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DOCDATE: 07/28/78
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DOCTYPE: LETTER NOTARIZED: NO
SUBJECT:
FORWARDING RESPONSE TO NRC REQUESTS FOR ADDL INFO AND RESPONSE TO STAFF POSITIONS CONCERNING FIRE PROTECTION AT SUBJECT FACILITY...W/ATT.

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WISCONSIN PUBLIC SERVICE CORPORATION

P.O. Box 1200, Green Bay, Wisconsin 54305

July 28, 1978

Division of Operating Reactors
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Attention Mr. A. Schwencer, Chief
Operating Reactor Branch #1

Gentlemen:

Docket 50-305
Operating License DPR-43
Response to Request for Additional Information and
Staff Positions Concerning Fire Hazards Analysis

Enclosed please find five (5) copies of Enclosure 1 - response to requests for Additional Information, and Enclosure 2 - responses to staff positions concerning Fire Protection at the Kewaunee Nuclear Power Plant.

Our response to your positions concerning Kewaunee Administrative Controls will be forthcoming. The delay is due to the unavailability to discuss and resolve these matters with the Plant Superintendent.

Very truly yours,

E. W. James
Senior Vice President
Power Supply & Engineering

snf

Enc.

A006
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1 cy DLWG TO BC

ENCLOSURE 1

RESPONSES TO REQUESTS FOR ADDITIONAL INFORMATION

37. The response to staff request 34 describes a type of roof deck construction that appears to be combustible. Describe where this metal roof deck is located, and the potential for a fire in the roof or for collapse of the roof to affect safety-related equipment.

RESPONSE: *The metal roof deck is located over all of the Auxiliary and Turbine buildings, however, all safety related equipment and cabling required for safe shutdown or to meet the accidents analyzed in FSAR is protected from roof collapse by interposing steel reinforced concrete floors.*

38. The response to staff position P2 notes the areas reachable from a hose station with a hose of not greater than 100 feet in length. During the site-visit, it was noted that several hose stations were provided with hose lengths of less than 100 feet. Verify that all safety related areas are reachable with the hose stored at the interior hose station, or that additional hose is available at the hose station to provide the required length, not to exceed 100 feet of hose.

RESPONSE: *All hose stations located in the auxiliary building are 100 feet in length. These were the hose stations originally addressed by staff position P2 as the staff was not certain of their length. The site review team and members of our plant staff measured 50' from the turbine building hose stations to the safety related areas at the time of the plant inspection. We have further verified that coverage of safety related areas is adequate without additional hoses at the 50' stations.*

39. The response to staff position P8 states that nozzles and service water hoses will be provided in the reactor building. Verify that the available hoses will be capable of reaching all significant cable concentrations and areas where oil fires may occur, and that fire suppression demands would not affect capability of the service water system to meet demands for safe shutdown.

RESPONSE: *We will verify that the service water hose stations reach all significant cable concentrations in the containment by the end of the next refueling. The areas in which oil fires may occur, the Reactor Coolant Pump Motors, are protected by an independent auto-activating fire suppression system.*

39. RESPONSE (cont.): Two service water pumps are the minimum required for safe shutdown. Tech Specs requires that four service water pumps be operable. The hose stations utilizing service water are spacially far removed from the pumps and there are several intervening fire walls. Therefore, four pumps will be available when these hose stations are used and they will have no noticable impact on the service water system.

ENCLOSURE 2

RESPONSE TO STAFF POSITIONS

P27. The response to staff request number 18 does not adequately verify the suitability of fire door frames. The response notes that the purchase specification required UL certified doors and frames. However, only the doors are labelled; there is no UL label on the frames. It appears that the frames are not UL listed. This situation has occurred at certain other plants. In these cases, the staff has accepted an evaluation that establishes the equivalency of the frames to fire rated frames. This provides reasonable assurance that the door frames will adequately support the fire doors in a fire situation. An evaluation should be performed that establishes the equivalency of the door frames to fire rated frames. The results of this evaluation should be submitted to the staff.

RESPONSE: *Enclosed you will find the purchase order specifications for the doors and frames along with drawing details that list the door and frame schedule, required UL certification, and installation details. As you will find upon examination of this information and as we have stated in response to request number 18, the specifications required UL listing for the door frames. We are sure they were delivered that way or a QA non-conformance would have been written upon reciept of the frames. Although the UL tag is not visible on the door frames, it may be that they are attached inside the frame or have been removed during installation.*

Further examination of the specifications and installation detail of the frames have shown that it is inconceivable that the frames could be less fire resistant than the doors. Our evaluation, therefore, concludes that the rating of the frames are equivalent to or better than the rating of the doors.

P28. To assure that safe shutdown may be achieved for a fire in the relay room, a capability to safety shutdown independent of the relay room should be provided. As a minimum, this capability should include: means for primary system boration and makeup; capability for providing feedwater to the steam generators; steam generator level insturmentation; pressurizer level and pressure instrumentation. The shutdown method independent of the relay room should be capable of maintaining hot shutdown for a period in excess of 72 hours without offsite power.

P28. RESPONSE: Summarized below are our previous responses and verbal communications over the means available for boration, make-up and providing feedwater to the steam generators.

Boration and make-up can be provided by either the Safety Injection System taking suction from the Boric Acid Tanks and RWST or through the Charging Pumps and Boric Acid Pumps taking suction from the Boric Acid Tanks and Refueling Water Storage Tank. Power to run the pumps will be available through safeguard power supply. Even though some (and, incredible in our opinion, even all) instrumentation and control may be lost through a relay room fire, we have calculated that no make-up or feedwater action need be taken for approximately one hour allowing ample time to manually close in breakers and align valves if necessary.

Through discussions with members of your staff, we understand that there is a concern for pressure and level instrumentation so that it can be assured that enough water is being provided to keep the reactor core covered. We have previously explained that in the extremely unlikely event that all instrumentation were lost, just continuing to add water until water is relieved through the relief valves will ensure that the core is covered. Since this incident is considered incredible by us and since the total loss of equipment in the relay room would be tremendously costly, the damage to a few valves would be of minor consequence in comparison. The releases made to the environment should this incredible event occur would not exceed those previously analyzed in the FSAR, since the containment and primary to secondary system boundary remain intact.

As far as providing the instrumentation addressed in your staff position, we have made the following evaluation. Pressurizer pressure instrumentation exists independent from the relay room with readout physically located in the primary sampling area. Communications are available and there is no need to relocate this instrumentation.

P28. RESPONSE (Cont.): To install two new complete safety grade instrument loops independent of the relay room would not be cost beneficial. These instruments are not needed since means already exist to ensure the reactor core is covered, and since the level of protection that exists makes the total loss of all instrumentation and control incredible.

Summarized below are the four levels of protection that demonstrate the low probability of this event occurring.

1. The design of the electrical equipment layout and cable routing include sufficient separation such that a fire initiated at one point would not destroy redundant instrumentation without significant spreading.

2. The spread of this fire to other areas in the relay room is prohibited or at least delayed indefinitely by the installed CO_2 deluge system. This sytem could restrain the fire from engulfing all the equipment and instrumentation until the plant is safety shutdown.

3. Administrative controls are established which ensure that there are <u>no</u> low temperature combustibles in this area and no ignition sources which could by combining ignite the high temperature cable jackets. (It should be noted here that the licensee considers cables as combustible only if there exists a feasible means for reaching a fire with the intensity necessary to ignite the cables. We are continued to be puzzled at the insistance of the staff fire protection consultants to assume a fully enveloped fire when no credible means exists to cause ignition.)

4. The fourth level of protection is provided by the onsite fire brigade whose only purpose for existence is to mitigate the consequences of such a fire, including the use of water which is immediately available.

P28. RESPONSE (cont.): *Furthermore, besides relying upon water relief to ensure the reactor core remains covered, there is other available indication which can be used to ensure the water levels in the pressurizer and steam generator have not disappeared. The pressurizer has sample taps near to bottom for liquid analyzation and near the top for steam space analyzation. By processing the sample through the boron analyzer it can be determined whether the sample is liquid or steam. This will allow us to maintain a pressurizer level adequate to ensure core coverage. The Steam Generators also have sample taps and blowdown piping near the bottom of the Steam Generators from which we could identify the continued presence of water. The Steam Generators could be filled to overflow into the steam lines which we could identify through various drain lines. There is also the presence of wide range Steam Generator level indication which is not safeguard level instrumentation and is not routed through the relay room but directly to the Control Room.*

P29. To provide adequate fire detection and suppression capability for all safety systems as required by GDC number 3 of Appendix A to 10 CFR 50, detectors should be located in the following areas:

AX-28 (Stairwell "A")
AX-34 (Stairwell "B")
AX-24 (El. 586'-along north wall)
AX-23 (lower level)
TU-94 (CO_2 tank room)
control area ventilation equipment rooms
turbine driven auxiliary feedwater pump room
corridor to the screenhouse

RESPONSE: - *AX-28 (stairwell "A") - no detection required as investigation revealed no safeguard cabling or equipment in the area.*

- *AX-34 (stairwell "B") - no detection required as investigation revealed no safeguard cabling or equipment in the area.*

- *AX-24 (El. 586' - along north wall) - no detection required as investigation revealed that the only safeguard cabling in the area was for Spent Fuel Pool Exhaust System. This system is not required for safe shutdown and not necessary to operate in the*

P29. *RESPONSE (cont.):*

- *AX-24 (Cont.)*
  event of a fire to meet the criteria analyzed in the FSAR.
- *AX-23 (lower level) - fire detection will be added.*
- *TU-94 (CO_2 tank room) - fire detection will be added.*
- *Control Area ventilation equipment rooms - no additional detectors required as safeguard equipment in this area consists of ventilation equipment which has not been credited in evaluation of releases to the environment. The loss of operation of this equipment would not change the result of the analysis presented in the FSAR.*
- *Turbine driven auxiliary feedpump room - fire detection will be added.*
- *Corridor to screenhouse - fire detection will be added.*

P30. The response to staff request 17 provides the results of hydraulic calculations for the hose stations in the auxiliary building. In seven of the eight hose stations, the pressures available are below the required pressure for operation of 1 1/2" spray nozzles. To provide adequate pressure for the spray mode, hose stations 1 through 6 and number 8 should be provided with 1" hose nozzles with limited flows, rated at about 15-30 gpm. These nozzles should still satisfy the commitment made in response to staff position P15 concerning electrically-safe nozzles in certain areas.

RESPONSE: These nozzles will be changed to meet the commitment made in response to staff position P15.

P31. To preclude loss of service water pumps and fire pumps due to a fire involving the circulating water pump lube oil, automatic sprinkler or water spray system providing coverage of the circulating water pumps should be provided or an analysis must be provided which shows that heat buildup in the area of the service water pumps will not result in temperatures greater than the ambient temperature rating for the service water pumps. In this regard the assumptions used for any such analysis must be stated and justified (e.g., burning rate, pool size, air flow distribution, initiation and maintenance of ventilation, etc.).

P31. RESPONSE: Attached you will find our calculations for the temperature rise in the screenhouse. Part 1 of the calculation determines the temperature rise given varying burn times. The BTU input from the burning oil is fixed; the longer it takes to burn, the lower the temperature buildup will be due to the change of air. The calculation is conservative in that it assumes the BTUs added per minute are not removed and discarded to the atmosphere, but rather remain and are added to incoming air at the rate the fans add additional air. The results of this calculation show a plot of temperature versus burn time that approaches zero temperature change as burn time increases.

The second part of the calculation is performed to establish the burn time of this oil fire.

It is assumed that the pool first fills with oil and then is ignited (worst case). Depth of pool is 1.238 inches. The burning rate in depth per time of oil is considered to be less than 3 in/hr. This is derived from data from the Fire Protection Handbook which shows the more volatile substances like gasoline to have a 10 to 12 in/hr. burning rate and kerosine to have a 5 to 8 in/hr. burning rate. At 3 in/hr. or 24.75 min. burn time ambient temperature would reach 195^{0} F. If we were to utilize the data from some combustion notes supplied by members of your staff, a burning rate of 9 in/hr., a burn time of 8.25 min. and an ambient temperature rise of 340^{0} F would be reached. However, this data does not appear applicable since it disagrees with typical burning rate data from more up to date sources. We consider the 3 in/hr. a conservative estimate of the burn rate of oil. A best estimate which employs deriving the ratio of the burning rate curve of kerosine to oil supplied by the staff's notes and the exact burning rate of kerosine yields a burning rate of 1.875 in/hr., a burn time of 39.6 min. and an ambient temperature rise of about 85^{0} F. It should be stressed that these numbers are conservative due to the method of calculation and the results

P31. RESPONSE (cont.): are being compared to an ambient operational long term limit. We know that the Service Water Pump motors and Exhaust Fan motors will continue to operate in higher temperatures with no abnormal effects for a period of time.

Air flow distribution has been considered uniform. For any intense short term fire this surely would be representative of the actual conditions. For long term burning and low temperatures there may be air streaming. If so, the hottest temperatures would be immediately above the fire at the roof and would be directly exhausted by the fans. Hence, the consequences would be minimized by this streaming affect. In conclusion, we have shown that even using conservative estimates, a circulating water pump oil fire would not jeopardize the operation of the Service Water Pumps.

CALCULATION FOR TEMP RISE IN SCREEN HOUSE — PART I

(A) TOTAL VOLUME OF AIR IN SCREENHOUSE — 176,314 ft^3

(B) OIL = MOBIL DTE HEAVY MEDIUM — 20,400 BTU/lb.

TOTAL OIL PER PUMP — 322 lb.

TOTAL BTUS IN OIL — = 6,600,000 BTU

(C) SPECIFIC HEAT OF AIR AT STP — 0.2399 BTU/lb °F

(D) WT OF AIR — .08 lb/ft^3

TO CALCULATE TEMP RISE TAKE BTU INPUT TO AIR SPACE VOLUME

$$[\Psi_{BTU_{in}}]\left[\frac{1}{\text{Specific ht}}\right]\left[\frac{1}{\text{WT AIR}}\right]\left[\frac{1}{\Theta \text{ volume}}\right] = \text{Temp. Rise}$$

Ψ } VARIABLES DETERMINED BY BURNING RATE OF OIL
Θ } WHICH GIVES TIME — WHICH WILL give EFFECTIVE VOLUME

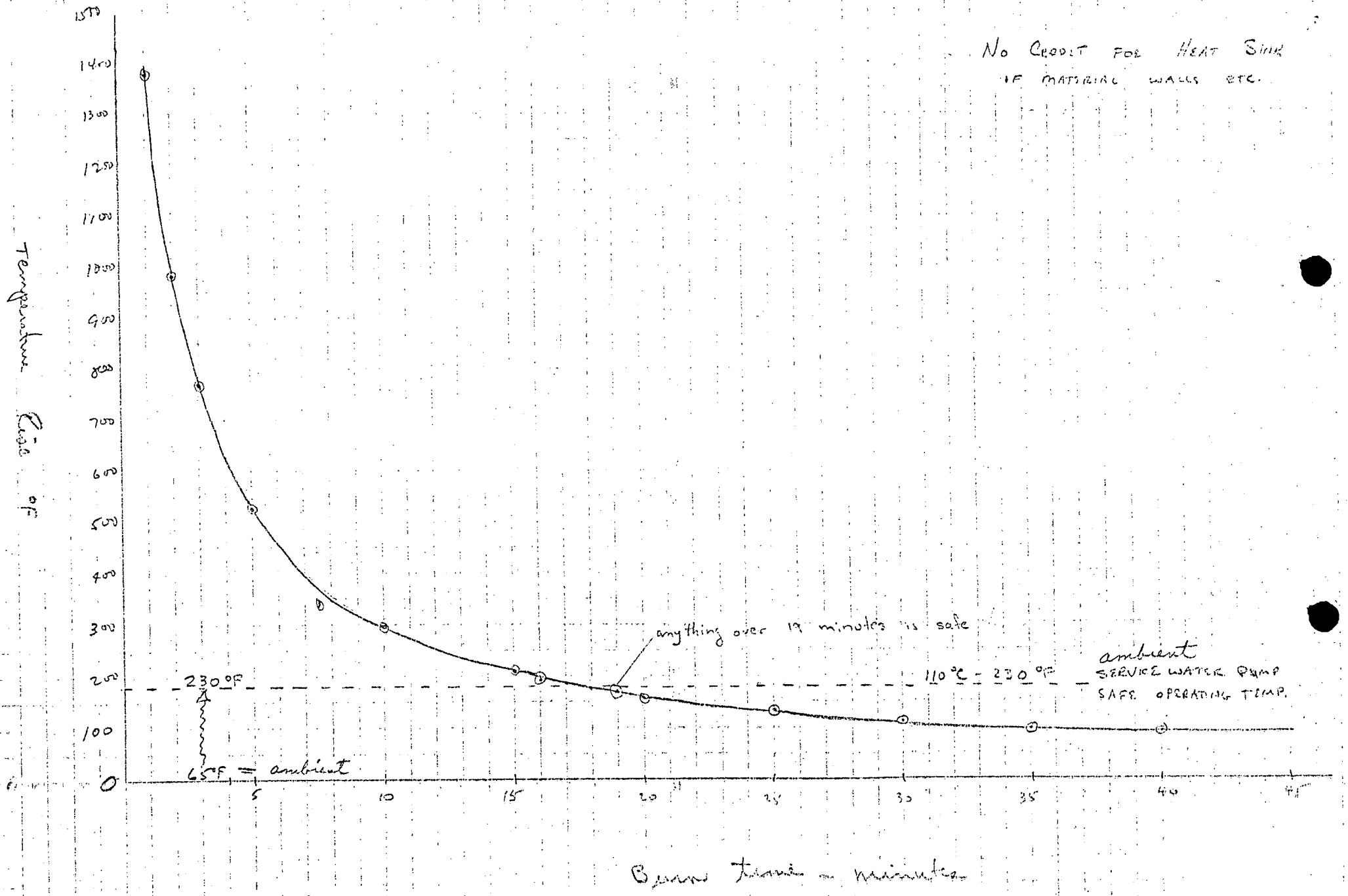
EXAMPLE 1 — ASSUME BURNING RATE OF 1 MINUTE
AT THIS HEAT IMPUT RATE BOTH FANS WILL START IN LESS THAN 5 SECONDS.

ASSUME ALL HEAT HAS BEEN ADDED IN 1 MINUTE
AND FANS ADD ADDITIONAL 100,000 SCFM OF AIR VOLUME

$$\left(\frac{6.6 \times 10^6 \text{ BTU}}{}\right)\left(\frac{1}{.2399 \text{ BTU}/lb\,°F}\right)\left(\frac{1}{.08\ lb/ft^3}\right)\left(\frac{1}{250{,}000\ ft^3}\right) = 1375.6\ °$$

SIMILARLY ONE CAN CALCULATE TEMP RISE FOR X minute burns

2 min	= 982.6 °F	10 min	= 299.0 °F
3 min	= 764.2 °F	15 min	= 208.4 °F
5 min	= 529.1 °F	20 min	= 159.9 °F
7.5 min	= 343.9 °F	25 min	= 129.8 °F
35 min	= 94.2 °F	30 min	= 109.2 °F
		40 min	= 82.9 °F


No Credit for Heat Sink
if material walls etc.
Temperature Rise °F
150
140
130
120
110
100
90
80
70
60
50
40
30
20
100
0
230°F
65°F = ambient
anything over 19 minutes is safe
110°C - 230°F
ambient
SERVICE WATER PUMP
SAFE OPERATING TEMP.
5
10
15
20
25
30
35
40
45
Burn time - minutes

CALCULATION OF BURN TIME — PART II

USING SURFACE AREA AND DEPTH OF POOL

(E) SURFACE AREA – OIL WILL BE CONFINED TO PUMP TORUS ← IF

RADIUS OF PUMP TORUS = 4.167 ft

Area = πr^2 = 54.5 ft^2

(F) DEPTH OF POOL

$$45\ gal\left(\frac{ft^3}{8\ gal}\right)\left(\frac{1}{54.5\ ft^2}\right)\left(\frac{12\ in}{ft}\right) = 1.238\ inches$$

(G) Burning Rate of Oil

From FIRE PROTECTION HAND BOOK			From GRAPH OF NRL INFO PROVIDED
Kerosine = 5-8 in/hr estimate oil = < 3 in/hr		Ratio from curves	Burn Rate
5"/hr.	3" in/hr	1 in/hr	9"/hr.
		1.875 in/hr	

(H) Burn Time

14.86 min	24.76 min	74.28 min	8.25 min
		39.62 min	

WISCONSIN PUBLIC SERVICE CORPORATION
WISCONSIN POWER & LIGHT COMPANY
MADISON GAS AND ELECTRIC COMPANY

Kewaunee Nuclear Power Plant
Unit 1
Project 23-7127A

SPECIFICATION NO. 226
FOR
HOLLOW METAL DOORS, FRAMES, BORROWED LIGHTS AND METAL CLAD SLIDING DOORS

June 5, 1970

Pioneer Service & Engineering Co.
CHICAGO, ILLINOIS

SPECIFICATION NO. 226
FOR
HOLLOW METAL DOORS, FRAMES, BORROWED LIGHTS AND METAL CLAD SLIDING DOORS

(June 5, 1970)

1.0 SCOPE OF WORK

.1 Work Included

The work covered by this specification shall consist of furnishing, fabricating and delivering to the job site the hollow metal doors, frames, borrowed lights and metal clad sliding doors in accordance with the door schedule, as detailed on the drawings and as herein specified.

.1.1 The work shall also include, but not necessarily be limited to the following:

.1.1.1 Door louvers where indicated on the drawings.

.1.1.2 Door astragals and rabbeted meeting stiles.

.1.1.3 Removable metal glazing stops as required.

.1.1.4 Furnishing standard and special anchorages to suit wall conditions as indicated on the drawings.

.1.1.5 Furnishing metal borrowed lights for interior masonry partitions where indicated on the drawings.

.1.1.6 Furnishing underwriter's labels as required.

.1.1.7 Factory finishing of doors where specifically called for in door schedule.

.2 Contract Drawings

The following drawings are to form a part thereof: June 5, 1970

Drawing No.	Description
A-221	Architectural - East Elevation - Powerhouse
A-222	Architectural - South Elevation - Powerhouse
A-223	Architectural - West Elevation - Powerhouse
A-224	Architectural - North Elevation - Powerhouse
A-225	Architectural - Miscellaneous Elevations and Sections
A-244	
A-248	Architectural - Auxiliary Building - Fuel Handling Area - Elevation 606'-0"
A-253	Architectural - Door Schedule and Details
A-254	Architectural - Door Schedule and Details
A-255	Architectural - Door Schedule and Details

1.0 SCOPE OF WORK (CONTINUED)

.3 Reference Drawings

The following drawings are included for General Information. Other pertinent and associated drawings are available for examination and review in the office of the ENGINEER.

Drawing No.	Description
A-203	General Arrangement - Turbine and Administrative Building - Basement Floor
A-204	General Arrangement - Reactor and Auxiliary Building - Basement Floor
A-205	General Arrangement - Turbine and Administrative Building - Mezzanine Floor
A-206	General Arrangement - Reactor and Auxiliary Building - Mezzanine Floor
A-207	General Arrangement - Turbine and Administration Building - Operating Floor
A-208	General Arrangement - Reactor and Auxiliary Building - Operating Floor
A-209	General Arrangement - Reactor and Auxiliary Building - Miscellaneous Floor Plans
A-212	General Arrangement - Miscellaneous Plans and Sections
A-213	General Arrangement - Screenhouse and Circulating Water Discharge

.4 Work Not Included

.4.1 Furnishing and installing of finish hardware including cylinder locks (by Superstructure Contractor).

.4.2 Glass and glazing

.4.3 Steel channel door frames

.4.4 Field finish painting

.4.5 Unloading and installation (by Superstructure Contractor).

2.0 DELIVERY SCHEDULE

.1 Door and Frame Shipment Sequence

Door and Frame shipment shall conform to the following shipment sequence schedule unless otherwise approved or directed by the ENGINEER.

2.0 DELIVERY SCHEDULE (CONTINUED)

.2 Shipment Sequence Schedule

Item	Arrive at Job Site
.2.1 Door Frames Mark 7, 28, 29, 31, 32, 33, 35, 37, 38, 97, 103, 105, 106, 107, 108, 109, 110, 112	August 28, 1970
.2.2 Doors for the above Frames	September 1, 1970
.2.3 All other Door Frames	September 1, 1970
.2.4 All other Doors	October 1, 1970

3.0 MATERIALS

.1 Steel Sheet

Steel sheet shall be cold-rolled furniture stock steel, patent levelled, full pickled, and free from blisters, pits, burns, or other defects.

4.0 FABRICATION

.1 General

.1.1 Hollow metal doors, frames, borrowed lights, and metal clad sliding doors shall be products of manufacturer's specializing in such items and shall be marked with the opening number on adhesive labels. Provisions for fitting of swing and sliding door hardware shall be done at the factory from certified templates or their physical hardware. Swinging doors shown on the drawings for which steel channel frames are indicated shall be double mortised to receive both leaves of hinges.

.1.2 Hollow metal swing and sliding metal clad doors shall be of the types, sizes, and thicknesses as called for on the door schedule. Panels shall be made of two 18 gauge minimum sheets welded to a rigid frame of rolled or formed shapes, properly reinforced. The space between panels shall be either hollow core with six pound density mineral Rockwool sound deadener, solid core constructed, or insulated with U.L. approved material as required. Doors shall be of either "A" or "B" label type construction and bear the underwriter's label where called for on the door schedule.

.2 Sliding Doors

Metal clad sliding doors shall be of the flush type furnished complete with all required hardware, sliding door tracks, hold open device, fusible links and accessories and bear fire underwriter's label as called for on the door schedule.

4.0 FABRICATION (CONTINUED)

.3 Seams and Joints

Seams and joints of hollow metal doors shall be welded, and exposed surfaces of welds dressed smooth and flush with adjacent metal surfaces. Joints shall be neatly and accurately made in accordance with best current trade practice. Members shall be adequately reinforced, keyed and braded. Where screw or other fastenings are required, they shall be concealed, unless otherwise approved.

.4 Sinkages

Suitable sinkages shall be provided for all bored, mortised or countersunk hardware. Metal reinforcement shall be inserted for attaching all hardware, and shall be of ample size to stiffen the sheet metal against service strains. Reinforcement shall be drilled and tapped for attaching the hardware. Plaster guards or dust boxes shall be provided for hinges and strikes as required.

.5 Hollow Metal Door and Borrowed Light Partition Frames

.5.1 Hollow metal frames and trim for hollow metal doors and borrowed lights shall be 16 gauge cold rolled steel. The door frames shall be furnished with full adjustment to compensate for floor irregularities. Door and borrowed light frames shall be mitred and internally welded, ground smooth and be shipped as set-up frames complete with bottom frame spread and brace bars. Door frames shall be provided with door silencers at jambs as required.

.5.2 Door frames shall be of either "A" or "B" label type construction and bear the underwriters label where called for on the Door Schedule.

.6 Door Louvers

Door louvers shall be inverted "V" type fixed slat metal louvers of sizes as indicated on the drawings and as called for in the door schedule.

.7 Astragals

Where a pair of doors are required, provide a flat bar, overlapping sheetmetal astragal, or rabbeted lap at the meeting stiles.

.8 Glass Light Moldings

Glazing rebates in moldings shall be wide enough for installation of ¼" thick glass. Mouldings shall be attached with special cadmium plated Jackson head type screws or equal.

5.0 HARDWARE

.1 All doors shall be prepared for hardware, as required, from certified templates. Mortise, reinforce, drill and tap for all mortised and bored hardware and reinforce for surface applied hardware. The CONTRACTOR shall be responsible for coordinating and securing the delivery of the sliding door tracks and accessories and all certified hardware templates from the Superstructure Contractor so as not to delay the progress of his work.

5.0 HARDWARE (CONTINUED)

.2 The hardware cut-outs and reinforcements shall be for hardware type, design, and manufacture as specified in the Door Schedule and as shown on the Drawings.

6.0 DETAIL DRAWINGS AND INSTRUCTIONS

.1 Drawings Required

The CONTRACTOR shall prepare shop drawings of the hollow metal doors, frames, borrowed lights and metal clad sliding doors and prepare complete erection drawings.

.2 Shop Drawings

The shop drawings shall show all dimensional, bending and forming information required for shop fabrication.

.3 Erection

The erection drawings shall show the various doors and sizes including locations, fastening details, etc.

.4 Approval of Drawings

Three prints of the drawings shall be submitted to the ENGINEER for approval. Approval by the ENGINEER does not relieve the CONTRACTOR of responsibility for the accuracy of the drawings. Sixteen prints of approved drawings will be required for distribution. No fabrication shall be conducted until approved shop drawings have been received by the CONTRACTOR. The bidder shall indicate in his bid the time required to submit shop drawings after receipt of order.

7.0 SHOP FINISHES

.1 Prime Coat

.1.1 All hollow metal door and borrowed light frames shall be bonderized and receive a baked on coat of rust inhibitive gray primer.

.1.2 Doors where called for in the Door Schedule to be "Prime Coated" shall be bonderized and receive a baked on coat of quality rust inhibitive primer, and meet a minimum performance test of 200 hours per ASTM Specifications D-714 and B-117 for humidity cabinet and salt spray tests.

.2 Color Finish

Doors where called for in the Door Schedule to be "Color Finished" shall be bonderized, prime painted with a coat of baked on rust inhibitive primer, finish coated with a high grade baked on enamel, and meet a minimum performance test of 200 hours per ASTM Specification D-714 and B-117 for humidity cabinet and salt spray tests. Gloss and color of "Factory Finish" shall be as selected by the ENGINEER.

7.0 SHOP FINISHES (CONTINUED)

.3 Wood Grain Finish

Doors where called for in the Door Schedule to be "Wood Grain Finished" shall be shop coated with a graining reproduction type of a high molecular weight polyvinyl chloride coating or be bonderized and receive a wood grained gravure type printing process over a matching base coat of lacquer and be sealed after graining with a durable, clear lacquer protective coating. Wood grain finish shall be as selected by the ENGINEER.

8.0 TOUCH-UP

The CONTRACTOR shall furnish the OWNER with an adequate supply of specified shop coatings for use in touching up abraded or scratched surfaces.

9.0 SHIPMENT

.1 Provide sturdy suitable packaging to protect all doors and frames during shipment.

.2 Doors shall also be suitably enclosed with plastic coverings and/or bags.

10.0 GUARANTEE

The CONTRACTOR shall provide a written one year guarantee against any defects in workmanship and materials, effective from building acceptance date as approved by the ENGINEER.