

May 1, 1970

Name to File (Midland Plant)

MEETING TO DISCUSS AEC REQUIREMENTS/PLANS TO LICENSE THE USE OF MIDLAND PLANT STEAM BY THE DOW CHEMICAL COMPANY

PURPOSE:

This meeting was set-up to brief the ACRS Subcommittee Chairman (L. Squires) on the requirements and plans of the AEC with respect to the licensing of Consumers Power Company and/or the Dow Chemical Company for use of secondary steam from the Midland Plant in the Dow works at Midland.

ATTENDEES:

ACRS L. Squires
R. F. Fraley, Staff

AEC Regulatory Staff

- C. K. Beck, Reg.
- M. M. Mann, Reg.
- L. S. Rogers, *RPS*
- P. A. Morris, DRL
- H. Shapar, OGC (Reg.)
- R. E. Cunningham, DML
- P. J. Veerling, DML
- D. Smith, RPS
- J. Murphy, DRL

DISCUSSION:

Les Rogers noted that fission products in the steam being used by Dow will normally be a factor of 100 - 1,000 below Part 20 limits. It will normally not be zero, however, (it would be zero if the steam generator had a zero leak rate) and will therefore require a license or exemption from the AEC for Consumers to transfer the material and for Dow to receive and use the material - if any. The Staff is planning to require the continuous gross gamma monitor proposed (set at 3×10^{-6} uc/ml) and frequent grab samples of beta activity (with a limit on beta activity of 10^{-8} - 10^{-9} uc/ml) as the most sensitive practical methods of monitoring for radioactivity. A determination will have to be made that these limits will preclude a detectable level of added radioactivity in Dow products. With this system the AEC can say, in effect, that no detectable amount of radioactivity is being added (cont'd on page 2)

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Memo to File (Midland Plant) cont'd

To Dow products, although it cannot certify that the amount is absolutely zero.

Mr. Squires inquired if it is considered practicable to meet these limits on activity. Mr. Rogers noted that the fuel failures and steam generator leak rates for the Midland plant would have to be lower than the levels that exist in plants that have experience to date.

Dr. Beck noted that the licensing requirement by the AEC may present a problem to Dow in dealing with FDA since the AEC can certify that no detectable radioactivity is being introduced in the Dow product but it cannot certify that absolutely no radioactivity is being added. He noted that, in other cases, FDA has accepted concentrations below the lowest detectable level as representing zero in the monitoring of impurities in products.

It was noted that fission products (eg. X_e -132) may represent a significant fraction of the gross gamma activity in the steam. It was noted that X_e - 132 is not considered biologically significant; however, Dow is to provide additional data regarding the relationship between 3×10^{-6} mc/ml gross gamma limit and the F. P. inventory in the steam and Dow products. Part 20 concentration limits are not considered applicable for the steam since it is to be used in a process. (Part 20 limits are considered applicable only to material being released to the environment). In some cases, the radioactivity in process steam could be considerably higher than Part 20, however, in this case, it will have to be much lower. (e.g. low enough so added activity in Dow products is undetectable). It was noted that Dow plans a program to determine the background levels of their products before the nuclear plants go into operation.

In response to a question by Mr. Squires, Pete Morris noted that he personally did not feel that all of these issues have to be fully resolved before a construction permit for Midland. He suggested that, it is only necessary to determine that adequate R&D is in progress and/or alternate solutions can be implemented at the operating license stage. Mr. Squires noted that use of this steam by Dow is a basic consideration to this plant and should be resolved before the project gets too far along.

R. F. Fraley
Executive Secretary

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ACRS Members
J. C. McKinley

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Project: Midland Plant

Status: Construction Permit - second of two scheduled ACRS meetings, letter requested

Background: November 7, 1968, Volumes I & II of PSAR received
January 10, 1969, Preliminary DRL report received
January 13, 1969, Application formally filed
January 22, 1969, Site visit and Subcommittee meeting ✓
January 23, 1969, DRL site report received
February 4, 1969, Subcommittee meeting ✓
February 6-8, 1969, ACRS meeting on site related issues ✓
March 6, 1970, DRL report received
March 24, 1970, Subcommittee meeting ✓
April 9-11, 1970, ACRS meeting ✓
April 24, 1970, Subcommittee meeting ✓

The Midland Plant Units 1 and 2 are two loop (4 pumps) Babcock and Wilcox FWRs with design power levels of 2452 MWt. The plant is owned and will be operated by Consumers Power Company with the Bechtel Corporation as the A-E. The reactors are similar to the units provided for the Rancho Seco, Arkansas Nuclear One, and Three Mile Island Plants.

A unique feature of the Midland Plant is the intent to supply approximately 4,050,000 lb/hr of process steam to the adjacent Dow Chemical Company plant.

At the April 24, 1970 Subcommittee meeting the applicant was requested to prepare presentations on the radioactivity in the process steam exported to Dow and the hazard to the control room from off-site accidents (chlorine tank rupture).

DRL was requested to provide a written supplementary report covering:

- (1) An assessment of the process steam proposal, including the acceptability of the licensing-or-exemption approach, and of criteria which the applicant may propose regarding the use of the steam in Dow's process.
- (2) An estimate of the gaseous effluent releases from the Midland complex vs a more standard FWR.
- (3) An assessment of the "chlorine accident."
- (4) ECCS and reactor trip signal diversity.

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| OFFICE (5) | PMF calculation. | ACRS | |
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(7) Subsidence at the site.

(8) Vessel cavity design.

Other topics for possible discussion include:

(1) Emergency plans - discussed briefly by the Subcommittee, there appears to be a built in delay of 15-20 minutes between the accident and notification to Dow.

(2) Consequences of an undetected fuel enrichment error and of the propagation of fuel failures - identified for Subcommittee consideration but not discussed.

(3) Failure to scram on anticipated transients - identified for Subcommittee consideration but not discussed.

(4) Turbine missiles - the applicant has orally agreed to protect Class I equipment from turbine missiles.

(5) Vibration tests - the applicant has agreed in writing to perform confirmatory vibration tests of the reactor internals.

(6) Hydrogen generation - the applicant has agreed to proceed to the next required step if it is concluded that purging is not acceptable.

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EXCERPT FROM 121ST ACRS MEETING

SPECIAL PROJECTS

✓ 2. Midland Plant Units 1 and 2 - The Committee held its second meeting to review the application by Consumers Power Company for authorization to construct Midland Plant Units 1 and 2. A third meeting has been scheduled for the June (122nd) ACRS Meeting. Items discussed during the meeting included:

a. Reactor Vessel Cavity - The applicant stated that the reaction forces and pressures resulting from a primary coolant pipe rupture having an opening of 3 ft.² was the basis for the current reactor vessel cavity design. The applicant stated that he was prepared to design the cavity to withstand forces similar to those considered at the Indian Point/Zion plants. Consumers believes that the brittle fracture of a reactor pressure vessel is incredible. They had not considered a ductile tear mode of failure, however. Mr. Allen stated that Consumers would not want to operate any nuclear plant where a reactor vessel split was considered a credible occurrence.

Dr. Hendrie informed Consumers that it would be desirable for them to submit a written statement that the vessel cavity design will be equivalent to the Indian Point/Zion designs.

b. Anticipated Transients (no scram) - B&W stated that they had recently discussed with the Regulatory Staff the results of the B&W studies of various systematic failures. B&W added that the Staff had additional requirements regarding the studies, and, therefore, B&W would have to wait for a clarification of these requirements before continuing the studies. B&W had not analyzed a number of anticipated transients, e.g., loss of all primary coolant pumps, loss of off-site power. The possible benefits of additional safety valves and of rapid injection of boron into the reactor moderator were mentioned by the Committee. Dr. Hendrie advised the applicant to be prepared to continue discussion of this matter at the next meeting.

Dr. Hanauer prepared a list of anticipated transients for the applicant to analyze before the next meeting. (This list has been given to the Regulatory Staff for transmittal to the applicant.)

c. Subsidence - The applicant indicated that there was an informal understanding between Consumers and Dow restriction mining operations in the vicinity of the Midland reactor site. The Regulatory Staff has requested the applicant to have wells 19 and 20 abandoned and plugged in addition to the other wells in the area which have been or will be plugged. It was suggested by Dr. Hendrie that consideration be given to an agreement between Dow and Consumers which identifies the zone around the nuclear plant where mining operations would be prohibited. Such an agreement should be made a part of the application.

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EXCERPT FROM 121ST ACRS MEETING

SPECIAL PROJECTS

- d. Chlorine Storage - (effect of chlorine leakage on nuclear plant operations) - Dow representatives reviewed the provisions made to limit the quantity of chlorine released to the atmosphere in the event of a catastrophic failure of a chlorine storage tank. The applicant believes that, for the worst chlorine accident, the nuclear plant operators could be protected through use of Scott Air-Pacs (in the worst case they would be required for about 3 hours) and with charcoal filters in the control room bypass ventilation system.

The applicant stated his intent to strive for a design which would permit the operators to work without air packs under the worst chlorine accident conditions. One ppm chlorine in air is considered by the applicant to be a tolerable level for restricted work.

The Staff felt that the use of air packs was not a satisfactory approach for the continued operation of the nuclear plant. Dr. Hendrie suggested to the applicant that it would be desirable to arrive at an agreement with the Staff on the criteria to which the control room ventilation system will be designed for operational safety and comfort. The desirability of the use of air packs seems questionable.

- e. Containment Sprays - The applicant was notified by the Committee that he should be prepared to discuss the B&W sodium thiosulfate spray research program and the Consumers-supported borated water spray R&D program.
- f. Seismic Criteria for Class I Systems - Dr. Okrent asked the Regulatory Staff to be prepared to discuss, at the June ACRS meeting, the seismic criteria which should be established for Class I systems prior to the completion of a construction permit review of Midland. (Ref: Millstone Section, pg. 4, para. i.)
- g. Other Items Discussed with Staff - Discussions were held with the Regulatory Staff regarding: (1) cable separation criteria (the Staff is satisfied with the applicant's proposal); (2) containment overpressure margins vs. Indian Point/Zion (the Staff is satisfied with the present design); and (3) process steam (the Staff reported that the applicant is still studying means of detection and of ensuring that the radioactivity present is below the limits established by the AEC for the process steam).