AEGIS

POWER GENERATION
PROPERTY RISK ASSESSMENT

Prepared for:

City of Gainesville, Gainesville Regional Utilities
Deerhaven Generating Station
10001 NW 13th Street
Gainesville, FL 32614-7117

July 10, 2014

Attention:
Dan Sweat
Production Manager

Prepared by:

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Solutions for Success

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Scope

The purpose of this Property Risk Assessment is to evaluate the critical plant equipment located at this facility with regard to operations and maintenance. Evaluations are risk-based with emphasis on the human element aspects of the loss control programs.

It is understood that each facility has its own specific conditions that characterize its design and operating procedures. Generally, national and industry recognized standards are the basis for the evaluation and suggestions. This is not to preclude a consultant's qualified judgment when evaluating the adequacy of existing programs.

Conferred With

Mr. John Stanton	*Assistant General Manager of Energy Supply*
Ms. Melissa Jones	*Director of Production Energy Supply*
Mr. Dan Sweat	*Production Manager*
Mr. Stacy Cowart	*Production Leader*
Mr. Brian Mott	*Production Leader, Operations*
Mr. Dino De Leo	*Director of Production Assurance Support Energy Supply*
Mr. Rick Lavery	*Utility Training Officer, Fire Protection Subject Matter Expert*
Mr. Steve Varvel	*Risk Manager, City of Gainesville*
Mr. James Casey	*Marsh USA Inc., VP, Senior Property Risk Consultant*
Mr. Art Hall, Jr.	*Senior Loss Control Consultant, Starr Technical Risks Agency*

Executive Summary

A Property Risk Assessment was performed for the City of Gainesville, Gainesville Regional Utilities Deerhaven Generating Station located at 10001 NW 13th Street, Gainesville, FL on July 10, 2014. This is a re-inspection survey completed at this location by AEGIS Insurance Services, Inc.

A tour of the premises was conducted along with a review of special hazards present, protective systems, building construction details, management loss control programs and other related aspects of the facility. Work has begun to correct a number of fire protection deficiencies previously identified.

Deerhaven 1 is currently in an outage.

Risk Reduction Programs – Overall rated: *Good*

Inspection programs for the fire systems have been improved and there is an active hot work and impairment reporting/control system in place. Documentation of operational procedures has been given priority that will help new operators.

Housekeeping in the coal handling areas was found to be satisfactory. The only significant build-up was some coal dust on the building framing and ductwork above the Unit 2 feeders. This area will be washed down at the next outage. The only other housekeeping issue was a significant amount of cardboard packaged replacement electronic boards found in the 660 Room containing Boiler Management control equipment. The station management was in agreement and has committed to moving this storage to a secure air conditioned space in the Warehouse.

During this visit, one fire protection valve to the #4 cell of the Unit 2 cooling tower was found isolated. This untagged closure was traced to the fire protection contractor performing the inspection testing and maintenance of the fire systems 4 days prior to the visit. The previous month's self-inspection forms for the valves showed it to be open. Increased scrutiny of contractor work will be provided. This is believed to be an isolated incident and not a systematic problem.

Fire Protection – Overall rated: *Poor*.

As previously identified, the fire protection water supply at this station is not sufficient to meet all the (flow and pressure) demands of currently installed water based fire suppression systems. A number of projects are underway to improve the fire protection and there are capital projects through 2016 to address most of the fire protection issues.

Fire protection has not been provided for critical areas of the plant including under the steam turbines. Combustion turbine leakage testing and repairs have been made since the last visit.

A few additional minor floor penetrations were noted in the Control Room walk-in cabinets. These areas were pointed out and will be re-sealed immediately with fire proofing caulk.

Some corrosion damage is occurring on the piping and deluge valves for the Unit 2 cooling tower. This was pointed out and discussed. Management will immediately address the issue to prevent increased costs associated with equipment replacements.

Major Equipment – Overall rated *Fair*. Additional fire protection should be installed to protect the steam turbine generator bearings and underdeck areas, boiler front and coal conveyors. The Crusher house is slated to receive major electrical system and lighting upgrades with all intrinsically safe equipment during 2015.

Risk Reduction Suggestions

The following risk reduction suggestion is offered as a result of this survey:

DGS-P2014-01	Plans and specifications for fire protection equipment upgrades should be sent to AEGIS for review and comment prior to installation.

The following risk reduction suggestions remain outstanding:

DGS-P2010-04	The fire protection water supply should be improved using the steps outlined in this report, following the schedule developed by the City of Gainesville Utilities. (This work is in progress)
DGS-P2010-05	Automatic sprinkler protection should be provided for the Unit 1 & 2 steam turbine-generator bearings and lagging areas.
DGS-P2010-06	Provide underdeck sprinkler protection for Units 1 & 2 that includes all areas where turbine generator lubrication, seal and control oil could flow.
DGS-P2010-07	Install fire protection systems to protect the coal conveyors No. 4 and No. 5 as well as the tripper floor area.

Supplemental Risk Reduction Suggestions

For best protection of the plant's assets additional informal suggestions (identified as Supplemental Suggestions) are given in this report. No formal Risk Reduction Suggestions are given at this time for these items; however, the Supplemental Suggestions are in the best interest of property loss control and are offered for plant management's consideration. (Please note that the following suggestions have been renumbered from previous reports, based on AEGIS' new report formatting.) These suggestions are summarized as follows:

DGS-P2010-08S	**(Formerly DGS-P2010-08 – this suggestion was downgraded since liquid fuel is not likely to be burned on Unit 1)** Install boiler front fire protection for Unit 1.
DGS-P2010-11S	**(Formerly Advisory Suggestion 1)** The installation of approved flange guards should be considered on all fuel and lubrication oil piping operating at 50 psi or above inside of the combustion turbine compartments.
DGS-P2010-12S	**(Formerly Advisory Suggestion 2)** To ensure prompt notification of a fire or overheating conditions in the Gas Turbine Units (GT1, 2 and 3), smoke detection with remote annunciation to the plant's Control Room should be provided in the Mark V controls enclosures and GT03's CEMS structure.
DGS-P2010-14S	**(Formerly Advisory Suggestion 4)** The CEM for Combustion Turbine 3, control cabs for Combustion Turbines 1 and 2 and various electrical rooms throughout the plant should be equipped with additional smoke detectors.

DGS-P2013-01S **(Formerly Advisory Suggestion 5)** Lightning rod protection should be provided on each of the three cooling towers due to the high frequency of lightning strikes in Florida.

The following risk reduction suggestion was resolved:

DGS-P2010-13S **(Formerly Advisory Suggestion 3)** Continued repairs should be made and fan door testing apparatus should be used to ensure that the three combustion turbines can maintain the CO_2 concentration of gas per the original design for 30 minutes. Use of actual agent discharge testing is not required.

Assessment Summary

Overall, conditions were found to be *Poor* for property-related perils. This rating reflects the inadequate fire protection water supply and the lack of fire protection in critical plant areas. Please refer to the **Risk Characteristics Rating** section of this report for details. However, projects are in the works to improve water supplies and correct a number of the deficiencies.

An exit interview was conducted with a large assembly of GRU management staff (see "Conferred With" above), including, Mr. Dan Sweat, the new Production Manager. Former Production Manager Joe Shaw is now heading the projects to upgrade the fire protection systems.

Risk Reduction Suggestions

Risk Reduction Suggestions represent opportunities for continued improvement. The suggestions are risk based and customized to this facility. The suggestions are made using national and industry recognized standards and recommended practices.

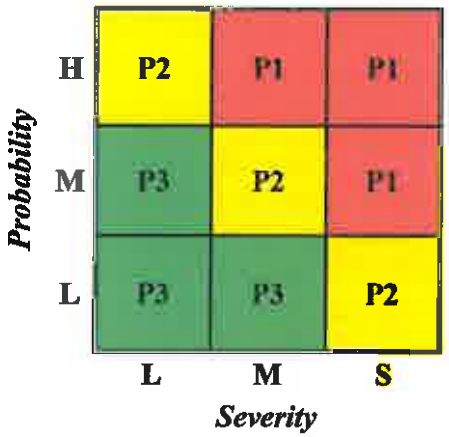
Probability Based on historic information provided by recognized industry organizations and AEGIS loss experience

High	The probability of a loss is greater than average.
Medium	The probability of a loss is average.
Low	The probability of a loss is less than average.

Severity Based on insurable values, deductibles and AEGIS loss experience

Severe	The incident may result in significant financial impact to the facility.
Moderate	The incident may result in moderate financial impact to the facility.
Low	The incident may result in low to moderate financial impact to the facility.

Priority Matrix



New Risk Reduction Suggestions

DGS-P2014-01	Risk Reduction Suggestion	O&M Expenditure

Priority 2

Plans and specifications for fire protection equipment upgrades should be sent to AEGIS for review and comment prior to installation.

References: Best practices

AEGIS Comments: As discussed, AEGIS will review fire plans and specifications and provide feedback to the City of Gainesville on the basis of acceptability for insurance purposes.

Status: New

Member Response: Receptive to suggestion and will submit for review any equipment upgrades prior to installing.

Open Risk Reduction Suggestions

(Please note that the AEGIS Risk Reduction Suggestions have been formatted differently than in previous reports. Only those marked as Revised have substantial changes.)

DGS-P2010-04	Water Supply	Capital Expenditure

Priority 1

The reliability and capacity of the plant fire protection water supply should be upgraded.

References: NFPA 13, *Standard for the Installation of Sprinkler Systems* – 2013 Edition; NFPA 850, *Recommended Practice for Fire Protection for Electric Generating Plants and High Voltage Direct Current Converter Stations* – 2010 Edition; *Chapter 6 General Fire Protection Systems and Equipment, 6.2 Water Supply* and NFPA 20, *Standard for the Installation of Stationary Pumps for Fire Protection* - 2013, Edition

AEGIS Comments:
The following steps should be implementing following upgrade path:

a. **Phase I:** Create a new underground connection to the discharge of the No. 2 fire pump and run a 12 inch underground line to the Unit 1 cooling tower fire riser. Disconnect the current supply from the elevated tank feeding this riser and cap it off. (Completed subsequent to the site visit.)
b. **Phase II:** Install approximately 70 feet of 8 inch schedule 40 steel pipe between Powerhouse 1 and 2 fire water headers located along the north sides of the respective Powerhouse structures. An 8" control valve needs to be installed in this line to allow isolation of the supplies for maintenance or impairments. Valve tamper monitoring should also be provided on this valve that would be in the normally open position.
c. **Phase III:** At the south wall of the Unit 2 Powerhouse, connect an 8" schedule 40 steel main to the existing 6" fire water main feeding the Unit 1 lube oil sprinkler system. Run the new 8" main to the west along the south wall of the two Powerhouses terminating near the existing fire risers for the Unit 1 lube oil sprinklers, Unit 1 bearing sprinklers and lube oil storage tank.

Use this new supply line to connect the Unit 1 seal oil fire riser, Unit 1 lube oil riser, Unit 1 (No. 1 and 2) bearing sprinkler system and the Unit 1 lube oil storage tank to the fire water supply. Disconnect and cap all existing feeds from the service water system so that all the newly resupplied systems are now on the fire water header only. The water utility people may make you upgrade the backflow preventer to a reduced pressure zone (RPZ) type backflow device. The existing double check backflow is located at the SE corner of the Unit 2 Powerhouse.

d. **Phase IV:** Install a 6" and an 8" check valve in the Powerhouse 1 and 2 (respectively) fire water supplies coming into the buildings from the underground fire protection supply. The two check valves should be installed inside the buildings and close to the beginning of the above ground piping. (This will prevent the wash water pump and fire department connections (pumped by the fire department) from pressurizing the underground fire mains outside the Powerhouse structure.

e. **Phase V:** Connect the existing fire house standpipe connections in the Unit 1 and Powerhouses to the new fire water header installed as part of Phase III to increase pressure and flow to the hose connections and Tripper Floor fire sprinklers.

f. **Phase VI:** Construct a new fire pump house containing a minimum of one diesel engine driven 3,000 gpm at 135 psi (+/-) fire pump. A second pump, if provided, would be electric and would not need a backup generator supply. The new fire pump should be built in the field north of the No. 1 Fire Pumphouse in the current open area. The pump should take suction from the 12 inch line that is fed from the gravity tank and is currently feeding the No. 2 fire pump. A section of this main will be cutout so that the new pump(s) will take suction from the south cut and discharge into the north cut. Once installed, the existing No. 2 fire pump must be removed and replaced with a 12 inch line from the pump suction connection to the pump discharge connection with a tap to reconnect the cooling tower deluge system riser. In addition, permanently open the Unit 1/Unit 2 fire line cross connection Post Indicating Valve (PIV) located north of the LP ash pump structure. The No. 1 fire pump and its jockey pumps will be re-designated as service water pumps and not fire pumps. They will continue to provide service water when extracted from the fire water supply and be set to start first. The new fire pump(s) can be equipped with a sequential start timer to delay the start of the diesel fire pump for about 10 seconds to reduce the change of nuisance starts when non-fire water is drafted from the fire water supply.

g. **Phase VII:** An 8 inch tap should be made into the 16 inch main from the 500,000 gallon water tank is proposed to be constructed near the new Fire Pumphouse. It will terminate at a fire hydrant with a 5 inch steamer connection to be used for fire department suction. The hydrant must be located in a place accessible to a fire engine using a 10 foot length of hard suction hose. A six 2-1/2" connection fire department connection should be installed nearby on the down-stream side of the new fire pump(s). This will allow the fire department to draft from the ground storage water tank and supplement fire water pumping as needed and increase the available fire water quantity to a total of 800,000 gallons.

h. **Phase VIII:** The Unit 2 Tripper Room fire sprinkler system should be hydraulically reinforced by replacing the 4 inch fire riser, its control and check valve and approximately 77 feet of downstream 4 inch pipe with 8 inch schedule 40 or 10 black steel pipe. In addition, replace the existing 5.6 K-factor sprinklers with retrofit style ½" National Pipe Thread (NPT) retrofit heads having an 8.0 K-factor and rated at 286°F.

The plant is currently equipped with a domestic water supply that consists of a 300,000 gallon elevated storage tank with a static pressure of 55 psi and two electric fire pumps that take suction from this tank. Based on hydraulic analysis performed by a contractor, many of the fire systems are not adequate with the current water supply. The phased set of steps above, are designed to correct the deficiencies and make it possible to upgrade the under-turbine fire protection. A phase VIII was added to the project since the closing conference based on hydraulic calculations completed after the site visit.

Status: Open

Member Response: Phase I was completed on August 1, 2014. Phases II – IV will be completed before September 30, 2014. Phase V will be completed by April 1, 2015, Phases VI and VII will be budgeted in 2016 and/or 2017, new addition Phase VIII may be completed in 2015 if funding can be found; if not it should be completed in 2016.

DGS-P2010-06 REVISED **Fire Protection Systems** **Steam Turbine** **Capital Expenditure**

Priority 1

The areas beneath the Unit 1 and 2 steam turbine generators are not provided with adequate automatic sprinkler protection. At the present time, partial wet pipe sprinkler protection is provided to protect the under turbine areas as noted in the report.

References: NFPA 850 *Recommended Practice for Fire Protection for Electric Generating Plants and High Voltage Direct Current Converter Stations* - 2010 Edition, Section 7.7.4

AEGIS Comments: An automatic, wet pipe sprinkler protection should be installed to protect the levels below each of the steam turbine generators using hydraulically designed systems to provide a density of 0.30 gpm per sq. ft. over the hydraulically most remote 5,000 ft^2 of floor area. The coverage area should extend out to all areas where released lubrication oil could flow and 20 feet beyond (for exposure protection if not at a wall). The system should use a minimum 8.0 K-factor sprinkler, but preferably 11.0 K-factor heads due to larger water drop formation. Coverage by the sprinklers must be limited to 100 ft^2. All calculations need to include a 400 gpm fire hose stream deduction at the fire hydrants plus a 100 gpm deduction for inside hose usage by the fire department. Additionally, the turbine bearing water supply demand should be considered as a supply deduction in the calculations, since the systems could operate simultaneously.

A fire involving combustible lubricating oil beneath the turbine generators can result in severe damage to the turbine generator above, adjacent equipment, turbine generator support structure, and building structural components. Proper protection for lubricating oil hazards involves a combination of both automatic sprinklers protecting the levels below the turbine generator decks where oil can spray, accumulate or spread.

NFPA 850 references the addition of foam-water fire sprinkler protection for these under turbine deck areas. This supplemental protection could be expected to reduce damages by more quickly controlling a fire and should also be strongly considered. This suggestion was discussed during the exit conference as being the largest potential fire exposure at the site with the longest potential for a forced outage. With the water supply work now underway, reconsideration should be given to this suggestion, as the changes will facilitate the protection additions. Since Unit 2 is the most critical asset, focusing on adding the protection to that unit first would seem to make sense.

Status: Open **Member Response:** A tie-in for future installation will be made in Phase IV of the previous suggestion. Management will review after the new fire pump installation.

DGS-P2010-07 REVISED **Fire Protection Systems** **Fuel Handling** **Capital Expenditure**

Priority 1 The above ground coal conveyors No. 4 and No. 5 in the plant are not adequately protected with automatic sprinklers. Automatic sprinkler or water spray systems should be provided within the coal handling structures such as the coal conveyors and bunker rooms (Tripper Floor areas) utilizing dry pipe sprinkler systems.

References: NFPA 13, Sprinkler Systems and NFPA 850, *Electric Generating Plants and High Voltage Direct Current Converter Stations* – 2010 edition, Section 7.4.6 Fire Protection

AEGIS Comments: The systems should be hydraulically designed to provide a minimum density of 0.25 gpm over the most remote 2,500 ft^2 area. The coal conveyor enclosures should be protected with sprinkler systems that are hydraulically designed to provide a density of 0.25 gpm over the most remote 2,000 ft^2 of enclosed conveyor or 100 lineal feet up to 2,000 ft^2 of enclosure. Since more than one system is required due to the length of the conveyors, the design should be based on the simultaneous activation of two systems. All piping should have a UL corrosion resistance ratio of at least 1.0. Interlocks should be provided between the DCS system controlling the belts and the waterflow alarm detection.

Accumulations of coal and coal dust can result in a fire, as coal is susceptible to spontaneous heating and ignition. Significant property damage could result in the event of a fire in these structures. Additional fire protection is needed for the 2, 4 and 5 conveyors. The existing coal conveyor fire protection should also be evaluated. All areas of the conveyors should be protected including areas below covers, belts with solid bottoms, head, tail and tensioning pulleys. Interlocks should be provided between the belts and the sprinkler systems. Test burns are reportedly going to be made using Illinois Basin Coal which represents a much higher risk of fires in coal handling systems than eastern hard coal. Burning this coal elevates the need for complete coal handling protection.

Status: Open **Member Response:** Sprinkler protection is provided on all underground coal conveyors and at the Crusher Building. Extension of these systems is not currently budgeted but will be considered annually and may be incorporated as part of Phase VIII upgrade. The current infrastructure is not adequate to allow installation at this time.

DGS-P2010-05 **Fire Protection Systems** **Steam Turbine** **Capital Expenditure**

Priority 1

Automatic preaction water spray fire protection systems should be installed to protect the bearings and lagging on the steam turbine generators.

Reference: NFPA 850 *Recommended Practice for Fire Protection for Electric Generating Plants and High Voltage Direct Current Converter Stations* - 2010 Edition, Section 7.7.4.2

Additional information concerning turbine-generator fire protection can be found in EPRI Research Project 1843-2 report, *Turbine Generator Fire Protection by Sprinkler System*, July 1985. Also, reference the EEI Fire Protection Task Force special report, *Turbine Building Fire Protection*, August 1996.

AEGIS Comments: The systems should be hydraulically designed to provide a density of 0.25 gpm/ft^2 over the entire application area. The bearing portion of the systems should be designed with two 60 - 90° angle directional spray nozzles installed at the approximately 10 and 2 o'clock positions and approximately 24 inches from the centerline of the shaft. Sprinkler nozzles should be 1/2-inch orifice and rated at 286°F utilizing the existing preaction systems that are currently in place. If the ambient temperature around the nozzle installation area of the No. 1 and 2 bearings is over 236°F, a higher temperature nozzle should be used to maintain at least a 50 degree buffer. The sprinkler protection in the lagging area should be designed with sprinklers spaced at approximately 8 feet. Water discharge on hot turbine parts can be avoided by the use of directional spray sprinkler heads and protecting these areas with shields and encasing insulation with metal covers.

The hydraulic calculations should include a 500-gpm hose stream allowance and an allowance for the turbine underdeck protection also being suggested. All piping should have an Underwriters Laboratories (UL) corrosion resistance ratio of at least 1.0. The fixed temperature heat detectors associated with the system should be installed directly above each bearing area. The detectors should be installed no more than 3 ft. from the bearing area with adequate support to prevent physical damage.

As an alternative to sprinkler protection for the exciter bearing, an automatic, total flooding carbon dioxide suppression system can be installed inside the exciter housing. The system should be designed to provide a 50% concentration within the enclosure for 20 minutes or the anticipated rundown time of the unit.

There are currently no fire protection systems installed to protect the turbine generator bearings. A well-designed fire suppression system should be capable of controlling the fire until manual suppression is provided, allowing the turbine generator unit to coast down with lube, seal, and control oil systems in operation until the oil supply can be shut off.

Status: Open

Member Response: There are no current plans to comply with this recommendation on Unit 1. Upgrades on Unit 2 will be considered pending the re-evaluation of the water supply.

Closed Risk Reduction Suggestions

DGS-P2010-13S	**Fire Protection Systems**	**Combustion Turbines**	**O&M Expenditure**
	(Formerly Advisory Suggestion 3) Continued repairs should be made and fan door testing apparatus should be used to ensure that the three combustion turbines can maintain the CO_2 concentration of gas per the original design for 30 minutes. Use of actual agent discharge testing is not required.		
Status: Closed	**AEGIS/Member Comments:** Testing and sealing of the combustion turbines has been completed during the past year. This RRS will be removed from future reports		

General Plant Information

AERIAL PLANT VIEW

Plant Description

The Deerhaven Generating Station is an electric power generating facility located seven miles north of Gainesville on U. S. Highway 441 near Hague, Florida. The facility is owned by the City of Gainesville and operated by Gainesville Regional Utilities (GRU). The plant is built on 1,146 acres.

The facility is equipped with two steam turbine electric generating units, three combustion turbines and three emergency generators. The plant began operations in 1972. The plant has a total generating capacity of 448 MW as a result of a steam path upgrade to Unit No 2.

Unit 1 is equipped with a B & W, 860,000 lbs. per hour, natural gas and No. 6 oil fired boiler. This boiler supplies steam to a Westinghouse steam turbine generator rated at 80 MW. Unit 2 was completed in 1981 and is equipped with a Riley 1,700,000 lbs. per hour, coal fired boiler with natural gas used for ignition fuel. Steam is supplied to a Westinghouse steam turbine generator rated at 235 MW (248 MW with the steam path upgrades). Unit 1 is used for cyclic operation with over 200 starts per year and Unit 2 is typically used for base loaded operation. The plant successfully completed its first seasonal lay-up with Unit 2 this past February, necessitated by the newly commissioned GREC facility coming on-line as referenced below.

The plant is also equipped with three combination natural gas and fuel oil fired combustion turbines; two GE Frame 5 units installed in 1976, rated at 20 MW each and one GE MS7001EA installed in 1996 rated at 80 MW. These units are used for peaking purposes.

Power is sold to Florida Power and Light and Progress Energy. Approximately 90% of the power that is produced is utilized by the City of Gainesville (86,000 customers) with the remaining 10% sold to the market. Power is dispatched by GRU. GRU purchases 75 – 200 MW from other sources based on market price. The plant does not have black start capability.

Since the 2013 AEGIS visit, the adjacent 100MW GREC Biomass generating station has come on line. GREC has a 30-year contract with Gainesville Regional Utilities (GRU) to sell electricity to the utility, which displaces the amount of run time for various GRU units.

MAIN PLANT LOOKING EAST

Exposures

Latitude	Longitude
29°45'16.33N	-82°23'16.40W

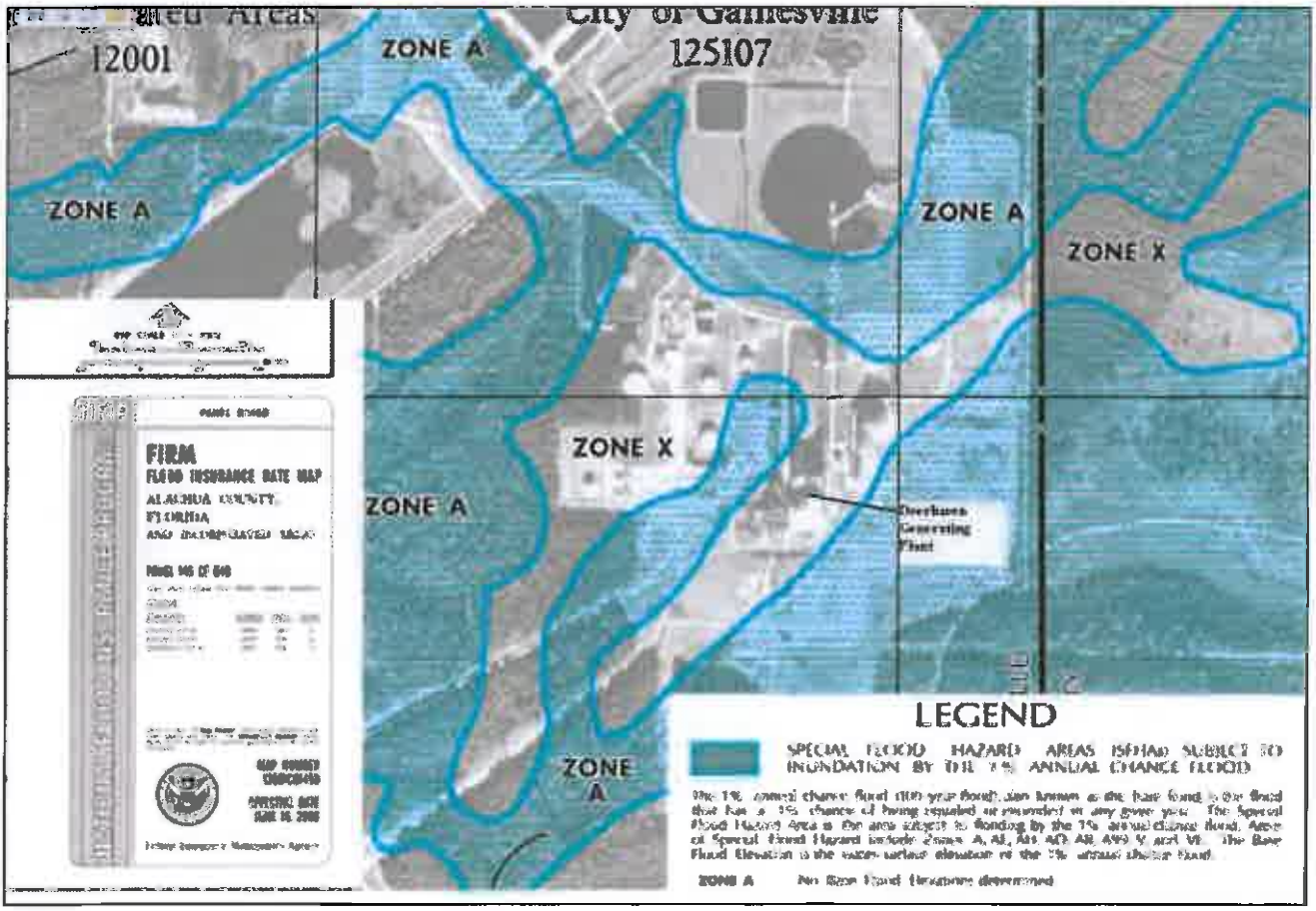
Earthquake

FM Zone >500 – Earthquake potential is considered slight.

FM Zone >500 – the >500 represents the average frequency in years of a moderate to severe earthquake occurring within the region (Richter 7 scale magnitude).

Flood

FEMA Zone A & C – Map 12001C0145D Alachua County, dated 06/16/2006 with a slight to moderate exposure to flooding. The site is at 184 ft. MSL. There have has been no reported flooding of the site although the flood map below indicates that there is a flood zone in the center of the power block.



Windstorm

Construction was to local codes; management indicated roof design was for *110 mph*. The plant is located in the central part of Florida approximately 65 miles from the coasts. The area is subject to high winds from thunderstorms, tornados and seasonal hurricanes. The state of Florida has adopted a state wide building code. Work on some of the Powerhouse roof structures was completed in 2013.

External

The facility is located 5 miles from the Gainesville Regional Airport. The flight paths do not go over the plant.

North	Open area for several hundred ft., woods beyond
South	Open area for several hundred ft., woods beyond
East	Open area for several hundred ft., woods beyond
West	Open area for several hundred ft., 1-2 story homes and townhouses across 441 Highway

Internal

PCB-containing equipment has been removed from the plant. Asbestos remains in the plant on Unit 1 and consists of insulation on pipe and in steam turbine lagging areas. The asbestos is encapsulated and there are no plans to remove the material. Asbestos removal and abatement is included in the scope of work when repairs or maintenance is needed and is removed by a qualified contractor. There is no asbestos associated with Unit 2 (constructed in 1981). There is no reported asbestos in the building materials.

The auxiliary cooling tower is located 50 ft. north of the Unit 1 cooling tower. There is a moderate mutual fire exposure between the two pieces of equipment.

Transformer for CT 1 is located 25 ft. from the CT enclosure inside of a concrete dike with a pit/grate. The CT's are located approximately 50 ft. apart.

Lightning protection is provided on the stacks only.

Risk Characteristics Ratings

Area Rated	Rating	Risk Reduction Suggestions/Comments
Risk Reduction Programs		
Housekeeping	G	
Hot Work Program	G	
Emergency Organization & Pre-Planning	G	
Fire Protection System Testing & Maintenance	G	
Fire Protection Impairment Handling	G	
Fire Plans Review	N/A	**DGS-P2014-01**
Fire Protection		
Water Supply & Distribution System	P	**DGS-P2010-04**
Fire Protection Systems & Equipment	P	**DGS-P2010-05, DGS-P2010-06, DGS-P2010-07**
Fire Detection Systems	G	**DGS-P2010-12S**
Fire Signaling Systems	G	
Major Equipment		
Boilers and Auxiliary Equipment	G	**DGS-P2010-08S**
Pollution Control Equipment	G	
Steam Turbine Generators	P	**DGS-P2010-06, DGS-P2010-11S, DGS-P2010-14S**
Combustion Turbine Generators	G	
Internal Combustion Engine Generators	G	
Transformers	G	
Electrical/Electronic Rooms	G	
Fuel Handling Systems	G	
Cooling Towers	P	**DGS-P2010-04, DGS-P2013-01S**
Warehouses	F	
Buildings and Structures	G	

Excellent	The facility has taken measures that exceed industry standards and best practices. Loss potential is considered significantly reduced.
Good	The facility has taken measures that are consistent with industry standards and best practices. Loss potential is considered to be average.
Fair	The facility has taken some measures that approach industry standards and best practices; however, deficiencies exist. Loss potential is considered somewhat increased.
Poor	The facility has major deficiencies and does not approach industry standards and best practices. Loss potential is considered to be significantly increased.

Risk Reduction Programs

Housekeeping/Smoking

There is a written policy. Smoking is not allowed inside of the plant buildings and there are now only two designated smoking locations. The housekeeping throughout the plant and specifically in the coal handling areas was found to be very good. Significant effort is being made to keep the coal handling areas clean. As noted in the Executive Summary two minor housekeeping issues were identified. One was combustible storage in the 660 Room containing Burner Management Control Systems and switchgear. The other was above the Unit 2 feeder deck on transport piping and the structure due to previously repaired coal leaks. Both of these items will be addressed, so no formal risk reduction suggestions were made and AEGIS will follow up on these items at the 2015 site visit.

Hot Work Program

The plant has a written hot work permit procedure. Hot-work permits are required for all hot-work that is conducted at the Generating Stations except that which is done inside the DH Main Plant Maintenance Shops, the DH Process Plant Maintenance Shop or the DH Coal/Ash Vehicle Maintenance area. Any hot-work performed in these areas requires the same safe work practices dictated under a hot-work permit.

Emergency Organization & Pre-Planning

Organization	Response	Type	Distance	Comments
City of Gainesville	4 minutes	Full	3 miles	RR Crossing
City of Alachua	7 minutes	Full	9 miles	RR Crossing

The plant has conducted joint exercises with the fire department and the fire department utilizes the plant property for training purposes. The Gainesville Fire Department is part of a city/county team. The Gainesville Fire Department is the first responder with an automatic mutual response by the City of Alachua.

Fire response by employees is limited to incipient stage fires only.

Fire Protection System Testing & Maintenance

System	Weekly	Monthly	Quarterly	Six Months	Annual
Extinguishers – Visual		X			
Extinguishers – Maintenance					X
Fire Pump – Inspection/Operation	X				
Fire Pump – Capacity Test					X
Control Valves – Visual Inspection			X		
Control Valves – Maint./Operation					X
Sprinkler Waterflow Alarms		X			
Fire Alarms					X
Deluge And Water Spray Systems		X			
Dry Pipe Systems					X
Wet Pipe Systems		X			
Fire Hydrants – Maint/Operation					X
Hose Stations		X			
Gaseous Extinguishing Systems – CO_2					X
Detection Systems and Notification Devices					X
Fire Doors, Dampers and Penetrations					X

Fire Protection Impairment Handling

Impairments are handled using the plant Management of Fire Suppression System procedure. This procedure is to ensure the fire suppression system is maintained in operational condition and the proper communication is established to remove the system from operation when maintenance is required or when other impairments occur. The impairment procedure is dated 6/10/2014.

As indicated in the Executive Summary, a lapse in the fire system impairment procedures was found. It is suspected that a contractor conducting the inspection, testing and maintenance of the fire systems left the site with a valve to the Unit 2 cooling tower closed. Operations will be tasked to follow behind contractor activities in the future. In addition, management has investigated the issue and is implementing strategies to prevent recurrence.

Fire Protection

Water Supply & Distribution System

Water Supply Description

Pump	UL Listed	Driver	Rated Flow	Rated Pressure	Suction Source
1	Yes	Electric	1,000	55	Storage tank
2	Yes	Electric	2,000	100	Storage tank

Comments: The plant obtains water from 2 sources: city water and plant derived consisting of four deep wells that pump water through a header to the ground level storage tank and 3 high-head pumps that fill the elevated water tank.

City water is supplied to the plant from the GRU Murphree Water Treatment Plant by way of the water distribution piping grid. The Murphree Plant is located eight miles roadway distance from Deerhaven. The GRU Water Grid System supplies water to Deerhaven through an eight inch pipeline at pressures of 40 to 50 psig. There are two city water electric driven booster pumps, rated at 200 gpm @ 28 psi (jockey pump) and 500 gpm @ 28 psi (fire pump) that discharge through a common header, associated piping and equipment; one in service and one in standby. A jockey pump is normally running. A recirculation line ensures minimum flow is always maintained while a pump is running. A solenoid valve in the recirculation line opens when a pump is running below the minimum required flow rate. The standby pump starts when flow demand is greater than 220 gpm or the jockey pump is off. This pump is not a listed fire pump. This pump stops when flow demand is less than 180 gpm and the jockey pump is on.

The City Water System is capable of supplying back up water for the closed cooling water system, as well as cooling water for the instrument air compressors. City water may be supplied to the system by opening the City Water Emergency Flow Control Valve from the DCS. When this valve is open, city water is supplied to the Closed Cooling Water supply header. City water is used to back-flush the raw water side of the Closed Cooling Water Heat Exchanger.

Water flows into the underground side of the Auxiliary Water System. The following valves are normally closed to provide isolation points between the two water supplies:

- CWP-10 cross connect between city water and domestic water at the north side of the Unit 1 building
- DWY 1-6 cross connect between city water and domestic water just southwest of the Unit 2 cooling tower.
- DWY-10 cross connect between city water and domestic water west of the neutralization basin

The current operating practice is to keep the domestic water system separated with the elevated tank supplying all of the plant water.

Plant water is obtained from four deep well pumps located on the site grounds, west of the Unit 1 cooling tower and east of the bulk oil storage tanks. The well pumps are driven by electric motors designed to provide water to the 500,000 gallon ground level storage tank. The No. 1 and No. 4 deep well pumps are rated at 2,000 gpm and deep well pumps No. 2 and No. 3 are rated for 1,000 gpm. The discharge lines of the four pumps combine into a common 16 inch header that discharges into the top of the ground level storage tank and supplies water to the suctions of the three 275 gpm high-head pumps located in the existing fire pump house. These pumps maintain the water level in the 300,000 gallon elevated water storage tank that provides a typical static water pressure of about ~55 psi at ground level. A level controller indicates the percent of the water volume as well as pressure due to the height of the water in the tank. The high alarm is set at 25 feet and the low alarm at 9 feet. When the alarm horn activates, the corresponding light illuminates in the Control Room. A bypass valve is provided between the well pumps and the high-head pumps. When the ground level storage tank is out of service, the well pumps are operated manually.

The plant is equipped with two booster fire pumps. The Unit 1 fire pump is located in the pump house with the high-head pumps and takes suction from the elevated storage tank. The system is equipped with a jockey pump which maintains system pressure at 120 psi and operates continuously. The pump is set to start at 70 psi and shut off at 118 psi. This pump is equipped with a 5 minute timer and will shut off when the system reaches and maintains shut off pressure. The fire pump controller is improperly piped from the system to the controller, but no recommendation is being made at this time, since upgrades to the fire water supply will make this condition mute.

A Caterpillar 120 KW, 312 kVA diesel generator is installed inside of the pump house to provide a source of backup power to the fire pump. The generator is manually operated. The unit is equipped with a double wall tank. There is no fire protection over the diesel generator.

A number of the fire protection systems in the plant are not adequately supplied by water. A review of this condition was made during this visit and followed up on work by the previous AEGIS field engineer and the insurance broker's engineer. **Risk Reduction Suggestion DGS-P2010-04 (REVISED)** included in this report has been broken into eight discrete tasks to upgrade the fire protection water supply. Each step builds on the previous step and provides a basis for a formal engineering analysis and design. Part of this work includes the removal of the No. 2 fire pump from the structure next to the Unit 2 cooling tower. This pump is located in the zone of chlorinated water drift from the tower and has resulted in the failure of two motors and is showing accelerated corrosion damage. This was a poor design location for the pump and the proposed solutions include it's eliminate to reduce future maintenance and increase the fire water reliability.

The following test results, completed by Regional Fire Protection Services on November 4, 2013 for the two fire pumps are as follows:

Driver	Rating			Flow	Suction	Discharge	Net Press	RPM	Speed Corrections	
	GPM	PSI	RPM						Flow	Net Pressure
Unit 2 Electric	0	120	1,780							
	2,000	100								
	3,000	65								

Driver	Rating			Flow	Suction	Discharge	Net Press	RPM	Speed Corrections	
	GPM	PSI	RPM						Flow	Net Pressure
Unit 1 Electric	0	66	1,760	0	45	150	105	1,788		
	1,000	55		1,000	40	110	70	1,781		
	1,500	36		1,350	40	100	60	1,778		

Fire Protection Systems & Equipment

Water Based Systems

Area	Design Density/Area (gpm/ft.^{2} / ft.^{2})	BOR Demand (no hose) (gpm @ psi)	Detection
Deluge Sprinkler Systems			
Unit 1 cooling tower	Unknown	Unknown	Pilot heads
Unit 2 cooling tower, system 1	0.33 over fill and 0.15 over the fan deck	1,520 gpm @ 159 psi	Pilot heads
Unit 2 cooling tower, systems 2-5	0.33 over fill and 0.15 over the fan deck	3,681 gpm @ 150 psi	Pilot heads
Unit 2 cooling tower, system 6	0.33 over fill and 0.15 over the fan deck	1,201.93 gpm @ 109.58 psi (2,235 @72.9 at fire pump 1 disch. with hose)	Pilot heads
Auxiliary cooling tower	0.33 over fill and 0.15 over the fan deck	1,735 @ 68.6	Pilot heads
Preaction Sprinkler Systems			
Administration Building 3rd Floor	0.20/16 sprinklers	347.5 @ 77.3 psi	-
Administration Building 2nd Floor	0.20/1,950	474.7 @ 75.1 psi	-
Administration Building 2nd Floor (Below Mezzanine)	0.20/1,950	508.3 @ 70.6 psi	-
Wet Pipe Sprinkler Systems			
Administration Building 3rd Floor	0.20/1,500	405.4 @ 72.1	-
Administration Building 2nd Floor offices	0.15/1,500	322.3 @ 74.8 psi	-
Administration Building 2nd Floor	0.20/1,500	313.4 @ 64.1 psi	-

Area	Design Density/Area (gpm/ft.^{2} / ft.^{2})	BOR Demand (no hose) (gpm @ psi)	Detection
Unit 1 TG lube oil	0.30/area	200.3 gpm @ 70.3 psi	
Unit 1 H_2 seal oil	0.30/area	143.5 @ 47 psi	
Unit 1 – limited under TG pedestal protection (13 sprinklers total)	0.30/area	454.4 @ 72.3 psi	
Unit 2 Turbine oil/hydraulic seal	0.20/900	254.66 gpm @ 44.67 psi	
Unit 2 Hydrogen Seal Oil	0.20/320 ft.^{2}	88.3 gpm @ 23.97 psi	-
#6 Conveyor Floor	0.20/1,300	274.52 gpm @ 26.3 psi	
Stockout Tower #3 Conveyor	0.20/1,500	526.54 gpm @ 59.9 psi	
Track Hopper and No. 2 Conveyor Tunnel	0.20/1,200	516.6 gpm @ 52.02 psi	
Unit 2 Burner Front (deck 1)	0.25/area	187.6 gpm/ 32.9 psi (687.6 gpm at 64 psi at fire pump #1 disch.)	
Unit 2 Burner Front (deck 2)	0.25/area	194.7 gpm/ 34.2 psi (694.8 gpm at 68.7 psi at fire pump #1 disch.)	-
Unit 2 Tripper Floor	0.25/3,000	System demand is 781.9 gpm @ 75.3 (BOR) and 1,281.9 @ 168.3 at the fire pump #1 discharge with 500 gpm hose)	-
Dry Pipe Sprinkler Systems			
#4 Crusher/Sampler House	0.25/area	661.2 gpm @ 119.8 psi	N/A

Standpipe and Hose Stations

Fire hose risers are located throughout the entire plant including the administration section of the building. Unit 1 has a fire hose riser that runs from the 1st floor to the 9th floor just north of the elevator. A hose reel station is located on each floor. Hose connections with reels are located in the warehouse, Crusher House, Track Hopper Building and conveyor pits.

While at the station, the topic of maintaining small fire hoses was discussed. Since the plant has only an incipient stage fire response, it is not necessary to maintain the fire hoses and they should be removed, if acceptable to the local fire department. Maintenance of the hose valves would still be necessary.

Non-water Based Systems

Area	Detection	Suppression	Comments
CT 1	Heat	Total Flooding CO_2	Accessory compartment, turbine compartment and load tunnel, fuel forwarding pump enclosure
CT 2	Heat	Total Flooding CO_2	
CT 3	Heat	Total Flooding CO_2	
CT 3	Gas detection		

A 6 ton Chemetron, low pressure CO_2 system provides fire protection for Combustion Turbines 1 and 2 and a similar 4 ton system is provided Combustion Turbine 3.

Portable Extinguishing Equipment

A full complement of portable fire extinguishers is located throughout the plant.

Fire Signaling System

System Type	UL Listed	Location	Alarms Supervised	Comments
Local	Y	Control Room	Sprinkler water flow (all systems), pump running, system activation (CO_2, deluge), smoke detector, low air pressure, manual fire alarms	See below

See **Appendix A - Alarm Initiating Devices** for additional details.

The fire protection valves in the plant are locked open using plastic chain and frangible locks. This meets the NFPA 13 requirement for fire protection valve supervision.

Major Equipment

Boilers and Auxiliary Equipment

Unit	Year	Manufacturer	Rating		Fuel	
			lbs./hr	MAWP/°F	Primary	Ignition
1	1997	B & W	860,000	1,250/950	Oil/Gas	Nat Gas
2	1981	Riley	1,700,000	1,800/1,005	Coal	Nat Gas

The Unit 2 boiler will no longer be used to burn fuel oil and the capability to do so has been disconnected physically by removing the supply piping and controls. This function is not in the upgraded DCS control system. It is being operated on natural gas and coal only. Unit 1 will be started on gas and will burn either oil or gas. Unit 1 has not run on oil for over a year.

Test burns using Illinois Basin Coal were conducted during the previous year. Future use of this type coal has not been ruled out. Use of higher volatility coal would increase the importance of retrofitting the elevated coal conveyors with fire protection.

Deerhaven is maintaining the ability to operate the Unit 1 boiler on fuel oil, the preferred fuel for both start-up and normal operation is natural gas. Unit 1 operated approximately 24 hours on oil in 2013. In lieu of fixed protection, wheeled cart extinguishing units has located near the burners. As a result of the change in operations and the reduced Unit 1 run time, previous Risk Reduction Suggestion **DGS-P2010-08** has been downgraded to Supplemental Risk Reduction Suggestion **DGS-P2010-08S.**

The critical areas of the boilers are separated by clear space of approximately 80 feet. A catastrophic boiler explosion in one unit would be expected to cause damage to the adjacent unit.

Combustion Safeguards

Unit #1 is equipped with 5 front burners on 2 levels and Unit #2 is equipped with 9 front and 9 rear burners on 1 level. The operator interface is accomplished through control displays on an ABB operator console.

The Unit 1 ABB Burner Management System appears to be installed in general accordance with NFPA 85 Guidelines. The plant installed a low NO_x burner upgrade to DH2.

Unit 2 is equipped with an ABB Burner Management System (BMS). The system is designed for use with a coal fired, balanced draft steam generator containing three Babcock & Wilcox Type MPS 75 pulverizers with primary air fans. Each pulverizer supplies coal to three coal burner pairs. Each burner pair has one pair of Class I gas igniters. There are no identified deficiencies for this control system.

Boiler Feedwater Pumps			
Unit	**Driver**	**Rating**	**Protection**
1	Westinghouse Pacific 3 Electric	2 - 50% and one spare	None
2	Westinghouse Pacific 3 Electric	2 - 50% and one spare	None

Pulverizers			
Unit	**Manufacturer**	**Number**	**Protection**
1	N/A	N/A	N/A
2	B&W MPS75 with classifiers	3	See below

The station operators monitor the temperature of the air in and out of the pulverizer that normally runs 165 – 170°F. An alarm set point of between 180-190°F is provided. The air temperature is controlled with a damper. When the pulverizer is reset all of the valves are closed and the cooling valve is open. Air is supplied from the burner cooling fan. Each of the pulverizers is connected to a dedicated primary air fan. The unit can operate with 1 pulverizer and associated equipment out of service at 66% load. A separate set of air fans provide seal air for each pulverizer. Sealing air is greater in pressure than the internal pressure of the pulverizer, which prohibits coal dust from escaping. In case of a unit trip, the seal valves close automatically and can also be manually operated. No inerting or CO monitoring for the coal pulverizers. Manual water fire suppression is operable from the Control Room or locally using motor operated valves.

Future use of Illinois Basin Coal would elevate the need for CO monitoring for the coal silos and for some type of inerting or extinguishment capability in the pulverizers.

Air Preheaters			
Unit	**Type**	**Protection**	**Detection/Alarms**
1	Ljungstrom, regenerative	Water wash	Air out 415°F, Gas in 478°F, Air in 100°F, Gas out 207°F. Pneumatic motor starts on loss of electric power. Alarm at 370°F; 400 °F maximum temperature with automatic bypass.
2	Ljungstrom, regenerative	Water wash	Clean steam and manual water wash system. Air outlet 589°F, Gas in 682°F, Air in 100°F, Gas out 331°F. High temperature alarm 675°F Pneumatic motor starts on loss of electric power. Gas to Turbosorp 310-350°F.

The units are inspected at each outage and cleaned as needed.

Protective Systems

Area	Detection	Suppression	Comments
Unit 1	IR detectors	None	*Burner front automatic sprinkler protection is desirable. Risk Reduction Suggestion* ***DGS-P2010-08***
Unit 2	IR detectors	Wet pendent sprinkler heads with guards are mounted approximately 6 ft. above the floor on each side of the burners	None

Infrared heat detectors are mounted on each corner of the burner deck and provide an alarm to the operators in the control room. This system is tested by plant personnel.

Pollution Control Equipment

Electrostatic Precipitators

Unit 2 is equipped with a hot side ESP located at the inlet of the SCR on the hot side of the unit. The operating temperature is approximately 750°F. The power for the precipitator is provided by twenty-four transformer/rectifier sets located in a stacked arrangement along the north wall of the Precipitator Electrical Building

Selective Catalytic Reduction (SCR)

The SCR utilized 50% urea to produce ammonia. The urea is received in a tank car and trucks. The urea is stored in an insulated tank that is heat traced and maintained at 100°F. The urea is converted to ammonia in a hydrolyzer to produce a 28% solution with water. The vessel sends ammonia to 2 control skids east and west. The plant has monitors for ammonia leakage that annunciate locally at the hydrolyzer skid and SCR's on the top of the units. It is understood that the system is arranged to prevent the ammonia from entering the boiler system.

Baghouse

The Air Quality Control System (AQCS) baghouse is equipped with polyester bags that are rated for 400°F. The baghouse is equipped with 10 compartments, 9 of which are needed for plant operation (approximately 10,000 bags). The plant currently maintains 1/2 cell of replacement bags. The compartments are separated by steel barriers. The unit operates at approximately 170°F when the scrubber is operating and 300 to 325°F when the unit is not operating. A high temperature alarm is present. The baghouse can be bypassed and there is a continuous water jet located in the middle of the Turbosorp column to control temperature prior to gas discharge to the baghouse.

The lime addition to the scrubber can be stopped when the plant is burning lower sulfur coal (The gas path is still through the scrubber). There are no standpipes or fire protection in the baghouse. Portable fire extinguishers are provided in the area of the unit. Manual firefighting in the baghouse wouldn't be expected to be effective.

Flue Gas Desulfurization (FGD)/Absorber Unit - Turbosorp

The plant has the capability of receiving pebble by rail and hydrated lime by tanker truck. The unloading system is pneumatic and is locally operated. The lime is off loaded and transferred to the 14 day capacity pebble lime silo. The lime is transferred using blowers to two surge bins and from the bines using a vibrator followed by hammer mills. The discharge from the hammer mill is transferred to the crushed lime bin using a bucket elevator. The lime is transferred to the hydrators. The discharge from the hydrated lime tank discharges to a hydrated lime surge bin. The hydrated lime is blown into the Turbosorp reactor. The quantity of the reactant is based on a reduction set point (more or less). The unit receives process water for temperature with the gas coming from the East ID fan and West ID fans. The Turbosorp is equipped with a baghouse with booster fan that discharge to the plant stack. Two air slides remove the ash from the bottom of the baghouse and recirculate most of the material back to the Turbosorp and a small amount of the byproduct is transferred to the byproduct surge bins. The wasting percentage is based on the reduction percentage and the sulfur in the coal. The bottom of the Turbosorp discharges to 2 screw conveyors and into roll-off bins. The surge bins discharge to the byproduct ash silo, and is disposed of by truck.

CEM

The Unit 3 combustion turbine is equipped with a 6 ft. x 6 ft. detached building. The building should be equipped with a smoke detector that annunciates in the plant control room.

Unit 2 has had mercury detection equipment added to the existing CEMS equipment array. The station management is preparing for the implementation of the MATS rule. The station's current mercury emissions are only slightly above the anticipated limits and there are going to be attempts to control this with fuel blending, fuel treatment with Calcium Bromide or possibly the addition of an Activated Carbon PAC) system. Some concerns about the installation of PAC systems including industry fires and the potential for dust explosion were discussed.

Stacks/Chimneys			
Stack	**Size**	**Construction Structure/Liners**	**Inspection/Maintenance**
Unit 1	300 ft. x 11 ft. OD	Concrete/ Brick	2010 inspection - removed and replaced the upper 37 ft. 6 inches of lining brickwork. Prep and repaint the upper and lower platforms and full height ladder and cage. The 3-5 year plan is to install brick in the top 40 ft. of the Unit 1 stack. Cost of repairs estimated $250,000.
Unit 2	350 ft. x 40 ft. OD	Concrete/ Brick	The last internal and external inspections of this stack were completed in 2012. The inspections are completed every 3 years. The upper 40 ft. portion of the stack is coated with Gunnite.

The Unit 2 stack is equipped with lightning protection.

Steam Turbine Generators

Turbines				
Unit	**Year**	**Manufacturer**	**Type**	**MW**
1	1972	Westinghouse (HP)BB 133 (LP) BB 170	Twin cylinder, tandem compound, double condensing	81
2	1981	Westinghouse (HP/IP) BB 145 (LP) BB271	Tandem compound, single shaft	248

Generators					
Unit	**Year**	**Manufacturer**	**MVA**	**Voltage**	**Cooling**
1	1972	Westinghouse	88.235	13.8KV	Hydrogen intercooled
2	1981	Westinghouse	295	22KV	

The isophase buss duct is air cooled. The two steam turbine generators are about 75 feet apart from each other.

Turbine and Generator Ancillaries

Oil Reservoirs				
System	**Capacity(gallons)**	**Location/Separation**	**Containment /Drainage**	**Protection**
Unit 1 Lube Oil	2,400	Second floor in the southwest corner of the building.	No diking is provided. Drainage is to the floor drains.	Four wet sprinkler heads are installed above the tank.
Unit 1 Seal Oil	Part of LO system	South side of the ground		Four wet sprinkler heads are installed above the tank.
Unit 1 EHC	100 gallon	The EHC system utilizes Quintolubric fluid		None, fire resistive fluid
Unit 2 Lube Oil	10,400	Top of the reservoir is located on the second floor		Six wet sprinkler heads are located above the unit.

Oil Reservoirs				
System	**Capacity(gallons)**	**Location/Separation**	**Containment /Drainage**	**Protection**
Unit 2 Seal Oil	Part of LO system	SE/East end of the first floor		Four wet sprinklers are installed above.
Unit 2 EHC	Not determined	Level 2, EHC system utilizes Fyrquel		None, fire resistive hydraulic fluid.
Unit 2 Bulk Storage	10,000 Tank is generally empty with the exception of repairs or outage when the units are drained.	Ground floor of Unit 2.		Ten wet sprinkler heads are installed above the tank.
Unit 1 Bulk Storage	2,625 The tank is normally empty.	Ground floor of Unit 1.SW corner.		Two wet sprinkler heads.

Unit 1 turbine lube oil system is equipped with an AC, a turning gear and a DC pump. Both units are equipped with mechanical shaft- driven pumps. Unit 2 has one DC lube oil pump, a turning gear/seal oil pump and an AC oil pump. All of the wiring is in conduit.

The area beneath Unit 1 has very limited protection with automatic sprinklers with a row of sprinklers along the south and west sides of the unit and directly below the pedestal. There is no fire protection for Unit 2 with the exception of the lube oil systems as noted above. The overall frequency of a major turbine underdeck fire is low, but the consequences include the loss of the affected unit for up to a year. Manual firefighting in these areas is difficult and certainly dangerous, so automatic systems provide a faster and safer response to minimize damages. The addition of fluid retention dikes around the oil hazards would be desirable and consistent with the recommended practice of NFPA 850, covering turbine generator hazards.

The coverage area for the suggested turbine generator under deck fire protection should include all areas where a major oil release could flow or be carried by the fire suppression water. Even if the area of spill is limited by drainage, containment dikes or other feature, providing sprinkler protection 20 feet beyond these limits will reduce the potential for additional thermal damage and represents a best practice design approach. Risk Reduction Suggestion **(DGS-P2010-06)** addresses this concern.

Hydrogen System		
Type	**Location**	**Separation**
Gas bulk, high pressure tanks and portable cylinders.	Outside, north of switchyard and southeast of Unit 2	100 ft.

The H_2 portable cylinders are stored on three skids with twelve bottles each and are used as a backup for the bulk supply. A tube trailer equipped with 28 horizontal tubes located at the east end of the plant and is perpendicular to the building. This is the primary source of hydrogen for the plant. A fixed set of 10 tubes are located adjacent to the tube trailer and located parallel to the building. These tubes are enclosed inside of a fence.

Bonding and grounding is provided and No Smoking and hydrogen warning signs are posted. There is no barrier protection for the trailer or the skids. The hydrogen is discharged to the plant at 70 psi through single wall stainless steel pipe underground.

Manual control valves are located at the tanks, outside of the Powerhouse wall and below the units. The hydrogen is removed through a valve located under the generator. The bulk system is not equipped with an excess flow device. The plant supplies gas continuously to the units through regulators that are located inside of the plant. There is no remote shut off for the hydrogen flow to the plant.

In the event of an emergency, the operator would be required to manually shut-off the valves in the plant. Plants with bulk tanks ideally should be equipped with excess flow devices and automatic valves located at the supply with local and Control Room operable emergency shutoff valves.

HYDROGEN STORAGE FOR STG

Combustion Turbine Generators

COMBUSTION TURBINES GT01, GT02 AND GT03

The three combustion turbines in the picture above show the very good separation between the units. The mutual exposure between them is considered slight.

Combustion Turbines				
Unit	**Year**	**Manufacturer**	**Model**	**MW**
Unit CT-1	1976	GE	Frame 5	20
Unit CT-2	1976	GE	Frame 5	20
Unit CT-3	1996	GE	MS7001EA	80

Generators					
Unit	**Year**	**Manufacturer**	**MVA**	**Voltage**	**Cooling**
Unit GT01	1976	GE	24.889	13.8KV	Air
Unit GT02	1976	GE	24.889	13.8KV	Air
Unit GT03	1996	GE	113.100	13.8KV	Air

Work is completed on testing and sealing the combustion turbines, since the last AEGIS visit. Combustion turbine CT-3 had all the fire alarm and Carbon Dioxide extinguishing system wiring replaced in 2013 to correct ground fault problems.

Turbine and Generator Ancillaries

Oil Reservoirs			
System	**Capacity**	**Location/Separation**	**Containment/Drainage**
Lube oil Turbine	Not determined	In accessory compartment	Unit enclosure and adjacent tank

Electrical/Electronic Rooms

The battery enclosures for Units 1 and 2 is approximately 3 ft. x 10 ft., concrete block walled structure with a wood roof located west of the units. The enclosures are provided with HVAC units to maintain proper battery temperatures.

A control cabinet on the west side of the units and measuring about 100 ft.^{2} contains the Mark V control system for the combustion turbines. A second similar control cabinet is provided for GT03. There are no remote detection capabilities of a fire from an occupied location for this critical equipment. GT03 is equipped with a CEMs building for stack emissions monitoring. There is no fire detection in this important structure either.

Internal Combustion Engines

The Unit 1 emergency generator is located on the ground floor, NE of Unit 1. The unit is not enclosed and there is no fire protection provided for this unit. This is a skid mounted, 300 kW, 375 kVA, 480 V Caterpillar diesel generator that is used for an emergency power supply to Unit 1. A day tank is located inside, along the north wall of the building and is hard piped to the generator. The piping is not equipped with fusible link operated valves. The day tank is refilled automatically from the bulk GT tank located outside of the building.

The Unit 2 emergency generator is located on the ground floor, northwest side of Unit 2. The unit is not enclosed and there is no fire protection provided for this unit. This is a skid mounted, Caterpillar 1,000 kVA, 800 Kw, 480 V diesel generator equipped with a 1,000 gallon double walled concrete Convault tank located 5 ft. outside of the building wall with shut offs at the tank and at the inlet and outlet pipe to the engine. The piping is not equipped with fusible link operated valves.

Ideally the diesel generators should be enclosed by a 2 hour fire rated room and protected in accordance with NFPA 850 *Recommended Practice for Fire Protection for Electric Generating Plants and High Voltage Direct Current Converter Stations, 2010 Edition, including section*7.9.1 Emergency Generators.

Transformers

Unit	Year	Manufacturer	MVA	Voltage	Oil Capacity
Unit 1 Step Up T-62	1970	Westinghouse	35/52	13.8 to 138 kV	6500
Unit 1 Step up T-61	1970	Westinghouse	35/52	13.8 to 138 kV	6500
Unit 2 Step Up T-67 A,B,C	1979	Westinghouse	90	21 to 138 kV	2250
Unit 2 Run Transformer T-69	1979	Westinghouse	22	22 to 4 KV	2250
Unit 2 Run Transformer T-68	1979	Westinghouse	22	22 to 4 KV	2250
CT 1 Step Up T-70	1973	GE	15/28	13.8 to 138 kV	4460
CT2 Step up T-71	1973	GE	15/28	13.8 to 138 kV	4460
CT3 Step Up T-72	1994	ABB	90/120	13.8 to 138 kV	9553
Unit 1 Start/Station Service T-63	1970	Westinghouse	7.5/9.375	13.8 to 4,160	4200
Unit 1 Black Start/Station Service T-64 (out of service)	Unknown	Westinghouse	3.75	12.47 / 4,160	Not determined
Unit 2 Start/Station Service T-66	Unknown	GE	22.4	4,160 to 138 kV	3830
AQCS SSTR 1 and 2	2010	Cooper	3	4,160/480/277V	646 gallon Environtemp FR3 fluid
T74	2008	ILJIN	7.5/10/12.5	13.8 to 4,160	3190

Unit 1 Transformers

Unit 2 Transformers

Protective Systems

Transformer	Detection	Suppression	Fire Barriers/ Separation	Containment/ Drainage
T63 Substation	None	None	10 ft. to Oil Circuit Breakers (OSB's)	Concrete slab, gravel
Unit 1 Step Up T-62	None	None	10 ft. to 20 ft. high concrete block barrier wall	4 inch concrete sill, drains to the plant sump
Unit 1 Step up T-61	None	None	10 ft. to 20 ft. high concrete block barrier wall	4 inch concrete sill, drains to the plant sump
T65	None	None	20 ft. to the exterior metal wall of Powerhouse and 30 ft. to T61	4 inch concrete sill, drains to the plant sump
Unit 2 Step Up T-67 A,B,C	None	None	Separated by 20 ft. high concrete block walls. The Isophase is installed over the concrete block barrier	4 inch concrete sill, drains to the plant sump
Unit 2 station service T-69	None	None	15 ft. to T-68, 5 ft. to concrete block barrier wall and 20 ft. to T67	4 inch concrete sill, drains to the plant sump
Unit 2 Station Service T-68	None	None	50 ft. to building wall, 15 ft. to T69, 20 ft. to a concrete block barrier wall	4 inch concrete sill, drains to the plant sump
CT 1 Step Up T-70	None	None	None/24 ft.	Concrete dike
CT2 Step up T-71	None	None	None/24 ft.	Concrete dike

Transformer	Detection	Suppression	Fire Barriers/ Separation	Containment/ Drainage
CT3 Step Up T-72	None	None	None/24 ft.	Concrete dike
Unit 1 Station Service T-66	None	None	None/10 ft. to OCB's	Concrete pad/gravel
SSTR 1 and 2	None	None	5 ft. to PDC/15 ft. to SSTR	Concrete dike
T74	None	None	None/10 ft. to OCB's	Concrete pad with trench drain/gravel

There is a spare single phase transformer that could be used as a replacement in the event a failure of one of the Unit 2 transformers (3-single phase). The spare is stored on site and is located on a pad about 10 feet from the operating transformers. A concrete wall provides exposure protection to the spare unit.

Unit 2 GSU transformers are single phase units are installed in close proximity to each other. The transformers are separated by a concrete block wall. The walls do not extend high enough to prevent damage to the adjacent transformer if the high side bushing would fail. The wall should be extended at least 1 foot above the top of the high side bushing.

Electrical/Electronic Rooms

Major Equipment & Protective Systems

Area	Detection	Suppression	Cutoff/Comments
Unit and 2 Control Room	Smoke; Constantly occupied	None	The Control Room is located on the mezzanine and adjacent to Unit 1 turbine deck. The room is constructed of concrete block with glass in metal sash window facing the turbine hall. ABB DCS. SCBA equipment is located inside of the Control Room. *Providing a 2 hour rated cut-off is advisable between the control room and the turbine hall.*
Unit 1 660 Room	Smoke	None	This 22 x 20 ft. concrete block walled room is provided with a glass filled door.
Unit 1 Battery Room	Smoke/Heat	None	The batteries are in a concrete block constructed room with ventilation.
Unit 1 Switchgear room second floor, center of the building below the Control Room.	Smoke	None	This room is constructed with concrete block and is located directly below the Control Room. It contains 480V/4,160V equipment.

Area	Detection	Suppression	Cutoff/Comments
Unit 2 -660 Room	Smoke detectors ceiling and HVAC ducts	None	All of the Unit 2 control systems for the boiler and turbine are located in this 4th floor concrete block enclosed room with a 20 minute rated door. There is a grated mezzanine above the floor with 2 layers of cable trays above. Storage of cardboard packaged electrical circuit boards was found stored on shelving during the 2014 site visit. This material is to be relocated to the Warehouse.
Unit 2 Switchgear Room South side of plant adjacent to Unit 1, second floor.	Smoke	None	This concrete block enclosed room contains the 480& 4,160V equipment. MCC's 7, 8, 9, 10 and 11, essential power and 4,160V switchgear for the pulverizers, boiler feed pumps, fan drives. 1-2 levels of cable trays are installed above the electrical equipment.
Unit 2 Battery room	None	None	This ventilated metal walled room is located on the 4th floor above the Control Room.
PDC No.1	Smoke/Heat	None	This 15 ft. x 70 ft. electrical equipment enclosure is constructed of insulated metal construction and is elevated on piers above the ground with three levels of cable trays below. The building is located to the north of Unit 2 and west of the No. 2 cooling tower. The building houses the 4,160V switchgear for the AQCS.
PDC No. 2	Smoke/Heat	None	This free standing metal structure supplies power to the 4,160 and 480 AQCS equipment
PDC No. 3	Smoke/Heat	None	This 15 ft. x 30 ft. electrical equipment enclosure is constructed of insulated metal construction. It supplies Limestone operations and the baghouses with 4,160 and 480V power.
Track Hopper Control room	None	None	The room is located on the mezzanine overlooking the track hopper.
Detached Crusher House MCC 14	Smoke detectors	None	This is a one story 20 ft. x 40 ft. masonry structure for the motor control equipment related to the Crusher House
Precipitator Building MCC 12 & 13	Smoke detectors	None	This one story masonry structure contains electrical equipment to the precipitator transformer rectifier sets, air duct heaters and Unit 2 cooling tower fans. There is a pit with cable trays below the room that is provided with a sump pump
Relay Building Switchyard	Smoke detectors	None	-

The electrical switchgear and equipment are being examined yearly using IR scanning. Some of the 4,160 volt switchgear is being provided with remote racking equipment for protection from arch flash hazards.

Fuel Handling Systems

Fuel Storage and Handling

Tank	Contents	Capacity (gallons)	Protective Systems	Containment
South Bulk Tank	Bunker C oil	2,350,000 Avg. inventory 1,050,000	Steam injection for fire suppression	2,660,000 gallons earthen berm lined
North Bulk Tank	Bunker C oil	2,350,000 **This tank is now empty**	Steam injection for fire suppression	2,660,000 gallons earthen berm lined
No. 2 Fuel Oil Tank	#2 fuel oil	835,000 Avg. inventory 224,000	None	946,000 gallons earthen berm lined

The north tank is to be abandoned and placed in a standby condition. The 20 year internal inspections will be completed after the tank has been drained, so that it could be reused if needed in the future. This change reflects the plans to not run Unit 2 on oil in the future.

The No. 2 fuel oil tank is located 100 ft. to the east of the combustion turbines in a diked area equipped with a membrane. Two high pressure and two low pressure (Unit 1) fuel forwarding pumps are located inside of the diked area. All of the oil shutoff valves are manually operated. The No. 6 oil is heated with steam and the piping is steam traced.

Fuel Pumps	Location	Protection
Fuel forwarding pumps are located in a detached metal enclosure	South of the CT's	None

Natural Gas Supply

The natural gas is supplied by Florida Gas Transmission (FGT) system with an 8 inch line that comes into the gas yard @ 940 psi. Incoming metering arrangements are standard and well-arranged. The combustion controls on the burners are adequate and on a regular testing and maintenance program. The gas yard is located on the south side of the plant.

Florida Gas Transmission reduces the incoming gas pressure to 340 psi for GT03. Gainesville Regional Utilities further reduces the pressure to 200 psi for the Unit 1 and Unit 2 steam units, GT's 01 and 02, and the process plant.

From the gas yard an 8 inch line goes to GT03, an 8 inch line comes up to the steam units, a 6 inch line goes to GT's 1 and 2. The process plant gas line is a 1 inch line that is tapped off a 6 inch stub out at the north east corner of GT02.

The Control Room operators do not have the ability to remotely kill gas to the site through a remotely operable valve. No risk reduction suggestion has been made, but this is an industry best practice to have this remote emergency shutdown.

Coal Storage and Handling

The plant is burning eastern bituminous coal. The coal is from 2 sources: compliance coal with low sulfur <1.2 weight % and medium sulfur coal between 1.2 and 2.5 weight %. The plant is storing an approximately 30 day supply of coal. This is a significant reduction and is based on the reduced generating expected due to the purchased power from the GREC biomass generation, located on the adjacent property.

The coal is received in the track hopper building located north of the main plant. The coal is discharged into the grated hopper with the assistance of a shaker when needed. The coal is transferred onto Belt 1 through feeders and is transferred to Belt 2 which removes the coal from the pit and transfers the coal to the 3 A and 3 B conveyors for stock out to the storage building or coal yard. The underground coal handling areas are provided with automatic fire sprinklers. The two main partially elevated conveyors, 4 and 5, are not protected against fire. The belts are all low flame spread type belts typically used in mining operations.

Major conveyor upgrades were completed in 2012 that included the addition of skirt boards on the belt sides near the fuel transfer points. This has drastically cut the coal rejection from the belts and reduced the labor factors for keeping the areas clean.

During the past year a trial burn of Illinois Basin Coal (IBC) was run at this facility in the Unit 2 boiler. If this fuel is planned for future use, AEGIS would make Risk Reduction Suggestions beyond the already suggested coal handing sprinkler suggestions to include: the addition of CO monitoring for the coal silos and inerting for the pulverizers. Operator training by persons knowledgeable with the hazards of burning IBC should also be considered.

UNDERGROUND COAL HANDLING EXAMPLE

Coal is taken from either the reclaim pile or the stockout pile through vibrating feeders. The feeders discharge coal to Conveyor No. 4A which runs to the top of the Crusher House where in drops into the crusher bin. A feeder installed at the outlet of the crusher bin delivers coal to the coal crusher where the coal is sized. The discharge of the crusher is directed to Conveyor No. 5A which transports the coal to the tripper room and onto Conveyer No. 6A for distribution to the bunkers.

Coal Conveyor No. 6A is located above the Unit 2 coal bunkers. It receives coal from Conveyor No. 5A and discharges it into the coal bunkers via a tripper system. There are six coal bunkers, each capable of holding up to 301 tons. Total capacity for the six bunkers is 1,806 tons.

The underground coal areas were walked down and the housekeeping conditions were found to be very good.

Coal Handling Structures & Equipment			
Area	**Detection**	**Suppression**	**Comments**
Track Hopper Building	None	Wet Sprinklers	Lower 1 and 2 conveyor below ground.
Crusher Building	None	Dry Sprinklers	-
Unit 2 Tripper floor	None	Fire Sprinklers	The current fire protection is inadequate with the water supply available. See Risk Reduction Suggestion DGS-P2010-04 Phase VIII.

Coal Conveyor Systems			
Conveyor	**Detection**	**Suppression**	**Interlocks/Comments**
1	None	Wet Sprinklers at ceiling	Alignment switches, zero speeds, sprinkler systems The belts on Conveyors 4 and 6 were replaced in 2011 *Additional sprinkler protection is recommended for the belts. Risk Reduction Suggestion* ***DGS-P2010-07*** Housekeeping controls are good in the coal handling areas.
2	None	Wet Sprinklers at ceiling in underground tunnel area only	
3 A&B	None	None	
4	None	Wet Sprinklers at ceiling in underground tunnel area only	
5	None	None	
6 & 6A	None	Wet Sprinklers at ceiling	

There are no dust collectors in the plant.

UNIT 2 TRIPPER FLOOR AREA

Cooling Towers

Unit	Cells	Size	Construction	Protective Systems
Unit 1	6	50 ft. x 200 ft.	Cross Flow, wood/plastic Wood barrier between cells	Fan interlocks, no lightning protection
Unit 2	10	50 ft. x 360 ft.	Cross Flow, wood/plastic Wood barrier between cells	Fan interlocks, no lightning protection
Unit 2 Auxiliary	2	50 ft. x 50 ft.	Cross Flow, FRP/plastic Fiberglass barrier between cells	Fan interlocks, no lightning protection

There are three cooling towers, each with automatic sprinkler protection. The water supply is not adequate for the Unit 1 and 2 cooling towers, but is satisfactory for the Auxiliary Tower. Risk Reduction Suggestion **DGS-P2010-04** calls for the installation of a 3,000 gpm at 135 psi booster fire pump. This new pump should meet the demands of the systems, with its ability to pump up to 4,500 gpm. Slight modifications to the Unit 2 cooling tower sprinkler systems may be needed to bring the system pressures down a bit for the new pump, but this cannot be determined without further engineering analysis. One option that may help is the use of a variable speed controller on the proposed fire pump. That would allow the pump to be set up with a fixed output pressure and allow a slightly higher pressure pump to meet the demands of the cooling tower systems. This could eliminate the need to modify the systems.

The components utilized for tower construction are considered to be combustible.

Warehouses

The main warehouse is located in a one story, 40 x 200 ft. light noncombustible, detached building located between Unit 1 and CT 1. The building and contents are considered low value. The installation of automatic sprinklers would be advisable, but it is a low priority based on the other fire protection needs at this facility.

INTERIOR OF THE MAIN WAREHOUSE

The Round Warehouse is a one story, steel tank with a 140 ft. diameter and 40 ft. high that was installed for the storage of fuel for the boilers. The tank was never used and has been converted to a warehouse. The building is equipped with 3 double row racks 30 ft. long with storage to 15 ft. The remainder of the building is used for on floor storage. This building is used for miscellaneous long term storage obsolete equipment, materials, equipment and supplies such as pumps, motors, gear boxes, heaters, sheet metal, etc.

NAVCO Building is one story, 40 x 60 ft., fiberglass panels on steel frame located 200 ft. east of the No. 2 cooling tower. The building is used to store approximately 160 drums of combustible liquids such as oil and other lubricants. The floor of the building is diked. There is no fire protection provided for this building.

The Round Warehouse and NAVCO building are considered low value and would not warrant the installation of fixed fire suppression systems.

Buildings and Structures

Process Building is used to remove pond water and process the water for plant use. This is a zero discharge plant. The front end of the process is used for plant make up water for the cooling tower. The north side of the building is used as a maintenance shop. A small cutoff concrete block walled Motor Control Center (MCC) contains the 4,160/480V electrical equipment.

The facility is used to process ground water that has entered the plant using a soda ash and lime treatment. The process creates demineralized water for the boilers. A spray dryer is used to create a brine concentrate. The dryer is natural gas fired and is equipped with a single burner. The burner is equipped with a prepurge, spark ignited pilot, electronic flame failure device, air flow interlock, dual safety shut off valves and high and low gas pressure supervision. The unit operates at 600°F and discharges at 325°F. The material that is being dried is noncombustible. There are no unusual hazards with this operation.

Loss History

No losses have been reported for this location.

Loss Estimates

Insurable Values PD = $555,039,218

Probable Maximum Loss (PML)

The PML takes into consideration impairment to a single fire protection system (i.e., sprinklers, waterspray, or extinguishing system within the immediate area), but it expects that within a reasonable timeframe, the secondary systems (i.e., fire pumps and protective systems) operate properly, and there will be a prompt response from the plant's fire brigade or local fire departments.

PD PML Calculation	
Mechanical failure with ensuing lubricating oil fire involving the (largest unit) steam turbine generator unit controlled by fixed fire protective systems and manual fire suppression The PML is calculated assuming mechanical failure with a lubricating oil fire following on the Unit 2 steam turbine/generator. This fire on this 235 MW unit would need to be controlled manual fire suppression by the local fire department. The unit is not equipped with automatic fire suppression with the exception of the lube oil reservoirs, which provide virtually no protection from a large scale fire.	
PML Property Damage Estimate	$45,200,000
The PML takes into consideration physical property damage, expediting expense, pollution cleanup, debris removal, etc. The figures do not take into consideration deductibles or sub-limits.	

BI PML Calculation	
PML Business Interruption Estimate	Not Applicable for this Account

Maximum Foreseeable Loss (MFL)

The MFL takes into consideration the largest loss that could result from a single incident. The incident renders the protective systems within the area inoperable, with only passive protection, such as fire barriers and adequate separation. It also considers a delayed response from local fire departments and plant personnel.

PD MFL Calculation	
Mechanical failure with ensuing lubricating oil fire involving the (largest unit) steam turbine generator unit operating deck and under turbine areas resulting in catastrophic damage to the unit, auxiliary equipment and collateral damage to adjacent equipment areas. Structural damage to turbine hall, pedestal, etc. and including expediting cost, debris removal, etc. The MFL event assumes a mechanical failure resulting in a lubricating oil fire below the Unit 2 steam turbine generated rated at 235 MW. Catastrophic damage to steam turbine/generator unit, operating deck structure, pedestal and auxiliary equipment is anticipated. Collateral damage to cable trays, the Control Room, and smoke/water/heat damage throughout the Powerhouse and offices can be expected.	
MFL Property Damage Estimate	$95,000,000
The MFL takes into consideration physical property damage, expediting expense, pollution cleanup, debris removal, etc. The figures do not take into consideration deductibles or sub-limits	

BI MFL Calculation	
MFL Business Interruption Estimate	Not Applicable for this Account

Appendix A - Alarm Initiating Devices

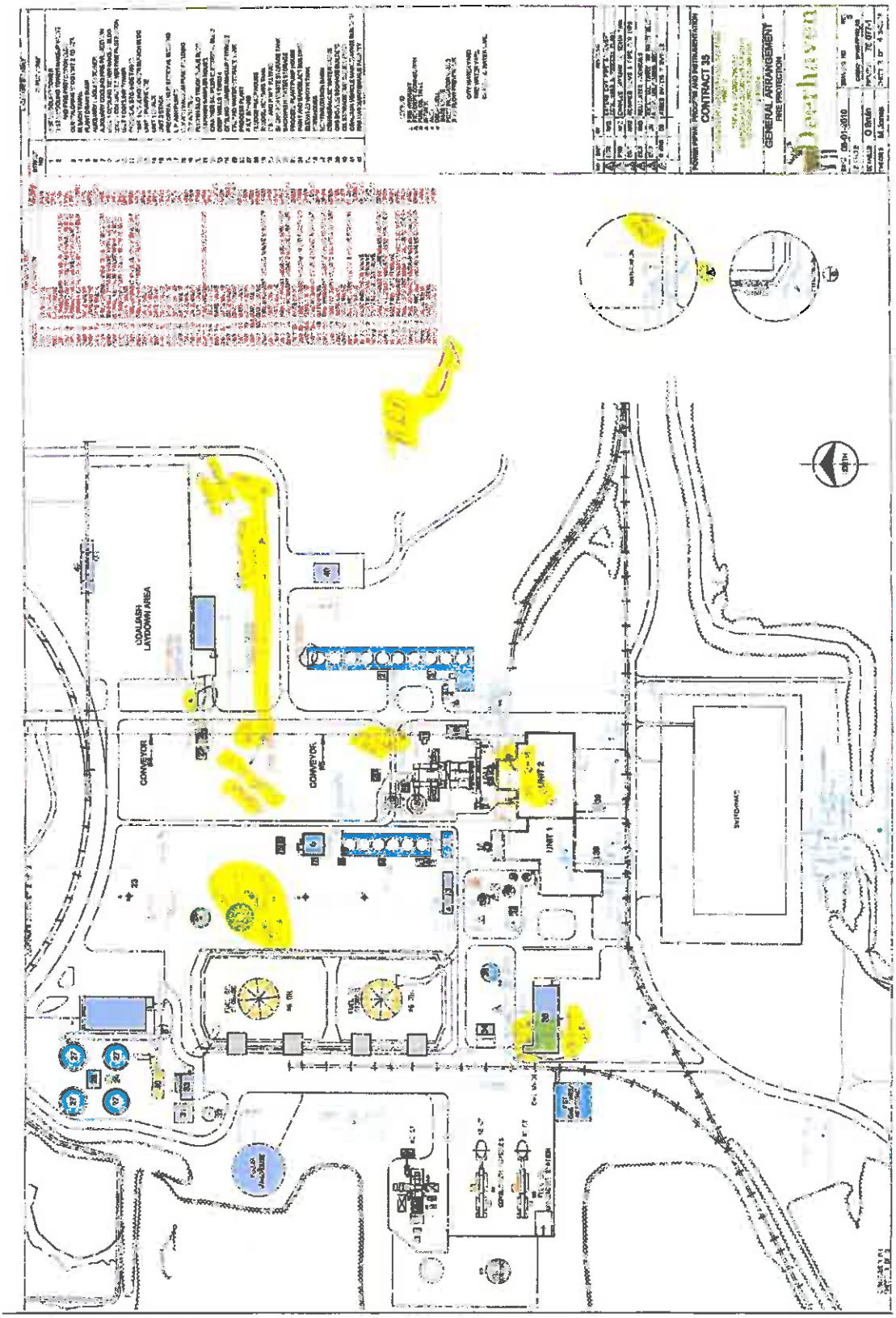
Dev. ID/Type Description
DSD / Duct Smoke Detector
FD/Flame Detector
HD/Heat Detector
PSD/Photo Smoke Detector

Type	Building	Floor	Area	Zone No.
PSD	Admin bldg.	01	Admin elevator lobby	3-8
PSD	Admin bldg.	01	Break room	4-45
PSD	Admin bldg.	01	By main entrance	3-9
PSD	Admin bldg.	01	Elevator equip. Room	3-13
PSD	Admin bldg.	01	Golf cart room	4-46
PSD	Admin bldg.	01	Ladies restroom	3-11
PSD	Admin bldg.	01	Maintenance Break Room	*3-17*
PSD	Admin bldg.	01	Maintenance Restroom	3-14
PSD	Admin bldg.	01	Maintenance Supervisors office	3-16
PSD	Admin bldg.	01	Mezzanine	3-15
PSD	Admin bldg.	02	Admin elevator lobby	3-56
PSD	Admin bldg.	02	Admin hall	3-35
PSD	Admin bldg.	02	Chart storage	3-26
PSD	Admin bldg.	02	Conference room	3-34
PSD	Admin bldg.	02	Mezzanine	3-27
PSD	Admin bldg.	02	Mezzanine	3-25
PSD	Admin bldg.	02	Office area hall	3-30
PSD	Admin bldg.	02	Records room	3-32
PSD	Admin bldg.	02	Restroom	3-36
PSD	Admin bldg.	02	Safety & training office	3-18
PSD	Admin bldg.	02	Stairwell	3-31
PSD	Admin bldg.	02	Training office	3-29
PSD	Admin bldg.	03	Admin elevator lobby	3-57
PSD	Admin bldg.	03	By lab sup. Office	3-37
PSD	Admin bldg.	03	By men's restroom	3-48
PSD	Admin bldg.	03	By plant entrance	3-45
PSD	Admin bldg.	03	By electric shop	3-51
PSD	Admin bldg.	03	Electric shop part room	3-52
PSD	Admin bldg.	03	Electric shop part room	3-47
PSD	Admin bldg.	03	Electric shop sup. Office	3-50
PSD	Admin bldg.	03	Instrument shop	3-41
PSD	Admin bldg.	03	Inst. Shop parts room	3-43
PSD	Admin bldg.	03	Inst. Shop parts room	3-44
PSD	Admin bldg.	03	Lab sup. Office	3-40
PSD	Admin bldg.	03	Laboratory	3-42
PSD	Admin bldg.	03	Men's restroom	3-49
PSD	Admin bldg.	03	Stairwell	3-39
PSD	Admin bldg.	04	Admin elevator lobby	4-2
PSD	Admin bldg.	04	Admin Services Manager's office	4-19
PSD	Admin bldg.	04	By Engineering Tech's office	4-14
PSD	Admin bldg.	04	By Plant Manager's restroom	4-9
PSD	Admin bldg.	04	By restrooms	4-20
PSD	Admin bldg.	04	Conference room	4-10

Type	Building	Floor	Area	Zone No.
PSD	Admin bldg.	04	Copy room	4-17
PSD	Admin bldg.	04	Engineering tech office	4-4
PSD	Admin bldg.	04	Ladies restroom	4-6
PSD	Admin bldg.	04	Maint. Manager's office	4-12
PSD	Admin bldg.	04	Men's restroom	4-56
PSD	Admin bldg.	04	Plant engineers office	4-11
PSD	Admin bldg.	04	Plant Manager's office	4-7
PSD	Admin bldg.	04	Plant Manager's reception	4-5
PSD	Admin bldg.	04	Plant Manager's restroom	4-8
PSD	Admin bldg.	04	Plant Ops Manager restroom	4-18
PSD	Admin bldg.	04	Top of stairwell	4-3
PSD	Admin bldg.	04	Visiting engineer office	4-21
PSD	Admin bldg.	04	Work order planning	4-15
PSD	Coal ash bldg.	01	Vehicle maintenance #1	6-33
PSD	Coal ash bldg	01	Vehicle maintenance #2	6-33
PSD	Coal ash bldg.	01	Vehicle maintenance #3	6-33
PSD	Coal ash bldg.	01	Vehicle maintenance #4	6-33
PSD	Crush house	01	Crush house elec #1	6-35
PSD	Crush house	01	Crush house elec #2	6-35
PSD	Main plant	01	Demineralizer room	3-22
PSD	Main plant	01	Dh-1 fan area	4-41
PSD	Main plant	01	DH--1 fuel oil pump area	4-40
PSD	Main plant	01	DH--2 air receiver	5-11
PSD	Main plant	01	DH--2 feed pump area	5-13
HD	Main plant	01	Lab storage	3-12
DSD	Main plant	02	DH--1 MCC room	
PSD	Main plant	02	DH--1 switchgear room	4-32
PSD	Main plant	02	DH-1 switchgear room	4-32
PSD	Main plant	02	DH--2 switchgear room	5-22
PSD	Main plant	02	DH--2 switchgear room	5-20
PSD	Main plant	02	DH--2 switchgear room	*5-19*
FD	Main plant	03	DH-1 east	4-24
FD	Main plant	03	DH-1 west	4-23
PSD	Main plant	03	Operations locker room	4-13
DSD	Main plant	04	660 room	6-5
PSD	Main plant	04	660 room	6-3
PSD	Main plant	04	660 room	6-1
PSD	Main plant	04	660 room	6-4
PSD	Main plant	04	Above F.A.C.P.	5-50
PSD	Main plant	04	Control room east	5-30
PSD	Main plant	04	DCS room	5-27
PSD	Main plant	04	DH-1 service elevator	4-25
FD	Main plant	04	DH-1 southeast	4-52
FD	Main plant	04	DH-1 southwest	4-51
FD	Main plant	04	DH-2 burner deck N.E.	6-29
FD	Main plant	04	DH-2 burner deck N.W.	6-23
FD	Main plant	04	DH-2 burner deck S.E.	6-25
FD	Main plant	04	DH-2 burner deck S.W.	6-24
PSD	Main plant	04	Shift Super. Office	5-28
DSD	Main plant	05	HVAC room	
DSD	Main plant	05	HVAC room	
PSD	Main plant	05	HVAC room	6-12
PSD	Main plant	10	Unit 1 elevator equip. Rm.	4-50
PSD	Main plant	11	Unit 2 elevator equip. Rm.	6-41
PSD	Paint shop	01	Paint shop	6-31

Type	Building	Floor	Area	Zone No.
PSD	Paint shop	01	Paint shop	6-31
PSD	Precipitator bldg.	01	Precipitator bldg. #1	6-36
PSD	Precipitator bldg.	01	Precipitator bldg #2	6-36
PSD	Lab south			
PSD	Lab north			
PSD	MCC room east			
PSD	MCC room west			
PSD	Pump house east			
PSD	Pump house west			
PSD	Ash pond MCC			
HD	Lime Unloading Structure		Lime Unloading Structure	

Site Plan


GENERAL ARRANGEMENT
FIRE PROTECTION
CONTRACT 35
Deerhaven
CONVEYOR
CONVEYOR
UNIT 2
UNIT 1
SKYDOME