Q. Please provide a copy of all inspections and particularly, any third party inspection of this unit confirming the readiness of this unit.

A. A third party inspection of the unit was completed between April 28 and May 1, 2014 to evaluate the condition and suitability of the unit for use. The unit was found to be in good condition and suitable for use. The inspection report is attached as GT-DD-NLH-002 Attachment 1.

30 May 2014

Mr. Stephen Parsons, P. Eng.
Project Manager
NALCOR Energy
Hydro Place, 500 Columbus Drive
PO Box 12800
St John's, NL, Canada
A1B 0C9

Dear Stephen,

Newfoundland and Labrador Hydro – GT Inspection Assessment

As per our Agreement, we have completed the final report of the Newfoundland and Labrador Hydro GT Inspection Assessment. I trust that the report satisfies your needs.

Overall it seems that the Siemens D5A GT has been reasonably stored and the storage requirements of specific systems such as dehumidifying the GT and electrical skid, internal heating of generator, and heating/turning of various motors have been regularly undertaken and monitored. Pipes and openings have been sealed to minimize exposure to vermin. Based on the inventory of parts, the stored materials appear to be complete (at least major elements). Overall the condition of the parts of the units appear to be in good condition, consistent with preserving the life of the major parts of the unit.

Thank you for the opportunity to work on this very interesting project.
Yours truly,

Blair Seckington

Blair Seckington
Director, Power Technology
Direct Tel.: 905-403-5004
Direct Fax: 905-829-1707
E-mail: blair.seckington@amec.com

BRS/brs

c: G. Forbes C. Woodall

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Newfoundland and Labrador Hydro GT Inspection Assessment

May 30, 2014

Newfoundland and Labrador Hydro GT Inspection Assessment

Prepared by: Blair Seckington — *Blair Seckington* — *30 May 2014* *Date*

Checked by: Benjamin Garren — *Joe Garren* — *30 May 2014* *Date*

Approved by: Blair Seckington — *Blair Seckington* — *30 May2014* *Date*

Rev.	*Description*	*Prepared By:*	*Checked:*	*Approved*	*Date*
A	*Draft Report*	*Blair Seckington*	*Joe Garren*	*Blair Seckington*	*5 May 2014*
0	*Final Report*	*Blair Seckington*	*Joe Garren*	*Blair Seckington*	*30 May 2014*


REGISTERED PROFESSIONAL ENGINEER
PEG
Newfoundland and Labrador
BLAIR R. SECKINGTON
SIGNATURE
30 May 2014
DATE
NEWFOUNDLAND & LABRADOR


PROVINCE OF NEWFOUNDLAND AND LABRADOR
PEG
Newfoundland and Labrador
PERMIT HOLDER
This Permit Allows
AMEC AMERICAS LIMITED
To practice Professional Engineering
in Newfoundland and Labrador.
Permit No. as issued by PEG D0018
which is valid for the year 2014

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NEWFOUNDLAND AND LABRADOR HYDRO FACILITIES GT INSPECTION ASSESSMENT

1 INTRODUCTION/BACKGROUND

Newfoundland and Labrador Hydro (NL Hydro) has an interest in procuring and installing a previously owned/not used gas turbine (GT) unit for service at the Holyrood Thermal Generating Station (Holyrood). A suitable Siemens 501D5A/SGT6-3000E GT (originally designed for natural gas) is available from ProEnergy/Energy Parts as a component of a recently submitted EPC proposal. The unit is currently stored at the Barnhart Crane & Rigging facility located at 1701 Dunn, Memphis, Tennessee.

AMEC was contracted to undertake a third party visual inspection/assessment of the unit to determine if it has been stored properly and its storage managed in such a way as to maintain its viability for service in Newfoundland, and to provide an opinion on its suitability for service at the Holyrood site.

The ProEnergy/Energy Parts contact for the site review was Bob Dodson (660-281-5433) while Barnhart's site contact was Jeff Smith.

The major component information is:

Combustion Turbine:

Combustion Turbine Model	SGT6-3000E
Manufacturer	Siemens (Westinghouse)
Serial Number	37A7750
Year of manufacture	2007

Generator:

Generator Model	SGEN6-100A-2P
Manufacturer	Siemens
Serial Number	12009742
Rating	120 MVA, .90pf (@40 degrees C
Year of manufacture	2009

Expected Performance:

Net GT Power 102.9 MW
Net GT Heat Rate 10,289 BTU/kwh

For 14.271 psia, Inlet air temperature 95F, Relative Humidity 60% and evaporative cooler ON, and fuel lower heating value 20,981 BTU/lb LHV

The equipment has been in storage since approximately October 2009. The storage and preservation activities have been provided by Barnhart in accordance with the guidelines specified in the manufacturers "Storage, Preservation and Rehabilitation Manual for Econopac Systems" (SPM-2000 v5).

2 SCOPE AND FACILITIES AND METHODOLOGY

The key AMEC work tasks included:

i) A pre-visit review of ProEnergy/Hydro provided information;
ii) A visual assessment of GT at the storage site; and
iii) The preparation of a letter report summarizing site observations and providing an opinion of suitability of the unit for use at Holyrood.

The specific work tasks included:

- A review of the original PO/specifications for the GT, if available;
- A review of vendor documentation with the GT such as drawings and manuals to confirm whether or not the proper documentation had been shipped with the GT and to identify any data gaps;
- A review of storage maintenance records;
- A review of GT storage procedures and how it was laid-up;
- A general inspection of the storage facility and storage conditions;
- A visual inspection of all GT components, obtaining nameplate information, etc;
- Identification of any visually obvious defects in the GT;
- A review of ProEnergy's proposal to assess the suitability of the GT to operate in the Holyrood climate;
- Completion of a photographic log at the storage facility;
- A meeting with Nalcor and ProEnergy representatives on-site; and
- The preparation of a stamped letter report that includes:
  - A summary of findings and observations;
  - Consolidation of vendor and storage information;
  - Identification of potential climate and/or code issues associated with the operation of the gas turbine generator at Holyrood as compared to the location for which it was originally designed to be operated in; and
  - An opinion of suitability of the GT.

3 REVIEW OF DOCUMENTATION

3.1 Design Information and Pre-Site Visit Data

There was limited data available to review prior to the site visit. After the site visit, a brief review of documentation provided by Nalcor and ProEnergy included:

- A review of the original PO/specifications for the GT, if available. – None were available for review during the period; and
- A review of vendor documentation with the GT including a Siemens List of documents, drawings, specifications, commissioning manual, instruction manuals, O&M manuals, installation manuals, and equipment lists- equipment description.

It appeared that fairly extensive information had been shipped with the GT and can be provided to Nalcor upon procurement of the machine. No specific gaps were identified within the time available during the site visit. Additional data on the fuel oil firing systems will be required when that is engineered and installed by ProEnergy.

3.2 Storage Procedures and Lay-up and Maintenance Records

The equipment has been in storage since October of 2009. The storage and preservation activities have been provided by Barnhart' in accordance with the guidelines specified in the manufacturers "Storage, Preservation and Rehabilitation Manual for Econopac Systems" (SPM-2000 v5). A copy of an extract from SGT6-3000E COMBUSTION TURBINE AND GENERATOR PRESERVATION AND STORAGE I.L. 1700-0007-SGT6-3000E-STD Rev 1 is attached. Barnhart had an equipment storage procedure developed by Sargent & Lundy for the storage of this unit which has been followed since October of 2009.

ProEnergy provided data from Barnhart on the maintenance and monitoring records. These included the following documents:

Code	System/Equipment	Frequency	Type	Scope
22100	Maintenance Tools	3 Monthly	Walk Down	Rust, Vermin, General
22200	Service Lifts Assembly	3 Monthly	Walk Down	Rust, Vermin, General
33000	Starting Package	Monthly	Inspect/Test	Rotate motors, check amps
50000	Lube Pump, compressor	3 Monthly	Inspect/Test	Humnidity, temp, Other
81050	Inlet Duct materials	Monthly	Walk Down	Rust, cribbing, supports, vermin, etc
83050	Covered area Piping	Monthly	Walk Down	Rust, cribbing, supports, vermin, etc
Area 924 Outside	Lube oil & gen fans, elect package	Monthly	Inspect/Test	Motor turn, Amps, inspect
Area 972 Inside	GT Enclosire Fans (& gas system)	Monthly	Inspect/Test	Motor turn, Amps, inspect
Turbine & Generator	Gen & GT	Monthly	Inspect/Test	Humidity, Rust, vermin, heaters,etc.
500000 Meggering	Mechanical package	3 Monthly	Meggering	Meggering motors
5000000 Weekly	Mechanical package	Weekly	Inspect/Test	Humiidity, temperature

Based on these records, it appears that the equipment is being monitored on a regular basis and that conditions are maintained appropriately.

4 SITE INSPECTION

4.1 Storage Facility

There are five areas where five areas of storage at the Barnhart 1701 Dunn Street facility and one off-site at its Port Barge Unloading facility.

- Indoor enclosed – (i.e. insulation, IPB equipment, burner assembly materials, exhaust transition)
- Indoor – roof but not enclosed – (i.e. oils/greases//misc, bulk piping and large inlet/outlet ductworks)
- Climate controlled – enclosed and heated/humidity controlled – (i.e. controls, computer hardware, printers, DCS)
- Outdoor – exposed outdoors - fin fan coolers for generator and lube oil; lube oil skid, electrical skid
- Outdoor – exposed – bulk structural items, duct materials
- Off-site port storage building for gas turbine and generator storage – enclosed

The equipment inventory is well maintained. The locations of the stored equipment were consistent with the facility inventory logs. The ability to store materials in suitable environments (climate controlled, heavy lift, enclosed, open/covered, outdoor) is evident and appears to have been reasonably employed.

4.2 Visual Inspection of GT Components

An indicative walk-down and visual inspection of the GT components was undertaken, tracking major items against the summary inventory list for the AECI Essex II Siemens list provided by ProEnergy. The following was noted:

- Major pieces of equipment per the inventory list were accounted for using identifiers on packing slips or other equipment documentation. (NOTE: Upon project activation, a detailed inventory and sequence plan would be done by ProEnergy as part of their EPC implementation process.)
- Loose items were stored appropriately.
- Pipes and other openings were sealed where practical

- No areas of free standing water or appearances indicating that there no leaks on equipment and parts, particularly in covered areas
- No significant rusting or corrosion of various parts
- Undisturbed dust coating in some areas indicate that equipment has not been disturbed or moved
- No evidence evident of vermin or birds nesting in equipment
- Major pieces of equipment requiring special provisions (requiring heating, dehumidification, turning) appear to have been effectively addressed:
    - GT is dehumidified and records monitored/maintained
    - Generator has power to its heating coil circuits
    - Fin fan coolers are periodically turned
    - Heaters are in service on various equipment
    - Computer and sensitive control equipment kept in a climate controlled room
    - GT and generator management is consistent with Siemens instructions
- The GT seems in good condition in terms of its visible external elements. The humidification system was operational during the visit
- The generator was completed boxed up, but with power to its heating elements – likely more desirable than opening for a visual check
- The GT and generator rotors are not turned, which appears consistent with Siemens lay-up practice document attached as a pdf file in Appendix 2:
    - Would require extensive support systems to be in-place and operating (i.e. lube oil, motor)
    - Would likely expose equipment to elements (vs boxed up)
    - Any issues with rotor bowing would be minimal and worked out during initial start-up/commissioning
- Impressed with apparent capabilities and experience of ProEnergy/Energy Parts and its site representative:
    - Client focus, implementation of more complex/worse condition systems
    - Internal capabilities re fabrication, spares, engineering
    - Focus on building it as though they are owners/operators

The ability to obtain nameplate information was limited due to the packaging associated with most of the equipment (including the generator). The gas turbine nameplate was photographed and included in a photographic record in Appendix 1.

4.3 Photographic Record

A summary level photographic record was undertaken during the review. Given the scope and layout and timing, it is not intended as an exhaustive record. It is indicative of the manner in which equipment is being stored and its condition. It is included in Appendix 1. (Other photographs were taken and could be made available if desired.

5 SUITABILITY OF EQUIPMENT FOR HOLYROOD SITE APPLICATION

ProEnergy identified that Nalcor plans to use No.2 diesel as the fuel oil for this GT equipment at Holyrood. This will require a new fuel handling system and burner system to be provided by ProEnergy since the existing GT was designed and stored as a natural gas unit. The fuel oil is not a significant issue for the rest of the GT or balance of plant but will result in more frequent GT maintenance.

ProEnergy/Energy Parts are also looking at air intake and filter materials that would be more consistent with the salt water ambient air environment at Holyrood versus the original design of the stored equipment/materials. Provided this addresses the issue appropriately, this issue is not a showstopper, but also may require additional monitoring and maintenance over the longer term.

The ProEnergy/Energy Parts site representative also indicated that they are providing a black start capability for the unit that is not a part of the current system. This would provide additional flexibility for emergency conditions.

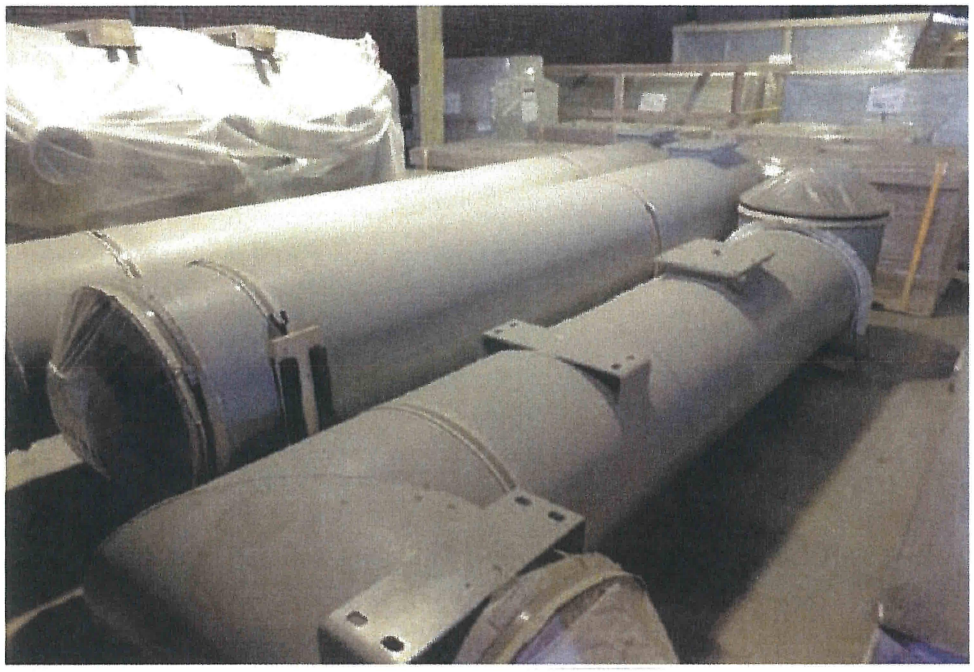
One question that remained after the site visit was what are the NOx emissions requirements and how are they addressed. The original equipment had a water injection system for NOx control on natural gas (may also have been useful for power augmentation). Given NOx increases with fuel oil use, it may be necessary to increase the water injection rate. This could result in a modest equipment change for the water injection system. The suitability of the existing water injection system is an issue that is outside of scope of this assessment, but should be considered.

6 CONCLUSIONS

Overall, the existing Siemens 501D5A/SGT6-3000E gas turbine visited seems in good condition and to be a suitable candidate for an application at Holyrood.

1. The storage and condition monitoring of the existing GT equipment has been and is being well managed, including equipment requiring special provisions and testing.
2. The walk down indicated that the equipment stored appears to be consistent with the inventory list supplied by ProEnergy.
3. No significant equipment damage was identified during the walk downs.
4. Computer equipment in the climate controlled room appears well preserved, but may be obsolete and require replacement by newer systems.
5. The equipment should be suitable for application at Holyrood provided:
    a. The liquid fuel system to be provided by ProEnergy is suitable (For which they do have experience and capability based on discussions with their site representative.)
    b. The air intake system and air filter materials are modified so that they will be suitable for a salt water ambient air environment
    c. The black start proposed to be added to the existing equipment is integrated into the overall scheme.
    d. The NOx emissions capability requirements can be met by the existing water injection system or require a modification to the system.

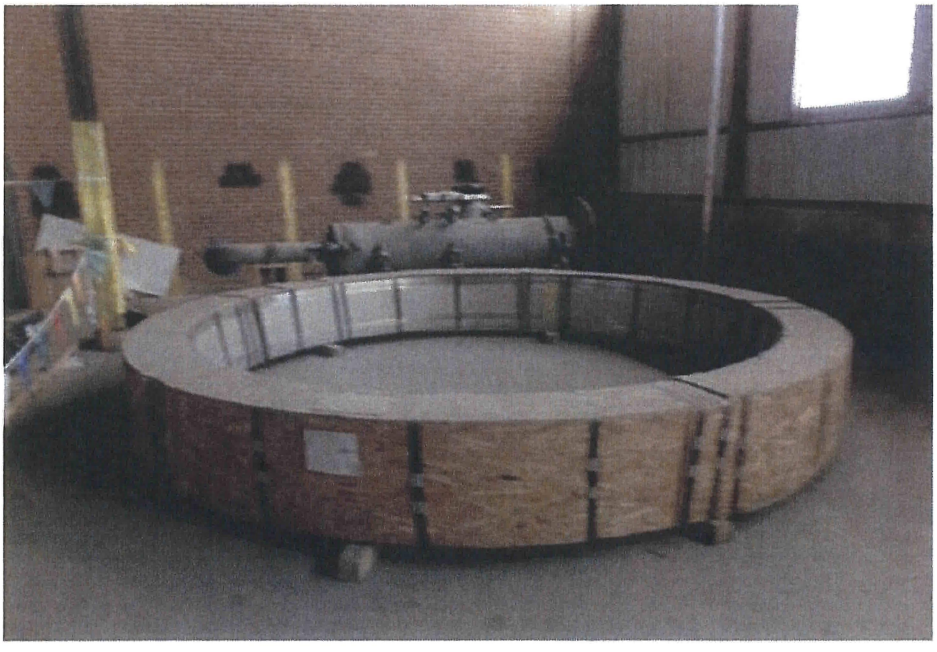
APPENDIX 1
Site Photograph Journal



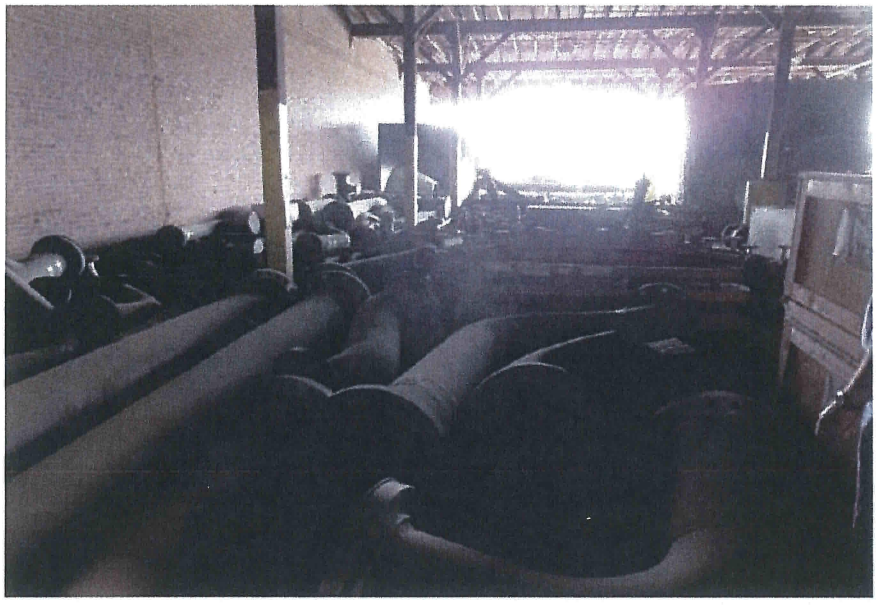
Isophase Bus Du
Enclosed Warehouse

Insulation
Enclosed Warehouse

Inlet Air Filters
Enclosed Warehouse



GT Expansion Ring
Enclosed Warehouse

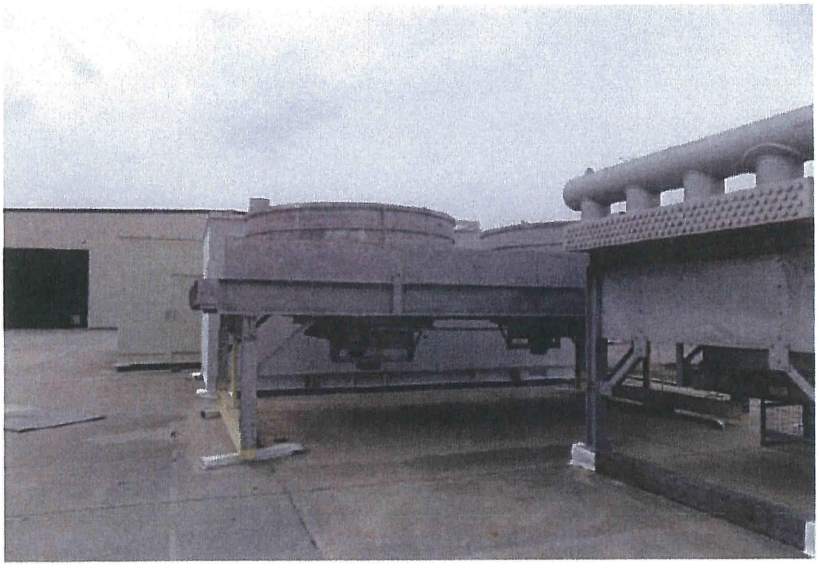


Misc Piping and GT Parts
Covered, Open Warehouse

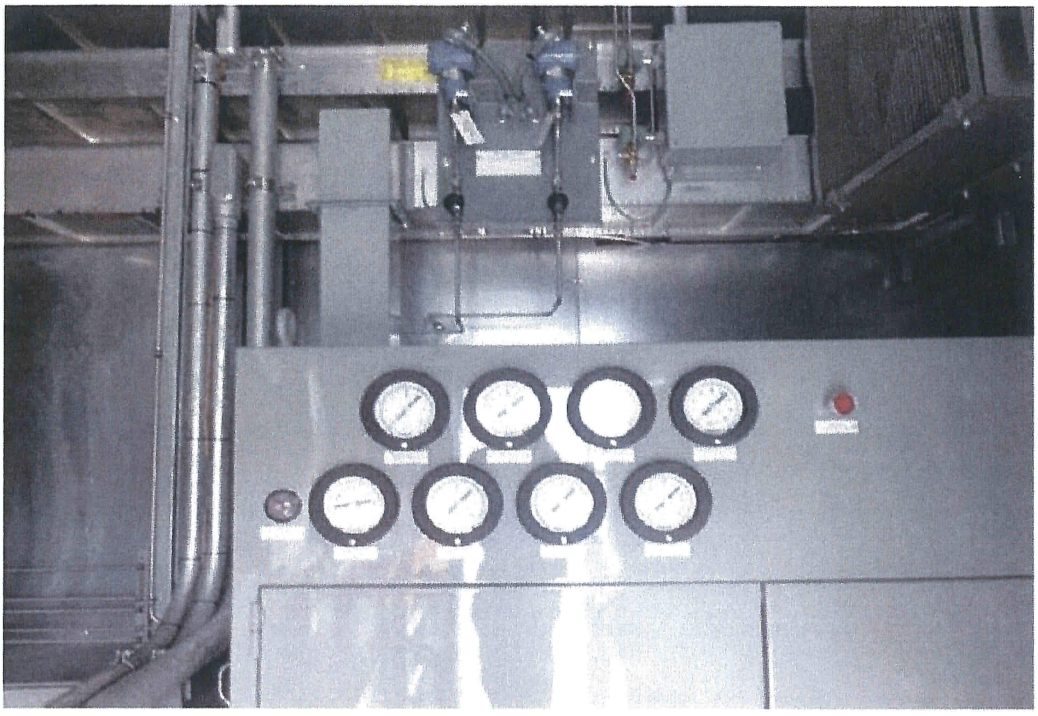
Piping Ends Covered; No pests

Misc Piping and GT Parts
Covered, Open Warehouse

Fin-Fan Lube Oil Cooler
Outdoor Storage

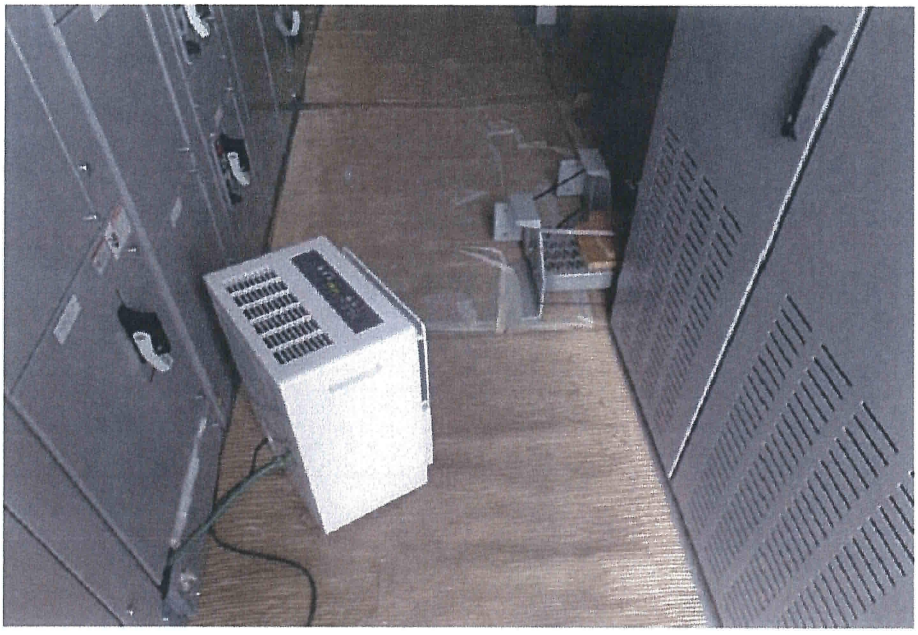


Fin-Fan Cooler; Lube Oil Cooler
Outdoor Storage



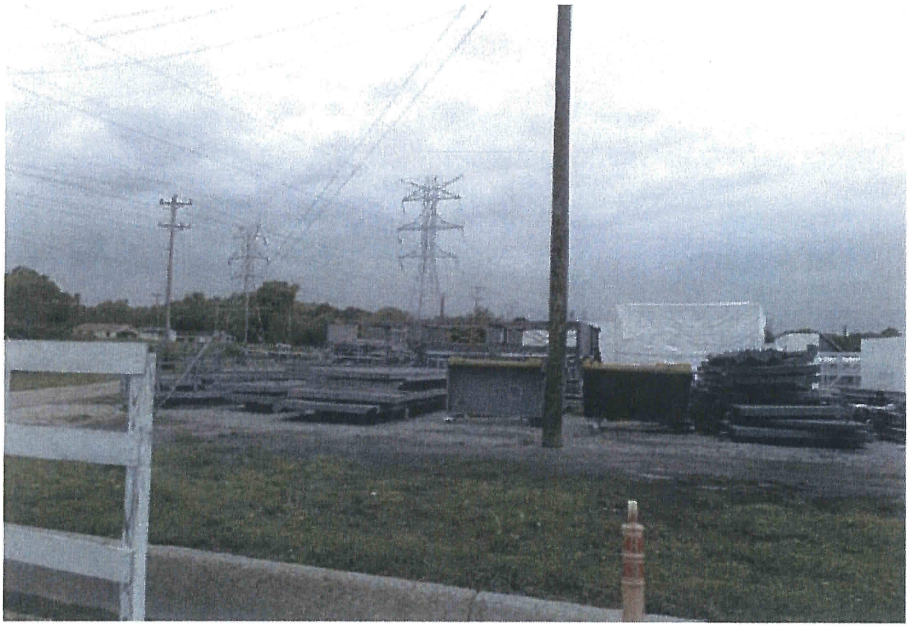
Lube Oil Skid
Outdoor Storage

Lube Oil Skid
Outdoor Storage



Electric Skid
Outdoor Storage

Dehumidifier



Structural Framing
Outdoor Storage

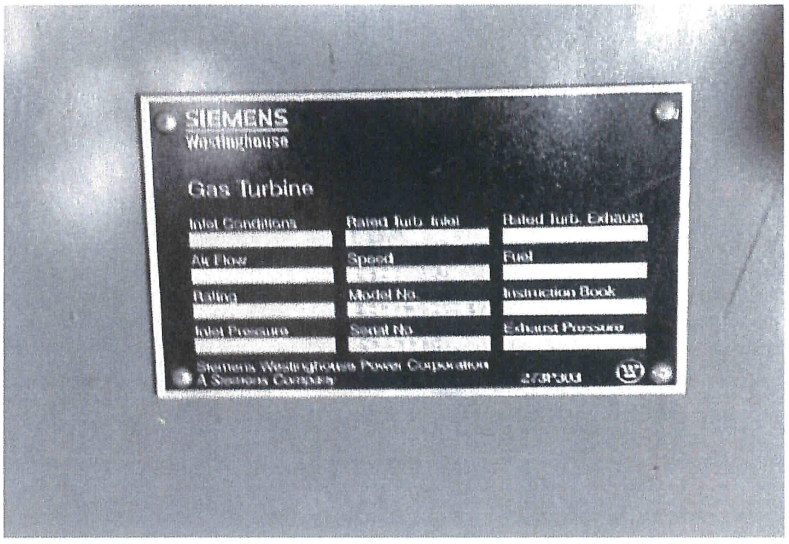
Painted/Galvanized/Stainless

Siemens 501D5 Gas Turbine
Heavy Lift Port Warehouse

Closed ports, inlet, outlet

Siemens 501D5 Gas Turbine
Heavy Lift Port Warehouse

Dehumidifier



Siemens 501D5 Gas Turbine
Heavy Lift Port Warehouse

Nameplate

Generator
Heavy Lift Port Warehouse

Generator
Heavy Lift Port Warehouse

Heater connection, lower left

Controlsd, Computers, Oils
Climate Controlled Storage
Enclosed Warehouse

Combustion Cans, Othe
Enclosed Warehouse

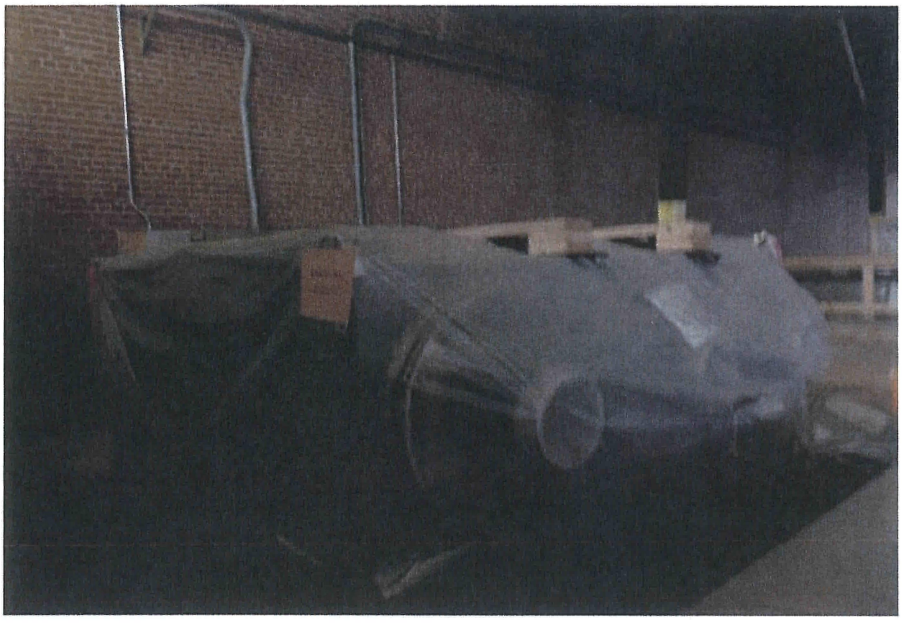
Start-Up Package Skid
Covered, Open Warehouse

Electrical Skid
Outdoor Storage

Grounded

Electrical Skid Cubicle
Outdoor Storage

De-humidified

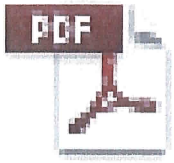


Isolated Phase Bus Fans
Enclosed Warehouse

Inlet Air Filters
Enclosed Warehouse

APPENDIX 2

Site Siemens Long term lay-Up Guide



Turbine and
Generator Preservati

APPENDIX 3
Document Reference

General Information

- Packing Lists.pdf
- PES Inventory List AMEC.pdf
- ESSEX II RBOM.xls
- Inventory for Shipping.xls
- Original BOM - AECI- .pdf

Pictures Provided

- Nalcor
- Siemens Generator AECI
- Fuel Yard
- Electric Room and Batteries
- 501D5A Photos

Maintenance Records

- 22100 and 22200 Monthly.pdf
- 33000 Monthly.pdf
- 50000 monthly maint.pdf
- 81050 Monthly.pdf
- 83050 monthly.pdf
- Area 924 Outside.pdf
- Building 972 Inside.pdf
- SBamhart C13110609221.pdf
- SBamhart C13110609230.pdf
- SBamhart C13110609231.pdf
- SBamhart C13110609240.pdf
- SBamhart C13110609241.pdf
- Seq 500000 meggering.pdf
- Seq 500000 weeklies.pdf

Vendor Data

- 11721.pdf
- 466460332.pdf
- 466460349.pdf
- 1445950500.pdf

Drawings

_Siemens List of Documents.pdf
501D5A-Model.pdf
785J429.pdf
835A342.pdf
1868J13.pdf
2012J20.pdf
2012J59.pdf
2198T72.pdf
2262J98.pdf
2275J77.pdf
2302J75.pdf
4660A37.pdf
8154D50.pdf
816RD64.pdf
FdnLoad.pdf
SPM2000.pdf

US1020-UE00-UMB-010500.pdf
US1020-XB00-MB-200560.pdf
US1020-XB00-MBP-202250.pdf
US1020-XB00-MBU-202260.pdf
US1020-XB00-MKA-200550.pdf
US1020-XG02-MB-011200.pdf
US1020-YD00-MB-010541.pdf
US1020-YD00-UBA-400501.pdf
US1020-YS18-MKY-013801.pdf
US1020-YU02-MB-013701.pdf
US1020-YU02-MKY-013601.pdf
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ZDX558-XB00-MBX-000001.pdf
ZDX558-XB00-UMX-000002.pdf
ZDX559-XB00-SGN-0000030101.pdf

Specifications

21T0050.pdf
21T4150.pdf
21T4300.pdf
21T6275.pdf
21T7353.pdf
21T7631.pdf
22T0770.pdf
22T0917.pdf
22T2599.pdf
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DG40T-000504.pdf
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US1020-XL00-MB-201300.pdf
US1020-YL19-MB-010901.pdf
US1020-YT01-MKY-013611.pdf
ZDX555-DC01-GC-4421-01.pdf
ZDX555-DC01-MBP-2500-01.pdf
ZDX555-DP00-MBA-000001.pdf
ZDX555-YL01-CJA-370010.pdf
ZDX559-YL01-CJA-370110.pdf