ORIGINAL

OFFICIAL TRANSCRIPT OF PROCEEDINGS

Agency: Nuclear Regulatory Commission

Title: Generic Letter 89-13 (Service Water System Problems Affecting Safety-Related Equipment)

Docket No.

LOCATION: Denver, Colorado

DATE: Thursday, December 7, 1989 PAGES: 1 - 75

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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

MEETING: WORKSHOPS

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For: :

GENERIC LETTER 89-13 (SERVICE : WORK ORDER NO. NRC-348-36

WATER SYSTEM PROBLEMS AFFECTING:

SAFETY-RELATED EQUIPMENT) :

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The Registry Hotel

2303 Quebec Street

Denver, Colorado

Thursday, December 7, 1989

APPEARANCES:

MS. ANGELA T. CHU, PROJECT ENGINEER
NUCLEAR REGULATORY COMMISSION

DR. VERN HODGE, REACTOR ENGINEER
NUCLEAR REGULATORY COMMISSION

MR. JARED WERMIEL, SECTION CHIEF
NUCLEAR REGULATORY COMMISSION

DR. DUANE NEITZEL
PACIFIC NORTHWEST LABORATORY

IN ATTENDANCE:

RICK L. RIETMANN, WOLF CREEK N.O.C.
GUY SHELTON, SAN ONOFRE, SO. CW. EDISON
MARCO D. AHUMADA, HOUSTON LIGHTING AND POWER
PAUL B. COX, TEXAS UTILITIES
MANU PATEL, T.U. ELECTRIC, LANSING
TIMOTHY ECKERT, EPRI - SERVICE WATER ASSISTANCE \< GROUP

KEN HUKARI, PORTLAND GENERAL ELECTRIC
ARTURO P. CORRAL, PORTLAND GENERAL ELECTRIC
FRANCIS G. BUCK, FT. CALHOUN, OPPD
PATRICK J. DOLAN, STONE & WEBSTER ENGINEERING CORP.
TIMOTHY C. PRENGER, STONE & WEBSTER ENGINEERING \< CORP.
JONATHAN L. ANDERSON, PACIFIC NORTHWEST LABORATORY
ASHOK DAVE, ARIZONA PUBLIC SERVICE CO.
NELSON HALLAS, ARIZONA PUBLIC SERVICE CO.
JOHN S. TAGGART, ARIZONA PUBLIC SERVICE CO.
DARRON DAYEFORDE, NEBRASKA PUBLIC POWER DISTRICT
WILLIAM R. HENNE, ENERCON SERVICE, INC.
JEFFREY P. NIBERT, TENERA ENGINEERING SERVICES
CHERYL ADAMS, SOUTHERN CALIFORNIA EDISON
JARLATH M. CURRAN, SOUTHERN CALIFORNIA EDISON
ALAN S. COHLMEYER, QUADROX CORPORATION
JOSEPH P. KOWALEWSKI, ARKANSAS POWER & LIGHT
MILTON HUTT, ARKANSAS POWER & LIGHT
ALBERT D. TOTH, USNRC REGION V
IAN BARNES, USNRC REGION IV

PROCEEDINGS

MS. CHU: Hello. My name is Angela Chu and I'm a Project Engineer from NRR. I've been assigned as the Lead Project Manager for this multi-plant action on Generic Letter 89-13.

As you know, NRC has ben studying problems affecting the reliability of service water cooling systems for a number of years. In July of this year, we issued Generic Letter 89-13, Service Water Problems Affecting Safety Related Equipment. To assist the industry to respond to this Generic Letter, NRC plans to hold four workshops to discuss the guidance in Generic Letter 89-13, as we announced in Federal Register October 23rd. Last week we had two workshops, 1 and 2 in Philadelphia and in Atlanta. Two days ago we had Workshop 3 in Chicago. This is the fourth one of these workshops. We have a panel of four NRC technical staff and one contractor assisting the NRC Office of Research. Our team members, two of them cannot be here today, but I'll introduce the whole team. The first one is Dr. Carl Berlinger, Chief Generic Communications Branch, NRR, he's not here today. Mr. Jerry Wermiel, Section Chief, Plant Systems Branch, NRR; Dr. Vern Hodge Technical Contact for Generic Letter 89-13, Generic Communications Branch, NRR; Dr. Duane Neitzel, Research Contractor on Generic Issue 51, from Pacific Northwest Laboratories; Mr. Rudy Bernhard, Regional Inspector, NRC Region 2, he's not here today.

Each of these individuals has been involved in the

development of Generic Letter 89-13, and they are here to answer technical questions on this Generic Letter.

The meeting will begin with a brief presentation on the contents of Generic Letter 89-13, followed by a question and answer period until everybody drops from exhaustion, or 5:00 o'clock this afternoon, whichever comes first. We will summarize the meeting before we adjourn.

In the Federal Register we requested licensees and applicants to submit questions in writing. We received many such questions in the mail as well as from the first three workshops. We have organized these questions in categories, one for each of the recommended actions in the Generic letter, also including a general category.

Today, we also welcome you to give us additional questions in writing during this meeting. We would like to consider these meetings as a group before we read them in to the transcript. Therefore, we would like to receive your additional questions by noontime today and this will give us an opportunity to sort out questions and consider the answers. This is because we want an accurate record in our transcript.

Our plan is to make public these deliberations by issuing a supplement to the Generic Letter consisting of responses to broad categories of questions and references to the transcripts of these meetings which will be placed in the public document room. We hope to issue this supplement within this

month.

These workshops are designed to continue NRC dialogue with the industry service water system reliability issue. Licensees and applicants should feel free to continue to submit questions to their NRC project managers, even after these workshops are completed.

We will break the meeting at 12:00 o'clock for lunch and reconvene at 2:00 o'clock this afternoon. Now, Dr. Vern Hodge will review the contents of Generic Letter 89-13.

DR. HODGE: Thank you, Angela. We appreciate all of you coming to this workshop. I want to now just review the contents of the Generic Letter.

To begin, I will briefly summarize the regulatory requirements which apply to cooling water systems. Those applicable to the service water system are found in 10 CFR Part 50, Appendix A, General Design Criteria, 44, 45, and 46; 44 addresses cooling water, 45, inspection of the system and 46, testing of the cooling water systems.

And then Appendix B applies as well. In particular Section 11 on test control.

The important point of this Generic Letter with respect to this part is that -- you can show the next slide, Appendix B -- is that the formalization of a test program and procedures appropriate to periodically verify that the service water system meets its design and functional requirements is put in place.

The purpose we had in writing the Generic Letter, first of all, we wrote this Generic Letter with a considerable background on the subject. A number of operational events had occurred over about ten years. We had issued a bulletin and several information notices and other events occurred indicating it may be time for an instrument such as a Generic Letter.

Our purpose was to insure that service water systems are in compliance with the with the GDC's and the quality assurance requirements, to insure that the safety functions of service water systems are being met today, and to insure that service water systems will continue to meet the design and functional requirements and regulatory requirements for the life of the plants.

Our objectives are stated in much the same words, to assure that all service water systems are in compliance with regulations and other regulatory requirements and are maintained in compliance. NRC firmly believes that changes and improvements in existing service water systems to implement effective continuing program such as described in the Generic Letter, to meet our regulatory requirements will result in marked improvements in the reliability of the service water systems.

In the Generic Letter we ask for -- or we made five recommended actions. Just to list those in a form that's probably pretty hard to read, I will just summarize each briefly. The first recommended action was to implement and maintain a

program to guard against biofouling.

The second was to establish and implement a program for both initial and periodic retesting of heat transfer capabilities of the service water system, the heat exchangers.

The third one was to establish a routine and maintenance -- routine inspection and maintenance program, essentially to allow -- excuse me, essentially to prevent the service water system from degrading to a condition in which it would not meet the regulatory requirements, or would present a safety concern before taking corrective action.

The fourth recommended action was to confirm that the as-built service water system meets its design requirements and will perform its intended function in accordance with the applicable licensing basis of the plant. This includes confirmation of its ability to perform its required safety function in the event of a single active component failure.

The fifth recommended action was to establish and implement a procedure review of -- a review of maintenance practices, operating and emergency procedures and training programs to insure that operators were aware of the importance of the service water system and that human errors could be reduced.

The next slide shows some of our intentions in formulating these recommended actions to improve the reliability of service water systems and some of the different attributes of each.

Actions 1, 2, and 3, for example, apply to open cycle systems. Actions 4 and 5 apply to the entire service water system including open and closed cycle systems. These have been questioned of us since issuance of the letter.

The service water system is defined as the system or systems that transfer heat from safety related structures, systems or components to the ultimate heat sink. And, as discussed in the letter, we define a closed cycle system as that portion of the service water system that is not subject to significant sources of outside contamination, has control water chemistry, and does not reject heat directly to a heat sink. And follow an open cycle system then would represent everything else.

When we developed this letter, the staff sought to give flexibility to licensees and applicants. We were sensitive to unique plant characteristics and variations and we did not wish to be overly prescriptive. Examples were given for guidance, but the specific actions need to meet the staff's general objectives were left to the discretion of the addressees. And, we included language such as equally effective, alternative actions to describe this flexibility.

The next slide gives some examples of that flexibility. For the recommended action on biofouling, we have included enclosure one which represents a recommended program that is acceptable to the NRC. Licensees and applicants are free to choose an equally effective program with justification.

For recommended action two, testing of heat transfer capability, we include an enclosure two to represent a program that would be acceptable to the NRC. Licensees and applicants are also free in this case to devise equally effective programs. For example, they could use frequent regular maintenance instead of testing in some cases.

Also, with regard to this particular action and also the following action three on routine inspection and maintenance, some of the flexibility offered is licensee determination of frequency of testing or maintenance. That's to be determined based on their own plant operating experience and unique characteristics.

It is not our intention to disrupt normal plant operations with respect to this letter, or to make any unnecessary change in plant protocol.

Action five asks for review of practices, procedures and training. We expect that improvements in these things would be made within existing plant protocol, while meeting the staff's overall objective to insure that the safety system cooled equipment, or service water system cooled equipment would meet its intended safety function by reducing human errors, as I've said before.

That's my introduction of the Generic Letter. Does anyone have any reaction or does the staff wish to make any comment?

We will proceed then with discussion of the questions that we have received in writing before the workshops began, and at each workshop held previous to this one. We have organized these in categories of questions. The first one is a general category.

And my procedure this morning will be to read the questions and then give the staff answers. We would ask that if any of the audience would like to comment on any of the answers that they step to the microphone, identify themselves for the transcript and ask their question, at which we will try to respond as best we can.

We will do this for every question. The whole operation should take perhaps three hours. When we near the 12:00 o'clock time, we will ask if anybody wants to submit a question at this workshop in writing, and ask to receive those at that time.

Our plan right now is to take a noon recess and reconvene at 2:00 to take up the rest of the questions and to take up those questions offered in this meeting.

Yes, sir? Could you identify yourself please.

MR. RICK RIETMANN: Rick Rietmann from Wolf Creek Nuclear Operating Corporation. Could we get a copy of those questions and answers?

DR. HODGE: No, I'm sorry, we don't have those available. Our plan is to conduct these workshops, write down

the questions and answers to Generic questions -- excuse me, write down the answers to Generic questions, and issue them in the form of a supplement to the Generic Letter. Transcripts are being made of these meetings. Those transcripts will be available to the public. The supplement of the Generic Letter will reference those transcripts.

If you're worried, for example, that answers to these questions should be in hand before the first response date comes, I would hasten to relieve that worry. We will try to get the a supplement out this month or early in January, only for reasons of helping you understand what questions and answers were.

The first question is what level of detail should be included in the descriptions of existing and proposed programs. And, as you can see, we have identified the source of this question by utility. This was in response to a question offered in the first workshop. And so, if you don't mind identifying yourself when you submit questions in writing, we would like to have that for the transcript as well.

The level of detail should be sufficient to permit an inspector to evaluate the activities performed, the conclusions drawn and the problems encountered and resolved. Each recommended action delineated in the Generic Letter or equivalent should be addressed in sufficient detail to enable an inspector to evaluate the action.

Is there any reaction to that answer? We'll proceed on

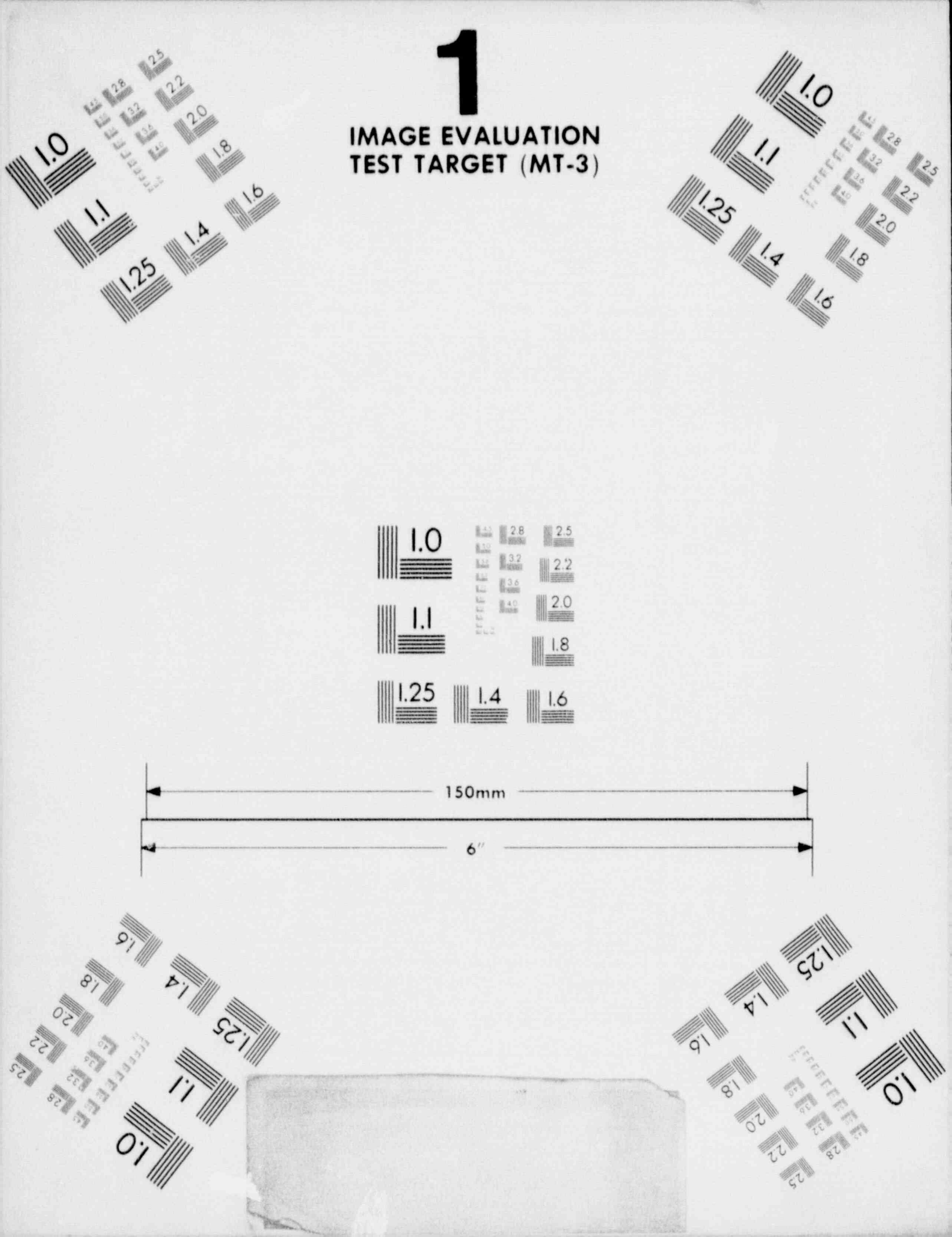
to the next question.

Generic Letter 89-13 provides the licensee with a great deal of leeway in defining their programs. This leeway is desirable and justifiable given the wide variation in conditions that may prevail. It is anticipated that the main mechanism for judging compliance with Generic Letter will be NRC site inspections. During such inspections what will be the basis for judging the acceptability of the program? What is being done to promote consistency in interpretations among regions?

We say the purpose of the Generic Letter is for licensees and applicants to assure the NRC that the heat removal requirements of the service water system are satisfied. This is required by regulations, as we have mentioned. Each individual inspector is responsible at all times for judging any regulated activity, including programs designed to response to Generic Letter 89-13 against the regulations.

These workshops constitute to date the NRC effort to promote consistency among the regions regarding Generic Letter 89-13. We plan to issue these questions and answers as a supplement to Generic Letter 89-13 this month. Guidance will thus be available not only to licensees and applicants but also to inspectors.

The traditional method of issuing a temporary instruction for inspection from headquarters to regional offices will not be used for this generic letter.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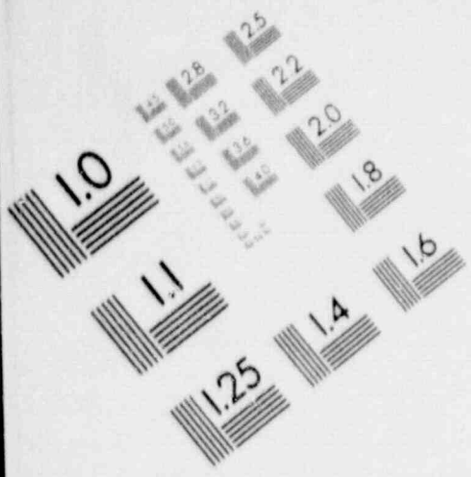

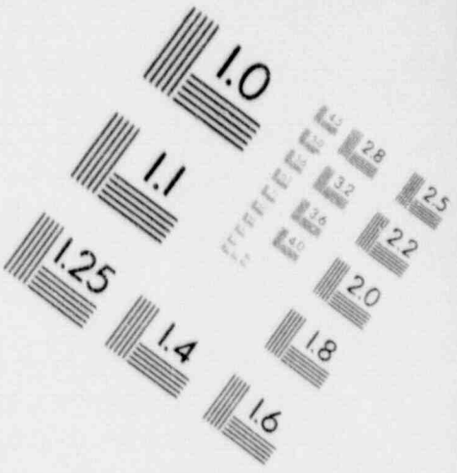

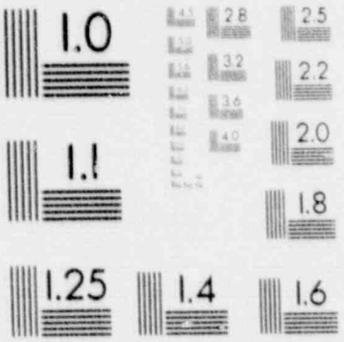

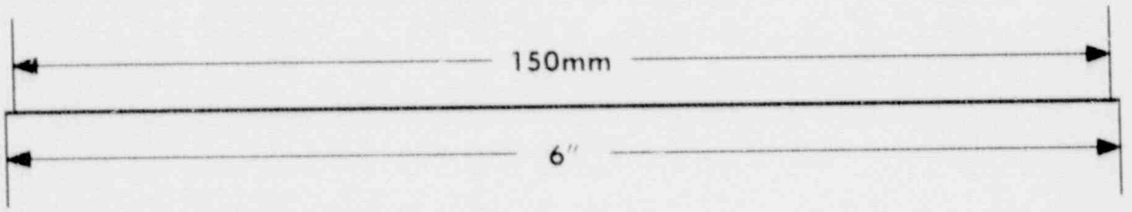

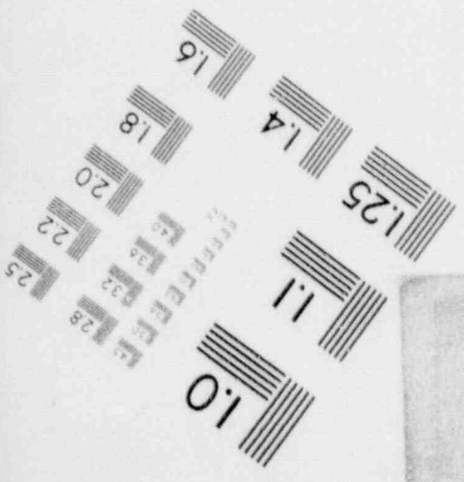

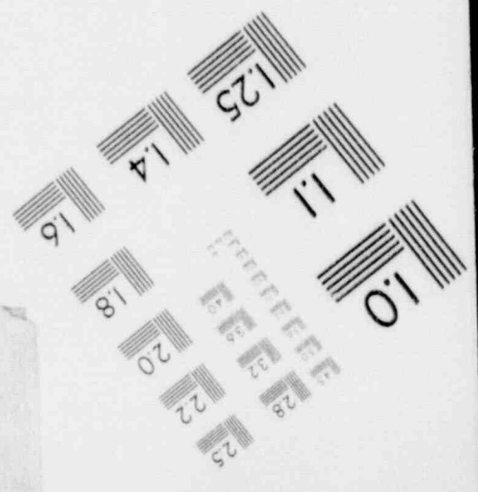

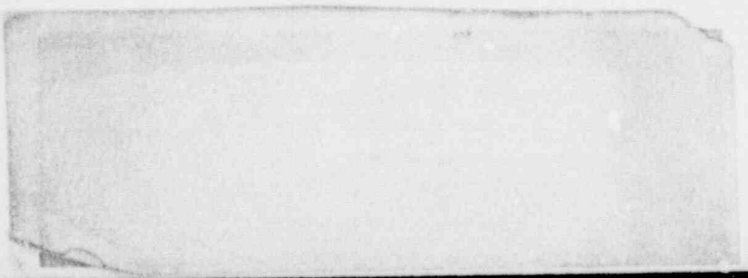

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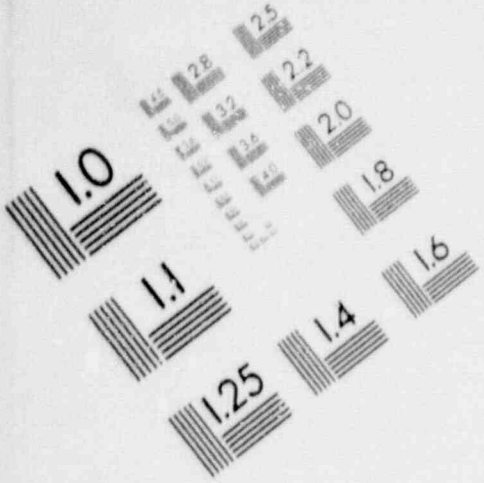

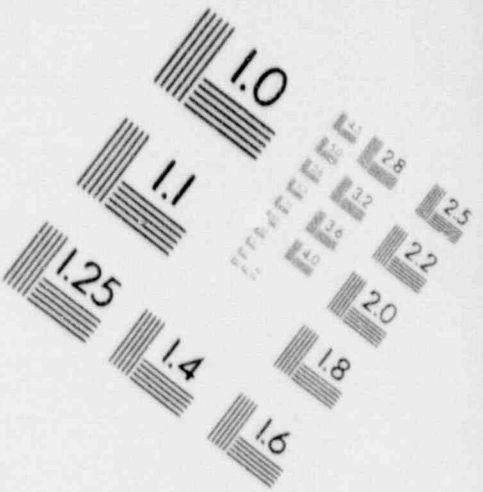

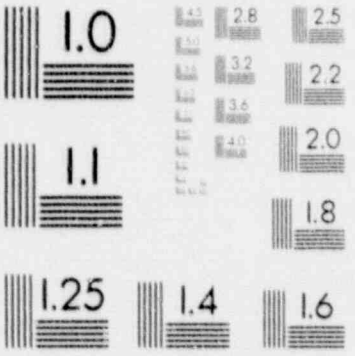

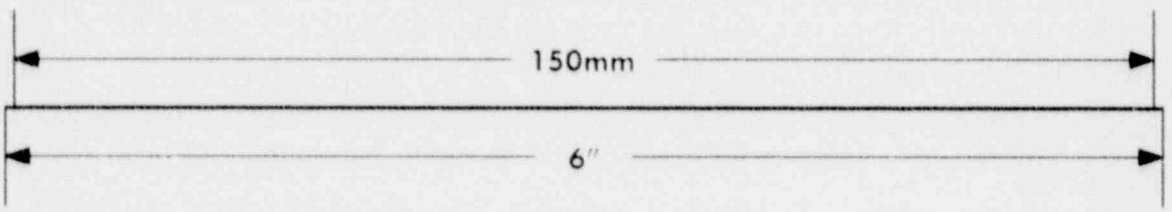

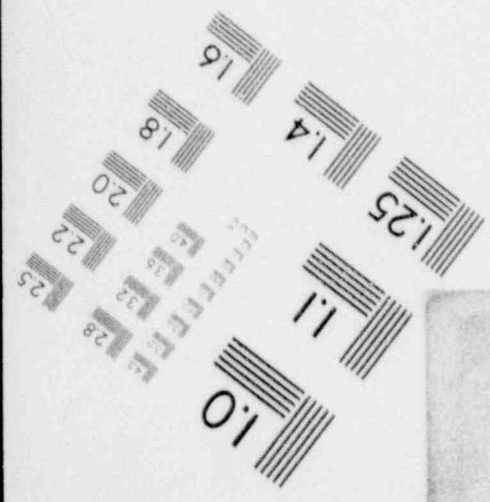

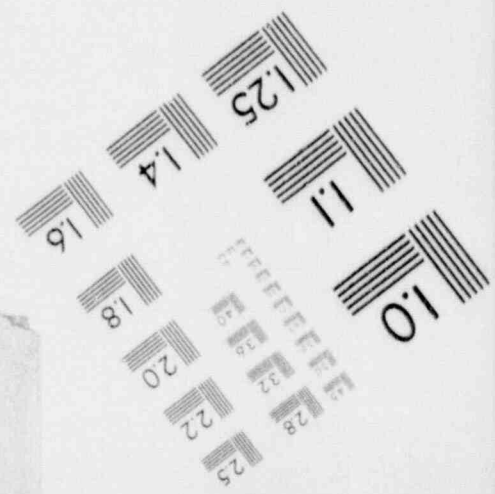

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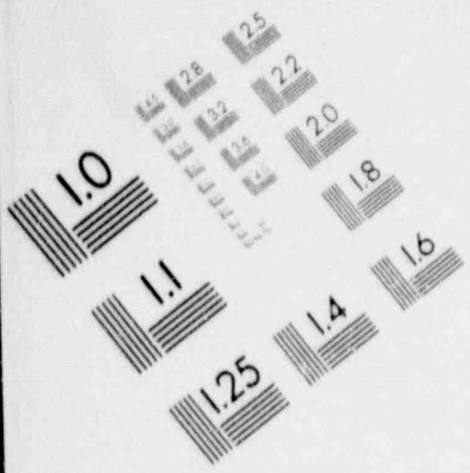

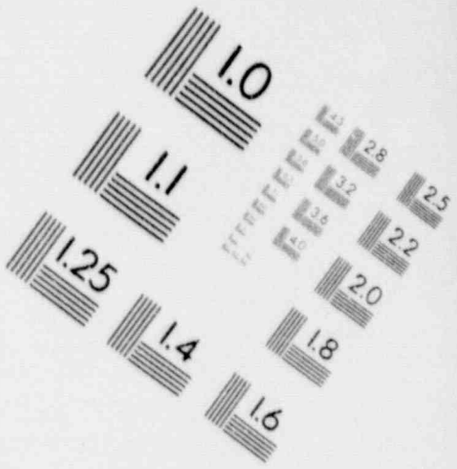

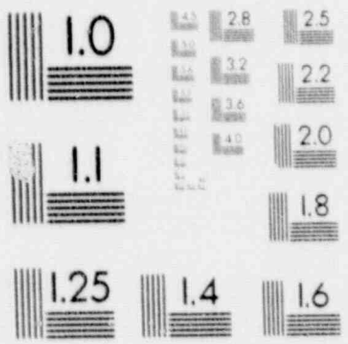

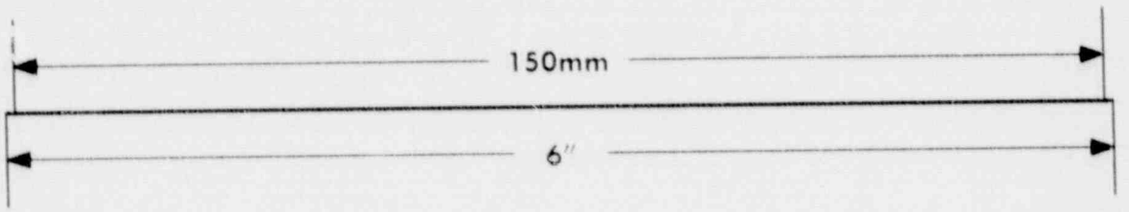

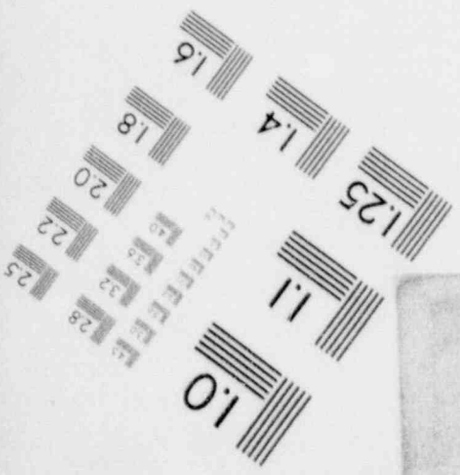

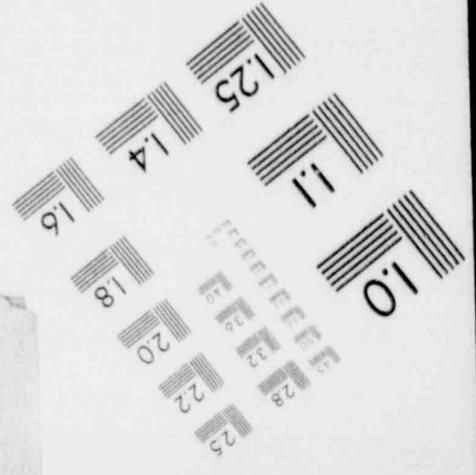

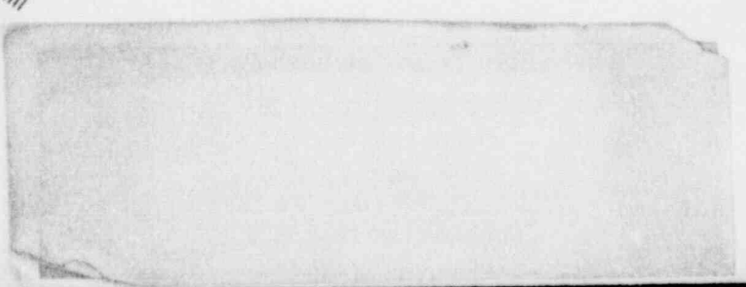

The proposed supplement to Generic Letter 89-13 will also reference the transcripts for these workshops which will be placed in the public document room. Individuals among the authors of the Generic Letter will be available by telephone to licensees, applicants and inspectors and may participate in selected team inspections.

Are there any questions? The next question then.

Similar regional meetings regarding Generic Letter 89-04 were conducted in the June, 1989 time frame. To date the minutes from these meetings have not been received. When can we expect the minutes from the Generic Letter 89-13 meetings?

Concerning Generic Letter 89-04, the minutes were issued by letter dated October 25, 1989, signed by James Partlow, Associate Director for Projects, Office of Nuclear Reactor Regulation. The minutes are being distributed to all licensees, meeting attendees, NRR project managers and the public document room. And we have discussed how you will get the results of these meetings.

Any questions? Proceeding on.

If we are looking into several options to determine which one is the most beneficial, however, we have not made a decision by the date that our response is due, would it be acceptable to explain this and confirm that whatever option is chosen will be completed on time?

The purpose of the 190 day response was to obtain the

commitment, plans and schedules of licensees and applicants to implement the recommended actions of the Generic Letter, or their equally effective alternatives. Your decision-making process should be made a part of the plans and schedules and submitted to the NRC when the response is due.

If additional circumstances prevent such submittal, such as regulatory requirements, technical specifications or outside governmental agencies, then adjustments in the schedule should be arranged with the appropriate NRR project manager.

Any questions? Okay, next question.

What was the basis or experience used to determine the schedule or completion for items 2 and 4? Do these schedules consider utilities with more than one plant?

The basis for the schedule was an appearance of reasonableness. Schedules are intended to be flexible and should be reported to the staff in the licensee's response with justification, if the recommended schedule in the Generic Letter is not used. Adjustments to the schedule should be arranged with the project manager.

Any reaction? Next question.

Do you recommend that actions 4 and 5 apply to closed cooling systems?

Yes, the Generic Letter defines service water system to include both open cycle portions and intermediate closed cycle loops that function to remove heat from safety related

structures, systems or components to the ultimate heat sink.

Recommended actions 1, 2, and 3 specifically apply to open cycle portions of the service water systems. Recommended action 2 can be extended to the closed cycle portions as conditions warrant. Whether a cooling loop is open or closed is not called out for actions 4 and 5.

Any need for clarification? Okay, next question.

If the CCWS is part of the scope for items 4 and 5 of the Generic Letter, would it be possible to modify the completion date commitments to fit this not our already existing SSFI schedule? SSFI is Safety System Function Inspection.

And the answer is yes, and refer to our previous discussions.

Questions? Next question.

Can we defer the Unit 2 required action dates so that they coincide with those of Unit 1? That is from October, 1990 to April, 1991 for Unit 2. And, as we have mentioned before, this leeway is available with justification.

Next question.

For action Items 4 and 5 of the Generic Letter, this utility plans to utilize the information gathered from a safety system function inspection for the essential cooling water and component cooling water systems. The SSFI for the ECW system supports the Generic Letter reporting requirements. However, the CCWS SSFI is scheduled for 1990. Is it acceptable to separate the

reporting for the ECW and CCW systems, that is, extend the CCW portion of the Generic Letter?

And the answer is yes, as we have said before.

Need for clarification? Okay, next question.

The actions proposed by the Generic Letter constitute new staff positions. To perform the testing and inspection requested by the Generic Letter, it may well be necessary for licensees to make significant plant modifications. For example, licensees will likely be forced to install new instrumentation in order to perform tests and to monitor test results.

Furthermore, changes will be required of procedures. An additional requirement of a walk down has been made. The proposed test may be beyond the licensing basis of the plant. These requirements seem to fit the definition of a backfit, under 10 CFR 50.109 Paragraph A1. Therefore, why were the requirements in the Generic Letter promulgated under the provisions of Section 50.54(f)?

The NRC concluded that it was not assured that licensees and applicants are in compliance with existing regulations, namely, general design criteria 44, 45, and 46 of Appendix A of 10 CFR Part 50 and Appendix B of that part.

The regulatory request for information represented by the Generic Letter is designed to gain this assurance and does not constitute a backfit.

Any questions? Next question is, was a backfit

analysis of the testing and inspection requirements performed? Will the staff make that analysis available to the public? In particular, did the staff's backfitting analysis, if any, justify the need for actions on closed systems?

The staff did not do a backfit analysis as required by 10 CFR 50.109; however, it did do an analysis for review by the NRC Committee on Generic requirements, CRGR as it's commonly called.

Since the CRGR reviews all proposed bulletins and generic letters, among other proposed staff actions, this may properly be referred to as a regulatory analysis pursuant to 10 CFR 50.54(f). This analysis was not made public due to its predecisional nature. It may be made public on approval of the Director of the Office of Nuclear Regulatory Regulation. Excuse me. I got that wrong, Nuclear Reactor Regulation, NRR.

Indeed, the staff was not able to justify inclusion of closed systems in the recommended actions of the generic order as it had once proposed to do. Accordingly, it relaxed its position on recommended action 2 with respect to closed cycle cooling systems.

Any need for clarification? Okay, next question.

This question was asked in one of the workshops. Many of your responses this morning fall back to the standard NRC position that the licensee should provide adequate assurance that they have a program o actions in place to satisfy the Generic

Letter concerns. This position could create a problem later when the inspector shows up to review our program. What kind of guidance will the NRR and research staff be providing to the inspector?

If you don't provide specific instruction in something like a TI, that's temporary instruction, the acceptability of a given program will be left to the opinion of an individual inspector. When will this type of guidance be available?

And we believe we have answered this question. Is there any discussion? Yes, sir?

MR. ALAN COHLMEYER: My name is Alan Cohlmeyer for Quadrex. As regards issuing or not issuing of temporary instruction, I wonder why this is different than for example Generic Letter 89-10 on motor operated valves where they did say that they would issue a temporary instruction within about a year. Could you explain why the difference?

DR. HODGE: I don't know. Do you know, Jerry?

MR. WERMIEL: No, I don't know why there's a difference. I know what thinking went into our position that a TI wasn't appropriate for this particular Generic Letter. That is, temporary instruction is generally intended for inspection of a one shot deal or a particular one-time action that we ask licensees to take. The program that's being implemented for improving its service water is intended for the life of the plant.

For that reason, it was felt that the existing inspection program for insuring safety functions of safety related systems was appropriate and we would allow the regions the necessary flexibility in implementing that part of the inspection program as we always had.

The only thing additionally that was needed was further instruction to them on the kinds of things that have been occurring over the years that we recognized were causing degradation of service water and therefore, needed to be looked at more specifically. And, we felt that we could do that quite easily and quite appropriately through this question and answer format, with the supplement to the Generic Letter itself.

MR. COHLMEYER: I could say the same words about the Generic Letter, motor operated valves, it's going to be an ongoing continued program for the life of the plant.

MR. WERMIEL: And I agree with that. I don't know why there's a difference. I know -- as I say, I don't know the thinking for that particular action at all. I only know the thinking that went into this Generic Letter.

MR. COHLMEYER: Okay. Thank you.

DR. HODGE: Any other questions?

The next question and this is the last question that we received in the general category. When does the NRC envision inspections to begin on this letter?

Our opinion is that the inspections should begin after

individual licensees indicate they have implemented their program. Such inspections will probably not begin until late 1990.

Turning now to the category on action 1 on biofouling, the first question received was, when determining whether a plant has clams in its source water, does consideration need to be given to the presence of clams in the plant vicinity, at the local environment, or solely in the water body, source of cooling water?

The purpose of this recommended action is to enable a licensee or applicant to know if the service water system might be subject to biofouling. All potential sources of water for the service water system should be examined annually for the presence of biofouling species.

If no waters in the local environment of a plant can get inside piping and components to cause biofouling degradation of the heat transfer function of the service water system, then such waters do not need to be samples.

Any question? Next question.

What is the definition of lay-up?

Lay-up means the filling of a system. Those service water cooling loops normally operated with water in the system, even in standby position, should contain chlorinated or equivalently treated water rather than untreated water.

Any discussion? Yes, sir?

MR. GUY SHELTON: Guy Shelton, San Onofre Nuclear

Generating Station. What period of time are you talking about being in a standby condition?

DR. HODGE: Duane, can you answer that question?

MR. NEITZEL: Yes. Tuesday, the same question was asked, almost word for word. There is no time limit on this definition. The idea of chlorinating or treating a system that is laid up is to prevent biofouling from becoming a problem from degradating the service water system, so the time definition for lay-up, as it deals with this question is how long would it take a biofouling organism to become a service water problem, and therefore, so that the individual environment, individual system, even individual components within a system, therefore, there you have your definition of time.

DR. HODGE: Additional questions? Okay, next question.

What constitutes an infrequently used component?

Paragraph C in Enclosure 1 in the Generic Letter says that redundant and infrequently used cooling loops should be flushed and flow tested periodically at the maximum design flow to insure that they are not fouled or clogged. This recommended action refers to ECCS loops or other safety related cooling loops that are normally in the standby condition.

The next sentence says that other components in the service water system should be tested on a regular schedule to insure that they are not fouled or clogged.

This recommended action refers to the pumps, pipes,

valves, strainers or other components, even in loops in which water is normally flowing. Often, flow is inadequate in these loops without being detected in the absence of such testing.

Consider a system in which water is normally flowing, with parallel branches, in which the states of components in the branches are not often changed. For example, branch throttle valves initially set before the plant began operation, may not be controlled by procedure. Subsequent changes in the throttle valve positions for various reasons, or clogging of them or other components in the branches, would upset the initial system flow balance without detection.

Any discussion on this answer? Next question.

We have several questions related to this one and we intend to read each one separately and ask for your reaction, so bear with us.

To what extent should fire protection systems be addressed in response to the Generic Letter?

The Generic Letter is not designed to focus on fire protection systems, but to incidentally include them if they use untreated water that could be subject to the service water system ills described in the Generic Letter.

Any discussion on this question? Next question received was, if it can be shown that the introduction of mollusks into the service water system is not plausible, based on service water system design and makeup water system design, can

the requirements of this Generic Letter concerning both inspection for and control of mollusks be waived?

Our response is, the purpose of the Generic Letter is for licensees and applicants to assure the NRC that the heat removal requirements of the service water system are satisfied. If this can be done by this proposed program, then it is acceptable.

Any discussion? Next question.

Enclosure 1 to Generic Letter 89-13 recommends varying requirements for service water systems based on intake structure configuration and location. In a service water system in which the suction point of the service water pumps is in the collecting basin for the ultimate heat sink, the cooling tower, would the basin be considered the intake structure, or would the source of basin makeup water be considered the intake structure?

Each licensee or applicant should define the scope of the intake structure. The authors of the Generic Letter consider that an intake structure would contain all the waters eventually used in the system. Now, we've discussed a question similar to this before.

Any discussion from the audience? Next question.

The Enclosure 1 describes an acceptable program to the NRC to implement recommendation 1. This program includes Biocide treatment regardless of whether the plant is susceptible to macroscopic biological fouling or not. Will a program that does

not include Biocide treatment be acceptable to the NRC?

And the answer is yes, for good cause shown.

Any questions on that? Next question.

Recommendation 1 states that initial activities should be completed before plant startup, following the first refueling outage beginning nine months or more after the date of this letter. What is the intent of the phrase initial activities? Does it mean the first round of activities, inspections, flushes, Biocide treatment, et cetera, has been completed? Or, the mechanisms have been put in place which will culminate in the implementation of the program, such as Biocide discharge permits submitted or procedures written and approved.

Both these possibilities could be included in the intent of the phrase. FOr those activities involving an outside governmental agency, the licensee or applicant should arrange a needed adjustment in the schedule with the appropriate NRR project manager.

For those activities involving procedural changes or new procedures, the initial activities refers to those inspections or other activities by which the need for procedural changes or new procedures are identified.

Any questions? Next question.

We use well water, raw water, as a source to the fresh water of fire protection storage tanks. Do we need to chlorinate these tanks or do we need to conduct full flow surveillance tests

on all five protection piping runs? We presently only surveil the fuel pumps for flow, not the piping runs. We do not presently chlorinate these tanks. The service water system per se is not used to fill these tanks, separate wall pumps are used.

Our answer is a little more lengthy. The recommended program described in Enclosure 1 was developed by a government-sponsored research program. If a licensee or applicant chooses an alternative course of action from that recommended, it should assess the potentials for microscopic biofouling and microbiologically influenced corrosion, commonly called MIC, and justify that the alternative course of action will result in satisfaction of the heat removal requirements of the service water system.

Paragraph B of this enclosure recommends chlorination whenever the potential for a microscopic biological fouling species exists. Such a potential may not exist for these wells, but the potential for MIC should also be considered.

Paragraph C of Enclosure 1 recommends flow testing of infrequently used loops, periodically, at the maximum design flow rate, to insure that they are not fouled or clogged. If the fire protection pumping runs are subject to biofouling but the water is not treated to protect him against biofouling, then the full flow testing of them may be necessary to insure minimum potential for clogging.

This paragraph also recommends chlorination to help

prevent MIC. Any discussion on this one?

The next question received then.

Does the visual inspection of intake structure apply to the intake piping as well? If so, will NRC give guidance as to replacement criteria of piping? If not, is B31.1 for wall thinning appropriate criteria?

The scope of the intake structure was purposely left vague to afford licensees and applicants sufficient flexibility in resolving problems and planning their responses to the Generic Letter. The NRC does not have an official position on proper placement criteria, but B.31.1 should be appropriate for plants so designed.

Any reaction to this question? Next question.

Larva sampling is difficult to do. We already have a sampling commitment, but we don't want to do this and can justify not doing it.

We say the earlier that licensee or applicant can identify the presence of a biofouling species in a source body of water for the service water system, the better chance it will have to control the situation and prevent a potential safety problem.

Any reaction? Next question.

This is a three-part question. With regards to Enclosure 1 of the Generic Letter, will NRC give guidance on use of Biocides other than chlorine?

The answer is no. The NRC is interested in the

effective heat transfer of the systems. We are not in a position to consult on the various Biocide treatments.

Next question, do we need to continuously chlorinate if under our inspection program we find no evidence of microscopic fouling? Does WPDES discharge limits take precedence to this? And I believe that should be NPDES.

Our answer is, the program described in Enclosure 1 represents a program acceptable to the NRC for implementing the recommended Action 1. The licensee or applicant can choose to pursue an equally effective alternative course of action if justified. Precaution should be taken to obey federal, state and local environmental regulations regarding the use of Biocides. This includes the National Pollutant Discharge Elimination System, NPDES discharge limits, administered by the U.S. Environmental Protection Agency that were referenced in the question.

Any discussion?

Is demineralized water acceptable for use in we lay-up of stagnant service water piping?

This question must be decided by the licensee or applicant. The result should be that the heat removal requirements of the service water system are satisfied. To accomplish this, the NRC recommends that such piping be flushed and flow tested periodically to insure absence of clogging and that chlorinated or equivalently treated water be used to fill service water loops before lay-up to help prevent MIC.

Any need for clarification? Okay, the next question.

Do Generic Letter 89-13 requirements apply to the fire protection systems which are not fed by either the service water system or the service water intake?

The answer is no. However, if the fire protection system source water is subject to fouling or corrosion, then a periodic monitoring program should be established to detect system degradation.

Any questions? Next question.

Does the Generic Letter imply that biofouling monitoring methods are required? Are side stream or in-line monitoring methods necessary? Does the NRC have a preference concerning the methods of visual, UT, radiography or electrochemical probes to monitor for biofouling?

Yes, biofouling monitoring of the source water is necessary; side stream or in-line monitoring is effective and could be used for this purpose. The NRC has no preference concerning methods for biofouling monitoring or nondestructive service water examination, provided the selected method is effective.

Any questions on this one? Next question.

When stating we should be aware of other plants, facilities, et cetera, that use the same service water source; for example, rive, and their biofouling problems, how far does that extend, within five miles, fifty miles? Please clarify.

This question was raised at one of the workshops. The NRC cannot place a speed limit on biofouling awareness. Conditions at each site would determine an appropriate program or how far away to monitor for biofouling. The licensee should use the best available site specific information and establish an appropriate monitoring program.

Any questions? Next item.

On Action 1, if the current sampling program, which was initiated to detect Asiatic clams, has not found any mollusk infestation. Do the sampling methods need to be modified to detect ZEBRA Mussels?

The recommended sampling methods in recommended Action 1 are intended to be general enough to enable licensees and applicants to become more aware of macro biofouling agents early enough to prevent the associated fouling problems from adversely affecting the safety related function of the service water system.

Recently we issued Information Notice No. 89-76, entitled "Biofouling Agent: ZEBRA Mussel," to address this question.

Does the audience have any questions? Okay, the next item.

Some state regulations do not permit the use of Biocides above the minimum detectable level. Yet Enclosure 1 to the Generic Letter appears to require Biocides while cautioning plants not to violate state and local regulations. Since it is

not possible in some jurisdictions to use any Biocides without violating state and local regulations, what alternatives to Biocides are acceptable to the staff?

We discussed this question, or one related to it, before. Does the audience have any questions? Okay, next question.

What is the basis for requiring treatment of fire protection systems that use raw service water as a source?

I believe we handled this question earlier. Any questions from the audience? Okay, next question.

Concerning inspection of intake structure for each refueling cycle, could inspection of other intake structures, namely fossil units, on the same body of water that had been in place and in service for up to 40 years, be used to justify either to extend the frequency of the inspection or maybe no inspection at all.

Our answer is the inspection of the intake should not be restricted to potential macroinvertebrate fouling. If the current program in place at the fossil unit mentioned has been shown to be effective to date, for the detection of fouling, including biofouling, mud and silt, then it may be sufficient for future monitoring.

However the licensee or applicant should be aware and consider possible rapid changes in environmental conditions and insure that their program includes the best available site

specific information.

Any need for discussion on this question? Any comments from the staff? Next question.

For NTOL plants, when does Generic Letter 89-13 have to be implemented?

The Generic Letter 80-13 should be in place at the time of initial plant licensing.

Any need for clarification? Next question.

Concerning redundant and infrequently used cooling loops. Define infrequently used?

The wording infrequently used cooling groups is intended to apply to those normally in a standby mode under stagnant flow conditions. The Generic Letter 89-13 program should address means for insuring against fouling under such conditions.

Any reaction? Next question.

If performance testing is done on all heat exchangers periodically, will this satisfy the intent of the recommendation?

Yes. Periodic performance monitoring of all safety-related heat exchangers is acceptable, provided it insures heat transfer, not merely flow or pressure drop.

Any discussion on that one? If you have any -- the next question.

If yearly inspections of a plant service water and intake structure shows no indication of Asiatic clams, and

testing results indicate that corrosion is not microbiologically influenced.

Is it acceptable to continue with the annual inspections for clams and perform maintenance and testing as required in Actions 2 and 3 of the Generic Letter, in lieu of a chlorination injection program.

Our response is that this appears to be reasonable for good cause shown. And we refer you to previous discussion.

Any questions on that one?

We have one more question on this category on the biofouling recommended action. It was introduced at the last workshop and so we scribbled out an answer here.

For a fire protection system supplied by raw water which meets flow requirements and does not provide safety related cooling, are any actions required?

And the answer that was scribbled out is no.

That concludes that category. Turning now to the category on Action 2, heat transfer testing, the first question received was should the proposed heat exchanger heat transfer testing method be provided for prior NRC review and approval?

And the answer is no. Next question.

Is it acceptable to determine the most restrictive heat exchangers in each group for testing in lieu of testing every heat exchanger?

The purpose of the Generic Letter is for licensees and

applicants to assure the NRC that the heat removal requirements of the service water system are satisfied. If this can be done by this proposed program, then it is acceptable.

Is there any need for discussion on this question?

MR. MILTON HUTT: My name is Milton Hutt, Arkansas Power & Light. Does that apply to the base line test as well, or the followup test?

DR. HODGE: We do intend for you to determine a base line and this mostly applies to the followup testing program, that's correct. Did you want to clarify, Jerry?

DR. WERMIEL: No, that's fine.

DR. HODGE: Okay, next question.

Has the NRC reviewed the EPRI Service Waterworking Group document prepared by Duke Power and Toledo Edison, describing several methods of heat transfer testing? If so, is the temperature effectiveness method acceptable or which methods are acceptable?

The staff has not formally reviewed this document but has received a draft copy, a method of heat transfer testing is acceptable for purposes of satisfying the Generic Letter if it can be used to assure the NRC that the heat removal requirements in the service water system are satisfied.

Any question? Next question.

DR. HODGE: If the pressure drop because the heat exchanger at design flow is less than or equal to the

manufacturer's specification, is heat transfer testing required? Provided the baffles have been inspected to ensure that the flow is not bypassing the coils.

The objective is not to satisfy the manufacturer's specification for flow in heat exchangers so much as it is to assure the heat removal requirements of the service water system.

If the latter assurance can be achieved by showing this condition to be necessary and sufficient, then heat transfer testing would be superfluous.

Next question?

To what extent can routine maintenance or cleaning of heat exchangers replace testing?

A licensee or applicant should determine the appropriate frequency of testing or maintenance activities to assure that the heat removal requirements of the service water system are satisfied. For a given heat exchanger, a licensee or applicant may elect to clean, replace, repair or otherwise maintain it initially before beginning a routine testing program.

If the licensee or applicant elects to not conduct a routine testing program for the heating exchanger, then a routine maintenance program may be necessary to provide the sought assurance. In the absence of a routine test program, no basis may be available for detecting potential degradation of heat transfer performance. In the absence of such a basis, the frequency of maintenance may have to be a maximum value to provide the sought

assurance.

Any discussion?

Next question: In an effort to minimize the amount of time that a single redundant division of safety-related equipment is out of service, some utilities employ a divisional outage concept for major plant outages. By utilizing this concept significant maintenance work activities, for example system flow balance test, standby diesel generator teardown, electrical distribution, bus work, et cetera, are performed on an alternating outage schedule for each division. This permits comprehensive maintenance on each division to be performed while reducing the overall impact on redundant safety system availability. The ability of the utility to implement and maintain a service water heat removal capability monitoring program would be significantly enhanced by the installation of permanent plant monitoring equipment. Installation of dedicated monitoring equipment would also reduce the impact on future -- of future testing on service water and heat exchanger availability.

For a utility that employs the divisional outage concept and wishes to install permanent plant equipment to perform the system testing identified in GL 89-13, is it permissible to defer baseline data acquisition for one division of the service water system until the second refueling outage following the issuance of a generic letter?

My response is that this request appears to be

reasonable for good cause shown. Any request for an adjusted schedule should be arranged through the project manager.

Next question: What is really required by the sentence on adequacy of chemistry control programs in the first paragraph of Page 5 on the Generic Letter?

Even though a closed cooling loop may contain water with controlled chemistry, the potential exists that the loop may be contaminated by inleakage, inadequate chemistry controls or materials in the system before a -- before the current chemistry control program became effective.

An example of this was recently disclosed at the EPRI service water system reliability improvement seminar at Charlotte, North Carolina, on November 6th through 8th, this year. And the internal study discussed there, optical examination of the primary side of the decay heat removal heat exchanger tubes disclosed no fouling. The tubes were shiny bright. Optical examination of the closed component cooling heat exchanger however disclosed significant fouling. The tubes did not reflect any light. The problem was a paraffin-based packing material inadvertently left in the system from construction days.

Suppose the licensee in this case can argue that it has a chemistry control program for water circulating through the CCW heat exchanger but can't show that the program has been in place since the system was initially filled?

A proper response to the Generic Letter then would

include testing that CCW heat exchanger. At any point in the program, if the resultant finding of degraded heat transfer cannot be explained or remedied by maintenance in the open-cycle portion of the system, as would be possible in this case, the CCW heat exchanger should be tested and, depending on those results, the DHR heat exchanger should be tested. The process should be continued until the problem is remedied.

Any reaction on this one?

Next question. Do both emergency service water systems and normal service water system need to be reviewed?

Yes. The NRC is concerned about the safety-related effects of both systems. Sometimes the mode of operation of a service water system is changed in emergency conditions to introduce uncontrolled water and thus potentially introduce biofouling agents, corrosion products, and silt that may adversely affect the heat transfer performance of the system.

Any clarification on this one?

Next question. Does our CCWS need to be addressed as part of our response?

We have recently shown through eddy current testing on the CCW heat exchangers that the physical barrier between the service water and component cooling water systems is adequate. Make up to the CCW is via make up water.

And we refer you to previous discussion on this one.

Any questions?

Next question. Recommendation No. 3, and here I think the author may have meant Recommendation No. 2 but No. 3 could apply, does not specify a frequency for heat exchanger inspections. Is it the NRC's intent that the utility establish the frequency of these inspections?

Yes. The Recommended Action II indicates limits. Initially tests should be conducted at least once every fuel cycle. More frequency testing may be necessary to enable a conclusion that the heat removal requirements of the service water system are satisfied.

After about three tests, a licensee or applicant may be in a position to set a differing test frequency. However, the finally determined testing frequency should not be less than once every five years.

Any need for clarification?

Next question. What is meant by frequent regular maintenance? Can frequency be determined in a similar method as test frequency?

Recommended Action II calls for heat exchanger performance testing. For small heat exchangers such as lube oil coolers, et cetera, testing might be excessively burdensome compared to maintenance of the heat exchangers.

A licensee or applicant can choose alternatively to routinely maintain the heat exchangers instead of testing them. Either the frequency of maintenance or frequency of testing

should be determined, to assure that the equipment will perform the intended safety functions during the intervals between maintenances or tests.

Any discussion on this:

THE AUDIENCE: Yes. Joe Kowalowski with Arkansas Power and Light.

For the lube oil coolers, does that imply that we could institute that regular maintenance without doing a baseline on jacket lube oil coolers and small canister lube oil coolers?

DR. HODGE: Well, if you only insist -- or if you only intend to do maintenance --

MR. KOWALOWSKI: Yes.

DR. HODGE: You don't need a baseline, I don't think.

Would you agree, Jerry?

DR. WERMIEL: That's right.

Then -- you'll know whether the heat exchanger is clean or not because you've already, presumably, maintained it. So, yes, that's okay.

DR. HODGE: Next question. Why were three tests chosen? Could a different number, more or less, be appropriate?

The number three is the minimum number needed to establish a trend. A larger number would be appropriate, but a small number is insufficient.

Any reaction to that?

Next question. Oh, excuse me; there's a question.

THE AUDIENCE: Yes. John Taggart, Arizona Public Service.

When you start talking about three tests, if we perform a test and -- and baseline it at its -- at its designed condition, after several years of service you certainly wouldn't need to perform that test every -- each refueling. Correct?

If you -- if you had five years of service and you're still meeting design specification on the heat exchanger, then essentially there has been no degradation during that period of time.

DR. HODGE: Well, that's correct.

MR. TAGGART: Then --

DR. HODGE: Then there would be no need to change the -- to determine the frequency of testing or maintenance except for once every refueling cycle, or ultimately no less than once every five years.

Is that a good answer?

DR. WERMIEL: That's right.

DR. HODGE: Next question. The Generic Letter does not specifically state -- excuse me, does not specifically address testing of automatic safety features actuation which may be required to provide the required service water flow to safety-related heat exchangers. Does the NRC have any recommendations on functional tests or systems -- excuse me, of systems?

The generic letter was written with a tacit assumption

that all other regulatory conditions would be observed. In particular, functional testing independent -- required by technical specifications must be accomplished independently of the recommended actions of the Generic Letter.

Where there is overlap, credit may be taken for the tech spec required functional test. The procedures, results and considerations of such tests should be documented with response to the Generic Letter and retained in appropriate plant records.

Any need for discussion?

Next question received. The term all heat exchangers is used. Does this imply every heat exchanger of a given design must be tested, or where more than one identical heat exchanger is used can one representative unit be selected?

Recommended Action II calls for testing of the heat transfer capability of all safety-related heat exchangers cooled by service water. The service water system is defined as the system or systems that transfer heat from safety-related structures, systems or components to the ultimate heat sink.

Each heat exchanger, regardless of redundancy, should be tested or maintained initially to establish that the heat removal requirements of the service water system are satisfied. The existence of identical conditions then can be used to determine the best test or maintenance frequencies to assure that the heat removal -- that the heat removal requirements of the service water system are maintained.

Any discussion?

Next question received. What is meant by the relevant temperatures should be verified to be within the design limits? Does this imply testing should be conducted with the design basis heat load? Is it acceptable to conduct testing for all heat exchangers at off-normal conditions, provided accurate and relevant data can be acquired and analytical methods used to determine the heat transfer capacity at design conditions?

Enclosure 2 in the Generic Letter contains much discussion about verifying various parameters to be within design limits. Testing with design basis heat loads is recommended ideally. If testing can be done under design conditions, it should be done under those conditions.

Realizing that this may not be practical in non-accidental circumstances, the next best step is to conduct tests under off-design conditions and analytically correct the results to the design conditions. Such a procedure is acceptable where it is necessary, but not where testing under design conditions is practical.

Any questions?

Okay. The next question we received was: If the maintenance period is know, why can't a test be performed before maintenance to establish a data point for the required testing or maintenance? If the overall maintenance period has been three or more fuel cycles, could this be used to establish the test

frequency? Is it necessary to retest the heat exchanger after maintenance if the work performed was a restoration only, that is cleaning, not tube plugging? And testing had been previously conducted with clean heat transfer surfaces.

We say all these steps are acceptable alternatives to the acceptable program outlined in Enclosure 2 in the Generic Letter. The justifications that these alternative procedures assure that the heat removal requirements of the service water system are satisfied should be documented and retained in appropriate plant records.

Any discussion on this answer?

Next question. What level of documentation is required to justify excluding close-cycle system heating exchangers from testing to verify heat transfer capability?

The goal of the Generic Letter is to obtain assurance that the heat removal requirements of the service water system are satisfied. To exclude a closed-cycle heat exchanger from testing, it should be shown that the chemistry of the primary fluid and the heat transfer characteristics of the heat exchanger have been controlled since the time the system was first filled.

Any discussion on this one?

Next question. Recommended Action II, Paragraph 4, states: "Tests should be performed following corrective actions". Would bulleting tubes be considered as corrective action?

The answer is yes.

Next question. Recommended Action II, Paragraph 5, states that: "Frequent, regular maintenance is acceptable alternative to testing." What is meant by frequent, regular maintenance? Does this mean more frequently than if testing were performed?

This paragraph further states that: "This alternative might apply to small heat exchangers located in low radiation areas." Would low radiation areas be defined by ALARA practices or less than 100 MR per hour?

Our answer is the frequency of periodic testing or regular maintenance is to be established by the licensee once sufficient data has been collected. The frequency should ensure that unacceptable degradation does not occur between testing or maintenance cycles.

Low radiation areas as intended in Generic Letter 89-13 are included in the licensee's ALARA program so that radiation levels will not preclude personnel access for maintenance and cleaning of heat exchangers.

Any need for discussion on this one?

Next question. To what degree should a utility endeavor to monitor real-time corrosion rates of the service water system? Is trending of heat exchanger performance and visual inspections sufficient documentation of the components' internal condition?

It is not necessary to determine numerical real-time corrosion rates in the service water system. The licensee's monitoring program should be sufficient to identify degradation and take the necessary corrective action before the system performance is unacceptably affected.

Trending of data is the recommended approach to monitoring system performance.

Any questions?

The next question received. Generic Letter 89-13 seems to imply that periodic maintenance, that is cleaning, of small acceptable heat exchangers is acceptable in lieu of performance testing. If so, is the refueling maintenance frequency acceptable?

The answer is yes, this is an acceptable initial frequency and may be acceptable in the long term with justification based on data from a minimum of three refueling outages.

Any discussion on this one?

Next question. For heat exchangers that cannot be tested at the design heat removal rate, what is the NRC recommended method to extrapolate the test data to design conditions? Does the NRC have any additional recommendations for extrapolating test data taken at very low loads, for example ten percent design load or less to design condition?

The staff does not have a recommended method of

extrapolation. However, the EPRI service water system working group has been developing such guidance as have some licensees such as Duke Power. These may be places to start when developing appropriate testing programs.

No questions?

Next question. Generic Letter 89-13 states that: "Tests should be performed on heat exchangers before and after corrective action is performed." What is meant by corrective action?

Corrective action is any action that would improve the heat transfer capability of the heat exchanger.

Yes, Sir?

THE AUDIENCE: Guy Shelton; Southern California Edison.

Our CCW system, the service water is piped where we can backflush it as necessary by monitoring flow and delta P. The reason we asked that question is, would you consider that to be corrective action? Because this is something we do generally once or twice a month.

DR. WERMIEL: I wouldn't say so, no.

No, I wouldn't consider that kind of an activity corrective action. You're not correcting a degra -- a known degradation, are you? You're --

MR. SHELTON: We're doing a more --

DR. WERMIEL: -- you're doing it more or less as a preventive measure, correct?

MR. SHELTON: Yeah. To --

DR. WERMIEL: Yeah, that's --

MR. SHELTON: For any blockage of tubes?

DR. WERMIEL: No. I would -- I say that's more consistent with a typical monitoring program, the idea is to pick up any problem before it becomes a problem.

I think the intent of the generic letter, from the standpoint of corrective action, was where you're taking an action because you know you have a problem that needs to be corrected.

DR. HODGE: Other questions?

The next question received is a little bit longer. Recommended Action II requires that the relevant temperature should be verified to be within design limits. Also Enclosure 2, Item 2A, states: "Perform functional testing with the heat exchanger operating, if practical, at its design heat removal rate to verify its capabilities. Temperature and flow compensation should be made in the calculations to adjust the results to design conditions."

It is not practical to test the heat exchangers at design heat removal rates. Also, we are unable to find a method which has the requisite level of precision to adjust the test results to design conditions.

Please discuss an acceptable method to adjust the test results to design conditions. Also provide the scientific bases

or a reference for the proposed method.

Also, the heat removal test cannot be performed on the containment spray heat exchangers because there is no heat source. The only test that can be performed is the pressure drop test. Is this acceptable? If not, what is recommended?

Our answer is, as mentioned previously NRC does not have a recommended test method.

With regard to testing of containment spray heat exchangers as well as with all heat -- safety-related heat exchangers, a pressure drop test alone is not sufficient to satisfy the indicated heat transfer capability concerns.

If a heat exchanger cannot be practically tested, then the licensee may propose a program of periodic inspection, maintenance and cleaning as an alternative.

We are aware, however, of one licensee who was able to test the containment spray heat exchanger by heating the refueling water storage tank water, approximately ten degrees Fahrenheit, and then performing temperature monitoring test as well as pressure drop test.

Any discussion from the audience?

Next question. How much detail does the NRC expect for the response to Action II? Would the proposed test or maintenance or inspection method for each heat exchanger be necessary?

Specific details of the licensee or applicant program

in response to Action II must be developed and retained as part of plant records.

Submittals to NRC in response to Generic Letter 89-13 should provide only enough information to sufficiently describe the approach to be taken for each heat exchanger. That is, test or maintenance or inspection.

Those heat exchangers not being included in programs under Action II should be identified and the basis given for being excluded.

Grouping of heat exchangers into categories based on the approach to be used would be acceptable.

Any discussion?

Next question. Is the NRC staff stating that a technical evaluation of a heat exchanger's capability to perform its design safety function cannot be used in lieu of initial testing?

Therefore, all heat exchangers must be tested and even maintenance or cleaning cannot be used in lieu of initial testing because it would require a technical evaluation to determine maintenance or cleaning frequency.

Also, when considering several identical heat exchangers in one loop, do all the heat exchangers require testing or maintenance or cleaning?

The answer is no. The initial heat exchanger test program may consist of both performance testing of some heat

exchangers and the maintenance or cleaning of others.

The staff's previous response on the initial test program was intended to ensure that the licensee has established a baseline for all safety-related heat exchangers served by the service water system and therefore, is confident that they can perform their heat removal function.

As further clarification, if there are several identical heat exchangers in one service water loop, a licensee may perform testing or develop a maintenance or cleaning program for these heat exchangers based on the most limiting one as part of their initial test program. Justification on the basis of comparable service conditions should be included in the response when all identical heat exchangers are not tested.

Is that clear?

Next question. We would like to limit heat exchanger performance testing to one unit, since the two units are identical. Is this an acceptable approach?

Not totally. Refer to our previous discussion.

Any questions?

Okay, the next question received was talking about Action Item II. Can the test program include data taken during routine operating intervals with minimum load on heat exchangers and extrapolated to substantiate adequate heat exchanger performance? Or when does the NRC consider it impractical to test a heat exchanger at the design heat removal rate?

And we just refer you to our previous discussion on this question.

Next question. If maintenance is performed in lieu of testing for degraded performance of the heat exchanger, how extensive does the maintenance have to be? That is, does maintenance have to be performed on both sides of the heat exchanger or just on the service water side?

Again, we refer you to our previous discussion.

Next question. In reference to your Recommended Action II, do all safety-related heat exchangers connected to or cooled by service water or raw water have to be tested or verified clean by maintenance to ensure satisfaction of the heat removal requirements prior to plant start-up following the first refueling outage beginning nine months or more after the issuance of the letter?

And the answer is yes. The reason this question was asked, if a heat exchanger was cleaned 13 or possibly 18 months prior to issuance of this generic letter and found to be clean, or tested and found acceptable, and the current program does not call for recleaning or testing for three years, then the program would have to be revised.

Also, trend data may exist, indicating that there is no need to clean or test in less than a five-year interval.

If the heat exchanger is a part of a larger component that is not scheduled for maintenance. That's also a reason for

asking the question.

We add to the discussion. The generic letter is designed to provide flexibility in determining a justifiable alternative program for testing. The goal of the letter is to assure that the heat removal sys -- that the heat removal requirements of the service water system are satisfied.

Any discussion on this?

Next question. The Advisory Committee on Reactor Safeguards, ACRS, June 14, 1989 letter to the Commission noted five areas of concern with which NUBARG, that's the Nuclear Utility Backfit Action Reform Group, agrees. Some of the concerns were accommodated in the generic letter. However, we are interested in -- to know the resolution of the following: An intermediate closed cooling water system exempt from the -- G -- from the generic letter provided it is not subject to significant sources of contamination, is chemistry-controlled, and does not reject heat directly to a heat sink. However, the adequacy of the chemistry-controlled program must be verified over the total operating history of the plan. The ACRS questioned whether the absence of an adequate water chemistry-controlled system or any -- over any part of the operating history of a closed cycle system was adequate justification for including the system within the scope of the generic letter.

How did the staff resolve this concern?

The staff relaxed its position on including closed

cycle cooling systems in Recommended Action II, but added the precautionary recommendation that if a degradation of heat transfer could not be explained or remedied by maintenance of the open cycle part of the service water system, then testing may have to be selectively extended to the closed cycle part of the system.

Are there any questions on this one?

Next question was, or the next item was: Are plants required to review closed cooling water system operating logs for the history of the plant to verify adequate chemistry control?

Licensees and applicants are required to assure the NRC that the safety-related heat removal requirements of the service water system are satisfied. If review of the closed cooling water system operating logs for the history of the plant can help provide this assurance, then that would be an acceptable part of the program.

Next question. Would a program involving inspection and maintenance activities in lieu of a performance test program be an acceptable program for all heat exchangers and components?

And we have discussed this, or question related to this, before.

Next question. Programs acceptable to the NRC in response to Actions I and II were identified. What are some examples of acceptable inspection and maintenance programs for Action III?

The NRC has not defined an acceptable program for

Action III. However, the generic letter is designed to give the licensee or applicant sufficient flexibility in developing an appropriate program.

And we've discussed this before.

Is there any discussion on this point?

Next question. Is it acceptable to eliminate heat exchangers from the testing requirement of Action II if they are in parallel or in series with other heat exchangers which are tested and operated under similar service conditions? For example, velocity, temperature, process fluid.

And the question -- the questioner refers us to EPRI heat exchanger performance monitoring guidelines for the service water systems. And we have discussed this question before.

Any questions from the audience?

In this category we received an additional four questions from the Chicago workshop. A number of these have long questions and short answers.

In Enclosure 2 of the generic letter a statement is made that testing should be done when necessary -- or with necessary and sufficient instrumentation. Flow measurement is one of the two key parameters when measuring heat exchanger performance. It is also the most difficult, since most plants never provide a means to measure individual flow rates to service water users. In general, orifice plates and interior tubes, pitot tubes and flow nozzles are the only recognized traceable type of

low measuring devices. All of which require intrusive elements.

To be able to utilize such devices would require plant system modifications at great expense to the utility and its customers. A less expensive alternative to this would be to use non-intrusive, non-traceable devices such as transit-time ultrasonic flow meters, which with current technology give very reliable results. Trending of data taken with such devices would appear to be equally effective for detecting degradation in cooling water systems. Would the NRC recognize the value and benefit of using such devices and accept programs which utilize them?

And the answer is yes.

Any questions on that?

Next question was: Thermographic cameras could potentially be used to scan the tubes on air-to-water heat exchangers to see temperature profiles of the tubes and detect tube blockage or sediment in the tubes. Will the NRC accept such qualitative checks rather than quantitative measurements to prove that a heat exchanger is not fouled?

The answer is yes. However, additional means should be included in the program to ensure adequate heat transfer.

Any questions on that one?

The next question was: Is off-the-shelf -- if off-the-shelf software is reviewed for technical adequacy and subsequently utilized to perform heat exchanger performance

calculations, will it be acceptable to the NRC?

Again, the answer is yes.

The last question. If a heat exchanger performance reveals that a heat exchanger is in a degraded condition, the first obvious question will be as to what the impact of the degraded condition is on system operability. Will a heat exchanger performance program be considered the same as a plant surveillance program with the same ramifications for questioning plant or system operability? If so, is the NRC considering asking licensees to include limiting conditions for operation statements in their technical specifications?

Yes. If a heat exchanger heat transfer capability is shown to be degraded below levels needed for design-basis heat removal, then it is considered inoperable. The staff does not intend to -- that elements of these programs be included in plant technical specifications.

That concludes the questions for the category on heat -- on Recommended Action II. It is close to 12:00 o'clock. We would wonder if there are any questions to be submitted to us in writing from this workshop.

Could you identify yourselves if you have questions?

Okay. You don't need to specify -- speak them now. We just want to know how many. The thought being that we only have a small number of questions remaining, we could continue at this point rather than taking a noon recess and just take a ten-minute

break if -- and wind this workshop up in early enough time for you to -- to accommodate any travel requirements you may have.

Would that be okay?

MR. WERMIEL: Yeah, it looks like -- there are no additional written questions at all at this point?

DR. HODGE: There is one individual that said he had a question. One, two.

MR. WERMIEL: Okay.

DR. HODGE: So if you would, submit those questions to use --

MR. WERMIEL: Let us have those.

DR. HODGE: And then we'll take a ten-minute break.

MR. WERMIEL: All right.

DR. HODGE: So be -- be back -- what time do you have? 11:53? 11:43? Okay, close to 12:00 then.

(Whereupon, a short recess was taken.)

DR. HODGE: Is everyone in the room? Have we received all questions in writing that are intended to be submitted? Jerry tells me that we have received six questions and one of them is a multi-parter, multiple part question. It may be appropriate to adjourn now for lunch, rather than go on. What does the group feel? Let's go as they say.

MR. WERMIEL: Okay.

DR. HODGE: I would like to reiterate we had passed around a meeting attendance sheet, if anyone has not signed that

sheet, we would appreciate it if you would for the transcript purposes.

We turn now to the category on Action 3, Routine Inspection and Maintenance. Recommendation 3 states insure by establishing a routine inspection maintenance program that corrosion, erosion cannot degrade the performance of the safety related systems supplied by Service Water, emphasis added.

It would seem unrealistic to assume that a program could be developed that will insure absolutely no degradation of the system. Could you identify that the intent here is to establish a program which will insure that the system cannot degrade to the point at which its ability to perform its safety function is impaired. And the authors of the generic letter concur in this interpretation. Next question.

Must all safety related service water piping be cleaned, or only the piping that is susceptible to corrosion buildup, that is low flow areas? Non-destructive examinations would be used to confirm the areas which needed to be cleaned.

Recommendation Action 3 is intended to provide assurance that open cycle service water piping and components do not have degraded performance from corrosion, erosion, protective coating failure, silting and biofouling. Once this assurance is made, the routine maintenance and inspection program can concentrate on those piping segments that are susceptible to these problems. Any questions on that?

Next question, would it be considered acceptable to omit from inspection piping which is practically inaccessible, that is underground piping, based on inspections of practically accessible piping. Our response, inaccessibility itself would not be a sufficient reason for not inspecting. However, if additional justification including operational data and prior history are available, along with an evaluation which clearly justifies that inspections would be necessary -- excuse me, would not be necessary, then inspection could be precluded.

Next question, does the maintenance program have to include sampling of any crud or sediment found to determine its source. For example, during routine maintenance, a small amount of sediment was cleaned from a heat exchanger and the only documentation stated that it appeared to be a normal corrosion deposit.

If the maintenance program can assure that the heat removal requirements of the service water system are met, then it is acceptable. The better the root cause analysis of a problem is, however, the more effective will be the corrective action. Any questions on that?

The next question, if minimum fouling is found during maintenance, it should be acceptable to assume that the heat exchanger can still perform to the original design specification. Does the NRC have a problem with this assumption?

The NRC Staff cannot judge the adequacy of heat

transfer capability based on a broad statement of minimum fouling. The licensee must determine what fouling level requires corrective action, and justify the approach to be taken. Any questions on that answer?

Next question, under specific Action 3A on page 6 of the letter, what constitutes excessive accumulations of biofouling agents, corrosion products and silt?

The Staff does not have a quantitative criterion for this parameter, but notes that recently one plant removed more than 20 tons of such accumulations from its service water system. If such accumulations cause degradation of the heat transfer capability of the system, as shown by performance trend data, then such accumulations are excessive. Any reaction?

Next question, are plant work requests adequate relevant documentation to support the reinspections and maintenance documentation requirement of specific Action 3?

The answer is yes, as long as they can be made available to an NRC inspector. And that constitutes all the questions for the recommended Action 3 on routine maintenance and inspection.

Turning to the category for Action 4, the Single Failure Walkdown, we have several questions.

To what extent does this walkdown have to be performed? We are presently conducting a design basis documentation reconstitution effort. A system walkdown is performed only if a

problem is identified during documentation review. Walkdowns are not conducted all the time and are not full scope. Is the intent to complete walkdowns as required to insure systems meet the licensing basis for the plant or to verify the as-built condition?

The intent of the recommended action is to verify that the as-built condition of the system is sufficient to insure performance of the intended function of the service water system. The phrase, in accordance with the licensing basis for the plant was inserted for fairness to those plants licensed before a single failure criterion was instituted in the regulations. A design basis reconstitution suffices for the walkdown inspection recommended here. Any questions?

Next question, a service water system walkdown inspection was completed in 1986 at our plant. Can we take credit for that effort for this action, or must we repeat it now to meet the 2-year criterion?

You may take credit for the 1986 walkdown to meet this recommended action. The suggested time of two years to qualify the word "recent" was not meant to be rigidly interpreted. The NRC is interested in the walkdown being done now or recently, not in the distant past.

Next question, does the system walkdown take into account piping, valves, and in-line components? What about cabling walkdown? Is our 79-14 walkdown sufficient to address this?

79-14, we believe, refers to Bulletin 79-14 and our answer; the system walkdown should take into account everything about the system. The recommended Action IV is intended to make maximum use of other pertinent activities in reviewing the system, but it is not sufficient to depend on 10-year old reviews to ascertain the condition of the system today.

However, we understand that Bulletin 79-14, "Seismic Analyses for As-Built Safety-Related Piping Systems," is not closed at all plants. So if the walkdowns have been done recently, they would be acceptable. Any questions?

Next item. I don't recognize that. Can you take that one off for the moment. Yes, thank you. Save that one until the end.

Recommendation number 4 discusses system walkdown inspections. GPU Nuclear assumes that the intent of the walkdown as down to the level of a flow diagram only. Does the NRC agree with this assumption, or do we intend for a more detailed walkdown?

We discussed this and add single failure inadequacies and concur in control systems as well as equipment in which water flows. We note that the single failure inadequacies have been found in some plants apart from routine surveillance procedures. Okay, next question.

Are there any specific requirements which are new that should be added into existing single failure analysis? Explain

what is meant by reconstitution of the design basis of the system is not intended.

Recommended Action 4 for single failure walkdown was not designed to incorporate any new feature into existing single failure analysis techniques. The phrase, "reconstitution of the design basis of the system is not intended" refers to excessively difficult determinations of design data. For example, this may be the case for small skid mounted heat exchangers that were purchased as piece parts of larger units of equipment and for which design data may not have been provided to the licensee or applicant by the vendor. It would be enough to demonstrate that the equipment module of which the heat exchanger is a part could do its job.

Questions?

AUDIENCE: Ken Hukari, Portland General Electric. Could I hear you repeat that again -- just repeat it again, please?

DR. HODGE: Sure. The question is, explain what is meant by reconstitution of the design basis of the system is not intended.

The recommendation was not designed to incorporate any new feature not existing single failure analysis techniques. This phrase refers to excessively difficult determinations of design data. For example, this may be the case for small skid mounted heat exchangers that were purchased as a piece parts of larger

units of equipment and for which design data may not have been provided to the licensee or applicant by the vendor.

It would be enough to demonstrate that the equipment module of which the heat exchanger is a part could do its job.

AUDIENCE: Part of my question here was, what about some of the contractor calculations that have been bought by the utilities and since found to be, some of them in error, by the NRC in their audits, I think. And does that mean we should go back and check some of our design basis background calculations, maybe random or complete?

MR. WERMIEL: Let me answer that, Vern.

DR. HODGE: Sure.

MR. WERMIEL: As far as this generic letter is concerned, we did not intend any licensee to necessarily go back and verify design calculations for heat transfer for the service water system. However, if you know of an already existing problem or suspect that such a problem may exist, then by all means it's very appropriate to go back and look into that.

But the particular recommendation here was only with the assumption that you have an adequately design basis, you don't believe you have any problem with it, and now all you need to do is make sure that the design basis is being met by the system that's installed in the plant. That's all we intended.

AUDIENCE: That if you run into any differences between those -- on your tests, then it's time to go back and --

MR. WERMIEL: Exactly, precisely. You should not ignore a situation where you found a problem or really suspect a problem. Not at all.

AUDIENCE: Thank you.

DR. HODGE: Any other questions?

The next question was, please elaborate on the requirements of Item 4, specifically what is intended by confirmation of the performance of the service water system in accordance with the design basis without reconstitution of the design basis? Also, is it intended by this requirement to perform a complete single failure analysis of the service water system?

The licensee is expected to confirm that the installed as-built system satisfies the design requirements stated within the plant's licensing basis, that is the FSAR, the technical specifications and additional licensing documentation. A single failure analysis is to be part of this confirmation. Any questions on this answer?

Next question, the generic letter states that the licensee should verify that the service water system is in accordance with the licensing basis of the plant. Is the licensing basis in the context of this generic letter considered to be the FSAR and tech specs or will a more expansive interpretation be used?

The licensing basis is as defined in the FSAR, tech

specs and other licensing documentation. It is not the staff's intent that the licensing basis be redefined when addressing generic letter 89-13.

Next Question, Action Iem 4 of generic letter 89-13 states that the system walkdown inspections are required to confirm the as-built configuration of the service water systems. As a recently licensed plant, we are confident that our configuration control program satisfies this requirement. We believe system walkdowns are unnecessary for our utility.

And NRC says this position appears to be reasonable for good cause. Ongoing programs that contain results pertinent to generic letter 89-13 should be referenced in the response as justification for an equally effective program and retained in appropriate plant records. Any discussion on this?

Next question, if other design issues are being addressed by other regulatory actions, is it acceptable to exclude them from the scope of review for Action 4? And we have discussed this question already.

Next question, with regard to Action 4 which requests confirmation that the service water system will perform its intended function in accordance with the licensing basis for the plant, which specific licensing basis must be reconfirmed at this time? Only the single active failure review?

And, again, we ask you to refer to previous discussions.

We received one additional question in this category from a previous workshop, and this is the one that I asked you to save until the end. Should single failure analysis of the service water system include motive power? Electrical, pneumatic, et cetera? To active components, motors, valves, et cetera? If so, should it be limited to only to the delivery of the motive power to the component and not the single failure reliability of the motive power sources. That is do not need to do a single failure analysis on motive power system.

Our answer is yes, the licensee should consider single failure in power operated equipment or components that are part of the service water system. The single failures in power supply systems themselves do not need to be considered under generic letter 89-13. Any clarification needed?

Okay. That completes the category dealing with the single failure walkdown inspection.

And in the category for Action 5, the procedures review, we received one question. Please discuss what constitutes the desired response for Action Item 5. Confirming the adequacy and maintenance practices of operating emergency procedures and training that involves the service water system.

The letter states that the confirmation should include recent reviews of practices, procedures and training modules. Please provide some guidance for performing an adequate review. Also, are there other actions which the NRC recommends as part of

the confirmation?

Our response is, the staff has no specific guidance on what procedures, training and maintenance practices should be evaluated or revised. The intent of this item is to increase personnel awareness of the importance of the service water system with the aim of reducing operator errors.

Personnel or procedural errors are identified as a significant source of service water system failures. We refer you to the wording in Action Item 5 in the generic letter itself. Any need for clarification?

All right. That completes the questions that we had received in writing before the workshops and each workshop except this one. We received a number of questions and Jerry Wermiel will address those.

MR. WERMIEL: Okay. I'll go through those questions that we just received from the floor here. Before I begin, I was asked by a participant to identify the Regional Representatives in this workshop and I thought I would do that, so that you can become familiar with those people that will be involved from Regional Headquarters. Mr. Al Toth, Region 5 is here and Mr. Ian Barnes from Region 4 is here. I believe both are Section Chiefs involved in this effort.

The questions that were received from the floor here are not in any particular order. I'll just go through them, and I'll ask that if there's any amplification that either Vern Hodge

or Duane would purpose to make sure that they do.

First question, this one is from Arkansas Power and Light. If the utility performs a baseline test that exceeds the design requirements, but is below the manufacturer's rating for the component heat exchanger, does the NRC consider this as a concern in that the design margin has been lowered?

And our answer is, no. The staff is not concerned that a licensee maintain the initially specified design margin for a heat exchanger. If a licensee chooses to operate with a reduced margin, then this is acceptable, provided the design basis heat requirements, heat removal requirements are still satisfied. Any further amplification that needed?

The second question, also from Arkansas Power and Light, this licensee is scheduled to chemical clean the entire service water system in the Fall of 1990. Does this constitute an acceptable method to restore thermal performance in lieu of performance testing for the first outage?

And our answer is, the licensee should justify such an approach to satisfy this part of the generic letter. Since chemical cleaning is a corrective action, some follow up verification such as visual examination or limited performance testing may be appropriate. In other words, merely chemically cleaning a system doesn't necessarily assure you that the system has been based lined which is the word that we use without necessarily performing some additional verification of some sort.

Is there any discussion on that?

The next question is from Houston Lighting and Power and it reads, the SSFI method currently being used to satisfy recommended Actions 4 and 5 is manpower intensive. Can program deficiencies identified in the open loop system be applied horizontally to the closed loop systems in lieu of an additional SSFI?

And our answer is, yes, a licensee may decide that based on other actions already taken, such as an SSFI on the open loop system, that application of deficiencies identified from this to the SSFI to the closed loop system is sufficient. And that is provided the licensee confirms that the existing configuration control program has been applied to the closed loop system.

In other words, if you've identified efficiencies from an SSFI programmatic concerns, and have applied them to other safety related systems such as the component cooling water system, and are satisfied that the existing configuration control program you've already implemented for the component cooling water system is sufficient, and you don't expect there to be any other problems, then that would be sufficient in addressing the generic letter's concern for this item. Any additional clarification needed?

In brief, we're not asking that you necessarily do a complete SSFI or manpower intensive design verification effort on each and every aspect of your safety-related cooling water

system. Only that which we've already identified and described in answer to the other questions.

I have two questions now from PGE, question one, restate what you would consider acceptable as impractical conditions for testing. As a followup to that, what are acceptable alte- tives, especially for utilities not privy to EPRI information?

Our answer is, an impractical condition would be a situation where flow or means of applying heat load cannot be achieved based on the system configuration. An acceptable alternative for such a situation is a periodic inspection and maintenance program for such heat exchangers. And I believe we already discussed this to some extent when dealing with the containment cooling heat exchanger.

We also amplify that impracticality itself is not a sufficient reason for precluding any heat exchanger from performance verification of some sort.

The second question, what if performance heat exchanger testing conditions that is off design cannot be used to demonstrate acceptable heat transfer because low delta T combined with instrument inaccuracies is insufficient, is maintenance inspection our only alternative?

And our answer is, yes, if reasonable results cannot be obtained from periodic performance testing, then inspection maintenance is an appropriate alterative. Any followup to that?

Okay. I now have a series of four questions, I believe, and these are from Nebraska Public Power District. Question one. in lieu of taking annual water samples to determine if Asiatic clams have populated the water source, can we perform annual visual inspections of sample heat exchangers cooled by river water?

Our answer is, the purpose of sampling the water source itself is to insure sufficiently early identification of potential fouling means. However, if the best available site specific information does not indicate a means of biofouling, then visual examination of a sample of service water system heat exchangers may be sufficient with proper justification to detect fouling.

Question two, since macroscopic biological fouling and MIC has not been a problem at our site, does that exempt us from the recommendation for chlorinating systems using raw water before lay-up?

The answer is, yes, with appropriate justification provided.

Item 3, periodic visual inspection of small heat exchangers such as seal water coolers as a class, do they need to be inspected when the pump is inspected?

And our answer is, once a licensee has established that a small heat exchanger such as a sealed cooler is performing satisfactorily, the licensee may choose to justify an extended

program of periodic inspection. For example, up to five years based on existing operating conditions. For example, if the cooling loop itself is not subject to fouling mechanisms, then an extended program of inspection may be appropriate. Any followup discussion on that one?

And the last item, is periodic maintenance adequate to address lay-up without chlorination?

And our answer is, yes, with appropriate justification provided. And that's all I have.

If there's no other question or comment, we can provide a very brief summary of where we plan to go from here and then we can conclude the session and adjourn.

DR. HODGE: There may be one potential for continuing dialogue here concerning the item in Action 2 on taking 3 tests. Perhaps the wording in the letter is a little bit not understandable. We intend for -- at first we intended for licensees and applicants to do the three tests to establish appropriate testing or maintenance frequencies without doing any corrective actions, the thinking being that testing a clean system doesn't tell you very much every time. You want to know if the system is being degraded.

We allowed then the possibility for a licensee to clean the system before testing, we don't want to just require licensees to test a system with no good reason. So they could clean the system and then perform testing in a periodic retest

manner.

And then the intention of the three tests was to establish the frequency in the best way. That may have been a point that needed to be clarified. Is there any question on that?

Have we answered your questions sufficiently well this morning? If there's any other discussion, we invite you to ask that now.

MR. WERMIEL: Keep in mind even if nothing comes to mind right now, you're free to call anybody from the staff at any time with any further follow up questions or anything that you find unique to your facility that you'd like the staff to consider. We're available, as well as direct contact with your project manager, that's always permitted and is always welcomed.

DR. HODGE: The only difference being that such questions may not find their way into print.

MR. WERMIEL: That's correct.

DR. HODGE: Okay. Well, if there are no other questions, I thank you for your attendance and the meeting is adjourned.

(Whereupon, at 12:43 p.m., the meeting was adjourned.]

REPORTER'S CERTIFICATE

This is to certify that the attached proceedings before the United States Nuclear Regulatory Commission

in the matter of:

NAME OF PROCEEDING: Generic Letter 89-13

DOCKET NUMBER:

PLACE OF PROCEEDING: Denver, Colorado

were held as herein appears, and that this is the original transcript thereof for the file of the United States Nuclear Regulatory Commission taken by me and thereafter reduced to typewriting by me or under the direction of the court reporting company, and that the transcript is a true and accurate record of the foregoing proceedings.

Ronald N. LeGrand
Official Reporter
Ann Riley & Associates, Ltd.