



AECOM  
7650 West Courtney Campbell Causeway  
Suite 700  
Tampa, Florida 33607  
www.aecom.com

813 610 0080

July 12, 2016

Wilbur Mayorga, P.E., Chief  
Environmental Monitoring & Restoration Division  
Miami-Dade County Department of Regulatory and Economic Resources  
701 NW 1<sup>st</sup> Court, 4<sup>th</sup> Floor  
Miami, Florida 33136

**Re: Supplemental Site Assessment Report and Remedial Action Plan  
Response to RER Comments dated May 16, 2016  
FPL Former Cutler Power Plant Property  
14925 SW 67th Avenue, Miami-Dade County, Florida  
HWR-442/File-16360/IW-79**

Dear Mr. Mayorga:

The following information is provided for the Florida Power & Light Company (FPL) former Cutler power plant property. This letter contains responses to the May 16, 2016 comments provided by the Miami-Dade County Department of Regulatory and Economic Resources-Division of Environmental Resources Management (RER). The RER comments were based on the Supplemental Site Assessment Report (SSAR) and Remedial Action Plan (RAP) dated February 5, 2016. The RER comments are included below in italics followed by our responses.

1. *The SARA portion of the document was previously approved in a DERM letter dated March 17, 2016 (attached).*

Response: Acknowledged.

2. *The RAPA report is incomplete and contains discrepancies:*

a) *Attachment C Site Management Plan/Health and Safety Plan/Dust Control Plan:*

- *Table of Contents list only Figure 1. However, a Figure 1 and a Figure 17 is provided in the hard copy. Please note that this differs in the PDF copy provided as only Figure 1 is present.*
- *Appendix B Engineering Control Plans by Ross Engineering. This portion of the document is empty. In addition, the hard copy labels this section as "Appendix B"; however, the PDF copy provided labels this section as "Attachment B". Please note that similar mislabeling between the PDF and hard copy is noted in additional sections (Health and Safety Plan, etc.)*
- *Appendix C: Health and Safety Plan: a) The signature portion is blank and Appendix D: Training Certificates, etc. is empty. If these portions are to be completed at a later date, please include this qualification in the individual sections, as applicable, b) Table of Contents lists "Attachments", however the labels are "Appendix".*

Response:

To assist in the review process, we are submitting a revised Attachment C with this letter. The Engineering Control Plan has been updated and provided as a stand-alone document, as described below. The signatures and the training certificates sections were intentionally left blank since we do not have the construction team in place yet. We have also provided notes in the appropriate section that these will be provided to DERM prior to commencement of construction activities.

- b) *The amended Engineering Control and Institutional Control maps and text proposal, such as provided previously in Section 4 of the September 28, 2015 submittal, was not provided in this document. Please also see comment 2.a) bullet 2 above. This information, revised in accordance with this submittal, shall be provided. Be advised that is necessary that the Engineering Control Plan be a stand alone*

Wilbur Mayorga, RER

July 12, 2016

*comprehensive document as it is a required Exhibit to the No Further Action with Conditions (NFAC)covenant package. The ECP shall include:*

- *A scaled site diagram with surveyed points clearly demarcating the boundary of the engineering control area. The site diagram/survey shall be clearly labeled as to the type of engineering control within an area. Any area that includes a buffer between the engineering control and the property boundary or wetland habitat boundary shall be clearly labeled and supporting information shall be provided that indicates contamination above approved background concentrations or residential cleanup target levels (CTLs) for all contaminants of concern are not present within the buffer. Provide a separate table of soil sample results representing the buffer areas.*
- *An ECP maintenance and inspection schedule.*

*Be advised that a surveyed map of the Institutional Control (IC) boundary shall also be provided. The map shall identify the overall extent of the institutional control closure area (based on both soil and groundwater) along with the ECP area within that IC boundary.*

*Please re-submit the document with appropriate corrections as needed and ensure that paper and electronic copies are the same document and consistent.*

**Response:**

The engineering plans submitted in **Exhibit A** have been drawn to scale showing all the pertinent features. The types of engineering controls are described in the ECP as well as on the plans. The ECP, along with a maintenance and inspection schedule, is provided as a stand-alone document, as **Exhibit A**, for this submittal.

As requested, we are also including separate tables and a figure of soil data representing the buffer areas in **Exhibit B**.

The site has been thoroughly surveyed by licensed professional surveyors and the site maps and ECP are based on the surveyed data. A final survey of the boundaries of the engineering and IC controls will be provided upon completion of construction and for the preparation of a Restrictive Covenant package for the property.

3. *Reference Sheet C-2 of the proposed drainage plans. There are still areas of proposed drainage that remain within the area of groundwater impacts or potential impacts. The referenced areas are located at the southwest portion of the property. Be advised that a delineating monitoring well shall be present between an existing plume and the proposed drainage areas. If not present, monitoring wells representing the drainage areas shall be required prior to further evaluating the conceptual drainage plans.*

**Response:**

The drainage area near the southwest portion of the property has been removed as part of our redesign, as shown on the attached Grading Plan (Overall) prepared by Ross Engineering, Inc. There are no groundwater impacts or potential impacts in the new drainage areas.

4. *Site/Soil Management Plan (SMP): Section 3.7 Contaminated Soil Management. DERM acknowledges that contaminated soils that are excavated will be stockpiled and covered. However, there is no information provided as to how the soils will be disposed. Be advised that if any soil re-use is intended, details of soil re-use including tracking of the origin of the soil and proposed reuse location within the engineering control area shall be provided.*

Wilbur Mayorga, RER

July 12, 2016

**Response:**

The stockpiled contaminated soil will be transported and disposed offsite at Waste Management's Medley Landfill or an alternative Class I Subtitle D landfill approved by DERM. Copies of waste manifests will be included in the Remedial Action Implementation Report.

Section 3.7 – Contaminated Soil Management on Page 4 of AECOM's Soil Management Plan has been revised to address offsite disposal of contaminated soils. There will be no reuse of any soils excavated from impacted areas. This section has been updated in the revised Attachment C described in our response to Comment No.1 above.

5. *DERM acknowledges the Groundwater Monitoring Plan in Support of NFAC to be implemented following completion of the engineering controls; however, an interim groundwater monitoring plan is required. The monitoring wells proposed in Figure 1A of the "Cutler Monitoring Only Plan" shall be sampled and analyzed semi-annually for arsenic and vanadium and for PAHs, antimony, and nickel annually.*

**Response:**

An interim monitoring only plan has been attached to this submittal as **Exhibit C**.

6. *Air Monitoring Plan:*

a) *Provide the location of the weather monitoring station on the site Figure.*

**Response:**

The weather monitoring station will be located as illustrated on the revised figure included in the updated **Attachment C** enclosed with this letter.

b) *Based on the size of the site, the specific air monitoring stations shall be positioned in proximity to the individual work areas at the given time instead of around the entire site perimeter. Sensor positions shall be located to monitor both interior conditions and potential off-site impacts.*

**Response:**

Additional air monitoring stations closer to work areas have been positioned along the boundary of the exclusion zone taking into consideration worker safety and truck traffic during the remediation activities. The locations of these monitoring equipments will be re-evaluated during the kick-off meeting. Additional air monitoring station locations are illustrated on the revised figure of the Air Monitoring Plan. It should be noted that there is a separate section for a Personal Monitoring Plan for the workers.

c) *The intent of the Air Monitoring Plan (AMP) shall be revised as it only states it is to monitor for protection of on-site personal. The AMP is also necessary to ensure proper dust control and monitoring for off-site receptor such as the abutting residential properties and school.*

**Response:**

The intent of the Air Monitoring Plan (AMP) has been revised as follows:

*"The purpose of this AMP is to monitor air quality and implement proper dust control measures to protect on-site and offsite personnel, adjacent residential properties, and school areas from air-borne contaminants during the proposed construction activities at the former Cutler Power Plant Property (Site), owned by Florida Power & Light (FP&L). Corrective actions are proposed to remediate the soil and groundwater media at the Site".*

A copy of the revised Attachment C that is being submitted with this letter addresses the changes described above.

*Additional Comment: Be advised that the Figure depicting air monitoring locations provided in Appendix A of the AMP differs from that provided in Figure 1 of the SMP and shall be clarified/corrected.*

Wilbur Mayorga, RER  
July 12, 2016

**Response:**

Changes recommended by DERM are incorporated in the AMP and SMP sections of the updated Attachment C. The figures showing the new air monitoring locations have also been included.

- 7. *Comments pertaining to DERM's Coastal Resources Section shall be provided under separate cover.*

The Coastal Resources Section provided comments on June 26, 2016 and they are shown below:  
*The project narrative states that a buffer of 15 feet, average of 25 will be maintained in accordance with state rules, however, this is not consistent with the work depicted on the grading plans. Please be reminded that these setbacks are not a DERM requirement and that maintaining those setbacks from the wetland areas affects your remediation plan. Please coordinate with the SFWMD if necessary to further discuss the setback requirement.*

*The grading plans are very busy and the jurisdictional wetland lines in relation to the limits of the remediation work are not clearly identifiable. Please revise the plans such that both are clearly depicted and labeled. In addition, if possible please reflect these lines on the cross-sections (adjacent to retention areas 1 and 2, along the intake canal, etc.). Include the minimum distance that will be maintained between the wetlands/top of bank and the remediation/other work (i.e. installation of catch basins, etc.). Also the grading plans seem to be missing a shoreline layer (the 1 story wood building appears to be in the intake canal).*

*The wetland line and project limits are not clearly identifiable on the Stormwater and Pollution Prevention Plan, please revise. There is also a note stating the that the contractor shall determine the exact location of the silt fence, however, the silt fence is shown extending through wetland areas. At a minimum the silt fence should be located landward of any wetlands on-site.*

**Response:**

Comments provided from the Coastal Resources Section were addressed within the revised plans described above. These include the revised grading plans shown in **Exhibit A** and the revised Stormwater and Pollution Prevention Plan shown in **Exhibit D**.

A complete set of signed and sealed engineering plans prepared for the remedial action plan will be submitted to DERM upon approval. Please contact us if you have any questions or need additional information.

Sincerely,



Ben T. Foster, P.G.  
Program Manager



**Enclosures:**

1. RAPA Attachment C (revised July 2016)
2. Exhibit A – Engineering Control Plan, July 2016
3. Exhibit B – Soil Data from Wetland Buffer Areas
4. Exhibit C – Interim Monitoring Only Plan
5. Exhibit D – Stormwater Pollution Prevention Plans (revised July 2016)

**ATTACHMENT C**  
Revised July 2016

## **Site Management Plan - Revised**

July 2016

**Florida Power & Light Company  
Former Cutler Power Plant Property  
HWR-442/File-16360/IW-79  
Miami, Florida**



## Table of Contents

1.	Objective .....	1
2.	Site Description and Background Information .....	1
3.	Site Management Procedures .....	1
3.1	Work Schedule	2
3.2	Site Control	2
3.3	Work Zone	2
3.4	Control Access	3
3.5	Communication	3
3.6	Traffic Management	3
3.7	Contaminated Soil Management	4
3.8	Vegetation Management	4
3.9	Dust Control	4
3.10	Monitoring and Inspections	4
3.11	Record keeping	4

### Figures

1	Site Vicinity Map
2	Work Areas and Air Monitoring Locations

### Appendices

Appendix A	Site Photographs
Appendix B	Health and Safety Plan
Appendix C	Air Monitoring Plan
Appendix D	Daily Monitoring Logs

## 1. Objective

The overall objective of this Site Management Plan (SMP) is to streamline remediation and any future site redevelopment activities at the former Cutler Plant (Site) currently owned by the Florida Power & Light Company (FPL). Prior to commencement of any construction activities, FPL will designate a Program Manager to coordinate and oversee site redevelopment and remediation activities at the Site. All construction activities will be conducted in accordance with the Supplemental Site Assessment Report and Remedial Action Plan (SSAR & RAP) approved by the Division of Environmental Resources Management (DERM) of the Miami-Dade County Department of Economic and Regulatory Resources. This SMP does not cover the sub-station parcel to the northwest of the Site.

## 2. Site Description and Background Information

The following sections summarize the technical and historical aspects of the site and surrounding area. This information was also provided in previous documents.

The Site covers approximately 82 acres and is located at 14925 SW 67<sup>th</sup> Avenue, in eastern Miami-Dade County, Florida. **Appendix A** contains photographs of the Site. The property is bordered to the north by residential properties, to the east and southeast by surface waters contiguous with Biscayne Bay, to the south by SW 152<sup>nd</sup> Street (Coral Reef Drive), and to the west by SW 67<sup>th</sup> Avenue (Ludlum Road). The Site is located west of Paradise Point on Biscayne Bay, 15 miles south of Miami. It is situated on the marl and peat-veneered seaward slope of the Atlantic Coastal Ridge the crest of which lies approximately 1½ miles west of the Site. A site vicinity map is included as **Figure 1**.

Extensive soil and groundwater assessment work has been conducted at the Site from February 2013 through September 2015. The assessment work found constituents of concern (COCs) such as arsenic and vanadium.

In order to mitigate any potential direct exposure risks associated with the impacted soils exceeding the Soil Cleanup Target Levels (SCTLs) approved by DERM, FPL will implement Engineering Controls (EC) as shown on the plans prepared by Ross Engineering, Inc. (REI), which are included in AECOM's Engineering Control Plan in a separate stand-alone document.

The soil remedial activities include installing and securing a geotextile liner at the surface of the designated area. The liner will be a high visibility orange colored 8 ounce geotextile (GSE or equivalent). Subsequently, one foot of clean fill will be placed on top of the geotextile liner. The clean fill will meet the criteria in DERM's SWP Guidance No.1, dated March 22, 2004. Finally, the area will be sowed for establishing a vegetative layer on top. Since the proposed remedial activities do not include soil excavation activities, except in specifically designated areas, no direct exposure with the contaminants of concern are anticipated.

## 3. Site Management Procedures

All field activities will be initiated under the direction of the Program Manager upon receipt of DERM approval of this Site Management Plan, and Notice to Proceed from FPL (Owner). A pre-

construction meeting with subcontractors, FPL representatives and the owner's representatives will be held at the site location to discuss the construction activities and assess and define work zones. All construction activities will be conducted in accordance with the procedures described in the following sections.

### **3.1 Work Schedule**

The Program Manager will develop a work schedule for various tasks associated with construction activities on-site. Expected work shifts are from 7 am to 6 pm, Monday through Friday. Personnel shall check in with the Contractor in command at the start of each work shift. At the end of the shift, personnel will check out with the contractor in command. A sign-in and sign-out system will be provided for workers and visitors. There will be physical boundaries that are established around the site during contaminated material excavation operations. Supervisors will instruct workers and visitors on the limits of the restricted areas. No one will be allowed to enter a restricted area without the required protective equipment for that area. Visitors should check in immediately upon arrival. Only authorized visitors will be allowed access to the contaminated areas. Each visitor will be required to provide and wear the necessary protective equipment during visits and will be escorted by supervisory personnel while on site. Visitors, subcontractors and other personnel will be required to sign a safety plan acknowledgment sheet to certify that they have read and will comply with this SMP and the Health and Safety Plan (HASP), included in **Appendix B**. Failure to comply with the site entry procedures may result in expulsion from the Site.

In certain extremely hazardous situations, the Site Manager or Contractor in command may request that site operations be temporarily suspended while the underlying hazard is corrected or controlled. During operations shutdowns, all personnel will be required to stand upwind to prevent exposure to fugitive emissions.

### **3.2 Site Control**

Appropriate site control procedures will be implemented by the Program Manager to control personal exposure to contaminated soils or moving equipment. The site control program may be modified as necessary as new information becomes available. Personnel will be cognizant of the work zones and follow the appropriate procedures. The site will be protected using silt fence to prohibit any unauthorized access.

### **3.3 Work Zone**

To prevent migration of hazardous materials or contamination caused by personnel or equipment, work areas and PPE are clearly specified by the contractor prior to beginning operations at the site. Designated work areas or zones will be established and delineated prior to the start of abatement activities and/or other activities anticipated that involve contact with hazardous or contaminated materials. Each work area containing potentially contaminated materials will be divided into three zones; an Exclusion Zone (EZ), a Contamination Reduction Zone (CRZ), and a Support Zone (SZ).

The arrangement of these zones is illustrated in the attached **Figure 2**. Zones may be adjusted in the field with **consultant's** approval. For instance, the EZ may be arranged to include only the areas of presently exposed soils and/or areas where existing contaminated soils are located. The EZ may be arranged in order to allow trucks delivering clean fill to enter the site for stockpiling without having to be decontaminated before leaving the Site. Details of the work zone areas are discussed in the HASP included in **Appendix B**.

### **3.4 Control Access**

Personnel shall check in with the Contractor in command at the start of each work shift. At the end of the shift, personnel will check out with the contractor in command. A sign-in and sign-out system will be provided for workers and visitors. Expected work shifts are from 7 am to 6 pm, Monday through Friday. There will be physical boundaries that are established around the site during contaminated material excavation operations. Supervisors will instruct workers and visitors on the limits of the restricted areas. No one will be allowed to enter a restricted area without the required protective equipment for that area. Visitors should check in immediately upon arrival. Only authorized visitors will be allowed access to the contaminated areas. Each visitor will be required to provide and wear the necessary protective equipment during visits and will be escorted by supervisory personnel while on site. Visitors, subcontractors and other personnel will be required to sign a safety plan acknowledgment sheet to certify that they have read and will comply with this Site Management Plan and the HASP included in **Appendix B**. Failure to comply with the site entry procedure will result in expulsion from the site.

The Site Manager or Contractor in command will determine an upwind evacuation area prior to each shift, and all personnel will be notified of its location. A horn or other signaling device will be used to signal an evacuation in the event of an emergency. Three blasts of the horn will be the signal to immediately stop work and proceed to the evacuation area.

### **3.5 Communication**

A communication network must be set up to alert site personnel of emergencies and to summon outside emergency assistance. Where voice communication is not feasible, an alarm system (i.e., sirens, horns, etc.) will be set up to alert employees of emergencies. Radio communication also may be used to communicate with personnel in the work area. Where phone service is not readily available, radios or portable telephones will be used to communicate with outside agencies. Site personnel will be trained on the use of the site emergency communication network. Emergency phone numbers will be posted at the phone or radio used for outside communication. The Program Manager will designate parties responsible for establishing the communication network prior to the start of work and for explaining it to all site personnel during the site safety briefing.

### **3.6 Traffic Management**

Routes for vehicle and equipment moving will be discussed and altered, if necessary, during the pre-construction meeting. The Site will be accessed using the main entrance, as shown in **Figure 2** of the HASP. The traffic routes will be discussed during the daily tailgate meetings. In order to allow trucks delivering clean fill to enter the site for stockpiling without having to be decontaminated before leaving the site.

### **3.7 Contaminated Soil Management**

Based on the scope of work of the proposed remediation activities, impacted soils may be excavated in areas shown in the engineering control plans. Any soil excavated from these areas will be stockpiled in designated on-site locations using a minimum 10 mil impermeable liner for containment or directly loaded for transport to the permitted disposal facility. In order to limit the fugitive dust from contaminated soils and incidental exposure, the areas of exposed contaminated soil (in-situ or stockpiled) will be securely covered at the end of each day with plastic sheeting.

The stockpiled contaminated soil will be transported and disposed offsite at Waste Management's Medley Landfill or alternative Class I Subtitle D landfill approved by DERM. Copies of waste manifests will be included in the Remedial Action Implementation Report.

### **3.8 Vegetation Management**

Prior to the initiation of the field activities, an updated tree survey will be conducted by a certified arborist to identify native and exotic trees or vegetation on site. Non-native trees will be removed prior to construction. A Tree Protection Area will be established around each native tree that will be preserved during clearing and grubbing activities. A typical detail for the Tree Protection Area is shown on the remediation plans for engineering controls.

### **3.9 Dust Control**

To minimize worker exposure, the contractor will implement dust control measures during construction activities. Dust control measures shall include provisions for an adequate supply of water and appropriate application method to provide effective dust suppression (note a garden hose is not an appropriate application method). Ambient air monitoring for arsenic and vanadium will be conducted during the excavation activities along the perimeter of the Exclusion Zone (EZ). The details of the dust and air monitoring activities are included in the Air Monitoring Plan included in **Appendix C**.

### **3.10 Monitoring and Inspections**

Daily site inspections will be conducted by the Program Manager or his designated representative prior to the start of each shift. During the inspection activities, if any discrepancies are identified, the Program Manager will be notified immediately. Inspections will be documented and maintained on site until the completion of the project, at which time they are placed in the project files. A copy of the daily monitoring log is included in **Appendix D**.

### **3.11 Record keeping**

The Program Manager will maintain the daily site activity records for the construction and inspection activities. Copies of fill tickets of clean fill delivered to the site documenting the source, quality and quantities will also be maintained on site. Any soil, vegetation or debris hauled off-site

will be documented using non-hazardous waste manifests. The material will be transported and disposed of only at an authorized facility. Copies of manifests will be maintained on site.

The health and safety records inclusive of daily tailgate meeting attendance logs, instrument readings and calibrations, PPE use and changes, health and safety-related issues, and deviations from or problems with this HASP will be recorded Appendix B of the HASP.

The Program Manager will prepare weekly status reports for each phase of the project that will be maintained on-site. Monthly progress reports will be submitted to DERM.

## FIGURES



TERRA CONSULTING GROUP, INC.  
PHONE: 305-415-9229  
WWW.TERRACONSULTING.COM

**SITE VICINITY MAP**

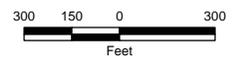
Florida Power & Light Company  
Former Cutler Power Plant Property  
HWR-442/Fla-16360/W-79  
Miami, Florida

**LEGEND:**

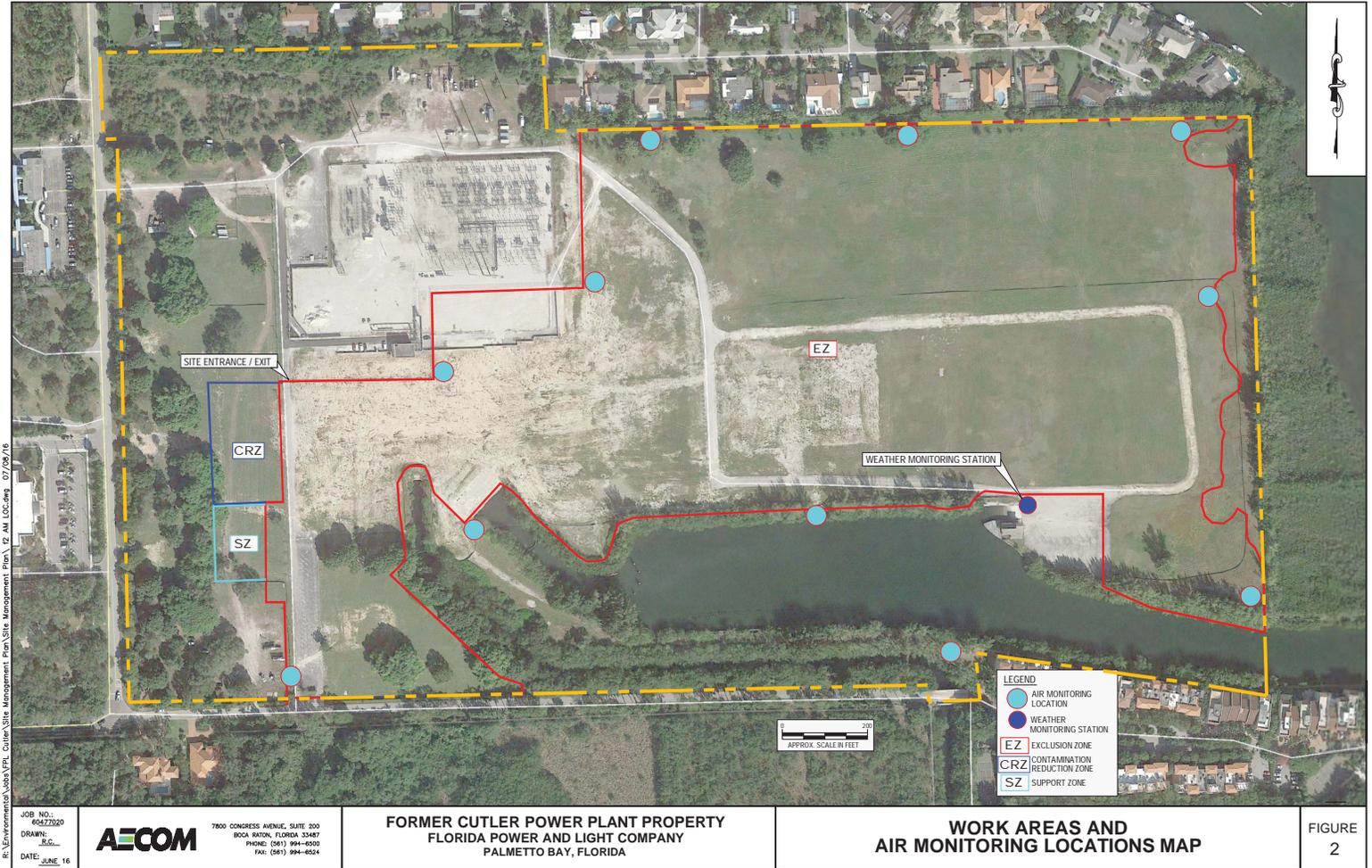


FORMER PLANT PROPERTY BOUNDARY

**SCALE:**



**FIGURE 1**



R:\Environment\Subs\PL Cutler\Site Management Plan\12 AM LOC.dwg 07/08/16  
 JOB NO.: 60427020  
 DRAWN: JG  
 DATE: JUNE 16



7800 CONGRESS AVENUE, SUITE 200  
 BOCA RATON, FLORIDA 33487  
 PHONE: (561) 994-6500  
 FAX: (561) 994-6524

**Appendix A**

**Site Photographs**



FORMER CUTLER POWER PLANT PROPERTY



IMG#G0023303 DATE : 9/23/15 PHONE # : 1-844-ICA-RUS8





FORMER CUTLER POWER PLANT PROPERTY



IMG#G0023307 DATE : 9/23/15 PHONE # : 1-844-ICA-RUS8





FORMER CUTLER POWER PLANT PROPERTY



IMG#G0023311 DATE : 9/23/15 PHONE # : 1-844-ICA-RUS8





FORMER CUTLER POWER PLANT PROPERTY



IMG#G0023313 DATE : 9/23/15 PHONE # : 1-844-ICA-RUS8





FORMER CUTLER POWER PLANT PROPERTY



IMG#G0023327 DATE : 9/23/15 PHONE # : 1-844-ICA-RUS8





FORMER CUTLER POWER PLANT PROPERTY



IMG#G0043333 DATE : 9/23/15 PHONE # : 1-844-ICA-RUS8





FORMER CUTLER POWER PLANT PROPERTY



IMG#G0043345 DATE : 9/23/15 PHONE # : 1-844-ICA-RUS8





FORMER CUTLER POWER PLANT PROPERTY



IMG#G0023277 DATE : 9/23/15 PHONE # : 1-844-ICA-RUS8





FORMER CUTLER POWER PLANT PROPERTY



IMG#G0023280 DATE : 9/23/15 PHONE # : 1-844-ICA-RUS8





FORMER CUTLER POWER PLANT PROPERTY



IMG#G0012854 DATE : 9/23/15 PHONE # : 1-844-ICA-RUS8





FORMER CUTLER POWER PLANT PROPERTY



IMG#G0012843 DATE : 9/23/15 PHONE # : 1-844-ICA-RUS8





FORMER CUTLER POWER PLANT PROPERTY



IMG#G0012832 DATE : 9/23/15 PHONE # : 1-844-ICA-RUS8





FORMER CUTLER POWER PLANT PROPERTY



IMG#G0012828 DATE : 9/23/15 PHONE # : 1-844-ICA-RUS8





FORMER CUTLER POWER PLANT PROPERTY



IMG#G0012816 DATE : 9/23/15 PHONE # : 1-844-ICA-RUS8





FORMER CUTLER POWER PLANT PROPERTY



IMG#G0012813 DATE : 9/23/15 PHONE # : 1-844-ICA-RUS8





FORMER CUTLER POWER PLANT PROPERTY



IMG#G0012809 DATE : 9/23/15 PHONE # : 1-844-ICA-RUS8





## FORMER CUTLER POWER PLANT PROPERTY



IMG#G0012806 DATE : 9/23/15 PHONE # : 1-844-ICA-RUS8





FORMER CUTLER POWER PLANT PROPERTY



IMG#G0012798 DATE : 9/23/15 PHONE # : 1-844-ICA-RUS8





FORMER CUTLER POWER PLANT PROPERTY



IMG#G0012797 DATE : 9/23/15 PHONE # : 1-844-ICA-RUS8





FORMER CUTLER POWER PLANT PROPERTY



IMG#G0012784 DATE : 9/23/15 PHONE # : 1-844-ICA-RUS8





FORMER CUTLER POWER PLANT PROPERTY



IMG#G0012779 DATE : 9/23/15 PHONE # : 1-844-ICA-RUS8



## **Appendix B**

### **Health and Safety Plan - Revised**

# Health and Safety Plan- Revised

Former Cutler Power Plant Property  
HWR-442/File-16360/IW-79  
14925 SW 67th Avenue,  
Palmetto Bay, Miami-Dade County, Florida



Prepared by:

**AECOM**

7800 Congress Avenue, Suite 200  
Boca Raton, Florida 33434

July 2016

AECOM Job No.: 60321482

## *Disclaimer*

*This Health and Safety Plan, and each of its provisions, is applicable only to, and for use only by, AECOM, its affiliates, and its subcontractors. Any use of this Plan by other parties, including, without limitation, third party contractors on projects where AECOM is providing engineering, construction management or similar services, without the express written permission of AECOM, will be at that party's sole risk, and AECOM shall have no responsibility therefore. The existence and use of this Plan by AECOM shall not be deemed an admission or evidence of any acceptance of any safety responsibility by AECOM for other parties unless such responsibility is expressly assumed in writing by AECOM in a specific project contract.*

---

## ACKNOWLEDGEMENT

Prior to conducting work at **Florida Power & Light Company's Former Cutler Power Plant, located in Miami, Florida** personnel must read this Health and Safety Plan (HASP). If the information presented is unclear, the AECOM Project Manager should be contacted for clarification. A copy of this HASP must be kept on-site for the duration of field activities.

"I have read the attached HASP. I have discussed questions that I had regarding this plan with the **AECOM Project Manager** and I understand the requirements."

<b>Print Name</b>	<b>Company/Affiliation</b>	<b>Signature</b>	<b>Date</b>

**EMERGENCY TELEPHONE NUMBERS**

- Emergency Medical, Police, Fire 9-1-1
- AECOM Office (561) 994-6500
- AECOM – Regional SHE Manager (757) 298-1563  
Tony Indorato
- AECOM – Area SHE Manager (703) 682-6122  
George Porter
- AECOM Project Manager (813) 610-0080  
Ben Foster
- AECOM Project Manager (305) 790-5829  
Vivek Kamath
- AECOM - Occupational Health Manager and Registered Nurse (RN) (512) 419-6440  
Nancie Feld
- AECOM Health and Safety Site Representative (561) 843-8059  
Sonia K. Burkule
- AECOM Technician (786) 299-4220  
Michael Powell
- WORKCARE (24-hr support) (888) 449-7787
- FP&L Contact (305) 442-5420  
Armando Fernandez
- Tierra Consulting Group (954) 993-7933 (c)  
Pete Laforge
- Jackson South Community Hospital (305) 251-2500  
9333 Southwest 152nd Street, Miami, FL 33157

## Other Contacts:

American Association of Poison Control Center ..... (800) 222-1222  
 OSHA..... (954) 424-0242  
 Office of Emergency Services..... (800) 852-7550  
 National Response Center..... (800) 424-8802

Table of Contents

Section	Page
<b>Limitations/Disclaimer</b> .....	1
<b>Purpose and Introduction</b> .....	2
<b>1. Site Description and Scope of Work</b> .....	2
<b>2. Key Personnel and Responsibilities</b> .....	2
<b>3. Site Characterization and Hazard Evaluation</b> .....	3
Physical HazArds associated with Scope of Work are: .....	4
<b>4. Site Control Program</b> .....	6
Site Work Zones .....	6
Access Controls During Operations .....	7
<b>5. Personal Protective Equipment</b> .....	7
PPE Selection and Action Levels .....	7
Heat Illness Related to PPE Sse and Weather Conditions .....	9
PPE Limitations .....	11
PPE Work Duration .....	11
PPE Maintenance and Storage .....	11
PPE Training and Proper Fitting .....	12
PPE Donning and Doffing Procedures .....	12
PPE Inspection Procedures .....	12
Evaluation of the Effectiveness of the PPE Program .....	12
Respiratory Protection Program .....	12
Respirator Cartridges .....	12
Cartridge Changes .....	13
Respirator Inspection, Cleaning and Storage .....	13
Respirator Use with Facial Hair .....	13
Respirator Use with Corrective Lenses .....	13
Medical Certification for Respirator Use .....	13
Respirator Limitations .....	13
<b>6. Personal air sampling plan</b> .....	13
<b>7. Decontamination Procedures</b> .....	15
Personnel Decontamination Procedures .....	15
Equipment Decontamination Procedures .....	15
Location and Layout of Decontamination Facilities .....	16
Employee Wash Facilities .....	16
Storage and Disposal of Decontamination Water .....	16
Labeling of Contaminated PPE .....	16

<b>8. Training and Medical Requirements.....</b>	<b>17</b>
OSHA Training.....	17
Medical Clearance.....	17
Respirator Fit Test.....	17
<b>9. Emergency Procedures.....</b>	<b>18</b>
Emergency Procedures.....	18
Places of Refuge.....	18
Identification of Nearest Medical Assistance .....	18
Status and Capabilities of Emergency Response Providers .....	18
Pre-Emergency Planning.....	18
Personnel Roles, Lines of Authority, and Communication .....	19
Emergency Recognition and Prevention .....	19
Site Security and Control.....	19
Decontamination of Injured Workers.....	19
Accident Reporting and Follow-Up .....	19
Emergency equipment list.....	19

**List of Tables**

	<b>Page</b>
Table 4-1 - Metal PELs .....	4
Table 4-2 - Dust PELs.....	4
Table 6-1 – Level D PPE Requirements .....	8
Table 6-2 – Summary of Work/Rest Periods Based on Temperature (Level C) .....	11

**Appendices**

Appendix A - Figures	
Figure 1 – Site Vicinity Map	
Figure 2 - Site Map and Site Work Areas	
Figure 3 – Decontamination Wash-Water Containment System Detail	
Figure 4 – Hospital Route	
Appendix B	NIOSH Data Sheets
Appendix C	Safety Management Sheets
Appendix D	Training Certificates, Medical Clearances, and Fit Test Documentation

## LIMITATIONS/DISCLAIMER

This Health and Safety Plan (HASP) has been prepared on behalf of the Florida Power & Light Company (FPL), with specific application for the proposed site remediation activities at the former Cutler Power Plant property.

This Health and Safety Plan, and each of its provisions, is applicable only to, and for use only by, AECOM Corporation, its affiliates, and its subcontractors. Any use of this Plan by other parties, including, without limitation, third party contractors on projects where AECOM is providing engineering, construction management or similar services, without the express written permission of AECOM, will be at that party's sole risk, and AECOM Corporation shall have no responsibility therefore. The existence and use of this Plan by AECOM shall not be deemed an admission or evidence of any acceptance of any safety responsibility by AECOM for other parties unless such responsibility is expressly assumed in writing by AECOM in a specific project contract.

This HASP dated February 2, 2016, has been prepared and reviewed by the following:

---

**Ben T. Foster, P.G.,**  
Project Manager

---

**Vivek S. Kamath, P.E.**  
Senior Project Engineer

---

**George Porter**  
Florida - Area SHE Manager

*Note: Signature page will be provided prior to the commencement of construction activities*

**PURPOSE AND INTRODUCTION**

The purpose of this HASP is to address health and safety (H&S) hazard information and associated requirements for the construction and implementation of the corrective action activities at the former Cutler Power Plant Property (Site), owned by Florida Power & Light (FP&L). Corrective actions are proposed to remediate the soil and groundwater media at the Site.

This HASP applies only to AECOM employees and its subcontractor's specific to the scope of work detailed in the following section.

**1. SITE DESCRIPTION AND SCOPE OF WORK**

The Cutler property covers approximately 82 acres and is located at 14925 SW 67th Avenue, in eastern Miami-Dade County, Florida. Site is bordered to the north by residential properties, to the east and southeast by surface waters contiguous with Biscayne Bay, to the south by SW 152nd Street (Coral Reef Drive), and to the west by SW 67th Avenue (Ludlum Road). Site is located west of Paradise Point on Biscayne Bay, 15 miles south of Miami. Site vicinity map and site location map are included as Figure 1, included as **Appendix A**.

Site assessment activities confirmed presence of metals impacted soil and groundwater media at the Site. Contaminated soil with concentrations above the residential/commercial cleanup target levels is present on portions of the Site. The groundwater plume is located entirely within the Site boundary.

AECOM prepared the Supplemental Site Assessment Report and Remedial Action Plan Reports (SSAR & RAP) for the Site, which documented the extent of environmental impacts investigated at the Site. Based on the assessment results, remedial actions to manage the contaminated soil and groundwater media were proposed. The remedial actions include installing a geotextile liner at the surface of the impacted area and covering with one foot of clean soil. The liner will be a high visibility orange colored 8 ounce geotextile (GSE or equivalent). Subsequently, the areas will be seeded for a vegetative layer. The soils impacted around the root zone of the trees to be preserved on-site will be hand cleared and covered with a geotextile layer and bonded rubber mulch. The engineering and institutional controls used as part of the remediation strategy for closure are described in the Engineering Control Plan available on file.

**2. KEY PERSONNEL AND RESPONSIBILITIES**

The construction contractor is ultimately and solely responsible for the H&S of their employees working on the Site and will comply with provisions of this HASP and all applicable OSHA regulations. AECOM will assist the contractor with the implementation and compliance with this document. AECOM will have an onsite H&S representative, during Site remediation activities, to evaluate compliance with this HASP. AECOM will

also conduct personal air sampling for the contractor's employees and evaluate personal protective equipment (PPE) requirements based on air sampling results.

The contractor will ensure all of their employees comply with the provisions of this HASP. The contractor will construct and maintain all of the facilities (i.e., barrier fences, decontamination areas, etc.) and supply and maintain all the supplies, PPE, and all other equipment necessary for compliance with this HASP.

The key personnel and their roles for the project are provided below:

- FP&L
- FP&L
- Ben T. Foster, AECOM Project Manager
- Vivek Kamath, AECOM Project Manager (alternate)
- Sonia Burkule, AECOM Onsite H&S Representative
- Carlton Gordon, AECOM Air Sampling Technician
- Michael Powell, AECOM Field Technician
- TBD, Contractor, Construction Manager
- TBD, Subcontractor, Superintendent
- TBD, Subcontractor, Designated Onsite Health and Safety Representative

### **3. SITE CHARACTERIZATION AND HAZARD EVALUATION**

As stated in the introduction, this HASP only addresses the additional H&S requirements attributed to the handling of contaminated soils. Based on the site assessment activities conducted at the Site, heavy metals with concentrations detected above the levels were:

- arsenic
- vanadium

Several site assessment activities have been conducted to delineate the concentrations of contaminants of concern (COCs) in soils and to quantify associated environmental impacts to site media and human health. AECOM and others completed site assessment activities for the Site. Miami-Dade DERM's files should be reviewed for the latest available site assessment data for Site. NIOSH Safety sheets are included in **Appendix B**.

The following table details the Occupational Safety and Health Administration (OSHA) permissible exposure limits (PELs) associated with the COCs:

**Table 4-1 - Metal PELs**

Metal	OSHA PEL
Arsenic	0.010 mg/m <sup>3</sup>
Vanadium	0.5 mg/m <sup>3</sup>

In addition to the potential exposure to the Site’s COC, there is also a potential health hazard associated with the exposure to dust generated from the soil handling activities. The following table presents the OSHA PELs for the dust.

**Table 4-2 - Dust PELs**

Compound	OSHA PEL
Total Dust (PNOS)	15 mg/m <sup>3</sup>
Respirable Dust	5 mg/m <sup>3</sup>

- PEL – Permissible Exposure Limit
- ppm – Parts Per Million
- TLV – Threshold Limit Value
- mg/m<sup>3</sup> – Milligrams per Cubic Meter
- STEL – Short Term Exposure Limit
- NIOSH- National Institute of Occupational Safety and Health
- PNOS – Particulates Not Otherwise Specified

To minimize worker exposure, the subcontractor shall implement dust suppression practices when handling contaminated soils. Dust suppression will include utilizing the continuous and generous application of water to exposed soils during excavation and handling. Dust control measures shall include provisions for an adequate supply of water and appropriate application method to provide effective dust suppression. A garden hose is not an appropriate application method. In order to limit the fugitive dust from contaminated soils and incidental exposure, the contractor shall securely cover areas of exposed contaminated soil (in-situ or stockpiled) at the end of each day with plastic sheeting. The contractor shall stockpile contaminated soil in designated on-site locations and use a minimum 10 mil permeable liner for containment.

Ambient air monitoring will be conducted along the perimeter of the Exclusion Zone (EZ) to evaluate the effectiveness of the contractor’s dust suppression implementation effectiveness.

**PHYSICAL HAZARDS ASSOCIATED WITH SCOPE OF WORK ARE:**

**Heavy equipment operations** - Operation of heavy equipment during excavation activities presents a potential "run over" or collision hazard to personnel. The hazards associated with heavy equipment can be effectively eliminated if personnel maintain a constant visual or verbal contact with the equipment operator. Never assume that the equipment operator sees you; make eye contact and use hand signals to inform the operator of your intent. Never walk directly in back of, or to the side of, heavy equipment without the operator's knowledge. AECOM employees are strictly prohibited from entering the area

of excavation and will be onsite for sampling only. See URS SMS 019 for additional information.

**Noise** - The primary noise hazard at this site is from the drilling equipment. Whenever feasible, noise levels, identified as exceeding 85 decibels, will be reduced by means of personal protective equipment. Earplugs and/or muffs will be worn at all times when AECOM personnel are within 25 feet of operating equipment. Hearing protection will also be worn in the vicinity of generators, concrete cutters, and any other high noise emitting equipment. See URS SMS 026 for additional information.

**Slip/Trip/Fall** - Slip-trip fall hazards are common at investigation and remediation sites due to open trenches, pits, and holes; muddy, slippery or unstable surfaces; and equipment on the ground. While it is difficult to eliminate all slip-trip-fall hazards, risk of injury will be minimized by implementing safe work practices, utilizing proper footwear, and keeping the work area free of obstructions. Good housekeeping measures will help eliminate slip-trip-fall hazards. See URS SMS 021 for additional information.

**Lifting Hazards** - Field operations often require the performance of laborious tasks. Employees must implement proper lifting procedures, such as keeping the load close to the body, and using leg muscles instead of back muscles to perform lifting tasks. Additionally, employees will not attempt to lift large, heavy, or awkwardly shaped objects without assistance. When moving drums, moving man-hole covers back in to position, and handling other heavy objects, proper precautions should be taken to avoid pinch points for hands. See URS SMS 069 and URS SMS 064 for additional information.

**Weather** - Weather conditions are an important consideration in planning and conducting site operations. Extremely hot or cold weather can cause physical discomfort, loss of efficiency and personal injury. Of particular importance is heat stress, often resulting from the use of impermeable protective clothing, which decreases the body's natural cooling processes. Lightning may also accompany storms, creating an electrocution hazard during outdoor operations. SMS 18 describes the procedure to protect project personnel from the effects of heat related illnesses.

**Fire Prevention** - URS personnel will protect against the hazard by implementing the following safety procedures:

- SMS 014 (Fire Prevention) will be followed;
- Potential ignition sources will be kept away from an explosive or flammable environment; and
- Fire extinguisher(s) will be provided at appropriate locations.

In the event fire or explosion becomes a threat, personnel will be evacuated to a predetermined evacuation area until the hazardous situation is properly controlled or eliminated. See URS SMS 014 for additional information.

**Dust Exposure** - High winds and site operations can cause airborne dust hazards. Perform air monitoring to confirm and document that there was no exposure to the contaminated dust particles above the site specific action levels site specific air

contaminants, during the field activities. On a daily basis, record general weather conditions such as air temperature, wind speed and wind direction in the field notes. See URS SMS 042 and O43 for additional information.

Copies of URS' SMS are included in **Appendix C**.

#### **4. SITE CONTROL PROGRAM**

Appropriate site control procedures must be implemented by the contractor to control exposure to hazardous substances during site remediation activities. The site control program may be modified as necessary as new information becomes available. Personnel will be cognizant of the work zones and follow appropriate the procedures described below.

##### **SITE WORK ZONES**

To prevent migration of hazardous materials or contamination caused by personnel or equipment, work areas and PPE are clearly specified by the contractor prior to beginning operations at the site. The Site will be protected using silt fence around the limits of construction. An Erosion and Sediment Control Plan has been prepared under separate cover. Designated work areas or zones will be established and delineated prior to the start of abatement activities and/or other activities anticipated that involve contact with hazardous or contaminated materials. Each work area containing potentially contaminated materials will be divided into three zones; an Exclusion Zone (EZ), a Contamination Reduction Zone (CRZ), and a Support Zone (SZ).

The arrangement of these zones for the Site is illustrated on the attached **Figure 2**. These zones may be adjusted in the field by the subcontractor with AECOM's approval. The EZ may be re-arranged in order to allow trucks delivering clean fill to enter the site for stockpiling without having to be decontaminated before leaving the Site.

##### **1.) Exclusion Zone**

The EZ consists of areas where exposure with contaminants is most likely. It is anticipated that the EZ will encompass the immediate confines of the work area with a buffer zone that will vary from location to location. The EZ boundary around each work area must be clearly and conspicuously marked using cyclone fencing, boundary tape or safety fencing and signs (or similar). A single entry and exit point will be established for the EZ. Entry will be limited to essential personnel or pre-approved visitors.

##### **2.) Contamination Reduction Zone**

The CRZ is established adjacent to EZ and prior to SZ. In this area, personnel begin the sequential decontamination process required to exit the EZ. To prevent off-site migration of contamination and to facilitate personnel accountability, personnel will enter and exit

the EZ through the CRZ. Prior to exiting the Site, the trucks will be driven through the designated wash area in the CRZ.

Waste materials generated in the CRZ are collected and effectively contained through the use of drums, bags, plastic sheeting, and/or tanks. Waste materials must be labeled as such and properly disposed of according to their hazard classifications. See Section 8 for decontamination procedures.

### **3.) Support Zone**

The SZ consists of a clearly marked area where the office, break areas, and changing facilities are located. Smoking, drinking, and eating are allowed only in designated areas. Sanitation facilities (toilets, drinking and washing water) are provided in the SZ.

## **ACCESS CONTROLS DURING OPERATIONS**

Personnel shall check in with the site safety officer (contractor in command) at the start of each work shift. At the end of the shift, personnel will check out with the contractor in command. A sign-in and sign-out system will be provided for workers and visitors. Expected work shifts are from 7 am to 6 pm, Monday through Friday. There will be physical boundaries that are established around the site during contaminated material excavation operations. Supervisors will instruct workers and visitors on the limits of the restricted areas. No one will be allowed to enter a restricted area without the required protective equipment for that area. Visitors should check in immediately upon arrival. Only authorized visitors will be allowed access to the contaminated areas. Each visitor will be required to provide and wear the necessary protective equipment during visits and will be escorted by supervisory personnel while on site. Visitors, subcontractors and other personnel will be required to sign a safety plan acknowledgment sheet to certify that they have read and will comply with this HASP. Failure to comply with the site entry procedure will result in expulsion from the site.

## **5. PERSONAL PROTECTIVE EQUIPMENT**

PPE has been selected to protect employees from the hazards and potential hazards they are likely to encounter as identified during the site characterization and analysis. The level of protection provided by PPE selection will be increased when additional information on site conditions shows that increased protection is necessary to reduce employee exposures below established or Permissible Exposure Limits (PELs).

### **PPE SELECTION AND ACTION LEVELS**

Minimum PPE will be at a **Level C** with respirators in the EZ areas where excavation activities will be conducted, and Level C with no respirators in the EZ areas where no excavation activities will be conducted. Minimum PPE requirements will be EPA Level D in the CRZ and the SZ as outlined in Table 6-1. If representative worker exposure air monitoring indicates airborne concentrations of contaminants below the PELs for known

contaminants, respiratory PPE may be downgraded, as described in Section 7 – “Personal Air Monitoring.”

If a previously unidentified material is discovered during work operations, PPE will be modified, if necessary, as determined by the on-site H&S representative or the Project Manager. **AECOM’s Luis Smith**, CIH will be consulted regarding any unidentified materials or situations which may impact the health and safety of site workers.

**Table 6-1 – Level D PPE Requirements**

Location	Tasks	EPA Level	Equipment Required
Exclusion Zones	Contaminated Soil Handling (areas with no excavation)	C	<ul style="list-style-type: none"> <li>• Hard hat</li> <li>• Protective Clothing</li> <li>• Hi-vis Safety vests</li> <li>• Rubber overboots</li> <li>• Nitrile gloves</li> <li>• Safety-toed boots</li> <li>• Ear plugs</li> <li>• Protective eye wear</li> </ul>
Exclusion Zones	Contaminated Soil Handling (areas with Excavation)	C	<ul style="list-style-type: none"> <li>• Half-face or full-face air-purifying respirator equipped with P100</li> <li>• Hard hat</li> <li>• Protective Clothing</li> <li>• Hi-vis Safety vests</li> <li>• Rubber overboots</li> <li>• Nitrile gloves</li> <li>• Safety-toed boots</li> <li>• Ear plugs</li> <li>• Protective eye wear</li> </ul>
Contamination Reduction Zone	All tasks	D	<ul style="list-style-type: none"> <li>• Hard hat</li> <li>• Protective Clothing</li> <li>• Nitrile gloves</li> <li>• Rubber overboots</li> <li>• Steel toed boots</li> <li>• Ear plugs</li> <li>• Protective eye wear</li> </ul>
Support Zone	All Tasks	D	<ul style="list-style-type: none"> <li>• Hard hat</li> <li>• Hi-vis Safety vests</li> <li>• Steel toed boots</li> <li>• Ear plugs</li> <li>• Protective eye wear</li> </ul>

Note that initially, half-face air purifying respirators equipped with High Efficiency Particulate Air (HEPA) filters (P100) will be utilized while workers are performing soil excavation and removal operations. Personal air monitoring results will be used to increase or remove the requirement of the use of respiratory protection during these operations.

Additionally, Level C protective apparel should consist of both outer and inner garments. The outer garments should consist of a zippered coverall with attached elastic sleeves, gloves, and rubber boots.

The coveralls, nitrile inner gloves, ear plugs, and respirator cartridges will be removed from service at the end of each workday or when damaged or no longer effective or usable. The safety-toed rubber boots, outer work gloves, hard hats, safety glasses, safety vests, and respirators will be decontaminated when leaving the EZ, and will be used for the duration of the project or until they are damaged or no longer effective or usable. Protective clothing removed from service will be placed in plastic trash bags for proper characterization and disposal.

The inner garments should consist of comfortable undershirts, under shorts/pants, and socks (i.e., standard work wear). Due to use of protective outer garments, the inner garments should not be exposed to site contaminants and, therefore, will be taken home by workers at the end of each work day.

Zippered coverall will be sufficient to protect workers from exposures to dust that may contain contaminated material. Please note that this is contingent upon the Contractor implementing appropriate dust control measures as detailed in this plan.

Workers in the SZ and workers performing site activities after contaminated soil disturbing activities have been completed and contact with the contaminated soil is not a concern (after at least 6" of clean soil has been placed over contaminated soils) will generally wear Level D PPE, as described in the aforementioned Table 6-1.

With the possible combination of ambient factors such as high air temperature, high relative humidity, low air movement, high radiant heat, and protective clothing, the potential for heat illness is of concern. All site workers will be provided adequate breaks in shaded areas and adequate drinking water will be available on Site. Additional details are provided below.

#### HEAT ILLNESS RELATED TO PPE SSE AND WEATHER CONDITIONS

Elevated body temperatures can cause serious injury or death. Working outdoors or in the sun may increase the chance of heat-related injuries. This hazard is especially critical when PPE (such as coveralls or rain gear) is worn, since heat from the body becomes trapped inside clothing. Personnel should drink plenty of liquids and take breaks as needed. The following describes the various **Heat Disorders and Health Effects**:

- **Heat Stroke:** This disorder occurs when the body's system of temperature regulation (e.g., sweating and evaporation) fails and body temperature rises to critical levels. The condition is caused by a combination of highly variable factors, and its occurrence is difficult to predict. Heat stroke is a serious hazard. Primary signs and symptoms are confusion, irrational behavior, loss of consciousness, convulsions, a lack of sweating (usually), hot, dry skin, and an abnormally high body temperature. If a worker shows signs of possible heat stroke, call 911 to obtain **immediate** medical assistance. The worker should be placed in a shady area, and his or her outer clothing should be removed. The worker's skin should also be wetted and air movement around the body increased to improve evaporative cooling until professional methods of cooling are initiated and the seriousness of the condition can be assessed. Fluids should be replaced as soon as possible--by mouth only if the worker is conscious. The medical outcome of an episode of heat stroke depends on the victim's physical fitness and the timing and effectiveness of first aid treatment. Regardless of the worker's protests, **no** employee suspected of being ill from heat stroke should be sent home or left unattended unless a physician has specifically approved such an order.
- **Heat Exhaustion:** The signs and symptoms of heat exhaustion include clammy skin, headache, nausea, vertigo, weakness, thirst, and giddiness. Fortunately, heat exhaustion responds readily to prompt treatment. For several reasons, this condition should not be dismissed lightly. One is that fainting associated with heat exhaustion can be dangerous because the victim may be operating machinery or controlling an operation that should not be left unattended. The victim could also be injured when he or she faints. While the signs and symptoms associated with heat exhaustion are similar to those of heat stroke, the notable difference (with heat exhaustion) is clammy skin. Workers suffering from heat exhaustion should be removed from hot environments and given fluid replacement, by mouth only if the workers are conscious. They should also be encouraged to get adequate rest.
- **Heat Rashes:** The most common problem occurring in hot work environments is heat rash. Prickly heat is manifested as red papules and usually appears in areas where the clothing is restrictive. As sweating increases, the papules give rise to a prickling sensation. Prickly heat occurs in skin that is persistently wetted by unevaporated sweat, and papules may become infected if they are not treated. In most cases, heat rash will disappear when the affected individual returns to a cool environment.
- **Heat Fatigue:** One factor that predisposes individuals to heat fatigue is the lack of acclimatization. Use of a program of acclimatization and training for work in hot environments are advisable. The signs and symptoms of heat fatigue include impaired performance of skilled sensorimotor, high-concentration, or high-vigilance activities. The sole treatment available for

heat fatigue is to remove heat stress and increase fluid replacement before a more serious heat-related condition develops.

In order to minimize the potential for heat stress and heat stroke, rest breaks will be taken by workers exposed to heat during Level C work activities and at work intervals shown in Table 6-2 below.

**Table 6-2 – Summary of Work/Rest Periods Based on Temperature (Level C)**

Work Environment Temperature (degrees F)	Work (minutes)	Rest (minutes)
75 to 80	120	15
80 to 85	90	15
85 to 90	60	15
90 to 95+	30	15

Workers will be encouraged to increase consumption of water and electrolyte-containing beverages such as Gatorade during warm weather. Site personnel will also be reminded to maintain proper hydration during non-working hours during warm weather.

**PPE LIMITATIONS**

The PPE selected for use at the site provides limited protection against chemical contaminants. Protective clothing must be worn in areas where splashing of hazardous liquids on the skin is possible.

Half face air-purifying respirators, or other air-purifying respirators, must not be worn in an oxygen deficient atmosphere or where contaminant concentrations exceed the capabilities of the respirator cartridge. Also, respirator cartridges must conform to the airborne contaminants present at the site. Always read the respirator cartridge prior to use to ensure that it is the correct type.

**PPE WORK DURATION**

Disposable protective clothing is to be disposed of after each use. Disposable protective clothing must be replaced upon re-entry into the EZ, or if the suit becomes damaged or saturated during use. Repairs to small rips may be made to protective clothing using duct tape.

**PPE MAINTENANCE AND STORAGE**

PPE, including over-boots and gloves, will be maintained in good condition. PPE found to be torn, cut, punctured, or otherwise damaged will be disposed of immediately. After use and decontamination, respirators will be stored overnight in a container.

## PPE TRAINING AND PROPER FITTING

Personnel will be thoroughly trained in the proper use and limitation of the equipment they are assigned to wear.

## PPE DONNING AND DOFFING PROCEDURES

PPE will be donned prior to entering the EZ, within the SZ. PPE will be worn in accordance with the manufacturer's recommendations. At no time will a person remove the designated PPE while in designated work zones. Disposable PPE will only be removed in the CRZ upon exiting the EZ. Personnel will utilize seating (during decontamination and doffing procedures) to prevent tripping and falling.

The PPE recommended will be donned in the following order: coveralls, steel toe boots, nitrile gloves, outer work gloves, rubber boots, eye goggles, respirator filter and a hard hat. The area around the ankles and wrists must be sealed using duct tape to prevent the possibility of exposure through the gloves and boots. The PPE will be doffed in the reverse order.

Both doffing and donning should be exercised using the buddy method; the second person will safeguard that all body parts are protected from the outside environment. The buddy should ensure that the fit is adequate, neither too tight nor too snug. In addition, this process should be conducted in a separate area inside the contamination reduction zone.

## PPE INSPECTION PROCEDURES

PPE will be inspected by employees prior to donning. Boots, gloves, and disposable clothing found to be defective will not be worn and will be disposed of. Defective respirators, safety glasses, and hard hats will be reported to the CIH.

## EVALUATION OF THE EFFECTIVENESS OF THE PPE PROGRAM

Periodic inspections and observations of personnel using PPE will be made by the CIH to ensure that the PPE Program elements are being followed.

## RESPIRATORY PROTECTION PROGRAM

This respiratory protection program provides the minimum requirements for respiratory protection whenever Level C or higher levels of personal protection are required.

## RESPIRATOR CARTRIDGES

The crew members working in Level C ensemble will wear half-face air purifying respirators equipped with P100 (HEPA) cartridges, depending on site conditions.

## CARTRIDGE CHANGES

Respirator cartridges will be removed and disposed of at the end of each workday. In addition, if workers notice odors, cartridges will be replaced. Cartridge changes will take place in the CRZ after decontamination of the exterior part of the PPE ensemble.

## RESPIRATOR INSPECTION, CLEANING AND STORAGE

Respirators will be maintained by the employee to whom they are assigned. Respirators and associated equipment will be inspected and cleaned, as necessary, prior to use and in compliance with the manufacturer's recommendations. Respirators will be decontaminated, cleaned, and disinfected by the user during each decontamination episode. Harsh detergents or solvents must not be used to clean respirators. Cleaned respirators must be thoroughly dried before storing. Respirators will be stored in a clean, dry container and out of direct sunlight. Respirators must also be stored in such a way that the face piece is not misshapen.

## RESPIRATOR USE WITH FACIAL HAIR

No personnel will be permitted to wear a respirator with facial hair that interferes with the respirator's sealing surface.

## RESPIRATOR USE WITH CORRECTIVE LENSES

Workers needing corrective lenses will be excluded from site activities requiring full-face respirators.

## MEDICAL CERTIFICATION FOR RESPIRATOR USE

Only workers who have been certified by a physician as being physically capable of respirator usage will be issued a respirator. See Section 9 for additional details.

## RESPIRATOR LIMITATIONS

The respirators specified for Site have their limitations. Respiratory protection specified in this Plan may not be worn in atmospheres that are immediately dangerous to life or health (IDLH), oxygen deficient (<19.5%), or in conditions where the contaminant exceeds the PEL in concentrations in excess of the assigned protection factor, (e.g., 10 x PEL = Half Face).

## **6. PERSONAL AIR SAMPLING PLAN**

Personal air sampling will be implemented to assess employee exposure concentrations to known contaminants in order to evaluate the appropriate PPE to be used by the

Contractor's employees while handling contaminated soils. AECOM has considered air sampling data from projects with similar scope and similar contaminant and contaminant levels for the development of the personal air sampling plan for Site.

AECOM will evaluate the required frequency and quantity of personal air samples to be collected based on our onsite observations of the performance of construction activities. Samples will be collected during activities and from workers that AECOM evaluates to be representative of a worst-case exposure risk scenario. We anticipate collecting daily samples for the first week of excavation activities and continuing daily samples until data indicates that the frequency may be reduced or monitoring may be discontinued. A minimum of five days of sampling for respirable dust and metals will be performed before potential downgrading of PPE will be evaluated.

AECOM will conduct personal air monitoring for the on-site employees (including subcontractors) with the highest potential for exposure to contaminants during construction activities. The subcontractor shall provide a list of all personnel along with the details of job descriptions to AECOM for an assessment, based on job description, of which employees will be monitored. These workers will be monitored for respirable dust and metals listed as COCs. AECOM will use the AIHA (American Industrial Hygiene Association) accredited laboratory, to provide the analysis for the personal sampling. NIOSH (National Institute for Occupation Safety and Health) Method 7303 will be used for the metal analysis and NIOSH method 0600 will be used for respirable dust.

AECOM will evaluate the required frequency and quantity of personal air samples to be collected based on our onsite observations of the performance of construction activities. Samples will be collected during activities and from workers that AECOM evaluates to be representative of a worst-case exposure risk scenario. We anticipate collecting daily samples for the first week of excavation activities and continuing daily samples until data indicates that the frequency may be reduced or monitoring may be discontinued. A minimum of three samples will be collected for respirable dust and metals before potential downgrading PPE will be evaluated.

Personal monitoring equipment will be selected by AECOM that is consistent with the applicable sampling methodology. AECOM will provide the necessary training for using the personnel monitoring equipment. Sample collection intake will be positioned to be in the breathing zone of the workers being sampled. The following equipment, or equivalent, will be used:

- SKC AirCheck 52, 0.005 to 5 liters per minute air sampling pump
- Respirable dust cyclone
- PVC filters, 5 micron, 37-mm for metal samples
- Pre-weighted 37-mm, 5 micron, 3-piece PV filters for dust samples
- Clips to secure pump and sampling media

Sample results will be submitted for 24-hour rush analysis so that potential downgrading of PPE can be evaluated as soon as possible. Results from the personal air sampling will be compared to levels described in Section 4 (see page 3).

## **7. DECONTAMINATION PROCEDURES**

Both personnel and equipment, including trucks and other heavy equipment, which enter the EZ, must be decontaminated in the CRZ prior to entering the SZ. The following sections outline the procedures for personnel and equipment decontamination.

### **PERSONNEL DECONTAMINATION PROCEDURES**

Employees leaving the EZ will be appropriately decontaminated. The Contractor shall provide an area with water and wash facilities within the CRZ for personnel decontamination. Contaminated clothing and equipment leaving a contaminated area will be appropriately disposed of or decontaminated. Surfaces shall be maintained as free as practicable of accumulations of impacted soil.

Waste, scrap, debris, bags, containers, PPE, and clothing contaminated with impacted soil and consigned for disposal shall be properly collected, characterized and disposed of in sealed impermeable bags or other closed, impermeable containers and properly labeled.

Workers will decontaminate their PPE by washing visible contamination using soap, water, and brushes, and then removing disposable clothing. Personnel will use the following decontamination procedure:

- Step 1: Hard hat removal
- Step 2: Boot and coverall wash
- Step 3: Boot and coverall rinse
- Step 4: Tape removal
- Step 5: Over-boot removal
- Step 6: Suit removal
- Step 7: Respirator removal (as necessary)
- Step 8: Respirator cartridge removal (as necessary)
- Step 9: Wash hands and face

Disposable protective clothing will be disposed of in a lidded container lined with a labeled drum liner. Waste generated at the site will be disposed of according to the hazard classification of the debris.

### **EQUIPMENT DECONTAMINATION PROCEDURES**

Upon exiting from the EZ, equipment, including heavy equipment and trucks, shall be properly decontaminated. The Contractor shall construct a decontamination system which shall include, at a minimum, an impervious liner with a berm to collect wash water

from cleaning activities. The contaminated water may also be collected in a tank. The containment system details is provided as Figure 3 (attached) included in **Appendix A**. Decontamination shall include applying a scrub brush on the wheels and side of the equipment, employing a commercial cleansing agent such as Alconox Detergent 8 and then pressure cleaning.

The resultant wash will then be sampled and analyzed by the Contractor for COCs then pumped into appropriate storage containers (i.e., 55 gallon drums, totes, or frac tanks) situated on site until the test results have returned. Based on analytical results, the wash will be disposed of by the Contractor, in accordance with state, local and federal regulations or at a Publicly Owned Treatment Works (POTW), if approved by the local regulators.

The site remediation activities at the Site will be planned to minimize the potential for trucks incoming with clean fill to come in contact with the contaminated soils inclusive of in-situ soils with surficial contamination. In order to minimize the decontamination activities, AECOM will advise the subcontractor to keep the utilized heavy equipment in the EZ for the duration of the site remediation activities.

## LOCATION AND LAYOUT OF DECONTAMINATION FACILITIES

Employee decontamination will be performed at the edge of each EZ, in the CRZ, adjacent to the SZ. This location will minimize the exposure of uncontaminated employees, areas, and equipment to contaminated employees or equipment. The decontamination facility will be arranged in such a way that personnel must exit the EZ only through the CRZ. Equipment decontamination facilities will be also established at locations within the staging areas. All trucks exiting the Site shall be routed through the truck wash near the exit entrance.

## EMPLOYEE WASH FACILITIES

After employees exit the CRZ (where they have decontaminated and removed their PPE), they will proceed to a wash facility to wash hands and face prior to eating, drinking, smoking, or leaving the site. Disposable towels will be provided for drying.

## STORAGE AND DISPOSAL OF DECONTAMINATION WATER

Water used for decontamination will be contained and stored in storage tanks or drums. Decontamination water will be sampled for the contaminants-of-concern so that a proper disposal plan can be devised. Hazardous substances and contaminated soils, liquids, and other residues will be handled, transported, labeled, and disposed of in accordance with the OSHA lead standard by the Contractor.

## LABELING OF CONTAMINATED PPE

The Contractor will comply with the OSHA lead standard, 29 CFR 1926.62(g)(2)(vii)(A). The Contractor shall ensure that the containers of contaminated protective clothing and equipment required by paragraph (g)(2)(v) of this section are labeled as follows:

DANGER: CLOTHING AND EQUIPMENT CONTAMINATED WITH LEAD. MAY DAMAGE FERTILITY OR AN UNBORN CHILD. CAUSES DAMAGE TO THE CENTRAL NERVOUS SYSTEM. DO NOT EAT, DRINK OR SMOKE WHEN HANDLING. DO NOT REMOVE DUST BY BLOWING OR SHAKING. DISPOSE OF LEAD CONTAMINATED WASH WATER IN ACCORDANCE WITH APPLICABLE LOCAL, STATE, OR FEDERAL REGULATIONS.

## **8. TRAINING AND MEDICAL REQUIREMENTS**

Workers must complete training and receive medical clearance to work at **Site**, as described in the following sections.

### OSHA TRAINING

AECOM recommends that workers that will perform work within the EZ receive OSHA 40 hour Hazardous Waste Operator Training (HAZWOPER) in accordance with 29 CFR § 1920.120.

Certificate of completion of OSHA HAZWOPER training for AECOM's employee working within the EZ are attached in **Appendix D**. OSHA HAZWOPER training certificate for each of the Contractor's or subcontractor's employees will be included with Contractor's or subcontractor's HASP.

### MEDICAL CLEARANCE

Contractor employees required to wear a respirator, in accordance with the requirements of this HASP, must have a written statement from a licensed physician stating they have had a medical examination which meets the requirements 29 CFR § 1926.62. This examination must include pulmonary function testing as well as certification by the physician of the employee's ability to wear a negative-pressure respirator and perform strenuous work. Documentation of medical clearance statements for each of the Contractor's applicable employees shall be attached to the site-specific HASP in **Appendix D**.

If a person sustains an injury or contracts an illness related to work on Site that results in lost work time, he/she must obtain written approval from a physician to regain access to the Site.

### RESPIRATOR FIT TEST

Annual qualitative respirator fit tests are required of personnel wearing negative pressure respirators. Qualitative fit tests will utilize Bitrex, isoamyl acetate or irritant smoke. Fit tests must incorporate the make and size of respirator to be used. Additionally, a positive and negative fit check will be conducted each time a respirator is donned.

Documentation of qualitative fit testing for each of the Contractor's applicable employees shall be included in **Appendix D**.

## **9. EMERGENCY PROCEDURES**

This emergency response plan explains how to handle anticipated emergencies prior to the commencement of the work applicable to this HASP.

### **EMERGENCY PROCEDURES**

Employees may respond to low danger emergencies, such as administration of first aid, fighting small fires (with fire extinguishers), and clean-ups of small chemical spills (of less than 55 gallons or 500 pounds). Employees will evacuate from the danger area when an emergency not listed above occurs and will not assist in handling the emergency. Should outside medical or other emergency assistance be required, personnel will notify the Contractor in command of the nature of the emergency and a call will be made to 911, (or equivalent emergency response). If the injury or illness appears to be relatively minor, the affected person or persons may be driven to the emergency room of the nearest hospital.

### **PLACES OF REFUGE**

Personnel, when alerted during emergencies, will exit the EZ through the CRZ and muster in the SZ (upwind of the event). Personnel are to remain in the staging area and await further instructions.

### **IDENTIFICATION OF NEAREST MEDICAL ASSISTANCE**

#### **In an emergency, call 911**

The Hospital Location Map for **Site** is provided as **Figure 4**, included in **Appendix A**. A Hospital Location Map will be available at the Site during remediation activities.

### **STATUS AND CAPABILITIES OF EMERGENCY RESPONSE PROVIDERS**

Local emergency responders (fire department, medical providers and transporters) are on full time alert and have the capabilities to respond to any anticipated site emergency.

### **PRE-EMERGENCY PLANNING**

The types of emergencies anticipated include personal injuries, fire, and small chemical spills. An OSHA-approved first aid kit will be made available at the site. A charged and inspected fire extinguisher will be available on each piece of equipment. Spill containment equipment will be made available if hazardous materials are stored on site.

## PERSONNEL ROLES, LINES OF AUTHORITY, AND COMMUNICATION

In the event of an emergency, personnel will follow the directions of the incident commander in charge that will coordinate and direct emergency response procedures to site personnel. An emergency will be communicated to persons on site using verbal communications.

## EMERGENCY RECOGNITION AND PREVENTION

Site personnel will be trained to recognize when an emergency situation has arisen and will know how to notify the commanding Contractor of the incident. Site personnel will use safe work practices to minimize the potential for an incident. Regular safety meeting will be held to identify and communicate problem areas at the site.

## SITE SECURITY AND CONTROL

During an emergency situation, personnel are responsible for assuring the public's safety and will keep bystanders and unauthorized personnel from entering the site. At no time will personnel give statements regarding an emergency to persons not associated with emergency response or management.

## DECONTAMINATION OF INJURED WORKERS

Decontamination procedures for injured workers may be limited to removal of outer coveralls and boots so long as such action will not aggravate the injury. If the injury is minor, and does not require immediate medical attention, workers may decontaminate as usual. The hospital will be capable of treating potentially contaminated workers as well.

## ACCIDENT REPORTING AND FOLLOW-UP

In the event of any work-related injury or illness, AECOM employees should contact the Safety Manager and the AECOM Occupational Health Manager to report the incident and to begin the Workers' Compensation claims process, in accordance with SMS 065, Injury Management. A copy of URS SMS 065 is included in **Appendix C**. All other employees should follow their own procedures.

## EMERGENCY EQUIPMENT LIST

Each work area will be equipped with the following equipment:

- Cellular phone
- First aid kit
- Eye wash
- Fire extinguisher
- Drinking water
- Extra set of PPE

INTENTIONALLY LEFT BLANK

**APPENDIX A**  
**FIGURES**



TERRA CONSULTING GROUP, INC.  
PHONE: 3051-210-9229  
WWW.TERRACONSULTING.COM

**SITE VICINITY MAP**

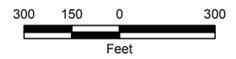
Florida Power & Light Company  
Former Cutler Power Plant Property  
HWR-442/Flie-16360/W-79  
Miami, Florida

**LEGEND:**

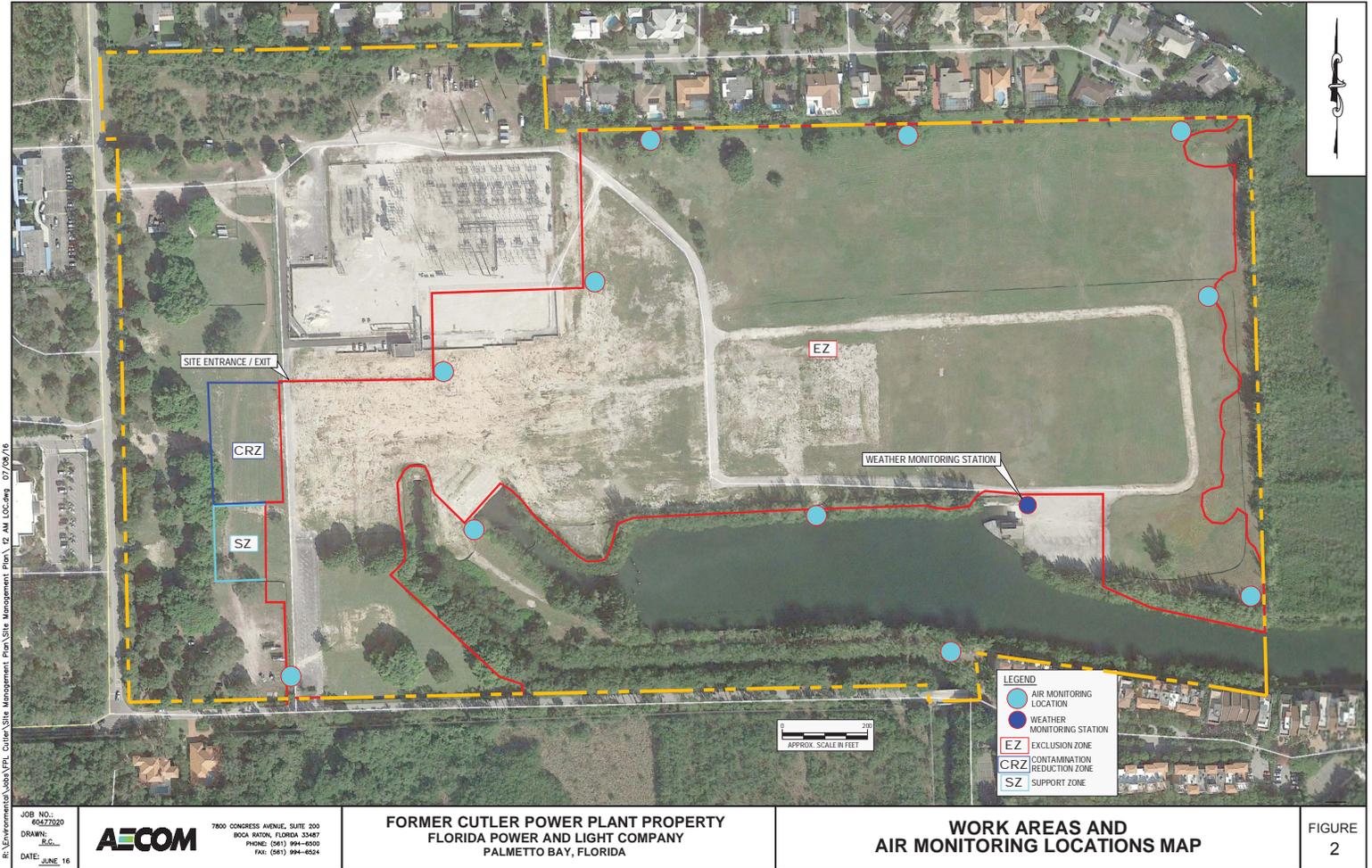


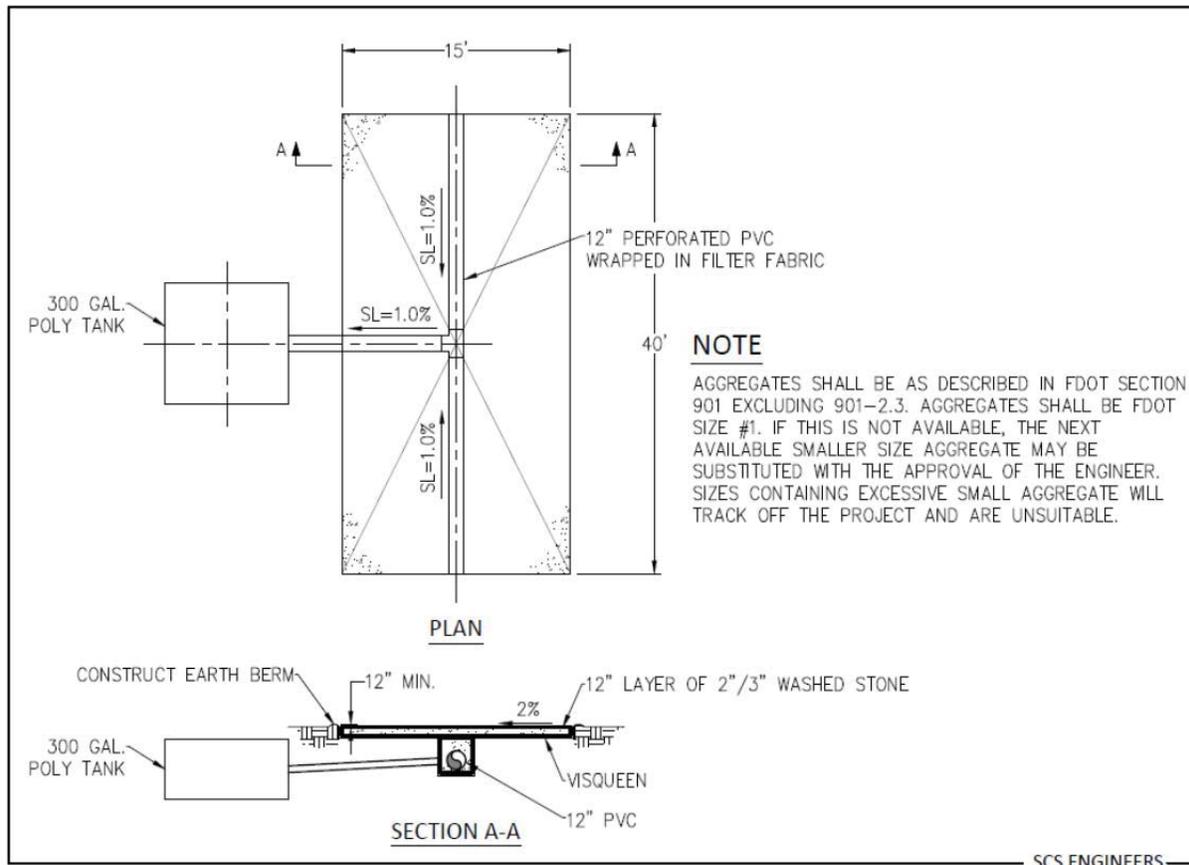
FORMER PLANT PROPERTY BOUNDARY

**SCALE:**



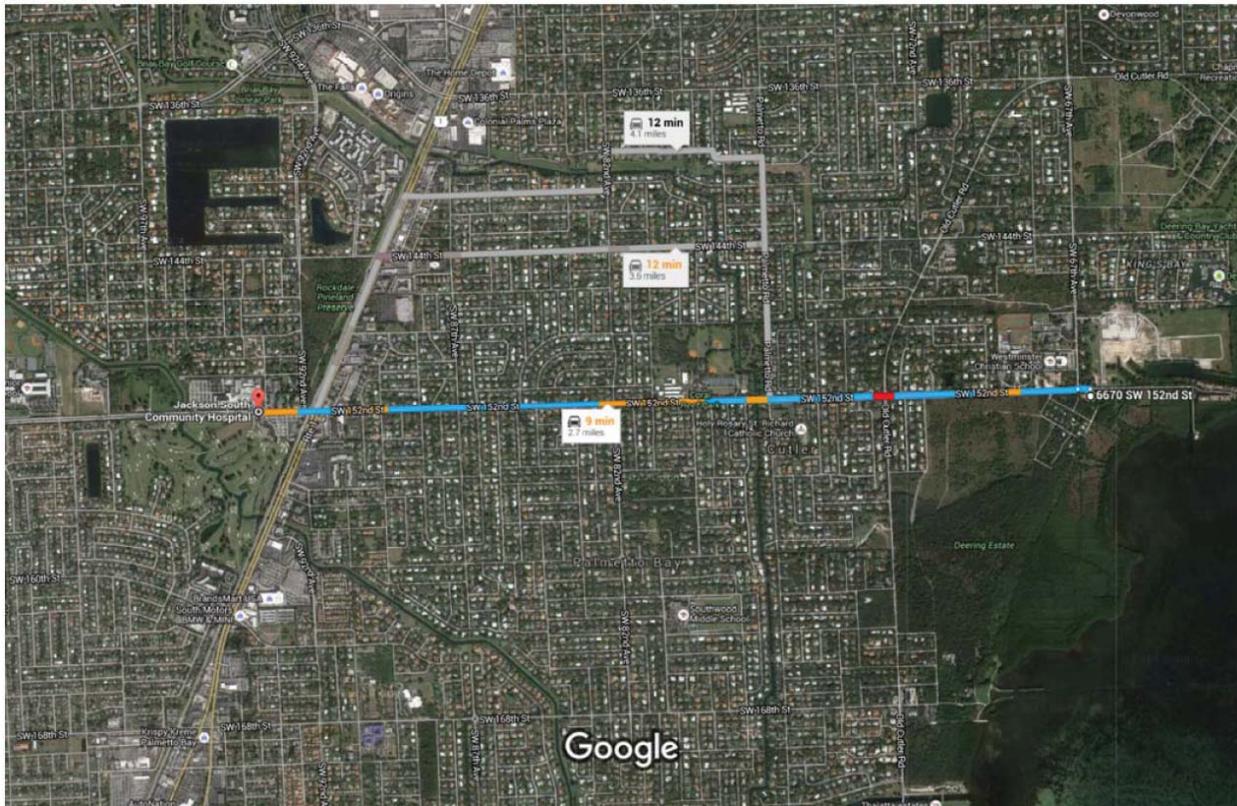
**FIGURE 1**





**FIGURE 3 – Equipment Decontamination and Containment System  
 (Provided by SCS Engineers)**

**Jackson South Community Hospital**  
9333 Southwest 152<sup>nd</sup> Street, Miami, FL 33157  
(305) 251-2500



- Head West on SW 152<sup>nd</sup> Street
- Hospital will be on right

Figure 4

## **APPENDIX B**

### **NIOSH Sheets**

- Arsenic
- Dust
- Vanadium



## Search the NIOSH Pocket Guide

Enter search terms separated by spaces.

# Arsenic (organic compounds, as As)

**Synonyms & Trade Names** Synonyms vary depending upon the specific organic arsenic compound.

<b>CAS No.</b>	<b>RTECS No.</b>	<b>DOT ID &amp; Guide</b>
	<b>Conversion</b>	<b>IDLH</b> N.D. See: <a href="/niosh/idlh/intridl4.html">IDLH INDEX (/niosh/idlh/intridl4.html)</a>

**Exposure Limits** NIOSH

**REL** : none  
**OSHA PEL** : TWA 0.5 mg/m<sup>3</sup>

**Measurement Methods**

**NIOSH 5022**  (</niosh/docs/2003-154/pdfs/5022.pdf>)  
See: [NMAM \(/niosh/docs/2003-154/\)](/niosh/docs/2003-154/) or [OSHA Methods \(http://www.osha.gov/dts/sltc/methods/index.html\)](http://www.osha.gov/dts/sltc/methods/index.html)   
<http://www.cdc.gov/Other/disclaimer.html>

**Physical Description** Appearance and odor vary depending upon the specific organic arsenic compound.

Properties vary depending upon the specific organic arsenic compound.

**Incompatibilities & Reactivities** Varies

**Exposure Routes** inhalation, ingestion, skin and/or eye contact

**Symptoms** In animals: irritation skin, possible dermatitis; resp distress; diarrhea; kidney damage; muscle tremor, convulsions; possible gastrointestinal tract, reproductive effects; possible liver damage

**Target Organs** Skin, respiratory system, kidneys, central nervous system, liver, gastrointestinal tract, reproductive system

**Personal Protection/Sanitation** (See [protection codes \(protect.html\)](protect.html))  
Recommendations regarding personal protective clothing vary

**First Aid** (See [procedures \(firstaid.html\)](firstaid.html))  
**Eye:** Irrigate immediately  
**Skin:** Soap wash immediately

depending upon the specific compound.  
 Recommendations regarding eye protection vary depending upon the specific compound.  
 Recommendations regarding washing the skin vary depending upon the specific compound.  
 Recommendations regarding the removal of personal protective clothing that becomes wet or contaminated vary depending upon the specific compound.  
 Recommendations regarding the daily changing of personal protective clothing vary depending upon the specific compound.  
 Recommendations regarding the need for eyewash or quick drench facilities vary depending upon the specific compound.

**Breathing:** Respiratory support  
**Swallow:** Medical attention immediately

**Respirator Recommendations**

Not available.

[Important additional information about respirator selection \(pgintrod.html#mustread\)](#)

See also: [INTRODUCTION \(/niosh/npg/pgintrod.html\)](#)

Page last reviewed: April 4, 2011

Page last updated: February 13, 2015

Content source: [National Institute for Occupational Safety and Health \(NIOSH\)](#) Education and Information Division

Centers for Disease Control and Prevention 1600 Clifton Road Atlanta, GA  
 30329-4027, USA  
 800-CDC-INFO (800-232-4636) TTY: (888) 232-6348 - [Contact CDC-INFO](#)





## Search the NIOSH Pocket Guide

Enter search terms separated by spaces.

# Particulates not otherwise regulated

**Synonyms & Trade Names** "Inert" dusts, Nuisance dusts, PNOR [Note: Includes all inert or nuisance dusts, whether mineral, inorganic, not listed specifically in 1910.1000.]

CAS No.	RTECS No.	DOT ID & Guide
	<b>Conversion</b>	<b>IDLH</b> N.D. See: <a href="/niosh/idlh/intridl4.html">IDLH INDEX (/niosh/idlh/intridl4.html)</a>

### Exposure Limits

**NIOSH REL** : See Appendix D (<nengapdx.html>)

**OSHA PEL** : TWA 15 mg/m<sup>3</sup>  
(total) TWA 5 mg/m<sup>3</sup> (resp)

### Measurement Methods

**NIOSH 0500** (</niosh/docs/2003-154/pdfs/0500.pdf>),

**0600** (</niosh/docs/2003-154/pdfs/0600.pdf>)

See: [NMAM \(/niosh/docs/2003-154/\)](/niosh/docs/2003-154/) or [OSHA Methods \(http://www.osha.gov/dts/sltc/methods/index.html\)](http://www.osha.gov/dts/sltc/methods/index.html)

(<http://www.cdc.gov/Other/disclaimer.html>)

**Physical Description** Dusts from solid substances without specific occupational exposure standards.

Properties vary depending upon the specific solid.

**Incompatibilities & Reactivities** Varies

**Exposure Routes** inhalation, skin and/or eye contact

**Symptoms** irritation eyes, skin, throat, upper respiratory system

**Target Organs** Eyes, skin, respiratory system

**Personal Protection/Sanitation** (See [protection codes \(protect.html\)](protect.html))

**Skin:** No recommendation

**Eyes:** No recommendation

**Wash skin:** No

**First Aid** (See [procedures \(firstaid.html\)](firstaid.html))

**Eye:** Irrigate immediately

**Breathing:** Fresh air

recommendation <b>Remove:</b> No recommendation <b>Change:</b> No recommendation	
--	--

**Respirator Recommendations**

Not available.

[Important additional information about respirator selection \(pgintrod.html#mustread\)](#)

See also: [INTRODUCTION \(/niosh/npg/pgintrod.html\)](#)

---

Page last reviewed: April 4, 2011

Page last updated: February 13, 2015

Content source: [National Institute for Occupational Safety and Health \(NIOSH\)](#) Education and Information Division

---

Centers for Disease Control and Prevention 1600 Clifton Road Atlanta, GA  
30329-4027, USA  
800-CDC-INFO (800-232-4636) TTY: (888) 232-6348 - [Contact CDC-INFO](#)





## Search the NIOSH Pocket Guide

Enter search terms separated by spaces.

Vanadium dust						
<p><b>Synonyms &amp; Trade Names</b> Divanadium pentoxide dust, Vanadic anhydride dust, Vanadium oxide dust, Vanadium pentaoxide dust Other synonyms vary depending upon the specific vanadium compound.</p>						
<p><b>CAS No.</b> 1314-62-1</p>		<p><b>RTECS No.</b> YW2450000 (<a href="http://niosh-rtecs/YW256250.html">/niosh-rtecs/YW256250.html</a>)</p>		<p><b>DOT ID &amp; Guide</b> 2862 151 (<a href="http://www.wapps.tc.gc.ca/saf-sec-sur/3/erg-gmu/erg/guidepage.aspx/guide151/">http://www.wapps.tc.gc.ca/saf-sec-sur/3/erg-gmu/erg/guidepage.aspx/guide151/</a>)  (<a href="http://www.cdc.gov/Other/disclaimer.html">http://www.cdc.gov/Other/disclaimer.html</a>)</p>		
<p><b>Formula</b> V<sub>2</sub>O<sub>5</sub></p>		<p><b>Conversion</b></p>		<p><b>IDLH</b> 35 mg/m<sup>3</sup> (as V) See: <a href="http://niosh/idlh/vandust.html">vandust (/niosh/idlh/vandust.html)</a></p>		
<p><b>Exposure Limits</b> <b>NIOSH REL</b> *: C 0.05 mg V/m<sup>3</sup> [15-minute] [*Note: The REL applies to all vanadium compounds except Vanadium metal and Vanadium carbide (see Ferrovanadium dust).] <b>OSHA PEL</b> † (<a href="http://nengapdxg.html">nengapdxg.html</a>): C 0.5 mg V<sub>2</sub>O<sub>5</sub>/m<sup>3</sup> (resp)</p>			<p><b>Measurement Methods</b> <b>NIOSH</b> 7300  (<a href="http://niosh/docs/2003-154/pdfs/7300.pdf">/niosh/docs/2003-154/pdfs/7300.pdf</a>), 7301  (<a href="http://niosh/docs/2003-154/pdfs/7301.pdf">/niosh/docs/2003-154/pdfs/7301.pdf</a>), 7303  (<a href="http://niosh/docs/2003-154/pdfs/7303.pdf">/niosh/docs/2003-154/pdfs/7303.pdf</a>), 7504  (<a href="http://niosh/docs/2003-154/pdfs/7504.pdf">/niosh/docs/2003-154/pdfs/7504.pdf</a>), 9102  (<a href="http://niosh/docs/2003-154/pdfs/9102.pdf">/niosh/docs/2003-154/pdfs/9102.pdf</a>); <b>OSHA ID185</b> (<a href="http://www.osha.gov/dts/sltc/methods/inorganic/id185/id185.html">http://www.osha.gov/dts/sltc/methods/inorganic/id185/id185.html</a>)  (<a href="http://www.cdc.gov/Other/disclaimer.html">http://www.cdc.gov/Other/disclaimer.html</a>) See: <b>NMAM</b> (<a href="http://niosh/docs/2003-154/">/niosh/docs/2003-154/</a>) or <b>OSHA Methods</b> (<a href="http://www.osha.gov/dts/sltc/methods/index.html">http://www.osha.gov/dts/sltc/methods/index.html</a>)  (<a href="http://www.cdc.gov/Other/disclaimer.html">http://www.cdc.gov/Other/disclaimer.html</a>)</p>			
<p><b>Physical Description</b> Yellow-orange powder or dark-gray, odorless flakes dispersed in air.</p>						
<p><b>MW:</b> 181.9</p>	<p><b>BP:</b> 3182°F (Decomposes)</p>	<p><b>MLT:</b> 1274°F</p>	<p><b>Sol:</b> 0.8%</p>	<p><b>VP:</b> 0 mmHg (approx)</p>		<p><b>IP:</b> NA</p>
<p><b>Sp.Gr:</b> 3.36</p>	<p><b>FLP:</b> NA</p>	<p><b>UEL:</b> NA</p>	<p><b>LEL:</b> NA</p>			
<p>Noncombustible Solid, but may increase intensity of fire when in contact with combustible materials.</p>						
<p><b>Incompatibilities &amp; Reactivities</b> Lithium, chlorine trifluoride</p>						
<p><b>Exposure Routes</b> inhalation, ingestion, skin and/or eye contact</p>						
<p><b>Symptoms</b> irritation eyes, skin, throat; green tongue, metallic taste, eczema; cough; fine rales, wheezing, bronchitis, dyspnea (breathing difficulty)</p>						
<p><b>Target Organs</b> Eyes, skin, respiratory system</p>						
<p><b>Personal Protection/Sanitation</b> (See <a href="http://protect.html">protection codes (protect.html)</a>) <b>Skin:</b> Prevent skin contact <b>Eyes:</b> Prevent eye contact <b>Wash skin:</b> When contaminated <b>Remove:</b> When wet or contaminated <b>Change:</b> No recommendation</p>			<p><b>First Aid</b> (See <a href="http://firstaid.html">procedures (firstaid.html)</a>) <b>Eye:</b> Irrigate immediately <b>Skin:</b> Soap wash promptly <b>Breathing:</b> Respiratory support <b>Swallow:</b> Medical attention immediately</p>			

**Respirator Recommendations**

NIOSH (as V)

**Up to 0.5 mg/m<sup>3</sup>:**

(APF = 10) Any air-purifying respirator with an N100, R100, or P100 filter (including N100, R100, and P100 filtering facepieces) except quarter-mask respirators.

[Click here \(pgintrod.html#nrp\)](#) for information on selection of N, R, or P filters.\*

(APF = 10) Any supplied-air respirator\*

**Up to 1.25 mg/m<sup>3</sup>:**

(APF = 25) Any supplied-air respirator operated in a continuous-flow mode\*

(APF = 25) Any powered, air-purifying respirator with a high-efficiency particulate filter.\*

**Up to 2.5 mg/m<sup>3</sup>:**

(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter.

[Click here \(pgintrod.html#nrp\)](#) for information on selection of N, R, or P filters.

(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter.\*

(APF = 50) Any self-contained breathing apparatus with a full facepiece

(APF = 50) Any supplied-air respirator with a full facepiece

**Up to 35 mg/m<sup>3</sup>:**

(APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

**Emergency or planned entry into unknown concentrations or IDLH conditions:**

(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

**Escape:**

(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter.

[Click here \(pgintrod.html#nrp\)](#) for information on selection of N, R, or P filters.

Any appropriate escape-type, self-contained breathing apparatus

[Important additional information about respirator selection \(pgintrod.html#mustread\)](#)

See also: [INTRODUCTION \(/niosh/npg/pgintrod.html\)](#) See [MEDICAL TESTS: 0240 \(/niosh/docs/2005-110/nmedo240.html\)](#)

Page last reviewed: April 4, 2011

Page last updated: February 13, 2015

Content source: [National Institute for Occupational Safety and Health \(NIOSH\)](#) Education and Information Division

Centers for Disease Control and Prevention 1600 Clifton Road Atlanta, GA 30329-4027, USA  
800-CDC-INFO (800-232-4636) TTY: (888) 232-6348 - [Contact CDC-INFO](#)



**APPENDIXD**

**TRAINING CERTIFICATES, MEDICAL CLEARANCES, AND FIT  
TESTING DOCUMENTATION**

*(This information will be provided prior to the commencement of construction activities)*

## **APPENDIX C**

### **URS' Safety Management Standards**

- 014 – Fire Protection and Prevention**
- 018 – Heat Stress**
- 019 – Heavy Equipment Operations**
- 021 – Housekeeping**
- 026 – Noise and Hearing Conservation**
- 042 – Respiratory Protection**
- 043 – Personal Monitoring (Industrial Hygiene)**
- 064 – Hand Safety**
- 065 – Injury and Claim Management**
- 069 – Manual Materials Handling**

# **URS SAFETY MANAGEMENT STANDARD**

## **Fire Protection and Prevention**

---

### **1. Applicability**

This standard applies to URS Corporation and its subsidiary companies.

### **2. Purpose and Scope**

The purpose of this standard is to reduce/eliminate potential fire hazards in the workplace and to provide for a rapid, effective response should a fire occur.

### **3. Implementation**

Implementation of this standard is the responsibility of the URS manager directing activities of the facility, site, or project location. At project sites controlled by contractors or building owners, some of these responsibilities may be covered by building/facility owners or owner agents.

### **4. Requirements**

#### **A. Fire Protection**

1. A fire protection program will be developed and followed throughout all phases of work.
  - a. Access to available firefighting equipment will be maintained at all times.
  - b. Firefighting equipment will be inspected monthly and maintained in operating condition. Defective equipment will be immediately replaced.
  - c. Fire extinguishers that out of service or discharged will be immediately tagged, removed from service, and replaced.
  - d. Firefighting equipment will be conspicuously located and not obstructed from view in the workplace.
  - e. Where and when required or necessary, the project manager will provide a trained and equipped firefighting organization (fire brigade) to assure adequate protection.
2. A temporary or permanent water supply (sufficient volume, duration, and pressure) required to properly operate the firefighting equipment will be made available as soon as combustible materials accumulate.

**URS SAFETY MANAGEMENT STANDARD**  
**Fire Protection and Prevention**

---

- a. Where underground water mains are to be provided, they will be installed, completed, and made available for use as soon as practicable.
- b. Fire Hose and Connections
  - i. One hundred feet, or less, of 1.5-inch (3.75-cm) hose, with a nozzle capable of discharging water at 25 gallons (95 liters) or more per minute, may be substituted for a fire extinguisher rated not more than 2A 20BC in the designated area, provided the hose line can reach all points in the area.
  - ii. If fire hose connections are not compatible with local firefighting equipment, the project manager will provide adapters or equivalent to permit connections.
  - iii. During demolition involving combustible materials, charged hose lines supplied by hydrants, water trucks with pumps, or equivalent will be made available.
- c. Fixed Firefighting Equipment
  - i. Sprinkler Protection
    - Where URS is involved in the construction of a facility in which automatic sprinkler protection is required, the installation of the sprinklers will closely follow the construction, and sprinklers will be placed into service as soon as practicable.
    - Where URS is involved in the demolition or alteration of a facility, existing automatic sprinkler installations should be retained in service as long as reasonable. Only authorized persons will permit the operation of sprinkler control valves. Modification of sprinkler systems to permit alterations or additional demolition should be expedited so that the automatic protection may be returned to service as quickly as possible. Sprinkler control valves will be checked daily, at the close of work/business, to ascertain that the protection is in service.

**URS SAFETY MANAGEMENT STANDARD**  
**Fire Protection and Prevention**

---

ii. Standpipes

In all structures requiring standpipes or where standpipes exist in structures being altered, they will be maintained to always be ready for fire protection use. Conspicuously marked standpipes will be provided with connections on the outside of the structure (at the street level). Each floor will be equipped with at least one standard hose outlet.

iii. Fire Alarm Devices

- An alarm system (e.g., telephone system, siren) will be established to alert both the employees on the site and the local fire department of an emergency.
- The alarm code and reporting instructions will be conspicuously posted at phones and at all employee entrances.

iv. Fire Cutoffs

- In new construction, firewalls and exit stairways required for the completed buildings will be given construction priority. Fire doors, with automatic closing devices, will be hung on openings as soon as practicable.
- Fire cutoffs will be retained in buildings undergoing alterations or demolition until operations necessitate their removal.

d. Jobsite Requirements

- i. Material storage areas will be equipped with fire extinguishers adequate for their size, construction, and the material stored therein.
- ii. Welding, cutting, grinding, and burning will not be done within 25 feet (7.6 meters) of any material fuel storage area. Fire extinguishers will be provided at the site of welding operations.

## **URS SAFETY MANAGEMENT STANDARD**

### **Fire Protection and Prevention**

---

- iii. Flammable materials will be stored as far as possible from the working area, at least 25 feet (7.6 meters). Safety cans will be used when handling and transporting fuel, gas, and other flammables.
- iv. Extinguishers are to be adequately maintained.
- v. The telephone number of the nearest organized firefighting group is to be displayed at jobsite telephones.

#### 3. Fire Extinguishing Equipment

##### a. Extinguisher Requirements

Use only UL-listed extinguishers. Mark extinguishers and extinguisher locations, indicating the suitability of each extinguisher for a particular classification of fire.

##### b. Building and Occupancy Hazard Protection

Requirements for fire extinguisher protection are divided into two categories: building protection and occupancy hazard protection. Provide for extinguishing equipment to protect both the building structure (if it is combustible) and the occupancy hazards inside it.

- i. For building protection, provide fire extinguishers rated for Class A fires or greater, as required by applicable building codes.
- ii. For protection against occupancy hazards, provide fire extinguishers rated for Class A, B, C, or other fire potential as appropriate. Requirements may vary from section to section within a single building. Determine the occupancy hazards, as well as the proper ratings of necessary fire extinguishers, of each room or section. Classify rooms or sections as light hazard, ordinary hazard, or extra hazard. See Supplemental Information B for additional details and assistance in determining extinguisher requirements.

##### c. Extinguisher Placement

**URS SAFETY MANAGEMENT STANDARD**  
**Fire Protection and Prevention**

---

- i. Place extinguishers in conspicuous locations, along normal paths of travel, and near exits. If the extinguishers are not readily visible, use wall markings, signs, or lights to identify their locations.
- ii. Ensure that extinguishers are readily accessible. Keep the space in front of and below extinguishers clear at all times. The floor area beneath extinguishers may be marked as a reminder to keep the area clear.
- iii. Hang extinguishers on hangers, brackets, or other equipment furnished by the manufacturer, or place them on shelves. If an extinguisher weighs less than 40 pounds (18.1 kg), the top of the extinguisher will not be more than 5 feet (1.5 meters) above the floor. If an extinguisher weighs equal to or more than 40 pounds (18.1 kg), it will not be more than 3.5 feet (1.1 meters) above the floor. The clearance between the bottom of the extinguisher and the floor will never be less than 4 inches (10.2 cm).
- iv. Provide the appropriate number and types of fire extinguishers for operations being performed. Refer to Supplemental Information A for guidance.

d. Inspection

Properly trained personnel will inspect extinguishers at least monthly. The monthly inspection will include the following items at a minimum:

- i. Location.
- ii. Rating.
- iii. Access.
- iv. Visibility.
- v. Operating instructions.
- vi. Seals.
- vii. Tamper indicators.

**URS SAFETY MANAGEMENT STANDARD**  
**Fire Protection and Prevention**

---

viii. Fullness.

ix. Physical condition.

Attach inspection tags to each extinguisher indicating the dates of purchase, inspection, testing, and recharging, and the initials of the inspector. In addition to the tag, a colored tape may be used to indicate that an extinguisher has been inspected.

Fire extinguishers must be inspected annually by a qualified fire services contactor.

e. Testing and Maintenance

- i. Establish periodic testing programs to ensure that extinguishers are in proper operating condition. Only properly trained personnel (preferably fire extinguisher vendors) should maintain extinguishers.
- ii. At the conclusion of testing or maintenance work, attach a tag to the extinguisher showing the date and the signature of the person who performed the service.

f. Testing Intervals

- i. Each year, recharge soda acid and foam extinguishers, and weigh others according to the manufacturer's instructions. Inspect the body, hose, and nozzle of the extinguisher, and examine the dry powder. Note: Testing is not necessary for stored pressure units unless a loss of pressure or other conditions indicates a need; however, units mounted in vehicles or otherwise subject to mechanical packing should have their powder examined.
- ii. Every five years, test the pressure parts of all extinguishers except Halon 1301 extinguishers; dry chemical extinguishers with braised-brass, mild steel, or aluminum shells; and dry-powder extinguishers for metal fires.

**URS SAFETY MANAGEMENT STANDARD**  
**Fire Protection and Prevention**

---

- iii. Every six years, empty dry-chemical, stored-pressure extinguishers and examine working parts for operability.
- iv. Every 12 years, test the pressure parts of Halon 1301 extinguishers; dry-chemical extinguishers with braised-brass, mild steel, and aluminum shells; and dry-powder extinguishers for metal fires.

g. Employee Training

- i. Where fire extinguishers are provided for employee use, training will be provided on general principles of portable fire extinguishers, including stages of fires and classes of fire extinguisher. The emphasis should be on hazards of fighting a fire during the initial phases of a fire.
- ii. Personnel designated to use firefighting as part of a site Emergency Action Plan must have training in the use of appropriate equipment. Training must be conducted prior to initial assignment and annually thereafter or whenever there is a change in the Emergency Action Plan or new equipment is introduced.

B. Fire Prevention

1. General

- a. Develop an Emergency Preparedness Plan as outlined in SMS 003 – Emergency Preparedness Plan.
- b. Conduct evacuation drills at least annually.
- c. Maintain good housekeeping to reduce fire hazards and to provide safe routes of egress should a fire occur.
- d. Conduct periodic workplace inspections to identify fire hazards such as unnecessary accumulation of combustibles (including paper and boxes), unnecessary storage of flammables, and sources of ignition.

2. Ignition Hazards

**URS SAFETY MANAGEMENT STANDARD**  
**Fire Protection and Prevention**

---

- a. Electrical wiring and equipment for light, heat, or power purposes will be properly installed.
  - b. Equipment powered by internal combustion will be located with the exhausts positioned away from combustible materials. When the exhausts are piped outside the building under construction, a clearance of at least 6 inches (15 cm) will be maintained between piping and combustible material.
  - c. Smoking is prohibited at or in the vicinity of operations that constitute a fire hazard. Such areas will be conspicuously posted as follows: "NO SMOKING OR OPEN FLAME."
  - d. Portable, battery-powered lighting equipment, used in connection with the storage, handling, or use of flammable gases or liquids, will be approved for the hazardous locations. For more information, see SMS 015 – Flammable and Combustible Liquids and Gases.
  - e. The nozzles of air, inert gas, and steam lines or holes used in the cleaning or ventilation of tanks and vessels containing hazardous concentrations of flammable gases or vapors will be bonded to the tank or vessel shell. Bonding devices will not be attached or detached while hazardous concentrations of flammable gases or vapors exist.
3. Temporary Buildings
- a. Temporary buildings will not be erected where the location adversely affects any means of employee exit.
  - b. Temporary buildings, located within another building or structure, will be of noncombustible construction or combustible construction having a fire resistance rating of not less than 1 hour.
  - c. Temporary buildings, located other than inside another building and not used for handling and storage of flammable or combustible liquids, flammable gases, explosives, or blasting agents, or similar hazardous occupancies, will be located at a distance of not less than 10 feet (3 meters) from another building or structure. Groups of temporary buildings, not exceeding 2,000 square feet (186 square meters) in total, will be considered a single temporary building.

**URS SAFETY MANAGEMENT STANDARD**  
**Fire Protection and Prevention**

---

4. Open Yard Storage

- a. Combustible materials will be stored with regard to the stability of piles and in no case higher than 10 feet (3 meters).
- b. Driveways between and around combustible storage piles will be at least 15 feet (4.6 meters) wide and maintained free of accumulations of rubbish, equipment, or other articles or materials. Driveways will be spaced to produce a maximum grid system unit of 50 feet (15.2 meters) by 150 feet (45.7 meters).
- c. The entire storage site will be kept free from accumulations of unnecessary combustible materials. Weeds and grass will be maintained, and procedures will be established for periodic cleanup of the entire area.
- d. The method of piling combustible materials will be solid and in orderly regular piles. No combustible material will be stored outdoors within 10 feet (3 meters) of a building or structure.
- e. Portable fire extinguishing equipment, suitable for the fire hazard involved, will be provided at convenient, conspicuously accessible locations in the yard area. Portable fire extinguishers, rated not less than 2A:20BC, will be placed to assure that the maximum travel distance to the nearest unit will not exceed 100 feet (30.5 meters).

5. Indoor Storage

- a. Storage will not obstruct, or adversely affect, means of exit.
- b. Materials will be stored, handled, and piled with regard to their fire characteristics.
- c. Noncompatible materials, which may create a fire hazard, will be segregated by a barrier having a fire resistance of at least 1 hour.
- d. Materials will be piled to minimize the spread of fire internally and to permit convenient access for firefighting. Stable piling will be maintained at all times. Aisle space will be

**URS SAFETY MANAGEMENT STANDARD**  
**Fire Protection and Prevention**

---

maintained to safely accommodate the widest vehicle used within the building for firefighting purposes.

- e. A clearance of at least 36 inches (90 cm) will be maintained between the top level of the stored material and the sprinkler deflectors.
- f. Clearance will be maintained around lights and heating units to prevent ignition of combustible materials.
- g. A clearance of 24 inches (60 cm) will be maintained around the fire door's path of travel, unless a barricade is provided, in which case no clearance is needed. Material will not be stored within 36 inches (90 cm) of a fire door.

C. Temporary Heating Devices

1. Ventilation

- a. Fresh air will be supplied in sufficient quantities to maintain the health and safety of employees. Where natural means of fresh air supply are inadequate, mechanical ventilation will be provided.
- b. Heaters used in confined spaces necessitate that special care be taken to provide sufficient ventilation to ensure proper combustion, maintain the health and safety of workmen, and limit temperature increase in the area.

2. Clearance and Mounting

- a. Temporary heating devices will be installed to provide clearance to combustible materials not less than the amount shown in the following table:

<b>Minimum Clearance in inches (cm)</b>			
<b>Heating Appliance</b>	<b>Sides</b>	<b>Rear</b>	<b>Chimney Connector</b>
Room heater, circulating type	12 (30)	12 (30)	18 (45)
Room heater, radiant type	36 (90)	36 (90)	18 (45)

- b. Temporary heating devices that are listed for installation with lesser clearance than specified in the previous table must be

## **URS SAFETY MANAGEMENT STANDARD**

### **Fire Protection and Prevention**

---

installed in accordance with the manufacturer's specifications.

- c. Heaters not suitable for use on wood floors will not be set directly upon them or other combustible materials. When such heaters are used, they will rest on suitable heat-insulating material or concrete at least 1 inch (2.5 cm) thick or equivalent. The insulating material will extend beyond the heater 2 feet (60 cm) or more in all directions.
- d. Heaters used near combustible tarpaulins, canvas, or similar coverings will be located at least 10 feet (3 meters) from the coverings. The coverings will be securely fastened to prevent ignition or upsetting of the heater due to wind action on the covering or other material.

#### 3. Stability

When in use, heaters will be set horizontally level, unless otherwise permitted by the manufacturer's instructions.

#### 4. Solid Fuel Heaters

Solid fuel heaters are prohibited in buildings and on scaffolds.

#### 5. Oil Fired Heaters

- a. Flammable liquid-fired heaters will be equipped with a primary safety control to stop the flow of fuel in the event of flame failure. Barometric or gravity oil feed will not be considered a primary safety control.
- b. Heaters designed for barometric or gravity oil feed will be used only with integral tanks.
- c. Heaters specifically designed and approved for use with separate supply tanks may be directly connected for gravity feed, or an automatic pump, from a supply tank.

### **5. Documentation Summary**

The following documentation will be maintained in the project file:

#### A. Emergency Action Plans.

## **URS SAFETY MANAGEMENT STANDARD**

### **Fire Protection and Prevention**

---

- B. Fire extinguisher inspection logs.
- C. Employee training documentation.
- D. Site audits.
- E. Evacuation drills.

#### **6. Resources**

- A. U.S. Occupational Safety and Health Administration (OSHA) Standard – [Means of Egress](#) – 29 Code of Federal Regulations (CFR) 1910, Subpart E
- B. U.S. OSHA Standard – [Exit Routes, Emergency Action Plans, and Fire Prevention Plans](#) – 29 CFR 1910.38
- C. U.S. OSHA Standard – [Fire Protection](#) – 29 CFR 1910, Subpart L
- D. U.S. OSHA Software – [Fire Safety Advisor](#)
- E. U.S. OSHA Construction Standard – [Fire Protection and Prevention](#) – 29 CFR 1926.150, Subpart F
- F. National Fire Protection Association – Standard for Portable Fire Extinguishers – [NFPA 10](#)
- G. International Code Council – [International Fire Code](#)
- H. [SMS 003](#) – Emergency Preparedness Plan
- I. [SMS 015](#) – Flammable and Combustible Liquids and Gases

#### **7. Supplemental Information**

- A. [Fire Classifications](#)
- B. [General Fire Extinguisher Requirements](#)

# **URS SAFETY MANAGEMENT STANDARD**

## **Heat Stress**

---

### **1. Applicability**

This standard applies to URS Corporation and its subsidiary companies on projects where ambient (not adjusted) temperatures exceed 70 degrees Fahrenheit (°F) (21 degrees Celsius [°C]) for personnel wearing chemical-protective clothing, including impermeable protective clothing such as Tyvek or Saranex coveralls, and 90°F (32°C) for personnel wearing standard permeable work clothes. Permeable clothing refers to clothes of standard cotton or synthetic materials. Note that certain governmental entities require heat stress prevention techniques be implemented at lower temperatures or whenever outdoor work is conducted. Always consult local regulations to determine if more stringent standards apply.

### **2. Purpose and Scope**

The purpose of this standard is to protect project personnel from the effects of heat-related illnesses.

### **3. Implementation**

Implementation of this standard is the responsibility of the URS manager directing activities of the facility, site, or project location.

### **4. Requirements**

- A. The project Health and Safety Plan will address heat stress control when temperatures identified in Section 1 of this standard are anticipated.

This standard introduces three different means of monitoring for heat stress conditions: Wet Bulb Globe Temperature (WBGT), Humidex Based Heat Response and Physiological Monitoring. These methods can be used separately or in conjunction. For employees wearing chemical-protective clothing, physiological monitoring (Section D) is the most effective approach, because evaporative cooling capability is limited.

- B. Heat stress is influenced by air temperature, radiant heat, and humidity. The WBGT is a useful index of the environmental contribution to heat stress. Because WBGT is only an index of the environment, the contributions of work demands, clothing, and state of acclimatization must also be accounted for, as described in the following steps.

1. Monitor ambient temperatures and conduct heat stress monitoring in accordance with the project Health and Safety Plan. Revise the heat

**URS SAFETY MANAGEMENT STANDARD**  
**Heat Stress**

stress monitoring and controls if there are any reports of discomfort due to heat stress.

2. Monitor temperatures in each unique environment in which workers perform work (e.g., take WBGT measurements inside truck cabs for truck drivers, and take separate WBGT measurements in the outdoor area where field employees work, etc.). Follow manufacturer's instructions on proper use of the WBGT.
3. Determine if individual workers are acclimatized or un-acclimatized. Full heat acclimatization requires up to 3 weeks of continued physical activity under heat-stress conditions similar to those anticipated for the work. Its loss begins when the activity under those heat-stress conditions is discontinued, or when there is a sustained increase in temperatures of 10 °F (5.6 °C) or more, and a noticeable loss occurs after 4 days. A worker can be considered acclimatized for the purpose of this procedure when they have been exposed to the site conditions (including level of activity) for 5 of the last 7 days.
4. Determine the approximate workload of each worker or group of workers. The following examples can be used for comparison:

**Table 1**  
**Examples of Activities within Workload Categories**

Categories	Example Activities
Resting	Sitting quietly
	Sitting with moderate arm movements
Light	Sitting with moderate arm and leg movements
	Standing with light work at machine or bench while using mostly arms
	Using a table saw
	Standing with light or moderate work at machine or bench and some walking about
Moderate	Scrubbing in a standing position
	Walking about with moderate lifting or pushing
	Walking on level at 6 Km/hr while carrying 3 Kg weight load
Heavy	Carpenter sawing by hand
	Shoveling dry sand
	Heavy assembly work on a non-continuous basis
	Intermittent heavy lifting with pushing or pulling (e.g., pick-and-shovel work)
Very Heavy	Shoveling wet sand

5. Determine the approximate proportion of work within an hour during a typical shift. Typically, the initial work schedule will be 60 minutes of work

**URS SAFETY MANAGEMENT STANDARD**  
**Heat Stress**

per hour (100 percent work) with a small break in the morning and afternoon, as appropriate, and a 30-minute lunch break mid-day.

6. Compare the WBGT values measured in 4.B.1 to the screening criteria and action limit values in the following table, using the determinations made in 4.B.3 through 4.B.5.

**Table 2**  
**SCREENING CRITERIA AND ACTION LIMIT**  
**FOR HEAT STRESS EXPOSURE**  
**(WBGT Values in °F /°C)**

Work Cycle (60 min/ hour)	TLV				Action Limit			
	Light Work	Mod. Work	Heavy Work	Very Heavy Work	Light Work	Mod. Work	Heavy Work	Very Heavy Work
75 to 100%	87.8/ 31.0	82.4/ 28.0	N/A	N/A	82.4/ 28.0	77.0/ 25.0	N/A	N/A
50 to 75%	87.8/ 31.0	84.2/ 29.0	81.5/ 27.5	N/A	83.3/ 28.5	78.8/ 26.0	75.2/ 24.0	N/A
25 to 50%	89.6/ 32.0	86.0/ 30.0	84.2/ 29.0	82.4/ 28.0	85.1/ 29.5	80.6/ 27.0	77.9/ 25.5	76.1/ 24.5
0 to 25%	90.5/ 32.5	88.7/ 31.5	86.9/ 30.5	86.0/ 30.0	86.0/ 30.0	84.2/ 29.0	82.4/ 28.0	80.6/ 27.0

- a. If the measured WBGT is *less than* the action limit value, there is little risk of excessive exposure to heat stress, and work can continue. Continue to monitor ambient conditions with the WBGT. However, if there are reports of the symptoms of heat-related disorders, then the analysis of little risk should be reconsidered.
- b. If the measured WBGT is *greater than* the action limit value, institute heat stress controls, including a work-rest cycle, and perform physiological monitoring as described in section D of this standard.
- c. Because of the physiological strain associated with heavy work among less fit workers regardless of WBGT, values are not provided in Table 1 for continuous work. For the same reason, values are not provided in Table 1 for up to 50% of very heavy work. Physiological monitoring should always be implemented under these conditions.
- d. If the measured WBGT is greater than the TLV value, work should stop and physiological monitoring should be followed.
- e. For workers wearing cloth coveralls (e.g., Nomex fire resistant clothing), add 3 to the measured WBGT. For impermeable clothing,

## **URS SAFETY MANAGEMENT STANDARD**

### **Heat Stress**

---

such as Tyvek or Saranex, the WBGT procedures cannot be used. For these situations, workers should begin physiological monitoring as soon as the temperature in the work area exceeds 70°F (21°C).

#### C. Humidex Based Heat Response

1. The Humidex method is a simplified way of protecting workers from heat stress which is based on the WBGT to estimate heat strain. It is an equivalent scale intended to express the combined effects of warm temperatures and humidity. Humidex is used as a measure of perceived heat that results from the combined effect of excessive humidity and high temperature.
2. This method requires only a local air temperature and relative humidity value. Monitoring must continue throughout the day for changing conditions. Identify a representative location where measurements can be taken. Measurements should be recorded at least hourly when ambient temperatures and 90°F (32°C) for personnel wearing normal permeable work clothes.
3. Specific procedures to complete the Humidex Based Heat Response Plan are included in Attachment 018-1 AMER – Humidex Worksheet.

#### D. Physiological Monitoring

Physiological monitoring provides a means to assess the effectiveness of the heat stress controls (training, hydration, work-rest cycles, etc.) that are in place. Based on the results of physiological monitoring and self-assessment, work-rest cycles can be adjusted to more effectively control heat stress by shortening the work period, or to allow for longer work periods if workers are recovering adequately during rest breaks.

1. Perform physiological monitoring as soon as the employee stops working and begins their break (rest). Perform *physiological monitoring at least every hour*. *Base rest breaks* on the results of the monitoring, workers' self-assessment, and professional judgment.
  - a. Example 1: If the WBGT is 85°F (29.4°C) or less for acclimatized, light-duty workers, they can work 60 minutes per hour (100 percent work), and they need only take their regularly scheduled breaks.
  - b. Example 2: If the WBGT is greater than 85°F (29.4°C) for acclimatized, light-duty workers, physiological monitoring must be

## **URS SAFETY MANAGEMENT STANDARD**

### **Heat Stress**

---

performed, and workers' work-rest cycles must be adjusted as described below.

2. Have workers assess themselves and their body's reaction to the heat and work conditions (self-assessment), and report any signs or symptoms of heat illness. These can include nausea or dizziness, heat cramps, extreme thirst, or very dark urine.
3. Based on the results of the physiological monitoring and on the workers' self-assessments, the work period may be adjusted as follows:
  - a. The work period may be *increased* (generally, by 5- to 10-minutes intervals, up to a maximum of 4 hours) if the results of the first 2 hours of the physiological monitoring and the workers' self-assessments indicate that workers *are* recovering adequately (see below), and on the judgment of the Health and Safety Technician.
  - b. The work period *must be decreased* if the results of the physiological monitoring and the workers' self-assessment indicate that workers are NOT recovering adequately (see below).
4. Perform physiological monitoring
  - a. The worker or the Health and Safety Technician must measure and record body temperature and pulse rate as described below. Use SMS 018-2 AMER – Heat Stress Monitoring Record as a tool.
5. Body Temperature Monitoring
  - a. Monitor body temperature to determine if employees are adequately dissipating heat buildup. Ear probe thermometers which are adjusted to oral temperature (aural temperature) are convenient and the preferred method of measurement. Determine work/rest regimen as follows:
    - i. Measure oral body temperature at the end of the work period. Oral body temperatures are to be obtained prior to the employee drinking water or other fluids.
    - ii. If temperature exceeds 99.6°F (37.5°C), shorten the following work period by 1/3 without changing the rest period.
    - iii. If, at the next rest period, temperature still exceeds 99.6°F (37.5°C), the worker should not be allowed to continue work until repeated temperature measurements are in the acceptable range (i.e., less

## **URS SAFETY MANAGEMENT STANDARD**

### **Heat Stress**

---

than 99.6°F). Do not leave the worker alone during the recovery time. Watch for signs of heat illness and be prepared to implement emergency response as necessary.

iv. Do not allow a worker to wear impermeable PPE when his/her oral temperature exceeds 100.6°F (38.1°C).

b. Have employees assess themselves and their body's reaction to the heat and work conditions, and report any signs or symptoms of heat stress, including, but not limited to, feeling nauseous or dizzy, skin rash or skin irritation, muscle cramps, weakness or fatigue, extreme thirst, dizziness, blurred vision, headache, or very dark urine.

#### 6. Pulse Rate Monitoring

a. Take the radial (wrist) pulse as early as possible in the rest period and determine the worker's heart rate in beats per minute. The heart rate is determined by counting the pulse for ten seconds and multiplying the number by 6 to get the beats per minute. Record this as P1.

b. Wait 2 minutes and repeat the pulse measurement. Record this as P2.

c. If P1 is greater than or equal to 110 beats per minute (bpm) and if (P1 – P2) is less than or equal to 10 bpm (indicating that workers are not recovering adequately), shorten the next work cycle by 1/3 without changing the rest period.

d. At the next rest period, if P1 is still equal to or greater than 110 bpm, and if (P1 – P2) is still less than or equal to 10 bpm, shorten the following work cycle by 1/3 without changing the rest period.

e. At the third rest period, if P1 is still equal to or greater than 110 bpm and (P1 – P2) is still less than or equal to 10 bpm, the worker should not be allowed to continue work until repeated pulse measurements are in the acceptable range (i.e., P1 is less than 110 bpm and (P1 – P2) is greater than 10 bpm). Do not leave the worker alone during the recovery time. Watch for signs of heat illness and be prepared to implement emergency response as necessary.

E. Record monitoring results and worker's self-assessments on Attachment 018-2 AMER – Heat Stress Monitoring Record.

F. Investigate the use of auxiliary cooling devices in extreme heat conditions.

## **URS SAFETY MANAGEMENT STANDARD**

### **Heat Stress**

---

- G. Conduct briefings for employees regarding health hazards and control measures associated with heat stress whenever conditions require the implementation of heat stress monitoring. Supervisors should receive training in heat related illness prevention prior to supervising employees in areas where heat stress could occur. The training should include emergency response information provided in Supplemental Information A.
- H. Provide cool water and electrolyte replacement drinks as described in Supplemental Information A.
- I. Allow employees who are not accustomed to working in hot environments appropriate time for acclimatization, as described in Supplemental Information A.
- J. Provide break areas as described in Supplemental Information A.

#### **5. Documentation Summary**

The following information will be maintained in the project file:

- A. Heat Stress Monitoring Records
- B. Employee Safety Briefing Verification Forms

#### **6. Resources**

- A. NIOSH – [Working in Hot Environments \(Publication No. 86-112\)](#), 1986
- B. NIOSH – Criteria for a Recommended Standard for Occupational Exposures to Hot Environments ([Publication No. 86-113](#)), 1986
- C. ACGIH – Documentation of the Threshold Limit Values and Biological Indices, 2007
- D. AFL-CIO Building Trades Division – [Heat Stress in Construction](#)
- E. Occupational Health Clinics for Ontario Worker, Inc. – [Humidex Based Heat Response Plan](#)
- F. [Attachment 018-1 AMER](#) – Humidex Worksheet
- G. [Attachment 018-2 AMER](#) – Heat Stress Monitoring Record

**URS** SAFETY MANAGEMENT STANDARD  
**Heat Stress**

---

**7. Supplemental Information**

- A. [Heat Stress Informational Supplement](#)

# **URS SAFETY MANAGEMENT STANDARD**

## **Heavy Equipment Operations**

---

### **1. Applicability**

This standard applies to the operations of URS Corporation and its subsidiary companies where heavy equipment is in operation by URS employees or subcontractors.

### **2. Purpose and Scope**

The purpose of this standard is to require that heavy equipment is operated in a safe manner; that the equipment is properly maintained; and that ground personnel are protected. Heavy equipment includes construction and mining equipment such as backhoes, excavators, skid steers, graders, loaders, dozers, tractors, cranes, drills, and draglines.

In addition to this standard, refer to SMS 023 – Lockout and Tagout Safety, SMS 038 – Cranes and Derricks; and SMS 056 – Drilling Safety.

Military related vehicles and equipment (e.g., tanks) are not covered under this standard.

### **3. Implementation**

Implementation of this standard is the responsibility of the URS manager directing activities of the facility, site, or project location.

### **4. Requirements**

#### **A. Authorized Operators**

1. Evaluate operators through documented experience (resume), and as appropriate, a practical evaluation of skills. Supplemental Information A through G, or a similar method, may be used for evaluating operators.
2. Allow only qualified operators to operate equipment. Trainees may operate equipment under the direct supervision of a trainer.
3. Prohibit equipment from being operated by any personnel who have not been specifically authorized to operate it.
4. Maintain a list of operators for the project, and the specific equipment that they are authorized to operate.

## **URS SAFETY MANAGEMENT STANDARD**

### **Heavy Equipment Operations**

---

5. Operators must wear seatbelts at all times in all equipment and trucks.
6. Except where allowed by the manufacturer, prohibit personnel other than the operator from riding in or on the equipment unless additional seating (with seatbelts) is provided by the manufacturer. In some cases, a trainer may ride in a cab not equipped with additional seating when training activities are being conducted.
7. Operators and service personnel must maintain three points of contact whenever mounting and dismounting a piece of equipment.
8. Brief operators on the following rules of operation:
  - a. Operators are in control of their work area.
  - b. Equipment must be operated in a safe manner and within the constraints of the manufacturer's Operation Manual.
  - c. Operators must stop work whenever unauthorized ground personnel or equipment enter their work area, and only resume work when the area has been cleared.
  - d. Operators must not use mobile phones while operating heavy equipment.

#### **B. Ground Personnel**

1. Require that URS ground personnel or ground personnel interacting with URS heavy equipment operations have received training, and comply with the following rules of engagement:
  - a. Wear high-visibility protective vests when in work areas with any operating equipment.
  - b. Stay outside of the swing zone or work area of any operating equipment.
  - c. No standing or working in the equipment operator's blind spots.
  - d. Ground personnel may only enter the swing or work area of any operating equipment when:

## **URS SAFETY MANAGEMENT STANDARD**

### **Heavy Equipment Operations**

---

1. They have attracted the operator's attention and made eye contact.
  2. The operator has idled the equipment down, placed it in neutral, grounded engaging tools, and set brakes.
  3. The operator gives the ground personnel permission to approach.
- e. Ground personnel must never walk, or position themselves between, any fixed object (e.g., working face, highwall) and operating equipment, or between two operating pieces of equipment.

#### C. Equipment

1. Maintain operation manuals at the site for each piece of equipment that is present on the site and in use.
2. Require that operators have read or been trained on the manual for the equipment, and operate the equipment within the parameters of the manual and this standard.
3. Require that all equipment is provided with roll-over protection systems (ROPS). Tracked excavators, road trucks, and drills are exempt from ROPS requirements, but must have a cab that provides protection from overhead hazards.
4. Verify that seatbelts are present and functional in all equipment and that they have not reached the expiration date (if date tag is missing, the seatbelt must be replaced). Note: Seatbelts shall be replaced in accordance with the manufacturer's recommendation. If there is no manufacturer's recommendation, then seatbelts shall be replaced 3 years from date of installation or 5 years from the date of manufacture.
5. Prohibit the use of equipment that has or had cab glass (per the manufacturer's specifications) that is cracked/broken (obstructing the operator's view) or missing.
6. Require that backup alarms are properly functioning on all trucks and equipment. Tracked excavators must have bi-directional alarms, or the operator must be provided with a spotter whenever tracking in either direction.

## **URS SAFETY MANAGEMENT STANDARD**

### **Heavy Equipment Operations**

---

7. Require all attachments such as buckets, blades, forks, etc., to be grounded when not in use.
8. Require brakes to be set and wheels chocked or equivalent (when applicable) when not in use.
9. Require fire extinguishers to be placed on all vehicles or equipment as required, and inspected by the operator prior to each shift. Service records will be documented and maintained in the project office. Monthly inspections must be documented on the extinguishing equipment.
10. Require that all haulage vehicles, whose payload is loaded by means of cranes, power shovels, loaders, or similar equipment, has a cable shield and/or canopy adequate to protect the operator from shifting or falling material. If protection is not available for the operator, the operator must leave the vehicle and wait in a designated safe location until it is loaded.
11. Require that a locking device be provided that will prevent the accidental separation of towed and towing vehicles on every fifth-wheel mechanism and two-bar arrangement.
12. Require that trip handles for tailgates of dump trucks and heavy equipment be arranged so that when dumping, the operator will be in the clear.
13. Require that motors and engines are shut off during fueling or maintenance operations. Ensure proper grounding/bonding between equipment and fuel vehicle prior to fueling operations. During fueling operations, ensure the fuel nozzle remains in contact with the tank and no smoking or open flame is present in the immediate area.
14. Require that each project location maintain construction equipment records onsite (including rental units) with inspections, maintenance, service and repair history. Records shall be made available for review upon request. Note: Documents may be electronically stored in the project files.

#### D. Subcontractor Equipment

1. Require that no unsafe vehicles or equipment be allowed in construction areas. Where compliance is refused, the project manager or his or her designate should be notified immediately.

## **URS SAFETY MANAGEMENT STANDARD**

### **Heavy Equipment Operations**

---

2. Require that subcontractor employees follow established safety procedures in operation, inspection, and maintenance of vehicles and equipment.
3. Require that URS supervisors visually observe the subcontractors' vehicles and equipment, and report any unsafe conditions or practices to the project manager. Equipment not in compliance with applicable safety standards is prohibited.

#### E. Safe Operation

1. All vehicles transporting material or equipment on public roads must comply with local laws pertaining to weight, height, length, and width. Obtain any permits required for these loads. [Energy & Construction may also refer to Project Execution Procedure 214 – Compliance with Department of Transportation Requirements for Equipment, Vehicles & Drivers.]
2. Prohibit operating Company-owned, leased, or rented vehicles or equipment while under the influence of alcohol or illegal drugs.
3. Seatbelts must be worn by all operators, drivers, and passengers within company-owned or leased vehicles and equipment.
4. Do not drive equipment into an unsafe area. This includes areas of construction where unnecessary tire, steering, or body damage could result, or where soil conditions are not adequate to support the equipment.
5. Do not smoke on, in, or within 50 feet (15 meters) of vehicles hauling fuel oils, gasoline, or explosives.
6. Do not ride with arms or legs outside of the truck body, in a standing position on the body, on running boards, or seated on side fenders, cabs, cab shields, rear of truck bed, or on the load.
7. Do not drive any vehicle at a speed greater than is reasonable and safe for weather conditions, traffic, intersections, width, and character of the roadway, type of motor vehicles, and any other existing condition.
8. Oilers, apprentices, and other operators will not be allowed to operate equipment unless authorized by the project manager or general superintendent.

## **URS SAFETY MANAGEMENT STANDARD**

### **Heavy Equipment Operations**

---

9. Do not operate any equipment beyond its safe load or operational limits.
10. Keep all employees clear of loads about to be lifted, or suspended loads.
11. Outfit equipment operated in hazardous atmosphere environments with the proper safety equipment (e.g., spark arrestors).
12. Utilize equipment with enclosed cabs where feasible or accessible. Where use of equipment with enclosed cabs is not feasible or said equipment is not accessible, require that operators use eye protection in accordance with potential airborne hazards present.

#### F. Inspection and Maintenance

1. Require operators to inspect equipment daily (or before each shift), using Attachment 019-1 AMER or equivalent (Energy & Construction's EQ 505 form).
2. Prohibit use of equipment deemed to be unsafe, as determined by daily inspection, until required repairs or maintenance has been completed.
3. Conduct maintenance as prescribed by the manufacturer in the Operation Manuals for each piece of equipment or division/site-specific preventative maintenance procedures.
4. During maintenance and repair, require that:
  - a. SMS 023 – Lockout and Tagout Safety procedures are followed.
  - b. Motors are turned off, unless required for performing maintenance or repair.
  - c. All ground-engaging tools are grounded or securely blocked.
  - d. Controls are set in a neutral position.
  - e. Brakes are set.
  - f. Electrically driven equipment is installed with provision for tagging and locking out the controls while under repair.

## **URS SAFETY MANAGEMENT STANDARD**

### **Heavy Equipment Operations**

---

- g. Manufacturer's requirements for maintenance and repair are followed.
- 5. Provide and use a safety tire rack, cage, or equivalent protection when inflating, mounting, or dismounting tires installed on split rims, or rims equipped with locking rings or similar devices.
- 6. Maintenance records for any service, repair or modification which affects the safe performance of the equipment must be maintained onsite and available to operator, and maintenance personnel, and regulatory agencies upon request.

#### **5. Documentation Summary**

The following information will be maintained in the project file:

- A. Operator qualifications.
- B. Daily Equipment Inspections.
- C. Site briefing documentation for operator rules and ground personnel "rules of engagement".

#### **6. Resources**

- A. U.S. Occupational Safety and Health Administration (OSHA) Standard – [Motorized Vehicles and Mechanized Equipment](#) – 29 Code of Federal Regulations (CFR) 1926, Subpart O
- B. U.S. Mine Safety and Health Administration – [30 CFR 48](#) – Training and Retraining Miners
- C. U.S. Mine Safety and Health Administration – [30 CFR 56](#) Subpart H – Loading, Hauling, and Dumping
- D. U.S. Mine Safety and Health Administration – [30 CFR 56](#) Subpart M – Machinery and Equipment
- E. U.S. Mine Safety and Health Administration – [30 CFR 77](#) Subpart E – Safeguards for Mechanical Equipment
- F. U.S. Mine Safety and Health Administration – [30 CFR 77](#) Subpart K – Ground Control

## **URS SAFETY MANAGEMENT STANDARD**

### **Heavy Equipment Operations**

---

- G. U.S. Mine Safety and Health Administration – [30 CFR 77](#) Subpart Q – Loading and Haulage
- H. [National Association of Demolition Contractors](#) – Safety Manual
- I. [SMS 023](#) – Lockout and Tagout Safety
- J. [SMS 038](#) – Cranes and Derricks
- K. [SMS 056](#) – Drilling Safety
- L. [Attachment 019-1 AMER](#) – Equipment Inspection Form

Note: The above regulatory resources are for U.S. operations only.

#### **7. Supplemental Information**

- A. [Rubber Tire Backhoe Operator Skill Evaluation](#)
- B. [Scraper Operator Skill Evaluation](#)
- C. [Bulldozer Operator Skill Evaluation](#)
- D. [Dump Truck Operator Skill Evaluation](#)
- E. [Roller/Compactor Skill Evaluation](#)
- F. [Front-End Loader Operator Skill Evaluation](#)
- G. [Grader Operator Skill Evaluation](#)
- H. [Excavator Operator Skill Evaluation](#)
- I. [Water Truck Operator Skill Evaluation](#)

# **URS SAFETY MANAGEMENT STANDARD**

## **Housekeeping**

---

### **1. Applicability**

This standard applies to the operations of URS Corporation and its subsidiary companies.

### **2. Purpose and Scope**

The purpose of this standard is to ensure proper housekeeping in office locations, on construction sites, and fixed work facilities to prevent cross contamination of hazardous materials, fires, and injuries resulting from slips, trips and falls.

### **3. Implementation**

Implementation of this standard is the responsibility of the URS manager directing activities of the facility or site.

### **4. Requirements**

#### **A. General**

1. Require tools, materials, extension cords, hoses, and other equipment to be stowed at the end of the day. These materials must not be strewn about the site in a manner that may cause tripping or other hazards while in use.
2. Clear general waste, scraps, debris, and rubbish from work areas, passageways, and stairs in and around the facility on a daily basis. Do not throw or drop materials from upper levels to lower levels or to the ground unless disposal areas are provided and the area below is barricaded or secured.
3. Provide metal or other approved containers in adequate numbers to handle waste and rubbish disposal.
4. Garbage (including solid or liquid wastes), refuse, and hazardous waste such as caustics, acids, and toxic materials must be stored in approved and covered containers. Containers must be appropriately labeled as to contents. SMS 009 – Corrosive and Reactive Materials and SMS 017 – Hazardous Waste Operations, provide additional information on hazardous materials.
5. Store supplies and generated wastes or scrap in locations away from walkways and in a manner that will not trip workers. Maintain

## **URS SAFETY MANAGEMENT STANDARD**

### **Housekeeping**

---

stored materials in safe, neat stockpiles for ease of access and to prevent collapse or falling.

6. Keep weeds and vegetation away from stockpiled materials and walkways.
7. Maintain flooring, stairways, gangways, access ways, and walkways in a clean, dry, and smooth condition.
8. Ensure that oil, grease, water, ice, or other hazardous materials that may cause slipping or fire hazards are removed promptly.
9. Ensure employees are trained in appropriate waste disposal procedures.
10. Identify a member of line management (typically a site supervisor or foreman) with the responsibility of ensuring proper waste disposal and storage requirements are followed.

**B. Regularly inspect the work area for slip and trip hazards.**

1. Office and trailer locations – Inspect work areas at least quarterly. Use the inspection sheet provided as Attachment 021-1 AMER.
2. Field sites – Inspect sites at least biweekly. Use the inspection sheet provided as Attachment 021-1 AMER.
3. Field sites performing aircraft and vehicle maintenance – Inspect the sites weekly if sanding, drilling, grinding, and/or painting operations are conducted. Use the inspection sheet provided as Attachment 021-2 AMER.

**C. Thoroughly investigate all injuries resulting from slips, trips, and falls on site. Correct those housekeeping conditions contributing to injuries.**

**D. Project management personnel shall address the following issues in project pre-planning:**

1. Estimate the types and quantities of waste or scrap generated during site-specific project activities.
2. Identify any needs for specialized containers or waste disposal services.
3. Coordinate waste disposal options with the client.

## **URS SAFETY MANAGEMENT STANDARD**

### **Housekeeping**

---

4. Identify any hazards associated with handling or storage of waste or scrap and determine if control measures, including engineering, administrative controls, or personal protective equipment, are required.
  5. Identify waste or scrap handling and storage procedures that will minimize impacts to site personnel, client operations, and the environment.
  6. Identify waste segregation criteria, as well as opportunities for recycling.
- E. For operations involving work with hazardous materials (including metals associated with aviation maintenance activities), the manager directing activities of the facility or site will assure that:
1. Eating, drinking, and smoking areas are removed from the work areas. Hand washing stations shall be available nearby for employees entering the eating and smoking areas.
  2. Resting, eating and smoking areas will be kept clean.
  3. Work areas will be cleaned to remove accumulated contaminants. Working surfaces, including workbenches, desks, and other lateral working surfaces, will be wiped down daily with an appropriate cleaner (soap, solvent, or oxidizing agent). Walking surfaces will be cleaned to remove accumulated contaminants weekly or more often.
  4. Chemicals shall be properly stored to minimize the potential for spills. Chemicals shall be stored in proper containers, organized, labeled and in secondary containment, when required.
  5. Spill cleanup materials must be accessible and appropriate for the materials that may be spilled.
  6. Proper communication measures shall be in place and initiated upon a spill event. Procedures should be based on type and quantity of materials spilled. Spills will be reported to regulatory agencies when required by regulations.
  7. Employees shall be trained on the proper response procedures for spilled materials. Training shall address proper communication procedures in the event of a spill.

## **URS SAFETY MANAGEMENT STANDARD**

### **Housekeeping**

---

#### **5. Documentation Summary**

The following information will be maintained in the project file:

- A. Completed Inspection Sheets
- B. Spill Response Training

#### **6. Resources**

- A. U.S. Occupational Safety and Health Administration (OSHA) Standard – [Sanitation – 29 Code of Federal Regulations \(CFR\) 1910.141](#)
- B. U.S. OSHA Standard – [Walking and Working Surfaces – 29 CFR 1910.22.](#)
- E. [SMS 009](#) – Corrosive and Reactive Materials
- F. [SMS 017](#) – Hazardous Waste Operations
- G. [Attachment 021-1 AMER](#) – Housekeeping Inspection Sheet
- H. [Attachment 021-2 AMER](#) – Special Housekeeping Inspection Sheet  
- Sanding, Drilling, Grinding, and Painting

# **URS SAFETY MANAGEMENT STANDARD**

## **Noise and Hearing Conservation**

---

### **1. Applicability**

This standard applies to the operations of URS Corporation and its subsidiary companies where personnel may encounter noise exposures that may exceed 85 decibels, measured using an A-weighted scale (dBA), as an 8-hour time-weighted average (TWA).

### **2. Purpose and Scope**

The purpose of this procedure is to protect employees from hazardous noise exposures and to prevent hearing loss.

### **3. Implementation**

Implementation of this procedure is the responsibility of the URS manager directing activities of the facility, site, or project location.

### **4. Requirements**

#### **A. General**

1. The use of hearing protectors is required in any location where powered or motorized equipment or any other noise source could reasonably be expected to exceed 85 dBA. Whenever information indicates that any employee's exposure may equal or exceed an 8-hour TWA of 85 dBA, the project manager or location manager will be responsible for enforcing the proper use of hearing protectors.
2. Implement a hearing conservation program in accordance with 29 Code of Federal Regulations (CFR) 1910.95(c) when applicable. Work not applicable to 29 CFR 1910.95(c) will assess hazards of noise exposure on a task basis, and implement engineering or administrative controls to reduce employee noise exposure.
3. Hearing protectors will be used in the event that administrative or engineering controls are either not effective or not feasible, and the following criteria will be applicable to selection of hearing protection devices.
  - a. Require that at least two types of hearing protectors are available to employees free of charge, and that the type of hearing protector is suitable to the task.

## **URS SAFETY MANAGEMENT STANDARD**

### **Noise and Hearing Conservation**

---

- b. Require that hearing protectors are used in accordance with manufacturer's specifications to effectively protect hearing.
- c. Evaluate the effectiveness of the hearing protectors chosen. The manufacturer's assigned noise reduction rating (NRR) for hearing protection devices can seldom be achieved in workplace conditions; therefore this rating must be attenuated for real world conditions and use. To do so, subtract 7 from the NRR of the protector provided by the manufacturer. Divide this result by 2, and then subtract the remained from the observed "A" scale sound level measurement collected in the employee's work area (see Section 4.B). If this number is below 85, the hearing protectors are adequate for use in the work area.

#### B. Noise Surveys

1. Noise surveys must be conducted in a manner that reasonably reflects the exposure of the affected employees. Surveys must be conducted under the supervision of a URS Safety Representative.
2. Sound-level meters and audio dosimeters used to determine employee exposure to noise sources must be Type II (accurate to within +/- 2 dBA), operated in "slow" response, on the "A" scale, and be calibrated to factory guidelines (including periodic factory recalibration).
3. Attachment 026-1AMER (Sound Level Survey) and Attachment 026-2AMER (Noise Dosimetry Field Sheet) may be used to record noise surveys.

#### C. Noise Controls

Eliminate noise sources to the extent possible. Examples of controls that must be considered include:

1. Adding or replacing mufflers on motorized equipment.
2. Adding mufflers to air exhausts on pneumatic equipment.
3. Following equipment maintenance procedures to lubricate dry bearings and replace worn or broken components.
4. Isolating loud equipment with barriers.
5. Replacing loud equipment with newer and quieter models.

## **URS SAFETY MANAGEMENT STANDARD**

### **Noise and Hearing Conservation**

---

6. Using caution signs and Hearing Protection Required signs to designate noisy work areas.
7. Installing HPD-dispensing devices at the entrance to noisy work areas.

#### D. Audiometric Exams

##### 1. Tests

- a. Details on the medical surveillance program (including audiometric testing) are included in SMS 024 – Medical Screening and Surveillance.
- b. Audiometric tests will be performed by a person meeting the requirements described in 29 CFR 1910.95(g)(3). Within 6 months of an employee's first exposure at or above the action level, a valid baseline audiogram will be established, against which subsequent audiograms can be compared. Testing to establish a baseline audiogram will be preceded by 14 hours without exposure to noise. Hearing protectors may be used as a substitute for the requirement that a baseline audiogram will be preceded by 14 hours without exposure to workplace noise. The medical surveillance provider will notify employees of the need to avoid high levels of non-occupational noise exposure during the 14-hour period immediately preceding the audiometric examination. For multi-year projects, an annual audiogram will be obtained for each employee exposed at or above an 8-hour time-weighted average of 85 decibels.
- c. Each employee's annual audiogram will be compared to that employee's baseline audiogram to determine if the audiogram is valid, and if there is a standard threshold shift (STS). A standard threshold shift is a change in hearing threshold relative to the baseline audiogram of an average of 10 dB or more at 2000, 3000, and 4000 hertz (Hz) in either ear. If the annual audiogram shows that an employee has suffered an STS, the employer will obtain a retest within 30 days, and consider the results in assessing an STS as the annual audiogram. The audiologist, otolaryngologist, or physician will review problem audiograms, and will determine whether there is a need for further evaluation. If an STS has occurred, the medical surveillance provider will notify the employee in writing within 21 days of the determination.

## **URS SAFETY MANAGEMENT STANDARD**

### **Noise and Hearing Conservation**

---

#### E. Standard Threshold Shifts

If an employee's test results show a confirmed STS, their hearing protection will be evaluated and refitted, and a medical evaluation may be required.

#### F. Training

Verify that each employee who must work in a noisy environment is current on required Hearing Conservation Training. At a minimum, training shall be conducted before initial assignment and annually. Training must include the following topics:

1. The effects of noise on hearing.
2. The purpose of hearing protectors.
3. The advantages and disadvantages of various types of hearing protectors.
4. The attenuation of various types of hearing protection.
5. The selection, fitting, care, and use of hearing protectors.
6. The purpose of audiometric testing.
7. An explanation of the audiometric testing procedure.

### **5. Documentation Summary**

The following documentation will be maintained:

- A. Noise surveys, when applicable.
- B. Training records.
- C. Audiometric test results.

### **6. Resources**

- A. U.S. Occupational Safety and Health Administration (OSHA) Standard – [Occupational Noise Exposure – 29 CFR 1910.95](#)

**URS SAFETY MANAGEMENT STANDARD**  
**Noise and Hearing Conservation**

---

- B. U.S. OSHA Construction Standard – [Occupational Noise Exposure – 29 CFR 1926.52 and 1926.101](#)
- C. U.S. MSHA – Occupational Noise Exposure [30 CFR 62](#)
- D. U.S. FRA – Occupational Noise Exposure [49 CFR 227](#)
- E. [U.S. OSHA Technical Links – Noise and Hearing Conservation](#)
- F. American Industrial Hygiene Association: [Protect Yourself from Noise-Induced Hearing Loss](#)
- G. [National Hearing Conservation Association web site](#)
- H. [SMS 024](#) – Medical Screening and Surveillance
- I. [Attachment 026-1AMER](#) – Sound Level Survey
- J. [Attachment 026-2AMER](#) – Noise Dosimetry Field Sheet

# **URS SAFETY MANAGEMENT STANDARD**

## **Respiratory Protection**

---

### **1. Applicability**

This standard applies to URS Corporation and its subsidiary companies that may require the use of respiratory protection, including Immediately Dangerous to Life and Health (IDLH) and emergency conditions. This program also addresses the voluntary use of respirators.

### **2. Purpose and Scope**

The purpose of this standard is to protect those employees performing operations for which exposures cannot be controlled by use of conventional engineering or administrative controls, and prior to establishing a negative air exposure assessment, and to require that respiratory protective equipment is selected, used, maintained, and stored in accordance with acceptable practices. This procedure establishes the minimum standard for respirator training, selection, and use during the performance of all work requiring such protection.

### **3. Implementation**

Implementation of this standard is the responsibility of the URS manager directing activities of the facility, site, or project location.

### **4. Requirements**

- A. Before assigning hazardous jobs to employees, determine if respirators are required.
  - 1. Assign a project-specific Respiratory Protection Program administrator. This position shall be manned by a competent industrial hygienist or other technically qualified person who knowledgeable of the requirements of the URS and project-specific programs, have appropriate training in the principles and application of respiratory protection, and have the authority to conduct program evaluations.
  - 2. If the potential for respiratory hazards exists for any portion of a job, complete Attachment 042-1 AMER – Identifying When A Respirator Is Needed.
  - 3. Contact a local Safety Manager, Regional or Strategic Business Unit (RBU/SBU) Safety Manager, or URS Certified Industrial Hygienist (CIH) for assistance, as needed, if any of the questions in Attachment 042-1 are checked "yes."

## **URS SAFETY MANAGEMENT STANDARD**

### **Respiratory Protection**

---

4. Follow instructions in Attachment 042-2 AMER – Voluntary Use or Respirators – for employees who wish to wear respirators on a voluntary basis when not required to by URS or a regulatory agency.
  5. Follow all the requirements of this standard for employees who wish to voluntarily use tight-fitting (e.g., air purifying) respirators.
  6. Required respirators will be paid for by URS and will be provided without cost to the employee.
  7. Control worker's exposure to air contaminants, where practicable, by engineering or administrative controls, or by substitution of process materials with less-toxic substances. Use respirators only when engineering or administrative controls are not feasible or completely effective.
- B. Select the proper respirator for the job.
1. Contact the appropriate Safety Manager or CIH for assistance in respirator selection for those jobs identified in Attachment 042-1 AMER.
  2. Contact the appropriate Safety Manager for follow up if there are any problems implementing the recommendations made.
- C. Require employees who will use respirators to be medically qualified by a project medical consultant (PMC) before fit-testing and assigning them a respirator. The PMC should preferably be an occupational physician; however, the Occupational Safety and Health Administration (OSHA) allows any physician or licensed health care professional (PLHCP) to conduct evaluations of respiratory protection medical forms. The PMC, where required, will determine the physiological and psychological status that is relevant to wearing different types of respirators. The PMC will review all questionnaires and test results and verify in writing that workers are physically and psychologically able to perform work while using respiratory protective devices. These determinations will be made using guidelines established by the PMC.
1. For program details, refer to SMS 024 – Medical Screening and Surveillance.
  2. Require that employees have a current and accurate Medical Surveillance form (Attachment 024-2).
  3. Obtain a copy of the employee's Health Status Medical Report from the Office Safety Representative. The consulting occupational physician of

## **URS SAFETY MANAGEMENT STANDARD**

### **Respiratory Protection**

---

the medical service provider following each work-related examination issues the Health Status Medical Report. Employees cannot be assigned respirators unless they are medically cleared for respirator use.

- D. Require respirator users to receive appropriate training.
  - 1. All respirator users must be trained:
    - a. Before they are assigned a respirator.
    - b. Annually thereafter.
    - c. Whenever a new hazard or job is introduced.
    - d. Whenever employees fail to demonstrate proper use or knowledge.
  - 2. Document training in accordance with the requirements of SMS 055 – Training.
  - 3. Training must address, at a minimum, the following:
    - a. Why the respirator is necessary, and what conditions can make the respirator ineffective.
    - b. What the limitations and capabilities of the respirators are.
    - c. How to inspect, put on and remove, and check the seals of the respirator.
    - d. What the respirator maintenance and storage procedures are.
    - e. How to recognize medical signs and symptoms that may limit or prevent effective use of the respirator.
    - f. The engineering and administrative controls being used and the need for respirators.
    - g. The hazards and consequences of improper respirator use.
    - h. How to recognize and handle emergency situations.
- E. Require respirator users to be fit tested.
  - 1. Any employee who has been assigned a reusable respirator must be fit tested on an annual basis (no more than 1 year may elapse between fit

## **URS SAFETY MANAGEMENT STANDARD**

### **Respiratory Protection**

---

tests), or when the employee is assigned a respirator of a different make, type, or size from that previously tested.

2. Qualitative or quantitative fit testing can be performed by contract or in-house personnel.
3. Obtain a signed, written copy of the fit-test results. The fit-test results should include:
  - a. Employee's name and employee identification number.
  - b. Respirator brand, model, and size fitted for.
  - c. Date fit tested.
  - d. Method of fit testing used.
  - e. Name and signature of fit tester.
  - f. Manufacturer and serial number of fit-testing apparatus (if used).

A fit test results form is available as Attachment 042-3 AMER.

- F. The project-specific Respiratory Protection Program administrator will issue respirators to persons who must wear respirators for protection against harmful atmospheres should be given adequate training to ensure that the correct respirator is issued for each application. This training should include, but not necessarily be limited to, the following:
  1. Establishment of a working knowledge of the specific types of respirators to be issued, their limitations, and the importance of issuing only the respirators for which each user is specifically approved.
  2. Familiarization with the respirator maintenance and repair program in order to be able to identify any respirator that is improperly cleaned or needs repair.
  3. Familiarization with the procedures for respirator issue. Only persons trained to ensure that proper respirators are issued will be permitted to issue respirators to persons needing them.
- G. Where required by Section 2.C of SMS 043 – Personal Monitoring, conduct initial exposure assessments for contaminants of concern. Record collected air-monitoring data. Respiratory protection must be worn until such assessments have been conducted, and it is determined that respiratory protection is not warranted.

## **URS SAFETY MANAGEMENT STANDARD**

### **Respiratory Protection**

---

- H. Provide qualified employees with respirator(s) and adequate amounts of parts and cartridges.
  - 1. Assign employees whose duties require respirators their own respirator for which they have been fit tested.
  - 2. Provide special eyeglass inserts designed for the respirator if an employee must wear eyeglasses with a full-facepiece respirator. Contact lenses may be worn when wearing a full-facepiece respirator.
  - 3. Respirators and cartridges must be approved by the National Institute for Occupational Safety and Health (NIOSH). Military-issue respirators are approved under Military Standard AR 11-34.
  
- I. Require respirators to be used properly.
  - 1. Prohibit facial hair where the respirator-sealing surface meets the wearer's face.
  - 2. Require employees to perform a positive and negative fit check every time the respirator is put on.
  - 3. Employees will leave the area where respirators are being used:
    - a. Before removing the facepiece for any reason.
    - b. To correct any respirator malfunction.
    - c. To change the respirator and/or respirator cartridges.
    - d. The employee becomes ill (dizziness, nausea, etc.).
    - e. If any of the following is detected:
      - 1. Vapor or gas breakthrough
      - 2. Leakage around the facepiece
      - 3. Increased breathing resistance.
  - 4. Use cartridges with End-of-Service-Life indicators, or determine the respirator cartridge change-out schedule. See Supplemental Information A for guidance.
  
- J. Require respirators to be cleaned and stored properly.

## **URS SAFETY MANAGEMENT STANDARD**

### **Respiratory Protection**

---

1. Clean and disinfect respirators after each use.
  2. Store respirators in a plastic bag or case and in a clean location.
  3. Inspect respirators before use and after each cleaning.
- K. Address issues associated with special-use respirators (self-contained breathing apparatus; air-supply respirators; emergency escape respirators).

#### 1. Self-Contained Breathing Apparatus

Inspect self-contained breathing apparatus monthly and after each use in accordance with manufacturer's instructions.

#### 2. Air-Supplied Respirators

- a. Air used for atmosphere-supplying respirators must meet or exceed the requirements for Type 1 – Grade D breathing air. Never use oxygen.

1. A certificate of analysis must accompany bottled air.

2. Compressors used to supply breathing air must:

- i. Prevent entry of contaminated air into the air supply.

- ii. Minimize moisture content.

- iii. Have suitable in-line sorbent beds and filter to provide appropriate air quality.

- iv. Have a high-carbon-monoxide alarm that sounds at 10 part per million (ppm).

- b. Couplings on air-hose lines must be incompatible with other gas system.

#### 3. Emergency Escape Respirators

- a. Emergency escape respirators intended to be used only for emergency exit. This may include situations where IDLH atmospheres and oxygen-deficient conditions exist. These respirators may be used as stand-alone protection or in conjunction with air-supplied respirators.

## **URS SAFETY MANAGEMENT STANDARD**

### **Respiratory Protection**

---

- L. Require follow-up training and medical surveillance to be provided as directed.
  - 1. Provide follow-up physical examinations as directed by the SMS 024-3 AMER – Medical Screening and Surveillance Exam Protocol table.
  - 2. Provide follow-up physicals as directed by the Occupational Health Manager.
  - 3. Provide annual refresher training.
  - 4. Provide annual fit testing.
  - 5. Conduct regular evaluations to determine the effectiveness of the program's implementation. This should include interviews with employees regarding such topics as respirator selection, fit, and maintenance.
  
- M. Where required, implement procedures for dealing with entry into areas with IDLH conditions.
  - 1. Ensure at least one employee or attendant is located outside the area with the IDLH atmosphere. This person must be equipped with:
    - a. Pressure demand or other positive pressure self-contained breathing apparatus (SCBA), or a pressure demand or other positive pressure supplied-air respirator with auxiliary SCBA; and either
    - b. Appropriate retrieval equipment to removing the employee within the IDLH atmosphere, or
    - c. Equivalent means of rescue.
  - 2. Maintain communication between the employee(s) in the area with the IDLH environment and the employee(s) or attendant(s) outside the area. Communication may include visual, voice, or signal lines.
  - 3. In an emergency situation, the manager overseeing operations must be notified before employee(s) outside the area with the IDLH atmosphere enter the space.

## **URS SAFETY MANAGEMENT STANDARD**

### **Respiratory Protection**

---

#### **5. Documentation Summary**

All Respiratory Protection Program documentation must be protected by the Privacy Act of 1974 (PL-93-579), and confidential medical information not required by OSHA may be protected under the Health Insurance Portability Accountability Act of 2003 (HIPAA).

The following information will be maintained in the office/project file by the Project Manager:

1. Identifying When A Respirator Is Needed – Attachment 042-1 AMER.
2. Voluntary Use of Respirators – Attachment 042-2 AMER.
3. Fit Test Record – Attachment 042-3 AMER.
4. Employee Health Status Medical Report, including clearance for respirator use.
5. Employee Respirator Training Records.

#### **6. Resources**

- A. U.S. OSHA Standard - [Respiratory Protection](#) – 29 Code of Federal Regulations (CFR) 1910.134
- B. U.S OSHA Technical Links – [Respiratory Protection](#)
- C. [ANSI Z88.6-2006](#) – Respirator Use – Physical Qualifications for Personnel
- D. [AIHA](#), The Occupational Environment – Its Evaluation and Control
- E. [NIOSH Respirator Decision Logic](#)
- F. [NIOSH Guide to Industrial Respiratory Protection](#)
- G. [SMS 024](#) – Medical Screening and Surveillance Program
- H. [SMS 055](#) – Safety Training
- I. [Attachment 042-1 AMER](#) – Identifying When a Respirator is Needed
- J. [Attachment 042-2 AMER](#) – Voluntary Use of Respirators
- K. [Attachment 042-3 AMER](#) – Fit Test Record

**URS SAFETY MANAGEMENT STANDARD**  
**Respiratory Protection**

---

- L. [Attachment 042-4 AMER](#) – Respirator Standard Operating Procedure

**7. Supplemental Information**

- A. [Respirator Cartridge Change Schedule](#)
- B. [Hazard Analysis for Respirator Use](#)
- C. [Fit Testing Guidance](#)
- D. [Respirator Selection Guidance](#)
- E. [Inspection, Cleaning, and Storage Guidance](#)

# **URS SAFETY MANAGEMENT STANDARD**

## **Personal Monitoring (Industrial Hygiene)**

---

### **1. Applicability**

This standard applies to the operations of URS Corporation and its subsidiary companies where employees may be exposed to airborne concentrations of hazardous air contaminants potentially exceeding permissible limits. Note that this standard does not cover monitoring for asbestos operations (SMS 008 – Asbestos Operations), hexavalent chromium (SMS 083 – Chromium (VI) Inhalation Exposure Protections), confined spaces (SMS 010 – Confined Space), heat stress (SMS 018 – Heat Stress), or noise (SMS 026 – Noise and Hearing Conservation).

### **2. Purpose and Scope**

The purpose of this standard is to assist and provide guidance to URS personnel who need to conduct personal industrial hygiene monitoring. Monitoring will be conducted to evaluate the exposures of URS employees to concentrations of toxic particulates, fibers, gases, vapors, mists, radionuclides, pathogens, hazardous biological agents, or to oxygen-deficient atmospheres.

Personal monitoring must be conducted under the following conditions:

- A. Where directed by a facility or site-specific health and safety plan.
- B. Where employees are exposed to known or suspected human carcinogens (e.g., beryllium, vinyl chloride, etc.).
- C. Where regulations require "initial exposure assessments" (e.g., lead, asbestos, methylene chloride, hexavalent chromium). The only exception to conducting an "initial exposure assessment" where there is a regulatory requirement to do so is when similar exposure assessments have been conducted under similar site conditions within 1 year prior to the start of work on the current project or site.
- D. When directed by a client or required by contract.
- E. At the direction of a Safety Manager in response to employee concerns or incidents involving chemical exposure.
- F. Co-sampling during regulatory inspections.
- G. Routine monitoring in compliance with regulatory requirements.

## **URS SAFETY MANAGEMENT STANDARD**

### **Personal Monitoring (Industrial Hygiene)**

---

#### **3. Implementation**

Implementation of this standard is the responsibility of the URS manager directing activities of the facility, site, or project location.

#### **4. Requirements**

##### **A. Procedures for Personal Industrial Hygiene Monitoring**

1. Calibrate sampling equipment in accordance with the manufacturer's recommendations and the approved sampling methodology.
2. Collect samples using the most current applicable methodologies established by either the National Institute for Occupational Safety and Health (NIOSH) *Manual of Analytical Methods*, U.S. Department of Labor – Occupational Safety and Health Administration (OSHA) *Sampling and Analytical Methods*, or applicable guidelines for the host country.
3. Select an analytical laboratory accredited by the American Industrial Hygiene Association (AIHA), or equivalent host country certification, licensing, or accreditation, to analyze the personal air samples.

Note: There are several programs under which a laboratory may receive AIHA accreditation. The laboratory must be currently accredited for the specific program, scope category, and field of testing for the analysis that will be performed, not merely hold AIHA accreditation.

4. Require the selected laboratory to use the applicable analytical methodologies and document quality control procedures.
5. Ensure equipment is maintained, serviced, and calibrated in accordance with manufacturer's recommendations.
6. Document personal monitoring activities using the appropriate URS Industrial Hygiene Monitoring Form; require that all laboratory chain-of-custody forms be properly completed; and ensure samples are sealed and secured according to Quality Assurance procedures.

## **URS SAFETY MANAGEMENT STANDARD**

### **Personal Monitoring (Industrial Hygiene)**

---

7. Ensure workers are being protected (e.g., engineering controls, respiratory protection, PPE) during the monitoring phase. Determine whether medical surveillance is required.

#### B. Evaluation of Personal Monitoring Results

1. Where feasible, require that a URS Certified Industrial Hygienist (CIH) approved by a Safety Manager evaluate the analytical results.
2. Obtain a written evaluation report from the Safety manager. If exposures exceed the Action Level and/or Permissible Exposure Limit for the air contaminant(s) of concern, a verbal report is to be made to the senior facility, project, or site manager immediately, and the evaluation report will include required corrective actions.
3. Complete evaluation reports within 5 working days of the receipt of the analytical results.

#### C. Procedures for Direct-Read Air Monitoring

1. Direct-read air monitoring instruments are used primarily as screening tools to provide real-time evaluations of hazardous airborne contaminants at a project site.
2. Select an appropriate air monitor for the air contaminant to be measured.
3. Calibrate monitor in accordance with manufacturer's recommendations. Dates of full instrument calibration will be recorded on the direct-read instrument and on any associated calibration data sheets. If full instrument calibrations are not performed daily, then bump tests (exposure to a known concentration of contaminant) will be performed to verify calibration and ensure alarms are working appropriately.
4. Conduct air monitoring using techniques identified by the instrument manufacturer.
5. Ensure equipment is maintained, serviced, and calibrated in accordance with manufacturer's recommendations.
6. Document personal monitoring activities using the appropriate URS Industrial Hygiene Monitoring Form.

## **URS SAFETY MANAGEMENT STANDARD**

### **Personal Monitoring (Industrial Hygiene)**

---

7. Ensure workers are being protected (e.g., engineering controls, respiratory protection, PPE) during the monitoring phase. Determine whether medical surveillance is required.
8. Where required by client request or by unique or high hazard areas, individual portable direct-read monitors shall be used.

#### D. Evaluation of Personal Monitoring Results

1. Compare measured results with project-specific Action Levels and/or published Permissible Exposure Limits. If exposures exceed the Action Level and/or Permissible Exposure Limit for the air contaminant(s) of concern, take corrective actions as identified in the site-specific health and safety plan. Where questions exist about the results, contact a CIH approved by a Safety Manager to evaluate the analytical results.

#### E. Communication of Sample Results and Evaluation

1. Provide copies of the evaluation report to the employee(s) monitored and to employees working in the area for which the exposures could be representative, within 5 days of receipt of lab results.
2. Provide a copy of the evaluation report and monitoring data to the manager directing activities of the facility or site for filing purposes.
3. Personal identifiers (e.g., name, address, employee number) or information which could reasonably be used to identify specific employees (e.g., exact age, height, weight, race, sex, date of initial employment, job title), must be removed from analysis reports before access to the exposure data is provided.

#### F. Corrective Actions

Implement required corrective actions immediately. If workers are being exposed above the PEL, respiratory protection should be worn in accordance with SMS 042 – Respiratory Protection. Engineering controls should be used to reduce exposures to the extent possible

#### G. Exposure Records

1. Exposure records include workplace monitoring, biological monitoring, material safety data sheets and chemical inventories. Sampling results, the collection methodology (sampling plan), a

## **URS SAFETY MANAGEMENT STANDARD**

### **Personal Monitoring (Industrial Hygiene)**

---

description of the analytical and mathematical methods used, and a summary of other background data relevant to interpretation of the results obtained, must be retained for at least thirty (30) years.

#### **5. Documentation Summary**

The following documents will be maintained in the project profile:

- A. Calibration data.
- B. Completed IH Monitoring Form(s).
- C. Evaluation Report with sample results (provide copy to affected employee as well).
- D. Relevant prior initial exposure assessments.

#### **6. Resources**

- A. [OSHA Sampling and Analytical Methods](#)
- B. [OSHA Chemical Sampling Information](#)
- C. [American Industrial Hygiene Association – The Occupational Environment: Its Evaluation and Control](#)
- D. [American Conference of Governmental Industrial Hygienists – Air Sampling Instruments for Evaluation of Atmospheric Contaminants](#)
- E. [NIOSH Manual of Analytical Methods](#)
- F. [SMS 008](#) – Asbestos Operations
- G. [SMS 010](#) – Confined Space
- H. [SMS 018](#) – Heat Stress
- I. [SMS 026](#) – Noise and Hearing Conservation
- J. [SMS 042](#) – Respiratory Protection
- K. [SMS 050](#) – Toxic and Hazardous Substances
- L. [Attachment 043-1 AMER](#) – General Industrial Hygiene Survey Form
- M. [Attachment 043-2 AMER](#) – Industrial Hygiene Sample Field Sheet

**URS SAFETY MANAGEMENT STANDARD**  
**Personal Monitoring (Industrial Hygiene)**

---

- N. [Attachment 043-3 AMER](#) – Total Dust Industrial Hygiene Sample Field Sheet
- O. [Attachment 043-4 AMER](#) – Respirable Dust Industrial Hygiene Sample Summary
- P. [Attachment 043-5 AMER](#) – Detector Tube Industrial Hygiene Sample Summary
- Q. [Attachment 043-6 AMER](#) – Gas/Vapor/Fume/Mist Industrial Hygiene Sample Summary
- R. [Attachment 043-7 AMER](#) – Combustible Gas Monitor Industrial Hygiene Sample Summary
- S. [Attachment 043-8 AMER](#) – PID/FID Monitoring Report

**7. Supplemental Information**

- A. [Industrial Hygiene and Medical Surveillance Evaluation Form](#)

# **URS SAFETY MANAGEMENT STANDARD**

## **Hand Safety**

---

### **1. Applicability**

This standard applies to URS Corporation and its subsidiary companies where the potential for hand injuries is present.

Appropriate gloves must be worn when persons work with materials or equipment that presents the potential for hand injury due to sharp edges, corrosives, flammable and irritating materials, extreme temperatures, splinters, etc.

### **2. Purpose and Scope**

This standard is intended to protect employees from activities that may expose them to injury. This standard provides information on recognizing those conditions that require personal protective equipment (PPE) or specific work practices to reduce the risk of hand injury.

### **3. Implementation**

Implementation of this standard is the responsibility of the URS manager directing activities of the facility, site, or project location.

### **4. Requirements**

#### **A. Hazard Assessment**

1. Perform hazard assessments for those work activities likely to require PPE.
  - a. Use the PPE Hazard Assessment Certification Form – Attachment 029-1 AMER to perform the assessment. The Hazard Assessment Certification Form will accompany URS personnel at jobsites for use in the event of a job or task change, or
  - b. Use the Gloves Needs Assessment and Selection – Attachment 064-1 AMER to perform the assessment.
  - c. Reevaluate completed hazard assessments when the job or task changes.
2. If possible, eliminate the hazards identified through engineering or administrative controls. Examples of controls are chemical substitution, machine guarding, and use of different tools.

## **URS SAFETY MANAGEMENT STANDARD**

### **Hand Safety**

---

3. Select PPE that will protect employees if hazards cannot be eliminated.
    - a. Review Safety Data Sheets for project or task-specific chemicals to determine appropriate PPE. If needed, consult with a URS safety representative for assistance.
    - b. Review glove manufacturer recommendations for both physical and chemical protection.
    - c. Obtain gloves of the correct size for project field staff.
    - d. When both chemical and physical protection is of concern, wear the chemical protection gloves (e.g., nitrile) inside the physical protection gloves (e.g., leather, Kevlar®).
    - e. Latex gloves are not recommended for chemical protection.
    - f. Do not wear metal or metal-reinforced gloves when working with electrical equipment or on electrical services. Proper leather and/or rubber gloves designed and tested for this purpose should be used.
  4. Follow glove requirements in the project-specific safety plan.
- B. Guidelines for Working With and Around Equipment (Hand Tools, Portable Powered Equipment)
1. General
    - a. Employees should be trained in the use of all tools.
    - b. Keep hand and power tools in good repair and use them only for the task for which they were designed.
    - c. Inspect tools before use and remove damaged or defective tools from service.
    - d. Operate tools in accordance with manufacturer's instructions.
    - e. Do not remove or bypass a guarding device for any reason.
    - f. Keep surfaces and handles clean and free of excess oil to prevent slipping.
    - g. Wear proper PPE, including gloves, as necessary.
    - h. Do not carry sharp tools in pockets.

## **URS SAFETY MANAGEMENT STANDARD**

### **Hand Safety**

---

- i. Clean tools and return to the toolbox or storage area upon completion of a job.
  - j. Before applying pressure, ensure that wrenches have a good bite.
    - i. Brace yourself by placing your body in the proper position so you will not fall if the tool slips.
    - ii. Make sure hands and fingers have sufficient clearance in the event the tool slips.
    - iii. Always pull on a wrench, never push.
  - k. When working with tools overhead, place tools in a holding receptacle when not in use.
  - l. Do not throw tools from place to place or from person to person, or drop tools from heights.
  - m. Inspect all tools prior to start-up or use to identify any defects.
  - n. Powered hand tools should not be capable of being locked in the ON position.
  - o. Require that all power-fastening devices be equipped with a safety interlock capable of activation only when in contact with the work surface.
  - p. Do not allow loose clothing, long hair, loose jewelry, rings, and chains to be worn while working with power tools.
  - q. Do not use cheater pipes.
  - r. Make provisions to prevent machines from restarting through proper lockout/tagout (refer to SMS 023 – Lockout and Tagout Safety).
2. Cutting Tools
- a. Always use the specific tool for the task. Tubing cutters, snips, self-retracting knives, concealed blade cutters, and related tools are task specific and minimize the risk of hand injury. For more information about cutting tools, see Supplemental Information A.
  - b. Fixed open-blade knives (FOBK) are prohibited from use. Examples of fixed open-blade knives include pocket knives, multitools, hunting knives, and standard utility knives.

## **URS SAFETY MANAGEMENT STANDARD**

### **Hand Safety**

---

- c. When utilizing cutting tools, personnel will observe the following precautions to the fullest extent possible:
  - i. Use the correct tool and correct size tool for the job.
  - ii. Cut in a direction away from yourself and not toward other workers in the area.
  - iii. Maintain the noncutting hand and arm toward the body and out of the direction of the cutting tool if it were to slip out of the material being cut.
  - iv. Ensure that the tool is sharp and clean; dirty and dull tools typically cause poor cuts and more hazard than a sharp, clean cutting tool.
  - v. Store these tools correctly with covers in place or blades retracted, as provided by the manufacturer.
  - vi. On tasks where cutting may be very frequent or last all day (e.g., liner samples), consider Kevlar® gloves in the PPE evaluation for the project.
  - vii. Do not remove guards on paper cutters.
  - viii. In office locations, paper cutters must always be kept in a locked position when not in use.

### 3. Moving/Rotating Equipment

- a. General Requirements for Rotating Equipment (feed augers, chippers, conveyors, etc.)
  - i. Never place hands, fingers, or extremities near hoppers and operational areas of machinery.
  - ii. When the equipment is rotating, stay clear of the rotating components and only operate equipment with proper machine guarding in place.
  - iii. Never clean a jammed piece of equipment unless the transmission is in neutral and the power source or the engine is off, and the moving parts of the equipment have stopped rotating. Refer to SMS 023 – Lockout and Tagout Safety.

### 4. Other Physical Hazards

## **URS SAFETY MANAGEMENT STANDARD**

### **Hand Safety**

---

- a. Activities such as drum handling, fencing, work near razor wire, manhole cover removal, and demolition also pose hazards to hands. Use tools instead of hands for high hazard tasks whenever possible.
- b. Plan work to avoid pinch points for hands when moving drums, moving manhole covers into position, and handling other heavy objects.
- c. Work handling scrap metal, glass or other sharp edges requires proper hand PPE (Kevlar® or leather gloves).

#### C. Ergonomics – Hand and Wrist Care

1. Keep your wrist in neutral. Avoid using your wrist in a bent (flexed), extended, or twisted position for long periods of time. Instead try to maintain a neutral (straight) wrist position. Ergonomic tools may be needed for long-term work.
2. Watch your grip. Gripping, grasping, or lifting with the thumb and index finger can put stress on your wrist. When practical, use the whole hand and all the fingers to grasp an object.
3. Minimize repetition. Even simple, light tasks may eventually cause injury. If possible, avoid repetitive movements or holding an object in the same way for extended periods of time.
4. Reduce speed and force. Reducing the speed with which you do a forceful, repetitive movement gives your wrist time to recover from the effort. Using power tools helps reduce the force.
5. Rest your hands. Periodically give your hands a break by letting them rest briefly. Or you may be able to alternate easy and hard tasks, switch hands, or rotate work activities.
6. Consider low vibration or anti- vibration hand power tools when possible.

#### D. Biological Impacts

1. Poisonous Plants
  - a. Personnel in regions where there is the potential for contact with poisonous plants should be aware of the hazard.
    - i. Avoid contact with poisonous plants.
    - ii. Wear appropriate PPE.

## **URS SAFETY MANAGEMENT STANDARD**

### **Hand Safety**

---

- iii. Clean hands thoroughly after contact before performing additional work tasks.
  - iv. Clean any tools used to cut poisonous plants before returning the tools to storage.
2. Further information can be obtained from SMS 047 – Biological Hazards.

#### E. Cleaning Hands

1. Avoid contamination of hands by proper use of gloves when contact with physical, chemical, or biological hazards is possible.
2. Use soap and water for normal hand cleaning. Do not use solvents for cleaning as they remove essential oils in the skin and may cause dermatitis. Do not use pressure washers for hand cleaning.
3. If the hands contact a corrosive (e.g., nitric acid), wash the area with water for fifteen minutes and then seek medical attention.
4. Use antibiotic ointment and skin protection on minor breaks/scratches of the skin.
5. In some cases barrier creams may be used to provide limited protection for hands exposed to greases and oils.

#### F. Safe Hands Observation Tool

1. The Safe Hand Task Review Card (Supplemental Information C) may be used to supplement and reinforce safe work practices and the requirements of this SMS.
2. The observer's responsibilities include:
  - a. Two-way conversation with the employees being observed.
  - b. Completing the card and mark the applicable fields on the back of the card.
  - c. Submitting the completed cards to the supervisor.
3. The supervisor's responsibilities include:
  - a. Reviewing the completed cards.
  - b. Identifying best work practices and any improvements.

## **URS SAFETY MANAGEMENT STANDARD**

### **Hand Safety**

---

- c. Communicating any changes back the employee(s).

#### **5. Documentation Summary**

The following documentation will be maintained in the project file:

- A. Hand tool training records, as applicable.

#### **6. Resources**

- A. U.S. OSHA Regulation - [29 Code of Federal Regulations \(CFR\) 1910.138](#) – Hand Protection
- B. American National Standards Institute/International Safety Equipment Association (ANSI/ISEA) – 105-2011 – American National Standard for Hand Protection Selection Criteria
- C. Chemical resistant glove selection: <http://www.bestglove.com/>
- D. [Attachment 064-1](#) – Glove Needs Assessment and Selection
- E. [SMS 016](#) – Hand Tools and Portable Equipment
- F. [SMS 023](#) – Lockout and Tagout Safety
- G. [SMS 029](#) – Personal Protective Equipment
- H. [SMS 047](#) – Biological Hazards
- I. [SMS 054](#) – Office Ergonomics
- J. [SMS 056](#) – Drilling Safety Guidelines

#### **7. Supplemental Information**

- A. [Safer Alternative Tools](#)
- B. [Guidelines for Safe Hands Free Lifting](#)
- C. [Safe Hands Task Review Card](#)

# **URS SAFETY MANAGEMENT STANDARD**

## **Manual Material Handling**

---

### **1. Applicability**

This standard applies to URS Corporation and its subsidiary companies where personnel perform manual handling of materials. For this procedure, manual material handling (MMH) is defined as the movement of items by lifting, lowering, pushing, pulling, carrying, holding, or restraining.

### **2. Purpose and Scope**

The purpose of this standard is to prevent common injuries caused by the practice of MMH. Immediate or short-term effects include lacerations, bruises, and muscle fatigue. Long-term effects include chronic pain, frequently in the lower back but also in limb joints and ligaments.

### **3. Implementation**

Implementation of this standard is the responsibility of the URS manager directing activities of the facility, site, or project.

### **4. Requirements**

#### **A. General**

1. Prior to lifting, lowering, pushing, pulling, carrying, holding, or restraining an object of any significant size or weight, employees must evaluate the object and the required task to determine whether they can handle the object safely.
2. If the employee has any doubt about whether he or she can safely move the object alone, the employee should obtain additional manual or mechanical help. Consider using lifting equipment such as dollies, hand trucks, lift-assist devices, jacks, carts, or hoists. When applicable, engineering controls such as conveyors, lift tables, and work station design must be considered.
3. Healthy employees with no physician-imposed restrictions should be able to lift and carry a maximum of 50 pounds (23 kilograms) using proper lifting and carrying techniques. Physical and workplace factors may reduce this recommended weight limit (RWL) significantly and should be considered prior to attempting lifts of this magnitude. Examples of physical and workplace factors may include the following:
  - a. Physical size of an object.
  - b. Slippery container surface or poor grip ability.
  - c. Sharp edges.

## **URS** SAFETY MANAGEMENT STANDARD **Manual Material Handling**

---

- d. Slippery floors or obstacles on the floor.
  - e. Cold or hot objects surfaces.
  - f. Distance and route of travel.
4. An employee's personal "safe" MMH capability is defined as the employee's personal capability to manually lift, carry, push, or pull an object alone. This "safe" limit must consider the employee's past experience and training with MMH, health status, and any other personal or environmental characteristics affecting the employee's ability to perform these tasks. An employee's "safe" MMH capability is typically at or below the calculated RWL. In some cases, a trained and physically conditioned employee may exceed the MMH capability limit, but only after a complete hazard review of the task has determined an acceptable risk for minimizing injury.
  5. An MMH task that exceeds an employee's personal "safe" MMH capability or RWL should be brought to the attention of the applicable manager or safety supervisor for the project.
  6. If, due to a medical or health condition, the employee's physician or the employee has set a personal "safe" MMH capability, then appropriate medical documentation must be provided to the applicable manager to define these limits. The manager and appropriate safety supervisor should evaluate the tasks to which that employee is assigned and recommend a specific course of action to limit the potential for injury. This should include periodic monitoring of the employee and his/her work environment.
  7. A recommended RWL can be calculated using the factors described in Supplemental Information A. The weight limit derived from these calculations is considered to be a load that over 99% of men and over 75% of women can safely handle without application of engineering or administrative controls. **Implementation of the calculations in Supplemental Information A should be attempted only with the assistance of a safety professional knowledgeable in the application of these factors. The calculations are intended to determine RWLs for repetitive lifting scenarios rather than occasional lifts.**
  8. Prior to any manual lift, it is suggested that the employee warm up his or her muscles and joints using a combination of stretching and flexing.

### B. Preplanning

## **URS** SAFETY MANAGEMENT STANDARD **Manual Material Handling**

---

1. Where MMH will be a necessary function of the task, the manager and/or safety supervisor should perform a thorough evaluation of the activities to determine ergonomic solutions to reduce or eliminate conditions that can cause or contribute to MMH injuries.
2. If a heavy object is to be moved to another location, the safest transport route should be determined prior to the activity.
3. The area around the object and the route over which it will be transported should be checked for slip, trip, and fall hazards. Hazards should be removed prior to initiation of the task. Adequate lighting should be checked and tasks performed in cold conditions may need to consider local heating or warm up break areas.
4. The object to be moved should be inspected for grasping or handling hazards, such as slivers, sharp edges, grease, water, etc. Eliminate or abate any identified hazards where possible. See SMS 064 and Attachment 064 -1 for guidance on selecting proper gloves for the task. Safe grasping or handling points on the object should be determined. Whenever possible, containers with carrying handles should be used for objects because they increase the manual grip strength for holding the object, thus providing better control and reduced muscle fatigue.
5. The distance to be traveled and the length of time that a grip on the object must be maintained should be considered before moving objects. If the travel distance is greater than 10 feet (3 meters) at maximum RWL, the employee should consider using an alternative method, rather than manually carrying the object.

### C. Lifting/Lowering Guidelines

1. Reduce or eliminate manual lifting and lowering tasks where possible. Determine whether there are ways to abate the safety and ergonomic hazards associated with manual lifting.
2. The recommended technique for two-handed manual lifting/lowering involves five maneuvers:
  - a. Get a firm footing. Keep your feet apart for a stable base. Put one foot slightly in front of the other.
  - b. Bend your knees. Do not bend at the waist. When grasping the object, a firm grip should be obtained before lifting/lowering.
  - c. Lift/lower with your legs. Lift/lower the load slowly and in a straight line, avoiding sudden movements.

## **URS** SAFETY MANAGEMENT STANDARD

### **Manual Material Handling**

---

- d. Keep the load close to the body. Generally, the closer the load is to the body, the less force it exerts on your back.
  - e. Keep your back straight, your head and shoulders up, and your stomach muscles tight. Do not add the weight of your body to the load. Avoid twisting.
3. When a turn or change of direction is necessary, the object should be lifted or lowered into a carrying position, then the whole body should be turned with the feet, avoiding any trunk twisting motion.
  4. Objects to be lifted to shoulder height should first be lifted to waist height, then rested on a level surface so the grasping position can be changed prior to lifting to a higher level.
  5. Employees should never lift a load above shoulder height. Tasks requiring lifts above this height must consider step platforms or lowering the required placement location.

#### D. Carrying/Holding Guidelines

1. Manual carrying is an inefficient way of transporting materials in the work place. Where possible, reduce or eliminate manual carrying tasks.
2. Never carry a load above the head.
3. Carry an object close to the body using both hands. The optimal carry zone should have the elbows at a 90 degree angle. One-handed carries are awkward and tend to unbalance the employee.
4. Do not carry objects that are so large they will obstruct visibility.
5. Do not change grips on an object while carrying or holding an object. Rest the object on a secure surface prior to changing grip.
6. If an object is of a size, shape, or mass that it requires two people to carry, use two people of similar size and physique. Two-person lifts should be planned and coordinated before performing the lift. Lift the item in unison.
7. Avoid carrying objects on stairs, particularly where the line of sight may be obstructed or the object can interfere with leg movement. All travel on stairs requires use of a handrail at all times, so only carry objects that can be safely handled with one hand. Always maintain handrail contact when carrying an object up or down stairs.

#### E. Pushing/Pulling Guidelines

## Manual Material Handling

---

1. Check the condition of the floor, ground, or other surface prior to pushing or pulling an object across it.
2. Be aware of the “break out” force of the object; this is the force at which a push or pull overcomes the frictional force between the surface and object. Adjust posture to avoid losing balance when this point is reached.
3. Get assistance when moving or guiding a large load.
4. Where possible, always push rather than pull a load.
5. When possible push at waist height not shoulder. The force capability at shoulder height is 50% less than at waist level.
6. When pulling a load be sure to have a well-lit and clear path of travel.
7. Casters or wheels on carts should be at least 6 inches diameter for heavier loads in order to exercise adequate control on rough or inclined surfaces. Tire materials should be suitable for the surface of travel.
8. Never load the cart or load-carrying device in such a manner that visibility is obstructed in the path of travel.
9. When pushing or pulling an object on an inclined surface, be certain that you can control the load and direction of travel before proceeding. Obtain additional support to control the load if necessary.
10. Never leave carts or loads in an area that will present a hazard to other workers. Make sure carts or transport devices are secured in position before leaving them unattended.

### F. Workplace Design

1. Store heavy or bulky materials at heights between the knee and shoulder to avoid the need to stretch or bend. Use step stools to load and access objects above shoulder height.
2. Pack or arrange items to be lifted to avoid shifting of weight in the package. If a box has hand cutouts (e.g., file archive boxes) do not load the box so full that the handles cannot be used for carrying the box.
3. Design work areas to avoid the need to lift, carry, push, or pull heavy or bulky materials for extended distances.
4. Design workplaces with the following in mind:
  - a. Lifts from the floor should be avoided.
  - b. The torso should never twist while handling loads.
  - c. Asymmetrical or unbalanced one-handed lifts should be avoided.

# **URS SAFETY MANAGEMENT STANDARD**

## **Manual Material Handling**

---

- d. Loads should not be lifted with sudden movements.
- e. Loads should not be lifted over obstacles.
- f. Loads should not be lifted at extended forward or sideway reaches.
- g. Uncomfortable or static postures should not be necessary throughout the work cycle.
- h. Environmental factors (e.g., task lighting, dry work surfaces, heat or cold stress) should be considered.

### **G. Training**

1. Personnel who may have MMH as part of their duties are required to receive training that includes the following topics:
  - a. Showing personnel how to avoid unnecessary physical stress and strain during MMH operations.
  - b. Teaching personnel to become aware of what they can comfortably handle without undue strain.
  - c. Instructing personnel on the proper use of equipment.
  - d. Teaching personnel to recognize potential hazards and how to prevent or correct them.
2. This training must be completed prior to an employee being assigned to a task that involves MMH activities.
3. Assistance with training or training materials is available through the HSE staff.

### **5. Documentation Summary**

The following documentation will be maintained in the project file:

- A. Training rosters.
- B. Other proof of completion of MMH training.

### **6. Resources**

- A. National Institute for Occupational Safety and Health (NIOSH) – Work Practices Guide for Manual Lifting <http://www.cdc.gov/niosh>
- B. Canadian Centre for Occupational Health and Safety <http://www.ccohs.ca/oshanswers/ergonomics/>

**URS SAFETY MANAGEMENT STANDARD**  
**Manual Material Handling**

---

- C. Oregon OSHA – Ergonomics of Manual Materials Handling  
<http://www.cbs.state.or.us/external/oshapdf/workshops/206w.pdf>
- D. North Carolina Department of Labor – A Guide to Manual Materials Handling and Back Safety <http://www.nclabor.com/oshapdf/etta/indguide/ig26.pdf>

**7. Supplemental Information**

- A. [Recommended Weight Limit \(RWL\) Calculations](#)

**Appendix C**

**Air Monitoring Plan - Revised**

# Air Monitoring Plan- Revised

Former Cutler Power Plant Property  
HWR-442/File-16360/IW-79  
14925 SW 67th Avenue,  
Palmetto Bay, Miami-Dade County, Florida



Prepared by:

**AECOM**

7800 Congress Avenue, Suite 200  
Boca Raton, Florida 33434

July 2016

AECOM Job No.: 60321482

**Disclaimer**

*This Air Monitoring Plan, and each of its provisions, is applicable only to, and for use only by, AECOM, its affiliates, and its subcontractors. Any use of this Plan by other parties, including, without limitation, third party contractors on projects where AECOM is providing engineering, construction management or similar services, without the express written permission of AECOM, will be at that party's sole risk, and AECOM Corporation shall have no responsibility therefore. The existence and use of this Plan by AECOM shall not be deemed an admission or evidence of any acceptance of any safety responsibility by AECOM for other parties unless such responsibility is expressly assumed in writing by AECOM in a specific project contract.*

---

---

Table of Contents

	<b>Page</b>
<b>1. Purpose and Introduction</b> .....	1
<b>2. Site Description</b> .....	1
<b>3. Air Monitoring</b> .....	1
3.1 Meteorological Monitoring .....	2
3.2 Air monitoring and sampling Stations .....	2
3.3 Monitoring equipment.....	3
3.4 Action levels.....	4
3.5 Dust Exposure.....	5
<b>4. Personal air sampling plan</b> .....	6

**Appendices**

Appendix A - Figure 1 – Site Vicinity Map  
                  Figure 2 - Air Monitoring Locations

Appendix B - Manufacturer data for Air Monitoring Equipment

---

## **LIMITATIONS/DISCLAIMER**

This Air Monitoring Plan (AMP) has been prepared on behalf of Florida Power and Light (FP&L) with specific application for the proposed site remediation activities at the former Cutler Power Plant property. The AMP should be modified in case of any changes in environmental or site conditions and/or revised scope of work. This plan should be used in conjunction with the approved AECOM Health and Safety Plan for this site.

This AMP dated July 8, 2016 has been prepared and reviewed by the following:

---

**Sonia Burkule**  
Environmental Engineer

---

**Vivek S. Kamath, P.E.**  
Senior Project Engineer

---

**Ben T. Foster, P.G.**  
Project Manager

*Note: Signature page will be provided prior to the commencement of construction activities*

---

**1. PURPOSE AND INTRODUCTION**

The purpose of this AMP is to monitor air quality and implement proper dust control measures to protect on-site and offsite personnel, adjacent residential properties, and school areas from air-borne contaminants during the proposed construction activities at the former Cutler Power Plant Property (Site), owned by Florida Power & Light (FP&L). Corrective actions are proposed to remediate the soil and groundwater media at the Site.

**2. SITE DESCRIPTION**

The Cutler property covers approximately 82 acres and is located at 14925 SW 67th Avenue, in eastern Miami-Dade County, Florida. The Site is bordered to the north by residential properties, to the east and southeast by surface waters contiguous with Biscayne Bay, to the south by SW 152nd Street (Coral Reef Drive), and to the west by SW 67th Avenue (Ludlum Road). The Site is located west of Paradise Point on Biscayne Bay, 15 miles south of Miami. The Site vicinity is included as **Figure 1** in **Appendix A**.

Site assessment activities confirmed presence of metals impacted soil and groundwater media at the Site. Contaminated soil with arsenic and vanadium concentrations above the residential/commercial cleanup target levels is present in the eastern, western and central portions of the Site. The remedial actions include installing a geotextile liner at the surface of the impacted area and covering with one foot of clean soil. Subsequently, the areas will be seeded for vegetative layer. No invasive techniques for soil removal are proposed as part of remedial actions except in areas designated for installation of utilities. Personnel exposure to dust or contaminated air is anticipated when trucks transporting clean fill enter or exit the Site and a minimal exposure during Site construction activities.

**3. AIR MONITORING**

The purpose of air monitoring will be to monitor the levels of air particulates during Site remediation activities. Monitoring data will be used to implement dust control measures to minimize dust generation and onsite personnel exposure. The monitoring activities will include using data recorders, personnel air monitors and collection of air samples for laboratory analysis.

Background air monitoring activities will be conducted in accordance with the following table:

<b>Parameter</b>	<b>Analytical Method</b>	<b>Frequency</b>
TSP	40 CFR Part 50 Appendix B	Two days
PM10	USEPA Reference Method: RFPS-1298-124 (BGI Manual Reference Method)	Two days
Metals	EPA Method 6010B	Two days

Air monitoring during construction activities will be conducted in accordance with the following table.

Parameter	Analytical Method	Frequency
TSP	40 CFR Part 50 Appendix B	Daily first week; Every other day starting second week
PM10	USEPA Reference Method: RFPS-1298-124 (BGI Manual Reference Method)	Daily
Metals	EPA Method 6010B	Daily first week; Every other day starting second week

### 3.1 METEOROLOGICAL MONITORING

Meteorological data will be recorded using a weather monitor to record temperature, wind direction, wind speed, barometric pressure, and humidity data. Wireless Vantage Pro2 will be used to record the meteorological data.



Manufacturer’s data for the weather station is included as **Appendix B**.

### 3.2 AIR MONITORING AND SAMPLING STATIONS

The sample locations will be at the perimeter of the work area or Exclusion Zone just inside the construction fence with potential receptors. The air monitoring locations are illustrated on **Figure 2**. The monitoring locations will be revised based on Site and weather conditions during the construction activities.

The DataRAM dust monitor will be setup at a stationary downwind location; however, this stationary location may be relocated based on wind direction. Additionally, the unit may periodically be removed from its stationary mounting

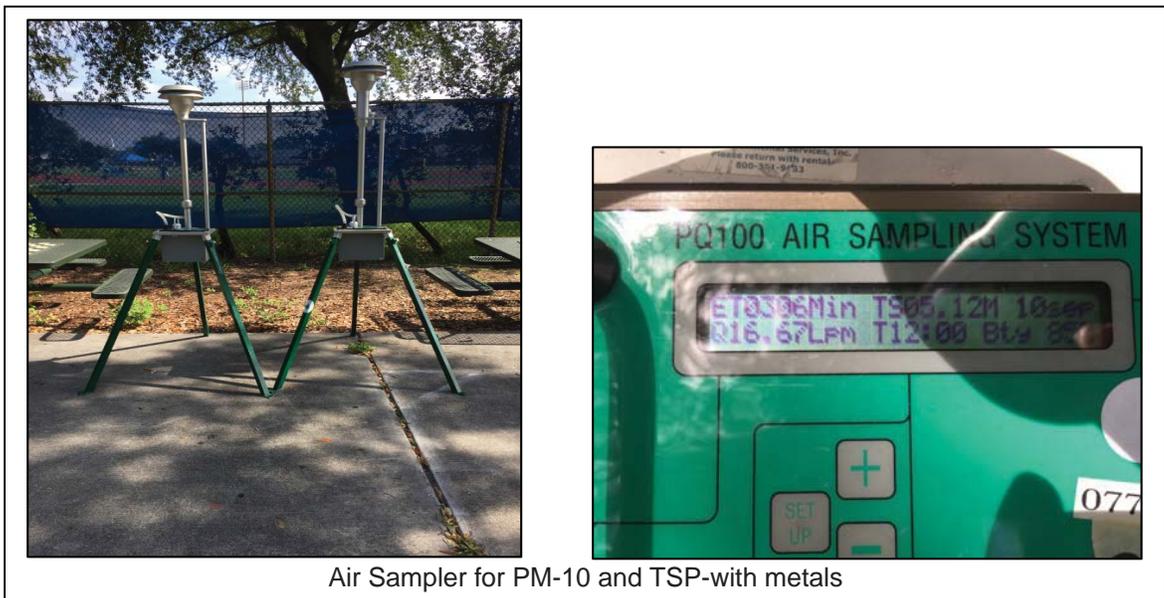
and used as roving unit to measure upwind concentrations or concentrations directly adjacent to work activities.

### 3.3 MONITORING EQUIPMENT

Air monitoring equipment selected for the proposed scope of work is based on the test method used for pollutant as developed by the US Environmental Protection Agency (EPA). The air monitoring equipment will be placed along the perimeter of the construction area. The monitoring locations are illustrated on **Figure 2**.

#### 3.3.1 Air Sampler

The BGI PQ-100 high volume sampler, approved by EPA, will be used for collection of PM10 and TSP samples. The base pump portion of the sampler is identified as the PQ-100 and when the sampler is configured for PM10 sampling it is referred to as the PQ-167. The air samples will be sent to laboratory for the analysis of arsenic and vanadium levels.



Manufacturer data for PQ-100/167 is included as **Appendix B**.

#### 3.3.2 Dust Monitor

A Thermo Scientific DataRAM™ pDR-1000AN Monitor will be used to measure total dust during the construction activities and setup at a stationary downwind location; however, this stationary location may be relocated based on wind direction. Additionally, the unit may periodically be removed from its stationary mounting and used as roving unit to

measure upwind concentrations or concentrations directly adjacent to work activities.



### 3.4 ACTION LEVELS

Based on the site assessment activities conducted at Site, heavy metals with concentrations detected above the levels were:

- arsenic
- vanadium

The following table details the Occupational Safety and Health Administration (OSHA) permissible exposure limits (PELs) associated with the COCs:

**Table 3.4-1 - Metal PELs**

Metal	OSHA PEL
Arsenic	0.010 mg/m <sup>3</sup>
Vanadium	0.5 mg/m <sup>3</sup>

- PEL – Permissible Exposure Limit
- ppm – Parts Per Million
- TLV – Threshold Limit Value
- mg/m<sup>3</sup> – Milligrams per Cubic Meter
- STEL – Short Term Exposure Limit
- NIOSH- National Institute of Occupational Safety and Health

For the duration of construction activities, real-time measurement of Total-Dust will be relied upon to evaluate the contractor's dust control measures. Using the highest soil concentrations reported in the top two feet available, total-dust concentrations correlating to benchmark levels were calculated for each contaminant of concern (COC). Only the

results from the top two feet were considered because proposed excavation is limited to less than two feet. A safety factor (SF) of 10 was applied to the calculated level to account for variations of airborne concentration of specific compounds which may vary dependent on the particle size, density of the metal and environmental conditions such as temperature, humidity, barometric pressure, and wind velocity. The calculations are summarized in **Table 1** below:

**Table 1: Total-Dust Concentrations for Site-Specific Contaminants**

COC	Highest Soil Concentration (mg/kg)	Soil Sample ID	Benchmark Air Concentration (mg/m <sup>3</sup> )	Correlating Total-Dust Concentration (mg/m <sup>3</sup> )
Arsenic (As)	125	E7-1 (0-2 ft)	0.01	8
Vanadium (Va)	7200	B6-7 (2-4)	0.5	6.94

An example calculation is provided below:

$$Total - Dust Concentration = \frac{Benchmark Air Concentration \frac{mg}{m^3}}{\left( Highest Soil Concentration \frac{mg}{kg} \right) \left( 10^{-6} \frac{kg}{mg} \right) (10 SF)}$$

$$Lead = \frac{0.01 \frac{mg}{m^3}}{\left( 125 \frac{mg}{kg} \right) \left( 10^{-6} \frac{kg}{mg} \right) (10 SF)} = 8 \frac{mg}{m^3}$$

Vanadium was calculated to be the compound with the lowest correlating Total-Dust concentration 6.94 mg/m<sup>3</sup> with a safety factor of 10. Accordingly, and considering background dust concentrations and National Ambient Air Quality Standards (NAAQS) for PM10, the action limits proposed for real-time dust measurements are provided in **Table 3.5-1** below.

### 3.5 DUST EXPOSURE

In addition to the potential exposure to the contaminants of concern at the site, there is also a potential health hazard associated with the exposure to dust generated from the soil handling activities. The following table presents the OSHA PELs for the dust.

**Table 3.5-1 - Dust PELs**

Compound	OSHA PEL
Total Dust (PNOS)	15 mg/m <sup>3</sup>
Respirable Dust	5 mg/m <sup>3</sup>

Table 2: Total-Dust Action Limits

Concentration	Action
150% of background concentration	Advise contractor to enhance dust control measures
200% of background, or 0.150 mg/m <sup>3</sup> (NAAQS for PM10), or Downwind > 0.50 mg/m <sup>3</sup> Upwind Concentrations	Advise contractor to suspend dust generating activity until such time as corrective actions are implemented to reduce particulate emissions below the action level.
2.94 mg/m <sup>3</sup>	Advise contractor to suspend work. If wind related, wait for winds to subside to continue work. If not wind related, notify DERM and submit plan to address condition.

To minimize worker exposure, the contractor shall implement dust suppression practices when handling contaminated soils. Dust suppression will include utilizing the continuous and generous application of water to exposed soils during excavation and handling. Dust control measures shall include provisions for an adequate supply of water and appropriate application method to provide effective dust suppression. A garden hose is not an appropriate application method. In order to limit the fugitive dust from contaminated soils and incidental exposure, the contractor shall securely cover areas of exposed contaminated soil (in-situ or stockpiled) at the end of each day with plastic sheeting. The subcontractor shall stockpile contaminated soil at designated on-site locations and use a minimum 10 mil impermeable liner for containment.

Ambient air monitoring will be conducted along the perimeter of the Exclusion Zone (EZ) to evaluate the contractor's dust suppression implementation effectiveness.

High winds and site operations can cause airborne dust hazards. The purpose of the air monitoring is to confirm and document that there is no exposure to the contaminated dust particles above the site specific action levels site specific air contaminants during the field activities. AECOM will record the general weather conditions such as air temperature, wind speed and wind direction shall be recorded in the field notes on a daily. See URS SMS 042 and 043 for additional information. Copies of URS' SMS are included in **Appendix D** of **HASP**.

#### 4. PERSONAL AIR SAMPLING PLAN

Personal air sampling will be implemented to assess employee exposure concentrations to known contaminants in order to evaluate the appropriate Personnel Protective Equipment (PPE) to be used by the subcontractor's employees while handling contaminated soils. AECOM has considered air sampling data from projects with similar scope and similar contaminant and contaminant levels for the development of the personal air sampling plan for Site. For the proper selection of PPE required for each action level, please refer to Section 6 of the site-specific HASP for this project.

AECOM will evaluate the required frequency and quantity of personal air samples to be collected based on our onsite observations of the performance of construction activities. Samples will be collected during activities and from workers that AECOM evaluates to be representative of a worst-case exposure risk scenario. We anticipate collecting daily samples for the first week of excavation activities and continuing daily samples until data indicates that the frequency may be reduced or monitoring may be discontinued. A minimum of five days of sampling for respirable dust and metals will be performed before potential downgrading of PPE will be evaluated.

AECOM will conduct personal air monitoring for the on-site employees (including subcontractors) with the highest potential for exposure to contaminants during construction activities. The subcontractor shall provide a list of all personnel along with the details of job descriptions to AECOM for an assessment, based on job description, of which employees will be monitored. These workers will be monitored for respirable dust and metals listed as COCs. AECOM will use the AIHA (American Industrial Hygiene Association) accredited laboratory, to provide the analysis for the personal sampling. NIOSH (National Institute for Occupation Safety and Health) Method 7303 will be used for the metal analysis and NIOSH method 0600 will be used for respirable dust.

AECOM will evaluate the required frequency and quantity of personal air samples to be collected based on our onsite observations of the performance of construction activities. Samples will be collected during activities and from workers that AECOM evaluates to be representative of a worst-case exposure risk scenario. We anticipate collecting daily samples for the first week of excavation activities and continuing daily samples until data indicates that the frequency may be reduced or monitoring may be discontinued. A minimum of three samples will be collected for respirable dust and metals before potential downgrading PPE will be evaluated.

Personal monitoring equipment will be selected by AECOM that is consistent with the applicable sampling methodology. AECOM will provide the necessary training for using the personnel monitoring equipment. Sample collection intake will be positioned to be in the breathing zone of the workers being sampled. The following equipment, or equivalent, will be used:

- SKC AirCheck 52, 0.005 to 5 liters per minute air sampling pump
- Respirable dust cyclone
- PVC filters, 5 micron, 37-mm for metal samples
- Pre-weighted 37-mm, 5 micron, 3-piece PV filters for dust samples
- Clips to secure pump and sampling media

Sample results will be submitted for 24-hour rush analysis so that potential downgrading of PPE can be evaluated as soon as possible. Results from the personal air sampling will be compared to levels described in Section 3.4.

**APPENDIX A**  
**FIGURES**



TERRA CONSULTING GROUP, INC.  
PHONE: 305-415-9229  
WWW.TERRACONSULTING.COM

**SITE VICINITY MAP**

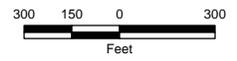
Florida Power & Light Company  
Former Cutler Power Plant Property  
HWR-442/Fla-16360/W-79  
Miami, Florida

**LEGEND:**

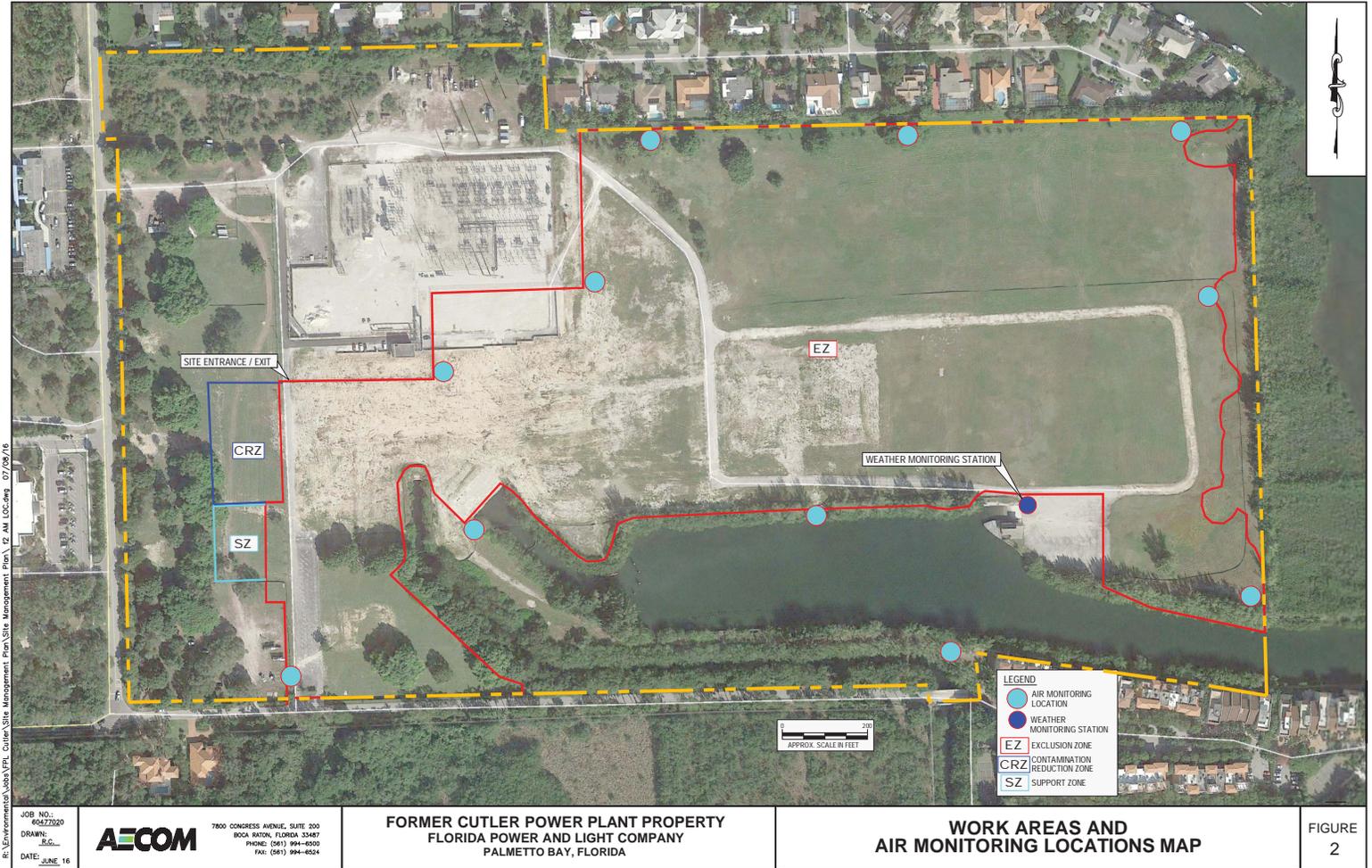


FORMER PLANT PROPERTY BOUNDARY

**SCALE:**



**FIGURE 1**



R:\Environment\Subs\PL Cutler\Site Management Plan\12 AM LOC.dwg 07/08/16  
 JOB NO.: 60427020  
 DRAWN: JG  
 DATE: JUNE 16



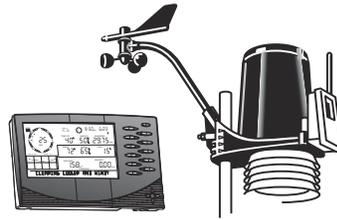
7800 CONGRESS AVENUE, SUITE 200  
 BOCA RATON, FLORIDA 33487  
 PHONE: (561) 994-6500  
 FAX: (561) 994-6524

**APPENDIX B**

**Manufacturer's data**

# Wireless Vantage Pro2™ & Vantage Pro2™ Plus Stations

(Including Fan-Aspirated Models)



6152    6162  
6153    6163

Vantage Pro2™ (6152, 6153) and Vantage Pro2™ Plus (6162, 6163) Wireless Weather Stations include two components: the Integrated Sensor Suite (ISS) which houses and manages the external sensor array, and the console which provides the user interface, data display, and calculations. The ISS and Vantage Pro2 console communicate via an FCC-certified, license-free, spread-spectrum frequency-hopping (FHSS) transmitter and receiver. User-selectable transmitter ID codes allow up to eight stations to coexist in the same geographic area. The frequency hopping spread spectrum technology provides greater communication strength over longer distances and areas of weaker reception. The Wireless Vantage Pro2 Plus weather station includes two additional sensors that are optional on the Vantage Pro2: the UV sensor and the solar radiation sensor.

The console may be powered by batteries or by the included AC-power adapter. The wireless ISS is solar powered with a battery backup. Use WeatherLink® for Vantage Pro2 and Vantage Vue® to let your weather station interface with a computer, to log weather data, and to upload weather information to the internet.

The 6152 and 6162 rely on passive shielding to reduce solar-radiation induced temperature errors in the outside temperature sensor readings. The Fan-aspirated 6153 and 6163 combine passive shielding with a solar-powered fan that draws outside air in over the temperature and humidity sensors, providing a much more accurate temperature reading than that available using passive shielding alone.

## Integrated Sensor Suite (ISS)

(Includes product numbers: 6152, 6153, 6162, 6163, 6322, 6323, 6327 & 6328)

Operating Temperature . . . . .	-40° to +150°F (-40° to +65°C)
Non-operating Temperature . . . . .	-40° to +158°F (-40° to +70°C)
Current Draw (ISS SIM only) . . . . .	0.14 mA (average), 30 mA (peak) at 4 to 6 VDC
Solar Power Panel . . . . .	0.5 Watts (ISS SIM), plus 0.75 Watts (Fan-Aspirated)
Battery (ISS SIM /Fan-Aspirated) . . . . .	CR-123 3-Volt Lithium cell / 2 - 1.2 Volt NiCad C-cells
Battery Life (3-Volt Lithium cell) . . . . .	8 months without sunlight - greater than 2 years depending on solar charging
Battery Life (NiCad C-cells, Fan-Aspirated) . . . . .	1 year
Fan Aspiration Rate (Fan-Aspirated only)	
Intake Flow Rate, full sun . . . . .	190 feet/min. (0.9 m/s)
Intake Flow Rate, battery only . . . . .	80 feet/min. (0.4 m/s)
Sensor Chamber Flow Rate, full sun . . . . .	500 feet/min. (2.5 m/s)
Sensor Chamber Flow Rate, battery only . . . . .	280 feet/min. (1.4 m/s)
Connectors, Sensor . . . . .	Modular RJ-11
Cable Type . . . . .	4-conductor, 26 AWG
Cable Length, Anemometer . . . . .	40' (12 m) (included) 240' (73 m) (maximum recommended)

Note: Maximum displayable wind decreases as the length of cable increases. At 140' (42 m) of cable, the maximum wind speed displayed is 135 mph (60 m/s); at 240' (73 m), the maximum wind speed displayed is 100 mph (34 m/s).

Wind Speed Sensor . . . . .	Solid state magnetic sensor
Wind Direction Sensor . . . . .	Wind vane with potentiometer
Rain Collector Type . . . . .	Tipping bucket, 0.01" per tip (0.2 mm with metric rain adapter), 33.2 in <sup>2</sup> (214 cm <sup>2</sup> ) collection area
Temperature Sensor Type . . . . .	PN Junction Silicon Diode
Relative Humidity Sensor Type . . . . .	Film capacitor element
Housing Material . . . . .	UV-resistant ABS, ASA plastic

ISS Dimensions (not including anemometer or bird spikes):

2

Wireless Vantage Pro2™

- Vantage Pro2 with Standard Rad Shield... 14.0" x 9.4" x 14.5" (356 mm x 239 mm x 368 mm)
Vantage Pro2 with Fan-Asprated Rad Shield... 20.8" x 9.4" x 16.0" (528 mm x 239 mm x 406 mm)
Vantage Pro2 Plus with Standard Rad Shield... 14.3" x 9.7" x 14.5" (363 mm x 246 mm x 368 mm)
Vantage Pro2 Plus with Fan-Aspirated Rad Shield... 21.1" x 9.7" x 16.0" (536 mm x 246 mm x 406 mm)

Console

(Includes product number 6312)

- Console Operating Temperature... +32° to +140°F (0° to +60°C)
Non-Operating (Storage) Temperature... +14° to +158°F (-10° to +70°C)
Current Draw... 0.9 mA average, 30 mA peak, (add 120 mA for display lamps, add 0.125 mA for each optional wireless transmitter received by the console) at 4 - 6 VDC
AC Power Adapter... 5 VDC, 300 mA, regulated
Batteries... 3 C-cells
Battery Life... up to 9 months
Connectors... Modular RJ-11
Housing Material... UV-resistant ABS plastic
Console Display Type... LCD Transflective
Display Backlight... LEDs
Console Dimensions
Console with antenna down (L x H x D)... 10.625" x 6.125" x 1.625" (270 mm x 156 mm x 41 mm)
Console with antenna extended up (L x H x D)... 10.625" x 9.625" x 1.625" (270 mm x 245 mm x 41 mm)
Display (L x H)... 5.94" x 3.375" (151 mm x 86 mm)
Weight (with batteries)... 1.88 lbs. (.85 kg)

Data Displayed on Console

Data display categories are listed with General first, then in alphabetical order.

General

- Historical Data... Includes the past 24 values listed unless otherwise noted; all can be cleared and all totals reset
Daily Data... Includes the earliest time of occurrence of highs and lows; period begins/ends at 12:00 am
Monthly Data... Period begins/ends at 12:00 am on the first of the month
Yearly Data... Period begins/ends at 12:00 am on the first of January unless otherwise noted
Current Display Data... Current display data describes the current reading for each weather variable. In most cases, the variable lists the most recently updated reading or calculation. Some current variable displays can be adjusted so there is an offset for the reading
Current Graph Data... Current graph data appears in the right-most column in the console graph and represents the latest value within the last period on the graph; totals can be set or reset. Display intervals vary. Examples include: Instant, 15-min., and Hourly Reading; Daily, Monthly, High and Low
Graph Time Interval... 1 min., 10 min., 15 min., 1 hour, 1 day, 1 month, 1 year (user-selectable, availability depends upon variable selected)
Graph Time Span... 24 Intervals + Current Interval (see Graph Intervals to determine time span)
Graph Variable Span (Vertical Scale)... Automatic (varies depending upon data range); Maximum and Minimum value in range appear in ticker
Alarm Indication... Alarms sound for only 2 minutes (time alarm is always 1 minute) if operating on battery power. Alarm message is displayed in ticker as long as threshold is met or exceeded. Alarms can be silenced (but not cleared) by pressing the DONE key.
Transmission Interval... Varies with transmitter ID code from 2.25 seconds (#1=shortest), to 3 seconds (#8=longest)
Update Interval... Varies with sensor - see individual sensor specs

Barometric Pressure

- Resolution and Units... 0.01" Hg, 0.1 mm Hg, 0.1 hPa/mb (user-selectable)

Range	16.00" to 32.50" Hg, 410 to 820 mm Hg, 540 to 1100 hPa/mb
Elevation Range	-999' to +15,000' (-600 m to 4570 m) (Note that console screen limits entry of lower elevation to -999' when using feet as elevation unit.)
Uncorrected Reading Accuracy	±0.03" Hg (±0.8 mm Hg, ±1.0 hPa/mb) (at room temperature)
Sea-Level Reduction Equation Used	United States Method employed prior to use of current "R Factor" method
Equation Source	Smithsonian Meteorological Tables
Equation Accuracy	±0.01" Hg (±0.3 mm Hg, ±0.3 hPa/mb)
Elevation Accuracy Required	±10' (3m) to meet equation accuracy specification
Overall Accuracy	±0.03" Hg (±0.8 mm Hg, ±1.0 hPa/mb)
Trend (change in 3 hours)	Change 0.06" (2 hPa/mb, 1.5 mm Hg) = Rapidly Change 0.02" (0.7hPa/mb, 0.5 mm Hg)= Slowly
Trend Indication	5 position arrow: Rising (rapidly or slowly), Steady, or Falling (rapidly or slowly)
Update Interval	1 minute or when console BAR key is pressed twice
Current Display	Instant
Current Graph Data	Instant, 15-min., and Hourly Reading; Daily, Monthly, High and Low
Historical Graph Data	15-min. and Hourly Reading; Daily, Monthly Highs and Lows
Alarms	High Threshold from Current Trend for Storm Clearing (Rising Trend) Low Threshold from Current Trend for Storm Warning (Falling Trend)
Range for Rising and Falling Trend Alarms	0.01 to 0.25" Hg (0.1 to 6.4 mm Hg, 0.1 to 8.5 hPa/mb)

### Clock

Resolution	1 minute
Units	Time: 12 or 24 hour format (user-selectable)
Date	US or International format (user-selectable)
Accuracy	±8 seconds/month
Adjustments	Time: Automatic Daylight Savings Time (for users in North America and Europe that observe it in AUTO mode, MANUAL setting available for all other areas) Date: Automatic Leap Year
Alarms	Once per day at set time when active

### Dewpoint (calculated)

Resolution and Units	1°F or 1°C (user-selectable) °C is converted from °F rounded to the nearest 1°C
Range	-105° to +130°F (-76° to +54°C)
Accuracy	±3°F (±1.5°C) (typical)
Update Interval	10 to 12 seconds
Source	World Meteorological Organization (WMO)
Equation Used	WMO Equation with respect to saturation of moist air over water
Variables Used	Instant Outside Temperature and Instant Outside Relative Humidity
Current Display Data	Instant Calculation
Current Graph Data	Instant Calculation; Daily, Monthly High and Low
Historical Graph Data	Hourly Calculations; Daily, Monthly Highs and Lows
Alarms	High and Low Threshold from Instant Calculation

### Evapotranspiration (calculated, requires solar radiation sensor)

Resolution and Units	0.01" or 0.1 mm (user-selectable)
Range	Daily to 32.67" (832.1 mm); Monthly & Yearly to 199.99" (1999.9 mm)
Accuracy	Greater of 0.01" (0.25 mm) or ±5%, Reference: side-by-side comparison against a CIMIS ET weather station
Update Interval	1 hour
Calculation and Source	Modified Penman Equation as implemented by CIMIS (California Irrigation Management Information System) including Net Radiation calculation
Current Display Data	Latest Hourly Total Calculation
Current Graph Data	Latest Hourly Total Calculation, Daily, Monthly, Yearly Total
Historical Graph Data	Hourly, Daily, Monthly, Yearly Totals

**Wireless Vantage Pro2™**

Alarm . . . . . High Threshold from Latest Daily Total Calculation

**Forecast**

Variables Used . . . . . Barometric Reading & Trend, Wind Speed & Direction, Rainfall, Temperature, Humidity, Latitude & Longitude, Time of Year

Update Interval . . . . . 1 hour

Display Format . . . . . Icons on top center of display; detailed message in ticker at bottom

Variables Predicted . . . . . Sky Condition, Precipitation, Temperature Changes, Wind Direction and Speed

**Heat Index (calculated)**

Resolution and Units . . . . . 1°F or 1°C (user-selectable) °C is converted from °F rounded to the nearest 1°C

Range . . . . . -40° to +165°F (-40° to +74°C)

Accuracy . . . . . ±3°F (±1.5°C) (typical)

Update Interval . . . . . 10 to 12 seconds

Source . . . . . United States National Weather Service (NWS)/NOAA

Formulation Used . . . . . Steadman (1979) modified by US NWS/NOAA and Davis Instruments to increase range of use

Variables Used . . . . . Instant Outside Temperature and Instant Outside Relative Humidity

Current Display Data . . . . . Instant Calculation

Current Graph Data . . . . . Instant Calculation; Daily, Monthly High

Historical Graph Data . . . . . Hourly Calculations; Daily, Monthly Highs

Alarm . . . . . High Threshold from Instant Calculation

**Humidity****Inside Relative Humidity (sensor located in console)**

Resolution and Units . . . . . 1%

Range . . . . . 1 to 100% RH

Accuracy . . . . . ±3% (0 to 90% RH), ±4% (90 to 100% RH)

Update Interval . . . . . 1 minute

Current Display Data . . . . . Instant (user-adjustable offset available)

Current Graph Data . . . . . Instant; Hourly Reading; Daily, Monthly High and Low

Historical Graph Data . . . . . Hourly Readings; Daily, Monthly Highs and Lows

Alarms . . . . . High and Low Threshold from Instant Reading

**Outside Relative Humidity (sensor located in ISS)**

Resolution and Units . . . . . 1%

Range . . . . . 1 to 100% RH

Accuracy . . . . . ±3% (0 to 90% RH), ±4% (90 to 100% RH)

Temperature Coefficient . . . . . 0.03% per °F (0.05% per °C), reference 68°F (20°C)

Drift . . . . . ±0.5% per year

Update Interval . . . . . 50 seconds to 1 minute

Current Display Data . . . . . Instant (user-adjustable offset available)

Current Graph Data . . . . . Instant; Hourly Reading; Daily, Monthly High and Low

Historical Graph Data . . . . . Hourly Readings; Daily, Monthly Highs and Lows

Alarms . . . . . High and Low Threshold from Instant Reading

**Extra Outside Relative Humidity (sensor located inside Temperature/Humidity Station)**

Resolution and Units . . . . . 1%

Range . . . . . 1 to 100% RH

Accuracy . . . . . ±3% (0 to 90% RH), ±4% (90 to 100% RH)

Temperature Coefficient . . . . . 0.03% per °F (0.05% per °C), reference 68°F (20°C)

Drift . . . . . ±0.5% per year

Update Interval . . . . . 50 seconds to 1 minute

Current Display Data . . . . . Instant Reading (user adjustable)

Alarms . . . . . High and Low Threshold from Instant Reading

### Leaf Wetness (requires leaf wetness sensor)

Resolution .....	1
Range .....	0 to 15
Dry/Wet Threshold .....	User-selectable
Accuracy .....	±0.5
Update Interval .....	46 to 54 seconds
Current Graph Data .....	Instant Reading; Daily High and Low; Monthly High
Historical Graph Data .....	Hourly Readings; Daily Highs and Lows; Monthly Highs
Alarms .....	High and Low Thresholds from Instant Reading

### Moon Phase

Console Resolution .....	1/8 (12.5%) of a lunar cycle, 1/4 (25%) of lighted face on console
WeatherLink Resolution .....	0.09% of a lunar cycle, 0.18% of lighted face maximum (depends on screen resolution)
Range .....	New Moon, Waxing Crescent, First Quarter, Waxing Gibbous, Full Moon, Waning Gibbous, Last Quarter, Waning Crescent
Accuracy .....	±38 minutes

### Rainfall

Resolution and Units .....	0.01" or 0.2 mm (user-selectable) (1 mm at totals ≥ 2000 mm)
Daily/Storm Rainfall Range .....	0 to 99.99" (0 to 999.8 mm)
Monthly/Yearly/Total Rainfall Range .....	0 to 199.99" (0 to 6553 mm)
Accuracy .....	For rain rates up to 4"/hr (100 mm/hr): ±4% of total or ± one tip of the bucket (0.01"/0.2mm), whichever is greater.
Update Interval .....	20 to 24 seconds
Storm Determination Method .....	0.02" (0.5 mm) begins a storm event, 24 hours without further accumulation ends a storm event
Current Display Data .....	Totals for Past 15-min
Current Graph Data .....	Totals for Past 15-min, Past 24-hour, Daily, Monthly, Yearly (start date user-selectable) and Storm (with begin date); Umbrella is displayed when 15-minute total exceeds zero
Historical Graph Data .....	Totals for 15-min, Daily, Monthly, Yearly (start date user-selectable) and Storm (with begin and end dates)
Alarms .....	High Threshold from Latest Flash Flood (15-min. total, default is 0.50", 12.7 mm), 24-Hour Total, Storm Total,
Range for Rain Alarms .....	0 to 99.99" (0 to 999.7 mm)

### Rain Rate

Resolution and Units .....	0.01" or 0.1 mm (user-selectable) at typical rates (see Fig. 2 and 3)
Range .....	0, 0.04"/hr (1 mm/hr) to 96"/hr (0 to 2438 mm/hr)
Accuracy .....	±5% for rates less than 5" per hour (127 mm/hr)
Update Interval .....	20 to 24 seconds
Calculation Method .....	Measures time between successive tips of tipping bucket. Elapsed time greater than 15 minutes or only one tip of the rain collector constitutes a rain rate of zero.
Current Display Data .....	Instant
Current Graph Data .....	Instant and 1-min. Reading; Hourly, Daily, Monthly and Yearly High
Historical Graph Data .....	1-min Reading; Hourly, Daily, Monthly and Yearly Highs
Alarm .....	High Threshold from Instant Reading

### Soil Moisture (requires soil moisture sensor)

Resolution .....	1 cb
Range .....	0 to 200 cb
Update Interval .....	77 to 90 seconds
Current Graph Data .....	Instant Reading; Daily and Monthly High and Low

**Wireless Vantage Pro2™**

Historical Graph Data . . . . .	Hourly Readings; Daily and Monthly Highs and Lows
Alarms . . . . .	High and Low Thresholds from Instant Reading

**Solar Radiation (requires solar radiation sensor)**

Resolution and Units . . . . .	1 W/m <sup>2</sup>
Range . . . . .	0 to 1800 W/m <sup>2</sup>
Accuracy . . . . .	±5% of full scale (Reference: Eppley PSP at 1000 W/m <sup>2</sup> )
Drift . . . . .	up to ±2% per year
Cosine Response . . . . .	±3% for angle of incidence from 0° to 75°
Temperature Coefficient . . . . .	-0.067% per °F (-0.12% per °C); reference temperature = 77°F (25 °C)
Update Interval . . . . .	50 seconds to 1 minute (5 minutes when dark)
Current Graph Data . . . . .	Instant Reading and Hourly Average; Daily, Monthly High
Historical Graph Data . . . . .	Hourly Average, Daily, Monthly Highs
Alarm . . . . .	High Threshold from Instant Reading

**Sunrise and Sunset**

Resolution . . . . .	1 minute
Accuracy . . . . .	±1 minute
Reference . . . . .	United States Naval Observatory

**Temperature****Inside Temperature (sensor located in console)**

Resolution and Units . . . . .	Current Data: 0.1°F or 1°F or 0.1°C or 1°C (user-selectable) °C is converted from °F rounded to the nearest 1°C Historical Data and Alarms: 1°F or 1°C (user-selectable)
Range . . . . .	+32° to +140°F (0° to +60°C)
Sensor Accuracy . . . . .	±1°F (±0.5°C), (see Fig. 1)
Update Interval . . . . .	1 minute
Current Display Data . . . . .	Instant (user-adjustable offset available)
Current Graph Data . . . . .	Instant Reading; Daily and Monthly High and Low
Historical Graph Data . . . . .	Hourly Readings; Daily and Monthly Highs and Lows
Alarms . . . . .	High and Low Thresholds from Instant Reading

**Outside Temperature (sensor located in ISS)**

Resolution and Units . . . . .	Current Data: 0.1°F or 1°F or 0.1°C or 1°C (user-selectable) nominal °C is converted from °F rounded to the nearest 1°C Historical Data and Alarms: 1°F or 1°C (user-selectable)
Range . . . . .	-40° to +150°F (-40° to +65°C)
Sensor Accuracy . . . . .	±1°F (±0.5°C) above 20°F (-7°C), ±2°F (±1°C) under 20°F (-7°C) (see Fig. 1)
Radiation Induced Error (Passive Shield) . . . . .	+4°F (2°C) at solar noon (insolation = 1040 W/m <sup>2</sup> , avg. wind speed ≤ 2 mph (1 m/s)) (reference: RM Young Model 43408 Fan-Aspirated Radiation Shield)
Radiation Induced Error (Fan-Aspirated Shield) . . . . .	+0.6°F (0.3°C) at solar noon (insolation = 1040 W/m <sup>2</sup> , avg. wind speed ≤ 2 mph (1 m/s)) (reference: RM Young Model 43408 Fan-Aspirated Radiation Shield)
Update Interval . . . . .	10 to 12 seconds
Current Display Data . . . . .	Instant (user-adjustable offset available)
Current Graph Data . . . . .	Instant Reading; Daily, Monthly, Yearly High and Low
Historical Graph Data . . . . .	Hourly Readings; Daily, Monthly, Yearly Highs and Lows
Alarms . . . . .	High and Low Thresholds from Instant Reading

**Extra Temperature Sensors or Probes**

Resolution and Units . . . . .	Current Data: 1°F or 1°C (user-selectable) °C is converted from °F rounded to the nearest 1°C Historical Data and Alarms: 1°F or 1°C (user-selectable)
Range . . . . .	-40° to +150°F (-40° to +65°C)
Sensor Accuracy . . . . .	±1°F (±0.5°C) above 20°F (-7°C), ±2°F (±1°C) under 20°F (-7°C) (see Fig. 1)
Update Interval . . . . .	10 to 12 seconds (77 to 90 seconds for Leaf Wetness/Temperature and Soil Moisture/Temperature Stations)
Current Display Data . . . . .	Instant Reading (user-adjustable offset available)
Alarms . . . . .	High and Low Thresholds from Instant Reading

Temperature Humidity Sun Wind Index (requires solar radiation sensor)

Resolution and Units . . . . .	1°F or 1°C (user-selectable) °C is converted from °F rounded to the nearest 1°C
Range . . . . .	-90° to +165°F (-68° to +74°C)
Accuracy . . . . .	±4°F (±2°C) (typical)
Update Interval . . . . .	10 to 12 seconds
Sources and Formulation Used . . . . .	United States National Weather Service (NWS)/NOAA Steadman (1979) modified by US NWS/NOAA and Davis Instruments to increase range of use and allow for cold weather use
Variables Used . . . . .	Instant Outside Temperature, Instant Outside Relative Humidity, 10-minute Average Wind Speed, 10-minute Average Solar Radiation
Formulation Description . . . . .	Uses Heat Index as base temperature, affects of wind and solar radiation are either added or subtracted from this base to give an overall effective temperature
Current Graph Data . . . . .	Instant and Hourly Calculation; Daily, Monthly High
Historical Graph Data . . . . .	Hourly Calculation; Daily, Monthly Highs
Alarm . . . . .	High Threshold from Instant Reading

Ultra Violet (UV) Radiation Dose (requires UV sensor)

Resolution and Units . . . . .	0.1 MEDs to 19.9 MEDs; 1 MED above 19.9 MEDS
Range . . . . .	0 to 199 MEDs
Accuracy . . . . .	±5% of daily total
Drift . . . . .	up to ±2% per year
Update Interval . . . . .	50 seconds to 1 minute (5 minutes when dark)
Current Graph Data . . . . .	Latest Daily Total (user resetable at any time from Current Screen)
Historical Graph Data . . . . .	Hourly, Daily Totals (user reset from Current Screen does not affect these values)
Alarm . . . . .	High Threshold from Daily Total
Alarm Range . . . . .	0 to 19.9 MEDs

Ultra Violet (UV) Radiation Index (requires UV sensor)

Resolution and Units . . . . .	0.1 Index
Range . . . . .	0 to 16 Index
Accuracy . . . . .	±5% of full scale (Reference: Yankee UVB-1 at UV index 10 (Extremely High))
Cosine Response . . . . .	±4% FS (0° to 90° zenith angle)
Update Interval . . . . .	50 seconds to 1 minute (5 minutes when dark)
Current Graph Data . . . . .	Instant Reading and Hourly Average; Daily, Monthly High
Historical Graph Data . . . . .	Hourly Average, Daily, Monthly Highs
Alarm . . . . .	High Threshold from Instant Calculation

Wind

Wind Chill (Calculated)

Resolution and Units . . . . .	1°F or 1°C (user-selectable) °C is converted from °F rounded to the nearest 1°C
Range . . . . .	-110° to +135°F (-79° to +57°C)
Accuracy . . . . .	±2°F (±1°C) (typical)
Update Interval . . . . .	10 to 12 seconds
Source . . . . .	United States National Weather Service (NWS)/NOAA
Equation Used . . . . .	Osczevski (1995) (adopted by US NWS in 2001)
Variables Used . . . . .	Instant Outside Temperature and 10-min. Avg. Wind Speed
Current Display Data . . . . .	Instant Calculation
Current Graph Data . . . . .	Instant Calculation; Hourly, Daily and Monthly Low
Historical Graph Data . . . . .	Hourly, Daily and Monthly Lows
Alarm . . . . .	Low Threshold from Instant Calculation

Wind Direction

Range . . . . .	0 - 360°
Display Resolution . . . . .	16 points (22.5°) on compass rose, 1° in numeric display
Accuracy . . . . .	±3°
Update Interval . . . . .	2.5 to 3 seconds

**Wireless Vantage Pro2™**

Current Display Data	Instant (user-adjustable offset available)
Current Graph Data	Instant; 10-min. Dominant; Hourly, Daily, Monthly Dominant
Historical Graph Data	Past 6 10-min. Dominants on compass rose only; Hourly, Daily, Monthly Dominants
<b>Wind Speed</b>	
Resolution and Units	1 mph, 1 km/h, 0.4 m/s, or 1 knot (user-selectable). Measured in mph, other units are converted from mph and rounded to nearest 1 km/hr, 0.1 m/s, or 1 knot.
Range	1 to 200 mph, 1 to 173 knots, 0.5 to 89 m/s, 1 to 322 km/h
Update Interval	Instant Reading: 2.5 to 3 seconds, 10-minute Average: 1 minute
Accuracy	±2 mph (2 kts, 3 km/h, 1 m/s) or ±5%, whichever is greater
Maximum Cable Length	240' (73 m) (See note on page 1)
Current Display Data	Instant
Current Graph Data	Instant; 10-minute and Hourly Average; Hourly High; Daily, Monthly and Yearly High with Direction of High
Historical Graph Data	10-min. and Hourly Averages; Hourly Highs; Daily, Monthly and Yearly Highs with Direction of Highs
Alarms	High Thresholds from Instant Reading and 10-minute Average

**Wireless Communications****Transmit/Receive Frequency**

US Models	902 - 928 MHz FHSS,
EU Models	868.0 - 868.6 MHz FHSS
Japan Models	928.15 - 929.65 MHz FHSS
NZ Models	921 - 928 MHz FHSS
India Models	865.0 - 867.0 MHz FHSS

ID Codes Available . . . . . 8

**Output Power**

US Models	902 - 928 MHz FHSS: FCC-certified low power, less than 8 mW, no license required
EU Models	868.0 - 868.6 MHz FHSS. CE-certified, less than 8 mW, no license required.
Japan Models	928.15 - 929.65 MHz FHSS, less than 1 mW, no license required.
NZ Models	921 - 928 MHz FHSS, less than 10mW, no license required.
India Models	865.0 - 867.0 MHz, less than 10mW, no license required.

**Range: All models except Japan**

Line of Sight	up to 1000 feet (300 m)
Through Walls	200 to 400 feet (60 to 120 m)

**Range: Japan models**

Line of Sight	up to 300 feet (100 m)
Through Walls	50 to 200 feet (15 to 60m)

**Sensor Inputs**

RF Filtering	RC low-pass filter on each signal line
--------------	--

# Sensor Charts

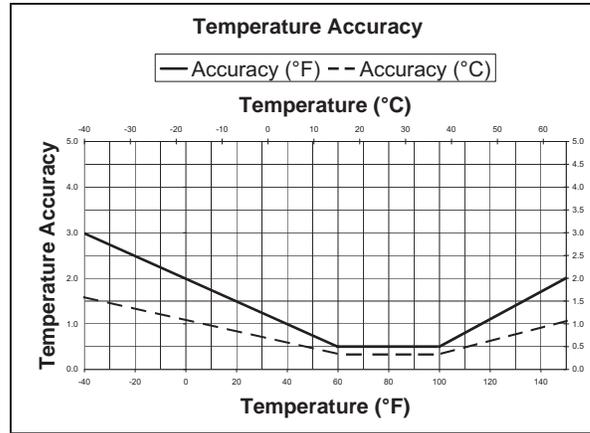


Figure 1. Temperature Accuracy

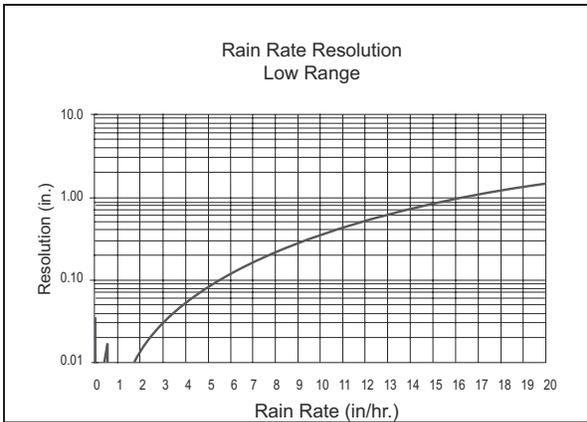


Figure 2. Low Range Rain Rate Resolution

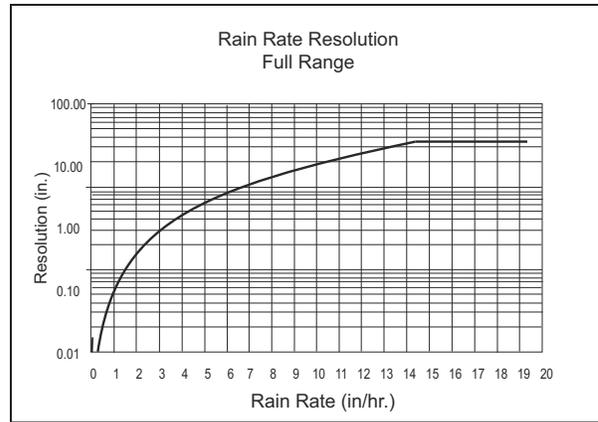


Figure 3. Full Range Rain Rate Resolution

## Package Dimensions

Product #	Package Dimensions (Length x Width x Height)	Package Weight	UPC Codes
6152 6152EU 6152UK	17.50" x 10.4" x 16.0" (445 mm x 264 mm x 406 mm)	11 lbs. 13 oz. (5.4 kg)	011698 00229 0 011698 00347 1 011698 00348 8
6162 6162EU 6162UK		11 lbs. 15 oz. (5.4 kg)	011698 00306 8 011698 00307 5 001698 00308 2
6153 6153EU 6153UK	14.9 x 12.9" x 23.4" (378 mm x 327 mm x 594 mm)	16 lbs. 11 oz. (7.6 kg)	011698 00335 8 011698 00336 5 001698 00337 2
6163 6163EU 6163UK		17 lbs. 5 oz. (7.9 kg)	011698 00341 9 011698 00342 6 001698 00342 3
6322 6322OV	17.50" x 10.4" x 16.0" (445 mm x 264 mm x 406 mm)	9 lbs.. 1 oz. (4.1 kg)	011698 00776 9 011698 00778 3
6327 6327OV		11 lbs. 1 oz. (5.0 kg)	011698 00781 3 011698 00783 7
6323 6323OV	14.9" x 12.9" x 23.4" (378 mm x 327 mm x 594 mm)	15 lbs. 15 oz. (7.2 kg)	011698 00779 0 011698 00780 6
6328 6328OV		16 lbs. 8 oz. (7.5 kg)	011698 00784 4 011698 00785 1
6312 6312EU 6312UK	12.6" x 9.3" x 2.5" (320 mm x 235 mm x 64 mm)	2 lbs. 10 oz. (1.2 kg)	011698 00724 0 011698 00766 0 011698 00767 7

**PQ100 – U.S. EPA FRM****Model PQ167R Portable Ambient Particulate Sampler**

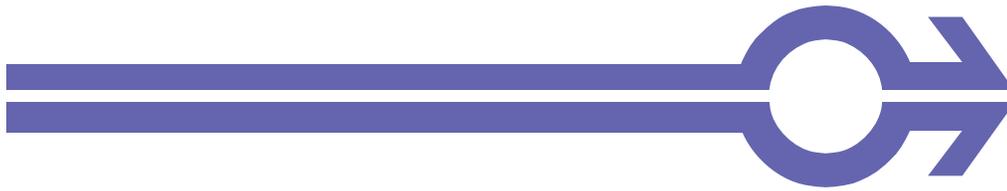
Provides EPA Reference Method Data for PM10. Can be configured for TSP and PM2.5

PQ 100 Ambient PM10 Sampler  
With Solar PanelEPA Designated Inlet and  
*miniPM* High Altitude Inlet

The BGI PQ100-FRM Sampler incorporates BGI's pioneering technology to meet the requirements for ambient particulate sampling dictated by the U.S. Environmental Protection Agency. This includes the design of novel PM10, PM2.5 and PM1 Inlets, Volumetric sample flow rate control, data logging and software for report and data processing. The sampler is based upon the BGI PQ family of ambient particulate samplers and has demonstrated its use over the past ten years in a multitude of domestic and international sampling scenarios. Most recently the introduction of the BGI *miniPM* Inlet, the PQ167R can be operated at sampling sites as high as 15,000 feet (457meters) elevation.

The PQ100 – FRM Sampler meets and exceeds the US EPA requirements for manual ambient particulate sampling. BGI cooperated with the EPA in 1996 to provide design and parts of the PQ100 that later became design and performance specifications dictated by the EPA in 40CFRPart 53 in 1997 for PM2.5 FRM sampling. BGI was pleased to provide the following:

- Ambient Temperature and Filter Temperature Testing
- PM10 Inlet Design
- Prototyped the EPA PM2.5 WINS Impactor



**BGI**

58 Guinan St.  
Waltham, MA 02451  
V: 781.891.9380  
F: 781.891.8151

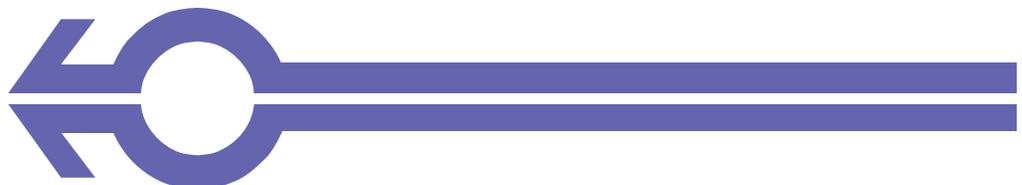
## Applications

- Ambient Particulate Monitoring (RFPS-1298-124)
- Fence Line Monitoring
- Remediation Projects
- Remote Site Monitoring
- High Altitude Sampling with Patented miniPM Inlet
- Suitable for Lead, Asbestos, Oil Mists, Indoor Air Pollutants and Allergens

## Features

- US EPA designated for PM-10
- Volumetric Flow Control, using ambient temperature and barometric pressure compensated mass flow sensor
- BGI's own Dual Diaphragm Vacuum Pump
- Portable and only EPA designated sampler with solar augmentation approval
- Operates up to 30 hours from its internal 12Volt DC Battery. AC power outages do not effect the sample event, true continuous sampling with no interruptions
- Can be configured for PM10, PM 4.0, PM 2.5, PM 1 and TSP for Low or Ultra high Altitude
- PQ100 Base can be used as an IAQ and Special Study Flow Controlled Vacuum Pump

Part#	Description
PQ167R	Portable PM10 Sampling System w/ Rigid Stand (120 or 240 volts)
3410	Portable TSP Sampling System w/ Rigid Tripod (120 or 240 volts)
PQ100	Portable Battery Operated Pump, w/ charger/ cables/ download software
A1904	Filter Holder Adapter
VSCCA	PM2.5 In Line Cyclone to convert from PM10 to PM2.5 Sampling
SP21	Solar Panel 32 Watt Power with Cables, Hardware and Regulator
A1446	Hose Adapter-Filter Holder (Silver)
F215	Spare 47mm Plastic Filter Holder and Metal Carrying Canister
CQ2	Download Cable
5011	miniPM Inlet Complete for TSP, PM1.0, PM2.5 and PM10



## **Appendix D**

### **Daily Monitoring Logs**



**EXHIBIT A**  
Engineering Control Plan  
July 2016

**Engineering Control Plan  
Implementation, Maintenance, Inspection and Reporting**

July 11, 2016

**Florida Power & Light Company  
Former Cutler Power Plant Property  
HWR-442/File-16360/IW-79  
Miami, Florida**



## Table of Contents

1.	Objective .....	1
2.	Site Description and Background Information .....	1
3.	Implementation of Engineering Controls .....	1
3.1	Geotextile Liner Installation	1
3.2	Backfilling and Vegetative Layer	2
3.3	Tree Protection	2
3.4	Soil Removal	2
4.	Maintenance Inspections and Reporting .....	2
5.	Contacts .....	3

### Figures

- |   |                                    |
|---|------------------------------------|
| 1 | Site Vicinity Map                  |
| 2 | Site Map with Engineering Controls |

### Appendices

Appendix A - Engineering Control Plan Sheets

Appendix B - Specifications

- Geotextile Liner
- Rubberized Mulch

Appendix C - Engineering Control Inspection Forms

## 1. Objective

The main objective of this Engineering Control Plan (ECP) is to provide controls for reducing or eliminating the potential for risks associated with direct contact with impacted soils. This document also provides procedures for inspection and maintenance of the engineering controls to be implemented at the former Cutler Plant (Site) currently owned by the Florida Power & Light Company (FPL). The engineering controls will be implemented as a part of the site remediation activities, which will be approved by the Division of Environmental Resources Management (DERM) of the Miami-Dade County Department of Regulatory and Economic Resources. This ECP does not cover the sub-station parcel to the northwest of the Site.

## 2. Site Description and Background Information

The following sections provide a brief summary of the site conditions and background information.

The Site covers approximately 82 acres and is located at 14925 SW 67<sup>th</sup> Avenue, in eastern Miami-Dade County, Florida. The property is bordered to the north by residential properties, to the east and southeast by surface waters contiguous with Biscayne Bay, to the south by SW 152<sup>nd</sup> Street (Coral Reef Drive), and to the west by SW 67<sup>th</sup> Avenue (Ludlum Road). The Site is located west of Paradise Point on Biscayne Bay, 15 miles south of Miami. It is situated on the marl and peat-veneered seaward slope of the Atlantic Coastal Ridge the crest of which lies approximately 1½ miles west of the Site. A site vicinity map is included as **Figure 1**.

Extensive soil and groundwater assessment work has been conducted at the Site from February 2013 through September 2015. The assessment work found constituents of concern (COCs) such as arsenic and vanadium.

In order to mitigate any potential direct exposure risks associated with the impacted soils exceeding background levels or the Soil Cleanup Target Levels (SCTLs) approved by DERM, FPL will implement Engineering Controls (EC). The boundaries of the EC are illustrated on **Figure 2**. Detailed engineering plans for these controls are provided in **Appendix A** and available on file at the FPL offices.

The soil remedial activities include installing and securing a geotextile liner and placing 1 foot of clean soil fill above the liner. The liner will be a high visibility orange colored 8 ounce geotextile (GSE or equivalent). The clean fill will be sourced from a local quarry unless otherwise approved by DERM. Finally, the area will be seeded for establishing a vegetative layer.

## 3. Implementation of Engineering Controls

The Engineering Controls on the site will be implemented in accordance with the plans approved by DERM. A general description of the EC is provided in the following sections.

### 3.1 Geotextile Liner Installation

A geotextile liner will be installed and secured in the excavated area. The liner will be an 8 ounce geotextile (GSE or equivalent) orange colored for high visibility. The specifications for the geotextile liner are included in **Appendix B** of this document.

### **3.2 Backfilling and Vegetative Layer**

One foot of clean fill will be placed on top of the geotextile liner and the area will be seeded to establish a vegetative layer on top.

### **3.3 Tree Protection**

A Tree Protection Area will be established around each tree not removed during clearing and grubbing activities. A typical detail for this area is shown on the engineering control plans provided REI plans, and will include hand digging around the root zone under the tree canopy. The root zone will then be covered with an 8 ounce geotextile liner (GSE or equivalent) covered with 2.5 inches of bonded rubberized mulch. The specifications for the mulch are included in **Appendix B**.

### **3.4 Soil Removal**

Although the removal of impacted soil is not anticipated for the proposed ECP, if impacted soil is removed for any reason then it will be disposed of offsite at Waste Management's Medley Landfill or an alternate Class I Subtitle D landfill approved by DERM.

## **4. Maintenance Inspections and Reporting**

The integrity of the onsite engineering controls will be inspected on an annual basis. A site inspector, designated by the owner, will utilize and fill out the inspection forms provided in **Appendix C** with as much detail as possible. The inspection forms are used to document the conditions of the controls and provide for any corrective action that will be required. The inspector will photo document the inspection and corrective action implementation activities. The corrective action will be implemented as soon as possible. Subsequently, an inspection report will be completed documenting the conditions of the engineering controls in the attached inspection form and any corrective actions taken along with photo documentation. The report will be submitted to DERM within thirty (30) days of completion of inspection and any corrective action. A copy of the inspection forms is included in **Appendix C**. Additional pages will be attached, as necessary.

**5. Contacts**

<b>Company</b>	<b>Contact</b>	<b>Phone Number</b>
AECOM Office		(561) 994-6500
AECOM Project Manager	Ben Foster	(813) 610-0080
AECOM Project Engineer	Vivek Kamath	(305) 790-5829
AECOM Technician	Michael Powell	(786) 299-4220
FP&L Contact	Ed Preast	(561) 346-5312

Note: The names of contacts provided above may change prior to implementation of the ECP. An updated ECP will be provided to DERM prior to implementation

## FIGURES



TERRA CONSULTING GROUP, INC.  
PHONE: (954) 202-9226  
WWW.TIERRACONSULTING.COM

**SITE VICINITY MAP**

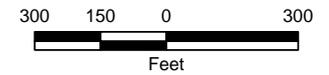
Florida Power & Light Company  
Former Cutler Power Plant Property  
HWR-442/File-16360/IW-79  
Miami, Florida

**LEGEND:**



FORMER PLANT PROPERTY BOUNDARY

**SCALE:**



**FIGURE 1**

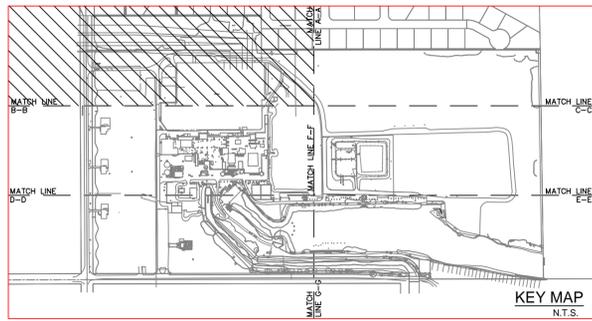


**Appendix A**

**Engineering Control Plan Sheets**

**(size 24 X 36) are included as a separate packet**

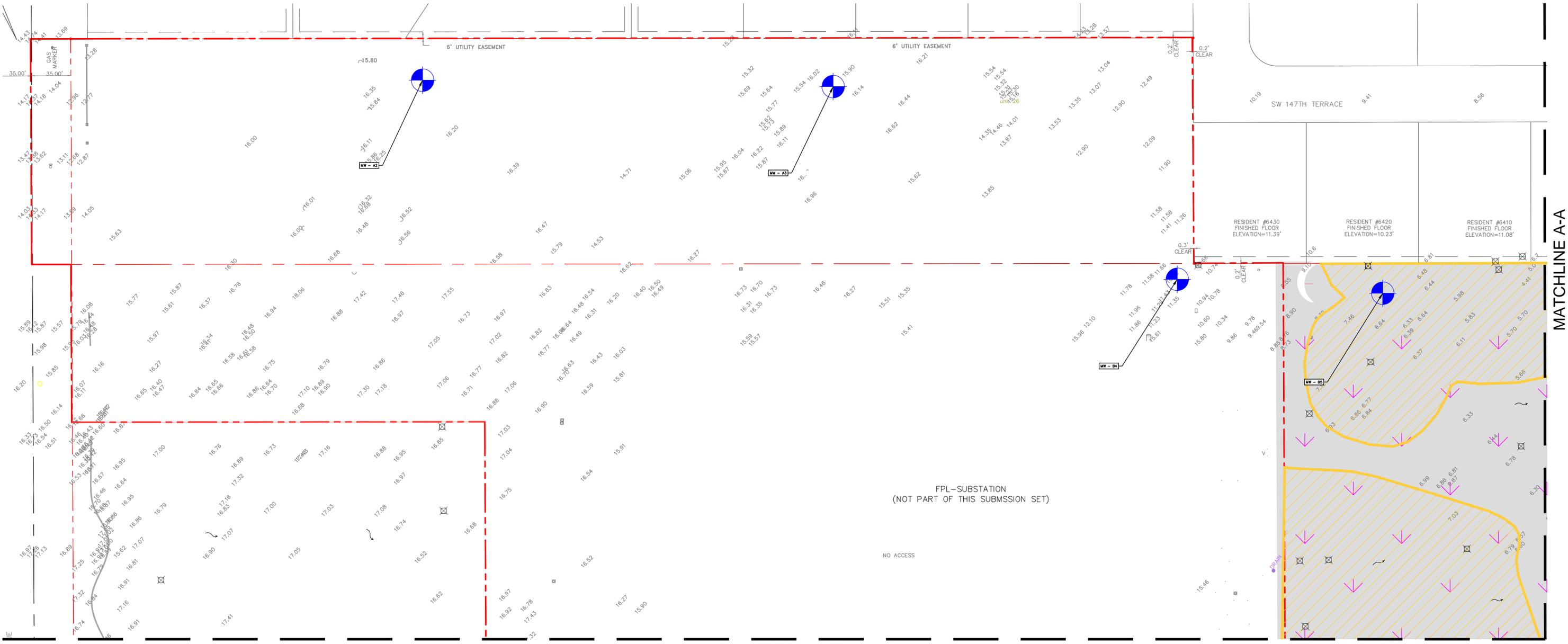
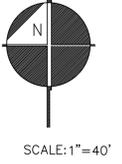




### LEGEND

- PROPERTY LINE
- EXISTING FENCE
- RETENTION AREA
- EXISTING WETLANDS
- 12" CLEAN FILL W/ 8 OZ. HIGH VISIBILITY ORANGE GEOTEXTILE GSE OR US-205NW (SEE SPECS)
- PROPOSED GRADE
- FLOW ARROW
- PROPOSED DRAINAGE
- PROPOSED CATCH BASIN
- PROPOSED DRAINAGE WELL
- SOIL BORING
- SOIL IMPACTED AREA
- VANADIUM GROUNDWATER PLUME
- ARSENIC GROUNDWATER PLUME
- MONITORING WELL
- WETLAND BUFFER
- PROJECT BOUNDARY

- \*NOTES:**
1. ANY SEEDING MUST BE A MIN OF 15' FROM ANY WETLAND AREAS OR WETLAND VEGETATION AND GRADE AWAY FROM WETLANDS AREAS AND WETLAND VEGETATION.
  2. THE CLEAN FILL MATERIAL MUST BE SOURCED FROM A NATIVE ROCK QUARRY UNLESS OTHERWISE APPROVED BY THE ENGINEER.
  3. ALL SOILS EXCAVATED DURING CONSTRUCTION ACTIVITIES SHALL BE DISPOSED OF AT A PERMITTED CLASS 1 LANDFILL.
  4. IN ACCORDANCE WITH APPLICABLE STATE REGULATIONS, AT A MINIMUM A 15 FT BUFFER AND AN AVERAGE 25 FT BUFFER WILL BE MAINTAINED BETWEEN THE PROJECT LIMITS AND WETLANDS BOUNDARIES.



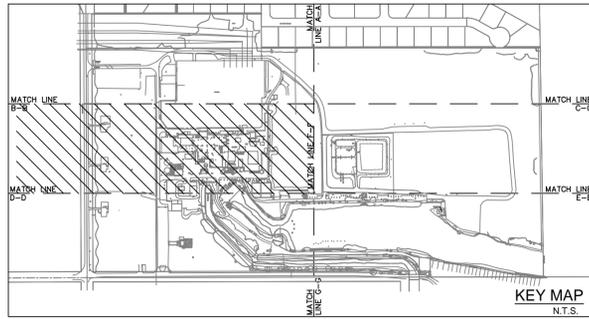
DCS	7/11/2016			
DESIGNED BY	DATE			
DCS	7/11/2016			
DRAWN BY	DATE			
MR	7/11/2016			
CHECKED BY	DATE			
RR	7/11/2016			
APPROVED BY	DATE	No.	DATE	REVISIONS

**FORMER FPL CUTLER POWER PLANT PPARCEL**  
PALMETTO BAY, FLORIDA

17670 NW 78TH AVE, SUITE 214  
MIAMI, FLORIDA 33015  
(786)468-8304 (305)392-1019 FAX  
CERTIFICATE OF AUTHORIZATION No. 9808

ROBERT J. ROSS, P.E.  
STATE OF FLORIDA  
REGISTRATION NO. 59485  
DATE: 7/11/2016

## GRADING PLAN (1 OF 6)



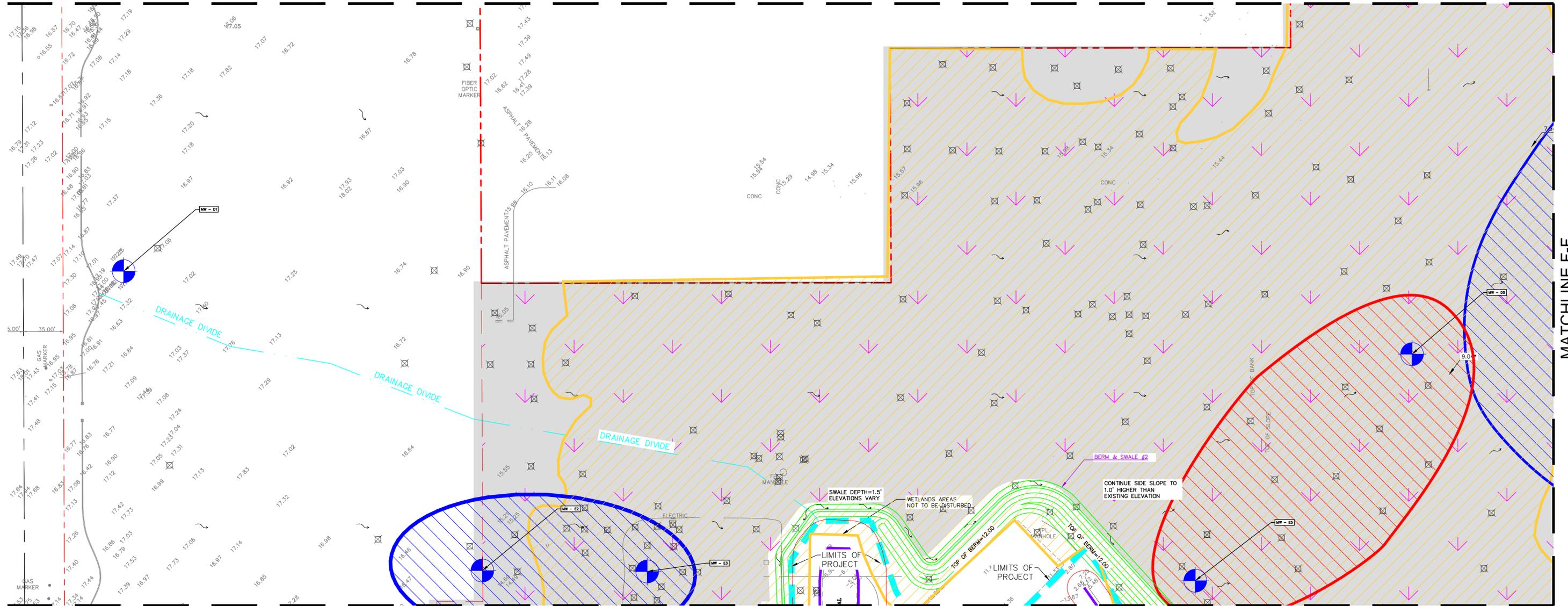
### LEGEND

- PROPERTY LINE
- EXISTING FENCE
- RETENTION AREA
- EXISTING WETLANDS
- 12" CLEAN FILL W/ 8 OZ. HIGH VISIBILITY ORANGE GEOTEXTILE GSE OR US-205NW (SEE SPECS)
- PROPOSED GRADE
- FLOW ARROW
- PROPOSED DRAINAGE
- PROPOSED CATCH BASIN
- PROPOSED DRAINAGE WELL
- SOIL BORING
- SOIL IMPACTED AREA
- VANADIUM GROUNDWATER PLUME
- ARSENIC GROUNDWATER PLUME
- MONITORING WELL
- WETLAND BUFFER
- PROJECT BOUNDARY

- \*NOTES:**
1. ANY SEEDING MUST BE A MIN OF 15' FROM ANY WETLAND AREAS OR WETLAND VEGETATION AND GRADE AWAY FROM WETLANDS AREAS AND WETLAND VEGETATION.
  2. THE CLEAN FILL MATERIAL MUST BE SOURCED FROM A NATIVE ROCK QUARRY UNLESS OTHERWISE APPROVED BY THE ENGINEER.
  3. ALL SOILS EXCAVATED DURING CONSTRUCTION ACTIVITIES SHALL BE DISPOSED OF AT A PERMITTED CLASS 1 LANDFILL.
  4. IN ACCORDANCE WITH APPLICABLE STATE REGULATIONS, AT A MINIMUM A 15 FT BUFFER AND AN AVERAGE 25 FT BUFFER WILL BE MAINTAINED BETWEEN THE PROJECT LIMITS AND WETLANDS BOUNDARIES.



### MATCHLINE B-B



### MATCHLINE D-D



DCS	7/11/2016			
DESIGNED BY	DATE			
DCS	7/11/2016			
DRAWN BY	DATE			
MR	7/11/2016			
CHECKED BY	DATE			
RR	7/11/2016			
APPROVED BY	DATE	No.	DATE	REVISIONS



**FORMER FPL CUTLER POWER PLANT PPARCEL**  
PALMETTO BAY, FLORIDA



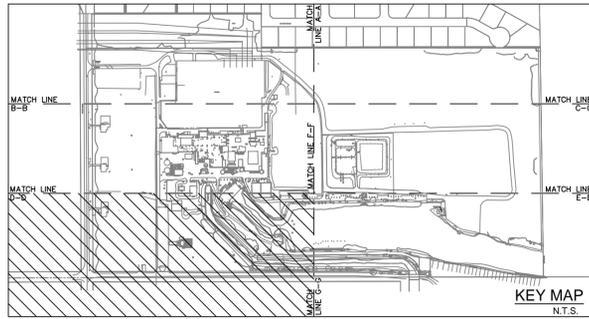
17670 NW 78TH AVE, SUITE 214  
MIAMI, FLORIDA 33015  
(786)468-8304 (305)392-1019 FAX  
CERTIFICATE OF AUTHORIZATION No. 9808

ROBERT J. ROSS, P.E.  
STATE OF FLORIDA  
REGISTRATION NO. 59485  
DATE: 7/11/2016

## GRADING PLAN (2 OF 6)

SCALE: 1"=40'

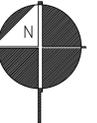
SHEET No. C-4



# LEGEND

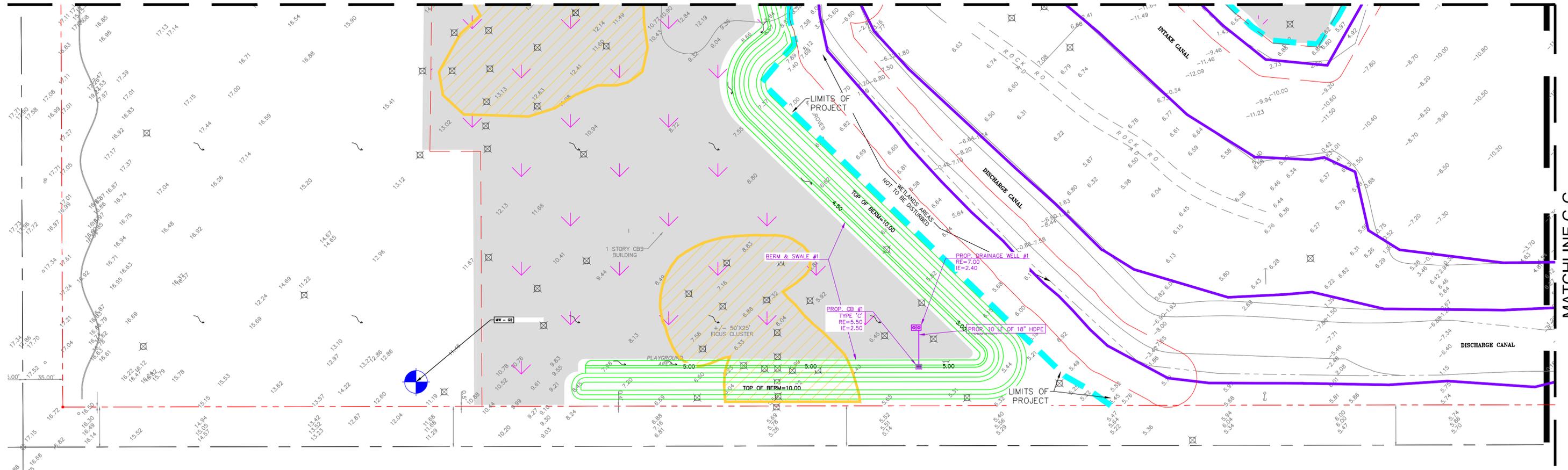
- PROPERTY LINE
- EXISTING FENCE
- RETENTION AREA
- EXISTING WETLANDS
- 12" CLEAN FILL W/ 8 OZ. HIGH VISIBILITY ORANGE GEOTEXTILE GSE OR US-20SNW (SEE SPECS)
- PROPOSED GRADE
- FLOW ARROW
- PROPOSED DRAINAGE
- PROPOSED CATCH BASIN
- PROPOSED DRAINAGE WELL
- SOIL BORING
- SOIL IMPACTED AREA
- VANADIUM GROUNDWATER PLUME
- ARSENIC GROUNDWATER PLUME
- MONITORING WELL
- WETLAND BUFFER
- PROJECT BOUNDARY

- \*NOTES:**
1. ANY SEEDING MUST BE A MIN OF 15' FROM ANY WETLAND AREAS OR WETLAND VEGETATION AND GRADE AWAY FROM WETLANDS AREAS AND WETLAND VEGETATION.
  2. THE CLEAN FILL MATERIAL MUST BE SOURCED FROM A NATIVE ROCK QUARRY UNLESS OTHERWISE APPROVED BY THE ENGINEER.
  3. ALL SOILS EXCAVATED DURING CONSTRUCTION ACTIVITIES SHALL BE DISPOSED OF AT A PERMITTED CLASS 1 LANDFILL.
  4. IN ACCORDANCE WITH APPLICABLE STATE REGULATIONS, AT A MINIMUM A 15 FT BUFFER AND AN AVERAGE 25 FT BUFFER WILL BE MAINTAINED BETWEEN THE PROJECT LIMITS AND WETLANDS BOUNDARIES.



SCALE: 1"=40'

## MATCHLINE D-D



MATCHLINE G-G



DCS	7/11/2016			
DESIGNED BY	DATE			
DCS	7/11/2016			
DRAWN BY	DATE			
MR	7/11/2016			
CHECKED BY	DATE			
RR	7/11/2016			
APPROVED BY	DATE	No.	DATE	REVISIONS



**FORMER FPL CUTLER POWER PLANT PPARCEL**  
PALMETTO BAY, FLORIDA



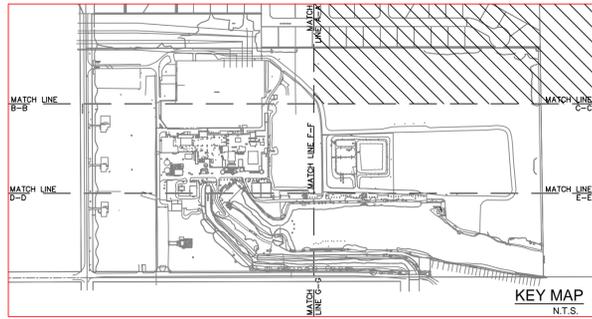
17670 NW 78TH AVE, SUITE 214  
MIAMI, FLORIDA 33015  
(786)468-8304 (305)392-1019 FAX  
CERTIFICATE OF AUTHORIZATION No. 9808

ROBERT J. ROSS, P.E.  
STATE OF FLORIDA  
REGISTRATION NO. 59485  
DATE: 7/11/2016

## GRADING PLAN (3 OF 6)

SCALE: 1"=40'

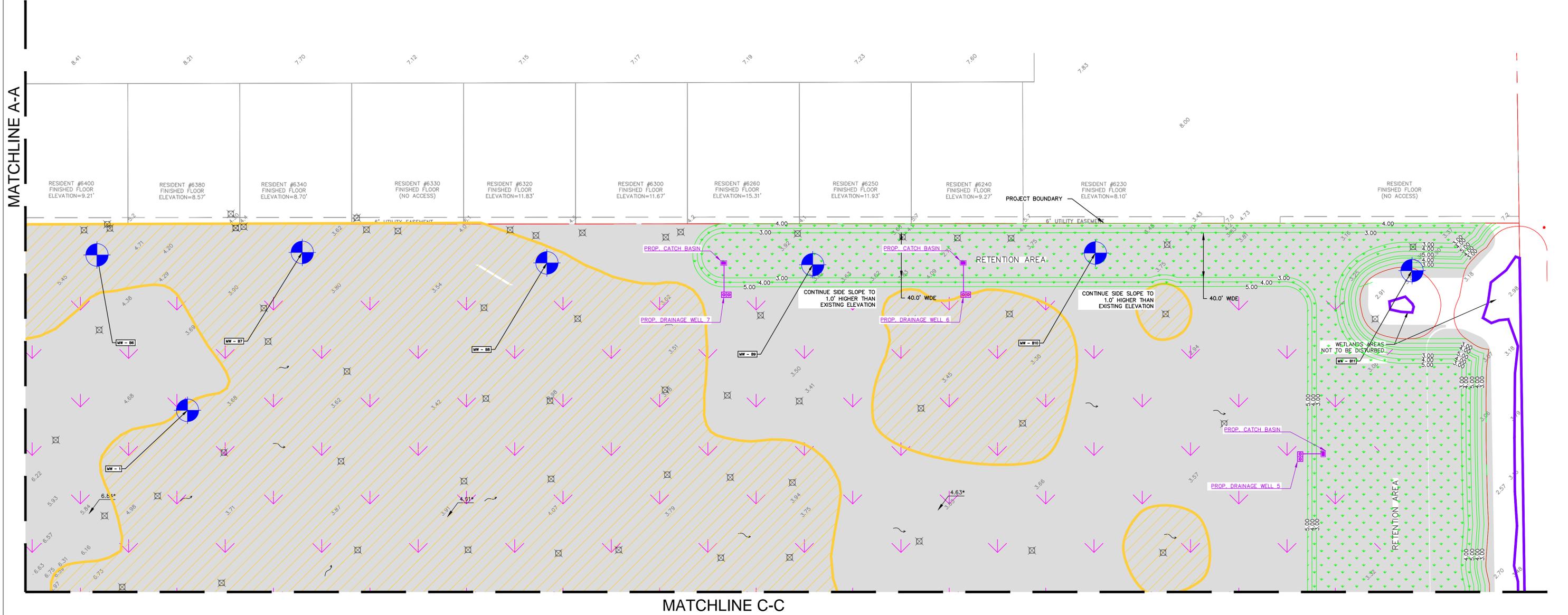
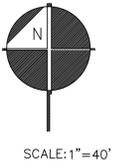
SHEET No. C-5



### LEGEND

- PROPERTY LINE
- EXISTING FENCE
- RETENTION AREA
- EXISTING WETLANDS
- 12" CLEAN FILL W/ 8 OZ. HIGH VISIBILITY ORANGE GEOTEXTILE GSE OR US-205NW (SEE SPECS)
- PROPOSED GRADE
- FLOW ARROW
- PROPOSED DRAINAGE
- PROPOSED CATCH BASIN
- PROPOSED DRAINAGE WELL
- SOIL BORING
- SOIL IMPACTED AREA
- VANADIUM GROUNDWATER PLUME
- ARSENIC GROUNDWATER PLUME
- MONITORING WELL
- WETLAND BUFFER
- PROJECT BOUNDARY

- \*NOTES:**
1. ANY SEEDING MUST BE A MIN OF 15' FROM ANY WETLAND AREAS OR WETLAND VEGETATION AND GRADE AWAY FROM WETLANDS AREAS AND WETLAND VEGETATION.
  2. THE CLEAN FILL MATERIAL MUST BE SOURCED FROM A NATIVE ROCK QUARRY UNLESS OTHERWISE APPROVED BY THE ENGINEER.
  3. ALL SOILS EXCAVATED DURING CONSTRUCTION ACTIVITIES SHALL BE DISPOSED OF AT A PERMITTED CLASS 1 LANDFILL.
  4. IN ACCORDANCE WITH APPLICABLE STATE REGULATIONS, AT A MINIMUM A 15 FT BUFFER AND AN AVERAGE 25 FT BUFFER WILL BE MAINTAINED BETWEEN THE PROJECT LIMITS AND WETLANDS BOUNDARIES.



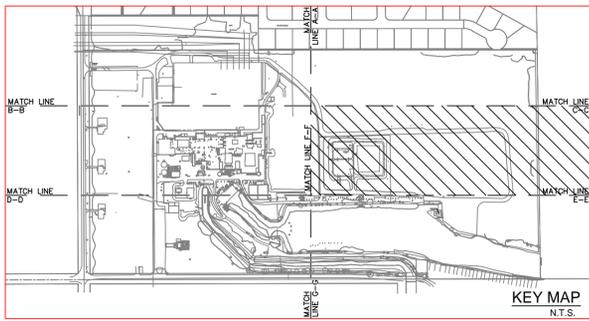
DCS	7/11/2016			
DESIGNED BY	DATE			
DCS	7/11/2016			
DRAWN BY	DATE			
MR	7/11/2016			
CHECKED BY	DATE			
RR	7/11/2016			
APPROVED BY	DATE	No.	DATE	REVISIONS

**FORMER FPL CUTLER POWER PLANT PPARCEL**  
PALMETTO BAY, FLORIDA

**RE**  
ROSS ENGINEERING, INC.  
17670 NW 78TH AVE, SUITE 214  
MIAMI, FLORIDA 33015  
(786)468-8304 (305)392-1019 FAX  
CERTIFICATE OF AUTHORIZATION No. 9808

ROBERT J. ROSS, P.E.  
STATE OF FLORIDA  
REGISTRATION NO. 59485  
DATE: 7/11/2016

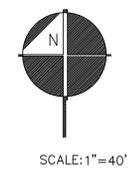
## GRADING PLAN (4 OF 6)



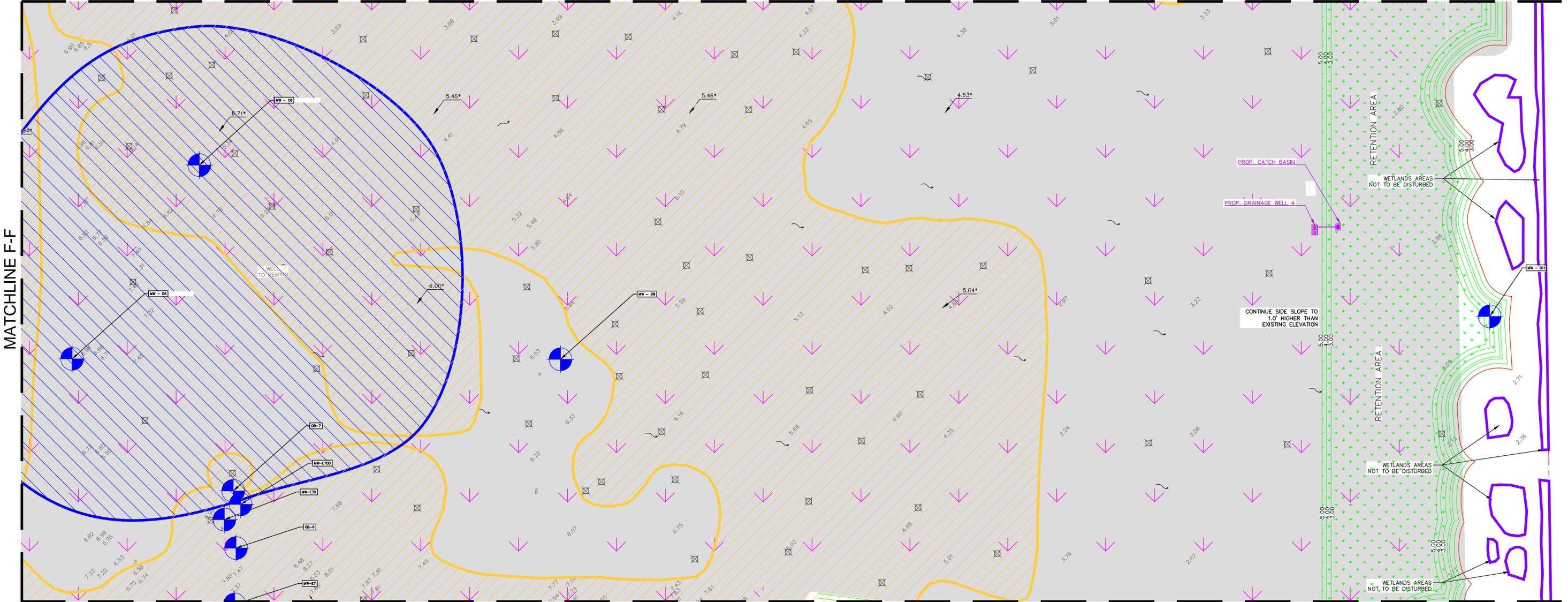
### LEGEND

- PROPERTY LINE
- EXISTING FENCE
- RETENTION AREA
- EXISTING WETLANDS
- 12" CLEAN FILL W/ 8 OZ. HIGH VISIBILITY ORANGE GEOTEXTILE GSE OR US-205NW (SEE SPECS)
- PROPOSED GRADE
- FLOW ARROW
- PROPOSED DRAINAGE
- PROPOSED CATCH BASIN
- PROPOSED DRAINAGE WELL
- SOIL BORING
- SOIL IMPACTED AREA
- VANADIUM GROUNDWATER PLUME
- ARSENIC GROUNDWATER PLUME
- MONITORING WELL
- WETLAND BUFFER
- PROJECT BOUNDARY

- \*NOTES:**
1. ANY SEEDING MUST BE A MIN OF 15' FROM ANY WETLAND AREAS OR WETLAND VEGETATION AND GRADE AWAY FROM WETLANDS AREAS AND WETLAND VEGETATION.
  2. THE CLEAN FILL MATERIAL MUST BE SOURCED FROM A NATIVE ROCK QUARRY UNLESS OTHERWISE APPROVED BY THE ENGINEER.
  3. ALL SOILS EXCAVATED DURING CONSTRUCTION ACTIVITIES SHALL BE DISPOSED OF AT A PERMITTED CLASS 1 LANDFILL.
  4. IN ACCORDANCE WITH APPLICABLE STATE REGULATIONS, AT A MINIMUM A 15 FT BUFFER AND AN AVERAGE 25 FT BUFFER WILL BE MAINTAINED BETWEEN THE PROJECT LIMITS AND WETLANDS BOUNDARIES.



### MATCHLINE C-C



### MATCHLINE E-E



DCS	7/11/2016			
DESIGNED BY	DATE			
DCS	7/11/2016			
DRAWN BY	DATE			
MR	7/11/2016			
CHECKED BY	DATE			
RR	7/11/2016			
APPROVED BY	DATE	No.	DATE	REVISIONS

  
**FPL**  
 FORMER FPL CUTLER POWER PLANT PPARCEL  
 PALMETTO BAY, FLORIDA

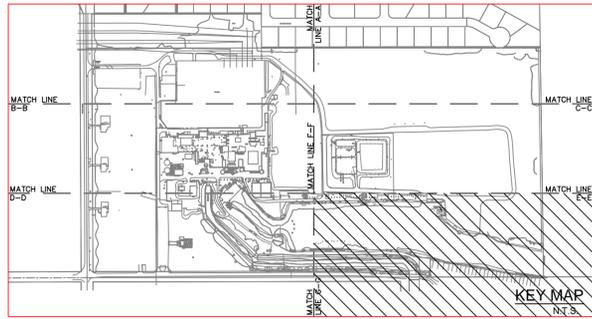
  
**RE**  
 ROSS ENGINEERING, INC.  
 17670 NW 78TH AVE, SUITE 214  
 MIAMI, FLORIDA 33015  
 (786)468-8304 (305)392-1019 FAX  
 CERTIFICATE OF AUTHORIZATION No. 9808

ROBERT J. ROSS, P.E.  
 STATE OF FLORIDA  
 REGISTRATION NO. 59485  
 DATE: 7/11/2016

## GRADING PLAN (5 OF 6)

SCALE: 1"=40'

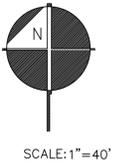
SHEET No. C-7



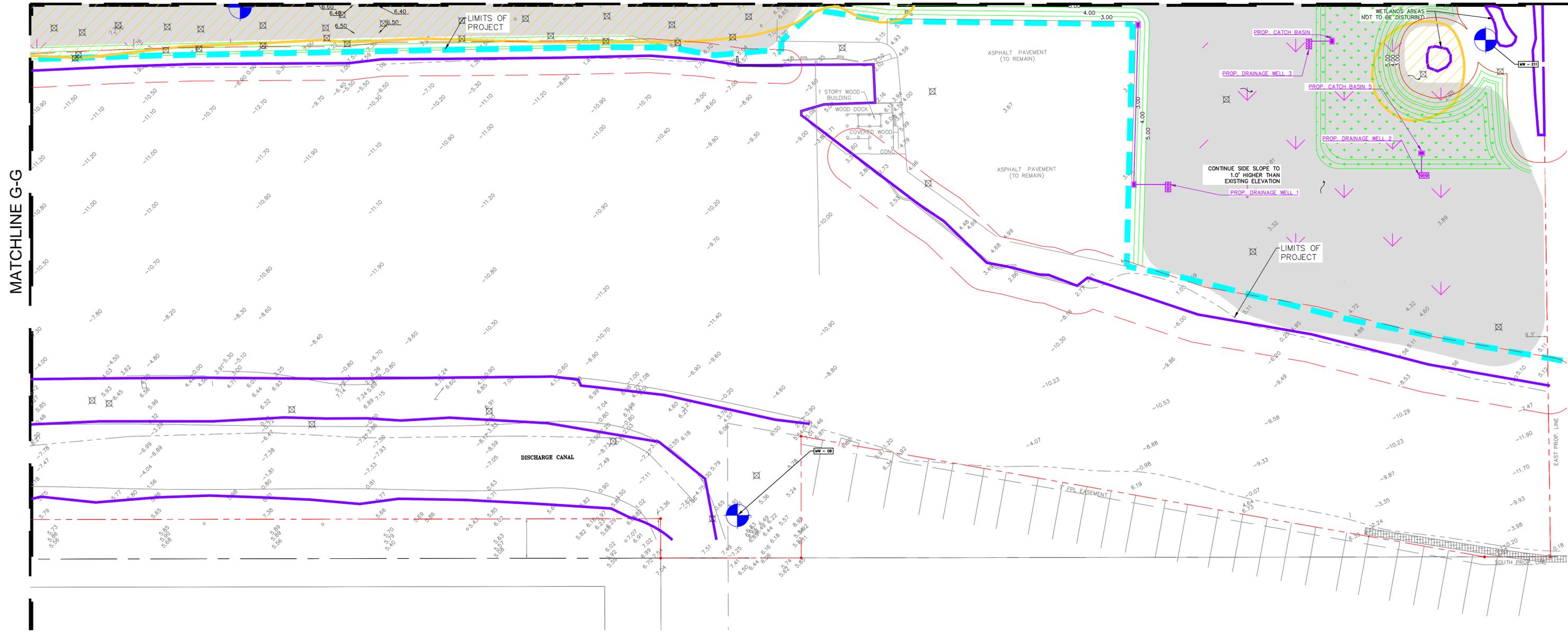
### LEGEND

- PROPERTY LINE
- EXISTING FENCE
- RETENTION AREA
- EXISTING WETLANDS
- 12" CLEAN FILL W/ 8 OZ. HIGH VISIBILITY ORANGE GEOTEXTILE GSE OR US-205NW (SEE SPECS)
- PROPOSED GRADE
- FLOW ARROW
- PROPOSED DRAINAGE
- PROPOSED CATCH BASIN
- PROPOSED DRAINAGE WELL
- SOIL BORING
- SOIL IMPACTED AREA
- VANADIUM GROUNDWATER PLUME
- ARSENIC GROUNDWATER PLUME
- MONITORING WELL
- WETLAND BUFFER
- PROJECT BOUNDARY

- \*NOTES:**
1. ANY SEEDING MUST BE A MIN OF 15' FROM ANY WETLAND AREAS OR WETLAND VEGETATION AND GRADE AWAY FROM WETLANDS AREAS AND WETLAND VEGETATION.
  2. THE CLEAN FILL MATERIAL MUST BE SOURCED FROM A NATIVE ROCK QUARRY UNLESS OTHERWISE APPROVED BY THE ENGINEER.
  3. ALL SOILS EXCAVATED DURING CONSTRUCTION ACTIVITIES SHALL BE DISPOSED OF AT A PERMITTED CLASS 1 LANDFILL.
  4. IN ACCORDANCE WITH APPLICABLE STATE REGULATIONS, AT A MINIMUM A 15 FT BUFFER AND AN AVERAGE 25 FT BUFFER WILL BE MAINTAINED BETWEEN THE PROJECT LIMITS AND WETLANDS BOUNDARIES.



### MATCHLINE E-E



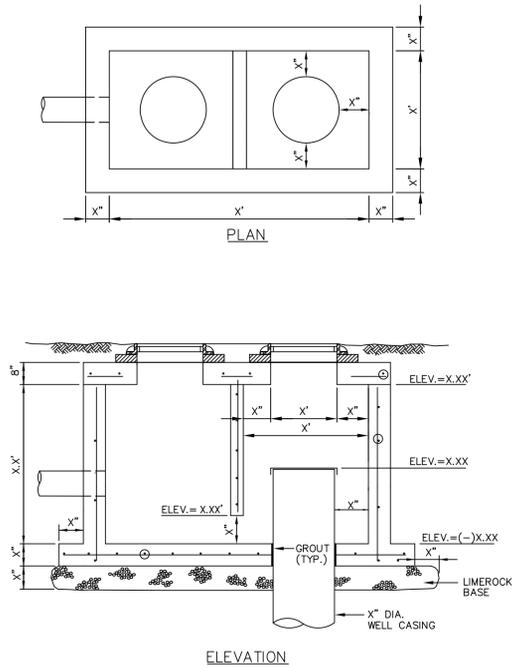
DCS	7/11/2016			
DESIGNED BY	DATE			
DCS	7/11/2016			
DRAWN BY	DATE			
MR	7/11/2016			
CHECKED BY	DATE			
RR	7/11/2016			
APPROVED BY	DATE	No.	DATE	REVISIONS

**FORMER FPL CUTLER POWER PLANT PPARCEL**  
PALMETTO BAY, FLORIDA

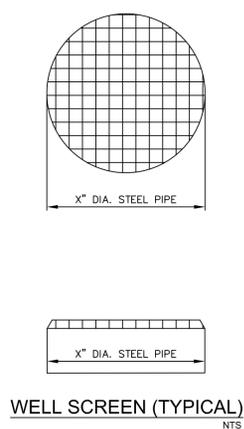
17670 NW 78TH AVE, SUITE 214  
MIAMI, FLORIDA 33015  
(786)468-8304 (305)392-1019 FAX  
CERTIFICATE OF AUTHORIZATION No. 9808

ROBERT J. ROSS, P.E.  
STATE OF FLORIDA  
REGISTRATION NO. 59485  
DATE: 7/11/2016

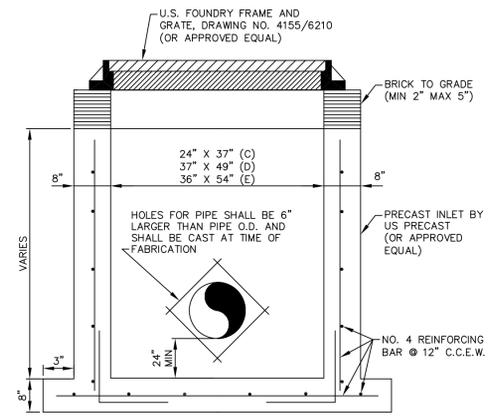
## GRADING PLAN (6 OF 6)



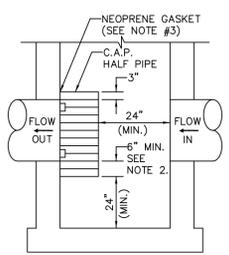
**PRECAST DRAINAGE WELL  
CONCRETE STRUCTURE - X'X'X'**  
NTS



**WELL SCREEN (TYPICAL)**  
NTS



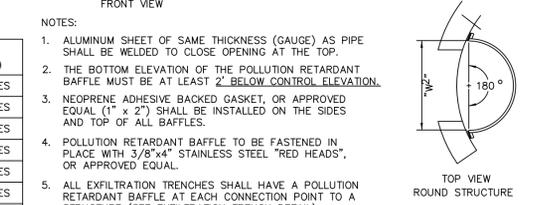
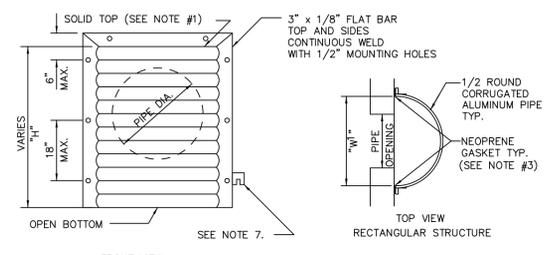
**CATCH BASIN (TYPICAL)**  
NTS



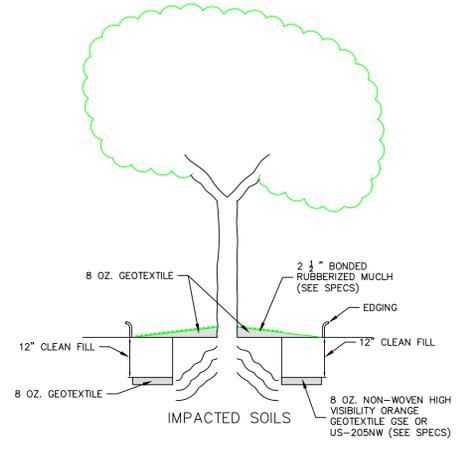
PIPE DIA. (IN)	W (IN)	W2 (IN)	T (GAUGE)	H (IN)
15"	21"	21"	16	VARIES
18"	21"	21"	16	VARIES
21"	24"	24"	16	VARIES
24"	30"	30"	16	VARIES
30"	30"	36"	16	VARIES
36"	36"	42"	14	VARIES
42"	42"	48"	14	VARIES
48"	48"	54"	14	VARIES
54"	54"	60"	14	VARIES
60"	60"	66"	14	VARIES

- RECTANGULAR STRUCTURE
- ROUND STRUCTURE

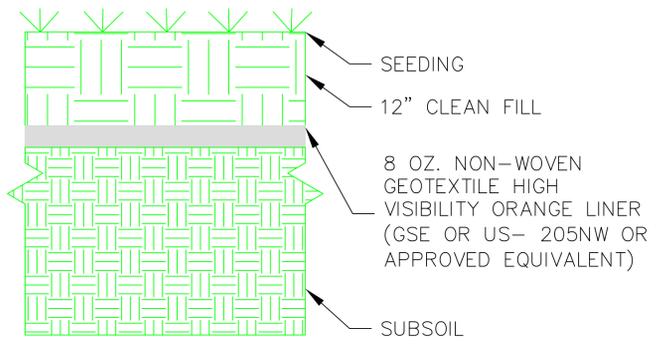
**POLLUTION RETARDANT BAFFLE**  
NTS



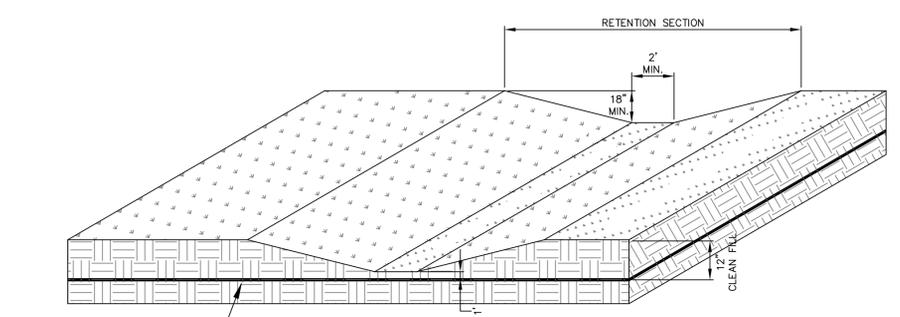
- NOTES:
- ALUMINUM SHEET OF SAME THICKNESS (GAUGE) AS PIPE SHALL BE WELDED TO CLOSE OPENING AT THE TOP.
  - THE BOTTOM ELEVATION OF THE POLLUTION RETARDANT BAFFLE MUST BE AT LEAST 2" BELOW CONTROL ELEVATION.
  - NEOPRENE ADHESIVE BACKED GASKET, OR APPROVED EQUAL (1" x 2") SHALL BE INSTALLED ON THE SIDES AND TOP OF ALL BAFFLES.
  - POLLUTION RETARDANT BAFFLE TO BE FASTENED IN PLACE WITH 3/8"x4" STAINLESS STEEL "RED HEADS", OR APPROVED EQUAL.
  - ALL EXFILTRATION TRENCHES SHALL HAVE A POLLUTION RETARDANT BAFFLE AT EACH CONNECTION POINT TO A STRUCTURE (SEE EXFILTRATION TRENCH DETAIL).
  - FIBERGLASS BAFFLES ARE NOT PERMITTED.
  - MOUNTING BRACKETS MAY BE ADDED TO FLAT BARS TO EASE INSTALLATION IN ROUND STRUCTURES. SPACING TO MATCH HOLES IN FLAT BARS.



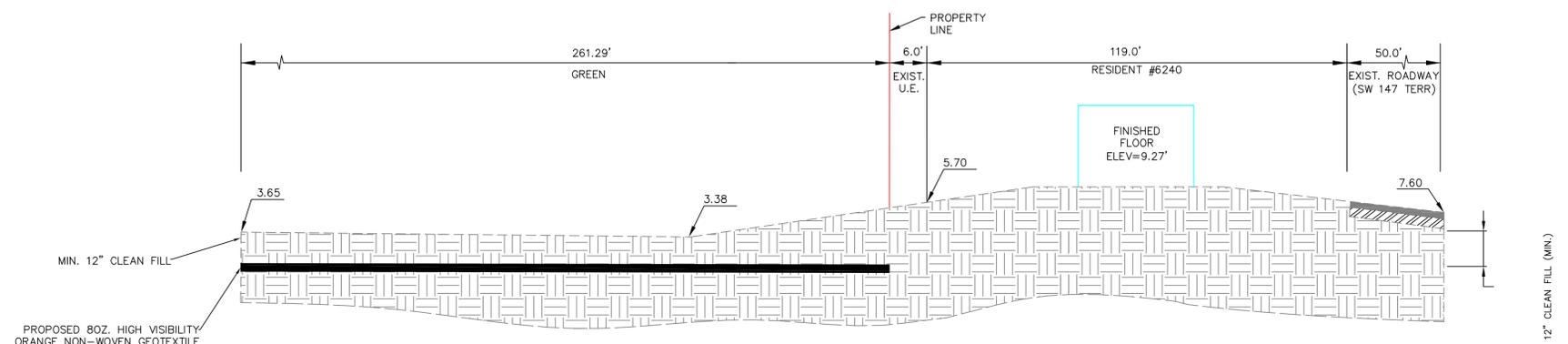
**TREE PROTECTION DETAIL (TYPICAL)**  
NTS



**GEOTEXTILE/SOIL COMPOSITE LAYER (TYPICAL)**  
NTS



**SECTION D-D  
EXISTING AND RETENTION**  
NTS



**SECTION C-C**  
NTS



DCS	7/11/2016			
DESIGNED BY	DATE			
DCS	7/11/2016			
DRAWN BY	DATE			
MR	7/11/2016			
CHECKED BY	DATE			
RR	7/11/2016			
APPROVED BY	DATE	No.	DATE	REVISIONS

**FORMER FPL CUTLER POWER PLANT PPARCEL**  
PALMETTO BAY, FLORIDA

17670 NW 78TH AVE, SUITE 214  
MIAMI, FLORIDA 33015  
(786)468-8304 (305)392-1019 FAX  
CERTIFICATE OF AUTHORIZATION No. 9808

ROBERT J. ROSS, P.E.  
STATE OF FLORIDA  
REGISTRATION NO. 59485  
DATE: 7/11/2016

**PAVING GRADING AND DRAINAGE PLAN**

## **Appendix B**

### **Specifications**

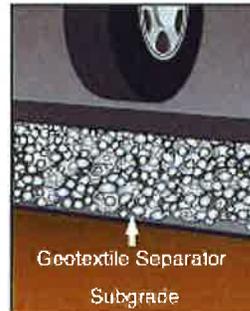
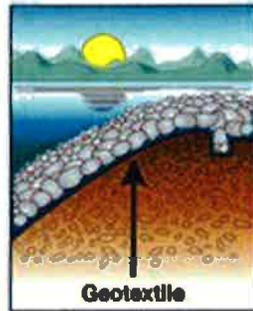
- Geotextile Liner
- Rubber Mulch

# US 205NW

## Nonwoven Geotextile



NTPEP APPROVED - GTX-2013-01-030. US 205NW is a nonwoven needlepunched geotextile made of 100% polypropylene staple filaments. US 205NW resists ultraviolet and biological deterioration, rotting, naturally encountered basics and acids. Polypropylene is stable within a pH range of 2 to 13. US 205NW will satisfy the requirements as outlined in AASHTO M-288-06 for Class 1 applications and meets the following M.A.R.V. values except where noted:



PROPERTY	TEST METHOD	ENGLISH	METRIC
Weight - Typical	ASTM D-5261	8.0 oz/sy	271 g/sm
Tensile Strength	ASTM D-4632	205 lbs	912 N
Elongation @ Break	ASTM D-4632	50%	50%
Mullen Burst*	ASTM D-3786*	350 psi	2,413 kPa
Puncture Strength*	ASTM D-4833*	130 lbs	579 N
CBR Puncture	ASTM D-6241	535 lbs	2,381 N
Trapezoidal Tear	ASTM D-4533	85 lbs	378 N
Apparent Opening Size	ASTM D-4751	80 US Sieve	0.180 mm
Permittivity	ASTM D-4491	1.35 Sec-1	1.35 Sec-1
Water Flow Rate	ASTM D-4491	90 g/m in/sf	3,657 l/m in/sm
UV Resistance @ 500 Hours	ASTM D-4355	70%	70%

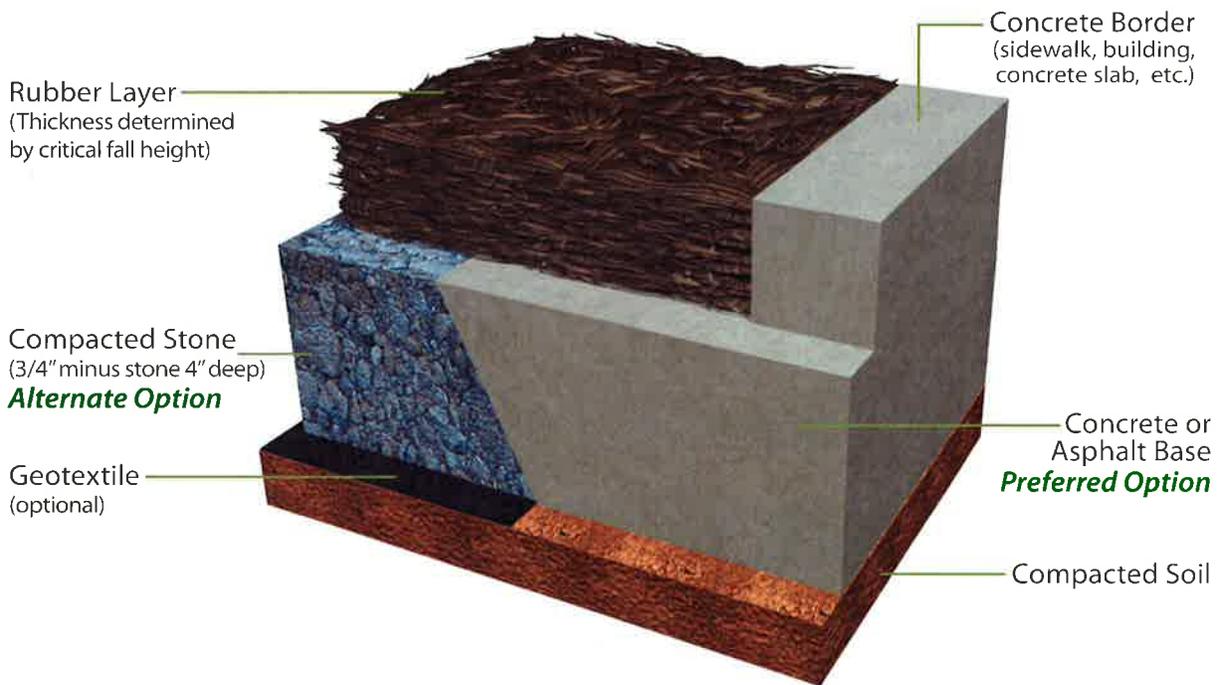
ROLL SIZE	ROLL DIAMETER	AREA	WEIGHT
12.5' x 360'	16.0 in	500 sys	270 lbs
15' x 300'	16.0 in	500 sys	270 lbs

\* Historical averages (current values not available): Mullen Burst Strength ASTM D3786 is no longer recognized by ASTM D-35 on Geosynthetics as an acceptable test method. Puncture Strength ASTM D4833 is not recognized by AASHTO M288 and has been replaced with CBR Puncture ASTM D6241.

This information is provided for reference only and is not intended as a warranty or guarantee. US Fabrics assumes no liability in connection with the use of this information (1/2015).



## Rubber Surfacing Bonded Rubber



*Components are not drawn to scale.*



## Bonded Rubber Landscape Surfacing Specification

### PART 1 - GENERAL

#### 1.1 DESCRIPTION

- A. Single-density, resilient, seamless, bonded rubber, landscape surfacing.

#### 1.2 RELATED DOCUMENTS

- A. Maintenance and Cleaning Instructions
- B. Warranty
- C. Aggregate Subsurface Specification
- D. Concrete Subsurface Requirements
- E. Asphalt Subsurface Requirements

#### 1.3 REFERENCES

- A. US Consumer Product Safety Commission (CPSC) Public Playground Safety Handbook
- B. ASTM F1292-09: Standard Specification for Impact Attenuation of Surface Systems Under and Around Playground Equipment
- C. ASTM F1951-09: Standard Specification for Determination of Accessibility of Surface Systems Under and Around Playground Equipment
- D. ASTM C1028-07: Standard Test Method for Determining the Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull Meter Method.
- E. ASTM E303-93(2008): Standard Test Method for Measuring Surface Frictional Properties Using the British Pendulum Tester
- F. ASTM D2859: Standard Test Method for Flammability of Finished Textile Floor Covering Materials
- G. ASTM D412: Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers
- H. ASTM D624: Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers
- I. ASTM D2240: Standard Test Method for Rubber Property - Durometer Hardness
- J. ASTM F1551: Standard Test Methods for Comprehensive Characterization of Synthetic Turf Playing Surfaces and Materials: Suffix-DIN 18-035, Part 6: Water Permeability of Synthetic Turf Systems and Permeable Bases
- K. ASTM 2047-11: Standard Test Method for Static Coefficient of Friction of Polished Coated Flooring Surfaces ad Measured by the James Machine
- L. The Consumer Product Safety Improvement Act (CPSIA) of 2008
- M. CPSC-CH-E1002-08: Standard Operating Procedure for Determining Total Lead (Pb) in Non-Metal Children's Products
- N. ASTM F963-11: Standard Consumer Safety Specification for Toy Safety
- O. CPSC-CH-C1001-09.3: Standard Operating Procedure for Determination of Phthalates

#### 1.4 SUBMITTALS

- A. Product Data: Submit manufacturer's specification
- B. Samples: Submit manufacturer's samples of bonded rubber landscape surfacing showing texture, color, and thickness.
- C. IPEMA Certification: Submit IPEMA Certificate of Compliance to ASTM F1292
- D. Manufacturer's Project References:



1. Submit list of successfully completed projects.
  2. Include project name and location, name of owner, and type and quantity of bonded rubber landscape surfacing furnished.
- E. Installer's Project References:
1. Submit list of successfully completed projects.
  2. Include project name and location, name of owner, and type and quantity of bonded rubber landscape surfacing installed.
- F. Maintenance and Cleaning Instructions: Submit manufacturer's maintenance and cleaning instructions.
- G. Warranty: Submit manufacturer's warranty.

## 1.5 QUALITY ASSURANCE

- A. Manufacturer's Qualifications:
1. Continuously engaged in manufacturing of bonded landscape safety surfacing of similar type to that specified.
  2. Furnished a minimum of 10,000 square feet of bonded rubber landscape surfacing of similar type to that specified within the past 6 months.
- B. Installer's Qualifications:
1. Successful experience in installation of bonded rubber landscape surfacing of similar type to that specified, with a minimum of 10 projects completed within last 6 months.
  2. Employ persons trained for installation of bonded rubber landscape surfacing of similar type to that specified.
  3. Approved by manufacturer.
  4. Covered by Workers Compensation, Automotive and General Liability insurance.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
- B. Storage: Store materials in a dry area at a minimum temperature of 40 degrees F.
- C. Handling: Protect materials during handling and installation to prevent damage or contamination.

## 1.7 ENVIRONMENTAL REQUIREMENTS

- A. Material Temperature: Ensure material temperature is a minimum of 40 degrees F at time of installation.
- B. Air Temperature: Ensure air temperature is a minimum of 40 degrees F for a minimum of 24 hours before, during, and a minimum of 72 hours after installation.
- C. Precipitation: Ensure no prospect of precipitation during and a minimum of 72 hours after installation.

## 1.8 LIMITATIONS

- A. The following chemicals may cause damage to the bonded rubber landscape surfacing and should be avoided: disinfectants, concentrated chlorine bleach, gasoline, diesel fuel, hydraulic and lubricating oils, acids and organic solvents.
- B. Dissolved minerals and other chemicals such as hydrochlorides from water play areas, pool surrounds and similar applications may cause surface discoloration.



- C. An amber shading may be noticeable when using standard binding agent.
- D. Areas in excess of 1000 square feet or composed of adjacent colors may contain a cold joint or seam due to the nature of the installation process. Large areas or adjacent colors require the material to be installed on separate days.

## 1.9 WARRANTY

- A. A three (3) year warranty from the date of completion of installation shall be provided against defects in materials and workmanship.

## PART 2 - PRODUCT

### 2.1 MANUFACTURER

- A. XGrass

### 2.2 BONDED RUBBER LANDSCAPE SURFACING

- A. XGrass Bonded Rubber Landscape Surfacing
  1. Description: Single-density, resilient, seamless, bonded rubber, landscape surfacing.
  2. Compliance: Meet or exceed CPSC guidelines for impact attenuation.
  3. Material: Mixture of colored SBR rubber buffings and 100 percent solids, aromatic, MDI polyurethane binding agent.
  4. Binder to Rubber Ratio: Approximately 18.75 pounds of binder to 100 pounds of rubber.
  5. Total Thickness: From 1 inches to 5 inches
  6. Colors: Standard solid colors include Red, Brown or Green. Standard color combinations include Red/Green/Tan, Red/Brown/Tan or Red/Brown. Standard solid colors and color combinations were chosen based on popularity, UV stability, and cost.
- B. Test Results:
  1. ASTM F1292-09, Gmax < 200, HIC < 1000
  2. ASTM F1951-09, Pass
  3. ASTM C1028-07, Dry > 0.80, Wet > 0.50
  4. ASTM E303-93, Wet BPN average of both directions between 40 and 60
  5. ASTM D2859, Pass
  6. ASTM D412, Average tensile strength > 6 psi, average elongation > 15%
  7. ASTM D624, Average lbs/force at rupture > 6, average thickness > .75", average tear strength > 8 lbs/ force/inch
  8. ASTM D2240, Average change between 4% and 5%
  9. ASTM F1551, > 2000 inches/hour
  10. ASTM 2047-11, Average SCOF > 0.70
  11. CPSC-CH-E1002-08, pass
  12. ASTM F963-11, pass
  13. CPSC-CH-C1001-09.3, pass

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas to receive bonded rubber landscape surfacing. Ensure all applicable site work, including subsurface preparation, fencing, playground equipment installation and all other relevant work, has been completed. Notify owner if areas are not acceptable. Do not begin installation until unacceptable conditions have been corrected.



### 3.2 PREPARATION

- A. Prepare subsurface in accordance with manufacturer's instructions to ensure proper support and drainage for bonded rubber landscape surfacing. Finished elevations of subsurface shall be as indicated on the Drawings. Finished elevations of adjacent areas/ borders/edging shall be as indicated on the Drawings. Subsurface shall be installed in a true, even plane and sloped to drain unless otherwise indicated on the Drawings.
- B. Aggregate Subsurface: Aggregate subsurface shall be as specified in Section 1.2.
- C. Concrete Subsurface:
  - 1. Concrete subsurface shall be as specified in Section 1.2.
  - 2. Apply light broom finish.
  - 3. Ensure concrete is sound with no cracks or loose material.
  - 4. Ensure concrete is a minimum of 28 days old.
  - 5. Test concrete for moisture in accordance with manufacturer's instructions to ensure it has sufficiently cured and is dry.
  - 6. Power wash existing concrete in accordance with manufacturer's instructions.
- D. Asphalt Subsurface:
  - 1. Asphalt subsurface shall be as specified in Section 1.2.
  - 2. Ensure asphalt is sound with no cracks or loose material.
  - 3. Ensure asphalt is a minimum of 28 days old.
  - 4. Test asphalt for moisture in accordance with manufacturer's instructions to ensure it has sufficiently cured and is dry.
  - 5. Power wash existing asphalt in accordance with manufacturer's instructions.
- E. Variations in Elevation: Repair variations in elevation of completed subsurface greater than plus or minus 1/4 inch over 10 feet in any direction.

### 3.3 INSTALLATION

- A. Install bonded rubber landscape surfacing in accordance with manufacturer's instructions at locations indicated on the Drawings.
- B. Ensure prepared subsurface is dry, clean and free of any foreign or loose material.
- C. Install edges in accordance with manufacturer's instructions and as indicated on the Drawings.
- D. Install cold seams as indicated on the Drawings.

### 3.4 PROTECTION

- A. Owner shall not allow foot traffic on bonded rubber landscape surfacing until a minimum of 80 percent cure is obtained. (Estimated time to obtain 80 percent cure will range from 6 to 72 hours depending on temperature and humidity.)
- B. Owner shall protect completed bonded landscape safety surfacing from damage during installation and cure time.
- C. Owner shall protect completed bonded rubber landscape surfacing from damage from subsequent construction activity.

### 3.5 MAINTENANCE AND CLEANING

- A. Owner should maintain and clean bonded rubber landscape surfacing in accordance with manufacturer's instructions.

**Appendix C**

**Engineering Control Inspection Form**

Florida Power & Light Company  
 Former Cutler Power Plant Property  
 HWR-442/File-16360/IW-79

Name of Inspector: \_\_\_\_\_  
 Date: \_\_\_\_\_

**Engineering Control - Geotextile Liner, 12" Fill and Vegetative Cover**

Area of Engineering Control	Soil Cover/Erosion Issues?	Geotextile Liner Exposed?	Impacted Soils Below Liner Exposed?	Corrective Action Required?

**Engineering Control - 12" Soil & Bonded Rubber Mulch around Trees**

Area of Engineering Control	Rubberized Mulch/Cracked or Weathered?	Geotextile Liner Exposed?	Tree Roots or Impacted Soils Exposed?	Corrective Action Required?
Bonded Rubber Mulch around Trees				
Bonded Rubber Mulch on Path				

**Other Areas (to be added after construction)**

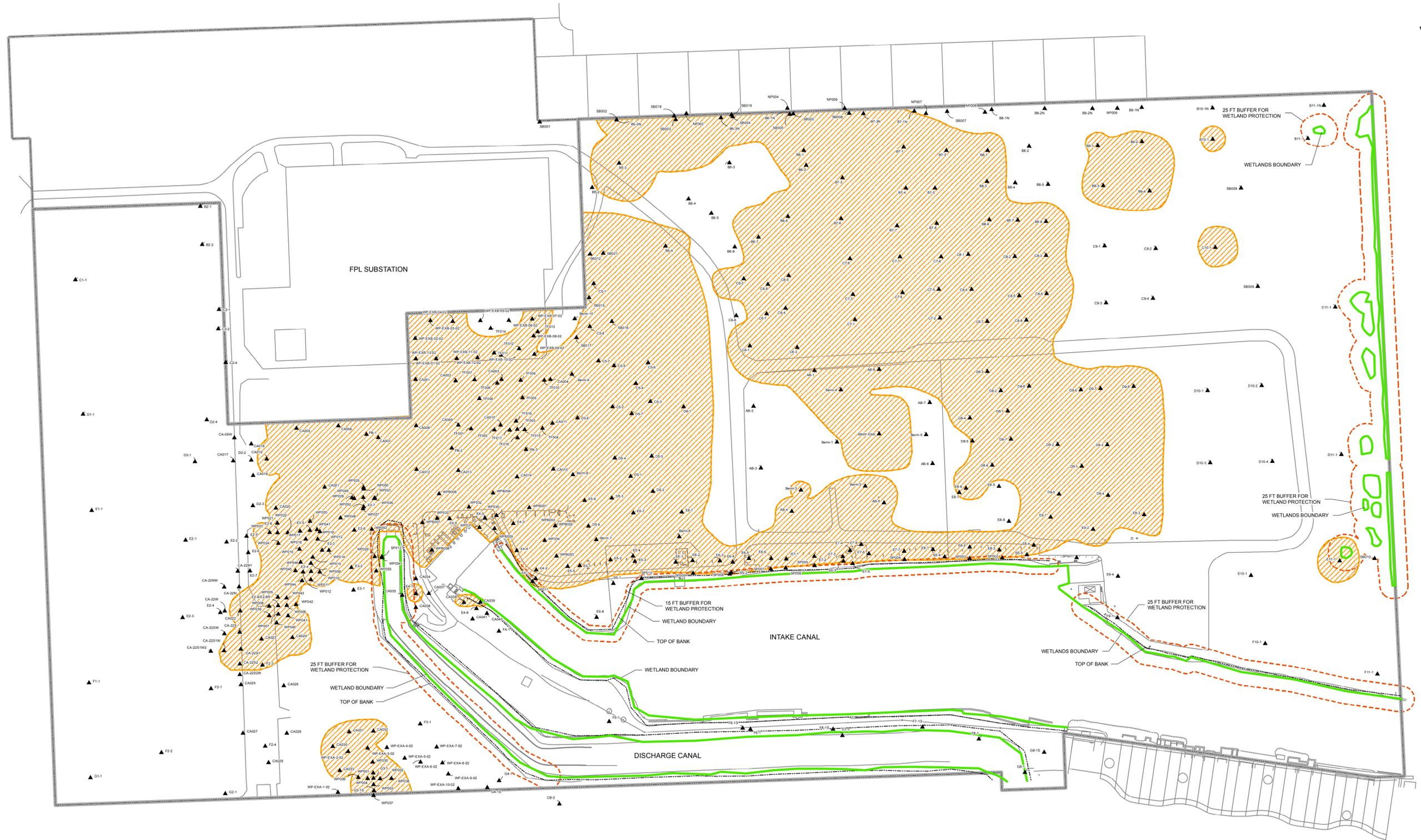
General Observation Area				

**Notes:**  
 1. Document observations with photos

2. A Corrective Action Form must be completed if the engineering controls are compromised based on the inspector's observations



**EXHIBIT B**  
Soil Analytical Data in Wetland Buffer  
July 2016



TIERRA CONSULTING GROUP, INC.  
PHONE: (954) 202-9226  
WWW.TIERRACONSULTING.COM

### SOIL BORING LOCATION MAP

FORMER CUTLER  
POWER PLANT PROPERTY  
MIAMI, FLORIDA

- LEGEND:**
- ▲ SOIL BORING LOCATION
  - PROPERTY BOUNDARY
  - WETLANDS BOUNDARY
  - TOP OF BANK
  - IMPACTED SOIL
  - BUFFER FOR WETLAND PROTECTION

SCALE:

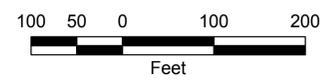
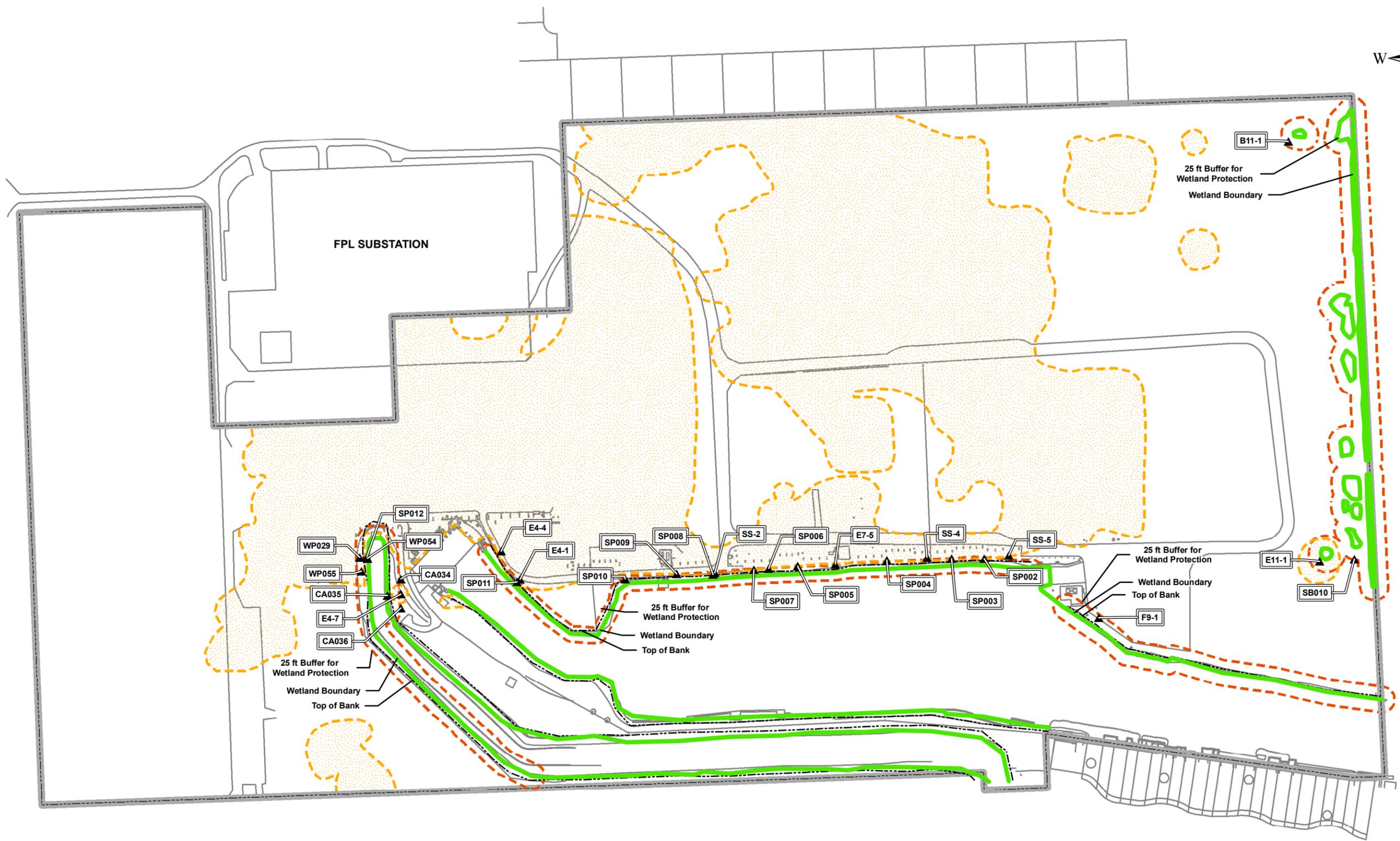


FIGURE 1



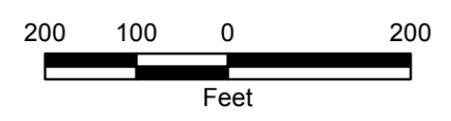
**SOIL BORINGS WITHIN WETLAND BUFFERS**

**FORMER CUTLER POWER PLANT PROPERTY MIAMI, FLORIDA**

**LEGEND:**

- ▲ SOIL BORING LOCATION
- PROPERTY BOUNDARY
- WETLANDS BOUNDARY
- WETLANDS BUFFER
- IMPACTED SOIL
- TOP OF BANK

**SCALE:**



**FIGURE 2**



**Table 1**  
**Summary of Metals Results for Soil Borings within Wetland Buffer Zones**

Point id	Sample id	Sample Depth	Sample Date	Antimony	Arsenic	Nickel	Vanadium
B11-1	B11-1-2	0 to 2 ft bls	2/13/2013	0.709 U mg/kg	3.02 mg/kg	0.492 mg/kg	2.83 mg/kg
E11-1	E11-1-2	0 to 2 ft bls	2/13/2013	6.6 mg/kg	3.12 mg/kg	3.24 mg/kg	14.1 mg/kg
E4-1	E4-1-4	2 to 4 ft bls	2/14/2013	0.709 U mg/kg	9.58 mg/kg	1.28 mg/kg	6.67 mg/kg
E4-1	E4-1-2	0 to 2 ft bls	2/14/2013	0.709 U mg/kg	72.6 mg/kg	0.968 mg/kg	8.18 mg/kg
E4-4	E4-4-4	2 to 4 ft bls	2/14/2013	2.38 mg/kg	1.4 mg/kg	2.48 mg/kg	6.35 mg/kg
E4-4	E4-4-10	4 to 6 ft bls	2/14/2013	1.88 i mg/kg	4.69 mg/kg	6.39 mg/kg	44.4 mg/kg
E4-4	E4-4-2	0 to 2 ft bls	2/14/2013	0.709 U mg/kg	9.65 mg/kg	2.1 mg/kg	15.7 mg/kg
E4-7	E4-7-2	0 to 2 feet bls	2/14/2013	4.56 mg/l	1.94 mg/l	3.54 mg/kg	8.09 mg/kg
E4-7	E4-7-4	2 to 4 feet bls	2/14/2013	2.98 mg/l	6.77 mg/l	10.5 mg/kg	13.5 mg/kg
E5-7	E5-7-1	0 to 2 ft bls	2/13/2013	3.87 mg/kg	2.67 mg/kg	2.4 mg/kg	8.39 mg/kg
E5-7	E5-7-3	2 to 4 ft bls	2/13/2013	2.04 i mg/kg	1.49 mg/kg	0.939 mg/kg	4.75 mg/kg
E5-7	E5-7-5	4 to 6 ft bls	2/13/2013	1.38 i mg/kg	5.93 mg/kg	0.688 mg/kg	1.96 mg/kg
F9-1	F9-1-2	0 to 2 ft bls	2/13/2013	2.63 mg/kg	3.7 mg/kg	0.941 mg/kg	2.95 mg/kg
SB010	SB010-0.5	0 to 0.5 feet bls	6/26/2014	0.54 U mg/kg	N/A	N/A	N/A
SB010	SB010-02	0.5 to 2 feet bls	6/26/2014	0.44 U mg/kg	N/A	N/A	N/A
SP002	SP002-2	0 to 2 ft bls	12/4/2014	N/A	1.3 mg/kg	N/A	N/A
SP002	SP002-4	2 to 4 ft bls	12/4/2014	N/A	1.9 mg/kg	N/A	N/A
SP002	SP002-6	4 to 6 ft bls	12/4/2014	N/A	25 mg/kg	N/A	N/A
SP003	SP003-2	0 to 2 ft bls	12/4/2014	N/A	1.8 mg/kg	N/A	N/A
SP003	SP003-4	2 to 4 ft bls	12/4/2014	N/A	3.6 mg/kg	N/A	N/A
SP003	SP003-6	4 to 6 ft bls	12/4/2014	N/A	2.5 mg/kg	N/A	5.7 mg/kg
SP004	SP004-2	0 to 2 ft bls	12/4/2014	N/A	14 mg/kg	N/A	N/A
SP004	SP004-4	2 to 4 ft bls	12/4/2014	N/A	2.3 mg/kg	N/A	N/A
SP004	SP004-6	4 to 6 ft bls	12/4/2014	N/A	4.2 mg/kg	N/A	N/A
SP005	SP005-2	0 to 2 ft bls	12/4/2014	N/A	5 mg/kg	N/A	N/A
SP005	SP005-4	2 to 4 ft bls	12/4/2014	N/A	6.8 mg/kg	N/A	14 mg/kg
SP005	SP005-6	4 to 6 ft bls	12/4/2014	N/A	4.9 mg/kg	N/A	N/A
SP006	SP006-2	0 to 2 ft bls	12/4/2014	N/A	4.2 mg/kg	N/A	N/A
SP006	SP006-4	2 to 4 ft bls	12/4/2014	N/A	1.8 mg/kg	N/A	N/A
SP006	SP006-6	4 to 6 ft bls	12/4/2014	N/A	1.2 mg/kg	N/A	N/A
SP007	SP007-2	0 to 2 ft bls	12/4/2014	N/A	4.2 mg/kg	N/A	N/A
SP007	SP007-4	2 to 4 ft bls	12/4/2014	N/A	1.6 mg/kg	N/A	N/A
SP007	SP007-6	4 to 6 ft bls	12/4/2014	N/A	1.3 mg/kg	N/A	N/A
SP008	SP008-2	0 to 2 ft bls	12/4/2014	N/A	3.5 mg/kg	N/A	100 mg/kg
SP008	SP008-4	2 to 4 ft bls	12/4/2014	N/A	2.2 mg/kg	N/A	N/A
SP008	SP008-6	4 to 6 ft bls	12/4/2014	N/A	1.2 mg/kg	N/A	N/A
SP009	SP009-2	0 to 2 ft bls	12/4/2014	N/A	1.6 mg/kg	N/A	N/A
SP009	SP009-4	2 to 4 ft bls	12/4/2014	N/A	2.9 mg/kg	N/A	N/A
SP009	SP009-6	4 to 6 ft bls	12/4/2014	N/A	2 mg/kg	N/A	N/A
SP010	SP010-2	0 to 2 ft bls	12/4/2014	N/A	2.9 mg/kg	N/A	N/A
SP010	SP010-4	2 to 4 ft bls	12/4/2014	N/A	1.9 mg/kg	N/A	N/A
SP010	SP010-6	4 to 6 ft bls	12/4/2014	N/A	1.5 mg/kg	N/A	N/A
SP011	SP011-2	0 to 2 ft bls	12/4/2014	N/A	9 mg/kg	N/A	N/A
SP011	SP011-4	2 to 4 ft bls	12/4/2014	N/A	4.6 mg/kg	N/A	N/A
SP011	SP011-6	4 to 6 ft bls	12/4/2014	N/A	4.4 mg/kg	N/A	N/A
SS-2	SS-2	0 to 2 ft bls	9/25/2013	N/A	11.6 mg/kg	N/A	N/A
SS-4	SS-4	0 to 2 ft bls	9/25/2013	N/A	5.56 mg/kg	N/A	N/A
SS-5	SS-5	0 to 2 ft bls	9/25/2013	N/A	1.63 mg/kg	N/A	N/A
CA-34	CA-34-04	2 to 4 feet bls	5/28/2015	N/A	2.4 mg/kg	N/A	N/A
CA-34	CA-34-06	4 to 6 feet bls	5/28/2015	N/A	2.7 mg/kg	N/A	N/A
CA-35	CA-35-02	0.5 to 2 feet bls	5/28/2015	N/A	2.6 mg/kg	N/A	N/A
CA-35	CA-35-04	2 to 4 feet bls	5/28/2015	N/A	1.1 mg/kg	N/A	N/A
CA-36	CA-36-04	2 to 4 feet bls	5/28/2015	N/A	0.35i mg/kg	N/A	N/A
CA-36	CA-36-06	4 to 6 feet bls	5/28/2015	N/A	4.7 mg/kg	N/A	N/A
SP012	SP012-2	0 to 2 ft bls	12/4/2014	N/A	1.9 mg/kg	N/A	N/A
SP012	SP012-4	2 to 4 ft bls	12/4/2014	N/A	0.99 mg/kg	N/A	N/A
SP012	SP012-6	4 to 6 ft bls	12/4/2014	N/A	0.89 mg/kg	N/A	N/A
SP012	SP012-8	6 to 8 ft bls	12/4/2014	N/A	0.47i mg/kg	N/A	N/A
SCTL RESIDENTIAL DIRECT EXPOSURE OR SITE SPECIFIC ALTERNATIVE CTL				27	5.2*	340	67
SCTL COMMERCIAL/INDUSTRIAL DIRECT EXPOSURE				370	12	35000	10000
SCTL FOR LEACHABILITY TO GROUNDWATER				5.4	***	130	980

Notes:

SCTL- Soil Cleanup Target Level as provided by Chapter 62-777 FAC

mg/kg- milligrams per kilogram

N/A- not analyzed

\*- Site specific alternative cleanup target level

\*\*\*- Leachability values may be derived using the SPLP Test to calculate site-specific SCTLs or may be determined using TCLP in the event oily wastes are present.

i - indicates that the reported value is between the laboratory method detection limit and the practical quantitation limit.

U- indicates that the compound was analyzed for but not detected above the MDL.

**Table 2**  
**Summary of Detected PAHs in Soil Borings within Wetland Buffer Zones**

Point ID	Sample Id	Sample Depth	Sample Date	Acenaphthene	Benzo (a) anthracene	Benzo (a) pyrene	Benzo (b) fluoranthene	Dibenz (a,h) anthracene	Indeno(1,2,3-cd)pyrene	Benzo(a)pyrene equivalents
E4-7	E4-7-2	0 to 2 ft bls	2/14/2013	0.000321 U mg/kg	0.0018 mg/kg	0.00024 U mg/kg	0.00635 mg/kg	0.000253 U mg/kg	0.000147 U mg/kg	0.0 mg/kg
E4-7	E4-7-4	2 to 4 feet bls	2/14/2013	0.000321 U mg/kg	0.000353 U mg/kg	0.00024 U mg/kg	0.000433 U mg/kg	0.000253 U mg/kg	0.000147 U mg/kg	N/A
WP029	WP029-0.5	0 to 0.5 feet bls	6/26/2014	0.14 U mg/kg	0.37i mg/kg	0.35i mg/kg	0.69 mg/kg	0.55 mg/kg	0.66 mg/kg	1.1 mg/kg
WP029	WP029-02	0.5 to 2 feet bls	6/26/2014	0.014 U mg/kg	0.011 U mg/kg	0.0044 U mg/kg	0.029 U mg/kg	0.011 U mg/kg	0.015 U mg/kg	N/A
WP029	WP029-04	2 to 4 feet bls	6/26/2014	0.014 U mg/kg	0.011 U mg/kg	0.0043 U mg/kg	0.028 U mg/kg	0.011 U mg/kg	0.014 U mg/kg	N/A
WP029	WP029-06	4 to 6 feet bls	6/26/2014	0.014 U mg/kg	0.011 U mg/kg	0.0043 U mg/kg	0.028 U mg/kg	0.011 U mg/kg	0.014 U mg/kg	N/A
WP029	WP029-08	6 to 8 feet bls	6/26/2014	0.014 U mg/kg	0.011 U mg/kg	0.0046 U mg/kg	0.030 U mg/kg	0.011 U mg/kg	0.015 U mg/kg	N/A
WP029	WP029-10	8 to 10 feet bls	6/26/2014	0.015 U mg/kg	0.012 U mg/kg	0.0047 U mg/kg	0.030 U mg/kg	0.011 U mg/kg	0.016 U mg/kg	N/A
WP054	WP054-0.5	0 to 0.5 feet bls	7/16/2014	0.034 U mg/kg	0.248 mg/kg	0.313 mg/kg	0.548 mg/kg	0.159 mg/kg	0.416 mg/kg	0.6 mg/kg
WP054	WP054-02	0.5 to 2 feet bls	7/16/2014	0.011 U mg/kg	0.057 mg/kg	0.07 mg/kg	0.065 mg/kg	0.0016 U mg/kg	0.07 mg/kg	0.1 mg/kg
WP055	WP055-0.5	0 to 0.5 feet bls	7/16/2014	0.036 U mg/kg	0.070i mg/kg	0.106i mg/kg	0.119 mg/kg	0.014 U mg/kg	0.152 mg/kg	0.1 mg/kg
WP055	WP055-02	0.5 to 2 feet bls	7/16/2014	0.036 U mg/kg	0.077i mg/kg	0.113i mg/kg	0.132 mg/kg	0.014 U mg/kg	0.164 mg/kg	0.2 mg/kg
SCTL RESIDENTIAL DIRECT EXPOSURE				2400	#	0.1	#	#	#	0.1
SCTL COMMERCIAL/INDUSTRIAL DIRECT EXPOSURE				20000	#	0.7	#	#	#	0.7
SCTL FOR LEACHABILITY TO GROUNDWATER				2.1	0.8	8	2.4	0.7	6.6	n/a

Notes:

SCTL- Soil Cleanup Target Level as provided by Chapter 62-777 FAC

mg/kg- milligrams per kilogram

N/A- not analyzed

\*- Site specific alternative cleanup target level

\*\*\*- Leachability values may be derived using the SPLP Test to calculate site-specific SCTLs or may be determined using TCLP in the event oily wastes are present.

i - indicates that the reported value is between the laboratory method detection limit and the practical quantitation limit.

U- indicates that the compound was analyzed for but not detected above the MDL.

# = Converted to Benzo(a)pyrene equivalents before comparison with the appropriate direct exposure SCTL for Benzo(a)pyrene

**EXHIBIT C**  
Interim Monitoring Only Plan  
July 2016

**Interim Groundwater Monitoring Only Plan (IMOP)**

July 7, 2016

**Florida Power & Light Company  
Former Cutler Power Plant Property  
HWR-442/File-16360/IW-79  
Miami, Florida**



## Table of Contents

1.	Objective .....	1
2.	Interim Groundwater Monitoring Only Plan .....	1
2.1	Groundwater Sampling Location and Schedule	1
2.2	Groundwater Elevation Contours	1
2.3	Groundwater Sampling Activities	1
2.4	Groundwater Sample Analysis	1
2.5	Report Preparation	2

### Figures

1	Site Vicinity Map
1A	Monitoring Only Plan – Well Location Map

## **1. Objective**

The main objective of this Interim Groundwater Monitoring Only (IMOP) is to monitor the groundwater quality during the interim period prior to implementation of the proposed engineering and institutional controls at the former Cutler Plant (Site) currently owned by the Florida Power & Light Company (FPL). **Figure 1**, attached to this IMOP, is the Site Vicinity Map. The controls will be implemented as a part of site remediation activities approved by the Division of Environmental Resources Management (DERM) of the Miami-Dade County Department of Economic and Regulatory Resources.

## **2. Interim Groundwater Monitoring Only Plan**

### **2.1 Groundwater Sampling Location and Schedule**

As required by the DERM, the IMOP will be implemented prior to implementation of engineering controls on the Site. The monitoring wells listed in the Table below and illustrated on the attached **Figure 1A** shall be sampled and analyzed semi-annually for arsenic and vanadium. Polyaromatic hydrocarbons (PAHs), antimony and nickel will be analyzed on an annual basis.

### **2.2 Groundwater Elevation Contours**

During each sampling event, the depth to water (DTW) in each monitoring well will be recorded by measuring the distance from the top of the water table to the top of the monitoring well casing using a water level indicator. The DTW measurements will be subtracted from the TOC elevations to obtain the groundwater elevation for each monitoring well. Groundwater elevations will be contoured to evaluate the site-specific groundwater flow direction.

### **2.3 Groundwater Sampling Activities**

Groundwater samples will be collected from the monitoring wells in accordance with Florida Department of Environmental Protection's Standard Operating Procedures (FDEP-SOP) 001/01 FS 2200 guidelines. The monitoring wells will be purged and sampled utilizing a low flow peristaltic pump or submersible pump. During purging activities, field parameters including pH, temperature, conductivity, dissolved oxygen, turbidity, and depth to water measurements will be recorded. Once the field parameters stabilized each monitoring well will be sampled. The groundwater samples will be collected from the monitoring wells utilizing dedicated polyethylene tubing and submitted for analysis, under chain-of-custody record, to a State-certified laboratory in laboratory supplied bottle ware.

### **2.4 Groundwater Sample Analysis**

The groundwater samples will be submitted to a NELAC certified environmental laboratory under a chain of custody documentation. The semi-annual groundwater samples will be analyzed for arsenic and vanadium by method SW846/6010B. The annual groundwater samples will be analyzed for arsenic, vanadium, antimony and nickel by SW846/6010B and PAHs by EPA Method 8270.

The sampling locations, frequency, and analytical parameters for groundwater monitoring only plan are summarized in the table below:

<b>Sampling Location</b>	<b>Frequency</b>	<b>Analytical Parameters</b>
MW-E2, MW-D5, MW-D6, MW-C6, MW-D1, MW-A2, MW-B5, MW-B8, MW-B11, MW-E11, MW-G8, MW-E7, MW-E7DD, MW-G2	Annual	Arsenic, Vanadium, Antimony, Nickel, PAH
MW-E2, MW-D5, MW-D6, MW-C6, MW-D1, MW-A2, MW-B5, MW-B8, MW-B11, MW-E11, MW-G8, MW-E7, MW-E7DD, MW-G2	Semi-annual	Arsenic, Vanadium

## 2.5 Report Preparation

Semi-annual and Annual Groundwater Monitoring Reports will be submitted to DERM within forty (45) days of each sampling event. The reports will summarize the details of the groundwater sampling events including FDEP groundwater sampling logs and groundwater analytical reports, conclusions, and recommendations.

## FIGURES



TERRA CONSULTING GROUP, INC.  
PHONE: (954) 202-9226  
WWW.TERRACONSULTING.COM

**SITE VICINITY MAP**

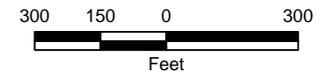
Florida Power & Light Company  
Former Cutler Power Plant Property  
HWR-442/File-16360/IW-79  
Miami, Florida

**LEGEND:**

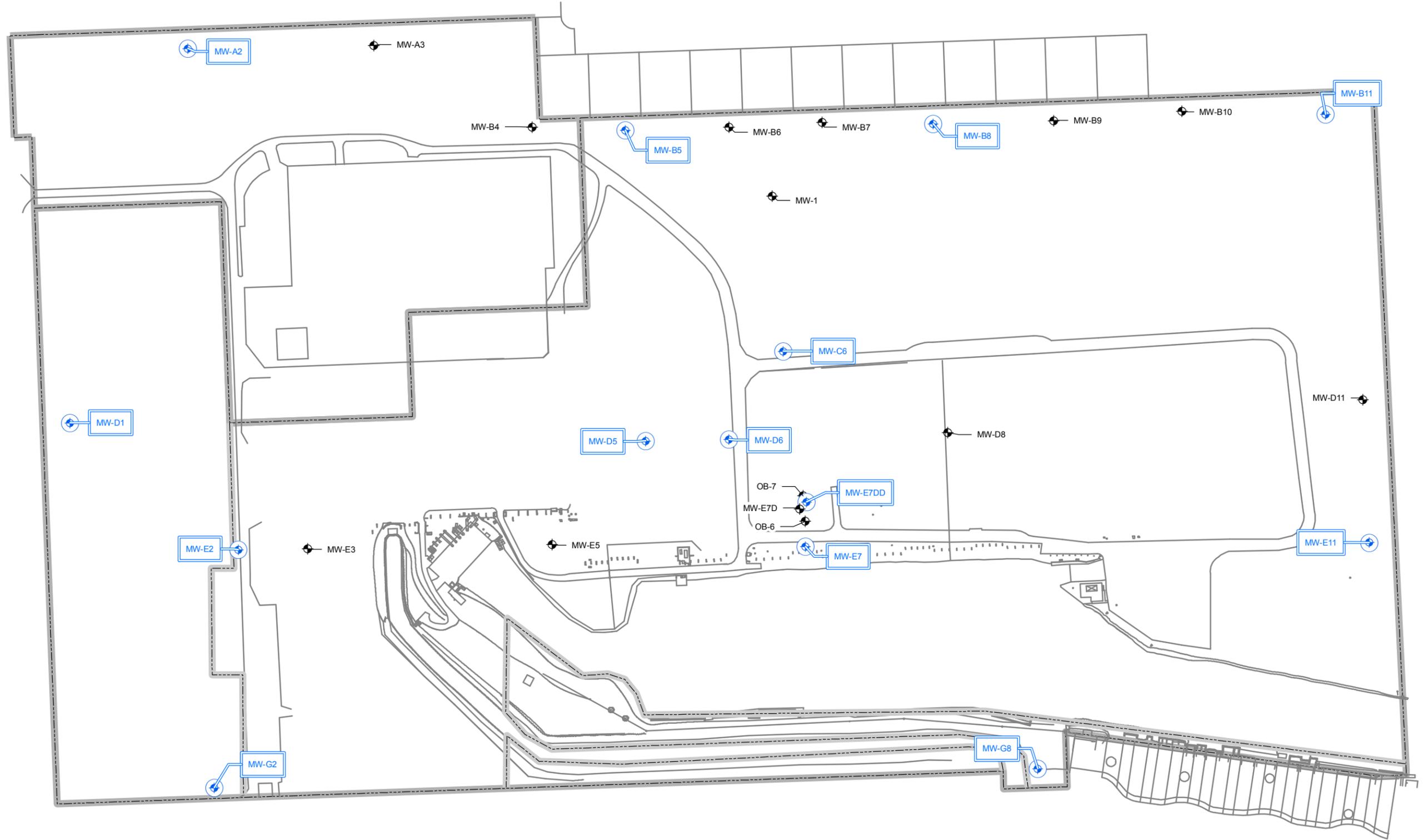


FORMER PLANT PROPERTY BOUNDARY

**SCALE:**



**FIGURE 1**

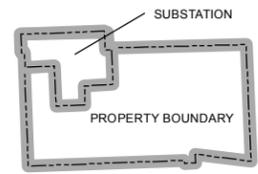


**MONITORING ONLY PLAN  
WELL LOCATION MAP**

Florida Power & Light Company  
Former Cutler Power Plant Property  
HWR-442/File-16360/IW-79  
Miami, Florida

**LEGEND:**

- MONITORING WELL INCLUDED IN MOP
- MONITORING WELL NOT INCLUDED IN MOP



**SCALE:**



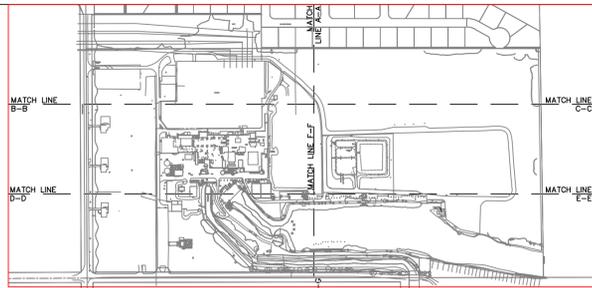
TIERRA CONSULTING GROUP, INC.  
PHONE: (954) 202-9226  
WWW.TIERRACONSULTING.COM

**FIGURE 1A**

REVISED: 2/2/2016

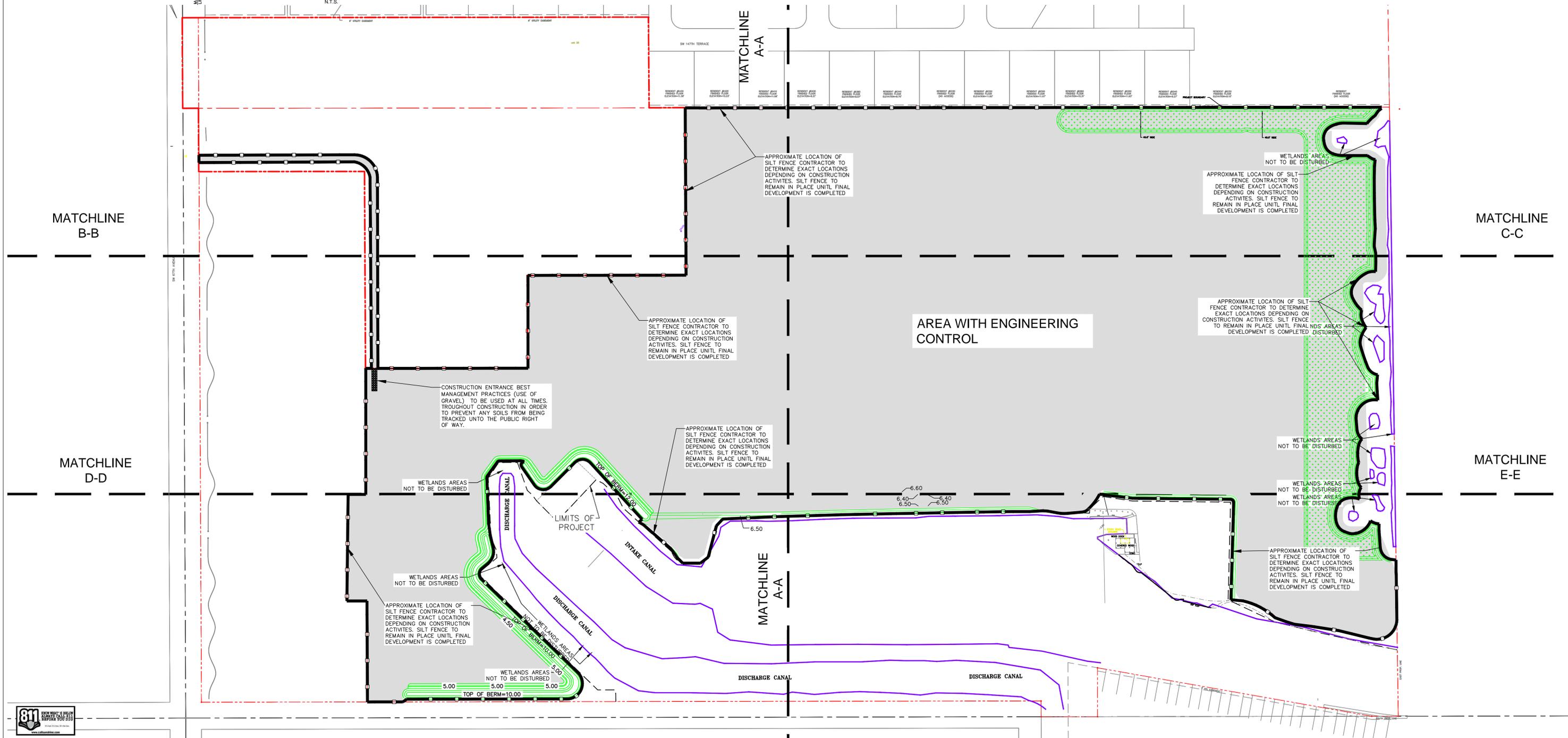
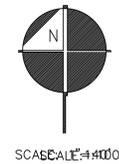
**EXHIBIT D**

Stormwater Pollution Prevention Plans (Revised July 2016)  
(size 24 x 36) are included as a separate packet



# LEGEND

 PROP. SILT FENCE	 EXISTING WETLANDS
 PROP. CONSTRUCTION ENTRANCE	



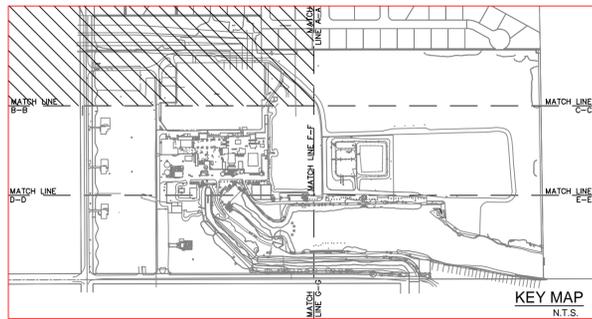
DCS	7/11/2016			
DESIGNED BY	DATE			
DCS	7/11/2016			
DRAWN BY	DATE			
MR	7/11/2016			
CHECKED BY	DATE			
RR	7/11/2016			
APPROVED BY	DATE	No.	DATE	REVISIONS

**FORMER FPL CUTLER POWER PLANT PPARCEL**  
PALMETTO BAY, FLORIDA

17670 NW 78TH AVE, SUITE 214  
MIAMI, FLORIDA 33015  
(786)468-8304 (305)392-1019 FAX  
CERTIFICATE OF AUTHORIZATION No. 9808

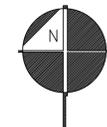
ROBERT J. ROSS, P.E.  
STATE OF FLORIDA  
REGISTRATION NO. 59485  
DATE: 7/11/2016

## STORMWATER POLLUTION PREVENTION PLAN (OVERALL)



# LEGEND

-  PROP. SILT FENCE
-  PROP. CONSTRUCTION ENTRANCE
-  EXISTING WETLANDS



SCALE: 1"=40'



DCS	7/11/2016			
DESIGNED BY	DATE			
DCS	7/11/2016			
DRAWN BY	DATE			
MR	7/11/2016			
CHECKED BY	DATE			
RR	7/11/2016			
APPROVED BY	DATE	No.	DATE	REVISIONS



**FORMER FPL CUTLER POWER PLANT PPARCEL**  
PALMETTO BAY, FLORIDA



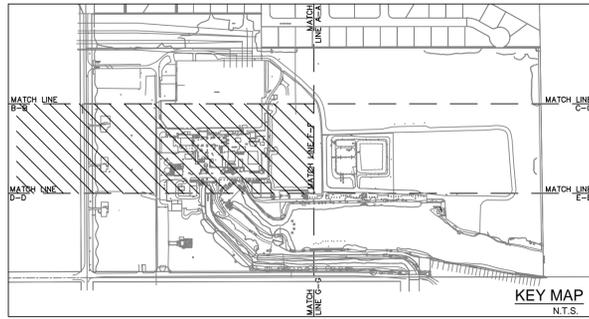
17670 NW 78TH AVE, SUITE 214  
MIAMI, FLORIDA 33015  
(786)468-8304 (305)392-1019 FAX  
CERTIFICATE OF AUTHORIZATION No. 9808

ROBERT J. ROSS, P.E.  
STATE OF FLORIDA  
REGISTRATION NO. 59485  
DATE: 7/11/2016

## STORMWATER POLLUTION PREVENTION PLAN (1 OF 6)

SCALE: 1"=40'

SHEET No. C-10

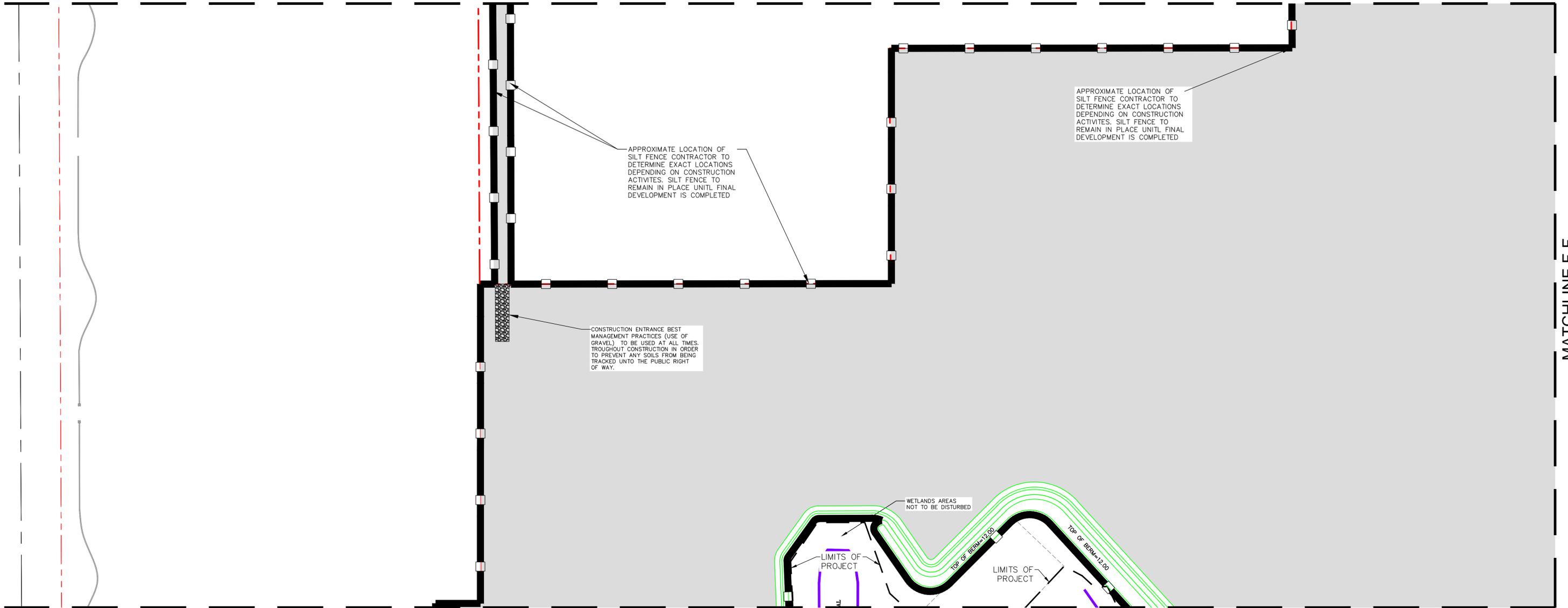


# LEGEND



SCALE: 1"=40'0"

## MATCHLINE B-B



## MATCHLINE D-D



DCS	7/11/2016			
DESIGNED BY	DATE			
DCS	7/11/2016			
DRAWN BY	DATE			
MR	7/11/2016			
CHECKED BY	DATE			
RR	7/11/2016			
APPROVED BY	DATE	No.	DATE	REVISIONS



FORMER FPL CUTLER POWER PLANT PPARCEL  
PALMETTO BAY, FLORIDA



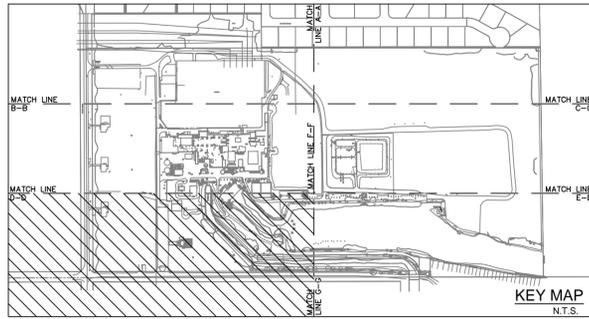
17670 NW 78TH AVE, SUITE 214  
MIAMI, FLORIDA 33015  
(786)468-8304 (305)392-1019 FAX  
CERTIFICATE OF AUTHORIZATION No. 9808

ROBERT J. ROSS, P.E.  
STATE OF FLORIDA  
REGISTRATION NO. 59485  
DATE: 7/11/2016

# STORMWATER POLLUTION PREVENTION PLAN (2 OF 6)

SCALE: 1"=40'0"

SHEET No. C-11



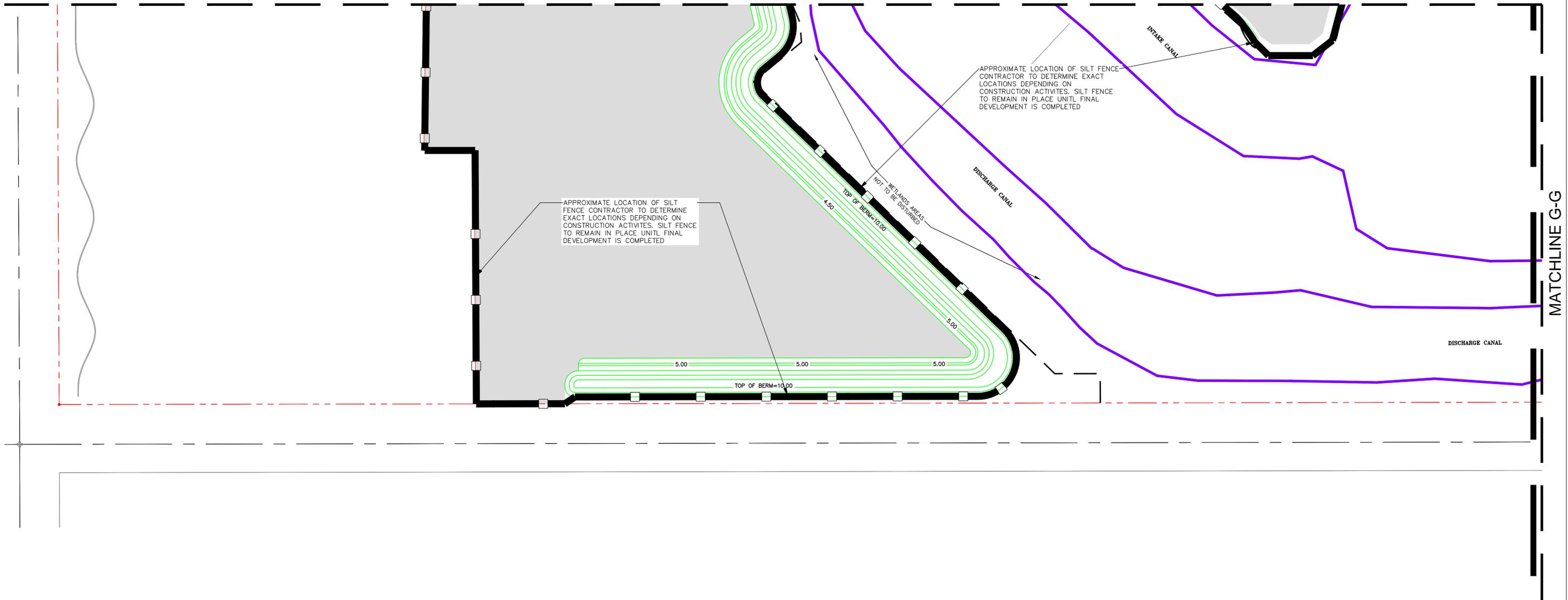
# LEGEND

- - 
  -
- PROP. SILT FENCE      EXISTING WETLANDS  
 PROP. CONSTRUCTION ENTRANCE



SCALE: 1"=40'0"

## MATCHLINE D-D



MATCHLINE G-G



DCS	7/11/2016			
DESIGNED BY	DATE			
DCS	7/11/2016			
DRAWN BY	DATE			
MR	7/11/2016			
CHECKED BY	DATE			
RR	7/11/2016			
APPROVED BY	DATE	No.	DATE	REVISIONS



**FORMER FPL CUTLER POWER PLANT PPARCEL**  
PALMETTO BAY, FLORIDA

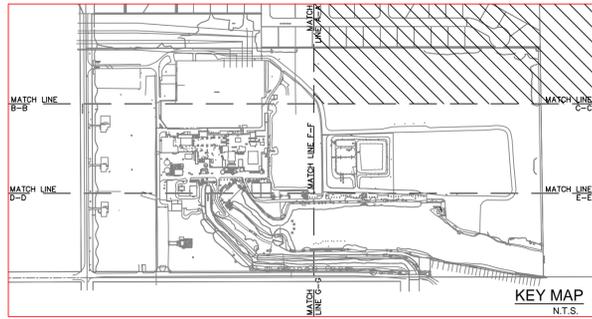


**ROSS ENGINEERING, INC.**  
17670 NW 78TH AVE, SUITE 214  
MIAMI, FLORIDA 33015  
(786)468-8304 (305)392-1019 FAX  
CERTIFICATE OF AUTHORIZATION No. 9808

ROBERT J. ROSS, P.E.  
STATE OF FLORIDA  
REGISTRATION NO. 59485  
DATE: 7/11/2016

## STORMWATER POLLUTION PREVENTION PLAN (3 OF 6)

SCALE: 1"=40'0"      SHEET No. C-12



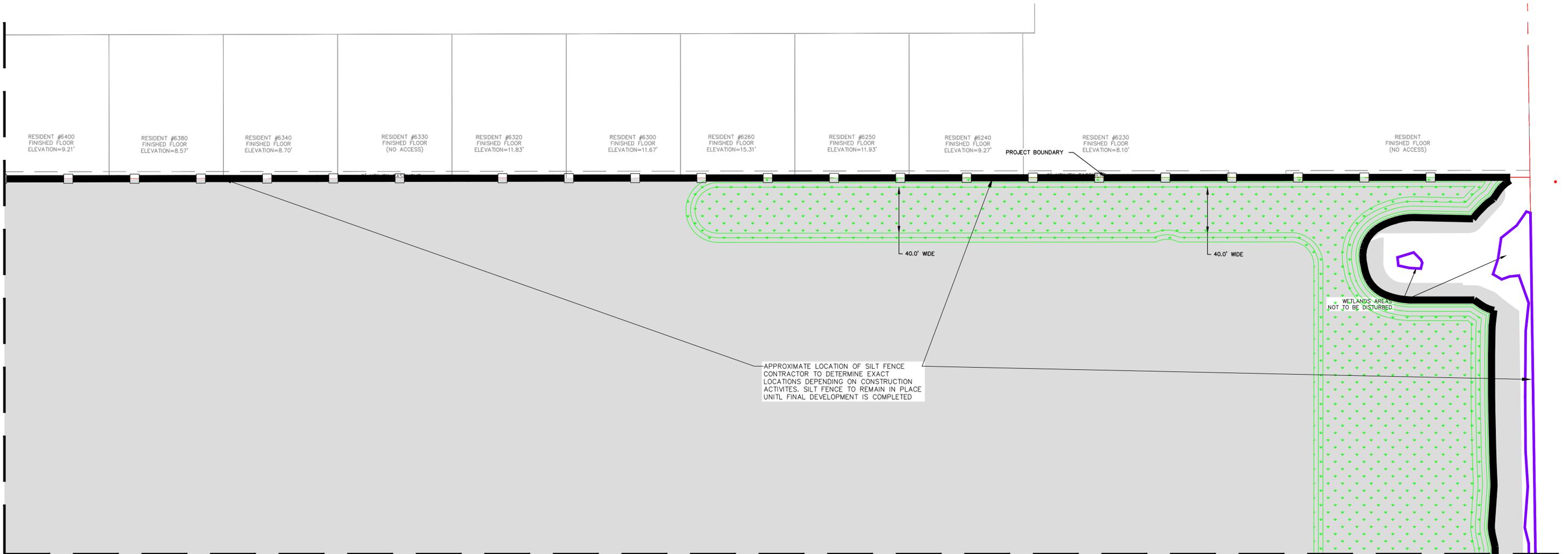
# LEGEND

- PROP. SILT FENCE
- PROP. CONSTRUCTION ENTRANCE
- EXISTING WETLANDS



SCALE: 1"=40' 40'

MATCHLINE A-A



MATCHLINE C-C

APPROXIMATE LOCATION OF SILT FENCE CONTRACTOR TO DETERMINE EXACT LOCATIONS DEPENDING ON CONSTRUCTION ACTIVITIES. SILT FENCE TO REMAIN IN PLACE UNTIL FINAL DEVELOPMENT IS COMPLETED

WETLANDS AREAS NOT TO BE DISTURBED



DCS	7/11/2016			
DESIGNED BY	DATE			
DCS	7/11/2016			
DRAWN BY	DATE			
MR	7/11/2016			
CHECKED BY	DATE			
RR	7/11/2016			
APPROVED BY	DATE	No.	DATE	REVISIONS



**FORMER FPL CUTLER POWER PLANT PPARCEL**  
PALMETTO BAY, FLORIDA



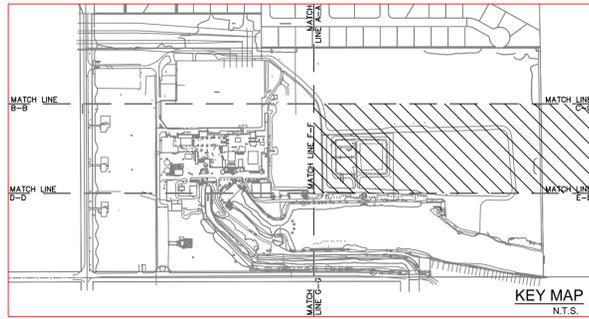
17670 NW 78TH AVE, SUITE 214  
MIAMI, FLORIDA 33015  
(786)468-8304 (305)392-1019 FAX  
CERTIFICATE OF AUTHORIZATION No. 9808

ROBERT J. ROSS, P.E.  
STATE OF FLORIDA  
REGISTRATION NO. 59485  
DATE: 7/11/2016

## STORMWATER POLLUTION PREVENTION PLAN (4 OF 6)

SCALE: 1"=40' 40'

SHEET No. C-13



# LEGEND

PROP. SILT FENCE	EXISTING WETLANDS
PROP. CONSTRUCTION ENTRANCE	



SCALE: 1"=40'0"

MATCHLINE C-C

MATCHLINE F-F



APPROXIMATE LOCATION OF SILT FENCE CONTRACTOR TO DETERMINE EXACT LOCATIONS DEPENDING ON CONSTRUCTION ACTIVITIES. SILT FENCE TO REMAIN IN PLACE UNTIL FINAL DEVELOPMENT IS COMPLETED

WETLANDS AREAS NOT TO BE DISTURBED

WETLANDS AREAS NOT TO BE DISTURBED

WETLANDS AREAS NOT TO BE DISTURBED

MATCHLINE E-E



DCS	7/11/2016			
DESIGNED BY	DATE			
DCS	7/11/2016			
DRAWN BY	DATE			
MR	7/11/2016			
CHECKED BY	DATE			
RR	7/11/2016			
APPROVED BY	DATE	No.	DATE	REVISIONS



**FORMER FPL CUTLER POWER PLANT PPARCEL**  
PALMETTO BAY, FLORIDA



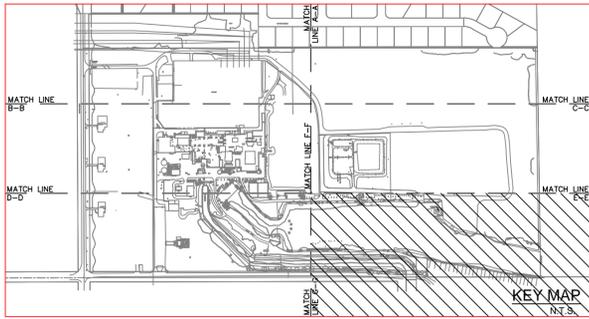
17670 NW 78TH AVE, SUITE 214  
MIAMI, FLORIDA 33015  
(786)468-8304 (305)392-1019 FAX  
CERTIFICATE OF AUTHORIZATION No. 9808

ROBERT J. ROSS, P.E.  
STATE OF FLORIDA  
REGISTRATION NO. 59485  
DATE: 7/11/2016

## STORMWATER POLLUTION PREVENTION PLAN (5 OF 6)

SCALE: 1"=40'0"

SHEET No. C-14



# LEGEND

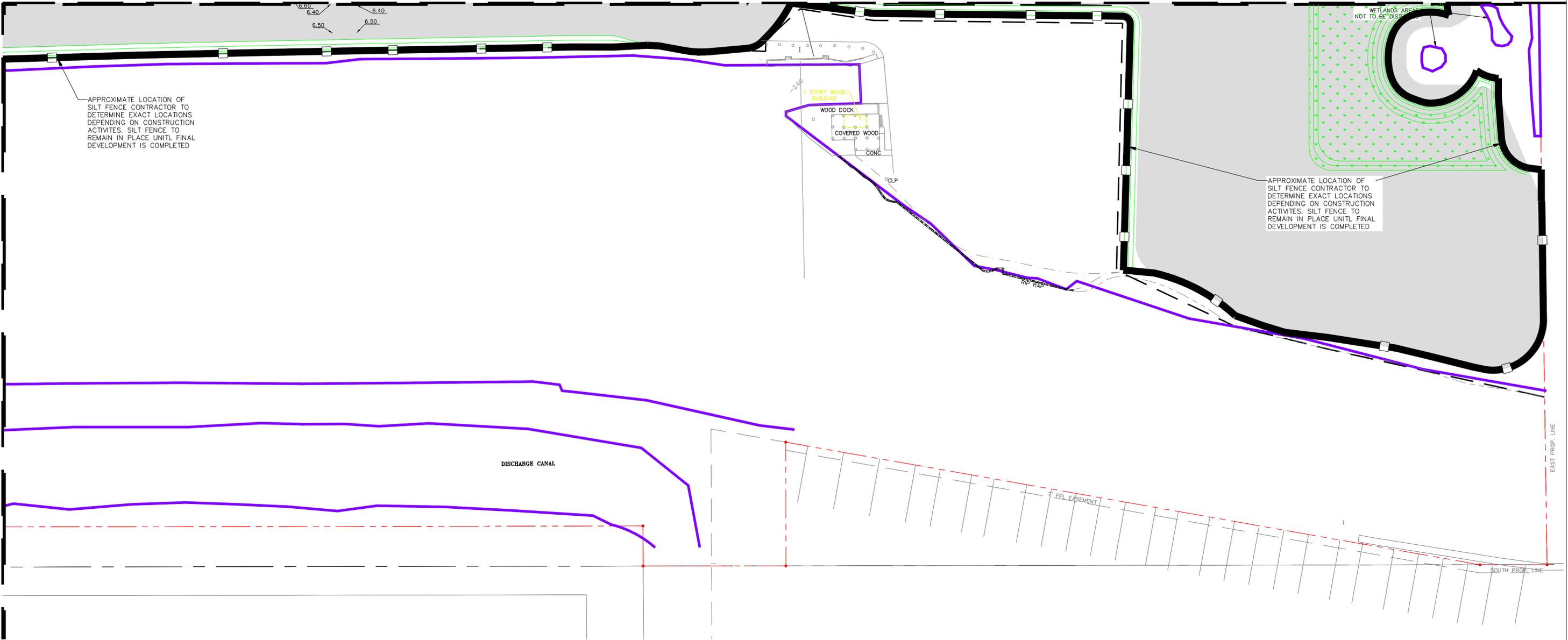
- PROP. SILT FENCE
- PROP. CONSTRUCTION ENTRANCE
- EXISTING WETLANDS



SCALE: 1"=40'0"

MATCHLINE E-E

MATCHLINE G-G



DCS	7/11/2016			
DESIGNED BY	DATE			
DCS	7/11/2016			
DRAWN BY	DATE			
MR	7/11/2016			
CHECKED BY	DATE			
RR	7/11/2016			
APPROVED BY	DATE	No.	DATE	REVISIONS



**FORMER FPL CUTLER POWER PLANT PPARCEL**  
PALMETTO BAY, FLORIDA



17670 NW 78TH AVE, SUITE 214  
MIAMI, FLORIDA 33015  
(786)468-8304 (305)392-1019 FAX  
CERTIFICATE OF AUTHORIZATION No. 9808

ROBERT J. ROSS, P.E.  
STATE OF FLORIDA  
REGISTRATION NO. 59485  
DATE: 7/11/2016

## STORMWATER POLLUTION PREVENTION PLAN (6 OF 6)

SCALE: 1"=40'0"

SHEET No. C-15