

APPENDIX H

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EMERGENCY GENERATOR SET MAINTENANCE REQUIREMENT

The contractor is responsible for reactivating the two existing generators housed in Building 113 and connecting them directly to the OB structure and ensuring the integrity of the existing Underground Storage Tank (UST). All maintenance performed on the generators shall be well documented and include as a minimum the tasks completed, the time and date completed, material and equipment used and or replaced, and the name and phone number of the technician performing the work. All documentation shall be kept on site.

In accordance with the general provisions of the maintenance statement of need all work shall be performed by qualified personnel.

Maintenance tasks for the generator sets are divided into several categories, depending on the frequency required by the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) and U.S. National Fire Prevention Association (NFPA) regulations. These requirements are as follows:

Generator Set Maintenance:

To be performed every three years (2005, 2008, etc) beginning in February 2005:

1. System controls:
 - re-evaluate the settings of the voltage sensing and time delay relays
2. Main switchgear and generator switchgear:
 - determine whether changes to the electrical supply systems have been made that require a revision of the main circuit breaker, fuse, or current-limiting bus duct coordination
 - calibrate and load test main circuit breakers. Spot-check bus bar bolts and supports for tightness. Obtain and record insulation tester readings on internal distribution feeders.

To be performed annually beginning in February 2005:

1. Generator sets: fuel system: diesel:
 - analyze fuel for condition and replace if required.
2. Lubricating systems:
 1. Analyze oil for condition and replace if required
 2. Change oil filter
 3. Replace carburetor air filter
3. Cooling system:
 1. Check condition and rod-out heat exchangers if necessary
 2. Change coolant on closed systems
 3. Clean exterior of all radiators

4. Check all engine water pumps and circulating pumps
 5. Examine all duct work for looseness
 6. Clean and check motor-operated louvers
4. Exhaust system:
 - Check condition of mufflers, exhaust lines, supports, and connections
 5. Ignition system:
 1. Spark ignition engines
 2. Replace points and plugs
 3. Check ignition timing
 4. Check condition of all ignition leads
 6. Generator:
 1. Clean generator windings
 2. Check generator bearings
 3. Measure and record resistance readings of generator windings using insulation tester.
 7. Engine control:
 1. General cleaning
 2. Check appearance of all components
 3. Check meters
 8. Transfer switch:
 - inspect transfer switch and make repairs or replacement if indicated
 9. On main switchgear and generator switchgear:
 1. Operate every circuit breaker manually
 2. Visually check bus bars, bracing, and feeder connections for cleanliness and signs of overheating

To be performed Semiannually beginning in February 2005:

1. Maintenance contractor should clean down spouts to enable water to drain from the roof top.
2. Generator sets:
 1. Change oil filters
 2. Clean crankcase breather
3. Fuel system:
 1. General inspection of all components
 2. Change fuel filter
 3. Change or clean air filter

4. Governor:
 1. Check all linkages and ball joints
 2. Check oil level
 3. Look for unusual oil leakage

5. Generator:
 1. Check brush length and pressure
 2. Check appearance of slip rings and clean if necessary
 3. Blow out with clean, dry compressed air

6. Engine safety controls:

check operation of all engine-operating alarms and safety shutdown devices (the generator is not under load during this check).

7. Oil water separator
 1. Clean dirt collector
 2. Check oil outlet

To be performed Quarterly beginning in February 2005:

1. Generator sets
 1. Engine electrical starting system
 - a. Check battery electrolyte specific gravity
 - b. Check battery cap vents.
 2. Engine lubricating system: analyze lubricating oil and document results

2. Fuel system
 1. Drain water from fuel filters
 2. Drain water from day tank
 3. Check fuel gauges and drain water from main fuel tanks
 4. Inspect all main fuel tank vents.

To be performed monthly beginning in February 2005:

1. Testing of generator sets and transfer switches under load and operating temperature conditions at least every 30 days (in intervals no less than 20 days and no more than 40 days). A 30-minute exercise period is an absolute minimum, or the engine manufacturer's recommendations should be followed. JCAHO regulations require the generator sets to start ignition less than 10 seconds after power is shut off.

2. Permanently record all available instrument readings during the monthly test.

3. During the monthly test, check the following systems and indicate condition/status on check sheet:

- a. Diesel fuel system:
 - 1. Main tank fuel level
 - 2. Day tank fuel level
 - 3. Operation of fuel supply pump and controls

- b. Engine cooling system:
 - 1. Coolant level
 - 2. Rust inhibitor in coolant
 - 3. Antifreeze in coolant (if applicable)
 - 4. Adequate cooling water to heat exchangers
 - 5. Adequate fresh air to engine and radiators
 - 6. Condition of fan and alternator belts
 - 6. Squeeze and check condition of hoses and connections
 - 7. Functioning of coolant heater (if installed)

- c. Engine lubricating system:
 - 1. Lubricating oil level
 - 2. Crankcase breather not restricted
 - 3. Appearance of lubricating oil
 - 4. Correct lubricating oil available to replenish or change
 - 5. Operation of lubricating oil heater (if installed)
 - 6. Oil pressure correct

- d. Engine electrical starting system:
 - 1. Battery terminals clean and tight
 - 2. Add distilled water to maintain proper electrolyte level
 - 3. Battery charging rate
 - 4. Battery trickles charging circuit operating properly.
 - 5. Spare batteries charged if provided

- e. Engine compressed air starting system:
 - 1. Air compressor operating properly
 - 2. Air compressor lubricating oil level
 - 3. Spare compressed air tanks full
 - 4. Main compressed air tanks full
 - 5. Drain water from compressed air tanks

- f. Engine exhaust system:
 - 1. Condensate trap drained
 - 2. No exhaust leaks
 - 3. Exhaust not restricted
 - 4. All connections tight

g. Transfer switch:

1. Inside clean and free of foreign matter
2. No unusual sounds
3. Terminals and connectors normal color
4. Condition of all wiring insulation
5. All covers tight
6. Doors securely closed

h. General:

1. Check for any unusual condition of vibration, deterioration, leakage, or high surface temperatures or noise.
2. Are maintenance manuals, service log, basic service tools, jumpers, and supplies readily available?
3. Check and record the time intervals of the various increments of the automatic start-up and shutdown sequences.

Weekly inspection beginning in February 2005:

1. Conduct a daily walk through of the generators and visually check for obvious signs of leaks, loose cables connections and ensure that all meters are physically in place, in according with operator's instruction manual.
2. Check oil level
 - a. In the compressor
 - b. In the storage tank
3. After inspection of generators fill out maintenance report and record any deficiencies noted during the time of the walk inspection.

Other:

1. Clean area
2. Complete documentation of inspection.
3. Initiate work requests to repair any deficiencies noted.

Underground fuel storage tank maintenance requirement

Annual beginning in February 2005:

1. Check for leaks on and around tank and on pipe fittings, seals, etc..
2. Check tank for proper anchorage.
3. Check all pipe connections for tightness.
4. Check that conduit containing control wires to high and low level sensors is properly secured.
5. Inspect sight level glass for proper indication, clogging, etc.
6. When applicable, blow down sediment strainer upstream of the automatic fill valve.
7. When applicable, observe operation of automatic fill valve.
8. When applicable, operate the manual bypass valve around the automatic fill valve.

9. Clean area
10. Complete documentation of inspection.
11. Initiate work requests to repair any deficiencies noted.

Semiannual beginning in February 2005:

1. Review and understand manufacturer's literature.
2. Schedule tank maintenance so that very little fuel is left at the time it is performed, or provide a clean means of temporary storage of fuel left in tank during maintenance.
3. Inspect and remove access cover.
4. If using a temporary holding tank, pump fuel only to that level where clean fuel, and no sludge, enters the storage means.
5. Pump sludge from the bottom of the tank, or remove by mechanical means. Dispose of properly.
6. Remove rust, scale and corrosion by scraping, wire brushing or shot cleaning. Remove all debris from tank.
7. Inspect interior of tank carefully, looking for cracks, and condition of openings, fittings, welds, rivets and joints. Check internal piping.
8. Examine clean and adjust all attached tank components, to include strainers, traps, control valves, flow meters and floats, if so equipped.
9. Reinstall access cover, using new gaskets where applicable.
10. Refill tank.
11. Fill out maintenance checklist and report deficiencies for repair.

Monthly beginning in February 2005:

1. Check with the operating or area personnel for any obvious deficiencies.
2. Check fuel pump engine oil and coolant level; add fluids as needed.
3. Change fuel pump engine oil and filter when required.
4. Check battery charger, battery charge and electrolyte specific gravity and add water as required; check terminals for corrosion and clean as required.
5. Check engine belts for wear and proper tension; adjust as needed.
6. Check that crankcase heater is operating.
7. Check engine air filter(s); change as required.
8. Check wiring, connections, switches, etc.; adjust as needed.
9. Check spark plugs (if so equipped) and injector nozzle condition; service or replace as required.
10. Check engine fuel filter(s); change as required.
11. Check for proper operation of pumps when performing 30 minute generator test run under full load
12. Check fuel transfer pumps and day tank; check float level switches and shutdowns for proper operation; check fuel filters; replace if needed.
13. Check main tank fuel level with gauge pole; add as required.
14. Wipe dust, dirt, grease and oil from engine and generator.
15. Clean area around generator.
16. Fill out maintenance checklist and report deficiencies for repair.