

TMI File

August 16, 1979

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

SECY-79-475A

INFORMATION REPORT

To: The Commissioners

From: James R. Shea, Director
Office of International Programs

Thru: Executive Director for Operations *TOR for L.U.G*

Subject: REPORTS GENERATED AND ACTIONS INITIATED BY OTHER COUNTRIES
SUBSEQUENT TO THE TMI-2 INCIDENT

Purpose: To advise the Commission and senior staff of information on TMI-related actions taken and reports received from foreign countries since SECY 79-485, and to notify them of the availability of reports sent out earlier for translation.

Discussion: IP, in SECY 79-485, advised the Commission and senior staff of TMI-related actions taken by and reports received from foreign countries as of June 27, 1979. Enclosure 1 supplements this information through August 8. Enclosure 2 lists those reports now available in English which were reported in SECY 79-485 to be out for translation.

James R. Shea
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Enclosures:
As stated

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FRANCE

Document Received

L'Accident Nucléaire de Three Mile Island (Pennsylvanie-USA), prepared by the Study Mission on the Events of the Accident, June 4, 1979, 55 pages.
Available in French.

This report chronicles the findings of the French team, headed by B. Augustin, Counselor to the Minister of Industry, which visited the U.S. April 29-May 5, 1979, for TMI-2 discussions with NRC, the Atomic Industrial Forum, the Governor of Pennsylvania and state civil defense services, Metropolitan Edison, and media representatives.

ITALY

Document Received

"CNEN Actions and Views About the National Regulatory Programmes in Light of the Three Mile Island Incident," prepared by the Comitato Nazionale per l'Energia Nucleare, June 1979, 8 pages. Available in English.

This paper, presented at the June 27-28 CSNI meeting in Paris, is essentially a translation of the summary of the report prepared by the CNEN Working Group on TMI implications to Italian nuclear power plants. It indicates the immediate actions which ENEL was ordered to take, and makes general recommendations for future actions and corrective measures based on the need for increased protection against unexpected situations of any kind and specific recommendations for the prevention of another TMI-2. The report also acknowledges that (1) its recommendations, except for a few cases (not noted separately), are in agreement with those of NRC and the U.S. vendors, and (2) the CNEN has undertaken a review of the existing emergency planning for Italy's nuclear installations.

JAPAN

Actions Taken

This summary was prepared by Warren Minners of the Lessons Learned Task Force following June 30-31 discussions in Bethesda with MITI officials.

"All operating PWRs in Japan are of Westinghouse design and the only proposed change resulting from the TMI-2 accident is the modification of the pressurizer pressure/level coincident signal for ECCS initiation. The coincident low pressure and low level signal (which is a 1/~ logic) will be retained but a partially independent low pressure ECCS initiation signal will be added. This signal will have independent logic (2/4 in two loop plants and 2/3 in three loop plants) but will use the same pressure transmitters as and will be set 100 psi lower than the pressure in the coincident circuit.

"The Japanese have more concern than we that ECCS will unnecessarily actuate and subject the system to a thermal cycle. Therefore the Ohi 1 & 2 units will not have the additional pressure signal because they are ice condenser plants with a very low setting of the containment pressure ECCS signal. Following a FW trip with a stuck open relief valve, the containment high pressure safety injection signal occurs relatively early (500 sec) and the core quality is always low (2%). They apparently feel that the possible consequence of this event does not justify the possible increase in the frequency of unnecessary ECCS actuations.

"In the other plants the containment signal is late (1367 to 4000 sec) and quality in the core is greater (up to 7%). These other plants will be modified to include the independent pressure signal.

"In plants with the added independent pressure signal, interlocks will also be added to prevent unnecessary ECCS actuation for two possible events. If the pressurizer pressure control logic caused the spray valve to fall open, the coincident signal would not be actuated because the pressurizer level would not reach the set point, but the pressure would go below the independent pressure set point. Therefore an interlock will be added to the spray valve control to prevent opening the valve below 154 kg/cm² (2193 psig).

"If a reactor coolant pump starts at a pressure below 140 kg/cm² (1993 psig) when ECCS actuation is blocked, the pressure will rise above this pressure and then fall below the independent pressure signal set point. To prevent ECCS actuation in this case, the independent pressure, but not the coincident pressure signal, will be interlocked with the intermediate neutron flux.

"Two other events were analyzed, but no changes were judged to be necessary. Loss of the pressurizer heaters would also result in the pressure falling below the independent pressure signal set point.

However this would not occur until after one hour, which is considered sufficient time for the operator to take corrective action. The final event analyzed was continued low flow after a reactor trip which would reduce pressure but not enough to actuate the independent pressure signal." (See first entry under "Documents Received.")

Assumed TMI-Related Incident

The following was also provided by W. Minners:

"A recent incident (July 15) at Ohi 1 was interpreted by the operators to be a TMI-2 type event. A short caused by twisted wires at a connector initiated a low flow reactor trip signal. (The circuit had a 1/1 logic.) The resulting transient caused the secondary system relief valve to open 2 minutes after the reactor tripped because the valve set point was inadvertently set too low. The blowdown through the valve caused the steamline differential pressure (between steamlines) to trip and actuate ECCS. During the transient the RCS pressure fell and returned rapidly to near the initial value. The high rate of pressure change caused the pressurizer relief valve to open. The operator checked the pressure control system and primary to secondary leakage. After 9 minutes the operators plotted the RCS pressure and temperature to assure adequate subcooling, checked pressurizer level (increased to 75% from normal 60%), AFW pump operation, SG level, main steamline valves closed, and containment sump level and then reset safety injection after 13 minutes. About two tons of water were added by the HPIS during the incident."

Documents Received

"Measures to Be Taken in Conformity with Analysis Results of ECCS Pertaining to Pressurizer Level Instruments of PWR Plants (Two and Three Loop Plants), prepared by the Agency for Natural Resources and Energy, MITI, June 28, 1979, 2 pages.

ANRE, as a result of the TMI-2 accident, has analyzed and evaluated the influence of pressurizer level instruments on the effectiveness and functionability of the ECCS of Japanese PWRs (2- and 3-loop plants) by simulating the initial sequence of TMI events, with the following results:

- (1) For the case in which all main feedwater pumps trip while a reactor is in rated full power operation with subsequent failure to start all three auxiliary feedwater pumps automatically against the design to be automatically initiated under this condition (15 minutes later to be manually started); pressurizer pressure will not build up to set point level for pressurizer relief valve(s) to actuate ($164.2 \text{ kg/cm}^2\text{G}$), and the plant can be safely shutdown.
- (2) With an additional assumption to (1) above in which the pressurizer relief valve once opens during the transient as designed but is to be stuck open

against the design even after system pressure comes back to its closing set point level due to a failure in the pressurizer pressure control system; the core can be kept totally covered with water for an extended period of time, and the coolant discharge from the primary system can be positively detected by such indications as the open or closed position of the pressurizer relief valve(s), exit line temperature of the valve(s), primary coolant temperature and pressure, containment vessel atmosphere temperature and radiation level, which provide the plant operator sufficient time for closing the isolation valve(s) in the pressurizer relief line manually.

- (3) With a further assumption added to (1) and (2) above in which the operator fails to close the isolation valve manually so that a longer period of time elapses before automatic initiation of the safety injection signal, the core can be maintained submerged for an extended period of time, which provides the plant operator sufficient time allowance for manually starting the high pressure safety injection system of ECCS.
- (4) For the conditions (1-3) above, manual operation is considered sufficient to mitigate the situation practically and safely. However, it is deemed more favorable to automatically start ECCS in a rather early stage of event when it is necessary by adding an independent low reactor pressure signal to initiate the safety injection signal (named P' in the following) in addition to the presently designed and existing coincident signal of low reactor pressure and low pressurizer level.
- (5) For the addition of this P' signal circuit, the possibility of inadvertent actuation of ECCS was also reviewed. It was concluded that precautionary measures such as adequate implementation of plant operation and control procedures and management, and engineering improvements to prevent spurious actuation of ECCS, can be sufficiently provided.
- (6) Finally, by safety analysis for the cases (1-3) above with the additional P' signal, it is concluded that the reactor plant can be safely shut down without impairing the integrity of the core.

"Report of the JAIF Survey Team on TMI Accident," Atoms in Japan, June 1979, Volume 23, No. 6, 9 pages. Available in English.

This report, prepared by a JAIF team which was in the U.S. April 18-27 to gather facts about the TMI-2 accident and to look into its social consequences, summarizes the team's findings. It contains an introduction, sections on the accident sequence and problems and emergency response and problems, and an appendix. The report observes that "the fact that the accident caused no immediate casualties indicates the overall safety of the system of nuclear power."

Report of the TMI Accident, prepared by the Science and Technology Agency, May 2, 1979, 22 pages. Available in Japanese.

This report collects information about the TMI-2 accident, including the correspondence of the developed countries.

First Interim Report by the Special Committee on Investigation of the Accident at an American Nuclear Power Station, prepared by the Special Committee of Investigation, May 28, 1979, 125 pages. Available in Japanese.

This report collects information on the TMI-2 accident obtained by the Special Committee by the middle of May, and makes a few comments on the material.

THE NETHERLANDS

Actions Taken

The Minister for Social Affairs, appearing by invitation before Parliament on April 5, expressed his concern about the seriousness of the TMI-2 accident, but stated his view that sufficient dissimilarities existed between TMI and Borssele (a PWR of KWU design) and Dodewaard (a BWR of GE design) that no shutdown of the Dutch plants for safety reasons was necessary. By follow-up note dated May 11 (See entry under "Documents Received."), he presented Parliament with more details on the accident, as well as with a review of implications for the Dutch nuclear program, the basic facts of which were derived from TMI information provided by NRC.

This preliminary review concluded that there is no immediate need for design changes in operating Dutch nuclear power plants. The Ministry for Social Affairs (NMSA) has, however, asked the plant owners to respond to a number of questions on verification of operating and maintenance procedures and the role of operating personnel. In general terms, these questions are similar to questions 1, 2, 6a, 7, 8, 9 and 11 of IE Bulletin No. 79-06B. The answers are presently being evaluated and discussed with the plant owners. Other technical design changes are under consideration by the NMSA staff.

On an interim basis the following measures have been taken at the Borssele plant:

- (1) Manual initiation of HPSI at low primary system pressure alone. Automatic HPSI had been designed at coincident low system pressure and low level signals or system pressure and high containment pressure. Preliminary analysis of small breaks in the pressurizer and of a stuck-open pressurizer spray valve have shown the possibility that neither one of these coincident signals might be triggered. However, drop of system pressure could easily cause voiding in the core. Change in protection system logic is under consideration (e.g., coincident low system pressure and small temperature difference between core outlet and pressurizer).
- (2) Automatic start of reactor building sump pump has been switched off. High level sump alarm with trigger operator response for a manual start.

At the Dodewaard plant, the hydrogen problem in containment has been prevented by inerting the containment after the recent refuelling outage. Provisions have been made for hydrogen and oxygen sampling and hydrogen removal by a recombiner.

The other chapters of the governmental note devote attention to the relation of the TMI accident to general safety studies, emergency planning both at TMI and in the Netherlands, and neighboring countries and international consultation on safety matters.

The various recommendations and topics for further study as mentioned in the ACRS interim reports and the NRC staff report NUREG-0560 are also under review. Special

attention has been devoted to the implication of the isolation of those systems that provide service water and lube-oil to the main coolant pumps.

Documents Received

"Aan de Orde Is de Regeeringsverklaring Over de Storing in een Kernreactor te Harrisburg in Amerika," April 5, 1979, 1 page. Available in Dutch.

Kernongeval nabij Harrisburg, Brief van de Ministers van Sociale Zaken en van Volksgezondheid en Milieuhygiene, May 11, 1979, 15 pages. Available in Dutch.

Chapter 1 of this report acknowledges NRC's cooperation in supplying information. Chapter 2 provides a description of the plant and the preliminary accident sequence. Chapter 3 contains an analysis of the radiological consequences of the accident, while Chapter 4 summarizes technical differences between Borssele and TMI-2 in the following areas:

- a) design and testing of feedwater system
- b) steam generator (design, heat transfer and water content-thermal inertia)
- c) reactor trip signals on feedwater transients
- d) automatic closure of relief line if relief valve is stuck open
- e) pressurizer level-indication
- f) HPSI operation and manual shut-off
- g) containment isolation trip signals
- h) natural circulation behavior
- i) containment design..

Chapter 5, based on these technical differences and the typical errors and failures in the TMI accident sequence, concludes that there is no immediate need for design changes in Dutch plants.

THE PHILIPPINES

Action Requested

The Embassy of the Philippines, by diplomatic note dated July 17, 1979, requested the Department of State to arrange for NRC to answer several questions in connection with the current inquiry being undertaken by a presidential commission in the Philippines on the nuclear power plant under construction on the Bataan peninsula. NRR and IP are preparing the responses, which will be submitted to the Commission for review before transmittal to State.

SWEDEN

Possible TMI-Related Action

A new law was passed in Sweden on June 19, 1979, which postpones the fueling of any reactor not fueled before that date to the end of June 1980 or any earlier date decided upon by the government. The object of the law is to prevent the start up of any new reactors (beyond the 6 already in operation) before the Swedish referendum on nuclear power policy to be held March 15, 1980. Immediately affected by the law were Ringhals 3 and Forsmark 1, which received their fueling permits, according to the stipulative law, on June 21. Ringhals 4 and Forsmark 2 might also be affected.

The new law provides that the owner of a reactor which has been given fueling permission according to the stipulative law but which cannot now be fueled because of the new law is entitled to indemnity from the state.

TRANSLATIONS NOW AVAILABLE

Denmark

Report on the TMI Incident in Harrisburg, Pennsylvania, May 1979, 31 pages.

France

"Answers of Industry Minister Andre Giraud to TMI Questions of Senator Charty,"
April 24, 1979, 5 pages.