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TO: Mr. Victor Stello

FROM: Northern States Power Company
Minneapolis, Minnesota
L. O. Mayer

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DESCRIPTION

Consists of response to 11/23/77 request by NRC for information on the proposed High Density Fuel Storage System.....

(5-P)

ENCLOSURE

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PLANT NAME: Monticello
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NORTHERN STATES POWER COMPANY

MINNEAPOLIS, MINNESOTA 55401

December 14, 1977

Mr Victor Stello, Director
Division of Operating Reactors
c/o Distribution Services Branch, DDC, ADM
U S Nuclear Regulatory Commission
Washington, DC 20555

Dear Mr Stello:

MONTICELLO NUCLEAR GENERATING PLANT
Docket No. 50-263 License No. DPR-22

Response to 11/23/77 Request
for Information on HDFSS

On November 23, 1977 the NRC Project Manager for Monticello verbally requested additional information related to the proposed High Density Fuel Storage System (HDFSS). The questions are repeated below along with their respective responses.

Q.1. In your report, entitled, "Replacement of Spent Fuel Pool Storage Racks", dated August 17, 1977, on Page 29, you refer to operating both trains of the spent fuel pool cleanup system "during refueling outages". How long are refueling outages?

A.1. The reference to refueling outages was used to differentiate, in a general way, that period of time when both trains of the spent fuel pool cleanup system are in service, rather than only one. Annual refueling and maintenance outages characteristically range from four to eight weeks. The period of time when both trains are kept in service is determined on the basis of water quality (conductivity, turbidity and disolved solids.) For the calculation of the annual volume of solid wastes generated in the form of spent resins, it was conservatively assumed that two cleanup trains were operated eight weeks out of each year with weekly backwashes and one train was operated the remainder of the year with monthly backwashes.

Q.2 The Licensee estimates 22 man-rem as the occupational exposure for removal and disposal of the old racks and installation of the new ones. You should demonstrate that the methods he will use for this operation will provide ALARA exposures to the personnel performing it. Relevant experience may be used as necessary. In response to this question, the Licensee should address dose rates, occupancy factors, and man hours expended for each phase of the operation.

A.2 The estimated 22-man-rem for the spent fuel pool storage modification was conservatively calculated and is therefore much higher than would actually be anticipated during the project. The methods employed in estimating the Monticello fuel rack replacement occupational exposure were similar to those used in estimating the occupational exposure for the Prairie Island spent fuel rack replacement. The Prairie Island occupational exposure estimate was 28 man-rem. Actual project occupational exposure, as measured by thermoluminescent dosimeters (TLD), was less than 5 man-rem.

The occupational exposure for the Monticello spent fuel rack replacement program was derived by breaking the job down into its component activities, estimating man-hours for each activity and estimating a conservative dose level for each activity.

The estimated man-hours during which significant exposure would be received, the average dose rates and the resulting exposures are given in Table I below for each activity.

TABLE I - ESTIMATED MODIFICATION EXPOSURES

	Activity	Dose Rate (mrem/hr)	Manhours (hrs)	Exposure (man-rem)
I	Rack removal and disposal	65	300	19.5
II	New rack installation	4	425	1.7
III	Fuel Handling	2	200	0.4
	TOTAL		925	21.6

Activity I

Man-hours for removal and disposal of existing spent fuel racks were estimated from Monticello plant experience with removal and disposal of twelve control-blade storage racks. Dose during removal and disposal of spent fuel racks was assumed to come from two sources; the pool and the contaminated racks. Dose from the pool was based on typical radiation levels above the pool. Spent fuel rack radiation levels were estimated based on radiation levels of the Monticello control blade racks which were removed. The exposure received by the plant personnel who removed and disposed of the racks was very low and was not readily distinguishable from their normal daily exposure.

Activity II

Workers who will be installing new spent fuel racks (modules) are assumed to receive exposure only from the pool. The dose rate is based on typical radiation levels in the pool area. Man-hours of activity in the pool area are estimated for each phase of the installation.

Activity III

Fuel handling durations were estimated based on plant experience. The only significant source of personnel exposure is from the pool. The dose rate for fuel handling is based on typical spent fuel pool radiation levels.

Occupational radiation exposure ALARA considerations were included in planning the pool preparation and construction sequence for the modification. Installation methods for the new racks and disposal methods for the old racks were discussed with the plant radiation protection personnel to assure that the selection of methods for performing the work were consistent with good radiological health and safety practices.

The new spent fuel racks (modules) and their installation tools are designed to simplify installation and shorten the construction time to the extent practical. This will reduce the exposure by reducing the occupancy factor. The tool and rack design also facilitate our intent to perform the modification from above the pool. Therefore, it is not anticipated that the modification will require use of a diver.

The pool radioactivity, the primary source of exposure for many of the modification activities, will be kept as low as practical by optimum use of the pool cleanup systems.

Most of the calculated exposure for replacing the spent fuel racks is received from handling the contaminated racks. To minimize the exposure from this source, the racks will be flushed down with water as they are pulled from the spent fuel pool. The old spent fuel racks will be handled using techniques similar to those used when handling the control blade racks which resulted in low exposures.

The Monticello spent fuel racks will be boxed for disposal using essentially the same method that was used for disposal of the Monticello control blade racks and the Prairie Island spent fuel racks. A comparison was made between boxing racks and cutting up racks for the Prairie Island spent fuel pool modification. Based on the evaluation for Prairie Island, it was concluded that boxing spent fuel racks at Monticello would result in the least exposure.

All provisions of 10 CFR Part 20, Standards for Protection Against Radiation will be enforced during this modification just as they are for all plant operations. Routine plant radiation protection measures which are described below, will help to assure that the exposures are kept ALARA. Workers will wear anti-contamination protective clothing during the work near the spent fuel pool and during disposal of the old racks. Control points will also be established to contain radioactive contamination within the work area. All personnel will wear personnel monitoring equipment. In addition, radiation surveys will be conducted to monitor area radiation levels. All phases of the rack replacement and disposal will be performed using written procedures which will be reviewed by the radiation protection personnel for ALARA considerations.

All workers, as a minimum, must wear a pocket dosimeter and a thermoluminescent dosimeter (TLD) when working in radiation areas. The pocket dosimeter can be read anytime and as a minimum is read when the worker leaves the plant

for the day. Normally the TLD is read monthly, but it may be checked any time there is a reason to believe a worker is approaching a radiation limit. Also the plant has administratively set a radiation exposure limit below Part 20 standards to provide a margin which includes dosimeter inaccuracy. In accordance with NRC regulations, all personnel working in radiation areas receive instruction on radiation, use of protective clothing, and methods of minimizing exposure.

As a further check on occupational exposure, plant radiation protection personnel are present when first-time activities occur, such as removal of a contaminated spent fuel rack from the pool. If the plant radiation protection supervisor determines that any of the activities have potential significant radiological considerations, radiation protection personnel would be present for all of those activities. Other activities will be monitored on a periodic basis.

Yours very truly,

L. O. Mayer

L O Mayer, PE
Manager of Nuclear Support Services

LOM/MHV/deh

cc: J G Keppler
G Charnoff
MPCA
Attn: J W Ferman