

UNITED STATES NUCLEAR REGULATORY COMMISSIONDOCKET NO. 50-309MAINE YANKEE ATOMIC POWER COMPANYMAINE YANKEE ATOMIC POWER STATIONISSUANCE OF DIRECTOR'S DECISION UNDER 10 CFR 2.206

Notice is hereby given that the Acting Director, Office of Nuclear Reactor Regulation, has acted on a Petition for action under 10 CFR 2.206 received from Ms. Anne D. Burt, on behalf of Friends of the Coast - Opposing Nuclear Pollution, dated January 20, 1996, for the Maine Yankee Atomic Power Station.

The Petition requests that the Commission take expedited action to (1) suspend the operating license of Maine Yankee pending resolution of the Petition; (2) examine and test by plug sampling — or other methods approved by the American Society of Mechanical Engineers — all large piping welds that may have been susceptible to micro-fissures at the time of construction; (3) reanalyze the Maine Yankee containment as one located in an area where seismic risk is not "low"; (4) reduce the licensed operating capacity of Maine Yankee to a level consistent with a flawed containment and/or flawed reactor coolant piping welds; (5) hold an informal public hearing in the area of the plant regarding the Petition; and (6) place the Petitioner on service and mailing lists relevant to the group's interests in safety at Maine Yankee and intention to participate in all public forums opened by the Nuclear Regulatory Commission (NRC).

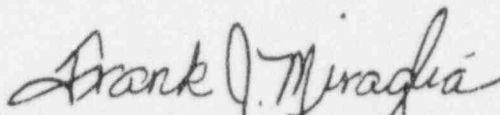
By letter dated May 13, 1996, the Director, Office of Nuclear Reactor Regulation (NRR), NRC, acknowledged the NRC's receipt of the Petition, and, for the reasons stated in the letter, denied Petitioner's request for immediate action suspending the operating license or reducing the licensed operating capacity of Maine Yankee (Requests 1 and, in part, 4). In addition, for reasons stated in the May 13, 1996, letter, the Director denied the Petitioner's request for an informal hearing (Request 5). The Director also stated in the May 13, 1996, letter that Petitioner's request that the NRC place Petitioner on service and mailing lists relevant to its interests in safety at Maine Yankee and its intention to participate in all public forums opened by the NRC (Request 6) was moot, as Petitioner's attorney had already been added to the Maine Yankee service list.

The Acting Director of the Office of Nuclear Reactor Regulation has now determined that no basis exists for taking any action in response to Requests 2, 3, and 4 of the Petition dated January 20, 1996. Accordingly, Requests 2, 3, and 4 have been denied for the reasons stated in the "Director's Decision Under 10 CFR 2.206" (DD-96-20), the complete text of which follows this notice and which is available for public inspection at the Commission's Public Document Room, the Gelman Building, 2120 L Street, N.W., Washington, D.C. 20555, and at the local public document room located at the Wiscasset Public Library, High Street, P.O. Box 367, Wiscasset, Maine 04578. A copy of this Decision will be filed with the Secretary for the Commission's review in accordance with 10 CFR 2.206. As provided by the regulation, the Decision

will constitute the final action of the Commission 25 days after the date of issuance of the Decision unless the Commission on its own motion institutes a review of the Decision within that time.

Dated at Rockville, Maryland, this 20th day of November 1996.

FOR THE NUCLEAR REGULATORY COMMISSION

A handwritten signature in cursive script, reading "Frank J. Miraglia".

Frank J. Miraglia, Acting Director
Office of Nuclear Reactor Regulation

70000, VRF 2
4/3

Swidinski
Thompson
ACTION

EDO Principal Correspondence Control

FROM:

DUE: 04/²³~~15~~/96

EDO CONTROL: GT96181

DOC DT: 01/20/96

FINAL REPLY:

Anne D. Burt
Friends of the Coast - Opposing Nuclear
Pollution

TO:

William Russell, NRR

FOR SIGNATURE OF :

** GRN **

CRC NO:

DESC:

2.206 PETITION TO SUSPEND OPERATING LICENSE OF
MAINE YANKEE

ROUTING:

Taylor
Milhoan
Thompson
Blaha
Russell, NRR
Lieberman, OE
TMMartin, RI

DATE: 03/26/96

ASSIGNED TO:

DRPE
OBC

CONTACT:

Varga
EXT

SPECIAL INSTRUCTIONS OR REMARKS:

NRR RECEIVED:

APRIL 3, 1996

NRR ACTION:

DRPE: VARGA

NRR ROUTING:

RUSSELL
WIRAGLIA
TRADANI
ZIMMERMAN
CRUTCHFIELD
BOHRER

ACTION

DUE TO NRR DIRECTOR'S OFFICE

BY *April 18, '96*

FRIENDS of the COAST - OPPOSING NUCLEAR POLLUTION
Post Office Box 98, Edgecomb, Maine 04556 phone/ fax - 207-882 - 6000

January 20, 1996

William T. Russell, Director
Office of Nuclear Reactor Regulation
United States Nuclear Regulatory Commission
Washington, DC 20555 - 0001

Dear Mr. Russell,

Pursuant to the provisions of 10 CFR 2.206, Friends of the Coast - Opposing Nuclear Pollution, a non-profit organization incorporated in the State of Maine, petitions prompt and thorough consideration of the following unresolved or insufficiently considered safety-related issues pertaining to Maine Yankee Nuclear Power Station (MYAPS):

1. Containment is inadequate for power operation in excess of original license and may be inadequate for original power operation limits based on insupportable original design acceptance criteria. The containment at MYAPS was designed and constructed without diagonal reinforcement rod. Upon our best information and belief, the Atomic Energy Commission staff recommended to the commission that a license amendment permitting this type of construction be allowed, "...for this plant and this plant only due to low seismic risk." Early in 1979 the MYAPS was shaken by an earthquake of 4.2 magnitude and epicentered less than ten miles from plant site. The NRC then ordered the shutdown of five nuclear power stations including MYAPS until piping and piping supports could be seismically qualified. Upon our best information and belief, there is no public record that NRC did a second evaluation of MYAPS marginally acceptable containment design, nor can we find any record of reevaluation prior to any subsequent granting of license amendments to operate at increased power. Enclosed are sample pages from 1968 and 1971 MYAPS/ AEC correspondence files indicating the situation. It is petitioner's belief that MYAPS unique containment design is first mentioned in construction license amendments one and two. Complete files are, of course, at your disposal

2. MYAPS Emergency Core Cooling System, Primary Coolant Piping, and other large piping has not been adequately analyzed for materials degradation to ensure integrity at power operation in excess of original license limits or under accident conditions. Such analysis could prove that piping integrity is inadequate for continued operation at original limits. A review of MYAPS construction license amendment 30 will show that the Atomic Energy Commission was concerned enough with the appearance of "micro-fissures" in reactor coolant system welds to appoint a "task force". In 1971 the AEC's concern prompted studies and reports by Battelle Columbus Laboratories, Stone and Webster Engineering, and consultant Dr. Ernest Nipes of Rensselaer Polytechnic Institute which generally concluded that the micro-fissures would not propagate or grow under foreseeable conditions.

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Rec'd OFE EDO

Date 3-26-96

Time 3P

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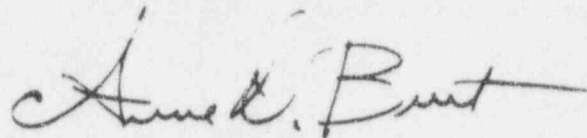
However, petitioners maintain concern for the micro-fissures was dismissed prior to a heightened awareness of embrittlement phenomena in reactor vessel walls and welds. Of particular concern to petitioners are those large pipe welds attaching to, or next to, the reactor vessel which have endured 23 years of corrosion, stress, vibration, and radiation and which may fail initiating a Loss of Coolant Accident or which may be subject to thermal shock failure initiated by use of the ECCS.

Enclosed are sample pages from the AEC/ MYAPS 1971 correspondence file which supply references to the issue microfissures in welds on the MYAPS reactor coolant system.

Pursuant to the conditions of 10 CFR 2.206, petitioners request the following actions be undertaken by NRC:

1. Suspend the operating license of Maine Yankee Atomic Power Station until the above issues are thoroughly examined and resolved. Examine and test by plug sampling or other ASME approved methods all large piping welds which may have been susceptible to micro-fissures at the time of construction. Reanalyze MYAPS containment as one located in an area where seismic risk is not "low".
2. Failing suspension of license, or should license be restored following examination of the above issues, reduce the license operating capacity of MYAPS to levels consistent with a flawed containment and or flawed reactor coolant piping welds.
3. Provide an informal public hearing regarding this petition in the plant area.
4. Act on this petition in an expedited manner due to what the petitioners believe are the serious implications of the concerns raised.
5. Place Friends of the Coast on such service and/or mailing lists as may be relevant to our interest in safety at MYAPS and our intention to participate in all public forums opened by NRC.

Thank you for your Attention. Please address all correspondence to :



Anne D. Burt
Corresponding Secretary,
Friends of the Coast - Opposing Nuclear Pollution
Post Office Box 98, Edgecomb, Maine 04556

Enclosure one - containment - 50-309.

ATTACHMENT (1)

January 15, 1968

MEB-168

United States Atomic Energy Commission
Washington, D. C. 20545

Attention: Director, Division of Reactor Licensing

Dear Sir:

MEB-168
STRUCTURAL DESIGN REPORT

We hereby submit, as requested, a report prepared by Hanson, Holley and Dings dated December 22, 1967. This report entitled "Recommended Provisions for Resistance to Potential Shear Forces Associated With Earthquake Loading" documents the material presented by Professor H. J. Holley, Jr. at a meeting with the Atomic Energy Commission staff and Drs. Housner and Hall on December 14, 1967. The report is submitted to substantiate designing the reactor containment using only circumferential and vertical rebars to provide the membrane strength.

Respectfully submitted,

MAINE Yankee ATOMIC POWER COMPANY

Bruce B. Beckley
Bruce B. Beckley
Project Engineer

BBB:bs

Att.

ACKNOWLEDGED

ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

1 TO:

2. 50-309

JAN 31 1968

Surgeon General, U. S. Public Health Service
Department of Health, Education, and Welfare
Attention: Nuclear Facility Analysis Section
1901 Chapman Avenue
Rockville, Maryland 20852

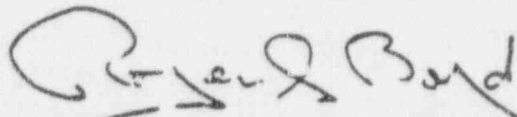
Gentlemen:

In accordance with the understandings reached August 1, 1961, between the Atomic Energy Commission and the Department of Health, Education, and Welfare, attached for your information are the following documents:

MAINE YANKEE ATOMIC POWER COMPANY

1. Amendment Nos. 1 and 2 dated January 15, 1968 to the license application for the Maine Yankee Atomic Power Station.
2. Transmittal letter dated January 15, 1968 from Maine Yankee Atomic Power Company and report dated December 29, 1967 from H. Wen, Holly and Biggs Consulting Engineers entitled "Recommended Provisions for Resistance to Potential Linear Forces Associated with Burial of Loading - Containment Shell of Maine Yankee Nuclear Power Plant."

Sincerely yours,



Roger S. Boyd, Assistant Director
for Reactor Projects
Division of Reactor Licensing

enclosures:
as stated above

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Encl. No. 50-529

JAN 22 1971

Mr. William H. Dunbar, President
Hafslund Inc. & Co., Inc.
9 Green Street
Augusta, Maine 04330

Gentlemen:

Our letter of December 22, 1970, requested additional information needed to complete our evaluation of your application for an operating license for the 1000 kW reactor. In recent contact with your representatives we have discussed our need for further information concerning aspects not covered by our previous letter. This information required is listed in the enclosure.

We also note that some of the information requested may be available in the public domain. In the context of our regulatory review of nuclear facilities of other utilities, it is the case, whenever it is to incorporate the information by reference in your application.

Please contact us if you desire any discussion or clarification of the material requested by this letter.

Sincerely,

Original Signed By
Peter A. Morris

Peter A. Morris, Director
Division of Reactor Licensing

Enclosure:

Additional Information Required

cc: Lawrence E. Minnick
Vice-President - Engineering
20 Turnpike Road
Westboro, Massachusetts 01581

John A. Ritcher, Esq.
Ropes & Gray
225 Franklin Street
Boston, Massachusetts 02110

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5.0 STRUCTURES

- 5.1 Why do you state (page 5-5(1) of the FSAR) that ACI Special Publication 17 will be used in the design of the primary shield wall where the ACI 318-63 code is not applicable, since ACI Special Publication 17 is a detailed expansion of the ACI 318-63 Code?
- 5.2 Indicate the stress and/or strain criteria that have been applied to the design of the large openings in the containment and the methods used to verify the adequacy of these large openings.
- 5.3 For the interior structures, indicate the bases for the loads given in Section 5.1.5.2.1 of the FSAR and the load combinations, stress and/or strain criteria, and method of design. List which stresses are critical and state their levels.
- 5.4 Describe the design of the radial shear ladders (described on page 5-20 of the FSAR) in the containment wall, including the extent of concrete presumed to act with these ladders.
- 5.5 Since no diagonal reinforcing has been provided in the containment wall for seismic shears, indicate, for comparison, the maximum seismic shear stress in the concrete and liner, and the normal and shear stresses in the radial reinforcing assuming (a) that all the load is carried by the concrete without liner participation, and (b) that all the load is carried by the liner.
- 5.6 Specify and describe the design of the neutron shield tank including criteria, codes, design methods, and applicable quality control provisions. Include sufficient details of the reactor supports on this tank to permit an evaluation of the design adequacy.
- 5.7 Define the frequency with which 12 inch lengths of reinforcing bars have been tested by an independent laboratory as a check on the acceptability of the bars of 50,000 psi yield point steel used in construction. Also, state whether full size samples have been tested to verify compliance with the design strengths.
- 5.8 Describe where the Prepack method of placing concrete was used and the checks that have been made on the quality and penetration of in-situ Prepack concrete, including the results of these checks.

- 5.9 Describe any deviations from specified dimensional tolerances for the liner erection, and corrective measures taken where required, and whether the erected liner meets the required dimensional criteria.
- 5.10 State whether arc welding has been used on reinforcing bars for either strength or tack welds, and list the acceptance criteria used for such welding. Also, describe the criteria used for bond and anchorage of reinforcing bars in concrete that is in tension (such as the concrete in the dome and discontinuity zones).
- 5.11 Describe the quality control measures employed to assure that 5000 psi concrete was placed, as required, in highly stressed areas of the containment, instead of the 3,000 psi concrete used in other areas.
- 5.12 Describe the permanent in-place instrumentation which will be available to record containment operating, accident and post-accident pressures and temperatures.
- 5.13 State whether the containment has been designed to permit testing to the calculated peak accident pressure at anytime during plant lifetime.
- 5.14 State whether the containment integrated leak rate test will be performed with the penetrations and associated piping systems fully installed. If the penetrations are to be blanked off for this test, justify the validity of conducting such a test by comparison with conditions which may prevail following completion of installation of the piping systems.
- 5.15 Describe the seismograph installation that will be used, including the location and maintenance program for the installation. State the criteria with respect to assessments to be made and plant operation to be permitted in the event of instrument readings in the range of the Operating Basis Earthquake and the Design Basis Earthquake.
- 5.16 Provide a discussion of the performance characteristics of protective coatings and paints used within the containment to withstand accident conditions, including consideration of spray washdown, steam environment, and jet impingement effects. Also, include an evaluation of the potential impairment of the performance capabilities of engineered safety features, due to flow blockage, fouling of heat transfer surfaces, or other events that might result from failure of the protective coatings and paints.

Enclosure Two - Micro. fissures in pipe welds.

September 21, 1971

United States Atomic Energy Commission
Washington, D. C. 20545

Attention: Director, Division of Reactor Licensing

Dear Sirs:

AMENDMENT NO. 30 to LICENSE APPLICATION
dated September 26, 1967 (Docket No. 50-309)

Pursuant to the Atomic Energy Act of 1954, as amended, and the Commission's Rules and Regulations issued thereunder, MAINE YANKEE ATOMIC POWER COMPANY hereby amends its license application by submitting the attached information.

1. Fifty copies of a report prepared for Maine Yankee by the Battelle Columbus Laboratories entitled "Laboratory Studies of Type 316 Stainless Steel Weld Metal From Maine Yankee Reactor Coolant System" dated September 17, 1971.
2. Fifty copies of a report by Dr. Ernest F. Nippes of Rensselaer Polytechnic Institute entitled "Analysis of Stainless Steel Weldments at Maine Yankee Atomic Power Station" dated 9/21/71.
3. Fifty copies of Stone & Webster Engineering Corporation letter MYS-4819 dated September 14, 1971.
4. Eighty copies of revised FSAR page 13-6 dated 9/71.
5. In response to questions asked by the task force investigating reactor coolant system welds the following information in pipe and vessel insulation is submitted:



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RESEARCH DIVISION
Director — Dr. E. F. Nippes

Rensselaer Polytechnic Institute
TROY, NEW YORK 12181

September 21, 1971

Telephone
518-276-6281

Maine Yankee Atomic Power Company
Engineering Office
Turnpike Road (Route 9)
Westboro, Mass. 01581

Attention: Mr. B. B. Beckley, Project Engineer

Subject : Analysis of Stainless Steel Weldments at
Maine Yankee Atomic Power Station

References:

- (1) Final Report "Laboratory Studies of Type 316 Stainless Steel Weld Metal from Maine Yankee Reactor Coolant System," Battelle Columbus Laboratories. September 17, 1971
- (2) Letter from N. R. Gilbert, Project Engineer, Stone and Webster Engineering Corporation to B. B. Beckley, Project Engineer, Main Yankee Atomic Power Company, dated September 14, 1971. Subject: "Microfissured Welds Maine Yankee Atomic Power Station."

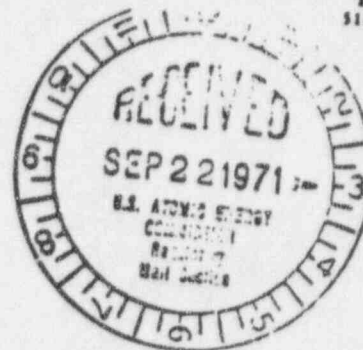
Dear Mr. Beckley:

The following summarizes my analysis of the Type 316 stainless steel weldments in the reactor piping systems of the Maine Yankee Atomic Power Station:

BACKGROUND

Weld metal microfissures have been discovered in a variety of steels, stainless steels, and other alloys. These microfissures are intergranular separations which are usually found only by metallographic techniques because they are short in length, generally in the range from 2 to 80 mils, and very narrow.

Microfissures in austenitic stainless steels are generally not found in as-deposited weld metal; they usually occur in the heat-affected zones of weld beads which have been reheated by a subsequent weld pass. Thus, microfissuring is thought to involve a hot-tearing mechanism in which contraction stresses rupture austenitic grain boundaries which have been liquated by reheating.



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... to 3% of ferrite was required to reduce the tendency for microfissure formation. When elevated-temperature service of the order of 1100° F to 1200° F was expected, an upper limit of 10% ferrite was set in order to minimize sigma-phase embrittlement which occurs at these temperatures. As a result of engineering experience, the ferrite content is often specified to be in the range of 5 to 10%. The upper limit can be set higher, if the service temperature is less than 1100° F.

The mechanism by which ferrite minimizes microfissuring is not definitely known at present. One of the more recent postulates involves the lower interfacial energy of an austenite-ferrite boundary compared to an austenite-austenite boundary. Thus, when liquation occurs, an austenite-austenite boundary would be wet by the liquid, whereas an austenite-ferrite boundary would not be. A boundary wet by liquid is not able to sustain the imposed contraction stresses and therefore ruptures, forming an intergranular separation.

Although the occurrence of microfissures in stainless welds has been recognized for many years, the effect of microfissures on mechanical properties has not been extensively reported in the open literature. The most important contribution has been recently made by Yeniscavich who reported the effect of fissures on the fatigue strength of nickel-base alloys containing chromium and iron. In tests performed at room temperature and 550° F, he concluded that fissures with effective diameters up to 70 mils would have no measurable effect on fatigue life in large components. In addition, local fissure densities as high as 70 per square inch had no measurable effect on fatigue life and these fissures did not propagate during fatigue testing to such an extent as to interconnect. The effect of fissures in lowering the fatigue strength was smaller in low-cycle than in high-cycle fatigue; this effect can be explained on the basis that the repeated plastic deformation accompanying low-cycle fatigue reduces the stress concentrations associated with defects in ductile materials. Examination of fatigue samples after failure showed that although some fissures had initiated fatigue cracks, others had not, and that the initiation of fatigue cracks was not a function of fissure size.

MAIN YANKEE

The reactor coolant system large-diameter piping is stainless steel-clad carbon steel piping. After heat treatment of the carbon steel piping, safe ends of Type 316 stainless steel, with a ferrite content in excess of 5%, were joined to this piping for subsequent site welding to other Type 316 stainless steel components, which contained in excess of 10% ferrite. The only joints welded with Type 316 stainless steel are those welds involving stainless steel components, i. e., pipe-to-valve, pipe-to-pump, and valve-to-pump, for a total of 15 welds, nine of which were completed with low-ferrite electrodes. The remaining six welds have been or will be completed using 316 ELC electrodes containing a minimum of 5% ferrite and which therefore will not be considered or evaluated in this analysis.

So like Inconel 600.