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8/12/92

DCD PROJECT

DESIGN CONFIGURATION DOCUMENTATION PROJECT

ALTERNATE AC GENERATOR SYSTEM

UPPER LEVEL DESIGN DESCRIPTION DOCUMENT

ULD-0-SYS-19

REV. D

This document shall not be used as design input without consideration of possible conflicting reference material not included in the reference list.

PREPARED BY: A Elizabeth Reder DATE: 8/12/92

INDEPENDENT REVIEW BY: Alan B Tonsil DATE: 8/12/92

INDEPENDENT REVIEW BY: _____ DATE: _____

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DCRG APPROVAL RECOMMENDATION: _____ DATE: _____

APPROVALS:

DISCIPLINE ENGINEERING MANAGER: _____ DATE: _____

GENERAL MANAGER OF ENGINEERING: _____ DATE: _____

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6039R234 (WP)
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ALTERNATE AC GENERATOR SYSTEM

TABLE OF CONTENTS

1.0 SYSTEM DEFINITION

1.1 Primary System Function

The Arkansas Nuclear One Alternate AC Generator System (AAC) provides backup power in the event of a Station Blackout at Unit 1 or Unit 2. (Blackout is assumed at only one unit.) The term "station blackout" refers to the complete loss of alternating current electric power to the essential and nonessential switchgear buses in one of the nuclear power units. Station blackout therefore involves the loss of offsite power concurrent with turbine trip and failure of the onsite emergency AC power system, but not the loss of available AC power to buses fed by station batteries through inverters or the loss of power from "alternate ac sources". (Ref. 2)

The Alternate AC Generator System is adequate to supply the loads of one 1E bus at a time. This can be either of the two ANO-1 1E buses or either of the two ANO-2 1E buses. The AAC generator can be aligned to replace any one of the EDGs allowing an LCO extension of up to (Later) days (not yet approved by the NRC). (Ref. Later) It is also designed so that it can be connected to carry up to its full capacity of station loads via either an ANO-1 or ANO-2 non-1E bus. This allows it to pick up non-1E loads in the event of a Loss of Offsite Power (LOOP) as determined by Operations, bo performance tested through a non-1E bus and allow for use of the machine for peaking.

Because Station Blackout is not a design basis event, the system is not required to be safety related. However, the Station Blackout related regulatory documents (see Section 3.8) do impose specific reliability and quality requirements. (Ref. 2)

1.2 System Boundaries

The AAC System includes a 4MW diesel generator set with the following auxiliary systems and their primary components: (Refs. 1,)

A. AAC Fuel Oil Subsystem

- Fuel Oil Transfer Pump (Later)
- Fuel Oil Day Tank (Later)
- Main Fuel Oil Solenoid Operated Transfer Valve (Later)
- "Shared" Bulk Storage Tank (T25)
- Associated Piping, "Shared" Vault Sump Pump, Valves, Filters, Strainers, and Instrumentation

B. AAC Starting Air Subsystem

- Air Compressor (Later)
- Air Dryer (Later)
- Air Receiver Tanks (Later)
- Air Starting Motors
- Associated Air Strainers, Filters, Piping, Valves, and Instrumentation

C. AAC Service Air Subsystem (Maintenance Support Only)

- Air Compressor (Later) with Integral Receiver
- Associated Piping, Valves and Quick Disconnects

D. AAC Air Intake & Exhaust Subsystem

- Air Intake Filter (Later)
- Exhaust Silencer (Later)
- Associated Piping

E. AAC Engine Cooling Water Subsystem

- Engine Jacket Water Cooling System
- Pre-Heating System
- Turbocharger Aftercoolers
- Expansion Tank (Later)
- Glycol Drain Tank (Later)
- Piping, Pumps, Valves and Instrumentation
- Radiator (Later)

F. AAC Heating, Ventilation and Air Conditioning (HVAC) Subsystem

- Unit Heaters (4) for Engine Room
- Room Cooling Exhaust Fans (2) for Engine Room
- Fume Control Exhaust Fan (1) for Engine Room
- Air Conditioning Unit and Exhaust Fan for Switchgear Room

G. AAC Lubrication Subsystem

- Lube Oil Circulating System
- Lube Oil Prelube/Preheat System (1)
- Lube Oil Cooler
- Lube Oil Sump
- Associated Strainers, Filters, Piping, Pumps, Valves and Instrumentation

Note (1): Design of Preheat system is dependent upon the diesel generator manufacturer.

H. AAC Electrical Auxiliary Equipment

- Generator Control Panel including Exciter and Voltage Regulator, Engine Control Panel, Circuit Breaker and Instrumentation Controls

The AAC System interfaces with the 1E electrical systems, non-1E electrical systems, non-1E 125 VDC system, local utility (AP&L) electrical system, the Fire Protection System and the non-Q Fuel Storage System.

The Electrical interfaces are as listed:

- In the event of a station blackout, the AAC Generator supplies power to one of the 1E buses of the blacked out unit.

- The Electrical System provides 480 VAC or 120 VAC power to the fuel transfer pump, sump pump, "keep warm" circulating pump, valves, heaters, air conditioning unit, exhaust fans, air compressor, monorail and instrumentation.

- The Electrical System provides black 125 VDC power to the air start system solenoid valves, motor driven fuel oil pump, motor driven lube oil pump, generator field flashing and various controls during AAC Generator startup. The DC loads in the new AAC Building will be supplied by a local 125 VDC battery.

- NOTE: The auxiliary lube oil pump and field flashing may operate with a different power source. This will be resolved when the engine manufacturer is selected.

- The preferred power supply for the AAC Generator System is a 13.8KV/480 VAC pad mounted transformer supplied by Arkansas Power & Light (AP&L). Once the AAC Generator is running, its loads will be switched over to the AAC Generator.

- The new AAC Generator can be connected to one non-1E bus (A1 or 2A1) at a time to allow the AAC Generator to carry station loads (for performance testing, carrying station loads during Loss of Offsite Power (LOOP) and peaking).

2.0 SYSTEM FUNCTIONS

2.1 Safety Related Functions

The AAC System does not provide a Safety Related Function.

2.2 Regulatory/Safety Significant Functions

The AAC System provides backup power to either of the two 4.16KV 1E buses in Unit 1 or either of the two 4.16KV 1E buses in Unit 2 in the event of a Station Blackout in one of the units. (A Station Blackout is only postulated in one unit.) The AAC Generator replaces, in total, one EDG from the Blacked Out unit.

The AAC System can also be aligned to replace any one of the EDGs allowing an LCO extension of up to (later) days (not yet approved by the NRC).

2.3 Non-Safety Function

The AAC Generator can be aligned with a non-Q bus in either unit to carry station loads as determined by the Operators during a Loss of Offsite Power (LOOP). This capability also allows it to effectively serve as a peaking unit.

3.0 DESIGN REQUIREMENTS/COMMITMENTS

3.1 Performance Requirements

The Alternate AC Generator System shall be of sufficient capacity and capability to replace the function of one of the four 1E diesel generators such that specified acceptable fuel design limits and design conditions of the Reactor Coolant Pressure Boundary (RCPB) are not exceeded, the core is cooled, and containment integrity and other vital functions are maintained in the event of a Station Blackout at either Unit. (Ref. 2)

Specific AAC unit requirements are as follows:

- Start on a remote manual start signal from the Unit 2 Control Room. If Unit 1 is the unit experiencing Station Blackout, it will request that the engine be started. (Ref. 2, 6)

- Accelerate to rated speed, establish rated voltage, and manually connect to the selected 4.16KV 1E Bus (which initiates the automatic load sequencing of the required Emergency Shutdown Loads) within 10 minutes of procedurally determining a Station Blackout. (Refs. 2, 6)

- At no time during the loading sequence should the frequency and voltage decrease to less than 95% of nominal and 75% of nominal, respectively. (Ref. 7)

- During recovery from transients caused by step load increase or resulting from the disconnection of the largest single load, the speed of the AAC should not exceed 75% of the difference between nominal speed and the overspeed trip setpoint or 115% of nominal, whichever is lower. (Ref. 7)

- Voltage should be restored to within 10% of nominal within one second and frequency should be restored to within 2% of nominal in less than 60% of each load sequence time interval. (Ref. 7)

AAC Auxiliary Systems requirements are as follows:

A. AAC Fuel Oil Subsystem (Ref. 8)

- Maintain a fuel supply for 4-1/2 days for the AAC at full load operation.

B. AAC Starting Air Subsystem (Ref. 11)

- The AAC shall be provided with two independent and redundant starting air receiver sets supplied by a common compressor.

- Capability of five cold starting attempts per AAC air receiver set without recharging the receivers.

C. AAC Engine Cooling Water Subsystem (Ref. 7)

- Capable of transferring heat from the AAC Subsystems and components to a heat sink (Radiator) under all operational and design environmental conditions.

D. AAC Lubrication Subsystem

- AAC lube oil system operating pressure, temperature differentials and heat removal rate shall be in accordance with the recommendations of the AAC manufacturer. (Ref. 7)

- The system shall allow for seven days of operation at rated load without operator interface, e.g., makeup. (Ref. 9)

3.2 System Configuration and Interface Requirements

The AAC system shall be designed to assure that upon a Station Blackout in either Unit 1 or Unit 2, the AAC shall be able to replace one of the EDGs in the blacked out unit. The AAC Generator System shall be designed such that the AAC is capable of supplying the electrical power to the required Emergency Shutdown Loads normally fed from one of the two independent buses per unit. (Ref. 2)

The HVAC Subsystem shall maintain the temperature in the AAC Generator Room within the 120°F ambient design basis. (Ref. Later) The Switchgear Room will normally be maintained between 65°F and 85°F with the Air Conditioning Unit and with extremes of 40°F and 105°F with the Exhaust Fan (if Air Conditioning Unit fails). (Ref. 9)

The Fuel Oil Subsystem of the AAC System shall interface with the Bulk Fuel Oil Storage Tank (T-25) to obtain the required 4-1/2 days of fuel oil to the AAC Generator.

T-25 is a common storage tank for the on-site emergency AC power system and other systems such as the Startup Boiler. It is not however, part of the safety related fuel oil supply/storage associated with the on-site emergency AC power system therefore the required independence of the AAC power system is maintained.

The fuel level in T-25 shall be administratively controlled to maintain a minimum of 4-1/2 days of fuel for the AAC Generator at all times. Required minimum level will be established considering all other users that could be operable at the same time. Additionally, any delivered fuel oil shall be sampled and analyzed consistent with applicable standards and current practice prior to transfer into T-25 and the contents of T-25 shall also be periodically sampled.

The AAC System shall interface with the following electrical systems as necessary to perform as a backup power supply for the 1E loads:

- Supplies 4160 volt power to 1E Bus A3, A4, 2A3 or 2A4, if Unit 1 or Unit 2 experiences a Station Blackout.

- Receives 125 VDC power from Unit 2 black battery (2D13) or the local 125 VDC battery (later) for AAC control circuits, motor driven fuel oil pump, lube oil auxiliary pump and field flashing (for AAC startup).

- NOTE: The auxiliary lube oil pump and field flashing may operate with a different power source. This will be resolved when the engine manufacturer is selected.

- Receives 480 VAC and 120 VAC power for AAC auxiliary pumps, heaters, solenoid valves and instrumentation from the AP&L offsite 13.8KV pole line via a 13.8KV/480V transformer.

3.3 Instrumentation and Controls Requirements

The AAC instrumentation and controls are required to control, monitor, test, and protect the AAC unit and auxiliary systems, while informing/alerting the operator as to their operational status. (Ref. 9)

Provide protection from adverse conditions such as overspeed, low lube oil pressure, differential relay operation, overcurrent with voltage restraint, reverse power, and loss of field excitation, during the loading sequence and continuous full load conditions. (Ref. 9, 10)

Instrumentation shall be located locally to monitor AAC Fuel Oil Subsystem status, AAC Starting Air Subsystem status, AAC Air Intake and Exhaust Subsystem status, AAC Engine Cooling Water Subsystem status, AAC HVAC Subsystem status and AAC Lubrication Subsystem status. Instrumentation shall be provided locally and in the ANO-2 Control Room to annunciate abnormal, pre-trip and trip conditions of the AAC. (Ref. 9)

The controls shall be designed for manual operation only. Manual control shall be possible from the ANO-2 Control Room (Remote) or the Diesel Generator Room (Local). (Ref. 6)

Voltage and frequency sensing devices shall be provided to prevent loading the AAC until rated voltage and frequency are attained. (Ref. 9)

The AAC shall be able to energize, via operator action, one of the 4.16KV 1E buses in either unit whenever the preferred offsite and onsite (EDGs) power supplies are unavailable. Load shedding and load sequencing shall be coordinated appropriate to the AAC generator capacity. (Ref. 6)

The AAC Generator shall have adequate instrumentation in the ANO-2 Control Room to be capable of synchronizing with the non-safety buses (A1 & 2A1) for performance testing and peaking. (Ref. 9)

3.4 Electrical Requirements

The supplied power to each 1E bus shall maintain independence from the offsite and EDG System supply by means of:

- A 1E breaker located in the cross tie between buses A3 and A4 and between 2A3 and 2A4. Refer to the 4160 Upper Level Design Description Documents (ULD-1-SYS-16, ULD-2-SYS-16) for descriptions of the crosstie functions.

- A non 1E breaker shall be provided upstream of the required 1E breaker to further isolate the AAC from the 1E buses. (Ref. 6)

- The AAC System shall be designed to require only 125 VDC availability to start and operate under Station Blackout conditions. A manual override of the air start solenoid valves shall be supplied to support AAC starting capabilities under loss of 125 VDC system(s). (Ref. 6)

The AAC Generator shall be capable of connecting to non-safety buses (A1 & 2A1) to allow testing, supplying various equipment during a LOOP and peaking.

3.5 Required Operator Actions

The AAC unit shall be maintained to be capable of manual starting from the ANO-2 Control Room within 10 minutes of procedurally identifying a Station Blackout at either Unit. (Ref. 6)

The operator shall be capable of connecting the AAC to the appropriate 1E bus from the main control room. (Ref. 6)

3.6 Test and Inspection Requirements

The AAC shall be started and loaded to the maximum Station Blackout load at a minimum of once every three months. The load shall be maintained for at least two hours. (Ref. 6)

Once every 18 months, a timed start (within 10 minutes) and rated load capacity test shall be performed. (Ref. 6)

Surveillance and maintenance procedures shall be consistent with those developed for the EDG System modified as required to account for the AAC manufacturer's differences (if applicable). (Ref. 6)

The AAC Generator System reliability shall be maintained at or above 0.95 per demand, as determined in accordance with NSAC-108 methodology or equivalent. (Ref

3.7 Hazards (External) Consideration

The AAC System shall be housed in a structure designed to the Uniform Building Code. Tornado missiles are not factored into the design of this building. (Ref. 6, 12)

Electrical cable to the 1E buses shall not be exposed to weather related hazards. They shall either be run through existing structures or run underground. (Ref. 6)

3.8 Codes and Standards

The AAC Generator System is committed to:

A. General:

10CFR50.63, "Loss of all alternating current power."

Regulatory Guide 1.155 - Station Blackout

NUMARC 87-00, Rev. 1; "Guidelines and Technical Bases for NUMARC Initiation Addressing Station Blackout at Light Water Reactors."

Wyckoff, H (1986), "The Reliability of Emergency Diesel Generators at U.S. Nuclear Power Plants," NSAC-108, Electric Power Research Institute (September 1986).

B. 1E Portion Only:

IEEE 279-71 "Criteria for Protection Systems for Nuclear Power Generating Stations".

IEEE 308-71 "Criteria for Class 1E Electric Systems for Nuclear Power Generating Stations" (Ref. 40).

IEEE 344-71 "Recommended Practices for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations" (See Seismic Topical) (Ref. 39, 40 and 37).

C. The mechanical commitments for the EDG system are:

ASME B31.1 "Power Piping."

ASME B&PV Codes Section VIII; "Pressure Vessels."

3.9 Quality Assurance Requirements

The AAC System shall be designed, constructed, tested and maintained as a "Non-Q" system conforming to augmented QA requirements based on RG 1.155.

4.0 SYSTEM DESIGN FEATURES DESCRIPTION

4.1 Performance Capabilities

(Later)

4.2 System Configurations and Interfaces

NOTE: A radiator is utilized in lieu of a tie to the Service Water System for the following reasons:

- Compliance with NUMARC 87-00 Rev. 1, paragraph B.8 (f)
- The AAC being non safety related and non-seismic would have to be normally isolated from the Service Water System requiring that in the event of a Station Blackout, operations would have to "valve in" the AAC within 10 minutes.
- The Service Water System would have to be analyzed to assure it could supply water to the location of the AAC. This could result in readjustment of system valving in the event of Station Blackout to assure the correct flow is still being received by all required users. This would have to be accomplished within 10 minutes. Additionally during AAC test the EDG System may not be able to respond to an accident due to Service Water flow unavailable.

4.3 Instrumentation and Controls

(Later)

4.4 Electrical

(Later)

4.5 Operations

(Later)

4.6 Tests and Inspections

(Later)

4.7 Hazards (External) Consideration Protection

(Later)

4.8 Codes and Standards

(Later)

4.9 Quality Assurance Requirements

(Later)

5.0 REFERENCES

1. P&ID for the "AAC Generator Building", Drawing M-2217 (Sheets 4, 5, 6 & 7) and M-2260 (Sheet 4).

2. R.G. 1.155 "Station Blackout."

3. Letters 1CAN048908 and 2CAN048908 dated April 13, 1989 - Response to Station Blackout

4. Safety Evaluation Report (SER) dated October 10, 1990 (0CNA109006).

5. Letter 0CAN049107 dated April 15, 1991, Revised Response to Station Blackout.

6. NUMARC 87-00, Rev. 1; "Guidelines and Technical Bases for NUMARC Initiatives Addressing Station Blackout at Light Water Reactors".

7. R.G. 1.9 "Selection of Diesel Generator Set Capacity for Standby Power Supplies". This document used only as a guide, it is not a requirement.

8. SAR Section 9.5.4.1 "Diesel Generator Fuel Oil Storage and Transfer System-Design Bases". This document section is used only as a guide, it is not a requirement.

9. Normal design practice.

10. IEEE Std. 242-1986, "IEEE Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems."

11. SRP 9.5.6 "Emergency Diesel Engine Starting System." This document used only as a guide, it is not a requirement.

12. Telephone Conversation Memorandum #RWC92001 dated 01/15/92 between Bob Clark (ANO) and the NRC; "Tornado Missile Protection for the AAC Machine."

NOTE: References indicated as "later" within the text are engine controlled and will be properly referenced when the engine is purchased.

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ATTACHMENT 2

DESIGN BASIS FOR ALTERNATE AC GENERATOR
BUILDING AND FOUNDATIONS FOR
ARKANSAS NUCLEAR ONE
(DRAFT)

DRAFT

REV: B
DATE: July 31, 1992

UNITED ENGINEERS & CONSTRUCTORS, INC.

30 SOUTH 17 STREET

PHILADELPHIA, PA 19101

DESIGN BASIS

FOR

ALTERNATE AC GENERATOR

BUILDING AND FOUNDATIONS

FOR

ARKANSAS NUCLEAR ONE

ENTERGY OPERATIONS, INC.

PREPARED BY: John Koch DATE: 7/31/92

CHECKED BY: Allen J. Hulshizer for JKP DATE: 7/31/92

APPROVED BY: _____ DATE:

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1.0 TASK DESCRIPTIONS

The purpose of this document is to identify the appropriate design bases for the new Alternate AC Generator Building and Foundation.

2.0 ASSUMPTIONS

2.1 Maximum opening through precast plank roof system shall not exceed 6'-0" square (36 ft^2).

2.2 Soil bearing value 2,000 p.s.f.

2.3 Location of underground utilities is based upon drawings provide by ANO.

3.0 APPLICABLE CODES AND STANDARDS

3.1 Nuclear Management and Resources Council - NUMARC 87-00 Rev. 1 - Guidelines for Addressing Station Blackout at Light Water Reactors.

3.2 American Concrete Institute - Building Code Requirements for Reinforced Concrete - ACI 318-89.

3.2.1 ACI 318R-89 - Commentary for ACI 318-89.

3.3 American Institute of Steel Construction - Manual of Standard Practice - 9th Edition.

3.4 American Society of Civil Engineers - Minimum Design Loads - ASCE 7- 88 (formerly ANSI A58.1)

3.5 American Society of Testing Materials

3.6 American Welding Society - Structural Welding Code - AWS D1.1-88

3.7 Concrete Reinforcing Steel Institute - Design Handbook - 1982

3.8 Steel Structures Painting Council - Painting of Steel - 1982

3.9 Uniform Building Code - 1991

3.10 Southern Building Code - Latest Edition

4.0 EXISTING DOCUMENTATION

4.1 The following existing documentation will be used in the design of the structure:

4.1.1 CEQN-00001-6 and CEQN-00003-2 - ANO General Structural and Architectural Design Criteria.

4.1.2 Existing ANO site drawings as well as existing survey drawings.

4.1.3 Existing ANO drawings indicating underground utilities including electrical, piping and drainage lines.

5.0 UNIQUE AND REQUIREMENTS

5.1 Three hour fire rated wall on south side of structure due to proximity of diesel fuel tank. (See 8.1.1 for remainder of walls.)

5.2 Three foot high parapet at roof level on south and west sides of the structure.

6.0 ANO INPUT REQUIREMENTS

6.1 Soils information indicating allowable bearing pressure for foundations and elevations thereof.

6.2 Site Survey

6.3 Underground Survey

7.0 FUNCTIONAL PERFORMANCE REQUIREMENTS

7.1 BUILDING DETAILS

7.1.1 Fire Barriers

7.1.2 Concrete Block to remain unfinished.

7.1.2.1 Architectural considerations will be given to the block walls to be compatible with the surrounding buildings.

7.1.3 Concrete block shall be UL rated C-3.

7.1.4 Building to have an insulation consistent with Arkansas' Energy Guidelines.

7.2 STRUCTURAL

7.2.1 Based on final functional and fire barrier requirements the building will be designed to incorporate as much standardized building materials as possible.

7.2.2 Foundations will be soil bearing and will be designed to bridge underground ductbank. Temporary sheeting will be used to prevent undermining of buried facilities.

8.0 DESIGN PARAMETERS

8.1 BUILDING DETAILS

8.1.1 Roof shall be two hour UL fire rated. West wall to be three hour UL fire rated due to proximity of the Oil Filled Transformer. Make all walls three hour UL fire rated for ease of construction.

8.1.2 Doors located in fire barriers shall be three hour fire rated.

8.1.3 Egress shall meet State and OSHA requirements.

8.1.4 Louvers, vents and ventilation fans supplied as part of mechanical heating and ventilating systems.

8.1.5 Framed openings to be provided for stacks, vents and louvers. Special flashing shall be provided for hot penetrations.

8.1.6 Roof drainage shall be collected and diverted away from the structure on grade to the local drainage system.

8.1.7 Foundations will be provided for new mechanical and electrical equipment outside of the building.

8.1.8 Provide new retaining wall for dike along south side of new building.

8.1.9 Provide 4" high curb at door between Electrical Equipment Room and Diesel Generator Room per NFPA 30.

8.2 STRUCTURAL

8.2.1 The Alternate AC Generator Facility is non-safety related, commercial, industrial construction.

8.2.2 All building footings shall extend a minimum of three feet below grade or to the underside of buried piping or utilities.

8.2.3 All structural design shall comply with CEQN-00001-6 and CEQN-00003-2.

8.2.4 Materials

8.2.4.1 Concrete: 3000 psi

8.2.4.2 Reinforcing: 60,000 psi, ASTM A615, Grade 60

8.2.4.3 Structural Steel: ASTM A36, 36,000 psi minimum yield

8.2.4.4 Roofing: Precast plank

8.2.4.5 Walls: Concrete masonry units - UL rated

8.2.4.6 High Strength Fasteners:

Bolts:	A325-86
Nuts:	A563-84
Hardend Washers:	F436086

8.2.4.7 Common Bolts: ASTM A307

8.2.4.8 Welding Rods: AWS A5.XX, Class ENF70XX

8.2.4.9 Drilled-in-Anchors: Hilti Kwik-Bolt II with allowables from CEQN-00001-6

8.2.5 Design Loads

8.2.5.1 Wind - 70 mph

8.2.5.2 Seismic - Zone 1

8.2.5.3 Roof - 20 p.s.f. snow plus equipment

8.2.5.4 Floor Loading - 250 p.s.f.

8.2.5.5 Overhead Crane - 2 ton capacity

8.2.5.6 Dead Load - materials and equipment as applicable

8.2.5.7 Allowable Soil Bearing - Assume 2 ksf - to be verified by soils report

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ATTACHMENT 3

(DRAWING LIST ENCLOSED, ALL DRAWINGS
ARE FOR INFORMATION ONLY)

DRAWING NO.	TITLE
C-2005A	AAC Generator Building Site Plan
M-2086, Sh. 1	AAC Generator Building General Arrangement Ground Floor Plan
M-2086, Sh. 2	AAC Generator Building General Arrangement Roof Plan and Elevations "A-A" & "B-B"
M-2086, Sh. 3	AAC Generator Building General Arrangement Exterior Elevations
M-2217, Sh. 4	AAC Generator Building Piping & Instrument Diagram AAC Generator System Engine Cooling Water Subsystem
M-2217, Sh. 5	AAC Generator Building Piping & Instrument Diagram AAC Generator System Air Intake & Exhaust Subsystem
M-2217, Sh. 6	AAC Generator Building Piping & Instrument Diagram AAC Generator System Fuel Oil Subsystem
M-2217, Sh. 7	AAC Generator Building Piping & Instrument Diagram AAC Generator System Starting Air and Service Air Subsystems
M-2219, Sh. 5A	AAC Generator Building Piping & Instrument Diagram AAC Generator System Fire Water System
M-2260, Sh. 4	AAC Generator Building Air Flow Diagram AAC Generator System Heating, Ventilation and Air Conditioning Subsystem

DRAWING NO.	REV.	TITLE
E-BLOCK, Sh. 1	P-3	Cable Block Diagram Alternate AC (AAC) Diesel Generator Power & Control Circuits
E-2005, Sh. 2	P-3	Single Line Meter & Relay Diagram Alternate AC (AAC) Generator 4.16 kV Generator & Switchgear
E-2016, Sh. 5	P-3	Single Line Diagram Alternate AC (AAC) Generator 480V Motor Control Center & Switchgear
E-2034, Sh. 2	P-3	Schematic Meter and Relay Diagram 4160V AAC System
E-2834, Sh. 1	P-3	Alternate AC (AAC) Generator Panel Layout Control Panel 2CXXX
E-2042, Sh. 1	P-3	Logic Diagram Alternate AC (AAC) Generator Generator Lockout and Generator Breaker
E-2042, Sh. 2	P-3	Logic Diagram Alternate AC (AAC) Generator 4.16 KV Tie Breakers
E-2042, Sh. 3	P-3	Logic Diagram Alternate AC (AAC) Generator 4.16 KV Tie Breakers
E-2042, Sh. 4	P-3	Logic Diagram Alternate AC (AAC) Generator 480V Switchgear 2BXX Breakers
E-2126, Sh. 1	P-3	Schematic Diagram AAC Generator Switchgear Room Exhaust Fan
E-2126, Sh. 2	P-3	Schematic Diagram AAC Generator Aux. Lube Oil Pump
E-2126, Sh. 3	P-3	Schematic Diagram AAC Generator Generator Fuel Oil Transfer Pump

DRAWING NO.	REV.	TITLE
E-2126, Sh. 4	P-3	Schematic Diagram AAC Generator Starting Air Compressor
E-2126, Sh. 5	P-3	Schematic Diagram AAC Generator Generator Building Drain Sump Pump
E-2126, Sh. 6	P-3	Schematic Diagram AAC Generator Room Exhaust Fan "A"
E-2126, Sh. 7	P-3	Schematic Diagram AAC Generator Aux. Jacket Waterpump
E-2126, Sh. 8	P-3	Schematic Diagram AAC Generator Building Room Heater "1"
E-2126, Sh. 9	P-3	Schematic Diagram AAC Generator Jacket Water Heater
E-2126, Sh. 10	P-3	Schematic Diagram AAC Generator Radiator Fan "1
E-2126, Sh. 11	P-3	Schematic Diagram AAC Generator Room Exhaust Fan "C"

DRAWING NO.	TITLE
E-PHYS	Conceptual Layout New Conduit & Tray Alternat AC (AAC) Generator

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NUMBER OF OVERSIZE PAGES FILMED ON APERTURE CARDS 31

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204
205
211
213
215
221
223
253
256
259
261
263
264
268
275
280
282
284
288
304
329
336
343
345
358
360
364
368
370
371