

NORTH ANNA ENVIRONMENTAL COALITION

Charlottesville, Virginia
May 5, 1979

Mailing Address: 412 Owens Drive
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(205) 536-0678

Commissioner Peter Bradford
U. S. NUCLEAR COMMISSION
Washington, D. C. 20555

Re: Steam Generator
Damage
Show Cause Hearing

Dear Mr. Bradford:

Thank you for your kind letter of April 11.

Briefing
Attendance

We were disappointed to learn only on May 1 of the steam generator briefing to be held on May 2. Such short notice made it impossible to attend from Alabama, as I am sure you understand. I was very grateful that you planned to raise questions on what "condenser tubing corrosion and leakage contributes to the steam generator denting problem," and hope that you will send us a transcript to allow us to see how the subject was presented.

S.G. Leaks
into the
James River

The Associated Press account in the HUNTSVILLE TIMES did not allude to condensers, but it did state that NRC technicians said that "almost all the radioactive water from the pipes remains inside the steam generators." Figures provided to us by VEPCO during the North Anna Operating License proceeding show this not to be the case: 55,530,000 gallons of radioactive water went into the James River from Surry in the first 9 months of 1976, entirely from steam generator tube leakage. (Please see enclosed NAEC news release of 2-18-77.) The figures are probably higher now.

The AP account did not discuss risks associated with replacement of steam generators nor did it discuss causes of degradation, surely of major interest to the Commission. (N.B. NUREG-0523, page 69.)

Condensers
as
Cause

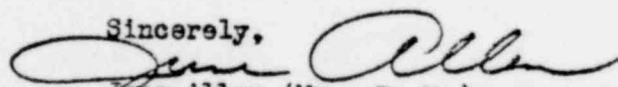
NAEC contends that the NRC staff failed to timely attend to condenser influence upon steam generator degradation and failed to regulate inadequate condenser materials and performance—failures which have led to serious steam generator damage. In support of that contention NAEC submits "Condenser Influence Upon Steam Generator Degradation," a brief summary of NAEC's inquiry to ACRS and NRC staff members.

Abuse
of
Discretion

NAEC further contends that Mr. Denton's denial of NAEC's request for an Environmental Impact Statement and Show Cause hearing on the Surry experimental steam generator replacement procedure was an abuse of discretion. We anticipate the Commission's review and reversal. It goes without saying that our request of December 29, 1978 was intended to preclude the procedure prior to adequate examination of the risks. Therefore, we amend our request to require that steam generator work at Surry be halted pending proof of safety for workers and residents of Virginia.

We hope for prudent action by the Commission.

Sincerely,



Ene Allen (Mrs. P. M.)
President, NAEC

Enc.

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Q.: Why are DEFECTIVE STEAM GENERATORS a major risk to nuclear safety?

A.: "The steam generator tubing...represents an integral part of a major barrier against fission product release to the environment...

"The weakening of these tubes...could result in rupture of tubes and release of fluid energy from the secondary system into the containment or reactor" during a loss-of-coolant accident (LOCA). --NRC Regulatory Guide 1.121

Q.: Could DEFECTIVE STEAM GENERATORS lead to a core melt?

A.: NRC's Risk Assessment Review (the Lewis Report) lists steam generator tube failures such as those "at Surry 2 and other reactors" as possible contributors to the probability of a core melt.

Q.: What has caused STEAM GENERATOR DEFECTS at VEPCO's Surry and 20 other reactors in the country? Did the corrosion come from LEAKING CONDENSERS?

A.: Yes, according to UCS and ACRS experts consulted by NAEC.
No, according to NRC staff members consulted by NAEC.

Q.: Why the contradiction?

A.: NAEC contends that the NRC staff failed to regulate inadequate condenser materials which have led to serious steam generator damage.

At Surry, \$10,000,000 is now being spent to replace copper-nickel condenser tubing with titanium.

Proper NRC regulations in regard to condenser materials might have prevented VEPCO's current \$133,000,000 experimental steam generator replacement with its high burden of radioactive exposure to workers and to the environs.

Q.: Can the NRC staff be trusted to act prudently in regard to steam generator and condenser replacement at Surry and elsewhere?

A.: Harold Denton denied NAEC's request for public hearing and environmental impact statement on this "unreviewed safety question."

This denial is currently before the Commissioners for review.

NAEC is submitting transcripts of its steam generator/condenser inquiries to allow for further examination of NRC staff competence and judgment.

* "...there exists no adequate basis for holding a Show Cause hearing on the steam generator repair program...an environmental impact statement need not be prepared."

POOR ORIGINAL

POOR ORIGINAL

CONDENSER INFLUENCE ON STEAM GENERATOR DEFECTS (cont.)

NAEC called Mr. Harold Etherington of the NRC Advisory Committee on Reactor Safeguards (ACRS) after reading the ACRS transcript of November 2, 1978, from which the following is excerpted:

MR. ETHERINGTON: In the questionnaire that went out to all PWRs on steam generator performance, I didn't recall that questions were asked about the condenser materials...

I think we really should get information on the condenser materials because there's a strong implication that the copper is an important factor in the corrosion problems they have.

MR. SCHWENCER: I'll speak obliquely. The licensee in addressing that matter, identified that they did plan to retube their condensers...I know the staff is concerned about the possibility of the condenser tubing affecting--

MR. ETHERINGTON: It is a very important matter.

Tr. 299-300

Transcription of NAEC telephone conversation with Mr. Etherington, 3-5-79:

NAEC: Is there a connection between condenser retubing and steam generator retubing?

MR. ETHERINGTON: Yes, there is a connection. The trouble in the steam generators started chiefly through getting impurities into the water. Those impurities get in through the condenser tubes.

NAEC: Would it be the copper corrosion that got into the water?

MR. ETHERINGTON: Copper is certainly one of the most undesirable of the impurities from the tubes themselves,

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MR. ETHERINGTON (cont.): but mainly it's the water that leaks. A leak develops in the condenser tubes, and that means that the water that is used to cool the condenser steam gets into the condensate and then into the steam generators...And then corrosion develops inside the steam generator...

NAEC: At Surry, are they retubing the condenser not just because it's downtime, a coincidence? there is a steam generator connection?

MR. ETHERINGTON: There's a direct connection there...

On February 28, NAEC endeavored to reach Mr. Schwencer of the NRC staff, quoted on page 2, to ask about condenser-steam generator influence. Finding him out, NAEC spoke with Mr. Grotenheist in his office. His views stand in strong contrast to those of Mr. Etherington.

NAEC: If there's a leak in the condenser, does that leak get back into the steam generator?

MR. GROTENHEIST: No. If there were a leak in the condenser, the leak would go from the steam circuit to the cooling water circuit, and that's not a big deal at all because it's non-radioactive water.

NAEC: So there's no way for a leak in the condenser to affect the steam generator?

MR. GROTENHEIST: No.

NAEC: I thought the fact that they're replacing condenser tubes at the same time they're replacing steam generators...?

MR. GROTENHEIST: That's just a coincidence...

NAEC: If they replace the condenser tubes with better materials, will they not have to do it again during the life of the plant?

MR. GROTENHEIST: I don't know...We really don't care. That's strictly an economic problem as far as the utility is concerned. ...It has no safety significance and therefore we don't pay any attention to it.

NAEC is concerned that the NRC staff "doesn't pay any attention" to condenser problems, now known to be major contributors to steam generator problems, which are of "safety significance."

Even VEPCO's Mr. Benton testified to their significance before the ACRS on October 28, 1978.

MR. BENTON: Yes, I have 20-20 hindsight...condensers have historically had problems with leakage. Up until recent times, the net effect of that leakage had not been fully realized. I think with the experience at hand it has been realized. Tr. 100

Nevertheless, when NRC spoke with NRC's Project Manager, Mr. Donald Neighbors, on February 26, 1979, he also contended that the replacing of condenser tubing at Surry was unrelated to steam generator repair.
tube

MR. NEIGHBORS: We don't have to review condenser/replacement. They don't have to come to us because it's not a safety question. It's not part of the steam generator repair program.

NAEC: Where in the regs does it say that? that no permission is required?

MR. NEIGHBORS: I don't know. I don't think the regs would state that.
...Condensers are not a safety-related system.

NAEC: Not even if they cause problems?

MR. NEIGHBORS: They don't cause problems...

NAEC: Then the retubing of the condenser is not related to the replacement of the steam generator?

MR. NEIGHBORS: That's correct. It's not related.

On March 4, 1979, NAEC requested the Commission to explore the foregoing contradictory views regarding the role of the condenser in causing steam generator damage. NAEC also renewed its request for a Show Cause Hearing and an Environmental Impact Statement on the unprecedented steam generator removal and replacement at Surry. On April 11, 1979, Commissioner Bradford wrote NAEC that the NRC staff would be asked to address condenser influence at the Commission briefing (held May 2, 1979).

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February 16, 1977

NORTH ANNA ENVIRONMENTAL COALITION

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Westinghouse "Under the Gun"
to Solve Radioactive Leakage Says NRC

SURRY'S W STEAM GENERATORS AMONG THE WORST IN THE NATION

Note to Reporters: This news release is longer and more detailed than usual because of the extreme importance of the topic. NRC calls leaking steam generators at nuclear plants "a very hot issue," affecting the entire industry as well as Surry where the problem is described as "more severe" and affects the following:

1. Prolonged downtime for repair
2. Radiation exposure of repair personnel
3. Increased costs for repair and replacement power
4. Increased offsite radioactive gases
5. Increased offsite radioactive liquids
6. Increased radioactive waste processing
7. Increased number of solid waste shipments

● VEPCO's possible cancellation of reactors #3 and 4 at the Surry nuclear station may be related to the defective and leaking performance of reactors #1 and 2.

Surry's Westinghouse steam generators have been plagued with leaks since the spring of 1974, greatly increasing the release of radioactive liquid into the James River. According to Mr. Joseph Massey, VEPCO Health Physics Supervisor at North Anna, anything over "600,000 gallons a month, you could attribute to steam generator tube leakage."

The steam generator leakage is evident in the 1974 releases in excess of 600,000 gallons a month:

May.....	285,000 gallons
June.....	1,270,000 gallons
July.....	2,610,000 gallons
August.....	2,800,000 gallons
September.....	5,050,000 gallons

Tube-plugging repair efforts began in 1974, and continued throughout 1976, but the problem remains unsolved. Surry's release of radioactive liquid the

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first nine months of 1976 alone was more than 3 times that of the preceding 2 years and almost 15 times that of 1973:

1973.....	4,301,000 gallons
1974.....	18,636,000 gallons
1975.....	18,705,000 gallons
1976 (9 months).....	60,980,000 gallons

NUCLEONICS WEEK, a major publication of the nuclear industry, has taken note of Surry's leaks: "VEPCO has problems with both its Surry units -- a tube in Unit 1 split, and according to the NRC, reached a leak rate of 80 gal/min. and there are indications of other cracks."

Surry was also cited in the December 1976 NUCLEAR NEWS, which explains the problem this way: "The generator tubes -- over 3000 in all -- in this Westinghouse design are held in place by horizontal carbon steel plates, which become corroded by deposits on the tubes. The corroded steel expands and pinches the tubes...resulting in leaks. At the Surry-2 plant of Virginia Electric and Power Company...denting is comparatively severe..."

Westinghouse "Under the Gun"

According to NRC/Atlanta, leaking steam generators "are obviously a liability" for Westinghouse, and the company is "under the gun" to find a long-term solution. NAEC asked NRC if utilities were considering a suit against Westinghouse for this costly defect in essential nuclear equipment. At the moment, Westinghouse (already being sued for defaulting on fuel contracts) is researching the problem jointly with the utilities.

North Anna May Be Affected

VEPCO calls the North Anna plant a "mirror image" of Surry. North Anna steam generators are also made by Westinghouse and thus may suffer from the same unsolved problem. NUCLEONICS WEEK writes that "W is considering preventive plugging of suspect tubes, rather than waiting till they start leaking," probably the aim of WEXTAK process performed at North Anna.

Safety Significance of Steam Generator Tubing

According to the NRC, "The steam generator tubing...represents an integral part of a major barrier against fission product release to the environment...The weakening of these tubes...could result in rupture of tubes and release of fluid energy from the secondary system into the containment or reactor vessel" during a loss-of-coolant accident (LOCA). 1.121 Reg.Guide

On September 15, 1976, Surry Unit #2 experienced a forced shutdown from a "ruptured tube," an accident that has the potential for releasing 17,800 curies of Xenon-133. VEPCO said the tube rupture incident involved "no direct release of gaseous radioactivity." Nevertheless, VEPCO reports the release of 14,300 curies of Xenon-133 during the first nine months of 1976, almost twice the amount of the 2 preceding years, and in keeping with Surry's mounting difficulties.

Morton Fairtile, NRC Surry Project Manager, called steam generator defects "one of the biggest problems we have today." The problem, he told The Fredericksburg FREE LANCE STAR, is seriously affecting four reactors in the United States. "Unfortunately," he added, "two of them are in your service area."

Steam Generator Leaks are "Expensive Occurrences"

The "forced shutdown" of Surry #2 on September 15 with a ruptured steam generator tube meant over 3 months of downtime for repairs, at a cost of c. \$9,000,000 per month for replacement power alone.

(The total out of service time for Surry #1 and 2 in 1976 for steam generator and other problems was 288 days, (#1:114, #2:174) putting replacement power costs alone in the vicinity of \$80,000,000 based on VEPCO's figure of \$250,000 - \$300,000 per day of downtime.)

"The high cost of replacement power and the high cost of man-rema received by repair crews make tube failures in nuclear power plants expensive

occurrences," according to NRC's NUCLEAR SAFETY magazine of March-April, 1976, which also cites Surry as suffering tube leaking and "tube thinning" beginning in May of 1974.

The problem areas are so highly radioactive that repair men can only work a few minutes at a time before their "allowable" dosage is used up. Recently about 50 men were recruited from North Anna to work on Surry repairs, NAEC has been told.

Consolidated Edison's Indian Point #1 attempts at in-place repair of defective steam generator welds "had to be abandoned due to the cramped work location and high radiation fields," according to a recent CEP report. "The radiation field restricted the average worker's repair time to 20 minutes, including 5 minutes to crawl into and out of the repair area through radioactive spaces." NAEC has been told that increasing areas at Surry are becoming radioactively contaminated.

Risk to Workers at Surry

A large part of NAEC's case against North Anna operation is based upon Surry's poor record of radioactive control.

NRC testimony at the recent operating license hearing substantiated VEPSCO's deficient performance: (Albert F. Gibson III, Chief, Radiation Support Section

"Personnel exposures to radiation have increased over the operating life of the station, due primarily to problems experienced with steam generators and liquid radwaste processing..."

"Airborne concentrations of radioactivity have been and continue to be high in the containment buildings due to system leakages..."

"Contamination control within the plant...has been a continuing problem at Surry..."

"Enforcement action has been taken in this area for failure to follow health physics procedures related to contamination control..."

"...two potential problems related to measuring radioactive iodine in effluents have been identified by NRC inspectors...

"In summary, steam generator tube leakage, high steam generator blowdown rate, and other system leaks have increased the rate of radioactive effluent release, particularly airborne."

At the same hearing at which Gibson of the NRC made the foregoing statements about Surry operation, VEPCO's Massey confirmed that the main source of personnel radiation exposure at Surry came from "steam generator maintenance." Massey also predicted that in the future "exposures are going to increase... because radioactivity builds up in the station."

● Solid Waste Shipments

In 1974, the Surry plant had the second highest number of solid waste shipments of any plant in the country, a total of 70: 34 to South Carolina and 36 to Kentucky. Massey testified that the number of shipments could indirectly be related to the steam generator tube problem at Surry: "If you are doing a lot of maintenance, you produce more waste."

The shipments included "protective clothing and other items, and 14,500 gallons of low level liquid waste..." NAEAC was told recently that even the tools for steam generator repair may become so radioactive that they are discarded as solid waste.

● Prognosis: Keep plugging?

Leaking steam generator tubes cannot be plugged indefinitely. NRC says that each plugging cuts out flow path for coolant. Westinghouse, cited by NRC for "Design Error," now says that a "penalty of 10°F must be applied for for each 1% of steam generator tubes that are plugged." That would mean a penalty of 94° for Surry #2 with 9.4% of its tubes plugged.

But plugging is not a solution. Neither is replacement until the problem is understood and solved. Nevertheless, replacement -- costing many millions

Now ask: 28% tube-plugging.

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and over a year of downtime -- is being considered.

In an NRC document entitled REVIEW OF SURRY 1 & 2, CRACKING OF STEAM GENERATOR SEISMIC RESTRAINTS, the NRC suggests that it might be wise to consider replacement of those restraints "with a material considered to be immune to environmentally induced failure." It appears that some repairs in the supports were made after cracks were discovered in the "swivel rings" in 1974, but better material is being recommended.

From the foregoing, it is obvious that the entire steam generator situation at Surry is a troubling and expensive one, accompanied by constant exposure risks for both VEPCO personnel and for citizens in the surrounding area.

VEPCO news stories talk about "contained" and "on-site" releases, but VEPCO's Massey testified quite candidly at the recent hearing:

"I can't distinguish between an onsite release and offsite release...

"Our releases in the liquid path are discharged in the circ water system which is onsite and goes offsite, so we discharge it within the site boundary, but it goes to the environment.

"The same way with gases. We have vent stacks on site which release the gas, which, of course, disperses offsite."

Given the current defective operation, it is a boon to the health of Surry area residents that Units 3 and 4 will not add to their radioactive dose.

Given the extraordinary costs of repairs and replacement power, VEPCO finances can only benefit by nuclear retrenchment, as NAEBC testified before the State Corporation Commission in both 1974 and 1975.