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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

November 5, 1980

Dockets Nos. 50-282
and 50-306

Mr. L. O. Mayer, Manager
Nuclear Support Services Company
Northern States Power
414 Nicollet Mall - 8th Floor
Minneapolis, Minnesota 55401

Dear Mr. Mayer:

We are reviewing the License Amendment Request dated January 31, 1980, as supplemented on June 10, 1980, on the Prairie Island Nuclear Generating Plants spent fuel storage facility modification. We find that the additional information as indicated in the enclosure to this letter is necessary for us to continue our review.

Sincerely,

Robert A. Clark

Robert A. Clark, Chief
Operating Reactors Branch #3
Division of Licensing

Enclosure: As stated

cc w/enclosure: See next page

8011190224 P

cc: Gerald Charnoff, Esquire
Shaw, Pittman, Potts and Trowbridge
1800 M Street, N.W.
Washington, D. C. 20036

Ms. Terry Hoffman
Executive Director
Minnesota Pollution Control Agency
1935 W. County Road B2
Roseville, Minnesota 55113

The Environmental Conservation Library
Minneapolis Public Library
300 Nicollet Mall
Minneapolis, Minnesota 55401

Mr. F. P. Tierney, Plant Manager
Prairie Island Nuclear Generating Plant
Northern States Power Company
Route 2
Welch, Minnesota 55089

Joclyn F. Olson, Esquire
Special Assistant Attorney General
Minnesota Pollution Control Agency
1935 W. County Road B2
Roseville, Minnesota 55113

Robert L. Nybo, Jr., Chairman
Minnesota-Wisconsin Boundary Area
Commission
619 Second Street
Hudson, Wisconsin 54016

U. S. Nuclear Regulatory Commission
Resident Inspectors Office
Route #2, Box 500A
Welch, Minnesota 55089

Mr. John C. Davidson, Chairman
Goodhue County Board of Commissioners
321 West Third Street
Red Wing, Minnesota 55066

Bernard M. Cranum
Bureau of Indian Affairs, DOI
831 Second Avenue South
Minneapolis, Minnesota 55402

Director, Technical Assessment Division
Office of Radiation Programs (AW-459)
U. S. Environmental Protection Agency
Crystal Mall #2
Arlington, Virginia 20460

U. S. Environmental Protection Agency
Federal Activities Branch
Region V Office
ATTN: EIS COORDINATOR
230 South Dearborn Street
Chicago, Illinois 60604

Chairman, Public Service Commission
of Wisconsin
Hill Farms State Office Building
Madison, Wisconsin 53702

AUXILIARY SYSTEMS BRANCH

1. Exhibit B item 5.6B and drawings NF 39208, NF 39211, NF 39212 and NF 39213 indicate that a fuel pool enclosure surrounds the two spent fuel storage pools and the new fuel pit. Provide the following information:

   a. Describe and discuss the limitations this structure imposes on the handling of all loads that pass through or are handled within the enclosure when using the large overhead crane.

   b. Describe the overhead cranes protective devices which will limit the bridge, trolley and hoist motions when handling loads within the fuel pool enclosure in order to be assured that the load or load carrying members do not contact the fuel pool enclosure.

   c. Describe the features of the overhead crane which precludes the possibility of "two blocking" while the lower load block passes over the fuel pool enclosure or demonstrate that the structure will withstand the impact of a dropped lower load block without failing or creating secondary missiles.

   d. Identify, describe and provide the weights and principal dimensions of all loads aside from those associated with this modification that must pass through the fuel pool enclosure during the modification program in order to accomplish repair, maintenance or replacement of equipment within the building. Estimate the frequency of handling each of these loads. Describe all features of the load handling system for these operations, including devices such as slings, yokes and other devices interposed between the hook and the load in detail sufficient to

enable the staff to conclude that the potential for a load drop is extremely small.

2 In regard to the heat removal capability of spent fuel pool cooling water heat exchangers 1 and 2, it is noted that the values presented in Table 3.5-2 Exhibit C are for conditions that would not exist if this submittal is implemented. For both heat exchangers update Table 3.5-2 and describe in detail how the new values are established. Also graphically, in a fashion similar to that shown in Figures 3.5-3, 3.5-5 and 3.5-7, present their heat removal performance throughout the three postulated conditions, i.e. normal, abnormal and faulted.

3. In regard to the heavy load handling operations required to accomplish the proposed spent fuel pool expansion program provide the following information:

a) Describe the 15 ton temporary crane and rigging to be employed in this modification in sufficient detail as to enable the staff to arrive at a finding that either: (1) the potential for a load drop is extremely small, or (2) for each area addressed, the following evaluation criteria are satisfied:

i. Releases of radioactive material that may result from damage to spent fuel based on calculations involving accidental dropping of a postulated heavy load produce doses that are well within 10 CFR Part 100 limits of 300 rem thyroid, 25 rem whole body (analyses should show that doses are equal to or less than 1/4 of Part 100 limits);

ii. Damage to fuel and fuel storage racks based on calculations involving accidental dropping of a postulated heavy load does not result in a configuration of the fuel such that k_{eff} is larger than 0.95;

iii. Damage to the spent fuel pool based on calculations of damage following accidental dropping of a postulated heavy load is limited so as not to result in water leakage that could uncover the fuel, (makeup water provided to overcome leakage should be from a borated source of adequate concentration if the water being lost is borated); and

iiii. Damage to equipment in redundant or dual safe shutdown paths, based on calculations assuming the accidental dropping of a postulated heavy load, will be limited so as not to result in loss of required safe shutdown functions.

b) Describe the 125 ton Auxiliary Building cask handling crane and rigging to be employed in this modification in sufficient detail as to enable the staff to arrive at a finding that either: (1) the potential for a load drop is extremely small, or (2) for each area addressed, the following evaluation criteria are satisfied:

i. Releases of radioactive material that may result from damage to spent fuel based on calculations involving accidental dropping of a postulated heavy load produce doses that are well within 10 CFR Part 100 limits of 300 rem thyroid, 25 rem whole body (analyses should show that doses are equal to or less than 1/4 of Part 100 limits);

ii. Damage to fuel and fuel storage racks based on calculations involving accidental dropping of a postulated heavy load does not result in a configuration of the fuel such that k_{eff} is larger than 0.95;

iii. Damage to the spent fuel pool based on calculations of damage following accidental dropping of a postulated heavy load is limited so as not to result in water leakage that could uncover the fuel, (makeup water provided to overcome leakage should be from a borated source of adequate concentration if the water being lost is borated); and

iiii. Damage to equipment in redundant or dual safe shutdown paths, based on calculations assuming the accidental dropping of a postulated heavy load, will be limited so as not to result in loss of required safe shutdown functions.

c) With the aid of drawings, describe the travel path that will be followed in installing and removing the 15 ton temporary crane and the storage racks. Identify all equipment, essential in the safe shutdown of the reactor or employed to mitigate the consequences of a load drop which is beneath, adjacent to or otherwise within the area of influence of the dropped load along the entire travel paths.

d) In the load handling operations involving the spent fuel pool covers, indicate and describe the load handling equipment and rigging that will be employed as well as the sequence and frequencies of these operations in order to complete the spent fuel pool modifications.

e) It is noted that pool cover analyses provided during the last spent fuel pool modification program were intended to show that the covers were adequate to:

i. Withstand the drop of previously installed racks from a height of six inches provided it drops in a non-tilted orientation

ii. withstand the drop of the previously installed racks from a height of three inches if it drops in a tilted condition

iii. withstand the resulting dynamic loading if the previously installed racks are not lowered onto the covers at a lowering speed in excess of 2 feet per minute

iiii. support the previously installed racks provided that they are placed on the cover such that a minimum clearance of 5 inches is maintained between the nearest edge of the legs of the racks and the outside edge of the cover.

In regards to the above qualifications, update the analysis for this modification and provide the following (1) a discussion which demonstrates that the loads being handled during this modification program cannot be dropped onto the covers from heights which will cause the cover or covers to fail, (2) a discussion which demonstrates that loads being handled at the maximum safe carrying height above the covers will only drop in the non-tilted orientation or that the covers can also withstand the resulting eccentrically applied dynamic loads resulting from tilted dropped loads and (3) that the covers can withstand, without failure, all load drops at any point along the length of travel of the loads over the covers.

f) Indicate the weight of the heaviest rack currently in the spent fuel storage pool and the weight of the heaviest proposed rack.

g) Describe the handling equipment and rigging utilized in removing and installing these racks in sufficient detail as to enable the staff to conclude that a load drop is extremely small.

4. In accordance with section IV (4) of the enclosure to NRC letter dated April 14, 1978, describe and discuss the maximum uplift forces available from the load lifting devices spanning the spent fuel pools and the adverse consequences if they should be applied to the free standing unanchored fuel storage racks. Further, verify that the specific loads and load combinations are acceptable and conform with 3.8.4-II-3 of the Standard Review Plan.

5. In regard to section 3.4.4.6 of Exhibit C, describe, discuss and verify that all the handling tools, that are to be handled above the stored spent fuel assemblies will not result in unacceptable consequences when dropped from their maximum operational elevations.

6. Provide the following information individually for the fuel transfer canal pool no. 1 and no. 2

a) free volume

b) volume of fuel racks including absorber materials

c) volume of a typical fuel assembly

d) volume of water at nominal level

STRUCTURAL ENGINEERING BRANCH

1. Provide details (discussion, sketches and schematics) of the rack base supporting structure, sliding surfaces, all gaps (clearance and expansion) of the rack structure, fuel handling system and fuel bundles.

2. Indicate whether fabrication, installation and quality control of the spent fuel racks are in conformance with Subsection NF of the ASME Code. If not, identify and justify the deviations.

3. Indicate if this proposed modification conforms with the NRC position on fuel pool modification entitled "OT Position For Review and Acceptance of Spent Fuel Storage and Handling Applications", issued on April 14, 1978, and later amended on January 18, 1979. If not, identify and justify the deviations.

4. The stainless steel protective cover was designed to protect the small spent fuel pool against the accidental drop of the spent fuel rack. Provide the method of analysis, assumptions and calculations for two cases: 1) accidental drop in the middle of the cover and 2) accidental drop at the edge of the cover for tilted and untilted positions under the weight of the new fuel racks.

5. Provide step by step general discussion on how the seismic effects on the racks have been considered. Indicate, also, the justifications why the sliding analysis, stability analysis and seismic analysis are separate.

6. In the sliding and stability analyses, the effect of the vertical component of SSE was considered using the peak vertical SSE acceleration. Provide discussion on the contribution of all modes to the response. An acceptable procedure is to multiply the peak of the applicable floor response spectra by a factor of 1.5.

7. Due to the gaps between fuel assemblies and the wall of the guide tubes, additional loads will be generated by the impact of the fuel assemblies during a postulated seismic excitation and sliding. Provide the justification and the numerical values of these dynamic magnification factors due to the impact. Provide, also, sufficient detail describing the gaps, the guide tubes and the boundary conditions of the fuel bundle inside the guide tubes.

8. For the heavy object drop accident over the fuel racks, it was assumed that the mode of failure is by crushing the upper portion of the rack.

   a. Indicate why the crushing is limited to the upper portion of the rack and not somewhere else where there might be a weak cross section.

   b. Provide justification why other cross sections of the rack (not affected by crushing) maintain their geometrical configurations, such that the structural criteria established for this case can be met.

   c. Indicate whether there might be other modes of failures, for example, buckling.

9. For the sliding analysis, it was found that the maximum sliding distance was .47 inches for fully loaded rack and 1.3 for empty rack. Provide description and sketches of the base assemblies and the gaps and justify why the effect of the impact of two adjacent racks is insignificant.

10. With regard to the issue of the straight drop accident of fuel assembly, provide the following:

a. Sketches, schematics and discussion regarding the shape of the impact area, bottom edge of the tube, bottom grid and base assembly.

b. The location of the plastic hinges and the ductility ratio of the affected area.

c. Detail justification on why there will be no geometric distortion of the storage tube as a result of the impact and why the structural criteria, established for this case, can be met.

11. Discuss the method used to account for the effect of sloshing water on the fuel pool wall and fuel racks.

12. Discuss in detail the effect of inclined drop of fuel assembly (small inclination) and straight drop over the edge or corner of fuel rack. Discuss mode of failure and the justification why the structural criteria can be met.

EFFLUENT TREATMENT SYSTEMS BRANCH

1. With regard to the cleanup loop in the spent fuel pool cooling and cleanup system;

   a. Other than during refueling, how often and for how long (on an annual basis) is it brought on line and used?

   b. What criteria are used for initiating and securing operation of the cleanup loop?

2. When were the filters upstream of the spent fuel pit demineralizers installed, and what precipitated this change?

CHEMICAL ENGINEERING BRANCH

1. In Section 5.4.2 (page 20) of the License Amendment Request for spent fuel storage, dated January 31, 1980, you stated that operating experience has shown that the greatest quantity of crud is released during movement of spent fuel assemblies. Indicate the quantity of crud that is estimated to be released during each movement of spent fuel assemblies and any crud released during other storage pool operations. If there is crud released during other operations, indicate whether the filters will have to be changed more frequently or determine the need for increased installed filter capacity.

2. In Section C of Supplemental Information related to January 31, 1980 License Amendment Request, you indicated that if a pre-established limit of chlorides or fluoride is exceeded, the SFP demineralizer would be used, and that if the SFP ion exchange decontamination factor is unacceptable, the ion exchanger resin would be changed. Provide the pre-established limits for chlorides and fluorides and the SFP ion exchanger decontamination factors for various radioactive elements that are expected to be present in significant amounts in the spent fuel pool water. Provide the basis for establishing these values.

3. With respect to the In-Pool Surveillance Program, provide the following:

   a. The type of surveillance specimen with respect to mechanical details, galvanic coupling effects and stressed materials.

   b. The location of the samples in the pool with respect to whether they are exposed to gamma flux levels comparable to the absorber material used in the racks.

   c. Type of tests or examinations to be made on the samples with respect to corrosion, visual observations and weight gain or loss, etc.

   d. Frequency of examinations.

   e. How the program addresses item 1.5(1) of the OT Position for Review and Acceptance of Spent Fuel Storage and Handling Applications.