



Northern States Power Company

Prairie Island Nuclear Generating Plant

1717 Wakonade Dr. East  
Welch, Minnesota 55089

December 21, 1994

Generic Letter 92-08

US Nuclear Regulatory Commission  
Attn: Document Control Desk  
Washington, DC 20555

PRAIRIE ISLAND NUCLEAR GENERATING PLANT  
Docket Nos. 50-282 License Nos. DPR-42  
50-306 DPR-60

Response to the September 23, 1994 Request for Additional Information  
Related to Generic Letter 92-08, "Thermo-Lag 330-1 Fire Barriers"

References:

- (a) R P Zimmerman, Office of Nuclear Reactor Regulation, to R O Anderson, Northern States Power Company, letter dated September 23, 1994
- (b) D D Antony, Northern States Power, to US Nuclear Regulatory Commission Company, letter dated May 17, 1994
- (c) D D Antony, Northern States Power, to US Nuclear Regulatory Commission Company, letter dated February 10, 1994
- (d) L J Callan, Nuclear Regulatory Commission, to R O Anderson, Northern States Power Company, letter dated December 20, 1993
- (e) Sheri Peterson, Office of Nuclear Reactor Regulation, to R O Anderson, Northern States Power Company, letter dated November 17, 1994

In Reference (a), the Nuclear Regulatory Commission (NRC) has requested a follow-up to the Request for Additional Information of Reference (d), to which Northern States Power Company had responded earlier by References (c) and (b).

This letter provides NSP's response to Reference (a). Section 1 of Attachment 1 to this response letter provides a summary of the NSP approach and progress accomplished thus far in resolving the Thermo-Lag issues at Prairie Island. Section 2 provides a quotation (in bold type) of the specific requests in the NRC's RAI, Reference (a), along with NSP's response to each request item. In Section 3, an assessment of the schedule progress is provided and the schedule of the return-to-compliance of Thermo-Lag at Prairie Island is projected.

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Please note that NSP has previously committed to the NRC in Reference (c) to resolve the Thermo-Lag issue by December 31, 1996. Since the issue date of Reference (c) new developments on the Thermo-Lag situation prompted several in-progress changes and/or adjustments to the NSP project plan. In implementing the changes all efforts have been made to meet NSP's commitments of Reference (c). However, the following uncertainties, which are beyond the control of NSP but have potential to affect the outcome of the project, still remain:

1. The use of the Nuclear Energy Institute's (NEI) application guide has not yet been approved by the NRC. In Reference (a), the NRC stated that "The NRC staff will review the application of the NEI guide on a plant specific basis." We could not determine from Reference (a) whether such a review could possibly be performed by the NRC to a schedule commensurate with NSP's commitment to return the Thermo-Lag installations at Prairie Island to regulatory compliance.

Please note that it is NSP's intent to meet our committed completion date regardless of when the NRC review will take place. A late NRC review/approval of NSP's application of the NEI guide may cause rework related to field installations.

2. There was no mention in Reference (a) indicated that the fire endurance concerns on Thermo-Lag could be resolved independent of the ampacity issues. However, NSP needs to perform and document appropriate engineering evaluations relative to ampacity before field installations are committed. While performing these evaluations, NSP will take into consideration the points of concern raised by the NRC in Reference (i).

As demonstrated in Attachment 1 to this response letter, NSP's approach to the Thermo-Lag issues greatly reduces the risk associated with the two above mentioned uncertainties. To help eliminate a third element of uncertainty, we are requesting NRC's staff cooperation in the following matter:

For configurations where applying the NEI guide does not provide for a straight-forward qualification documentation, NSP is considering new replacement and/or upgrade systems. The selection of a replacement and upgrade system for NSP shall be based on products available in the market for which the vendor has supplied reports of qualification testing completed to the requirements of Supplement 1 to GL 86-10. It is understood that the NRC is aware of the recent testing done by Transco Products Inc. and/or other utilities to qualify the Darmatt KM-1 material as a rated fire barrier for electrical raceways. Enclosed with this letter, NSP is submitting the controlling procedures and test reports of the 1-hour Darmatt KM-1 fire protection systems (Enclosures 1 through 4)

for potential use as the qualification basis for the replacement of Thermo-Lag installations at Prairie Island.

Please note that the removal of existing Thermo-Lag wrapping and the installation of Darmatt replacement system in the first fire area at Prairie Island (Area 31) is scheduled to be completed by December 31, 1995. This schedule allows approximately six months for the requested NRC staff review of the test reports, Enclosures 1 through 4, prior to the commencement of field installations in the second half of 1995. The staff's timely review and feedback on the acceptability of these reports is necessary for NSP to resolve the Thermo-Lag issue by June 30, 1996.

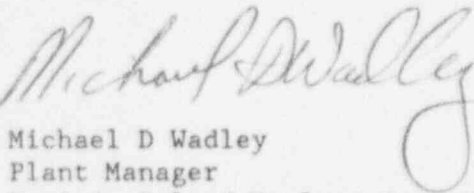
We are making the following new NRC commitment regarding the most recent RAI which was contained in Reference (e):

An NSP letter, in response to Reference (e), addressing ampacity derating factor calculations will be issued by January 31, 1995 for items 1 through 12. Responses to items 13 through 20 will be made by June 30, 1995.

Finally, this correspondence does not change the following commitment to the NRC which was provided previously by NSP in Reference (c):

We will resolve the Thermo-Lag issue at Prairie Island using Section B of Attachment 1 [to Reference (c)], THERMO-LAG QUALIFICATION PROGRAM PLAN as a guide with completion occurring by December 31, 1996 as shown in Attachment 4 [to Reference (c)], Prairie Island Station's Thermo-Lag Program schedule. This completion date is based on the potential need for cable rerouting which would take place during unit refueling outages.

Please contact Jack Leveille (612-388-1121, Ext. 4662) if you require further information.



Michael D Wadley  
Plant Manager  
Prairie Island Nuclear Generating Plant

CC: Regional Administrator - Region III, NRC  
NRR Project Manager, NRC  
Senior Resident Inspector, NRC  
Kris Sanda, State of Minnesota

Attachments

- (1) Thermo-Lag Resolution Approach & Progress and Itemized Response to the NRC Request for Additional Information
- (2) Integrated Schedule
- (3) Affidavit

Enclosures

- (1) Transco Products Inc. Procedure No. TIQAP 9.20, dated October 14, 1994, "The Installation of KM-1 Fire Barrier Systems For Electrical Raceway Systems."
- (2) Transco Products Inc. Manual No. TIQAM-1, dated March 31, 1994, "Quality Assurance Program Manual."
- (3) Faverdale Technology Centre Test Report No. FTICR/94/0060, dated August 4, 1994, "Test Report For A 1 Hour Fire Hose Stream Tests on Darmatt KM1 Fire Protection System For Electrical Circuit Systems to ASTM E119 NRC GL 86/10 Supplement 1."
- (4) Faverdale Technology Centre Test report No. FTICR/94/0073, Dated April 27, 1994, "Test To Determine The Ampacity Derating For Electrical Conductors Installed In Cable Trays Encapsulated By Darmatt KM1 1 Hour Replacement Material."

Thermo-Lag Resolution Approach & Progress and  
Itemized Response to the NRC Request for Additional Information

INTRODUCTION

As of 11/15/94, Northern States Power Company is past the mid-point in completing the Engineering Evaluation Task of Prairie Island's "Thermo-Lag Qualification Program Plan." This response letter is based on the progress made thus far in implementing the plan. The scope of the Thermo-Lag installations at Prairie Island has been reviewed and the various options to resolve the Thermo-Lag related issues are now established. The status of the project is summarized in Section 1, on an area-by-area basis. Section 2 presents the NRC's questions of Reference (a) and the NSP response to the questions. Some of the responses in Section 2 refer back to the related portions of the information presented in Section 1. In Section 3, an assessment of the schedule progress is presented and a projection is made to define the expected completion schedule.

SECTION 1      NSP Approach and Progress in Resolving the Thermo-Lag TSI  
330-1 Concerns at Prairie Island

1.0      APPROACH

The NSP program approach aims at affecting the return-to-compliance for all Thermo-Lag installations at Prairie Island within a given committed schedule. At the same time, the approach is designed to minimize the risk of rework or backfit due to several uncertainties inherent to the project but beyond the control of NSP. These uncertainties can be summarized as follows:

- (a) NRC's acceptance of applying the NEI guide,
- (b) NRC's outstanding technical concerns on ampacity derating, and
- (c) NRC's acceptance of qualifying vendor test reports on new replacement systems.

The risk associated with these items is controlled by the following objectives that have been implemented in the NSP program:

1. Reduce the scope by reviewing the station's safe shutdown analysis and Appendix R design basis. Credit was also taken from separation improvements resulting from recent and pending plant modifications to reduce the scope basis of Thermo-Lag protection.
2. Favor replacement with a new product over upgrade of Thermo-Lag in cases where the field conditions do not lend themselves to straight-forward application of the guide and the use of the new material can be justified technically and economically.

3. Control the risk factor associated with the NRC ampacity derating concerns by employing an approach that incorporates existing test data, such as TVA's testing, into an analytical model developed and used over the past ten years by our retained engineer for this project, Sargent & Lundy, L.L.C (S&L) of Chicago, Illinois. The results of applying the analytical model by S&L were compared to the NRC ampacity testing documented in IN 94-22 and found to be conservative.

The NRC, in Reference (a), indicated that there are unresolved technical concerns that would be addressed independent of the fire endurance issues. The analytical methodology on ampacity that the NSP approach employs will be utilized to evaluate the upgrade and/or replacement modification. (NSP will take into consideration the points of concerns raised by the NRC in Reference (i), while performing the ampacity evaluation.) The evaluation, being on sound technical basis, provides valid documentation that the proposed modifications would not adversely affect the protected cables' ampacity design basis.

## 2.0 AREA-BY-AREA RESOLUTION OUTLINE:

Originally, there were six fire areas at Prairie Island that contained Appendix R electrical raceways protected from postulated fire risk using TSI's Thermo-Lag 330-1 material. The design basis for the fire protection requirements in these areas were reviewed. The Thermo-Lag installed conditions were field inspected and documented. Recent and pending plant modifications affecting the scope of the fire protection requirements at Prairie Island were reviewed. Specifically, the SBO modification included provisions that aimed at improving the separation of redundant safe shutdown cables in the affected areas. Accordingly, the review of the results of this particular modification took credit for those provisions and reduced the scope of the Thermo-Lag protection requirements. An engineering evaluation on the various options to accomplish return to regulatory compliance of the Thermo-Lag scope in these areas was performed. The results of all of the above actions, relative to the original Thermo-Lag scope basis, are summarized below:

### 2.1 Fire Area 31

In this area, Division B cables were protected. Only one 18" X 6" tray (2SG-LB17) and a cable terminal box (TB-2304) were protected in this area using Thermo-Lag 330-1 material. The terminal box requires upgrade to meet the 1-hour rating required for this area. The tray's wrap was removed to allow for cable modification. The engineering evaluation conducted for this area recommended the option to protect Division A



items with a new material, instead of repairing or replacing the Division B items in accordance with the NEI guide.

The engineering evaluation, including a review of the recent SBO modification, resulted in adjustment to the current protection strategy. As a result of this, the tray and the cable terminal box protected by Thermo-Lag will be deleted from the scope, as Division A will now be protected.

The modification package for this work is in preparation and the field work is scheduled to be completed in the Fall of 1995, unless the NRC staff review identifies concerns with the test reports which are submitted with this response.

## 2.2 Fire Area 32

A detailed review of the station's record and a plant walkdown concluded that this area does not contain any Thermo-Lag protected safe shutdown components or electrical raceways.

## 2.3 Fire Area 58

Four raceways protected with Thermo-Lag are located in this area. A review of the basis of Appendix R exemption approved by the NRC for this area, the layout of the raceways from both divisions and the result of the recent SBO modification determined that adjustment to the current protection strategy results in the following disposition of the existing Thermo-Lag scope:

- 2.3.1 The Thermo-Lag fire wrap protection for Division B tray (30" X 6") covers routing points 1AG-LB1, LB2, LB3, LB4, LB11 AND LB12. The southern end of the protected portion of this tray can be shortened, by taking credit for the recent cable routing changes associated with the SBO modification. The evaluation concluded that removing the existing Thermo-Lag wrapping and protecting the revised boundary with a 1-hour Darmatt KM-1 replacement system is more effective than upgrading and extending the existing Thermo-Lag protected portion with additional Thermo-Lag material in accordance with the NEI guide.
- 2.3.2 The Thermo-Lag wrapping over the 18" X 6" tray (1AR-LB6 and 1AG-LB28) can be eliminated from the scope by taking credit of the 20-foot separation criteria. These cables are located near the SGB holdup tanks, more than 30 feet away from Division A safe shutdown cables. Since there are no combustibles in the intervening area, the existing exemption granted for Fire Area 58 applies to this situation.

- 2.3.3 The review determined that the Thermo-Lag wrapping over the 9" X 6" tray (1AG-LB8 and LB9) can also be eliminated from the scope. The protected cables are for the RHR pumps which are located in 30-foot deep pits. By taking credit for the ability to repair the damaged RHR pump cables, in case of a fire in the area, and the ability to perform the subsequent operator action to make the pump available for operation by the time it would be needed, the cables no longer require protection.
- 2.3.4 The 4" conduit for the number 12 safety injection pump, cable No. 16407-1, requires a 1-hour protection. The Thermo-Lag protection for this conduit is qualified for 1-hour protection using the NEI guide.

The related modification packages for the proposed field work in this area are in the process of being initiated for the new wrap protection using Darmatt KM-1 replacement material. The field installations are scheduled for completion in the 4<sup>th</sup> quarter of 1995, unless the NRC staff review identifies concerns with the test reports which are submitted with this response letter.

The exemption granted for this fire area would still be applicable. A 10CFR50.59/Generic Letter 86-10 evaluation of the above mentioned changes shall be performed to verify that the basis of the original exemption has not changed. If there are changes to the basis of the exemption, a revised exemption request will be submitted.

#### 2.4 Fire Area 59

Five raceways protected with Thermo-Lag are located in this area. The basis of Appendix R exemption approved by the NRC for this area, the layout of the raceways from both divisions and the result of the recent SBO modification were reviewed. It was determined that changing the division designated for protection in this area results in the following Thermo-Lag protected raceways to be deleted from the scope:

- 2.4.1 The 30" X 6" tray (Routing Points 1AM-LB2, LB3, LB4, LB5, LB6, LB7, LB8, LB9 and LB10).
- 2.4.2 The Unit 1 Division B cables in the 18" X 6" (Routing Points 1AM-LB25, LB27, LB28 and 1AR-LB6).
- 2.4.3 The 24" X 6" tray (Routing Point 1AM-LB1).
- 2.4.4 The Thermo-Lag protection for the 4" conduit (Division B Cable No. 16407-1).
- 2.4.5 The Thermo-Lag protection for the 9" X 6" tray (1AM-LB24).



Trays and conduits for the Division A cables now requiring protection have been field inspected. Modification packages are in the process of being initiated for the new protection using the Darmatt KM-1 material. The field installations are scheduled for completion in the 1<sup>st</sup> quarter of 1996, unless the NRC staff review identifies concerns with the test reports which are submitted with this response letter.

The exemption granted for this fire area would still be applicable. A 10CFR50.59/Generic Letter 86-10 evaluation of the above mentioned changes shall be performed to verify that the basis of the original exemption has not changed.

2.5 Fire Area 73

The cables originally protected by Thermo-Lag in this area have been abandoned in place as a result of the SBO modification. This includes the following raceways:

- 2.5.1 The 4" conduit for Cable 25405-1D.
- 2.5.2 The box enclosing the 2 1/2" conduit for Cable 25404-1D and the 4" conduit of 2.5.1 above. Routing of the new cable for #22 Safety Injection Pump, Cable 26410-1, is being evaluated to determine if the 20-foot separation criterion is satisfied or if one-hour protection is required. The engineering evaluation and installation, if required, will be completed on schedule consistent with Fire Area 74.

2.6 Fire Area 74

The resolution strategy for this area is associated with that made for Area 59, discussed in Paragraph 2.4 above. In addition, the SBO modification resulted in abandoning several cables which were previously protected by Thermo-Lag. Accordingly, all the cable raceways protected by Thermo-Lag in this area can be deleted from the scope. This includes the following raceways:

- 2.6.1 The 24" X 6" tray covering Routing Points 2AM-LB1.
- 2.6.2 The cable tray riser 2AR-LB1 containing Cables 25403-1D, 25404-1D and 25405-1D.
- 2.6.3 The 30" X 6" tray covering Routing Points 2AM-LB2, LB3, LB4 and LB5.
- 2.6.4 The 4" Conduit 1CB-981.

Trays and conduits for the Division A cables now requiring protection have been field inspected. Modification packages are in the process of

being initiated for the new protection using the Darmatt KM-1 material. The field installations are now scheduled for completion in the <sup>1<sup>st</sup></sup> quarter of 1996, unless the NRC staff review identifies concerns with the test reports which are submitted with this response letter.

The exemption granted for this fire area would still be applicable. A 10CFR50.59/Generic Letter 86-10 evaluation of the above mentioned changes shall be performed to verify that the basis of the original exemption has not changed.

The above discussion summarized the general approach and most likely options to be implemented in resolving the Thermo-Lag concerns in each area. Any changes to the above shall not cause changes to NSP's commitments to resolve the Thermo-Lag concerns.

## SECTION 2: Response to NRC Questions

Below are the specific NRC questions in Reference (a), in bold text with the questions numbered from (1) through (5), and the corresponding NSP response:

On the basis of NRC staff review of your response to the RAI, the information submitted for the following Sections was either deferred or incomplete:

- (1) Section II.B., "Important Barrier Parameters"
- (2) Section III.B., "Thermo-Lag Fire Barriers Outside the Scope of the NUMARC Program"
- (3) Section IV.B., "Ampacity Derating"
- (4) Section VI.B., "Schedules"
- (5) In your response to Section V of the RAI you indicated that you were considering using a performance-based approach such as a Probabilistic Safety or Risk Assessment, to achieve compliance with NRC fire protection requirements in areas that contain Thermo-Lag. Consistent with the SRM of June 27, 1994 the staff will not accept a performance-based approach to resolve the Thermo-Lag issue. Please revise your response to Section V of the RAI accordingly.

You are required, pursuant to Section 182a of the Atomic Energy Act of 1954, as amended, and 10 CFR 50.54(f), to submit a written report that contains the required information within 90 days from the date of this letter.

### 1.0 Response to point No. (1) - "Important Barrier Parameters"

The only Thermo-Lag protected raceway for which an evaluation is required is the 4" conduit in Area 58 (see Paragraph 2.3.4 of Section 1 of this attachment). All the parameters required to perform a tested-against-

installed evaluation have been obtained. The evaluation was conducted per the NEI guide. The barrier was determined to be qualified for 1-hour rating.

However, recent development indicated the potential for a new staff position on Thermo-Lag quality assurance following the September criminal indictment of TSI and its president (Inside N.R.C. - November 28, 1994). This new staff position may impose additional burden on the station in qualifying this barrier. The need for additional evaluation, such as chemical testing or destructive examination, resulting from this new NRC mandate may prompt NSP to replace the existing Thermo-Lag protection for that conduit also.

2.0 Response to point No. (2) - "Thermo-Lag Fire Barriers Outside the Scope of the NUMARC Program"

As discussed in Section 1 of this attachment, the only Thermo-Lag installations remaining in the scope is the 4" conduit wrap which is bound by the NEI program. All Thermo-Lag installations with potential to be outside the NUMARC scope have been either deleted from the scope or will be replaced by the new Darmatt KM-1 fire wrap material. Accordingly, there are no Thermo-Lag fire barriers, remaining at Prairie Island, that are outside the scope of the NEI (NUMARC) testing program.

3.0 Response to Point No. (3) - "Ampacity Derating"

As indicated in Point 3 of the APPROACH, Part 1.0 of Section 1 of this attachment, NSP will evaluate the effect of the final fire wrap (Thermo-Lag or Darmatt) using analytical modelling which is calibrated by data collected from recent ampacity testing.

An evaluation was conducted by S&L to compare the analytically developed ampacity values against those documented in IN 94-22. The review concluded that the values derived by the analytical techniques are more conservative for conditions similar to those tested by the Sandia Laboratories for the NRC (IN 94-22). The analytical procedure to calculate derated ampacity values will be revised to include a methodology to incorporate the results from the TVA testing program for multiple raceways and non-standard configurations.

This approach to ampacity is a stand-alone approach that is both technically sound and consistent with current industry testing. If at any time during the course of the evaluation NEI provides any generic derating factors or methodology to develop derating factors, that the NRC concurs with, NSP shall review that input for applicability, and will incorporate as necessary.

4.0 Response to point No. (4) - "Schedules"

As indicated earlier in the response letter, NSP's previous commitment provided to the NRC in Reference (c) remains unchanged. The return-to-compliance schedule date is still set for December 31, 1996. The details of the schedule have been changed to reflect the results of the progress accomplished thus far. The updated schedule is enclosed in Attachment 3.

5.0 Response to point No. (5) - The use of performance-based approach such as a Probabilistic Safety or Risk Assessment to achieve compliance with NRC fire protection requirements in areas that contain Thermo-Lag

Based on the enclosure to Reference (a), NSP revises its position on the use of performance-based assessment to support exemption requests to the NRC. The second bullet in Page 20 of 24 of Attachment 1 to Reference (c) is hereby replaced with the following position:

If and when the need arises in the course of the resolution effort to submit new exemptions to the NRC, NSP will prepare the technical information needed to support such requests in a manner consistent with the requirements of the enclosure to Reference (a).

SECTION 3: Schedule Progress Assessment

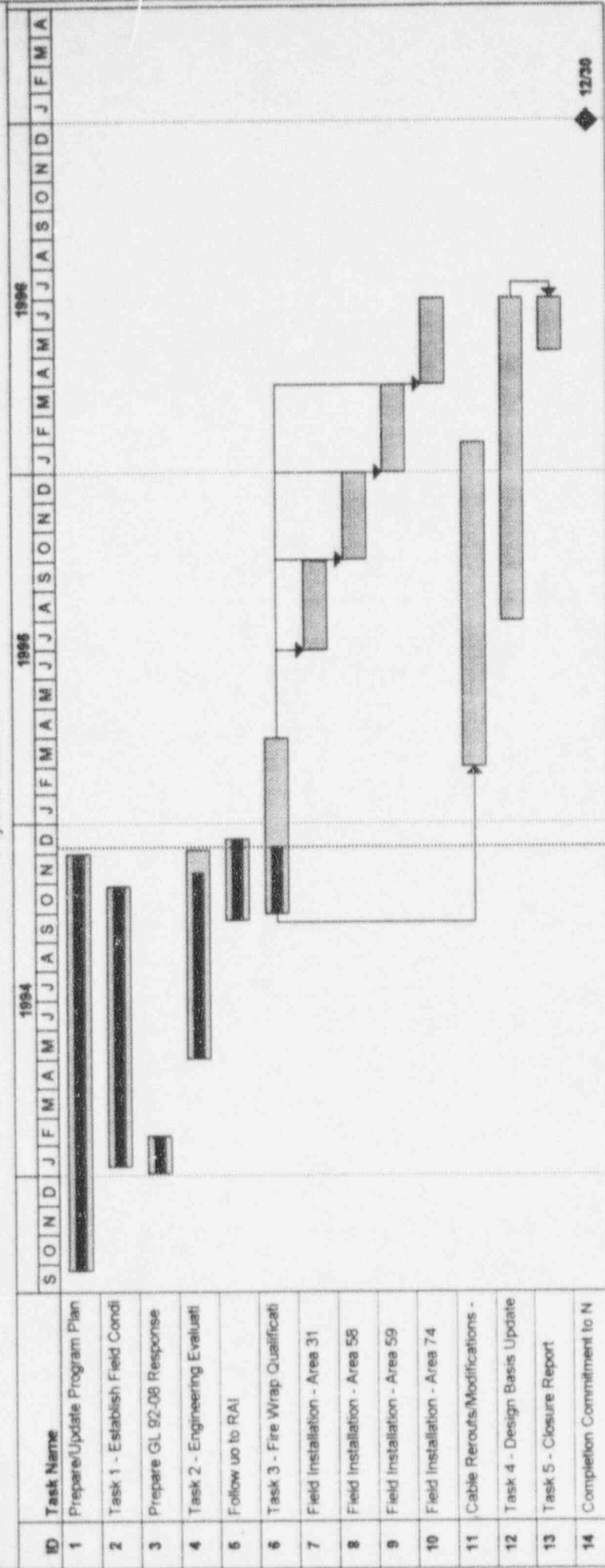
Attachment 2 provides the integrated schedule of this project reflecting the actual project progress as of 11/30/94. The following are the assessment of each task in that schedule:

- 1.0 This project is controlled by the program plan, No. SL-4894. Since the initial release, the program plan was updated twice to reflect industry development and changes to the process in progress. The current revision is Rev. 1 dated 12/7/94.
- 2.0 Task 1, Establish Field Condition, was completed on 10/28/94.
- 3.0 Task 2, Engineering Evaluation, was completed 12/15/94. This includes finalization of the resolution of the entire scope of Thermo-Lag installations at Prairie Island.
- 4.0 Task 3, Fire Wrap Qualification, is projected to be completed by 3/31/95. Fire wrap modification packages will be completed in this task. This includes ampacity and seismic support review for the fire wrap final condition. This also include revised and new Appendix R exemptions, if any.

- 5.0 Field Installations, for all fire areas in the Thermo-Lag scope, are scheduled to start on 7/1/95 and be completed by 6/30/96.
- 6.0 Cable reroutes or replacements that may be required as alternatives to the fire wrapping are scheduled between May 1995 and April of 1996. This is because many of the prospective cable modifications may be outage related.
- 7.0 Task 4, Design Basis Update, is scheduled between August 1995 and June 1996 to reflect installed conditions.
- 8.0 The closure report will be completed and filed by 6/30/96.

It is concluded therefore, that NSP's commitment to the NRC to return the Thermo-Lag installations to compliance by December 31, 1996 is achievable and can reasonably accommodate unforeseen developments, as well as adjustments needed to improve the cost performance of the project.

Prairie Island Nuclear Generating Plant  
Thermo-Lag Qualification Program  
Project No 8960-008



Task

Progress

Milestone

Summary

Rolled Up Task

Rolled Up Milestone

Rolled Up Progress

Project: 08960-008  
Date: Wed 12/7/94

(\*) Next Scheduled Outages - U2: 5/1/96, U1: 1/31/96



AFFIDAVIT

UNITED STATES NUCLEAR REGULATORY COMMISSION

NORTHERN STATES POWER COMPANY

PRAIRIE ISLAND NUCLEAR GENERATING PLANT

DOCKET NO. 50-282  
50-306

THERMO-LAG 330-1 FIRE BARRIERS

Northern States Power Company, a Minnesota corporation, with this letter is submitting information requested by Generic Letter 92-08, Thermo-Lag 330-1 Fire Barriers, pursuant to 10 CFR 50.54(f).

This letter contains no restricted or other defense information.

NORTHERN STATES POWER COMPANY

By

Michael D Wadley  
Michael D Wadley

Plant Manager

Prairie Island Nuclear Generating Plant

On this 21<sup>st</sup> day of December 1994 before me a notary public in and for said County, personally appeared Michael D Wadley, Plant Manager of Prairie Island Nuclear Generating Plant and being first duly sworn acknowledged that he is authorized to execute this document on behalf of Northern States Power Company, that he knows the contents thereof, and that to the best of his knowledge, information, and belief the statements made in it are true and that it is not interposed for delay.

Marcia K LaCore

