OFFICE OF THE ATTORNEY GENERAL

MEMORANDUM OF INVESTIGATION

CONCERNING

SEABROOK LOW POWER TESTING

TRANSIENT EVENT OF JUNE 1989

August 23, 1989

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I. SUMMARY OF FINDINGS

On June 22, 1989, a transient event occurred at the Seabrook nuclear power facility while low power testing was being conducted at a 3% power level. Testing was terminated and the reactor shutdown by New Hampshire Yankee (hereafter "NHY") pending an investigation by the Nuclear Regulatory Commission Region I office (hereafter "NRC"). On June 27, 1989, the Governor requested the Office of the Attorney General to conduct an independent inquiry of the circumstances surrounding the event. The following is a summary of the results of our investigation.

At no point during the events of June 22, 1989 was public health or safety at risk. As the NRC report carefully states, the significance of every concern now at issue must be assessed with this point clearly understood. All involved also agree that NHY violated testing criteria which required shutdown of the reactor.

Specifically, the conclusions of our inquiry are as follows:

- Communications between the NRC and NHY management led to misunderstandings concerning restart of the reactor and corrective actions initiated by NHY. On this point, both NHY and the NRC must share responsibility;
- Control room operators were inadequately informed (briefed) of important test limits prior to initiating testing;
- New Hampshire Yankee policy concerning adherence to test procedures was unclear and subject to differing interpretations;
- NHY management was unfamiliar with test criteria and, therefore, failed to intervene when procedures were violated;
- The number of people in the control room (57) created an atmosphere that may have affected the decisions of key control room personnel.

While not giving rise to safety concerns, the actions of NHY during and after the June 22nd transient event are of serious concern because they are the only indicator the public now has of the manner in which NHY control room operators and management may respond to unexpected equipment failures in the future. The procedural and management changes instituted by NHY since June 22nd are appropriate and proper, but there is no accurate way to assess the likelihood of control room operators ignoring operations or test criteria in the future, or of management exercising its judgment so as to comply fully with regulatory requirements at the same time technical solutions to plant problems are being implemented.

The inquiry by the Attorney General's Office identified four specific factors contributing to the noncompliance with procedures by NHY employees during the event, and it is our conclusion that each of these areas (with the exception of the numbers of persons in the control room) is being examined and addressed by NHY. We note, however, that time and an error free exhibition of competence and sensitivity to regulatory and public concerns are prerequisites to the restoration of the trust of New Hampshire's citizens.

In addition to problems during the test itself, significant concerns are raised regarding communications between NHY and the NRC during the initial hours after the reactor was shutdown. Our investigation indicated that NHY management made statements to the NRC concerning the event during telephone conference calls on June 22nd and 23rd which failed to adequately convey the actions it was taking and the significance it was attaching to correcting the violations which had occurred. Yet, we have also concluded that NRC officials failed to adequately articulate their expectations with respect to reactor restart during these conversations so that they were clearly understood by NHY management. As a result, the NRC became increasingly concerned that NHY was not attaching appropriate significance to the event.

While the consequences of such misunderstandings ultimately come to rest with the licensee which has committed the violation and has the burden to comply with safety requirements, the responsibility must be shared by the NRC which is the regulatory agency charged with ensuring that public health and safety are being adequately protected by appropriate actions of the licensee. It is the responsibility of the regulator to make explicit its expectations of necessary actions which a licensee must take to restore the necessary measure of public safety, and to do so immediately after an event has occurred. Otherwise, only

the licensee is making that judgment during the initial hours after a transient event. For these reasons, it is our conclusion that steps should be taken to ensure more precise communications between NHY and the NRC subsequent to transient events in the future so that the regulatory expectations of the NRC are understood by NHY, and so that the federal government receives accurate and timely information from NHY.

The text of the report which follows explains the nature and scope of this office's independent inquiry into the circumstances surrounding the June 22, 1989 shutdown of the Seabrook reactor (Part II); a description of the test being conducted and the response of plant equipment to the transient event (Part III); an assessment of NHY's response to the unfolding transient event (Part IV); this office's conclusions regarding the response of NHY management and the NRC subsequent to shutdown of the reactor (Part V); the restructuring of NHY management (Part VI); and recommendations are set forth in the final section (Part VII).

II. THE NATURE AND SCOPE OF THE ATTORNEY GENERAL'S INQUIRY

On June 27, 1989, the Governor requested this office to initiate an independent inquiry into the circumstances surrounding the events of June 22nd at the Seabrook nuclear facility. The report which follows is the result of extensive interviews and briefings by Assistant Attorney General Geoffrey M. Huntington with individuals from New Hampshire Yankee and the Nuclear Regulatory Commission Region I office. The New Hampshire Public Utilities Commission greatly assisted our efforts by providing the technical expertise of its resident nuclear engineer at the Seabrook Station to accompany the Attorney General's Office in certain briefings in order to assess the mechanical and technical aspects of the transient event, and to help translate these parameters into meaningful indices of safety and regulatory concerns.

A. Contacts with New Hampshire Yankee

The New Hampshire Yankee organization was, without qualification, fully cooperative with our inquiry, and provided the Attorney General's Office with access to every individual and resource requested. At our request, NHY conducted a simulation of the transient event and reactor shutdown at the Seabrook facility's control room simulator so that plant parameters, operator actions and plant equipment response could be observed in the same sequence and timing as occurred on June 22nd.

Interviews were then conducted with 7 NHY employees including the 3 individuals approached by NRC officials in the control room during the transient event (Startup Test Director, Startup Test Manager and Assistant Operations Manager); 3 operations management individuals who were in the control room and/or directly involved with follow-up actions by NHY including telephone conferences with the NRC (Operations Manager, Assistant Station Manager and Station Manager); and the current Senior Vice President and Chief Operating Officer of NHY. In addition, a video and audio tape taken of the control room panel display during the event was observed to confirm statements made in individual interviews. Follow-up discussions were held with Mr. Feigenbaum.

The Unit Shift Supervisor and other control room operations staff were made available by NHY, but were not interviewed by the Attorney General's Office. The uniformity of every factual account of control room events during the unfolding transient event (both by NHY and the NRC), combined with the shifting focus of our inquiry from the event itself to actions of NHY in response to the event made interviews of these individual duplicative and unnecessary.[1]

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[1] The Attorney General's Office did ask for and received an answer to one question from the Unit Shift Supervisor, but this was not done in person.

B. Contacts With the Nuclear Regulatory Commission

Because the Attorney General's Office inquiry was initiated after the NRC had conducted interviews comprising the initial phases of its own investigation and regulatory enforcement assessment, our office did not proceed via the NRC State Liaison program which provides certain participation rights to states wishing to observe NRC inspections or investigations. Rather, the Attorney General requested the cooperation of the NRC in deference to the Governor's desire for an independent state inquiry. NRC Region I Administrator William Russell acceded to this request, and established guidelines acceptable to this office which protected the independent status of the ongoing NRC process.

Initially, our office received and reviewed certain documents related to the scope and nature of the NRC's own investigation, and of observations of NRC inspectors present in the control room on June 22nd. Upon completion of the NRC report detailing the results of that agency's investigation, we visited NRC Regional Headquarters on August 5th and 6th to review the report in advance of its release and to discuss its conclusions with members of the investigation team, NRC management, and two of the three inspectors present in the control room on June 22nd. This office agreed that all documents and information provided by the NRC would remain confidential until such time as the NRC report was released to the public.

The cooperation and assistance of Regional Administrator Russell and his staff with the Attorney General's investigation is greatly appreciated.

III. THE JUNE 22ND NATURAL CIRCULATION TEST SUMMARY OF PLANT EQUIPMENT PARAMETERS

The natural circulation test is one of a series of startup tests required by Nuclear Regulatory Commission regulations. It is conducted at a 3% power level, for the purpose of demonstrating the natural circulation characteristics of a nuclear reactor coolant system. The reactor coolant system is a nuclear component of the power plant which is used to dissipate and transfer heat produced when a nuclear chain reaction is in progress.

The reactor coolant system is a closed looped system of a water and boron mixture which circulates under pressure. A "pressurizer" maintains the pressure of the coolant system. Guidelines are established requiring the shutdown of the reactor in the event that the water level in the pressurizer falls below a certain level, or the internal pressure of the coolant system reaches a predetermined level, or the temperature of the system exceeds a specified level. During normal operation, reactor coolant pumps maintain a flow due to temperature differential of the coolant system in the reactor. The natural circulation test is designed to demonstrate that, in the event those pumps fail to operate, the reactor coolant system will establish a natural flow due to temperature differential which will continue to dissipate the heat produced by the decay heat of the nuclear chain reaction.

The natural circulation test was initiated on June 22nd when the reactor coolant pumps were shut off. As expected, after a few minutes, the reactor coolant system average temperature began to increase and show indications of establishing a natural circulation flow. Approximately 7 minutes into the test, a condenser steam dump valve stuck fully open. This valve is one in a set of 12 which are used to control the reactor coolant temperature at times when the main turbine of the Seabrook facility is not using the steam to produce electricity. In other words, this steam dump valve which stuck open is one in a series of valves which are used to adjust (cool) the temperature of the reactor by releasing steam at times when no electricity is being produced but heat is being generated by the reactor.

Because this valve stuck in the open position and the increased steam flowing through the open valve could not be supported by the low power levels at which the reactor was being operated for the test, the reactor coolant system temperature began to decrease in a manner unexpected by the test. When temperature decreases in a pressurized water reactor such as Seabrook, the volume of water in the reactor coolant system also decreases and results in a corresponding decrease in pressure in the coolant system pressurizer. As the reactor coolant system cooled, the water level/volume in the pressurizer began to drop and eventually reached a level which violated a test criteria established for the purposes of gathering data about the various plant systems.

The natural circulation test manual reactor trip criteria called for shutting down the reactor if the mininum water level in the pressurizer reached 17%. This level was set at 17% for the low power testing process because levels below that threshold quite simply do not provide useful data on the various plant components being tested. There are no safety or operational concerns related to violating this criteria. Indeed, procedures for full power operation of the Seabrook Station call for shutdown of the reactor only if the water in this pressurizer falls below a 5% level. In the five minutes that the steam dump valve was open, the pressurizer water level reached a mininum of 14.5%.

After the open steam dump valve was discovered and closed, the pressurizer water level and pressurizer pressure began to rapidly recover. Yet, within five minutes after the valve was closed, the reactor was ordered shutdown anyway because the Unit Shift Supervisor believed that the pressure level in the reactor coolant system was increasing at a rate which would eventually violate a test limit requiring shutdown of the reactor at 2340 psig or an operations limit at 2385 psig. Simply stated, the Unit Shift Supervisor tripped the reactor, in anticipation of reaching a plant equipment status, one different from the pressurizer water level, which required a reactor trip. At the time the reactor was shutdown, the pressurizer water level was at 21%, and pressurizer pressure was at 2310 psig. No technical specifications parameters or safety analysis limits were exceeded other than the 17%

pressurizer water level test criteria during this transient event. No plant equipment was damaged and no personnel injury occurred. The natural circulation test was introduced into regulation by the NRC after the Three Mile Island accident in 1979, and may be conducted by NHY at a later date when full power testing is completed.

IV. CONTROL ROOM RESPONSE DURING THE TRANSIENT EVENT

A. Event Chronology: June 22nd 10:30 a.m. - 12:45 p.m.

The following is a chronology of the events which occurred in the control room on June 22, 1989 during the conduct of the natural circulation test until manual shutdown of the reactor. The times are approximations derived from both the NHY and NRC reports.

Thursday, June 22, 1989

10:30 -- Startup Test Director completes individual briefings of on-shift operations crew members.

12:05 -- All prerequisites to conducting the natural circulation test completed, and Test Director signifies readiness to proceed to the Unit Shift Supervisor (hereafter "USS").

12:19 -- Reactor coolant pumps are manually tripped to initiate the natural circulation test.

12:27 -- Decreasing pressurizer levels first noted and announced to the USS.

12:29 -- USS verbally informed Test Director that pressurizer level was approaching the 17% test limit (made a statement concerning "your limit").

12:29 -- Pressurizer reached the 17% test criteria threshold for manual reactor trip. USS directed the primary control board operator to confirm when pressurizer level reached 15%, and to state his ability to stop the decrease.

12:31 -- Steam Dump Valve was first reported stuck open to the USS, and was immediately closed; pressurizer water level reached 14.5%.

12:32 -- NRC Inspector advised NHY Startup Manager of the on-going violation of the 17% test criteria requiring manual trip of the reactor.

12:33 -- Shift Superintendent informed the USS that Tavg temperature was below 541°F, thus commencing a 15 minute time period to restore this parameter to greater than 541°F or manually shutdown the reactor.

12:34 -- NRC Inspector approached and informed NHY Startup Test Director of on-going violation of the 17% test criteria requiring reactor trip. The Test Director immediately approached the USS and informed him of communication from the NRC regarding the trip requirement.

12:34 -- The NRC Senior Resident Inspector and a NRC Inspector approached and advised NHY Assistant Operations Manager of the on-going violation of the 17% test criteria requiring manual trip of the reactor.

12:38 -- Manual reactor trip (shutdown) was directed by the USS with pressurizer level at 21%, but pressurizer pressure at 2310 PSIG -- 30 PSIG less than the 2340 PSIG level which is also a criteria requiring manual trip of the reactor.

12:37 -- NHY Assistant Operations Manager informed NHY Operations Manager of the test procedure violation, and directed NHY Shift Superintendent to retain the on-shift crew for debriefing.

12:45 -- NRC Deputy Regional Administrator informed NHY Vice President of Nuclear Production of violation of the manual trip test criteria, and that said that the violation was "of serious concern" to the NRC.

To fully understand the events of June 22nd, it is essential to understand the organizational chain of command that structured the roles of the NHY individuals in the control room that day. Tests such as the natural circulation test being conducted that day involve two separate hierarchial lines of authority -- the operations crew and the startup test crew -- which have separate chains of command functioning under the oversight of a delineated line of authority of NHY management. The operations crew is headed by the Unit Shift Supervisor ("USS") and normally consists of the USS and 2 control room operators responsible for monitoring and operation of specific plant functions and equipment. Because of the nature of the test being conducted on June 22nd, the operations crew consisted of the USS and 4 control board operators.

While each licensed operator has authority to shutdown the reactor, the unit shift supervisor is responsible for "maintaining a comprehensive perspective on operating conditions ... [and is] ... the sole authority in charge of the control room unless relieved of that duty [by NHY management].... See NHY Report, Enclosure 4, p. 2. The startup test crew is headed by the startup manager, and is comprised of a shift test director, a test director, and test engineers. See NHY Report, Enclosure 4, p. 3. The individuals comprising the startup test organization, while not authorized to order the operations crew to shutdown the reactor, briefs the operations crew on the test, oversees the conduct of the test, and has authority to terminate the test and to recommend shutdown of the reactor to the USS or plant management based on improper conduct of the test or plant parameters. See NHY Report, Enclosure 4, p. 3. Simply stated, the startup crew is responsible for the technical preparation and conduct of a test, and the operations crew (headed by the USS) is responsible for implementing the test being conducted. Id.

In every shirt, both organizations are joined in the chain of command at the shift superintendent position which is the first tier of the NHY management structure. Above that position are the assistant operations manager, operations manager, assistant station manager, the station manager, and the vice president of nuclear production -- except for the VP-NP, each of these individuals has authority to follow procedures to intercede and

overrule the operations decision of the USS or shift superintendent. Of the entire operations, startup and management hierarchial structure outlined above, only the assistant station manager was not present in the control room during the transient event on June 22, 1989.

B. NHY Actions During the Transient Event

Of individuals in the control room with the authority and responsibility to intervene and order or recommend that the test be terminated and the reactor tripped, not one NHY operations staff, startup test staff, or NHY management official acted to comply with the natural circulation test criteria requiring a manual trip of the reactor when the pressurizer level dropped below 17%. There is no disagreement on this point. There existed a 6 minute time interval in which only NRC inspectors observing the test and indicators of the operating status of plant equipment recognized and acted to seek compliance with the test procedures which had been delineated in advance.

Generally, NHY control room staff were focusing on operating the plant and compensating for transient conditions caused by the failed steam valve, and in this light viewed the trip criteria as guidance rather than mandatory. The startup crew recognized the violation for what it was, but were tentative in their assessment, and failed to intervene in the operations chain of command to terminate the test and recommend a reactor trip. Representatives

of NHY management, on the other hand, failed to exercise their authority to act because these individuals generally lacked a basic comprehension of the test criteria, and thus were unaware a violation of test procedures was even occurring.

1. Operations Staff Actions

Our inquiry into the performance of the operations crew revealed a surprisingly uniform assessment of why a test criteria was violated by the unit shift supervisor and the control room operators -- the operations crew, and the USS specifically, did not view the test requirement calling for manual trip of the reactor below a pressurizer level of 17% as a mandatory procedure. Rather, it was understood by the operations crew to be a guideline for termination of the natural circulation test. A guideline that, if violated, signaled the end of useful data collection but presented no safety or operational concern when attempting to compensate for transient conditions such as occurred on June 22nd.

The USS was quite aware of the 17% trip criteria, and that it had been breached. As the pressurizer level fell below the 17% level, he directed the relevent control board opeator to monitor it and call out the declining levels, and he then informed the startup test director that: "your limit" has been exceeded.

By all accounts, the USS viewed the unfolding transient plant conditions from an operational perspective, with a mind focused on compensating for the heat loss being caused by a stuck valve and toward regaining specific operating parameters. It was not until other plant parameters were not recovering in an acceptable manner to the USS that he ordered the reactor tripped well in advance of violating any operating licensing or safety criteria.

But for the violation of the test criteria, the NRC has determined that the operations crew appropriately responded to the valve failure and the resulting transient event. See NRC Report, p. 6. We see no basis to question this conclusion. The videotape of the event indicates no confusion, no disagreement, and no hesitation as control room decisions were made. It corroborates all individual accounts that the USS exercised unquestioned authority in a manner designated to correct operational transients within normal operating parameters, but in clear violation of test parameters which he was aware which he thought did not apply.[2] It also confirms that no other control room operator acted to contradict others, the U.S.S., and comply with the test criteria.

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[2] Recall, 5% is the pressurizer water level criteria set for reactor shutdown in the operating license for the Seabrook facility.

2. Startup Crew Actions

Interviews of the startup test director and test manager indicate a clear understanding that the test criteria was not simply guidance, but that it required a reactor trip on June 22nd. Both individuals, however, failed to assert their authority to terminate that test and to recommend to the USS that the reactor be tripped.

While the test director informed the USS of the NRC's "concern" after being approached by the NRC inspector, he deferred to the USS's response that it would be taken care of. The startup manager stated to this office that he did not respond to the violation of the 17% criteria and questioning by the NRC because he was attempting to assess if there were any overriding reasons why the USS was failing to trip the reactor. It remains unclear at what point either individual would have asserted his authority to challenge the actions of the USS.

3. NHY Management Actions

The NHY management team was well represented in the control room on June 22nd. The shift superintendent, assistant operations manager, operations manager, station manager and vice president of nuclear production were all in the control room for the entire transient event.[3] While each of these individuals, with the exception of the VP-NP, had supervisory responsibilities in the

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[3] The assistant station manager observed initiation of the test, but left the control room prior to the onset of equipment complications.

command hierarchy allowing them to order a manual reactor trip when the USS failed to do so, our interviews indicated that not one possessed independent knowledge of the 17% trip criteria so that he understood that plant conditions called for a manual trip of the reactor. Of this group, only the assistant operations manager (AOM) knew of the breach of the test criteria before the reactor was shutdown, and he was told by the NRC. After he was approached by the NRC, the AOM asked the test director if it was true that a test criteria had been exceeded, and was told that the USS knew and would take care of it. Our interviews indicate that before the AOM could act on this confirmation, the USS had ordered the reactor shutdown. The AOM then immediately informed the operations manager of the violation.[4]

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[4] Perhaps reflective of the intensity of events and short duration of the transient, our interviews reveal a difference between the recollections of the NRC observers on this point and those of NHY individuals present in the control room. NRC documents and our interviews with NRC officials indicate that, immediately after speaking with the test director, the AOM spoke to the operations manager and the USS prior to the USS shutting down the reactor. Infact, NRC observers noted that: "Subsequently [after the communication between the AOM, operations manager, and USS], and without a clear impression of whether the response was or was not prompted by the expression of NRC concern, ... the USS directed a control room operator to trip the reactor." See NRC Observations Regarding Seabrook Natural Circulation Test, p. 3.

Interviews of NHY individuals reflect vivid recollections that no interaction occurred between the AOM and the Operations Manager and the USS prior to the reactor trip, and that the trip occurred within seconds of the AOM's confirmation of test criteria with the Test Director. While these differences have little significance, they serve as a reminder that the duration of the transient event was less than 6 minutes, and both human performance and recollection are less than uniformly reliable.

While each management representative understood the nature of the transient conditions which the control room operators were responding to, they were uninformed with respect to the specific test criteria calling for a reactor shutdown at 17% pressurizer level. Thus, management focused on plant recovery and operational limitations, and offered no supervisory role with respect to testing procedures. They were not prepared to address specifics of the natural circulation test being conducted, even though it fell within their oversight responsibilities.

C. Conclusions Regarding the Reasons for NRY Actions During the Event

1. Inadequate Pre-test Briefing of the Operations Crew

A fundemental responsibility of the startup test organization is to adequately brief all members of the operations crew on the criteria of the test which will be conducted during their shift. This did not occur prior to the June 22nd natural circulation test.

In this instance, the control room operators had conducted a practice test in the control room simulator at Seabrook Station in May, 1986, and in a course form late in 1988, but were never again briefed as a crew. Twenty-four hours before the test, the startup test organization provided each operations crew member with a copy of the test and reactor trip requirements. The morning of June 22nd as they prepared to initiate operations, each operator and

the USS was individually briefed by the test director on various facets of the test, including the 17% reactor trip criteria. While procedures did not require preparation of the crew as a group, all parties involved agree that what was done was ineffective, and this office concurrs with that conclusion.

The natural circulation test was the most complex low power test to be conducted prior to full power operation. It also called for operation of the reactor at the highest power levels to date, and involved a greater number of control room operators than is ordinarily necessary to run the reactor (5 instead of 3). These factors, combined with the amount of time which had passed since instruction had been provided to the operators, demanded that a concentrated briefing be provided by the startup crew. On this point, both the NRC and NHY evaluations concur with our findings. See NHY Report, Response Letter p. 2; NRC Report, p. 21.

In response to identifying inadequate pretest briefing procedures as a contributing factor to the June 22nd transient event, NHY has initiated revisions to the Startup Test Program to require more comprehensive pre-test briefings, and additional preparation (including simulator rehersals) of operations crews before they assume shift duties. See NHY Report, Enclosure 1, p. 3. The Office of the Attorney General concurs with this remedy, and agrees that it addresses the noted deficiency.

2. Lack of Clear NHY Directives Concerning Adherance to Test Procedures

The lack of explicit directives of the procedure compliance policy in the existing Seabrook Station Management Manual is another contributing cause of the Operations crew's failure to adhere to the reactor trip criteria of the natural circulation test. Failure of the USS to adhere to the test criteria is explained succinctly by his audible comment to the test director during the unfolding transient event. As plant conditions breached the 17% criteria, he called out to the test director that "your limit" was just passed. The operations crew did not view the criteria as a binding operational limit of the same status as a license limit or a limit based on technical specifications. As such, the 17% test limit became guidance and was relegated to a secondary concern when the operational transient occurred and the USS began to work toward recovering from the heat loss caused by the stuck valve.

Both the NRC and NHY investigations focused extensively on this aspect of the June 22nd event, and determined that lack of clear policy indeed contributed to the procedural violations. NHY Report, Enclosure 4, p. 10, and Enclosure 4, Appendix p. 17; NRC Report, pp. 20-21. We reach the same conclusion, noting that the instructions set forth in the Operations Management Manual included the following:

> Plant operation should be conducted in accordance with applicable procedures. If procedures are deficient, a procedure change should be initiated. An exception to this policy is that in emergency conditions operators may take whatever action is necessary to place the plant in a safe condition, and to protect equipment, personnel and public safety without first initiating a procedure change. [Emphasis added.]

See NHY Report Enclosure 4, p. 7. Within hours of the June 22nd event, NHY identified the deficiency of this and other compliance procedures, and implemented changes. These and subsequent procedural amendments specify that departure from approved procedures is permissible only when such action is required to protect the public health and safety, personnel safety, or to prevent serious damage to plant equipment. See NHY Report Enclosure 1, p. 1; Enclosure 4, Appendix p. 17-18. Our inquiry indicates that the review and amendments addressing procedural compliance directives which guide operations staff during transient plant conditions are well directed.

3. Management Unfamiliarity With Test Criteria.

The lack of awareness of the natural circulation test criteria by members of NHY management in the control room was a breach of responsibility by those who are charged with being most responsible. While these individuals clearly understood the test and the status of critical plant functions during the unfolding transient, our inquiry indicated that not one possessed the requisite knowledge to step into the transient event to direct adherence with the test criteria by ordering a reactor shutdown.

The command hierarchy was established to ensure that operational would be made consistent with NHY procedures, and the protection of public health and safety requires informed management personnel asserting their authority when the control room operations staff is in error. While public health and safety were not at risk on June 22nd, steps should be taken to assure that every individual in the chain of command who is present in the control room is substantively briefed so that he is capable of executing his responsibilities. Policy amendments planned by NHY appear to address one aspect of this concern -- that operations management define their responsibilities upon entering the horseshoe area of the control room -- but do not focus on instituting procedures aimed at assuring a greater understanding of critical test criteria by this group of individuals. See NHY Report, Enclosure 1, p. 4. It is our conclusion that further assurances are necessary in this regard.

4. Cumulative Effect of the Number of Individuals Present in the Control Room

Present in the control room on June 22nd were fifty-seven (57) people either participating or observing the test and transient event. This number was without precedent in the 2 1/2 year history of control room activities, and it is our conclusion that it may have been a factor contributing to the operations and startup crews' failure to manually shutdown the reactor.

By agreement, conduct of the natural circulation test was to be a training exercise for all of the different operations crews and other NHY staff. Accordingly, the test was conducted at a time allowing for as many observers as possible to attend. The complexity of the test, and the fact that it involved operating the reactor at the highest power levels to date also drew a significant number of NHY management personnel. In any event, the individuals called upon by the test criteria to terminate the test and seek a manual reactor trip were making decisions in an unusual control room atmosphere.

While there exists no indication that the control room suffered from noise or confusion which interfered with the execution of the test, our interviews suggest that an unspoken momentum to complete the test successfully may have affected the performance of the startup and operations crews. This is not uniformly acknowledged among NHY management and staff level individuals. Yet, our interviews indicated a feeling (albeit aided by hindsight) that the onshift startup and operations crews were "on show" with an "added burden" to meet the "inherent goal to have a successful startup program." There are no indications of any overt pressure by NHY management to conduct a successful test, but the pervading team spirit, combined with the presence of so many peers and management, may have impacted the decision making process of these individuals by instilling a reluctance to take any action out of ordinary.

Neither the NRC nor NHY have noted the number of control room observers as a factor affecting the performance of control room staff, and from a regulatory perspective it may in fact be correct to expect satisfactory performance by on-shift staff regardless of who is present in the control room. Yet the consistency and conviction with which this atmosphere was conveyed to the Attorney General's Office indicates that it may have been a factor contributing to the events of June 22nd.

The NHY Corrective Action Plan proposes to revise the current access policy to establish a maximum number of personnel allowed in the control room. It is our conclusion that such a change is warranted, along with a thoughtful review of other procedures which may be implemented to retain a consistent working environment for on-shift staff and to avoid a fishbowl type of control room atmosphere during future operations tests.

V. RESPONSE OF NHY MANAGEMENT AND THE NRC AFTER REACTOR SHUTDOWN

A. Chronology of Events After Reactor Trip

Thursday, June 22, 1989

12:36 p.m. -- Manual trip of the reactor.

12:45 p.m. -- Meeting in NHY Station Manager's office to discuss the test criteria violation and subsequent reactor trip. Event Evaluation Team was initiated.

1:00 p.m. -- Management/Supervision meeting convened by Vice President of Nuclear Production (hereafter "VP-NP") to discuss test criteria violation and subsequent reactor trip. Discussed:

- Cause
- Sequence of Events
- Confirmation of 17% procedural violation
- Determine necessary action to be taken prior to restart

1:30 p.m. -- Private meeting between VP-NP and Station Manager concerning appropriate management response.

2:45 p.m. -- NHY Station Manager commits to NRC Senior Resident Inspector that plant restart will not occur without advance NRC concurrence.

2:10 p.m. -- VP-NP confirms that both the Event Evaluation Team and Independent Self Evaluation Teams had been initiated.

3:00 p.m.
to 4:20 p.m. -- NHY "Post Trip Review" Meeting. Attended by approximately 23 individuals including relevant control room operations staff. Subject: Assess plant equipment response and current status. Purposefully delayed debriefing of operations staff on procedural violations. See NHY Report, Enclosure 4, Appendix p. 7.

4:30 p.m. -- NHY VP-NP convened a management meeting to prepare for scheduled 6:00 p.m. telephone conference call with NRC Projects Branch Chief.

5:00 p.m. -- "Post Trip Review" report completed with initial information and conclusions concerning the test procedure violations and plant response parameters.

6:00 p.m. -- Conference call between NHY management and NRC Projects Branch Chief to discuss the reactor transient event, procedural noncompliance, as well as subsequent, on-going and planned NHY corrective actions. Second telephone conference call scheduled for 7:30 a.m. Friday. See NHY Report, Enclosure 4, Appendix p. 9-12.

9:00 p.m. -- VP-NP adjourned internal discussions which had concluded that:

(1) The natural circulation test criteria was not improper, and a 17% pressurizer level was an appropriate reactor trip that should remain in place.

(2) The USS was in error for not ordering a reactor trip at the 17% pressurizer level.

(3) The need for stronger NHY policy and direction regarding procedural adherence during plant transient conditions was agreed upon and all present were asked to consider the discussed options in preparation for the next day's conference call with the NRC.
See NHY Report, Enclosure 4, Appendix p. 14.

11:45 p.m. -- The VP-NP briefed NHY President and CEO with a summary of the 6:00 p.m. conference call with the NRC.

Friday, June 23, 1989

6:45 a.m. -- Pre-conference call meeting of NHY management.

7:30 a.m. -- Telephone conference call between NHY management and NRC Projects Branch Chief to discuss recommended procedural changes, plant equipment status and planned NHY corrective actions.

11:40 a.m. -- NHY/NRC onsite inspectors meeting prior to inspectors leaving the facility.

1:50 p.m. -- NRC Deputy Regional Administrator phone conversation with NHY President and CEO informing NHY that an NRC inspection team was being formed to investigate the transient event and subsequent management response.

B. NHY Management and NRC Actions After Reactor Shutdown

NHY management's response subsequent to the event itself has been the subject of significant discussion in the NHY and NRC reports. The NRC report cited NHY management response on Thursday after the reactor shutdown as "safety significant." See NRC Report, p. 29. Consistent with this, the NHY organization reacted to the event by relieving the Vice President of Nuclear Production (VP-NP) from all responsibilities, and publicly stating that management response to the shutdown was "inappropriate" and did not "reflect NHY policy"; and that "unauthorized" statements were made to the NRC concerning restart. See NHY Press Release; July 13, 1989.

The telephone conference calls between NHY management representatives and the NRC at 6:00 p.m. Thursday and 7:30 a.m. Friday are at the center of such conclusions. Precisely what transpired during those two phone conference calls can not be re-created, but it is clear from our interviews that the message NHY thought it was conveying on Thursday, June 22nd was not heard by the NRC, and the significance of the NRC's responses was not understood by NHY management. As a result, members of NHY participating in these calls felt that their efforts were what the NRC wanted to see in response to the incident, and the NRC concluded that NHY management was minimizing the event and prematurely pushing to restart the reactor.

Our interviews with individuals of NHY management who were present during the Thursday 6:00 p.m. conference call reveal a near uniform assessment of what took place -- that the VP-NP began by briefing the NRC on the plant status during the transient event, and the partial results of NHY's preliminary review which had been initiated earlier in the afternoon; that NHY did not have concise, direct answers to provide in response to some questions asked by the NRC representative, but that the issues raised were addressed without making excuses for improper conduct; and that NHY had agreed not to restart the reactor over 3 hours earlier, so that talk about readiness to restart was spoken with that restriction understood and it was therefore proper to continue with preparations toward such a goal. While several of these same individuals recognized that the NRC representative was quite concerned about the procedural violations and associated issues, no one interviewed identified that the NRC was also concerned about NHY's preparations toward restart simultaneously with its evaluation of the event. To NHY management, it was a given that no restart would occur until an assessment was conducted which satisfied the NRC.

Such impressions of NHY management personnel became even stronger during the Friday morning telephone conference call with the NRC. Every NHY official interviewed who was present during both calls felt quite secure at the conclusion of Friday's phone conversation that the NRC concurred with the steps being taken,

and that the NRC representative needed only to speak with NRC management about setting a target time for plant restart in parallel with the measures being taken to address the procedural violations. It was not until later that morning when NRC inspectors were leaving the facility, and at 1:50 p.m. when the NRC Deputy Regional Administrator phoned NHY President and CEO Edward Brown, that these management personnel grasped the true extent of the NRC's regulatory concerns.

Our interviews indicate NHY officials hung up from the Thursday evening telephone conference call feeling that serious issues remained but that they were headed in the right direction. However, the NRC Region I representative with whom they had spoken had growing concerns about what he perceived to be the casual manner in which plant officials seemed to be viewing the procedural violations. The NRC report states:

> The initial management thrust following this event appeared to be to resolve any equipment problems necessary to resume testing. An in-depth review of the cause or causes leading to the improper conduct of the ... test apparently did not take place prior to an initial management decision to resume testing. See NRC Report, p. 28.

Not expressly stated in the report, but clearly asserted by Region I officials in our discussions, was the impression on Thursday that NHY was rationalizing its performance rather than taking affirmative steps to implement corrective actions prior to restarting the reactor.

References to restart of the reactor were also viewed as improper given NHY management's preliminary assessment of the reasons for the failure to adhere to test procedures, the appropriateness of the 17% level as a manual trip criteria, and the policy concerns raised by the failure of three NHY individuals to respond to prompting by NRC observers in the control room. Indeed, our interviews indicated that NRC officials were dismayed that NHY appeared Thursday evening to be even considering reactor restart on Friday. That NHY had already agreed not to restart the reactor without NRC concurrence may have changed NHY's view about the legitimacy of working toward restart as a management goal, but it clearly did not alter the NRC's. Unfortunately, NHY management did not perceive this, and NRC officials thought their concern was so abundantly clear that it did not need to be more explicitly stated.

When the Friday morning conference call was initiated at 7:30 a.m., NHY had concrete answers and solutions to many of NRC's key concerns which had been addressed only preliminarily the prior evening. Yet, our inquiry revealed that the focus of the NRC's concerns had now changed from the previous day. By Friday, the important issue to the NRC were not what procedural fixes were necessary prior to restart, but why NHY wanted (on Thursday) to restart without attaching significant importance to those procedural violations and fixing them before moving forward.

Thus, the impression of several NHY individuals participating in the Friday morning call was that the NRC was satisfied with the steps taken. But that impression would last only until early that afternoon when the Deputy Regional Administrator for NRC Region I would phone the NHY President and CEO to inform him that a Confirmatory Action Letter was being issued and that an NRC investigation was about to commence.[2]

C. Conclusions Concerning NHY Management and NRC Actions In Response to Reactor Shutdown

There can be no argument that NHY management bore full responsibility for addressing every concern of NRC officials before restarting the Seabrook reactor. To restart the reactor without affirmatively assessing the appropriateness of the trip criteria and the procedures governing the actions of control room operators would have been unreasonable. We do not believe, however, that this was the intent of NHY management on Thursday, June 22nd, even though the impression was conveyed to the NRC that NHY wished to restart without such an assessment.

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[2] A Confirmatory Action Letter ("CAL") is a letter memorializing an oral agreement between the NRC and a utility licensee regarding specific commitments made by the licensee to undertake corrective actions, and regarding the operating status of the plant. In this instance, the June 23, 1989 CAL confirmed an agreement by NHY not to restart the reactor prior to a full evaluation of the transient event and management actions thereafter. The NRC has not ordered continued shutdown of the Seabrook facility, and NHY is not prohibited by federal law from conducting further low power operations at any time. Rather, low power testing has ceased by agreement between the two entities.

It is of serious concern that both NHY and the NRC failed to adequately communicate and understand each other's positions with respect to necessary corrective actions, regulatory expectations, and affirmative steps already taken on Thursday toward resolving the cause of the violations. It is our conclusion that this failure was shared by both entities.

NHY management clearly was not sensitive to the regulatory expectations of the NRC. The Vice President of Nuclear Production was twice told by NRC management officials that the startup and operations crews' failure to follow procedures was of "significant concern" to the agency, and all interviews indicated that the NRC's displeasure was apparent during the Thursday phone conference.

NRC officials, however, reached conclusions concerning the actions (or lack of actions) by NHY to address the procedural noncompliance without closely identifying the accuracy of those impressions. The NRC report concludes, our discussions with NRC officials indicate that it was not until after a Friday afternoon phone call from the Deputy Regional Administrator initiating the NRC enforcement process, that NHY assigned its Independent Event Evaluation Team to assess the company's performance of necessary corrective actions. See NRC Report, p. 28. Yet, NHY had in fact formally activated its Independent Event Evaluation Team at approximately 12:45 p.m. Thursday, June 22nd -- a fact unknown to the NRC until our own interviews in August. See NHY Report, Enclosure 4, Appendix p. 4.

While these misperceptions involved no public health and safety consequences in this instance, the citizens of New Hampshire rely on both NHY and the NRC to respond to unexpected circumstances at the Seabrook facility in a manner which leaves no doubt as to what has happened, what is being done, and what must be addressed to complete a response that ensures the safety of the public and proper operation of the plant. Yes, the NRC stated it was "concerned" about procedural noncompliance, but it apparently never expressed an identifiable standard or expectation by which NHY knew it would be judged as a licensee. Likewise, NHY management failed to identify clearly the steps being taken by the utility in response to the situation, and to isolate the exact prerequisites to restart of the reactor in light of its earlier agreement not to do so.

Neither the NHY nor the NRC reports attach significance to this failure to adequately communicate which was observed so clearly in our interviews. Steps should be implemented by both NHY and the NRC, however, to address this problem.

VI. RESTRUCTURING OF NHY MANAGEMENT

On July 13, 1989, the NHY President and CEO issued a press statement announcing a planned realignment of NHY management and the resignation of the NHY Vice President of Nuclear Production. The stated reason for relieving the VP-NP of his duties at Seabrook Station was that unauthorized and inappropriate statements were made to the NRC on June 22nd concerning restart of the Seabrook reactor. See NHY Report, Enclosure 1, p. 6.

The Attorney General's Office draws no conclusions concerning actions by the NHY organization relieving the VP-NP from all responsibilities. The sole issue considered by this Office is whether the VP-NP was authorized to represent NHY in discussions with the NRC in the initial hours after the June 22nd event, and whether the authority of management positions restructured by NHY is consistent with current operations procedures of the organization.

In his July 13th statement to the press the President and CEO indicated that statements made to the NRC by the VP-NP concerning reactor restart were made without the President's "knowledge, concurrence or authorization," and that they were "unauthorized and inappropriate." See NHY Press Release, July 13, 1989. Yet, Our interviews, uniformly indicate that Mr. Thomas made no statements to the NRC on June 22nd or 23rd in the presence

of other NHY individuals which they observed to be beyond his authority to make as the Vice President of Nuclear Production given applicable operations management procedures in place at that time.

NHY policy did not require the "knowledge, concurrence or authorization" of the NHY President and CEO prior to restarting the reactor (or setting a target time to do so) after a transient event such as occurred on June 22, 1989; and such a policy requirement is not clearly present today. The precise authority of specific positions in the NHY management structure should be clarified in this respect so that current NHY staff and management, the NRC, and the State of New Hampshire have a clear understanding regarding this issue.

VII. RECOMMENDATIONS FOR FUTURE STATE ACTIONS

The NHY Corrective Action Plan addresses nearly all of the necessary procedural changes arising out of the events of June 22nd. See NHY Report, Enclosure 1. The State should monitor the company's implementation of these corrective actions, and the Attorney General's Office will seek a response from NHY on the issues we raise in this report.

In addition, the State of New Hampshire may benefit from the lessons of this incident by considering actions of its own. Specifically, four steps should be considered to further New Hampshire's involvement and understanding of future events which may occur at the Seabrook Station.

1. The Governor should appoint a State Liaison Officer to act as the Governor's primary representative for communications with the Nuclear Regulatory Commission, and to participate in the Liaison Program offered by the NRC to states with fixed nuclear facilities. The former Director of the Office of Emergency Management served as New Hampshire's liaison officer prior to his resignation this month. The Governor should consider which state representatives may best serve in this capacity as the Governor's personal liaison with the NRC for all issues relating to Seabrook's operation and the NRC's regulation of it.

2. The State of New Hampshire should enter into an agreement with the NRC, via the State Liaison Program, which will provide the State Liaison Officer, or his/her designate, with access to future NRC inspections and investigations of the Seabrook facility. Such an agreement between New Hampshire and the NRC would assure that opportunities to accompany the federal government in its conduct of activities at Seabrook are not missed.

3. The State of New Hampshire should enter into an agreement with New Hampshire Yankee Organization to provide the State Liaison Officer and other state officials with access to the Seabrook facility and to NHY employees for purposes of gathering information and establishing open communications regarding plant operations, equipment status, and planned tests of reactor parameters. Such a cooperative agreement between the State and NHY would enhance New Hampshire's knowledge and confidence in the operational safeguards exercised by plant officials.

4. The State should consider changes to enhance New Hampshire's ability to monitor actions of both NHY and the NRC. Currently, the Governor's Office, Office of Emergency Management, Public Utilities Commission, Department of Public Health Services, Attorney General's Office, and the Nuclear Waste Policy Advisory Committee each undertake to monitor and respond to actions by NHY and the NRC. Consolidation of the State's efforts to monitor amendments to federal laws, and NRC rule changes and decisions, as well as specific actions being undertaken by NHY should be tracked for the specific purpose of developing a coordinated response on behalf of the Governor. Specifically, it may be appropriate to consider amendments to RSA 125-G:4 so that either the existing Nuclear Waste Policy Advisory Committee, or a new oversight committee of agency representatives with specific expertise could be utilized to track and coordinate the State's response to these issues which cross the jurisdictional lines of the various state departments but have public health and safety implications to New Hampshire's citizens.

The Attorney General's Office stands ready to assist in the implementation of any one, or all, of the foregoing recommendations.