## D.8.1. Applicability and Intent

This plan is intended to conform to 62-737.800(e) F.A.C. It begins with an overview of the Quality Assurance Plan. Total Quality Management includes more than the process efficiencies and materials testing covered in the Quality Assurance Plan. In order to demonstrate how the recovery and reclamation, and health and safety, emergency control and hygiene objectives are met, the plan is further separated into the following categories:

- Operations and Hygiene, Including Security, Preparedness and Hazard Prevention
- Container Management System
- Plant Configuration
- Air Monitoring

*Quality Assurance*

All materials will be received according to appropriate state or federal policy or regulation. There are differences between states' and federal policies and regulations with respect to the designation of some wastes as hazardous or non-hazardous, transportation and manifest requirements, etc. Some materials may arrive at the facility on a Hazardous Waste Manifest (Manifest) and some on a standard Bill of Lading (BOL) due to differences in policy interpretation and regulation. Some material may arrive on a BOL, and be shipped out on a Manifest due to other states' requirements. Other Quality Assurance Program elements include the use of control measures, operating checks, monitoring procedures, and record keeping to insure systems are performing as intended and that performance criteria are met. A summary of these items is provided in Attachment 14 | Item D.12 - *Inspection Plan*.

## D.8.2. Description of Facility

AERC operates an integrated waste recycling facility located in West Melbourne Florida. The facility uses patented and proprietary processes to recover mercury lamp components and mercury containing devices, to remove for recycling metallic mercury from components and wastes, and to clean, purify and separate the hazardous and non-hazardous coproducts, and return the base materials to a usable form. The goal is to recover as many of the waste components as possible. Mercury-containing wastes created through the facility's recovery processes are shipped off-site for reclamation to a permitted TSDR facility (such as the permitted AERC facility located in Allentown, PA).

## D.8.2a Quality Assurance- Process and Coproduct Testing

The West Melbourne facility and AERC's other U.S. facilities continue to perform and accumulate sampling data for mercury concentrations on processed lamp components. The sampling data is maintained at the West Melbourne facility and can be reviewed upon request. Testing is done by independent laboratories using state (per 62-160.500) and federal (SW 846) approved sampling and testing methods for these materials. These data are consistent with the results achieved by the company at all its locations in the U.S.

The company's history of operating these types of recycling systems will mean that not only will the Florida performance standards be met, but all other state's and federal treatment requirements for this type of waste are achieved. We are informed by the commercial testing laboratories we use that the analyses performed on waste and process materials will meet the Quality Assurance requirements of Rule 62-160 F.A.C. The facility maintains records of operations and test data for a period of at least three (3) years in accordance with 62-160.600. This is proprietary and confidential information but can be made available to regulatory agencies if needed.

AERC will operate as a 90-day generator for any hazardous wastes and coproducts. The company will follow all generator requirements in 40 CFR 262, including training, manifesting, and record keeping, and reporting requirements.

*Categories of material*

Table 2.A. outlines the expected levels of mercury in the materials processed at the facility, the types of testing and criteria used for hazardous/non-hazardous determination on wastes and process materials generated by AERC and their treatment, disposal or recycling options.

AERC can send hazardous plant scraps and other mercury-containing wastes to commercial licensed facilities, including AERC in Allentown, PA for mercury reclamation. AERC's goal is to recycle all hazardous waste material generated. Non-hazardous process materials are recycled locally or through the company's affiliation with manufacturing firms nationally. AERC has also instituted an office recycling program, which includes mixed ledger, beverage containers, newspapers, and corrugated cardboard.

## Table 2.A.
## Materials and Process Recovery Rates

| Categories of Materials Introduced into Processes | Components in Materials and Composition | Range of Mercury Concentration and Quantitative Limits | Effective Recovery Rate and Final Destination |
|---|---|---|---|
| 1. Fluorescent and Mercury Lighting Devices | Whole Lamps | Mercury ranges from 10 ppm to over 250 ppm in standard fluorescent lamps, and up to several grams per lamp for many HID lamps. In fluorescent lamps mercury is mixed with powder and in HID lamps it is contained in separate capsules. Test methods do not make it possible to determine exact concentration, (mg/kg) without first removing these capsules. | Materials are processed into separate components as described below. |
| Lamp processing residual | Aluminum end-caps, metal filaments, harnesses and other metal parts | Processed end products range from non-detect to a few ppm. AERC maintains analytical data on coproduct testing at each of its facilities, available for agency review upon request. | Post processing tests to determine <0.2 mg/L TCLP for Hg and ≤1ppm for 12 week ave. and ≤3ppm for weekly composite.<br><br>Recycling or Disposal |
| Lamp processing residual | Glass | Glass cullet ranges from non-detect to a few ppm. AERC maintains analytical data on coproduct testing at each of its facilities, available for agency review upon request. | Post processing tests to determine < 0.2 mg/L TCLP for Hg and ≤1ppm for 12 week avg. and ≤3ppm for weekly composite<br><br>Recycling or Disposal |
| Lamp processing residual | Phosphor Powder | Untreated powder contains varying amounts of Mercury depending on manufacturer, age of lamp, and the fact that dosing lamps at manufacture is imprecise.<br><br>AERC maintains analytical data on coproduct testing at each of its | Powder containing mercury is shipped off-site to an authorized retort facility for mercury reclamation. Post processing tests are conducted by the retort facility to determine < |

## Table 2.A.
## Materials and Process Recovery Rates

| Categories of Materials Introduced into Processes | Components in Materials and Composition | Range of Mercury Concentration and Quantitative Limits | Effective Recovery Rate and Final Destination |
|---|---|---|---|
| | | facilities, available for agency review upon request. | 0.2 mg/L TCLP for Hg and 99% Hg recovery. |
| | NOTE: The above noted lamp processing residuals, e.g., glass, will be appropriately managed based on post-processing analysis at a properly RCRA permitted facility for mercury recovery/treatment, e.g., AERC's Pennsylvania facility. | | |
| 2. Mercury-Containing Devices | Whole Devices | Untreated devices contain a wide range of mercury, from a few ppm in some to several ounces or even pounds in others. There is no way of determining exact concentration before the device is disassembled. | Devices are mechanically or manually taken apart, non-mercury portions removed and mercury components are shipped off-site to an authorized retort facility for further processing and reclamation. Processed materials are tested by the retort facility to determine < 0.2 mg/L TCLP for Hg and 99% Hg recovery. |
| | Processed devices and component materials, such as casings, piping, non-metal parts, etc. | End Products range from non-detect to few ppm.<br><br>AERC maintains analytical data on coproduct testing at each of its facilities, available for agency review upon request. | Processed materials are tested to determine < 0.2 mg/L TCLP for Hg and 99% Hg recovery.<br><br>Recycling, Retort or RCRA Off-Site Treatment |
| 3. Non-Specific Mercury Bearing Wastes, including process and pollution abatement materials | Activated Carbon or other spent filter media from AERC normal operating processes. | Pre-treated filter media collects mercury from air in varying concentrations, from a few ppm to several thousand ppm. | Material tested to determine < 0.2 mg/L TCLP – treatment according to required standards for Hg Retort. i.e., RMERC, Recycling, Disposal, or RCRA Off-Site Treatment |
| | Plant Scraps; Gloves, Tyvek, | Pre-treated materials can range from non-detect to a few ppm. | RCRA Off-Site Treatment at an authorized RCRA |

## Table 2.A.
## Materials and Process Recovery Rates

| Categories of Materials Introduced into Processes | Components in Materials and Composition | Range of Mercury Concentration and Quantitative Limits | Effective Recovery Rate and Final Destination |
|---|---|---|---|
| | Booties, etc., from AERC normal operating processes. | AERC maintains analytical data on coproduct testing at each of its facilities, available for agency review upon request. | TSD Facility, Retort Facility or Recycler. |
| | Cardboard boxes from AERC normal operating processes. | Containers are visually inspected and any phosphor powder is swept or vacuumed. | Recycling |
| | Process and cleaning liquids from AERC normal operating processes. | Pre-treated materials can range from a few ppm to >260 ppm. | Authorized RCRA Off-Site Treatment, Retort Facility or Recycler. |
| Metallic Mercury | Elemental mercury received from generators | Mercury, contaminated with various impurities. May also be commodity grade, which is approximately 99% pure. | Resalable commodity grade Hg or ship off-site to an authorized Retort Facility or Recycler. |

## D.8.2b Processes Defined for West Melbourne Facility

The Facility receives materials from numerous private and public sources. Generators include institutions, hospitals, schools laboratories, manufacturing operations, electrical maintenance companies; both large and small businesses. Materials that are received include mercury containing solids, such as all mercury containing fluorescent lamps. AERC also accepts all Universal Waste Mercury-Containing Devices (UW MCDs), which include; regulators, switches, glassware. The facility also receives various types of batteries, PCB and non-PCB lighting ballasts, as well as electronic scrap.

Mercury from other sources (e.g. soils, carbons. contaminated solid materials, etc.) is transferred through the facility in agreement with the 10-day transfer activities. AERC can consolidate shipments in the 10-day holding area of the facility for accumulation and shipment off-site to a TSD / reclamation facility. Items are manifested directly to the permitted TSD or reclamation facility. AERC waste profile documents (presented in **Exhibit D.8.1**) are used to gather water material characteristic information from generators prior to approval and processing by AERC facilities. The types of materials handled via the 10-day transfer activities are specifically detailed within **Exhibit D.8.4** *Acceptable Materials List.*

The facility is integrated so that materials entering any one process are separated into various coproducts, which can then be processed and reclaimed using one or more of the other processes at the facility, or at another facility operated by the company. Process capacities for all categories are found in Attachment 5 | Item D.3 – *Integrated Process Flow Diagram*. of this document and the operating parameters are found in Attachment 7 | Item D.5 – *Operations Plan*. A general process overview follows:

*Category 1 - Mercury containing lighting devices (lamps) recycling:*

This process involves the physical demanufacturing (crushing or separation) of mercury-containing lighting devices. In this process lamps are separated into their components of glass, metals, phosphor powders and mercury, which is contained in the powders. The glass and metal components are segregated from the others, rendered non-hazardous for the mercury characteristic, recovered and resold or recycled as product. The mercury-contaminated phosphor powder is accumulated in 55-gallon steel drums and shipped off-site to an authorized Retort facility for reclamation of the mercury. The retort facility performs testing to ensure that the retorted powder has TCLP values <0.2 mg/L and 99% Hg recovery.

*Category 2 - High Intensity Discharge Lamps:*

HID lamps are manually disassembled under a hooded area with excess airflow to an air filtration system. Operators segregate various lamp parts based on recyclability. Inner lamp

capsules containing mercury are also separated from the rest of the HID lamp. Capsules are accumulated in 55-gallon steel drums and shipped off-site to an authorized Retort facility for reclamation of the mercury. The retort facility performs testing to ensure that the retorted powder has TCLP values <0.2 mg/L and 99% Hg recovery.

*Category 3 - Mercury Containing Devices:*

Mercury containing devices, such as electronic switches, thermometers, regulators, barometers, arc tubes, and various other objects which have mercury associated with them, are prepared for off-site mercury retorting in several different ways. Some objects are repackaged or disassembled; some have rubber and plastic components removed. Others are manually broken into smaller pieces, or separated into batches for processing. In all cases this processing is done in an area with air collection and filtration systems.

## D.8.2c Sampling to Determine Effectiveness- Grab and Composite Sample Analyses from the West Melbourne Facility

Incoming materials all have some level of mercury in them. This is discussed in Table 2.A. and analytical data from random testing thousands of samples at several locations in the U.S. and from information provided by generators is available at the company facilities. Exact concentration of mercury intrinsic in incoming materials is not routinely tested, as it would be an impractical exercise, unnecessary expense and the data would not affect the quality of the material processed, the system used, or the end results. Processed materials are tested using both the TCLP and Total Mercury analyses. The methods used are as follows:

A. Chain of Custody Record
B. Sampling Equipment
C. Sample Containers
D. Sampling Equipment and Container Decontamination (Cleaning)
E. Sampling Methodology

*The general sampling methods are:*

Recovery of processed glass, end-caps, devices and metallic components - A minimum 8 oz. sample is taken daily from point of generation. The sample is taken using pre-cleaned stainless steel collection tool or equivalent device. This sample stored in a container with a screw top lid (or equivalent) and is combined with other daily samples to make 1 gallon composite. Samples are labeled, maintained and handled in accordance with the SOP. Weekly, an 8 oz. sample is taken from the 1 gallon composite and sent to a commercial laboratory for total mercury analysis. These samples are taken in agreement with the FDEP Quality Assurance Mercury

SOPs using unbiased sampling techniques to collect samples that are both representative and homogenous in character to the media being evaluated.

A standard chain of custody form is used by all parties handling and testing the samples. Periodically, additional 8 oz. samples are tested for mercury using TCLP test. Sampling logs are maintained at the facility, with appropriate signatures, times and locations indicated. Sampling devices and containers are washed and stored in accordance with the SOP.

Samples from historical processing activities at the facility were sent to different commercial laboratories for testing. For easier understanding of the sampling data, the following abbreviations are used:

CGS - Processed glass sample.
ECS - End-cap sample.
HB - HID base sample.

Records of actual processed material sample analyses are maintained at the facility and are available to the DEP upon request.

Testing Laboratories Utilized by the Company - Each of these laboratories has been approved by the company and copies of the individual QA/QC plans can be made available upon request.

West Melbourne, FL:

Lab Central Inc./US BioSystems
2752 Cypress Head Trail
Oviedo, FL 32765
407-977-3998
ComQAP 980126

Accutest Laboratories Southeast, Inc.
405 Vinelad Road, Suite C-15
Orlando, FL 32811
407-425-6700
CompQAP 940304G/5

AERC uses its internal laboratory at its Allentown facility for R&D purposes only:

AERC
2591 Mitchell Ave
Allentown, PA 18103
610-797-7608
Matt Blanar – *Waste Analysis Manager*

## D.8.2d QA Plan for Each Category and Process

*Performance Standards*

The State of Florida imposes specific performance criteria on recovery activities. The criteria are found in Florida Administrative Code Rule §62-737.800 *et seq*. Specifically, for mercury recovery operations the residual mercury levels are established at 3 ppm for weekly composite testing and 1 ppm of average mercury during each consecutive 12 week period (§62-737.840).

The company will continue to test all processed materials and components of lamps devices etc. to determine that anything recovered is free from hazardous levels of mercury, and that any hazardous materials are shipped either to a licensed treatment facility, disposal facility, or retort facility, or directly to another party who can use the material directly. Examples of the logs used for various media as well as historical data summaries are presented in **Exhibit D.8.2**.

## D.8.3 Operations and Hygiene

The following is a description of the Technical Operational, and Industrial Hygiene procedures employed by AERC to recover the various components of fluorescent and mercury lamps and devices to protect our employees, the community and the environment.

*Receiving Procedures*

All incoming loads are subject to strict quality control (QC) procedures to ensure the load meets the AERC waste acceptance plan. Prior to shipment, customers inform AERC operational staff as to the nature and volume of the shipment. The load is then issued an AERC order / authorization number, which acts to track the load through the AERC recycling system.

Once the shipment arrives at the AERC facility, the incoming material is inspected for the following:

- Proper packaging
- Leaks or discharge
- Quantity discrepancies
- Paperwork completion and accuracy

All incoming material is unloaded and a piece count is made (and compared to the shipping papers). These notes, as well as the date of receipt, is documented on the AERC receiving ticket – presented as **Exhibit D.8.3**. AERC also applies barcode tracking labels to non-lamp

containers. Fluorescent lamps are moved to the work platform for processing. Contaminated cardboard is segregated and containerized for decontamination and recycling by end of shift. HID lamps are moved to the airflow system for disassembly. MCDs are moved to the designated storage area for segregation and / or repackaging / disassembly.

*Lamp Processing Procedures*

Pallets of intact lamps are immediately fed into the processing equipment by process technicians. Based on their job assignment, the technicians wear appropriate personal protective equipment (PPE), which could include: cotton work uniform, steel-toed boots, tyvek coveralls, face shield and safety glasses, hearing protection, nitrile and cotton/leather gloves.
Lamp components are separated in the process equipment. Process technicians monitor glass, end caps, and powder flow, and perform visual spot checks on these materials to ensure equipment is functioning properly.

Samples of each coproduct are collected and consolidated. A grab sample of both glass and end caps is collected every shift of production and made into a composite sample. Composites are sent to a certified off-site laboratory every week. Samples are numbered and documented in an analytical log prior to being sent off-site. Analysis includes total mercury and TCLP for mercury. Production co-products are stored on-site until sufficient volumes are accumulated for shipment to recyclers and until analytical results are obtained. No coproducts have failed TCLP at AERC's Florida facility.

At the end of each days production, the equipment and the floor is cleaned. Both hazardous and non-hazardous wastes are generated on site as a result of daily operating procedures and recycling processes. Hazardous waste is shipped off-site on a hazardous waste manifest for treatment or retorting at an authorized RCRA TSD treatment facility of retort facility.

*Vacuum / Air Cleansing System*

This system provides the airflow and filtration needed by the crushing and separation systems to remove and isolate small size particulates and mercury from the other lamp components and provide the negative pressure to assure there are no dust of mercury emissions into the workplace. The system operates with high flow air movement and a series of various size particulate filters along with treated carbon for mercury removal.

*Health and Safety*

AERC considers the health and physical well being of its employees to be the most important factor in its approach to production. All employees received pre-employment physicals to both

verify ability to perform job function and establish base lines to which future testing can be compared. Any person leaving AERC employment receives an exit physical. Office staff receive follow-up physicals bi-annually while operations personnel receive annual physicals and quarterly blood and urine heavy metals screening, which is conducted by independent labs. The frequency of testing is designed to catch any potential exposures before they can become a long-term health hazard.

In order to insure that plant operations are safe from an employee-exposure standpoint, AERC implemented a comprehensive personnel monitoring program. AERC also checks plant worker exposure every quarter using Industrial-Hygiene-Personnel-Monitoring-Equipment, such as active dosimeter pumps worn while work is being performed. This information is kept in the employee personnel records at the facility. Industrial hygiene audits are performed annually by AERC's Corporate health and safety staff. Results of these audits are maintained at the facility and are available for agency review upon request.

Production workers are required to wear the proper PPE and disciplinary action is taken against any employee violating AERC's health and safety policy. Visitors are also required to follow AERC's safety policy, and to wear safety glasses, and shoe covers when touring the process area.

*Security*

The AERC facility can be operated up to 24 hours per day. During operating hours, there are several employees working in the office/administrative area, and in the process/operations areas. AERC will prevent the unknowing entry and minimize the possibility for the unauthorized entry into the active portion of the facility. The offices and facility are located on Fortune Place, with normal first shift operating hours from 7:00 a.m. to 3:30 p.m. Second shift operates between 3:00 p.m. and 7:30 a.m. Sunday night through Friday night. Normal office operating hours are 8:30 a.m. to 5:00 p.m., Monday through Friday.

The building is not open to the public, and any visits by customers, regulators, or other persons must be accompanied by company employees. Because all activities are conducted inside a single building, there is no unauthorized entry by anyone that would go unchallenged by company employees. Entrances to the facility are locked after hours and may only be accessed by AERC personnel.

Inside the process operations areas there are doors and walls, which separate the active portion of the facility from other areas. In some locations there are "clean-room/dirty-room" areas for employees and visitors to don and doff protective clothing and personal hygiene.

The facility is posted with signs as follows:

- At access doors to the process area- "Danger-Unauthorized Personnel Keep Out"
- Inside the storage and process areas- "Danger-Hazardous Materials Storage Area," and "Caution-Hazardous Waste Storage Area- Unauthorized Personnel Keep Out".

The legend of the warning signs is printed in English and is legible from a distance of at least twenty-five (25) feet.

*Preparedness and Prevention*
The AERC Contingency Plan is included in Attachment 8 | Item D. 6.

The facility has been designed and constructed to minimize the possibility of fire, explosion, or any unplanned release of hazardous materials or hazardous materials constituents that could threaten human health or the environment. Internal communications such as a telephone and walkie-talkies have been installed for the purpose of alerting personnel in the event of an incident. There is also an intercom system to supplement the existing emergency communication devices.

Emergency response phone numbers are placed near telephones at the facility in the event the local police, fire, or state departments have to be notified. Portable fire extinguishers are located in designated areas. Additional emergency response equipment such as spill kits and assorted hand held tools (i.e. shovels, brooms) are located in the storage area.

The emergency equipment is inspected on a monthly basis by the AERC personnel and is documented on the Monthly Inspection Log. This report is used to indicate that supplies are adequate and equipment has been determined to be in working order. The types of materials and equipment inspected for this report include the following:

- Fire protection equipment
- Personnel protective apparel
- Spill clean-up materiel (vermiculite, pads, booms, lime)
- General housekeeping

Presently, AERC has the appropriate arrangements with the local authorities as outlined in the facility Contingency Plan, including the police and fire departments. These arrangements are kept on file at the Fortune Place facility.

The local fire department will be requested to participate in drills and inspect the facility on an annual basis. In the event these arrangements cannot be made, AERC will document the refusal or declination of the respective departments.

*Hazard Prevention*

In order to insure worker safety and compliance with OSHA regulations, AERC has periodic safety meetings. These meetings can cover any safety or health related topic affecting the operations and employees and the group works with facility management to insure that corrections and improvements are implemented. AERC also performs daily monitoring of mercury vapor. Material handling is not exposed to weather conditions. Hazardous containers are kept indoors in the processing area in covered boxes. Non-hazardous material may be stored outside in covered containers.

Personnel are required to wear their supplied work uniforms while on duty. Personnel are required to shower at the end of each day. The uniforms are then collected and sent off site to be laundered. In addition to the uniforms, all material handlers are trained in the use of personal protective clothing, respiratory protection, and air monitoring requirements in order to reduce exposure to hazardous waste.

AERC employs a “non-smoking” policy throughout the company. Personnel, visitors, or contractor are not permitted to smoke in the building.

Containers are stored and managed at the facility to prevent the following hazards or releases from occurring.

- Generation of extreme heat or pressure, fire or explosion, or reaction
- Production of toxic dust in quantities that may threaten human health or the environment
- Production of flammable vapors or gasses in quantities that pose a risk of fire or explosion
- Damage to the structural integrity of the containers
- Threat to human health or the environment

## D.8.4 Container Management System

AERC receives and uses containers of many types, ranging from small to large boxes, and poly and metal drums of up to 55 gallons. In some cases the containers may be packed in 85-110 gallon overpack-type drums. These containers are shipped by the waste generators, and some of the materials received in containers are not regulated by USDOT. Examples include lamps or objects with low levels of mercury that are shipped in cardboard or wooden boxes. The containers used for regulated quantities of hazardous materials meet the USDOT requirements for the material they contain. (AERC incorporates the requirements found in 40 CFR §173, 178 and 179 pertaining to the specifications of containers.) While this is not a complete listing, additional examples include:

1) Cardboard Boxes
2) Wooden Boxes/Crates (15-A type)
3) Steel Drums (17-H, 17-C, 17-E)
4) Poly or Plastic Drums/Buckets (21-C, 6-D)
5) Fiber Drums and Boxes (21-C, 12-A, 12-B)

All containers meet USDOT requirements or are UN approved and tested meeting the approved specifications for wastes contained therein. Since many wastes received are lab-packs, all non-bulk, DOT, UN approved specification containers may be received from sizes ranging from 1-gallon capacity through 55 gallon to pallet-sized boxes. All DOT non-bulk specification container numbers are acceptable.

*Materials of Construction*

The containers used for solids materials storage and processing are made of materials, which are compatible with and will not react with the wastes they contain. In no case is the container's ability to contain the waste impaired.

*Container Management Practices*

In order to ensure container integrity and to protect human health and the environment, the following container management procedures will be employed:

AERC and its customers use both Certified Hazardous Waste Transporters and common carriers for lamps and non-regulated Mercury Containing Devices. AERC also utilizes its own transportation vehicle within the state to transport universal waste lamps, devices, batteries and electronic scrap. Materials from other transporters will be subject to the same quality control procedures performed by the company as outlined herein.

At the generator's site, each container is inspected by the generator, making certain there are no leaks, ruptures, or other defects, which detract from the ability of the container to hold its contents. The containers will be further checked to ensure proper closure and compatibility of container construction materials with the waste. If a container holding hazardous waste is not in good condition or if it begins to leak, it will be transferred from the defective container to a container that is in good condition, overpack the defective container, or manage the waste in some other way that complies with the regulations.
At the facility AERC receives and temporarily stores lamps and all other materials in several types of boxes and containers. During processing, various lamp components, process materials and coproducts are contained and stored in any one of the containers discussed herein. Upon arrival at the AERC facility, each container will again be inspected to ensure container integrity. This inspection will be performed by site personnel, who will also check to ensure the containers have been properly labeled and listed on the manifest or Bill of Lading documents. If a container is not in good condition, or if it begins to leak, facility personnel will transfer the material from the defective container to a container that is in good condition, overpack the defective container, or manage the material in some other way that complies with the regulations.

All containers holding hazardous wastes are kept closed during storage, except when it is necessary to add or remove waste or perform a corrective action. Containers are not opened or handled in such a manner which may rupture or cause a leak. Containers are properly labeled for the material which they contain.

Material handling will be performed either manually or with the use of a drum dolly, pallet jack, or forklift, depending on the container size and weight. All personnel involved with waste handling at the facility will be trained in proper waste handling procedures.

Facility personnel will inspect areas where containers are stored on a daily basis. The inspections will be recorded on the appropriate inspection form and the following noted:

--lamp breakage
--leaks or deterioration of containers caused by corrosion or other factors
--open containers
--swollen or bulged containers
--unidentified containers
--spills in containment systems
--cracks, gaps, or corrosion of containment areas

Remedial or corrective actions as well as any notifications made, if required, will also be noted.

Remedial or corrective actions include, but are not limited to:

--transferring material to another like container
--overpacking the leaking or corroded container into a larger container
--cleanup of spills using sweeping or vacuuming equipment, absorbents, pads, etc.
--closing the container
--properly identifying and/or labeling the container
--remediating any spilled material
--sealing cracks, gaps, or repairing corroded areas.

*Container Storage Areas and Secondary Containment*

AERC provides secondary containment for all liquid materials in storage or processing inside the facility.

*Secondary Containment*

Mercury containing lighting devices are enclosed lamps and therefore, intrinsically, they are containers of mercury and other potentially hazardous constituents. Lamps are received and stored in boxes, drums, bins, totes or other containers to hold them prior to processing. These containers could be considered "primary containment". Additionally, the concrete floor of the facility serves as secondary containment for any glass or other lamp breakage in the building. Upon arrival, lamp containers are restacked, stretch-wrapped, if necessary, and placed on pallets. Pallets and containers are stored in rows with adequate aisle space for access and cleaning. All boxes and other containers are inspected for breakage and spillage when they are unloaded and any spillage is cleaned up immediately.

Spill kits are maintained at the facility, including absorbent and neutralizer material for corrosives, and salvage drums (85 gallon overpack drums) are used to recontainerize any liquid containers which may be leaking. In the case where multiple containers are stored on one pallet, each pallet is shrink-wrapped to prevent individual containers from tipping or falling off the pallet.

Additionally, the entire plant floor is inspected throughout the course of each operating day and any breakage is swept and cleaned as soon as it is detected. The company uses specially designed filtered vacuum systems for the clean up of any broken glass and phosphor powder throughout the facility.

As described above, the other storage areas of the facility use some form of commercially available secondary containment tray, pan, containment pallet or similar device. We have

included literature from a manufacturer of these devices, including a chemical compatibility guide, to exemplify the secondary containment throughout the facility.

*No standing liquids*

There are no standing liquids, run-on or run-off at the facility because everything is contained inside the building. As such there are no drainage areas, sumps or collection systems, other than the container and the secondary containment system themselves. The capacity of each containment system, e.g. floor, poly-spill pallets, or trays, is such that they will contain 100% of the volume of the largest single container, or 10% of the volume of all the containers. These are all inspected daily by facility employees. If any liquids are present they are removed immediately.

*Containment Capacity*

As stated above, all liquids are stored inside secondary containment devices which can contain >100% of the largest container or >10% of all the containers. This is also true for non-liquids. There is a secondary containment area walled under and around the oil heating unit located outside the rear of the building.

For the dry solid objects and materials, the floor and walls of the building serve as secondary containment. The usable portion of the building floor surface is approximately 10,000 square feet. Non-hazardous process materials may be stored outside the building in the truck dock and parking areas, which comprise approximately 24,000 square feet.

The capacities of the storage areas vary depending on the materials being stored. Volumes of materials in temporary storage are all stated in "drum or pallet equivalents", because of the differing size, shape and composition of the wastes. So, while each storage area has different capacity for different material, the combined storage areas can accommodate the total "drum equivalent" volume stated in Attachment 5 | Item D. 3 – *Integrated Process Flow Diagram* and Attachment 6 | D. 4 – *Storage Area Capacity Table*

*Container storage configuration*

A floor plan of the facility, showing all container storage areas is provided as Figure D.2.-2. Aisles are generally comprised of rows of drums or drum equivalents, 2 to 4 drums wide (approx. 4ft) by the length of the storage area, by one or two drums high (less than 9 feet). Aisles between rows of waste shall be maintained in agreement with the requirements set forth in 40 CFR 264.35. More specifically, the width of each aisle shall be adequate to allow for such inspections, in addition to normal operations and access by emergency responders.

Additionally, AERC may store recycled materials which are non-hazardous, e.g., glass and metallic parts of lamps, in enclosed containers or trailers outside the building.

*Weighing or measuring facilities*

The AERC facility is not required to have weighing facilities, because all wastes are delivered by pre-arrangement only. All loads are visually inspected and volumes are compared to the manifest or other shipping documents. Lamps are recounted upon arrival at the time of process

## D.8.5 Plant Configuration

All materials inside the facility are stored in aisles with adequate aisle space. Drums and boxes are stored on pallets, either singly or doubly stacked, so that the maximum height of 12 feet is not exceeded. Cartons, boxes or other wooden containers of lamps are stored in a similar fashion.

Separated by a concrete block and poly-curtain wall, adjacent to the plant processing area is a workshop/maintenance area where spare parts are stored, equipment is machined, repaired or welded as needed.

Fire Safety-

The building has automatic fire sprinklers, and has fire extinguishers mounted on the wall in seven locations in the facility. There is also adequate aisle space maintained on each side of the facility, and between all rows of stored materials. Attachment 1 of the facility Contingency Plan details Evacuation Routes, i.e., exit doors, and the locations of extinguishers. Medical, ambulance or other emergency services can be reached by dialing 911. Telephones are also located at various places in the operation; in the office, conference room, operations office, maintenance area, shipping area, laboratory, etc., and there is a Public Announcement type intercom system accessible through the telephones from the front office to the operations areas.

Storage of Materials-

The following storage procedures are followed for the temporary storage of crushed glass and hazardous waste. Similar handling and storage methods will be used on the phosphor powder containing mercury. Unprocessed phosphor powder still containing mercury is collected in sealed containers and labeled for storage prior to shipment off-site.

Storage will be in the general area but will be separate from the work area. The drums of powder are stored with their lids tightly bolted on, on pallets, single or double stacked, with adequate of aisle space.

Crushed Glass-
Since the processed crushed glass and end-caps do not contain hazardous materials in excess of the TCLP limits, storage can be inside or outside the building in covered containers. Adequate precautions are taken to prevent any carryover during drum change out.

*Lamp storage and treatment areas*

Fluorescent lamps contain 25-150 mg of metallic mercury. They are not reactive, ignitable, or incompatible. The main exposure potential occurs when the lamps are broken in an uncontrolled manner or location. To minimize this potential exposure, AERC uses the following procedures:

**Broken Lamp and Powder Clean-up Procedure**

Within 5 minutes from the time when lamps are discovered broken or powder is seen on the floor, clean-up shall be undertaken by plant operators as follows:

The operator shall collect any breakage, using a broom or dust mop and dustpan, or vacuum system, removing large pieces carefully. Large pieces of lamps should be collected and processed as soon as possible. Very small size breakage and powder residues should be vacuumed with the HEPA/Carbon filtered system in the plant. The area vacuumed should include at least 25 square feet around the area where the breakage occurred. This will vary with the type and location of the breakage.

Debris, used carbon, mop heads, and other material from the vacuum collection container should be placed in a drum for hazardous wastes, and stored in the plant for later processing or shipment to an approved disposal facility.

Powder from the lamp processing system which spills on the floor should be cleaned up by vacuuming, per the Operations Plan. Respirators with mercury filter cartridges must be used when cleaning any powder spills. Floor and flat surface areas are wiped and/or swept on a weekly basis, a mercury absorbing solution (a commercially available product such as HgX®) is used to wipe surfaces.

## D.8.6 Air Monitoring

The following discussion summarizes air monitoring activities. The current corporate AERC procedure is presented as Exhibit D.7.4 within Attachment 9 of the application.

*Air Emission and Process Controls*

The method used to detect any mercury emissions throughout the plant operations, including container areas where lamps are stored, equipment processing areas, or process air filtration exhaust are discussed here.

At periodic times during each operating shift measurements are taken using a Jerome Direct Reading Mercury Vapor Analyzer Model Number 431 (or equivalent). This instrument has a sensitivity of 0.001 mg/m3 (OSHA's PEL for mercury is 0.100 mg/m3). The locations sampled include administrative offices, storage areas, and predetermined locations throughout the process areas. During production, air monitoring are performed every two hours. Air sampling consists of 18 sampling points inside and outside the facility. 6 sampling locations are in the office areas, 2 outside the facility, with the rest in the production and warehouse area. During production, air monitoring includes additional sampling of the air filtration system to assure that is functioning properly.

Mercury concentrations are logged in the air monitoring log. The OSHA standard for indoor work place concentration of mercury is 0.100 mg/m$^3$. AERC has established its own action level at approximately one quarter of the OSHA PEL, or 0.025 mg/m$^3$. Whenever process vents or other ambient room air exceeds the action level AERC requires the use of carbon filtered, half-mask or full-face respirators by plant workers until the source of the mercury has been detected and mitigated. At this level, AERC workers upgrade their level of PPE and establish the source of mercury vapor in order to neutralize or eliminate it. AERC employees are trained to Level C protection which includes air-purifying respirators. The most common sources of elevated mercury concentration levels are boxes received with crushed lamps. If levels of mercury vapor exceed concentrations appropriate for Level C protection, operations are immediately halted and Onyx Environmental Services is called in for emergency response. Operations are not resumed until the AERC emergency coordinator determines that it is safe to do so as described in the AERC Contingency Plan.

Normal emissions from plant operations range from 0.000-0.024 mg/m$^3$. Our "action-level" is 0.025mg/m$^3$, or approximately one-quarter of the PEL. When there are any spikes or localized mercury emissions that exceed the action level, the cause is found and appropriate remedial

action is taken. Spikes tend to indicate excess lamp breakage in shipments, an equipment malfunction or system leak.

Daily monitoring of both the inflow and outflow of air filtration media, e.g., carbon filters within the air handling system, is conducted. Regular preventative maintenance is scheduled for this equipment - with filter change out every 2-3 months. These filters are considered "saturated" and subsequently replaced when mercury emissions reach one half of the PEL at the outlet of the air handler. The measurement is taken through a port immediately downstream of the filter box using the hand-held Jerome meter. Frequent testing in multiple locations, as outlined on AERC's *Air Monitoring Log*, during all operations insures that any malfunctions are corrected promptly. AERC has accumulated data, which includes equipment development and plant operations throughout the company, representing over 10,000 sampling events. A typical cross-section taken from this database indicates routine emissions are below OSHA's indoor PEL.

AERC also has an extensive floor maintenance program to minimize potential contamination of the plant floor. Any areas potentially contaminated through lamp breakage are cleaned immediately upon breakage or daily. AERC also sweeps its plant floors weekly using a combination of a floor sweeping compound and mercury vapor absorbent/suppression liquid. In order to check the effectiveness of its floor maintenance program, AERC conducts periodic wipe sampling of its plant, lab and office area floors.

AERC also utilizes a Bootie policy to further minimize potential contamination. Any office staff or visitors to the facility must wear protective dust-resistant booties while inside the plant operating areas. Likewise, plant workers must don the booties when entering the office areas. All work clothing and boots remain at the facility.

In addition to monitoring personnel exposure, AERC has developed an extensive air filtration program to eliminate the potential environmental releases from its processes. The air filtration system is comprised of two sources of carbon filters and a series of monitoring locations to ensure that mercury is not released from the building. This system of checks has proven to be very successful.