.
- Review of analytical methods and required detection limits to verify that they agree with the Quality Assurance Project Plan and the laboratory contract.

At this time, other than reviewing data for completeness, samples will not be reviewed externally for data reduction/validation.

8.3 Reconciliation with User Requirements

Once the data results are compiled, the Project Coordinator, or designee, will review the data to determine if they fall within the acceptance limits as defined in this SAP. Completeness will also be evaluated to determine if the completeness goal for this project has been met. If data quality indicators do not meet the project's requirements as outlined in this SAP, the data may be discarded and re-sampling may occur. The Project Coordinator will evaluate the cause of the failure (if possible) and make the decision whether to discard the data and re-sample.

9.0 REPORTING

9.1 Analytical Reports

Analytical reports will be generated by the contracted laboratory within 28 calendar days after receipt of the samples. The contracted laboratory will forward the analytical information to the Project Coordinator, or designee.

9.2 External Reports

Anticipated reporting schedules are provided in the RCRA Closure Plan. Project reports will be generated by the Project Coordinator (or designate) for inclusion in the project file at the completion of the project. This report will include a summary description of project activities; a summary of data, a discussion of any problems encountered and associated corrective actions, a discussion of the conclusions drawn from the results of this project and the rationale for those conclusions, and the results of the data quality assessment.

FIGURES

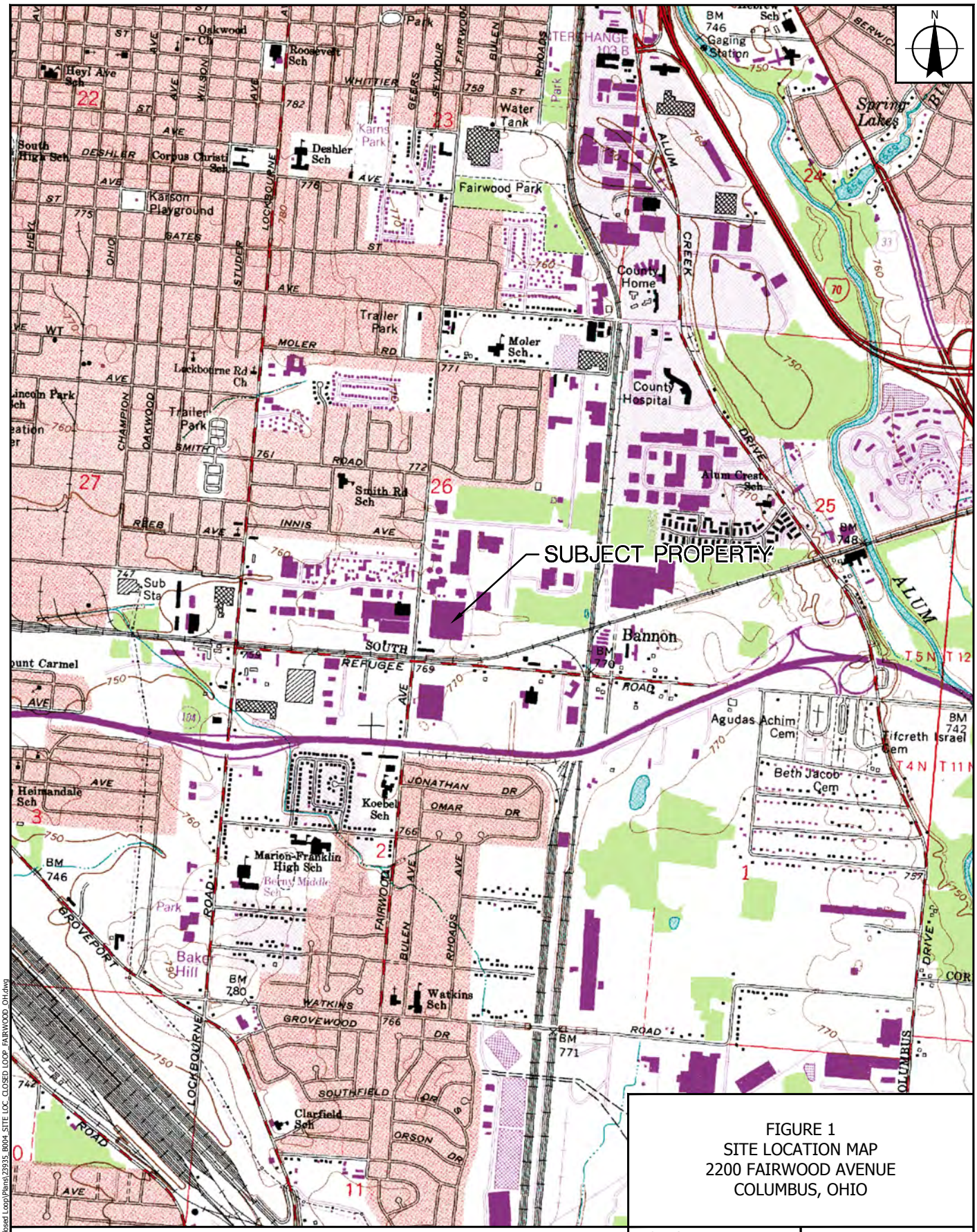

FIGURE 1
SITE LOCATION MAP
2200 FAIRWOOD AVENUE
COLUMBUS, OHIO

NAD 1983 STATE PLANE
UTM 17 NORTH

0 1,000 2,000
SCALE IN FEET

REQUESTED BY:	NB
DRAWN BY:	KMB
DATE:	11/14/2018
PROJECT:	0888823935

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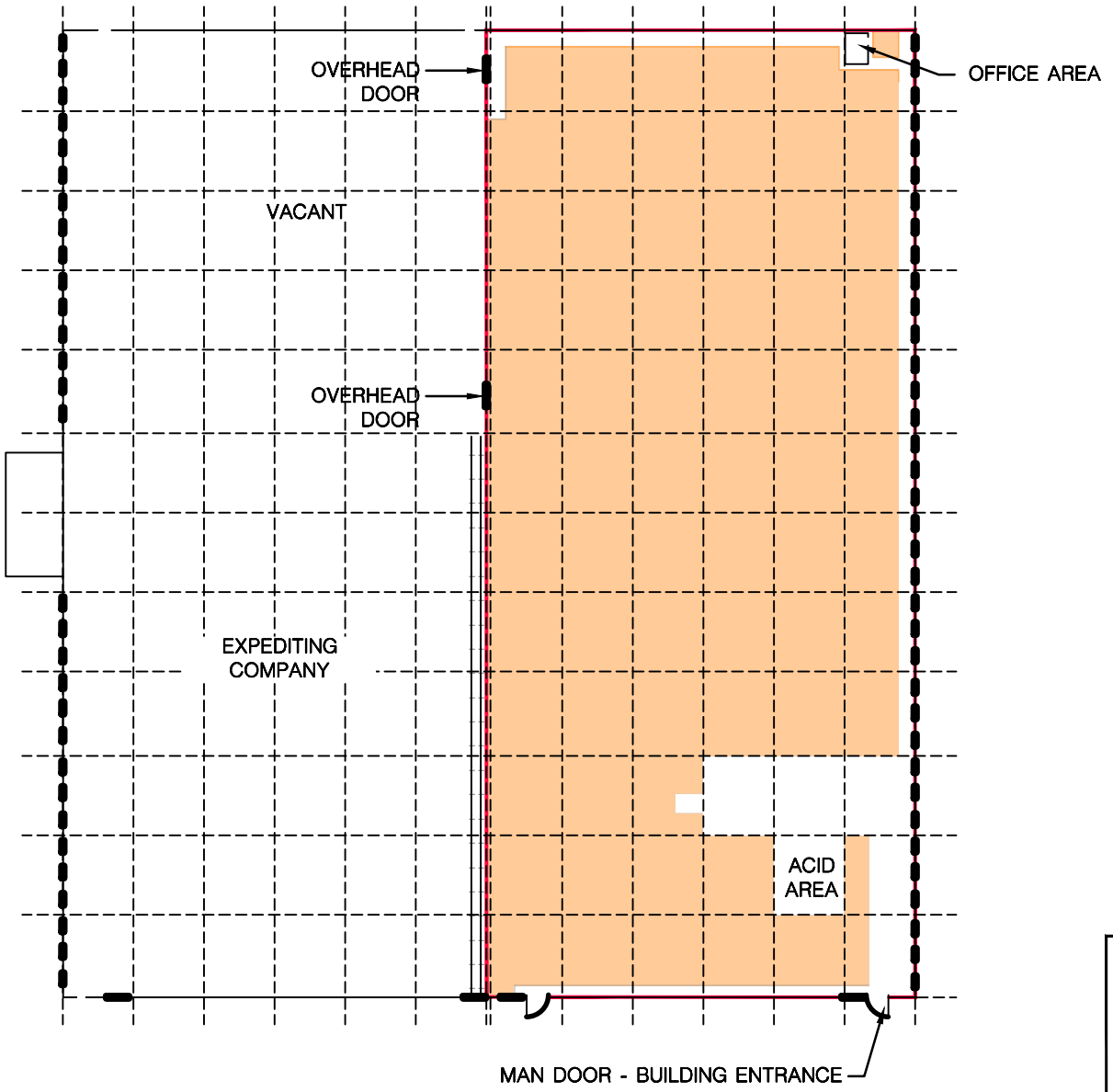
DATA SOURCES: U.S. Geological Survey. Southeast Columbus Quadrangle, Ohio [Map]. Photorevised 1994. 1:24,000. 7.5 Minute Series.

I:\CAD PROJECTS\23935 Closed Loop\Plans\23935_B004_SITE LOC_CLOSED LOOP_FAIRWOOD_OH.dwg



LEGEND

- CLOSED LOOP LEASE SPACE
- CRT - RELATED MATERIALS IN BOXES
- LOADING DOCK DOORS

NAD 1983 STATE PLANE OHIO SOUTH FEET

0 50 100

SCALE IN FEET

FIGURE 2
SITE LAYOUT MAP
2200 FAIRWOOD AVENUE
COLUMBUS, OHIO

REQUESTED BY:	NB
DRAWN BY:	KMB
DATE:	11/15/2018
PROJECT:	0888823935

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DATA SOURCES: OLYMBEC

I:\CAD PROJECTS\23935 Closed Loop\Plans\23935_B005_SITE LAYOUT_2200 FAIRWOOD_OHIO.dwg

Figure 3
Example Sample Label

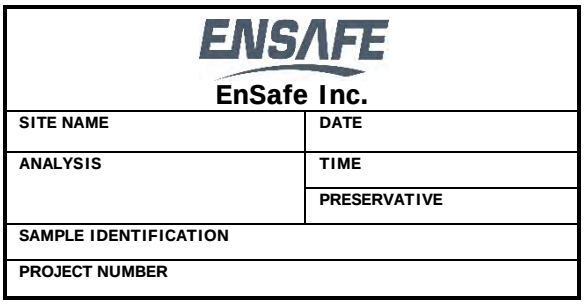

Figure 4
Example Chain of Custody Form

ENSAFE

EnSafe Inc.
800-588-7962

CHAIN OF CUSTODY AND ANALYTICAL REQUEST RECORD

COC No. | Page of

Project Name: | PO No. | Project No. | Phase

Site Location: | **Sample Analysis Requested** (*Enter number of containers for each test*)

Send Results To: | (3)→

Sampler/Site Phone#

Lab Name: | Turnaround Time(specify):

Lab ID	Sample ID (sys_samp_code)	Location ID (sys_loc_code)	(mm/dd/yy)	Time (Military) (hhmm)	Matrix Code (1)	Sample Type (2)	Field Filtered (Y/N)	Total No. of Containers											Extra Volume for MS/MSD	HOLD

Field **Comments:**

Lab **Comments:**

Sample Shipment and Delivery Details

Number of coolers in shipment:

Relinquished by (signature)	Date	Time	Received by (signature)	Date	Time
1			1		
2			2		
3			3		

Samples Iced?(check) Yes_____ No_____

Method of Shipment:

Airbill No:

Date Shipped:

(1) Matrix Code: **AA**=Air, **AQ**=Air QC Matrix, **CK**=Caulk, **GS**=Soil Gas, **LF**=Free Product, **LH**=Liquid Waste, **MS**=Mastic, **Oil**=Oil, **PT**=Paint, **SC**=Cement/Concrete, **SE**=Sediment, **SF**=Filter Sandpack, **SL**=Sludge, **SN**=Miscellaneous Solid/Building Materials, **SO**=Soil, **SQ**=Soil/Solid QC Matrix, **ST**=Solid Waste, **SW**=Swab/Wipe, **TA**=Animal Tissue, **TP**=Plant Tissue, **WG**=Ground Water, **WL**=Leachate, **WO**=Ocean Water, **WP**=Drinking Water, **WQ**=Water QC Matrix, **WS**=Surface Water, **SU**=Storm Water, **WW**=Waste Water
(2) Sample Type: **AB**=Ambient Blank, **EB**=Equipment Blank, **FB**=Field Blank, **FD**=Field Duplicate Sample, **FR**=Field Replicate, **MB**=Material Blank, **N**=Normal Environmental Sample, **RB**=Material Rinse Blank, **TB**=Trip Blank
(3) Preservative added: **HA**=Hydrochloric Acid, **NI**=Nitric Acid, **SH**=Sodium Hydroxide, **SA**=Sulfuric Acid, **AA**=Ascorbic Acid, **HX**=Hexane, **ME**=Methanol, **SB**=sodium bisulfate, **ST**=Sodium Thiosulfate, If **NO preservative** added leave blank

Rev. 12/12

Figure 5
Example Custody Seal

ENSAFE	*EnSafe, Incorporated* *5724 Summer Trees Dr.* *Memphis, TN 38134* **OFFICIAL SAMPLE SEAL**	**SAMPLE #**	**DATE**	**SEAL BROKEN BY:**
		SIGNATURE		**DATE:**
		PRINT NAME & TITLE:		

Attachment A
Standard Operating Procedures

Standard Operating Procedure
Logbooks

These standards will ensure continuity within the organization.

Preamble

This standard operating procedure (SOP) is designed to provide the user standards when making entries into a logbook. The SOP is not intended to tell the user what should be recorded in the logbook.

Before using this SOP and as part of the due diligence, the user is required to check if state and federal minimum record keeping standards need to be met. If a difference exists between state and federal SOPs then those contained herein, the state and federal SOPs takes precedent. If this SOP is modified per agreement between parties associated with the activity being recorded, the agreed changes will become part of the SOP and the modifications will be appended to this SOP for the record.

1.0 PURPOSE AND SCOPE

This SOP describes the activities and responsibilities pertaining to the identification, use and control of logbooks. As guidance for specific activities, this procedure does not remove the need for professional judgment. Deviations from this procedure while planning or executing planned activities must be approved by the parties responsible for such activities.

2.0 SAFETY

Not applicable

3.0 TERMS AND DEFINITIONS

Logbook: A logbook is a bound field notebook with consecutively numbered, water-repellent pages that is clearly identified with the name of the relevant activity, the person assigned responsibility for maintenance of the logbook, and the beginning and ending dates of the entries.

4.0 TRAINING AND QUALIFICATIONS (ROLES AND RESPONSIBILITIES)

4.1 Project Manager

The Project Manager or project designee will be administratively responsible for logbook(s) used on a project. The Project Manager in consultation with the client will determine if and when a dedicated logbook(s) are required for a particular project. For dedicated logbook(s) the Project Manager or designee will conduct periodic audits over the course of the project to make sure the SOP is being followed. The Project Manager will setup a filing system to archive logbooks and ensure log entries are distributed per the statement of work (SOW), if required.

If the client does not request a dedicated logbook, it will be EnSafe's policy that all field activities be logged in a dedicated logbook maintained by the individual field manager(s). The logbook will contain the author's name, projects' logged, and the interval of time the logbook covers. Pages copied from the logbook will be part of the historical record of the project and achieved as such.

4.2 Field Manager

The Field Manager is responsible for ensuring that all field personnel follow these procedures and that the logbook(s) are completed daily and according to this SOP. The Field Manager is also responsible for submitting copies of logbook entries to the Project Manager upon request. After tasks are completed either for the day or activity, the field manager shall review entries in each logbook; and document these reviews by the dated signature of the reviewer on the last page or page immediately following the material reviewed.

If non-dedicated project logbooks are used to record field events, field managers must maintain the logbook(s). Once these books are filled copies of project entries must be distributed to the responsible Project Managers.

4.3 Program Quality Manager

The program Quality Manager is responsible for ensuring overall compliance with this procedure.

4.4 Logbook Author(s)

The logbook user is responsible for recording pertinent data into the logbook to satisfy project requirements and for attesting to the accuracy of the entries by dated signature. The logbook user is also responsible for safeguarding the logbook while having custody of it. All field personnel are responsible for the implementation of this procedure.

5.0 EQUIPMENT AND SUPPLIES

5.1 Field Logbooks

Field logbooks shall be bound field notebooks with water-repellent pages.

5.2 Writing Instruments

Pens used to record field activities must contain black indelible ink.

6.0 PROCEDURE

6.1 Entries

- Begin each day's activities with a new page in the logbook
- All daily entries should be in chronological order with field segments broken down by time
- A date must be placed on each page of the logbook
- Enter logbook page numbers on each page to facilitate identification of photocopies
- Sufficient detail of the activity needs to be recorded to allow the writer or a knowledgeable reviewer to reconstruct the applicable events for the day
- At the conclusion of each day the author shall draw a diagonal line through the unused portion of the page after the last entry and sign indicating the daily activities have been concluded

6.1.1 Incorrect Entries

Since the logbook provides a historical record of activities being observed it must be accurate. However, when an entry needs to be revised due to a mistake, the author must draw a single line through the incorrect entry then place his/her initial and date by the change. Enter an explanation for the correction if the correction is more than for a mistake.

6.1.2 Acronyms

Acronyms and a person's initial can be used; however, they should be defined on the inside cover of the logbook.

6.1.3 Photocopies

To provide a backup if the logbook is lost or damaged, photocopies should be completed at the end of each day. The preparer can use cell phone technology to accomplish this.

6.2 Deviations

Deviations from this SOP shall be documented in the logbook and must be cleared with the Project Manager before being initiated, if possible.

6.3 Maintenance and Security

Logbooks will be kept under the control of its author at all times. If it is lost or stolen the Project Manager must be notified as soon as possible. The logbook should be kept away from dirt and/or potential contaminated media. If possible PPE gloves should be removed before making entries.

7.0 QUALITY CONTROL AND ASSURANCE

Not applicable

7.1 Review

See Section 4

8.0 RECORDS, DATA ANALYSIS, CALCULATIONS

See Section 6

9.0 ATTACHMENTS OR REFERENCES

Department of Defense, United States (DoD). 2005. *Uniform Federal Policy for Quality Assurance Project Plans*, *Part 1: UFP-QAPP Manual*. Final Version 1. DoD: DTIC ADA 427785, EPA-505-B-04-900A. In conjunction with the U. S. Environmental Protection Agency and the Department of Energy. Washington: Intergovernmental Data Quality Task Force. March. On-line updates available at: http://www.epa.gov/fedfac/pdf/ufp_qapp_v1_0305.pdf.

Standard Operating Procedure
Packing and Shipping Non-hazardous Environmental Samples

These standards will ensure continuity within the organization.

Preamble

This standard operating procedure (SOP) is designed to provide the user standards on packing and shipping environmental samples after they have been collected in the field so they arrive at their destination in a condition that meets the quality objectives required by the site's sampling and analysis plan (SAP). This SOP assumes the environmental samples have not been characterized as hazardous. If they are classified as hazardous then additional procedures will have to be followed that are not discussed in this SOP.

Before using this SOP and as part of the due diligence, the user is required to determine whether it meets the state-specific and federal minimum standards. If a difference exists between state and federal SOPs than those contained herein, the state and federal SOPs take precedence. If this SOP is modified per agreement between management-level parties associated with the activity, the agreed changes will become part of the site-specific SOP and the modifications will be appended to this SOP for the record.

1.0 PURPOSE AND SCOPE

This SOP sets forth the methods for use by personnel engaged in handling, packing, and shipping non-hazardous environmental samples. As guidance for specific activities, this procedure does not remove the need for professional judgment. Deviations from this procedure while planning or executing planned activities must be approved by the parties responsible for such activities.

2.0 SAFETY

When in the field, at a minimum, the following personal protective equipment must be worn:

- Gloves, such as blue nitrile and latex, as defined in the site-specific project health and safety plan, when handling sample containers to avoid contacting any materials that may have spilled out of the sample containers
- Safety glasses
- Steel toed boots
- Appropriate clothing to prevent spillage from contacting exposed skin

Additional caution should be implemented, such as:

- To avoid lifting injuries associated with heavy coolers, use the large muscles of the legs, not the back. Use hand carts, if possible or perform the lifting as part of a team of two members.

- When using cutting tools, cut away from yourself. The use of appropriate, task specific cutting tools is recommended.

- Handle glass containers with care. Discard any broken glass in a waste container that cannot be punctured.

- Acid used as preservatives should be cleaned up immediately if spilled. If a spill occurs on exposed skin or clothing use the proper procedure to reduce exposure time.

- Make sure all sample lids and caps are secured before packing into shipping coolers; this will help eliminate potential exposure of laboratory personnel receiving the environmental samples.

3.0 TERMS AND DEFINITIONS

- DOT — Department of Transportation

4.0 ROLES AND RESPONSIBILITIES

4.1 The **Project Manager** is responsible for verifying that these procedures are performed prior to the initiation of sampling active.

4.2 The **Program Quality Manager (QM)** is responsible for ensuring overall compliance with this procedure, if one has been designated to the project. The QM may request that audits be conducted to ensure procedures are being properly followed.

4.3 The **Field Manager** is responsible for ensuring that sample handling and shipping are performed in accordance with this procedure.

4.4 All **Field Personnel** are responsible for the implementation of this procedure.

5.0 PROCEDURES

Environmental samples should be packaged prior to shipment using the following procedures:

1. Inspect the cooler for integrity and structural damage, and be sure it is clean. Also check the handles to be sure they are secure. If the shipping cooler is damaged, do not use. Damaged cooler should be made unusable and discarded.

2. For a 20-gallon cooler (14”x14”x24”) put a clean, 39-gallon + trash bag in the cooler and open it up so that you have complete access to the inside. Smaller cooler will require smaller size plastic trash bag.

3. Inside the trash bag build a “nest” with bubble wrap or a similar sheet packing material on the bottom and sides.

4. Take double-bagged Ziplocs filled with wet ice and put/layer bags on the bottom of the cooler in the "nest". 1- or 2-gallon bags are ideal for this.

5. Next, if applicable, put a temperature blank in the bottom of the nest.

6. Glass sample bottles should be wrapped in bubble wrap — preferably sealable bubble wrap sample bags, if available. Place bottles in separate and appropriately-sized polyethylene bags and seal the bags. **MAKE SURE SAMPLES HAVE BEEN APPROPRIATELY LABLED AND RECORDED ON THE CHAIN OF CUSTODY BEFORE PLACING IN SAMPLE BAGS.**

7. Place the wrapped sample containers to be shipped to the inside of the nest. Make sure the containers are place in the vertical or upright orientation. Do not lay them on their sides.

8. As containers are added to the cooler, continue to strategically place ice filled double-bagged Ziplocs between the sample packages. There is no hard and fast rule on how much ice to use (frequently 2-3 bags at least), but if there is any doubt use more ice than less, and use extra cooler(s) with additional temperature blanks and trip blanks, if necessary, to spread the container load. If possible, put a layer of double bagged ice over the samples before sealing the protective plastic trash bag.

9. Pull the trash bag assemblage of "nested" containers-ice-bubble wrap tightly together and then twist the top into a "rat tail" and tie it off. If there are any void spaces remaining in the cooler, insert some type of packing material into them. The samples should not be allowed shift in transit; thus reducing the potential for breakage.

10. Put the complete-signed chain-of-custody into a Ziploc, affix/tape the Ziploc to the underside of the cooler lid. **DOUBLE CHECK THE NUMBER OF SAMPLES THAT ARE BEING SHIPPED TO WHAT IS ON THE CHAIN OF CUSTODY BEFORE SEALING THE COOLER. TO ENSURE THEY MATCH.**

11. Pre-tape the lid by holding the cooler lid tightly shut, then run some clear packing tape around it, just enough to hold it closed. Then if possible run lines of tape around both sides of the cooler and around the top seam of the lid-cooler body. If the cooler has a plug, make sure that is taped shut.

12. Once pre-taped add signed custody seals, when applicable, across the seam of the lid and body of the cooler in a staggered fashion. One seal on the hinge side of the cooler at one end, and one seal on the opening side of the cooler on the other end.

13. Add a sticker or tape a small sign to the cooler with the shipping address and phone# of the laboratory. Then affix any other stickers (perishable, wet ice, etc.).

14. Final taping should be done with loops of clear packing tape around the custody seals on each end of the cooler and across the lid-body seam. Use at least 8-10 loops of tape, and more if needed. If there are multiple coolers to multiple destinations, colored tapes on the coolers in each shipment can help to reduce confusion.

15. The cooler is ready to be shipped.

6.0 SHIPPING

Follow all appropriate DOT regulations for shipment of air, soil, water, and other samples.

For non-hazardous environmental samples, the samples may be shipped as non-hazardous.

When a cooler is ready for shipment to the laboratory, prepare a standard bill of lading for shipment. Keep a copy of the bill of lading and notify the laboratory the samples are being shipped and the shipping tracking number. Write the tracking number in the field log book with date and time.

Add additional information on the cooler such as:

- Fragile
- This-End-Up (or directional arrows pointing up), and/or
- The number of the cooler if multiple coolers are being shipped under one bill of lading (1 of 3, 2 of 3, and 3 of 3).

7.0 RECORDS

Maintain all copies of chain of custodies and bills of lading with the project file.

8.0 ATTACHMENTS OR REFERENCES

None

Standard Operating Procedure
Sampling Procedures

These standards will ensure continuity within the project

Preamble

This Standard Operating Procedure (SOP) describes general and specific procedures, methods, and considerations to be used and observed when collecting field samples for laboratory analysis. This SOP applies to the following project specific sampling activities:

- Waste Characterization Sampling
- Closure Performance Sampling
- Wastewater Confirmation Sampling

1.0 HEALTH AND SAFETY PRECAUTIONS

Proper safety precautions must be observed when collecting field samples. Engineering and work practice controls will be utilized to eliminate or minimize exposure. Refer to the Site-Specific Health and Safety Plan (SSHP) for guidelines on safety precautions, personal protective equipment (PPE), air monitoring requirements, personnel decontamination, and emergency contingency procedures.

2.0 EQUIPMENT AND SUPPLIES

The field team will ensure proper equipment and supplies are available prior to sample collection. Disposable sampling equipment, spent PPE, and decontamination fluids will be properly containerized and sampled pending offsite disposal.

Disposable sampling equipment will be preferred and selected based on guidance provided in the *Standard Guide for Selection of Sampling Equipment for Wastes and Contaminated Media Data Collection Activities, D 6232* (ASTM International 2016). The following is a list of some conventional sampling equipment that may be needed for collecting the samples:

- Composite Liquid Waste Sampler (COLIWASA), drum thief, bailer, push tube, bucket auger, or screw auger
- Disposable shovels, spatula, scoop, or spoon
- Disposable pipette ("turkey baster")
- Disposable plastic dust pan and brush
- Plastic squeegee bottle or spray bottle
- Polythene sheeting

A Spill Control Kit will be available at the Site during sampling activities to address any accidental spill during sampling activities. The Spill Control Kit will include absorbent pads, granular clay absorbent pellets, booms, gloves, googles, boot covers, disposal bags, and caution tape.

3.0 SAMPLING PROCEDURES

Each sample location should be surveyed for air quality prior to sampling. To reduce the potential for cross-contamination, place polythene sheeting under work areas while transferring materials from sampling equipment to the sample container.

Collected field samples and quality control samples will be sent to an approved laboratory for analysis in accordance with procedures identified in the *Sampling and Analysis Plan* (SAP). Sampling activities will be recorded in the logbook per SOP, *Logbooks*. Sampling and field equipment will be decontaminated per the SOP, *Sampling and Field Equipment Decontamination*. Required sample volumes and analysis, sample chain-of-custody, handling, packaging, and shipping will be in accordance with procedures identified in the SAP and per the SOP, *Packing and Shipping Non-hazardous Environmental Samples*. Copies of these SOPs are also included in Appendix A of the SAP.

3.1 Waste Characterization Sampling

It is currently anticipated that solid materials will consist of the following materials:

- Dust and fine grained materials stored in 55-gallon drums or Gaylord containers
- Solid wastes contaminated with lead-containing dust stored in 55-gallon drums, Gaylord containers, or roll-off boxes
- Insulation contaminated with lead containing dust stored in 55-gallon drums, Gaylord containers, or roll-off boxes

It is currently anticipated that liquid materials will consist of treated decontamination fluids that will not be disposed via an anticipated City of Columbus industrial discharge permit; these liquids may be stored in 55-gallon drums, totes, or larger portable containers.

Representative samples of these waste materials will be collected to determine the appropriate disposal methodology. The specific sampling methods selected will be dependent on the nature of the waste, its container, and its location. Only trained personnel will perform sampling. To the extent possible, disposable sampling tools will be used for sampling waste materials.

Samples of similar materials (e.g., lead-containing dust from Phase I and Phase II Removal activities) from multiple containers may be composited. The following sampling procedures will be followed:

- **Solid Samples:** A drum thief, shovel, or scoop is used to sample containers holding material that is solid in nature. These containers are anticipated to be filled with fine grained material.

Several areas from the container are sampled and composited to ensure a representative sample. The sample is then transferred to a laboratory-supplied sample container.

- **Bulk Solid Samples:** Bulk solids in roll-off containers are sampled at up to six locations in the waste container to ensure a representative sample. When sampling granular debris, a thief or shovel is used in order to collect a sample from as deep a cross section as possible at each location. When sampling bulk building construction and demolition debris, representative samples of debris will be collected by breaking or cutting off bulk materials representative of the waste stream; sampling will be biased towards materials that appear stained or otherwise impacted. The samples are composited together into a single laboratory-supplied sample container so that there is one sample, which represents that particular bulk solid. For non-granular materials that are too large for standard sample containers, the sample will be secured in a clean plastic Ziploc bag and sent to the laboratory. Particle size reduction of such waste samples will be performed by the laboratory prior to analysis.
- **Liquid Samples from Containers with no Sampling Port:** A COLIWASA or drum thief will be used to collect liquid samples from containers with no sampling port. The COLIWASA or drum thief is slowly lowered to the bottom of the container. Close the COLIWASA with the inner rod or create a vacuum with the sampler's gloved thumb on the end of the thief and slowly remove the sampling device from the container. Release the full contents from the device into the laboratory-supplied sample container(s). Repeat the procedure until a sufficient sample volume is obtained.
- **Liquid Samples from Containers with a Sampling Port:** If the frac tank or other portable container has been fitted with a sample port, fill the laboratory-supplied sample container(s) directly by collecting the water from the sampling port. Repeat the procedure until a sufficient sample volume is obtained.

3.2 Closure Performance Sampling

During the Phase III Decontamination, portions of the subject property will be washed and triple rinsed. As stated in the RCRA Closure Plan, a sample of the third rinsate may be collected after completion of the third rinsate activities to evaluate decontamination effectiveness.

Only trained personnel will perform sampling. A turkey baster, scoop with squeegee, plastic dust pan with brush, or similar devices are commonly used to sample liquid on horizontal surfaces. The sample collection equipment will either be previously unused or will be decontaminated prior to use (wash/triple rinse). To the extent possible, disposable sampling tools will be used for rinsate sampling.

The following sampling procedures will be followed:

- **Liquid Samples from Horizontal Surfaces (Floors):** The third rinsate water from the floor section will be collected using new or pre-cleaned turkey baster, scoop with squeegee, plastic dust pan with brush, or similar devices and transferred to the laboratory-supplied sample container(s).
- **Liquid Samples from Vertical Surfaces (Walls):** The third rinsate water from walls will be collected by placing a new or pre-cleaned plastic dust pan against the wall at the end of the rinsing operation and transferring the water to the laboratory-supplied sample container(s).

3.3 Wastewater Confirmation Sampling

The following procedure will be used to collect representative sample of treated water from drums, totes, frac tanks or other portable containers.

- **Containers with no Sampling Port –** A COLIWASA or drum thief will be used to collect liquid samples from containers with no sampling port. The COLIWASA or drum thief is slowly lowered to the bottom of the container. Close the COLIWASA with the inner rod or create a vacuum with the sampler's gloved thumb on the end of the thief and slowly remove the sampling device from the container. Release the full contents from the device into the laboratory-supplied sample container(s). Repeat the procedure until a sufficient sample volume is obtained.
- **Containers with a Sampling Port –** If the frac tank or other portable container has been fitted with a sample port, fill the laboratory-supplied sample container(s) directly by collecting the water from the sampling port. Repeat the procedure until a sufficient sample volume is obtained.

4.0 QUALITY CONTROL AND QUALITY ASSURANCE

Air monitoring equipment will be checked and calibrated as specified in the SSHP and per the manufacturer's recommendations. Photographs may be taken during field sampling activities to document the sample matrix, condition of sample, and sampling locations.

Quality control and quality assurance measures include collecting equipment blank samples at a frequency outlined in the site-specific SAP. These samples include:

- **Equipment Blank Samples:** An equipment blank is a sample collected using analyte-free water that has been run over/through reusable sample collection equipment after the equipment has been decontaminated. Equipment blank samples may not be collected when disposable sampling equipment is used.

- **Duplicate Samples:** A duplicate sample will be collected at the same time as the original sample. When a duplicate sample is collected, one-half of the sampling container yield will be used to fill sample containers, while the second half of the sampling container will be used to fill the container for the same parameter in the duplicate set.

Standard Operating Procedure
Sampling and Field Equipment Decontamination

These standards will ensure continuity within the organization.

Preamble

This standard operating procedure (SOP) is designed to provide the user with the procedures needed to decontaminate sampling and other field equipment while in the field. All equipment must be decontaminated before, during, and after sampling tasks; and between each sample location or sample depth, as required. **At no time is contaminated field equipment to be shipped back to rental companies or any of the EnSafe offices**.

Before using this SOP and as part of the due diligence, the user is required to check if state and federal minimum decontamination standards need to be met. If a difference exists between state and federal SOPs then those contained herein, the state and federal SOPs take precedent. If this SOP is modified per agreement between parties associated with field activities, the agreed changes will become part of the SOP and the modifications will be appended to this SOP for the record.

This SOP describes the activities and responsibilities pertaining to decontamination, however, this guidance does not remove the need for professional judgment. If possible or as soon as reasonably possible deviations from this procedure made while planning or executing this activity must be approved by the parties responsible for this task; i.e., project manager, Corporate Health and Safety Officer, and/or quality Assurance Manager.

1.0 PURPOSE AND SCOPE

The main objective of the decontamination of field and sampling equipment is to ensure that all equipment that has come into contact with a sample media and/or atmospheric conditions during sample collection is free of contaminants and analytes. Site contaminants and analytes could impact study objectives through cross contamination from one sample to the next if equipment is not properly decontaminated. These procedures help ensure that equipment, before or after use, has been cleaned in such a manner that it is free of contaminants and will not impact current or future sampling or endanger individuals handling the equipment.

2.0 SAFETY

The main focus of this SOP is the decontamination of equipment that has come in contact with the media or other atmospheric conditions (aerosols, engine combustion, crop dusting, etc.) creating the potential to cross contaminate samples. Examples of equipment commonly decontaminated by the field services group include:

- Water level probe and tape
- Depth sounding tape
- Groundwater down hole sampling equipment (pumps and bailers)
- Hand Augers
- Re-usable sampling equipment (shovels, trowels, bowls, spoons, spatulas)
- Water meters (YSIs, turbidity meters)

Larger equipment such as drill rigs, tractors, and excavators also will require decontamination under certain conditions; however, as operation of that type of large equipment is subcontracted, it is the responsibility of the vendors to follow decontamination procedures outlined in the statement of work (SOW) for the subcontractor operated equipment.

Because the nature of decontaminating small equipment requires only a limited area the activity can be conducted within the exclusion zone of the activity. If, however, the activity is confined to a small area where there is the possibility of a health and safety hazard and/or the potential to re-contaminate a piece of field equipment (exhaust from running motors as an example), then a secondary exclusion zone can be setup to conduct decontamination. Best profession judgment must be used when setting up decontamination stations. **DO NOT SETUP A DECONTAMINATION STATION DOWNWIND OF HEAVY EQUIPMENT IF AT ALL POSSIBLE.** If the exclusion zone needs to be moved this should be noted in the project's field log book.

The Sampling and Analysis Plan (SAP) for the activity will dictate the proper personal protective equipment (PPE) that should be worn when decontaminating field and sampling equipment. If a SAP has not been written for the project the minimum PPE is the following:

- Clean, i.e., new, Level D PPE (safety glasses, disposable gloves, safety boots, and hard hats) will be worn during all decontamination operations. PPE such as splash shields or goggles can be made available upon request. If field personnel deem the level of PPE needs to be up graded to Level C, they can don outer garments designed to protect against atmospheric contaminants, liquid splashes, or other direct contact of decontamination fluids. If air contaminants have been identified that exceed project action levels and/or other suspected contaminants field personnel must contact the project manager and EnSafe Health and Safety Officer **before** proceeding putting on air purifying respirator. If those individuals cannot be located then one of the following individuals needs to be notified:

  - Branch manager,
  - Associate principal, or
  - Principal

- No eating, smoking, drinking, chewing, or any hand to mouth contact shall be permitted during cleaning operations.

- Before a sampling task, unless noted otherwise, do not assume sampling equipment have been properly decontaminated. Take the time and use caution to inspect sampling equipment before use. Wear disposable gloves when inspecting equipment. If a piece of equipment is found to be contaminated inform the rental company and send the equipment back (if time permits). If time does not permit decontaminate the equipment and let the rental company and EnSafe's Field Supply Manager (Les Arnold) know the condition it was received.

- All field personnel have **STOP WORK AUTHORITY** if the activity becomes unsafe to continue. Work will not resume until all health and safety issues have been resolved.

3.0 TERMS AND DEFINITIONS

None

4.0 TRAINING AND QUALIFICATIONS (ROLES AND RESPONSIBILITIES)

4.1 Project Manager

The Project Manager or project designee will be administratively responsible for ensuring decontamination is carried out per this SOP. It is the project manager's responsibility to certify that the Site Specific Work Plan with this SOP has been read by all field personnel conducting the field activities, and that they understand all procedures contained therein. The project manager or designee will conduct periodic audits over the course of the project to make sure the Work Plan and these procedures are being followed.

4.2 Field Manager

The Field Manager is responsible for ensuring that all field personnel follow these procedures and that the decontamination procedures are completed according to this SOP. As time permits, the Field Manager should conduct periodic inspections of the field decontamination techniques by field personnel.

Before sampling begins and after field tasks are complete the Field Manager will inspect field equipment to make sure equipment has been properly decontaminated.

The Field Manager will report any deviations from this SOP to the Project Manager and keep a record in the project's log book.

4.3 Program Quality Manager

The program Quality Manager is responsible for ensuring overall compliance with this procedure.

4.4 EnSafe Field Personnel

All field personnel must read and be familiar with this SOP which is contained within the Work Plan. They are responsible for ensuring that field and sampling equipment are decontaminated properly and according to these procedures. If, based on their best professional judgment, procedures in this SOP need to be modified in the field, the field manager will be notified of any deviations and the changes will be recorded in the field logbook. If the field manager cannot be contacted, then the project manager should be notified.

5.0 EQUIPMENT AND SUPPLIES

Recommendations for the types of decontaminating cleaning supplies are discussed in this section.

- **Soap** shall be a standard brand of phosphate-free laboratory detergent such as Liquinox. Use of another detergent must be justified and documented in the field logbooks, and/or investigative reports. Soap may be stored in its original container or in a high density

polyethylene (HDPE) or polypropylene container. The soap should be poured directly from this container during use.

- If the SOW requires **solvents** to be used in the decontamination process only pesticide-grade isopropanol will be used. Use of a solvent other than pesticide-grade isopropanol (i.e., acetone, methanol, etc.) must be specified in the site-specific SAP, and must be approved by the Project Manager before use. Solvent shall be stored in its original container until used in the field. Solvents may be dispensed from glass, Teflon or stainless-steel containers. If a stainless-steel device is used, any gaskets that may contact the solvents must be constructed of inert material designed to be used with that solvent. Pesticide-grade isopropanol must be obtained from a laboratory supply vendor. Rubbing alcohol or other commonly available sources of isopropanol are not acceptable.

- **Tap water** may be used from any municipal water treatment system. Use of an untreated potable water supply is not an acceptable substitute for tap water; however, bottled water (i.e., drinking water, distilled water, etc.) is an acceptable substitute. Tap water may be kept in clean tanks, hand pressure sprayers, squeeze bottles, or applied directly from a hose.

- **Analyte-Free Water** at a minimum should contain no detectable heavy metals, other inorganic compounds, or organic compounds (i.e., at or above analytical detection limits). Unless specified otherwise in a SAP steam-distilled water and/or deionized water can be used. Storage of the analyte-free water must be stored in its original container or transferred to clean glass or Teflon containers that can be securely closed before and after use. The use of containers made of materials other than glass or Teflon must be specified in the approved site-specific SAP.

- **Decontamination area** is an area designated and constructed for decontaminating field and sampling equipment that is known or believed to be free of surface and atmospheric contamination. It should be located upwind of site activities. Typically, the decontamination area has a containment structure or pad capable of holding waste decontamination fluids and solids; however, the decontamination area may be as simple as sheet plastic beneath 5-gallon buckets that hold the wash and rinse solutions. When a pad is required, the pad should be constructed on a level, paved surface and should be designed to facilitate the removal of wastewater. Types of structures designed to hold equipment in or over the pad may include wooden tables supported by sawhorses, metal racks, and tail gates. The surface of the pad on which it is constructed should be steady and strong enough to hold the weight of the field equipment and liquids. If possible, the pad walls should be high enough above ground to prevent equipment from being splashed by other activities that may be ongoing during decontamination. All support surfaces should be lined with a water impermeable material (without seams) such as disposable plastic Visqueen. The impermeable material must be replaced between sampling events.

- **Cleaning Utensils** may include scrub pads, brushes, and buckets and these may or may not be dedicated to a specific project. Projects requiring frequent sampling may dedicate cleaning utensils to the project to avoid any possibility of cross-contamination from another site. Color coding dedicated equipment and cleaning utensils will aid in site/project-specific identification.

- **Decontaminated Equipment Storage and Materials:** Decontaminated equipment is wrapped to prevent recontamination prior to use. Covering for decontaminated equipment may include aluminum foil, untreated butcher paper, clean (untreated) disposable plastic bags, or other untreated plastic wrap. Plastic bags shall not directly contact equipment to be used when volatile and extractable organics are potential contaminants of concern. Plastic bags may be used on equipment that has been wrapped with foil or butcher paper. If the decontaminated equipment is to be stored for any period of time, the wrapping should include the date on which it was decontaminated.

6.0 PROCEDURE

The following procedures will be used for the decontamination of all sampling equipment. Any deviation from these procedures must be outlined in the site-specific SAP, and should be documented. Field personnel shall review the field decontamination requirements in the SAP prior to commencing field work activities.

All sampling equipment must be decontaminated between sample locations and between sample intervals, as required. At no time shall sampling equipment that has been in contact with contaminated or potentially contaminated media be used for sample collection without being properly decontaminated. The steps for decontamination are as follows:

1. Clean with tap water and soap using a brush to remove all debris and surface films. Equipment may be steam cleaned (soap and high-pressure hot water) as an alternative to brushing. Sampling equipment that is steam cleaned should be placed on racks or saw horses at least 2 feet above the ground of the decontamination pad. Teflon, Polyvinyl Chloride (PVC), Acrylonitrile butadiene styrene (ABS), or other plastic items should not be steam cleaned.

2. Rinse thoroughly with tap water.

3. Rinse thoroughly with deionized water.

4. If required by the SAP rinse thoroughly with solvent. Do not solvent rinse PVC or plastic items.

5. Rinse thoroughly with deionized water. If sufficient volumes of deionized water are not available, equipment should be allowed to completely air dry.

6. Remove the equipment from the decontamination area and wrap with aluminum foil, untreated butcher paper, or other acceptable material

Decontaminating Specific Field Equipment

- **Sample Tubing**

  The following procedure should be implemented if sample tubing must be re-used between monitoring wells:

  Exterior

  1. Decontaminate the exterior of the tubing by soaking in soapy water mixture. Use a brush to remove particulates if needed.

  2. Rinse the exterior of the tubing with tap water.

  Interior

  1. Mix a solution of tap water and soap.

  2. Connect one end of the tubing to the influent end of the pump.

  3. Place other end of the tubing into the soapy water mixture and allow the pump to draw the water through the tubing. The soapy water mixture should pass through the entire length of the tubing prior to entering the pump. Recycle the effluent from the pump by connecting a length of tubing at the pump effluent to the soapy solution.

  4. Place the other end of the tubing into tap water and allow the pump to draw the tap water through the tubing. The tap water volume should be twice the volume of the soapy water mixture.

  5. Follow the same procedure described above to pump deionized water through the Teflon tubing except do not recycle the deionized water. The volume of deionized water should be equal to that of the tap water.

When possible, tubing should be dedicated to each groundwater monitoring well to eliminate the need for decontamination and possible cross-contamination. If dedicated sample tubing is stored for long periods of time, the tubing should be decontaminated before use.

- **Sampling Pumps**

  Sampling pumps pose unique problems. Pumps may require disassembly to gain access to all parts that come in contact with contaminated or potentially contaminated media.

  Pump Exterior

  1. Scrub with soapy water mixture using a brush to remove all debris and surface films
  2. Rinse thoroughly with tap water
  3. Rinse thoroughly with deionized water
  4. Air dry

Pump Interior

If pump is used for purging and sampling, disassemble pump to gain access to all internal and external parts that may contact the sample media, if possible. If the pump cannot be disassembled then the following procedures apply.

1. Pump several(≥2 gallons) of soapy water
2. Pump several gallons of tap water
3. Pump several gallons of deionized water
4. Remove the equipment from the decontamination area and wrap with aluminum foil or other acceptable material

- **Decontamination of Field Instruments**

Field instruments include water level indicators, interface probes, etc. Follow manufacturer's recommendations for cleaning instruments. The following procedures should be performed at a minimum:

1. Wash equipment body, probes, and cables with soapy water mixture
2. Rinse thoroughly with tap water
3. Store equipment in accordance with manufacturer's specifications or wrap with aluminum foil

- **Field Analytical Instruments**

Field analytical instruments include pH meters, DO meters, conductivity meters, etc. Follow manufacturer's recommendations for cleaning instruments. The following procedures should be performed at a minimum:

1. Wipe the exterior of the instrument with a clean, damp cloth
2. Rinse the probe with analyte free water
3. Air dry

Each time the instrument is cleaned, check for and replace any desiccant.

- **Decontamination of Ice Chests and Reusable Shipping Containers**

1. Wash the interior and exterior of ice chests and reusable shipping containers with soapy water mixture
2. Rinse thoroughly with tap water
3. Air Dry

If the container becomes severely contaminated with wastes, clean as thoroughly as possible, render unusable and properly dispose.

7.0 DISPOSAL OF DECONTAMINATION FLUIDS

The site SAP should specify how spent decontamination fluids will be handled and disposed of. Spent decontamination fluids may need to be treated as investigation-derived waste (IDW), and handled accordingly. If solvents are used in the decontamination process, the solvents shall be collected, labeled and stored separately for proper disposal. Personnel shall review the field decontamination and IDW handling requirements in the SAP before commencing field work activities.

8.0 DATA/RECORDS MANAGEMENT

Record decontamination procedures in the project field logbook. Maintain a record of the lot number with the inclusive dates of use for all acids, solvents, and other cleaning supplies

9.0 QUALITY CONTROL AND QUALITY ASSURANCE

Quality control and quality assurance (QA/QC) measures include collecting rinsate blanks at a frequency outlined in the site-specific SAP. A rinsate blank is a sample collected using organic-free water that has been run over/through sample collection equipment after the equipment has been decontaminated.

10.0 NONCONFORMANCE AND CORRECTIVE ACTION

Failure to use proper decontamination procedures can lead to cross-contamination of samples. Improperly decontaminated equipment can also lead to the spread of contamination to designated clean areas and lead to possible exposures of personnel to hazardous substances. If cross contamination is suspected or confirmed (i.e., QA/QC sample results, data validation, etc.), all site field equipment shall be decontaminated and additional QA/QC samples should be collected to document that proper decontamination procedures have been followed.

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