DOE/HTGR--87-049

HFD-47016

MAINTENANCE BUILDING
STRUCTURAL DESIGN DESCRIPTION

4 x 350 MW(t) MODULAR HTGR PLANT

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LIST OF ABBREVIATIONS AND ACRONYMS

ACI	American Concrete Institute
ACWS	Auxiliary Cooling Water Subsystem
AISC	American Institute of Steel Construction
AMCA	Air Moving and Conditioning Association
ANS	American Nuclear Society
ANSI	American National Standards Institute
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigeration and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
BOP	Balance of Plant
CDS	Component Design Specification
CR	Control Room
CFR	Code of Federal Regulations
CHWR	Chilled Water Return
CHWS	Chilled Water Supply
DCS	Distributed Control System
ECA	Energy Conversion Area
FM	Factory Mutual
HVAC	Heating, Ventilation and Air Conditioning
ICD	Interface Control Document
IEEE	Institute of Electrical and Electronic Engineers
IRS	Instrument Repair Shop
MCC	Motor Control Center
MW(e)	Megawatt, electric
MW(t)	Megawatt, thermal
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
O/M	Operation and Maintenance
OPDS	Overall Plant Design Specification
OSHA	Occupational Safety and Health Act
QA	Quality Assurance
QAL	Quality Assurance Level
SDD	Structure Design Description
SSDD	Subsystem Design Description
SWEC	Stone & Webster Engineering Corporation
SWGR	Switchgear
TB	Turbine Building
TBD	To Be Determined
UHS	Ultimate Heat Sink
UL	Underwriters Laboratory

PREFACE

The objectives of the HTGR plant project are to produce safe, economical power. Supporting these objectives are four major goals and their associated plant states, identified as follows:

1. Maintain Safe Plant Operation
 - 1.1 Maintain Safe Energy Production
 - 1.2 Maintain Safe Plant Shutdown
 - 1.3 Maintain Safe Plant Refueling
 - 1.4 Maintain Safe Plant Startup/Shutdown
2. Maintain Plant Protection (in the event that plant operation cannot be maintained in the normal operating envelope)
 - 2.1 Protect the Capability to Maintain Safe Energy Production
 - 2.2 Protect the Capability to Maintain Safe Plant Shutdown
 - 2.3 Protect the Capability to Maintain Safe Plant Refueling
 - 2.4 Protect the Capability to Maintain Safe Plant Startup/Shutdown
3. Maintain Control of Radionuclide Release (in the low probability event of failure to maintain plant protection)
 - 3.1 Control Radiation
 - 3.2 Control Personnel Access
4. Maintain Emergency Preparedness (in the extremely low probability of failure to maintain control of release of radionuclides)

The Overall Plant Design Specification (OPDS) is the top-level technical document for the HTGR plant. The OPDS (based on owner requirements and regulatory requirements) establishes the overall performance, functional, institutional, interface, operational, safety, maintenance, inspection, and decommissioning requirements for design of the plant.

In response to the OPDS, a series of low tier documents, System Design Descriptions (SDDs), Subsystem Design Descriptions (SSDDs), Component Design Specifications (CDSs), and Interface Control Documents (ICDs), describe and control the individual designs. Traceability from plant-level requirements to equipment-level requirements is maintained throughout this hierarchy of design documents.

SUMMARY

The Maintenance Building is a grade-founded, two-story, steel-framed structure, located adjacent to the Turbine Building in the Energy Conversion Area. It has a reinforced concrete foundation and slab on grade, and insulated sheet metal exterior walls and roof decking. The Maintenance Building provides facilities for the following:

- Electrical Repair Shop
- Instrument Repair Shop
- Carpentry Shop
- Pipe and Steel Fabrication Shop
- Welding Shop
- Sandblasting and Paint Shop
- Machine Shop
- Locked storage for tools and supplies
- Personnel lockers, toilets, and lunch area

SECTION 1
FUNCTIONS AND DESIGN REQUIREMENTS

1.1 FUNCTIONS

The following lists the Integrated Approach structure functions for the Maintenance Building.

Function

Provide facilities

Afford space in the Maintenance Building

Support elements structurally in the Maintenance Building

Enable access in the Maintenance Building

Lift, handle, and/or transport design selection in the Maintenance Building

Isolate plant environment and enclose the Maintenance Building space envelope

In addition to these functions, the following requirements for the Maintenance Building are provided by the Utility/User Requirements (Reference 1).

- (i) The plant design goal for the permanent maintenance staff is a maximum of 75 full-time personnel. This would include first line supervisors and personnel assigned in the categories of mechanical, electrical, electronic, and instrument maintenance, quality control, and stores and warehouse activities (Ref. 1-3.3.3.6).
- (ii) A spare parts inventory shall be maintained (Abridged requirement, Ref. 1-3.4.13).
- (iii) Overhead cranes shall be sized to lift the heaviest piece of equipment or heaviest component part that would have to be handled to facilitate maintenance activities (Abridged requirement, Ref. 1-3.4.16).
- (iv) Separate mechanical/machine, welding, electrical instrument, and electronic maintenance shop facilities shall be provided (Abridged requirement, Ref. 1-3.4.17).

SECTION 4

INTERFACE REQUIREMENTS

4.1 FUNCTIONAL INTERFACES

Functional interfaces between the Switchgear Building and the systems completely or partially housed in it are presented below. Since facility functions are derived from requirements for system design selections, the system is viewed as defining the interface.

<u>System</u>	<u>Interface</u>
• Non-Class IE AC Distribution System (92-02)	Enclose and support the 13.8-kV Switchgear, the 4160-volt Switchgear, motor control centers, and load center transformers.
• Non-Class IE Uninterruptible Power Supply System (92-04)	Enclose and support the solid state inverters, station batteries and battery chargers, distribution
• Non-Class IE DC Power System (92-07)	switchgear, and cables and conduit.

SECTION 9

REFERENCES

1. Gas-Cooled Reactor Associates (GCRA). Utility/User Design Requirements for Modular High Temperature Gas Cooled Reactors, GCRA 86-002, Rev. 1. GCRA, San Diego, CA, March 1986.
2. GA Technologies, Inc. (GA) et al. Overall Plant Design Specification Modular High Temperature Gas-Cooled Reactor, HTGR-86-004, Rev. 1. GA, San Diego, CA, February 1986.

APPENDIX B

DRAWINGS

<u>Drawing No.</u>	<u>Title</u>
14884-DA-220A	General Arrangement - Maintenance Building Plan El. 0'-6"
14884-DA-220B	General Arrangement - Maintenance Building Plan El. 25'-0"

1				2				2	
NO. 1	DESCRIPTION	CHAS.	CORRECT	NO. 1	DESCRIPTION	CHAS.	CORRECT	NO. 1	DESCRIPTION

NOT TO BE USED FOR

GENERAL ARRANGEMENT

MAINTENANCE BUILDING PLAN EL. 0'-6"

SMALL HIGH PROGRAM

GAS COOLED REACTOR ASSOCIATES

STONE & WEBSTER ENGINEERING CORPORATION

BOSTON, MASS.

15004-DM-220A-1

DRAWING NUMBER

REV.	DESCRIPTION	DATE	BY	CHKD.
1	ISSUED FOR FEAR AND CONCEPT DESCRIPTION			
2	ORIGINAL ISSUE

4					3					2	
ISSUE	DESCRIPTION	CHNG	CHARACT	DATE	ISSUE	DESCRIPTION	CHNG	CORRECT	DATE	ISSUE	DESCRIPTION

CHKO	CORRECT	ISSUE	DESCRIPTION	CHKO	CORRECT
		1	ORIGINAL ISSUE ISSUED FOR FY86 AND CONCEPT DESCRIPTION REPORT	1	1

NOT TO BE USED FOR CONSTRUCTION

GENERAL ARRANGEMENT
MAINTENANCE BUILDING PLAN EL. 25'-0"

SMALL HTGR PROGRAM
GAS COOLED REACTOR ASSOCIATES
STONE & WEBSTER ENGINEERING CORPORATION
BOSTON, MASS.

DRAWING NUMBER: 14884-DA-220B-1