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TECHNICAL MEMORANDUM

To: Michael Shrader and Ron Johnson
Progress Energy Florida, Inc.

From: Kerem H. Esin, P.E.

Date: October 26, 2009

Subject: Stormwater Management System Operation and Maintenance Plan (Rev0)
Crystal River Energy Complex Unit 3
Dry Fuel Storage Facility
Crystal River, Florida

Our Ref.: 093-89554

This Operation and Maintenance (O&M) Plan describes the guidelines and procedures for the proper operation, inspection, and maintenance of the stormwater management system (SWMS) for the referenced project. The continuous and proper operation of the system is vital in preserving the water quality discharged to the environment and preventing flooding at the site during storm events. The O&M obligation is mandatory in order to comply with conditions of the permit issued for this SWMS. As long as the SWMS components were constructed properly and are maintained to function properly, state water quality standards are presumed to be met. The O&M recommendations, restrictions, inspection, and maintenance items are described below.

GENERAL MAINTENANCE

1. Have all stormwater pipes, inlets, catch basins, manholes, flumes, pond inflow and outflow structures (including oil skimmers), and discharge pipes inspected regularly (monthly or quarterly) and after major rainfalls. They should be maintained by removing built-up debris and vegetation and repairing deteriorating structures.
2. Do not throw grass clippings or other yard debris into the stormwater treatment pond. This will deteriorate the water quality and may restrict flow or clog the water-conveyance system.
3. Do not dispose of chemicals, oil, greases, or similar wastes directly into the stormwater facility or through storm sewers. Instead, dispose of these potentially dangerous materials at approved disposal or recycling facilities.

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4. Periodically remove sediments that accumulate in the SWMS and dispose of them in a permitted solid waste landfill in accordance with applicable regulations.
5. During any repair or maintenance activity, use care to avoid causing erosion or siltation to adjacent or off-site areas.
6. Alterations (filling, enlarging, etc.) of any part of the SWMS are not permitted without prior approval from all applicable governing agencies.
7. Keep copies of the approved permit and as-built drawings at the plant where they will be readily available for reviewing additional restrictions, instructions, and conditions.

DRY RETENTION AREA & HYDRAULIC CONVEYANCES

1. Mow frequently enough to prevent thatch buildup. Pick up grass clippings after cutting. Limit fertilizer use around the pond, and do not fertilize grass in the pond area.
2. Spraying of herbicide is not allowed. This may harm or kill the grass that protects the bank and slopes from erosion and sediment built-up.
3. Overgrown nuisance vegetation may be occasionally cut down but must be removed and not allowed to decay in the pond.
4. Re-sod any areas (side or bottom) where grass or sod has been removed or eroded.
5. Keep the outfall structure clear of debris and vegetation. Periodically remove sediment accumulated in the discharge control structures and culverts.
6. If pollutant-retardant baffles deteriorate so much with time that they become nonfunctional, replace them.
7. Repair any sinkholes according to the attached plan (Figure 1).
8. Inspect the skimmer on the outfall structure regularly (monthly or quarterly) and after major rainfalls. Maintain it by removing built-up debris and vegetation and repairing deteriorating structures.

INSPECTIONS

The SWMS should be inspected routinely to ensure proper functioning. Inspections should be scheduled monthly or quarterly and following any major rain event. More frequent inspections may be necessary during the rainy season. Each stormwater system and related equipment will be inspected for cracks or structural failures, deterioration of the unit, stains, stressed or overgrown vegetation, and the need for cleaning the unit. Regular inspections of the SWMS should record observations on the following items:

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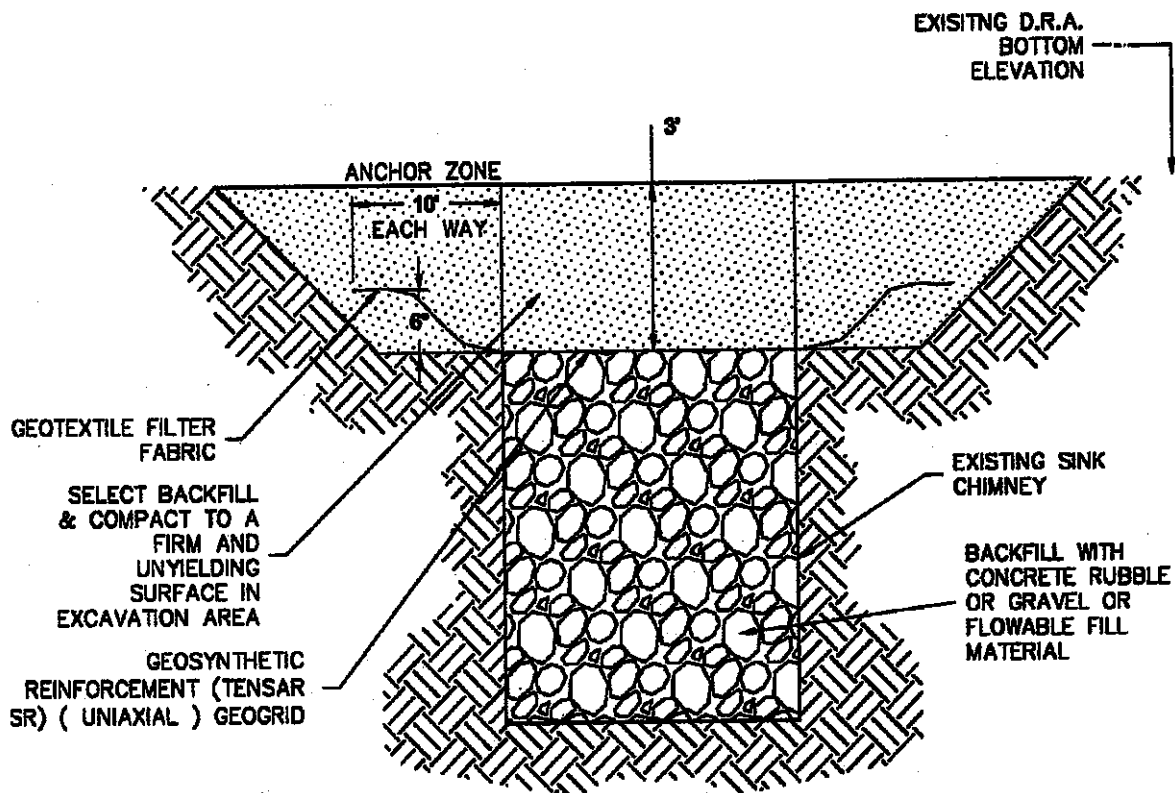
1. Bank stability for any indication of erosion;
2. Evidence of sinkholes;
3. Sod condition and any distress or coloration in vegetation;
4. Presence of wastes, debris, or pollutants; and
5. Cracks or structure failure for discharge control structure, culvert, and/or pollutant-retardant baffles.

Maintenance items identified during routine inspections should be reported and corrective actions should be initiated in a timely manner, but in no case later than seven calendar days following the identification of the problem. Vegetation that is no longer providing erosion control shall be replaced as deemed necessary. Copies of inspection records, including documentation of any required corrective actions, should be kept together with the permit and as-built drawings.

HOUSEKEEPING

Good housekeeping practices shall be implemented for the project area operations to reduce the risk of exposure of materials to stormwater and/or coastal flooding associated with a 100 year flood event. These practices should include the following items:

1. Neat and orderly storage of chemicals, pesticides, fertilizers, fuels, etc. that are being stored at the site.
2. Regular disposal of garbage and construction debris.
3. Elevated storage for certain materials as practical or necessary.
4. Prompt cleanup of any spills.
5. Cleanup of sediments that have been tracked by vehicles or have been transported by wind or stormwater.
6. Curbs or dikes to contain spills within liquid material storage areas.



SINKHOLE REPAIR PLAN

RECOMMENDATION FOR REPAIRING SINKHOLES IN RETENTION PONDS:
BY DEVO SEERGERAM PH.D., P.E.

STEP #1:
IF THE SINKHOLE CONSISTS ONLY OF A SURFACE DEPRESSION (I.E. NO OPEN FISSURE OR EXPOSED CAVERN), PROCEED TO STEP #3.

STEP #2:
IF THE SINKHOLE HAS AN OPEN FISSURE OR EXPOSED CAVERN, FILL THE SINKHOLE TO WITHIN 3 FEET OF PLAN GRADE WITH EITHER: A) CONCRETE RUBBLE OR GRAVEL, OR B) FLOWABLE FILL. IF CONCRETE RUBBLE OR GRAVEL IS USED IT SHOULD CONSIST OF HARD, DURABLE STONE, BROKEN CONCRETE AND/OR BROKEN CONCRETE BLOCK. MATERIAL ACCEPTANCE MAY BE BASED ON VISUAL INSPECTION. THE MOST IMPORTANT MATERIAL CHARACTERISTICS ARE THAT THE CONCRETE/STONE PIECES BE DURABLE (I.E. NOT SOFT AND DISSOLVABLE), SOMEWHAT ANGULAR, AND PREDOMINANTLY COARSER THAN A 1-1/2 INCH SIEVE.

STEP #3:
PLACE TWO LAYERS OF GEOSYNTHETIC REINFORCEMENT, AND ONE LAYER OF GEOTEXTILE FABRIC, IF REQUIRED, AS FOLLOWS:

MATERIAL: THE REINFORCEMENT TO BE USED SHOULD HAVE A MINIMUM TENSILE STRENGTH OF 1,350 LB/FT (ASTM D-4395) AT A STRAIN OF 10% OR LESS. IF THE REINFORCEMENT HAS AN APPARENT OPENING SIZE (AOS) LESS THAN 70, PLACE A LAYER OF TYPE D-3 (FOOT STANDARD INDEX 188) GEOTEXTILE FABRIC WITH AOS >70 OVER THE REINFORCEMENT LAYERS.

EXCAVATION: EXCAVATE TO A DEPTH OF APPROXIMATELY 3 FEET BELOW THE POND BOTTOM, AND TO A PLAN AREA WHICH ALLOWS FOR A REINFORCEMENT/FABRIC INSTALLATION THAT EXTENDS/PROVIDES COVERAGE TO AT LEAST 10 FEET BEYOND THE SURFACE OPENING OF THE SINKHOLE, BUT DOES NOT INTERFERE WITH EXISTING TRAVEL LANES.

PLACEMENT: PLACE THE GEOSYNTHETIC REINFORCEMENT LAYERS 3 FEET BELOW THE POND BOTTOM, WITHIN THE ABOVE DESCRIBED EXCAVATION. IF THE REINFORCEMENT HAS AN AOS LESS THAN 70, PLACE A LAYER OF ABOVE DESCRIBED GEOTEXTILE FABRIC OVER THE REINFORCEMENT LAYERS. ANCHOR THE TWO REINFORCEMENT LAYERS (AND THE FABRIC, IF INSTALLED) AT LEAST 10 FEET BEYOND THE LIMITS OF THE FISSURE/CAVERN OPENING. IN THE 10 FOOT ANCHOR ZONE AREA, THE TWO REINFORCEMENT LAYERS SHOULD BE SEPARATED BY AT LEAST 6 INCHES OF SOIL. IN THE NON-ANCHOR ZONE AREA, THE UPPER REINFORCEMENT LAYER MAY BE LAID DIRECTLY ON THE UNDERLYING LAYER. STAGGER THE TWO REINFORCEMENT LAYERS SO THE JOINTS DO NOT COINCIDE. FILL THE UPPER 3 FEET OF THE EXCAVATION/SINKHOLE TO GRADE USING SELECT BACKFILL, AND COMPACT TO A FIRM AND UNYIELDING SURFACE.

REFERENCE

Sinkhole Repair Plan, Crystal Engineering Corporation, 2008.

PROJECT

PEF DRY FUEL STORAGE FACILITY

TITLE

SINKHOLE REPAIR PLAN



Golder
Associates
Tampa, Florida

PROJECT No.	003-0554
DESIGN	JG 11/02/2009
GS	JG 11/02/2009
CHECK	MS 11/02/2009
REVIEW	KE 11/02/2009

SCALE 1:400

REV. D

FIGURE: 1