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EISENHUT,D.G. Division of Operating Reactors

SUBJECT: Forwards info re commitment to meet NUREG-0578 requirements & near-term emergency preparedness implementation schedule, in response to 790913 request.

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NIAGARA MOHAWK

NIAGARA MOHAWK POWER CORPORATION/300 ERIE BOULEVARD WEST, SYRACUSE, N.Y. 13202/TELEPHONE (315) 474-1511

October 18, 1979

Mr. Darrell G. Eisenhut, Acting Director
Division of Operating Reactors
Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Mr. Eisenhut:

Re: Nine Mile Point Unit 1
Docket No. 50-220
DPR-63

Your letter dated September 13, 1979 requested information related to our plans to implement the recommendations contained in NUREG 0578, TMI-2 Lessons Learned Task Force Status Report and Short-Term Recommendations. The attached Table 1 responds to that request.

The implementation schedules are based on a preliminary evaluation of your recommendations. As additional clarification is provided by your staff and the details of the design are finalized, schedule changes may be required. In any case, Niagara Mohawk will implement modifications as soon as practical after finalization of the design. At the present time, we plan to implement all modifications before the end of our next refueling outage which is scheduled to begin in March, 1981.

Your letter also requested information related to our plans to implement your emergency preparedness recommendations. The attached Table 2 addresses this request.

Very truly yours,

NIAGARA MOHAWK POWER CORPORATION

Gerald K. Rhode
Vice President
System Project Management

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S/1
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Attachments

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TABLE 1

Nine Mile Point Unit 1 Commitment to Meet NUREG-0578 Requirements

Recommendation No.	Position Title	NRC Position Description	NRC Implementation Date	NMPC Action & Date
2.1.1	Emergency Power Supply Requirement	Complete Implementation	January 1, 1980	The power-operated relief valves in Nine Mile Point Unit 1 are already powered by emergency power. There are no power operated block valves included in the design of the Nine Mile Point Unit 1 power-operated relief valves. The reactor vessel level indication instrument channels for safety system activation and control are already powered by emergency power. As discussed in NEDO-24708, dated August 1979, natural circulation in a BWR is inherent in all off-normal modes of operation, as long as sufficient inventory is maintained. This is independent of power supply. Since BWR's operate with both liquid and steam in the reactor pressure vessel, saturation conditions are maintained irrespective of system pressure. Thus, there is no need for emergency power to maintain natural circulation. There is also no need to keep the system pressurized. A loss of off-site power will not in itself cause the initiation of the High Pressure Coolant Injections or the Low Pressure Core Spray Systems to maintain reactor water level. Therefore, there is no need for action in response to recommendation 2.1.1 for Nine Mile Point Unit 1.

TABLE 1

Nine Mile Point Unit 1 Commitment to Meet NUREG-0578 Requirements

Recommendation No.	Position Title	NRC Position Description	NRC Implementation Date	NMPC Action & Date
2.1.2	Relief and Safety Valve Testing	Submit Program Description and Schedule Complete Test Program	January 1, 1980 By July 1981	The BWR design basis includes no transients or accidents in which two-phase flow or sub-cooled liquid flow is calculated or expected to pass through the safety and relief valves. Furthermore, the Nine Mile Point Unit 1 design includes a high level water trip which limits the water level below the main steam lines. This further precludes the possibility of having two-phase or sub-cooled liquid flow through the safety and relief valves. The attached report provides additional information which justifies that a testing program for BWR safety and relief valve capabilities regarding two-phase or sub-cooled liquid flow is not necessary. Safety and relief valves have been qualified for performance with steam flow. Therefore, no action is required by Niagara Mohawk on this recommendation.

TABLE 1

Nine Mile Point Unit 1 Commitment to Meet NUREG-0578 Requirements

Recommendation No.	Position Title	NRC Position Description	NRC Implementation Date	NMPC Action & Date
2.1.3.a	Direct Indication of Valve Position	Complete Implementation	January 1, 1981	The safety valves on the reactor vessel head are not power-operated nor do they have discharge piping to provide direct indication of safety valve position. Indication of safety valve opening is indicated by an increase in drywell pressure and temperature. Direct indication of relief valve opening will be provided by installing acoustic monitoring instruments on the torus in the areas where the quenchers discharge. The instruments are designed to meet the accident environmental conditions. Due to equipment lead times, this instrumentation will not be installed until February 28, 1980.
2.1.3.b	Instrumentation for Inadequate Core Cooling	Develop Procedures and Describe Existing Instruments	January 1, 1980	Niagara Mohawk will comply with this requirement by January 1, 1980.
		New Level Instrument Design	January 1, 1980 Submitted	Niagara Mohawk will perform a review of the existing water level instrumentation. A new level instrument design and implementation schedule will be submitted by January 1, 1980, if it is determined that additional instrumentation is required.

TABLE 1

Nine Mile Point Unit 1 Commitment to Meet NUREG-0578 Requirements

Recommendation No.	Position Title	NRC Position Description	NRC Implementation Date	NMPC Action & Date
		Sub-cooling Meter Installed	January 1, 1980	No action required. This position applies to PWR's only.
		New Level Instrument Installed	January 1, 1981	If it is determined that additional water level instrumentation is necessary, Niagara Mohawk plans to complete installation before the end of the next refueling outage scheduled to begin in March 1981.
2.1.4	Diverse Containment Isolation	Complete Implementation	January 1, 1980	Niagara Mohawk will perform a re-review of containment isolation and submit the results by January 1, 1980.
2.1.5.a	Dedicated H2 Control Penetration	Description and Implementation Schedule	January 1, 1980	Niagara Mohawk will review the design of the Nine Mile Point Unit 1 purge system and provide description and implementation schedule for any modifications determined necessary by January 1, 1980.
		Complete Installation	January 1, 1981	Niagara Mohawk plans to complete the installation of any necessary modifications by providing dedicated penetrations or single failure proof designs by the end of the next refueling outage scheduled to begin in March 1981.
2.1.5.c	Recombiners	Review Procedures and Basis for Recombiner Use	January 1, 1980	The Nine Mile Point Unit 1 design does not require the use of recombiners. Therefore, no action is required by Niagara Mohawk on this recommendation.

TABLE 1

Nine Mile Point Unit 1 Commitment to Meet
NUREG-0578 Requirements

Recommendation No.	Position Title	NRC Position Description	NRC Implementation Date	NMPC Action & Date
2.1.6.a	Systems Integrity for High Radioactivity	Immediate Reduction Program	January 1, 1980	Niagara Mohawk is currently reviewing its preventative maintenance program to determine if additional leak detection measures are required. The results will be submitted by January 1, 1980.
		Preventative Maintenance Program	January 1, 1980	Niagara Mohawk currently has a preventative maintenance program in place. This program will be revised accordingly to maintain leakage to as low as practical levels by January 1, 1980..
2.1.6.b	Plant Shielding Review	To Complete Design Review	January 1, 1980	Niagara Mohawk is currently performing a review of the Nine Mile Point Unit 1 plant. This is to identify areas which may need to be accessed to perform post-accident functions. The review will determine if personnel occupancy in these areas would be unduly limited or if safety equipment would be unduly degraded by the radiation fields during post-accident operation of these systems. The design review will be submitted by June 1, 1980.

TABLE 1

Nine Mile Point Unit 1 Commitment to Meet NUREG-0578 Requirements

Recommendation No.	Position Title	NRC Position Description	NRC Implementation Date	NMPC Action & Date
		Implement Plant Modifications	January 1, 1981	The schedule for implementing plant modifications will be provided when the design review is completed. However, implementation will depend on the extensiveness of modifications required. Niagara Mohawk plans to make all modifications by the end of the next refueling outage scheduled to begin in March 1981.
2.1.7.a	Auto Initiation of Auxiliary Feed	Complete Implementation of Control Grade Complete Implementation of Safety Grade	January 1, 1980 January 1, 1981	In the event of a loss of feedwater flow at Nine Mile Point Unit 1, safety-related systems would be automatically initiated. These automatic initiation signals and circuits are designed and tested in accordance with safety grade requirements. Therefore, no action is required by Niagara Mohawk on this recommendation.
2.1.7.b	Auxiliary Feed Flow Indication	Complete Implementation	January 1, 1981	Same as 2.1.7.a above.
2.1.8.a	Post Accident Sampling	Design Review Complete	January 1, 1980	Niagara Mohawk will review the capability to obtain samples from the reactor coolant system and containment atmosphere under high radioactivity conditions by January 1, 1980. Niagara Mohawk will also evaluate the capability for analyzing these samples either on-site or off-site by January 1, 1980.

TABLE 1

Nine Mile Point Unit 1 Commitment to Meet NUREG-0578 Requirements

Recommendation No.	Position Title	NRC Position Description	NRC Implementation Date	NMPC Action & Date
		Preparation of Revised Procedures	January 1, 1980	Existing procedures for obtaining samples of the reactor coolant system and containment atmosphere will be reviewed and revised accordingly by January 1, 1980. As modifications are completed, procedures will be revised accordingly.
		Description of Proposed Modifications	January 1, 1980	A description of the proposed modifications will be submitted by January 1, 1980.
		Implement Plant Modifications	January 1, 1981	Except for the analysis capabilities, Niagara Mohawk plans to complete all plant modifications determined necessary by the end of the next refueling outage scheduled to begin in March, 1981. The schedule for providing capability for analysis of high level samples will be provided by January 1, 1980.
2.1.8.b	High Range Radiation Monitors	Installation Complete	January 1, 1981	Niagara Mohawk will comply with the requirements by the end of the next refueling outage scheduled to begin in March 1981. The range of gas effluent monitors will be based on total activity (curies/second) rather than concentration, since the concentration is dependent on the flow rate of the release.

TABLE 1

Nine Mile Point Unit 1 Commitment to Meet NUREG-0578 Requirements

Recommendation No.	Position Title	NRC Position Description	NRC Implementation Date	NMPC Action & Date
2.1.8.c	Improved Plant Iodine Instrumentation	Complete Implementation	January 1, 1980	Presently, Nine Mile Point Unit 1 has the capability to determine airborne iodine concentration by gamma energy spectrum analysis. Cross contamination of the lab will have to be evaluated by January 1, 1980..
2.1.9	Transient and Accident Analysis	Complete Analysis Procedures and Training	In Accordance with NRC Schedule	The specific requirements for analysis are being developed in a continuing series of meetings between the BWR Owner's Group and the NRC Bulletins and Orders Task Force. The completion of the analysis, implementation of the emergency procedures and retraining will be done on a schedule consistent with agreements established with the Bulletins and Orders Task Force.
	Containment Pressure Monitor Containment Water Level Monitor Containment Hydrogen Monitor	Installation Complete	January 1, 1981	Niagara Mohawk will comply with this requirement by the end of the next refueling outage scheduled to begin in March 1981.

TABLE 1

Nine Mile Point Unit 1 Commitment to Meet NUREG-0578 Requirements

Recommendation No.	Position Title	NRC Position Description	NRC Implementation Date	NMPC Action & Date
	Reactor Coolant System Venting	Design Submitted Installation Complete	January 1, 1980 January 1, 1981	Niagara Mohawk endorses the position submitted by the BWR Owner's Group. These safety related pressure relief valves located on the main steam lines and the existing Reactor Head Vent System are sufficient to provide reactor coolant system venting. The Nine Mile Point Unit 1 design does not include a HPCI or RCIC system with steam driven turbines. The Nine Mile Point Unit 1 reactor head vent system employs a single 2" vent line with an AC motor operated valve in it. The main steam line can also be vented through a hydrostatic test line, which has a locked open valve in it. This test line is connected to the reactor head vent line upstream of the first AC motor operated valve. The vent line then branches into two lines, with one line going to the drywell equipment drain tank and the other line venting directly to the containment atmosphere. Each line has an AC motor operated blocking valve in it. This provides two motor operated valves operable from the control room in series between the reactor coolant system boundary and the containment atmosphere. Each emergency condenser has a high point vent which vents non-condensables to the main steam line. All other systems which could contain non-condensables are isolated from the reactor vessel during accident conditions and therefore would not require venting. Therefore, no action is required by Niagara Mohawk on this recommendation.

TABLE 1

Nine Mile Point Unit 1 Commitment to Meet NUREG-0578 Requirements

Recommendation No.	Position Title	NRC Position Description	NRC Implementation Date	NMPC Action & Date
2.2.1.a	Shift Supervisor Responsibilities	Complete Implementation	January 1, 1980	Niagara Mohawk will comply with this recommendation by January 1, 1980.
2.2.1.b	Shift Technical Advisor	Shift Technical Advisor on Duty	January 1, 1980	The accident assessment function of the Shift Technical Advisor will be performed by the Station Shift Supervisor whose training will be upgraded to include an in-depth college level knowledge of mathematics, chemistry, thermodynamics, fluid mechanics, electrical engineering, and control theory. He will be granted relief from routine administrative functions and first level operating supervision so that he may function as a full time manager of his shift. The operating experience assessment function will be performed by a committee of station professional personnel and corporate level engineering personnel coordinated by a person on the station technical staff whose primary duty will be operating experience assessment. Shift personnel assignments will be rearranged by January 1, 1980 to implement the required training and revised duty specifications. Training of the Station Shift Supervisor or interim shift personnel for the accident assessment function, and operations orientation training for the operating experience assessment function will be completed by January 1, 1981.
		Complete Training	January 1, 1981	

TABLE 1

Nine Mile Point Unit 1 Commitment to Meet NUREG-0578 Requirements

Recommendation No.	Position Title	NRC Position Description	NRC Implementation Date	NMPC Action & Date
2.2.1.c	Shift Turnover Procedures	Complete Implementation	January 1, 1980	Niagara Mohawk will comply with this recommendation by January 1, 1980.
2.2.2.a	Control Room Access Control	Complete Implementation	January 1, 1980	Niagara Mohawk will comply with this recommendation by January 1, 1980.
2.2.2.b	On-site Technical Support Center	Establish Center	January 1, 1980	By January 1, 1980, Niagara Mohawk will designate an area to be used as the on-site technical support center and submit a description of modifications and an implementation schedule.
2.2.2.c	On-site Operational Support Center	Complete Implementation	January 1, 1980	Niagara Mohawk will comply with this recommendation by January 1, 1980.

TABLE 2

Near Term Emergency Preparedness Implementation Schedule

Item	NRC Implementation Date	Niagara Mohawk Action and Date
1. Upgrade Emergency Plan to Regulatory Guide 1.101.	Mid-1980	Niagara Mohawk will comply with this requirement by mid-1980.
2. Implement certain short-term actions recommended by Lessons Learned Task Force and use these in action level criteria.		Niagara Mohawk will comply with the Lessons Learned recommendations, 2.1.8a, b, and c as indicated in Table 1. The information provided by this instrumentation will be related to the Emergency Plan action levels when it becomes available.
3. Establish emergency operation center for federal, state and local officials.		
a. designate location and alternate location and provide communications to plant	Mid-1980	Niagara Mohawk will comply with this requirement by mid-1980.
b. upgrade emergency operation center in conjunction with in-plant technical support center	January 1, 1981	Niagara Mohawk will comply with this requirement by January 1, 1981
4. Improve offsite monitoring capability	Mid-1980	Niagara Mohawk will review its offsite monitoring capability and perform any required modifications by mid-1980.

TABLE 2 (cont'd)

Near Term Emergency Preparedness Implementation Schedule

Item	NRC Implementation Date	Niagara Mohawk Action and Date
5. Assure adequacy of state/local plans		
a. against current criteria	Mid-1980	Niagara Mohawk will comply with this requirement by mid-1980.
b. against upgraded criteria	January 1, 1981	Niagara Mohawk will comply with this criteria by January 1, 1981.
6. Conduct test exercises (federal, state, local and licensee)		
a. test of licensees emergency plan	Mid-1980	Niagara Mohawk will comply with this requirement by mid-1980.
b. test of state emergency plan	Mid-1980	Niagara Mohawk will comply with this requirement by mid-1980.
c. joint test exercise of emergency plan (federal, state, local and licensee)	Once every 5 years	Niagara Mohawk will comply with this requirement.

BWR RELIEF AND SAFETY VALVE DESIGN AND OPERATING EXPERIENCE

NUREG-0578 Recommendation 2.1.2 - Performance Testing for BWR and PWM Relief and Safety Valves

Commit to provide performance verification by full scale prototypical testing for all relief and safety valves. Test conditions shall include two-phase slug flow and subcooled liquid flow calculated to occur for design-basis transients and accidents.

DISCUSSION:

The BWR design basis includes no transients or accidents in which two-phase flow or subcooled liquid flow at high pressure is calculated or expected.* In determining the need for special testing of BWR safety and relief valves it is essential to consider the service duty to which the primary system relief and safety valves of the BWR are exposed, and the consequences of maloperation of these valves. Relief valves are routinely used to mitigate the effects of system transients. A stuck-open valve is not an event of great significance in a BWR: in 300 reactor years of experience, 50 cases have occurred; in 3 such cases, the safety and relief valves passed two-phase flow. Tables 1 and 2 summarize the experience to date. This experience, as will be explained, clearly shows that there is no need for an extensive testing program for BWR safety and relief valves.

*Liquid flow is expected as an alternate shutdown mode in some units. This flow, however, is controlled and occurs at low pressure.

A. BWR Safety and Relief Valves

Table 2.1-3 of NEDO-24708 shows the complement of safety and relief valves for all domestic operating BWRs. Most BWRs have relief valves or dual-function safety/relief valves (S/RV), the discharges of which are piped to the suppression pool. Spring safety valves discharge directly to the drywell (or the containment in a dry containment), except for Humboldt Bay, in which the safety valves discharge to the suppression pool.

B. Valve Usage

(1) Dual-function S/RV Plants. The S/RVs are designed to routinely mitigate the effect of system transients. Their discharges are piped to the containment suppression pool. This massive heat sink prevents significant containment heatup. Complication of a system transient by a stuck-open valve has essentially no effect on reactor vessel water level measurement or on forced or natural circulation capability. The flow through the valve is saturated steam. If the valve cannot be closed by operator action the plant can be shut down using familiar and uncomplicated procedures.

(2) Plants with relief (and/or S/RV) and safety valves. Steam in the relief function is discharged to the containment suppression pool and the discussion of (a) applies. The safety valve set-point is sufficiently higher than the relief set-point that the safety valves are almost never required to operate (Table 2 documents the three cases in which safety valves have ever lifted in BWR

operation). Should a safety valve inadvertently lift, which has never happened in BWR operation, the effect is the same as a small steam line break inside containment. Even in this remote event, the flow through the valves will be saturated steam at all times.

(3) Dresden 1. For pressurization events, such as a turbine trip, the two relief valves, which are located downstream of the main steam isolation valves (MSIV), are sized to relieve pressure directly to the main condenser without requiring safety valve action. In the event of MSIV closure, reactor scram is initiated from MSIV position switches, which also initiate the redundant isolation condensers. Even one isolation condenser will limit reactor pressure to well below the safety valve set-point. The results of a stuck-open safety valve would be as described in (2) above.

(4) Big Rock Point - An isolation condenser is provided containing redundant cooling loops, either one of which (when automatically actuated at 1450 psig) keeps reactor pressure below the spring safety valve set-point. The results of a stuck-open safety valve would be as described in (2) above.

(5) Humboldt Bay - All spring safety valves are piped to the containment suppression pool. Therefore, the results of a stuck-open valve would be as described in (1) above.

C. Two-Phase Flow

Expected operating conditions and transients do not include two-phase flow through S/RV's, safety or relief valves. However, in three incidents, circumstances combined to cause high pressure water to flow down the steamlines and a steam/water mixture to flow through the valves. A summary of these events is given in Table 3. In these events, Electromatic relief valves and direct acting safety valves were actuated, discharged a steam/water mixture and reclosed, indicating that the flow media did not cause a stuck-open valve condition. Construction of other BWR direct acting S/RV's is equivalent to the designs used in these early plants. These events did not lead to any concern over core uncovery. However, following these events, high water level trips were added to all new BWRs and retrofitted to most of the BWRs in operation.

D. Valve Qualification

(1) Crosby, Dikkers, Okano and two-stage Target Rock S/RV's are tested for the expected saturated steam flow conditions. This includes life-cycle testing of 300 actuations as well as environmental qualifications including seismic, thermal, mechanical and radiation effects.

(2) Three-stage Target Rock S/RVs were subjected to restricted flow steam tests to qualify the set-point and valve opening time delay. Solenoid valves (used during power actuation) are qualified by autoclave test for the LOCA environment. Satisfactory valve operation is indicated by field service.

(3) Dresser Electromatic relief valve solenoids were qualified by autoclave test for the LOCA environment. Satisfactory valve operation is indicated by field service.

(4) Satisfactory operation of Dresser safety valves is indicated by field service.

E. Field Experience

Since 1971 there have been 50 events in BWR plant operation wherein S/RV's have stuck open (Table 1). In each of these cases the reactor was depressurized, the stuck valve was repaired or replaced, and the plant was placed back into service.

Although a stuck-open S/RV is ordinarily of no safety concern, programs are underway to reduce the frequency of such events. From Table 1 it is seen that the total number of S/RV blowdowns has steadily decreased since the mid-70's. The improvement in the number of S/RV blowdowns as a percentage of the total number of S/RV's in service has been even more dramatic. From Table 2 it is seen that experience with Dresser safety valves and Electromatic relief valve has always been good.

F. Summary

(1) BWR S/RV's are routinely tested for the only expected mode of operation (saturated steam), both by in-place functional tests and by frequent usage in mitigating plant transients;

(2) There is no design-basis transient or accident which requires S/RVs to pass two-phase or liquid flow at high pressure;

(3) Inadvertent passage of two-phase flow is not likely where high pressure feedwater and injection systems are tripped by high vessel water level.

(4) In the three events wherein BWR S/RVs did pass two-phase flow, the valves reclosed;

(5) Spring safety and Electromatic relief valves are almost never required to open: in the even less likely event that one should stick open, the effect is identical to that of a small steam line break. There is no concern for core uncovery, and the valve need not pass two-phase flow;

(6) Dual-function S/RVs are frequently called on to operate and occasionally stick open. The consequences of a stuck-open valve are minimal and reactor shutdown is uncomplicated, as proven by numerous field occurrences. In some BWR's the procedure for responding to a stuck-open relief valve include the opening of additional relief valves. There is no concern for core uncovery, and the valve need not pass two-phase flow. Improvement programs are reducing the frequency of such events.

G. OWNERS GROUP IMPLEMENTATION CRITERIA

It is concluded that concerns regarding safety/relief valve performance have been addressed and no additional testing is required provided that the following criteria are met:

1. A procedure exists for responding to a stuck open relief, S/RV, or safety valve.

2. The procedures shall address prevention of inadvertent overfilling of the reactor vessel.

3. A control grade system, actuated by reactor vessel high water level, shall be provided to prevent the feedwater system from overfilling the vessel.

4. A safety grade system, actuated by reactor vessel high water level, shall be provided to prevent the high pressure injection systems from overfilling the vessel.

TABLE 1

S/RV BLOWDOWNS IN BWR OPERATION

YEAR	3-STAGE TARGET ROCK			2-STAGE TARGET ROCK		CROSBY-OKANO-DIKKERS		TOTAL S/RV BLOW-DOWNS	TOTAL S/RVs IN SERVICE	TOTAL BLOWDOWNS DIVIDED BY TOTAL VALVES IN SERVICE
	TOTAL BLOWDOWNS	STUCK OPEN FOLLOWING DEMAND	# OF VALVES IN SERVICE	TOTAL BLOWDOWNS	# OF VALVES IN SERVICE	TOTAL BLOWDOWNS	# OF VALVES IN SERVICE			
1971	2	2	14					2	4	0.5
1972	1	1	23					1	23	0.04
1973	1	1	56					1	56	0.02
1974	10	1	108					10	108	0.09
1975	7	0	127					7	127	0.06
1976	11	1	149					11	149	0.07
1977	9	4	157					9	157	0.06
1978	5	3	157	0	11	0	35	5	203	0.02
1979 to Sept.	4	1	132	0	36	0	52	4	220	0.02

NOTE: The above table does not include Dresser Safety Valves (unpiped discharge) or "Electromatic" relief valves. See Table 2 for information on this equipment.

TABLE 2

SAFETY AND ELECTROMATIC RELIEF VALVE

BLOWDOWNS IN BWR OPERATION

A. Dresser Safety Valves.

Only one event has ever occurred with partially stuck open valves - the Dresden 2 event described in Table 3. The lifting levers which jammed the valves partially open were subsequently removed from safety valves at all plants and there have been no further occurrences. There have only been three occurrences in which safety valves have ever lifted during operation (see Table 3). The total number of valves in service is 76[1].

B. Dresser Electromatic Relief Valves.

There have been two occurrences of a stuck open Electromatic relief valve, one of which followed a demand. These events occurred at the same plant in April 1973 and March 1977. The number of valves in service is 37.[1]

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[1] Some BWRs are in the process of replacing Dresser Safety valves and Electromatic relief valves with Target Rock S/RVs.

TABLE 3

BWR EVENTS IN WHICH TWO-PHASE FLOW OR

LIQUID PASSED THROUGH SAFETY/RELIEF VALVES

DRESDEN 2 - JUNE 5, 1970

During the course of the initial test program on Dresden 2 with the unit operating at 75% power, a spurious signal in the reactor pressure control system occurred. This spurious signal resulted in sumultaneous opening of the control and the turbine bypass valves with resultant turbine trip, reactor scram, and main steamline isolation.

In response to the initial and expected water level drop, the operator switched to manual control of the feedwater system and began filling the reactor vessel at the maximum rate. Water level misinterpretation led to reactor water overflowing into the main steam lines. A pressure surge resulted in the main steam lines when relief valves were cycled. This momentarily opened one of the safety valves, resulting in a discharge directly to the containment (unpiped discharge). The fluid impinged upon the lifting levers of two other safety valves causing these safety valves to cock slightly open. The water-steam mixture from the two safety valves pressurized the primary containment. As a result, the containment was pressurized to an estimated 20 psig and an estimated temperature of approximately 300°F. Damage within the drywell was generally limited to over-heating of most of the flux monitoring instrumentation cables and water impingement on insulation. At no time during the event was there difficulty maintaining adequate water supply to the reactor core, and there was no question of adequate core cooling.

DRESDEN 2 - DECEMBER 8, 1971

Unit 3 was operating about 98% power on December 8, 1971, when the plant was shut down due to a reactor low water level scram. The scram resulted from a condensate/condensate booster pump trip and the subsequent trip of two reactor feed pumps on low suction pressure. Following the scram, the standby feed pump started. The vessel was overfilled and the steam lines flooded. Due to a pressure surge in the main steam lines, a safety valve lifted causing discharge directly to the containment (unpiped discharge). Pressurization of the containment continued as high as 20 psig. Inspections showed that the high humidity and temperature in the drywell following the release to the containment damaged LPRM cables, which required replacement. Other results of the discharge from the safety valve included damage to an electromatic relief valve controller, damage to insulation near the safety valve, scoured paint on the drywell walls, and a damaged ventilation duct. There was never any concern for maintaining adequate water supply to the reactor core, and there was no question of adequate core cooling.

KRB (GERMANY) - JANUARY 13, 1977

The unit was operating at 100% power when a bus on two of its 200 KV lines opened. The plant was scrammed and isolated. Manual feedwater control was initiated which resulted in flooding of the steam lines. Safety valves opened and discharged water, steam and two-phase media. The valves discharged directly to the containment (unpiped discharge). The safety valves opened and reclosed several times. Because of the unique piping arrangement (which is not present in any US-BWR), reaction forces of the discharging valves caused or contributed to a pipe rupture in two of the fourteen flanged nozzles by which the valves are connected to a U-shaped header. At no time during the event was there concern for maintaining adequate water supply to the reactor core, and there was no question of adequate core cooling.

[illegible]

[illegible]

[illegible]