

# WOLF CREEK

NUCLEAR OPERATING CORPORATION

Otto L. Maynard  
Vice President Plant Operations

February 9, 1994

WO 94-0013

U. S. Nuclear Regulatory Commission  
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Washington, D.C. 20555

- Reference: 1) NRC letter dated December 17, 1992, "Thermo-Lag 330-1 Fire Barriers (Generic Letter 92-08)  
2) NRC letter dated December 22, 1993, "Request For Additional Information Regarding Generic Letter 92-08 (TAC No. M85625)"

Subject: Docket No. 50-482: Response To NRC Request For Additional Information Regarding Thermo-Lag 330-1 Fire Barriers (Generic Letter 92-08)

Gentlemen:

This letter provides Wolf Creek Nuclear Operating Corporation's (WCNOC) response to Reference 2, pursuant to the requirements of 10 CFR 50.54(f). The NRC issued a Request for Additional Information (RAI) regarding Generic Letter 92-08, "Thermo-Lag 330-1 Fire Barriers," on December 22, 1993.

The RAI requires each addressee to provide additional information on the configurations and amounts of Thermo-Lag fire barriers installed in the plant and the cable loading within particular Thermo-Lag configurations. The RAI also requires additional information be provided concerning: each addressee's plans for addressing barriers not bounded by the NUMARC test program; each addressee's plans for addressing ampacity derating concerns; alternatives available to each addressee to installing Thermo-Lag upgrades; and an integrated schedule addressing the overall corrective action schedule for the plant to resolve Thermo-Lag fire barrier concerns.

Attached is WCNOC's response to the RAI. The attached response provides as complete a response as is possible at this time. Following completion of the NUMARC test program, WCNOC will re-examine this response and provide an updated response, if necessary.

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If you have any questions concerning this matter, please contact me at (316) 364-8831 Ext. 4002 or Mr. Kevin J. Moles of my staff at Ext. 4565.

Very truly yours,

A handwritten signature in cursive script, appearing to read "Otto L. Maynard".

Otto L. Maynard  
Vice President  
Plant Operations

OLM/jra

Attachment

cc: L. J. Callan (NRC), w/a  
G. A. Pick (NRC), w/a  
W. D. Reckley (NRC), w/a  
L. A. Yandell (NRC), w/a

STATE OF KANSAS       )  
                              )  SS  
COUNTY OF COFFEY     )

Otto L. Maynard, of lawful age, being first duly sworn upon oath says that he is Vice President Plant Operations of Wolf Creek Nuclear Operating Corporation; that he has read the foregoing document and knows the content thereof; that he has executed that same for and on behalf of said Corporation with full power and authority to do so; and that the facts therein stated are true and correct to the best of his knowledge, information and belief.



By

Otto L. Maynard  
Otto L. Maynard  
Vice President  
Plant Operations

SUBSCRIBED and sworn to before me this 8<sup>th</sup> day of February, 1994.

Sandra Elliott  
Notary Public

Expiration Date 5/14/95

RESPONSE TO THERMO-LAG REQUEST FOR ADDITIONAL INFORMATION

RAI Section I. Thermo-Lag Fire Barrier Configurations and Amounts

NRC Item I.B.1-Describe the Thermo-Lag 330-1 barriers installed in the plant to:

- a. meet 10 CFR 50.48 or Appendix R to 10 CFR Part 50,
- b. support an exemption from Appendix R,
- c. achieve physical independence of electrical systems,
- d. meet a condition of the plant operating license,
- e. satisfy licensing commitments

The descriptions should include the following information: the intended purpose and fire rating of the barrier (for example, 3-hour fire barrier, 1-hour fire barrier, radiant energy heat shield), and the type and dimension of the barrier (for example, 8-ft by 10-ft wall, 4-ft by 3-ft by 2-ft equipment enclosure, 36-inch-wide cable tray, or 3-inch-diameter conduit).

WCNOC Response

Wolf Creek Generating Station (WCGS) relies upon Thermo-Lag 330-1 fire barriers to meet 10 CFR 50.48(e), which is implemented at WCGS by NRC guidance provided in Branch Technical Position CMEB 9.5-1. A listing of these WCGS applications is provided in Table 1 (attached), which identifies the purpose, fire rating, type, and dimension of each barrier.

WCGS also utilizes Thermo-Lag 330-1 barriers to meet Regulatory Guide 1.75 physical independence of electrical system criteria. These barriers are not intended to meet the 1-hour or 3-hour fire rated configurations. Table 2 (attached) provides a listing of these WCGS applications and identifies the type and dimension of each barrier.

NRC Item I.B.2.-For the total population of Thermo-Lag fire barriers described under Item I.B.1, submit an approximation of:

- a. For cable tray barriers: the total linear feet and square feet of 1-hour barriers and the total linear feet and square feet of 3-hour barriers.
- b. For conduit barriers: the total linear feet of 1-hour barriers and the total linear feet of 3-hour barriers.
- c. For all other fire barriers: the total square feet of 1-hour barriers and the total square feet of 3-hour barriers.
- d. For all other barriers and radiant energy heat shields: the total linear or square feet of 1-hour barriers and the total linear or square feet of 3-hour barriers, as appropriate for the barrier configuration or type.

### WCNOC Response

#### BRANCH TECHNICAL POSITION CMEB 9.5-1 APPLICATIONS:

The following table provides an approximation of the installed amounts of Thermo-Lag 330-1 material used in WCGS Branch Technical Position CMEB 9.5-1 applications.

Table 3

	1-hour Barrier Total Linear Feet	1-hour Barrier Total Square Feet	3-hour Barrier Total Linear Feet	3-hour Barrier Total Square Feet
CABLE TRAY	0	0	23	107
CONDUIT	53	Not Requested	600	Not Requested
OTHER*	Not Requested	5.5	Not Requested	525

\*Includes hatches, an encapsulation box, junction boxes and fire stops.

#### REGULATORY GUIDE 1.75 APPLICATIONS:

The following table provides an approximation of installed amounts of Thermo-Lag 330-1 material used in WCGS Regulatory Guide 1.75 applications. These applications for Regulatory Guide 1.75 requirements utilize 1-hour rated material, 1/2" thick.

Table 4

	Fire Barrier Total Linear Feet	Fire Barrier Total Square Feet
CABLE TRAY	2	11
CONDUIT	805	Not Requested
JUNCTION BOXES	Not Requested	80

#### RAI Section II. Important Barrier Parameters

- II.B.1 State whether or not you have obtained and verified each of the aforementioned parameters for each Thermo-Lag barrier installed in the plant. If not, discuss the parameters you have not obtained or verified. Retain detailed information on site for NRC audit where the aforementioned parameters are known.
- II.B.2 For any parameter that is not known or has not been verified, describe how you will evaluate the in-plant barrier for acceptability.
- II.B.3 To evaluate NUMARC's application guidance, an understanding of the types and extent of the unknown parameters is needed. Describe the type and extent of the unknown parameters at your plant in this context.

## WCNOC RESPONSE

The response to Item II has been divided into two sections. The first one addresses the twenty-four parameters of importance to Thermo-Lag 330-1 material installation. The second addresses the eight parameters of importance concerning cable protected by fire barriers.

### Raceway Fire Barrier Parameters

WCNOC has been actively evaluating WCGS Thermo-Lag 330-1 applications relied upon to meet BTP CMEB 9.5-1 requirements. WCNOC has obtained and verified the 24 parameters listed in the RAI for WCGS BTP CMEB 9.5-1 applications. This information was obtained and/or verified through the use of general walkdowns, design drawing reviews, and review of QA records of the applications.

It should be noted that additional rated fire barrier parameters, including fire barrier panel rib location, raceway gauge (mass), type of cable tray side rails, cable tray rung spacing and thermal shorts penetrating the barrier but not contacting the raceway, have been identified as potentially important. In addition, the planned NUMARC Phase 2 testing could result in identification of further fire barrier parameters of importance or demonstrate that some of the existing fire barrier parameters are not significant.

It is WCNOC's intent to utilize the fire barrier performance parameters specified in the final Application Guide as issued by NUMARC and agreed upon by the NRC when evaluating fire barriers for acceptability.

As requested in Action Item II.B.1, detailed information is available on-site for NRC audit of the known parameters.

### Cable Parameters

Cable functionality is presently an unresolved issue, and NUMARC is not currently conducting any cable functionality tests or evaluations as part of its Phase 2 Test Program. Conduit in the NUMARC tests use a bare copper conductor.

WCGS has very limited applications of Thermo-Lag 330-1 on cable trays. There are two applications of 3-hour rated Thermo-Lag 330-1 on a 24" x 4" tray for a length of approximately eleven feet each.

If NUMARC fire tests demonstrate temperature criteria exceedance, one optional approach to resolution, as provided in the NRC draft test and acceptance criteria, would be to evaluate cable functionality at the elevated temperature using cable performance test data or information for specific installed cable types. However, the NRC has not yet finalized requirements for cable functionality evaluation, and test results are not yet available that would clearly indicate the scope of such evaluations.

Based on the above, WCNOC does not intend to obtain and verify the eight listed parameters for each of the WCGS applications for the purposes of this response. However, if the results of the NUMARC testing does warrant cable functionality evaluations on an application specific basis, and NRC requirements have been finalized for that type of evaluation, WCNOC will

obtain and verify the necessary cable parameters on an application specific basis.

The WCGS Thermo-Lag 330-1 applications installed to meet Regulatory Guide 1.75 requirements are not intended to meet 1-hour or 3-hour rated fire barrier configurations. Therefore, the twenty-four fire barrier parameters of importance referenced in Section II A of the RAI, are not all applicable to the Regulatory Guide 1.75 applications. Parameters such as location, material thickness, and material amounts have been obtained for WCGS Regulatory Guide 1.75 applications. These parameters may be necessary to evaluate these applications for ampacity derating and to perform a material combustibility screening.

Chemical testing performed by NUMARC on a wide variety of aged samples has not revealed significant variations in chemical composition. NUMARC intends to discuss these test results with the NRC and distribute them, along with the Phase 1 test reports, to the various licensees. Further, NUMARC has indicated that Phase 2 testing will include additional chemical testing on barrier materials of various ages. Unless unexpected results are encountered, plant unique chemical evaluation should not be necessary. Therefore, WCNOC does not have any plans at this time to conduct material chemical testing.

**RAI Section III THERMO-LAG FIRE BARRIERS OUTSIDE THE SCOPE OF THE NUMARC PROGRAM**

- III.B.1. Describe the barriers discussed under Item I.B.1 that you have determined will not be bounded by the NUMARC test program.
- III.B.2. Describe the plant-specific corrective action program or plan you expect to use to evaluate the fire barrier configurations particular to the plant. This description should include a discussion of the evaluations and test begin considered to resolve the fire barrier issues identified in GL 92-08 and to demonstrate the adequacy of existing in-plant barriers.
- III.B.3. If a plant-specific fire endurance test program is anticipated, describe the following:
  - a. Anticipated test specimens.
  - b. Test methodology and acceptance criteria including cable functionality.

**WCNOC RESPONSE**

As discussed in the April 16, 1993 WCGS response to NRC Generic Letter 92-08 (Letter ET 93-0047, F. T. Rhodes, WCNOC, to USNRC) the WCGS rated fire barrier applications can be classified into two categories. The first category (typical fire barrier applications) includes conduit, with their associated junction boxes and supports, and cable tray. The second category (WCGS unique applications) includes various hatch covers, a cable tray fire stop and a single encapsulation box.



The first category falls within the scope of the NUMARC test program in terms of applications, fire barrier ratings, raceway types, raceway sizes and configurations.

The second category is outside the scope of the NUMARC test program. The WCGS unique fire barrier applications are:

1. Tendon Surveillance Access Hatches in the Auxiliary Building at Elev. 2020'-0" (2 hatches) and 2047'-6" (2 hatches).
2. Residual Heat Removal and Containment Spray Encapsulation Access Covers in the Auxiliary Building at Elev. 2000'-0" (2 access covers).
3. Box type enclosure of motor operated valve AL-HV-32 supplying Essential Service Water to the Turbine Driven Auxiliary Feedwater Pump in the Auxiliary Building at Elev. 1989'-0".
4. Radiological Control Area 5 Personnel Escape Hatch in the Auxiliary Building at Elev. 1989'-0".
5. Cable Tray Fire Stops in the Corridor between the Component Cooling Water Pumps in the Auxiliary Building at Elev. 2026'-0".

WCNOC has completed a detailed evaluation of each of the above fire barriers. Results of these evaluations are as follows:

1. Tendon Surveillance Access Hatches in the Auxiliary Building at Elev. 2026'-0" (2 hatches) and 2047'-6" (2 hatches).

At each elevation identified there are two hatches which consist of a 2'-10" x 3'-3" x 1/4" checker steel plate with a 1" layer of Thermo-Lag 330-1 material bolted on the top side. The covers rest on 5" x 5" x 1/2" steel angle supports attached to concrete walls on two sides and to concrete curbs on the other two sides. The steel plate and the angle supports are covered with Albi-Duraspray fireproofing material on the bottom side. The hatch covers serve to provide separation between fire areas within the plant.

The detailed evaluation determined that the as-installed hatches represent a non-rated fire barrier which affords protection from fire based on the hazards present in the fire areas. Therefore, no further work is required for this item.

2. Residual Heat Removal (RHR) and Containment Spray Encapsulation Access Covers in the Auxiliary Building at Elev. 2000'-0" (2 access covers).

The two access covers located in the floor of the auxiliary building at elevation 2000'-0" consist of openings that are approximately 10'-6" x 12'-6" with C15 steel channel frames around the perimeter of the opening on top of 18" high curbs. The barrier is made of 4"x4" tube steel in a grid with 1" Thermo-Lag 330-1 material panels. The channel steel is covered with



Albi-Duraspray fireproofing material. The hatch covers are provided as a separation between two fire areas in the plant.

The detailed evaluation determined that, due to the large unsupported span of Thermo-Lag 330-1 material, installation of 1/4" steel plating in lieu of the existing Thermo-Lag panels would provide a non-rated fire barrier suitable for the hazards present in the two fire areas. Therefore, a plant modification has been initiated to replace the Thermo-Lag 330-1 panels on the RHR and Containment Spray Encapsulation Access Covers with 1/4" steel plate.

3. Box type enclosure of motor operated valve AL-HV-32 supplying Essential Service Water to the Turbine Driven Auxiliary Feedwater Pump (AFWP) in the Auxiliary Building at Elev. 1989'-0".

The 4'-9" L x 3'-0" W x 5'-0" H enclosure is constructed of 1" Thermo-Lag 330-1 material on 5 sides with the sixth side against a concrete wall.

Both Turbine Driven AFWP suction valves are located within the same fire area. This fire barrier provides separation between the two valves to ensure that a suction source for the Turbine Driven AFWP is available, as required by BTP CMEB 9.5-1, for areas which do not have installed suppression systems.

The detailed evaluation determined that an equivalent method of compliance with BTP CMEB 9.5-1 requirements could be achieved with the addition of fire detection and fire suppression to the area, since the redundant Turbine-driven AFWP suction valves have more than the required 20' horizontal separation. This would allow removal of the box-type enclosure. Therefore, a plant modification has been initiated to add fire detection and fire suppression to the area, and to remove the box enclosure.

4. Radiological Control Area 5 Personnel Escape Hatch in the Auxiliary Building at Elev. 1989'-0".

The 3'-0" x 3'-0" hatch installed in the floor at elevation 1989'0" is covered by a 1/4" steel plate that has a hinge on one side. The underside of the plate is covered by 1" Thermo-Lag 330-1 material. Embedded steel around the perimeter of the opening is covered with the same Thermo-Lag material and a minimal amount of the 1 1/2" thick Albi-Duraspray on the vertical leg of the 6" angle iron supporting the cover.

The hatch cover provides a fire barrier between two fire areas in the plant.

The detailed evaluation determined that the as-installed hatch cover represents a non-rated fire barrier suitable for the hazards present in the two fire areas. Therefore, no further work is required for this item.

5. Cable Tray Fire Stops in the Corridor between the Component Cooling Water Pumps in the Auxiliary Building at Elev. 2026'-0".

The cable tray fire stops extend for a total length of 3'-0" along cable trays 6U5E, 6U5D and 6J5B. The fire stops consist of 1/2" thick Thermo-Lag 330-1 panels which form a 3'-0" long box around each of the 24" ladder back cable trays. Within the Thermo-Lag box there is approximately 9" of Dow corning 3-6548 silicone foam between two 1/2" thick Thermo-Lag panels installed vertically in the tray to act as damming boards. Trays 6U5E, 6U5D and 6J5B are totally enclosed in a solid steel cover for a distance of approximately 10 feet in one direction and 25 feet in the other direction from the fire stop.

The fire stop was installed adjacent to the sprinkler protected area of Room 1408 based upon an original licensing concern that the non-safety related cables in these trays were intervening combustibles between two redundant safe shutdown trains in this area. The fire stop is intended to stop flame propagation along the cables in the above mentioned trays.

The detailed evaluation determined that the presence of Thermo-Lag material in the fire stops on cable trays 6U5E, 6U5D and 6J5B will not degrade the performance of the configuration as designed. Therefore, no further work is required for this item.

As a result of the above evaluations and design changes, WCNOC currently has no plans to conduct plant-specific testing of any WCGS-specific fire barriers.

No discussion of the WCGS Thermo-Lag 330-1 applications installed to meet the requirements of Regulatory Guide 1.75 has been included in response to this item. These applications are not intended to meet 1-hour or 3-hour rated fire barrier configurations. Therefore, the NUMARC fire endurance program is not applicable to them.

#### RAI Section IV AMPACITY DERATING

- IV.B.1. For the barriers described under Item I.B.1, describe those that you have determined will fall within the scope of the NUMARC program for ampacity derating, those that will not be bounded by the NUMARC program, and those for which ampacity derating does not apply.
- IV.B.2. For the barriers you have determined fall within the scope of the NUMARC program, describe what additional testing or evaluation you will need to perform to derive valid ampacity derating factors.
- IV.B.3. For the barrier configurations that you have determined will not be bounded by the NUMARC test program, describe your plan for evaluating whether or not the ampacity derating tests relied upon for the ampacity derating factors used for those electrical components protected by Thermo-Lag 330-1 (for protecting the safe-shutdown capability from fire or to achieve physical independence of electrical systems) are correct and applicable to the plant

design. Describe all corrective actions needed and submit the schedule for completing such actions.

- IV.B.4. In the event that the NUMARC fire barrier tests indicate the need to upgrade existing in-plant barriers or to replace existing Thermo-Lag barriers with another fire barrier system, describe the alternative actions you will take (and the schedule for performing those actions) to confirm that the ampacity derating factors were derived by valid tests and are applicable to the modified plant design.

Your response to Section IV.B may depend on unknown specifics of the NUMARC ampacity derating test program (e.g., the final barrier upgrades). However, your response should be as complete as possible. In addition, your response should be updated as additional information becomes available on the NUMARC program.

#### WCNOC RESPONSE

As discussed in the April 16, 1993 WCNOC response to NRC Generic Letter 92-08 (Letter ET 93-0047, F. T. Rhodes, WCNOC, to USNRC) WCGS ampacity derating factors for conduit and cable trays covered with Thermo-Lag 330-1 are based on vendor supplied heat transfer coefficient values for Thermo-Lag 330-1. During original design, WCNOC performed heat transfer calculations to address the specific applications and provide the basis for ampacity derating. The ampacity derating values are not based on ampacity derating tests. Conservatism was used in the assumptions made to bound operating parameters. The generic concern with the acceptability of ampacity derating factors is that long term life of the cable insulation may be degraded due to a potentially higher operating temperature for the cable.

WCNOC has evaluated WCGS Thermo-Lag 330-1 applications of conduits and cable trays for ampacity margin. Ampacity margin is the percentage difference between the actual current of the cable and the acceptable current of the cable not including the thermal insulating effects of Thermo-Lag. It was determined that WCGS has very conservative ampacity margins compared to results of tests performed by other organizations. The ampacity margins will be applied to future upgrades as appropriate. Furthermore, WCGS Class 1E electrical cables are qualified for a 40 year life and have been in service less than one-quarter of the qualified life.

WCNOC currently has no plans to evaluate instrumentation and control cable as they do not carry a significant current compared to the ampacity of the conductors. Furthermore, the heat generated is not significant compared to that generated by power conductors.

WCNOC also does not intend to evaluate ampacity deratings on fire barrier configurations which enclose a raceway for six (6) inches or less in length. This is based on the assumption that this small an area will not create a significant temperature rise.

NUMARC has not yet determined an exact method to test configurations for ampacity derating associated with fire barrier material. Although it is currently anticipated that most WCGS Thermo-Lag 330-1 applications on cable

tray and conduit will be bounded by the NUMARC testing, it is not possible to determine exactly which WCGS barriers will be bounded by the NUMARC testing program until the scope of the NUMARC testing has been finalized. Therefore, the specifics of the additional testing and evaluation needed to envelop the ampacity derating configurations to the NUMARC program can not be specified at this time. Furthermore, any schedule proposed at this time for conducting additional testing and evaluations for ampacity derating would be speculative, since the scope of the NUMARC testing has not yet been defined.

As indicated above, the need for and future scope of additional testing and evaluations by WCNOC for ampacity derating will be based on the results of the NUMARC test program. Depending on those results, WCNOC intends to perform one of the following options:

- If the NUMARC test results indicate that WCGS fire barriers need to be modified, WCNOC will determine an acceptable ampacity derating for the new configurations by: 1) following NUMARC's ampacity derating tests, or 2) analysis of the new configuration using heat transfer techniques, or 3) performing additional testing beyond the scope of the NUMARC tests, or 4) a combination of the above.
- If the NUMARC test results indicate that WCGS fire barriers are adequate, and NUMARC conducts ampacity derating tests following completion of the fire barrier tests; then WCNOC will address the issue as mentioned above.
- If NUMARC does not perform the ampacity derating tests, WCNOC will acquire test methods and results from other organizations which have already performed ampacity derating tests. WCNOC will then analyze the test methods and results to determine an acceptable resolution to the issue by: 1) using the test results as applicable, or 2) evaluating the configurations with heat transfer techniques, or 3) perform additional testing, or 4) a combination of the above options.

This response is applicable for both Regulatory Guide 1.75 and BTP CMEB 9.5-1 applications.

#### RAI Section V ALTERNATIVES

V.B. Describe the specific alternatives available to you for achieving compliance with NRC fire protection requirements in plant areas that contain Thermo-Lag fire barriers. Examples of possible alternatives to Thermo-Lag based upgrades include the following:

1. Upgrade existing in-plant barriers using other materials.
2. Replace Thermo-Lag barriers with other fire barrier materials or systems.
3. Reroute cables or relocate other protected components.
4. Qualify 3-hour barriers as 1-hour barriers and install detection and suppression systems to satisfy NRC fire protection requirements.

#### WCNOC RESPONSE

In the event the NUMARC Phase 2 tests which bound the WCGS applications are not successful, or if additional WCGS evaluations using the NUMARC Application Guide indicate that some upgrades that rely on additional thicknesses of Thermo-Lag material (or other fire barrier materials) may not be practical due to the effects of ampacity derating or clearance problems, alternative methods exist to restore the fire barriers to operable status. The following is a discussion of some of the alternatives available. However, the following discussion is not meant to limit WCNOC to only those methods described.

1. The majority of WCGS applications involve 3-hour rated fire barriers. If the NUMARC test results indicate that some WCGS configurations would not pass a 3-hour fire endurance test, evaluations, based upon the use of fire modeling in conjunction with NUMARC baseline (non-upgraded) test results, may be performed to demonstrate adequate protection for the installed hazard. Alternatively, or in conjunction with the above evaluations, probabilistic safety analysis (PSA) could be used as an exemption basis, by demonstrating insignificant core damage frequency impacts, assuming barrier inoperability.
2. Reroute of cable, or replacement of specific cables with fire rated cable (i.e., Rockbestos Firezone R)
3. If NUMARC Phase 2 testing is successful but evaluation using the NUMARC Application Guide indicates that the specific WCGS applications are not bounded due to differences in baseline Thermo-Lag 330-1 installation details, WCNOC can rework the WCGS baseline installations to achieve compliance with the as-tested NUMARC configurations.
4. In many WCGS applications it would be possible to install fire suppression and fire detection to the area and then qualify the existing 3-hour barriers as 1-hour rated barriers.
5. Performing a re-evaluation of engineering analyses used for determination of safe shutdown pathways, equipment, and actions, could provide a basis for reduction in the scope of protected circuits and their associated fire barriers.
6. For certain applications, WCNOC could replace the Thermo-Lag fire barrier with rated fire barriers using other qualified materials or systems.
7. If the NUMARC tests of fire barrier upgrades using Thermo-Lag material are not successful, upgrades using other fire barrier materials may be developed. However, test and acceptance criteria have not yet been finalized and issued by the NRC. The final approved test methods and acceptance criteria must be evaluated to determine net effect on the scope and complexity of upgrades to WCGS installed barriers before this option could be chosen.

The WCGS applications of Thermo-Lag 330-1 material installed to meet the requirements of Regulatory Guide 1.75 are not intended to meet 1-hour or 3-hour rated fire barrier configuration requirements. Future ampacity

derating evaluations, or combustibility evaluations, for these applications may indicate Thermo-Lag 330-1 material is not suitable for use in specific applications. In this event, the Thermo-Lag 330-1 material will be replaced with an alternate material which is suitable as a radiant energy shield.

#### RAI Section VI SCHEDULES

VI.B. Submit an integrated schedule that addresses the overall corrective action schedule for the plant. At a minimum, the schedule should address the following aspects for the plant:

1. Implementation and completion of corrective actions and fire barrier upgrades for fire barrier configurations within the scope of the NUMARC program.
2. Implementation and completion of plant-specific analyses, testing, or alternative actions for fire barriers outside the scope of the NUMARC program.

#### WCNOC RE. ONSE

The WCGS schedule is subdivided into three smaller schedules, each one addressing the different application categories.

##### 1) WCGS UNIQUE APPLICATIONS

As discussed in our response in Section III, the engineering evaluation of each of the WCGS unique Thermo-Lag 330-1 applications is complete. A Plant Modification Request (PMR) has been developed to modify several of these applications as discussed in Section III. This PMR will be implemented by December 30, 1994.

##### 2) WCGS REGULATORY GUIDE 1.75 APPLICATIONS

WCNOC has evaluated WCGS Thermo-Lag 330-1 applications of conduits and cable trays for ampacity margin. Ampacity margin is the percentage difference between the actual current of the cable and the acceptable current of the cable not including the thermal insulating effects of Thermo-Lag. It was determined that WCGS has very conservative ampacity margins compared to results of tests performed by other organizations. These ampacity margins will be applied to future upgrades as appropriate. It is WCNOC's intent to evaluate and utilize the ampacity deratings derived by Texas Utilities Electric Company for these applications once NRC acceptance is obtained.

A schedule for completion of this activity will be provided to the NRC by July 15, 1994.

##### 3) WCGS PTP CMEB 9.5-1 APPLICATIONS WITHIN THE SCOPE OF THE NUMARC TEST PROGRAM.



Numerous uncertainties currently exist within the NUMARC program as noted in several of the above responses. It is WCNOC's intent to begin detailed engineering evaluations for potential application upgrades as soon as the NUMARC Application Guide is received. The extent of specific upgrades will be based primarily on the level of success of NUMARC's Phase 2 Test Program. The following is a schedule provided by NUMARC for their Phase 2 testing and ampacity testing.

<u>Activity</u>	<u>Schedule</u>
Issue Phase 2 test reports	April 15, 1994
Issue Application Guide	April 15, 1994
Ampacity program information	April 29, 1994
Perform ampacity testing	July 1994 (estimated)
Issue Ampacity test reports	August 1994 (estimated)

Before any upgrades using Thermo-Lag 330-1 or other barrier materials can be approved for the WCGS 3-hour rated applications, the ampacity derating testing for the upgrade must be completed. Because the NUMARC schedule for ampacity derating testing is estimated, an integrated schedule for this activity will be provided to the NRC by July 15, 1994.

It is WCNOC's intention that restoration of fire barrier operability will be complete prior to startup from the WCGS eighth refueling outage, which is scheduled for the spring of 1996.

#### **RAI Section VIII SOURCES AND CORRECTNESS OF INFORMATION**

Describe the sources of the information provided in response to this request for information (e.g., from plant drawings, quality assurance documentation, walkdowns or inspections) and how the accuracy and validity of the information was verified.

#### **WCNOC RESPONSE**

The sources of information provided in response to this request for information included plant drawings, QA documentation, NUMARC-provided documentation, electrical circuit databases, plant walkdowns, and installation procedures. The accuracy and validity of the information was verified by independent physical plant inspections.



TABLE 1  
WCGS Applications of Thermo-Lag 330-1 Material  
Required to Meet 10CFR50.48(e) Requirements

Component	Type/Size	Hours	Purpose	Remarks
3JJ053	J-BOX/6 x 6 x 30	1	Fire Barrier	5.5 sq. ft.
1J1L01	TRAY/4X24	3	Fire Barrier	11 feet 3 inch/Ready Access Design/supports - WR 03329-92)
1J1L1B	CONDUIT/1	3	Fire Barrier	37 feet
1J2027	CONDUIT/1	N/A	Heat Shield	65 feet/Non. Comb. Rad. Energy Shield/7 supts-19 sq. ft./(2) unscheduled J-Box 14 sq. ft.
1U1037	CONDUIT/3	3	Fire Barrier	53 feet/supports - 32 sq. ft./P-Box - 7.1 sq. ft./unscheduled J-Box - 6.2 sq. ft.
1U1038	CONDUIT/1 1/2	3	Fire Barrier	6 feet 2 inch/enclosed w/1U1039/w/supports 7.5 sq. ft.
1U1039	CONDUIT/1 1/2	3	Fire Barrier	6 feet 2 inch/enclosed w/1U1038/w/supports 7.5 sq. ft.
1U1040	CONDUIT/1 1/2	3	Fire Barrier	6 feet 6 inch
1U1041	CONDUIT/1 1/2	3	Fire Barrier	6 feet 6 inch
1U1042	CONDUIT/1-1/2	3	Fire Barrier	18 inch/enters J-BOX 1UJ029/1U1044, 45, 43, 42 enclosed
1U1043	CONDUIT/1-1/2	3	Fire Barrier	18 inch/enters J-BOX 1UJ029/1U1044, 45, 43, 42 enclosed
1U1044	CONDUIT/1-1/2	3	Fire Barrier	18 inch/enters J-BOX 1UJ029/1U1044, 45, 43, 42 enclosed
1U1045	CONDUIT/1-1/2	3	Fire Barrier	18 inch/enters J-BOX 1UJ029/1U1044, 45, 43, 42 enclosed
1U1E6N	CONDUIT/3	3	Fire Barrier	6 feet
1U1K01	TRAY/4X24	3	Fire Barrier	11 feet 3 inches/Ready Access Design/Supports/28 sq. ft. supports
1U1K5C	CONDUIT/1 1/2	3	Fire Barrier	6 inch/J-Box (1UJ029) to floor
1U1K5N	CONDUIT/4	3	Fire Barrier	3 feet/PMR 01320/trowel grade skim coat entire length
1UJ029	J-BOX/24X12X8	3	Fire Barrier	8 sq. ft./wall mounted
2J1019	CONDUIT/1 1/2	3	Fire Barrier	2 feet/enclosed with 2J1052
2J1026	CONDUIT/2	3	Fire Barrier	6 feet/wrapped at (2) supports f/1J1L1B
2J1035	CONDUIT/3	3	Fire Barrier	10 feet/(2) supts. 6" x 8" x 2' long
2J1036	CONDUIT/3	3	Fire Barrier	40 feet/15 sq. ft. supports
2J1037	CONDUIT/3	3	Fire Barrier	75 feet/supports - 39 sq. ft.
2J1040	CONDUIT/3	3	Fire Barrier	4 feet/supports - 2 sq. ft.
2J1042	CONDUIT/4	3	Fire Barrier	43 feet/4U3E9Z,4J3C9Y,2J1042 in common enclosure
2J1043	CONDUIT/4	3	Fire Barrier	75 feet/supports - 39 sq. ft.
2J1046	CONDUIT/3	3	Fire Barrier	13 feet
2J1047	CONDUIT/3	3	Fire Barrier	24 feet
2J1052	CONDUIT/1 1/2	3	Fire Barrier	3 feet/supt 6/C-0604/wrapped with 2J1019
2J1B1G	CONDUIT/4	3	Fire Barrier	27 feet/supports - 12.5 sq. ft.
2J1B1H	CONDUIT/4	3	Fire Barrier	27 feet/supports - 19 sq. ft.
2JJ051	J-BOX/30X24X8	3	Fire Barrier	11 sq. ft.
2JJ052	J-BOX/6X6X24	3	Fire Barrier	4.5 sq. ft.
2JJ053	J-BOX/6X6X30	3	Fire Barrier	5.5 sq. ft.
2JJ054	J-BOX/6X6X24	3	Fire Barrier	4.5 sq. ft.
2JJ056	J-BOX/18X18X8	3	Fire Barrier	11 sq. ft.
2U1021	CONDUIT/4	3	Fire Barrier	18 inch
2U1014	CONDUIT/4	3	Fire Barrier	18 inch
3J1024	CONDUIT/1 1/2	3	Fire Barrier	8 feet/Includes unscheduled J-Boxes
3J1027	CONDUIT/3	1	Fire Barrier	22 feet
3J1029	CONDUIT/3	3	Fire Barrier	18 inch/support (4 x 8 x 24) - 4 sq. ft.
3J1031	CONDUIT/3	3	Fire Barrier	82 feet/65 sq. ft on hangers and unscheduled pull boxes
3J1034	CONDUIT/1 1/2	3	Fire Barrier	23 feet
3J1B1D	CONDUIT/4	3	Fire Barrier	20 inch/supports - 6 sq. ft.
3J1B1F	CONDUIT/3	3	Fire Barrier	21 feet/supports - 10 sq. ft.
3JJ052	J-BOX/30X15X8	3	Fire Barrier	11.25 sq. ft.
3U1002	CONDUIT/1 1/2	3	Fire Barrier	9 feet
4J1013	CONDUIT/3/4	3	Fire Barrier	Enclosed w/4JJ046, 4J3C1C, 4J1014, 4J1038/8" x 9" x 29" / 8 sq. ft.
4J1014	CONDUIT/3	3	Fire Barrier	Enclosed w/4J3C1C, 4J1038, 4J1013, 4JJ046/8" x 9" x 29" / 8 sq. ft.
4J1038	CONDUIT/1 1/2	3	Fire Barrier	Enclosed w/4JJ046, 4J3C1C, 4J1014, 4J1013/8" x 9" x 29" / 8 sq. ft.
4J1064	CONDUIT/2	3	Fire Barrier	12 feet 6 inch
4J1066	CONDUIT/2	3	Fire Barrier	4 feet
4J3C1C	CONDUIT/3	3	Fire Barrier	Enclosed w/4JJ046, 4J1038, 4J1014, 4J1013/8" x 9" x 29" / 8 sq. ft.

TABLE 1 (Continued)  
WCGS Applications of Thermo-Lag 330-1 Material  
Required to Meet 10CFR50.48(e) Requirements

Component	Type/Size	Hours	Purpose	Remarks
4JJ046	J-BOX/24X6X6	3	Fire Barrier	Enclosed w/4J3C1C, 4J1038, 4J1014, 4J1013/8" x 9" x 29" / 8 sq. ft.
4U3003	CONDUIT/2	1	Fire Barrier	30 feet 6 inch
5J1026	CONDUIT/4	3	Fire Barrier	3 feet
5U1Y5X	CONDUIT/2	3	Fire Barrier	2 feet 6 inch/supports - 4 sq. ft.
6J1030	CONDUIT/1 1/2	3	Fire Barrier	3 feet
6J1120	CONDUIT/1 1/2	3	Fire Barrier	11 feet/Portions wrapped w/1U1037
6J5B30	TRAY/4x24	N/A	Fire Stop	3 feet long/Fire Stop/15.5 sq. ft.
6U1116	CONDUIT/3/4	3	Fire Barrier	18 inch
6U5D30	TRAY /4X24	N/A	Fire Stop	3 feet long/Fire Stop/15.5 sq. ft.
6U5E30	TRAY/4X24	N/A	Fire Stop	3 feet long/Fire Stop/15.5 sq. ft.
N/A	HATCH	N/A	Fire Barrier	PMR 04585/Area 5 Personnel Hatch/3' x 3' / 9 sq. ft.
N/A	HATCH	N/A	Fire Barrier	PMR 04585/Tendon Access Hatches (4)/ 39 sq. ft./40" x 35"
N/A	HATCH	N/A	Fire Barrier	PMR 04585/RHR Valve Encap. Tank Hatches (2)/ 262 sq. ft./126" x 150"
N/A	SUPPORTS	3	Fire Barrier	M-16EG01-R014/142 / W8 x 40 x 5 feet 1 inch/17 sq. ft.
N/A	SUPPORTS	3	Fire Barrier	On same support as 3J1027/support 5B/C-603 wrapped 36 inches
N/A	SUPPORTS	3	Fire Barrier	Supports f/ 4J3C9Y & 4U3E9Z/2 supts. ceiling mounted/25 sq. ft.
N/A	SUPPORTS	3	Fire Barrier	Supports f/4U3C05, 4U3D05, 4U3E05/24 sq. ft.
N/A	SUPPORTS	3	Fire Barrier	Supports f/4U3C05, 4U3D05, 4U3E05/24 sq. ft.
N/A	SUPPORTS	3	Fire Barrier	Supports f/4U3C05, 4U3D05, 4U3E05/24 sq. ft.
N/A	VALVE ENCAP.	3	Fire Barrier	4'9"L x 3'W x 5'H/PMR 04585/ALHV032 Valve Encapsulation/

TABLE 2

WCGS Applications of Thermo-Lag 330-1 Material  
Required to Meet Regulatory Guide 1.75 Requirements

Component	Type/Size	Hours	Purpose	Remarks
16031	CONDUIT/1-1/2 Flex	N/A	Radiant Energy Heat Shield	6 inch
1G1B1C	CONDUIT/2	N/A	Radiant Energy Heat Shield	9 feet
1G6004	CONDUIT/3	N/A	Radiant Energy Heat Shield	6 inch
1G6006	CONDUIT/3	N/A	Radiant Energy Heat Shield	6 inch
1J1019	CONDUIT/4	N/A	Radiant Energy Heat Shield	36 feet
1J1020	CONDUIT/4	N/A	Radiant Energy Heat Shield	9 feet
1J1021	CONDUIT/4	N/A	Radiant Energy Heat Shield	18 inches
1J1022	CONDUIT/4	N/A	Radiant Energy Heat Shield	18 inch
1J1024	CONDUIT/1	N/A	Radiant Energy Heat Shield	6 inch
1J1035	CONDUIT/3/4 Flex	N/A	Radiant Energy Heat Shield	6 inch
1J1062	CONDUIT/4	N/A	Radiant Energy Heat Shield	7 feet/supports - 3 sq. ft.
1J1063	CONDUIT/4	N/A	Radiant Energy Heat Shield	20 feet
1J1098	J-BOX/	N/A	Radiant Energy Heat Shield	5 sq. ft./J-Box between 1J1098 & 4U1105
1J1130	CONDUIT/4	N/A	Radiant Energy Heat Shield	5 feet w/supports
1J1132	CONDUIT/4	N/A	Radiant Energy Heat Shield	24 feet/w/supports
1J1J8B	CONDUIT/4	N/A	Radiant Energy Heat Shield	10 inch
1J2030	CONDUIT/2	N/A	Radiant Energy Heat Shield	4 feet
1J2069	CONDUIT/1	N/A	Radiant Energy Heat Shield	6 inch
1J3011	CONDUIT/1 Flex	N/A	Radiant Energy Heat Shield	6 inch
1J31AB	CONDUIT/1 1/2	N/A	Radiant Energy Heat Shield	10 feet
1J3A1L	CONDUIT/1 1/2 Flex	N/A	Radiant Energy Heat Shield	14 inch
1J6004	CONDUIT/2	N/A	Radiant Energy Heat Shield	9 feet/Runs w/1U6036 (WR 03244-92)/Trowel grade overlay
1J6008	CONDUIT/1 1/2 Flex	N/A	Radiant Energy Heat Shield	18 inch/Runs together w/ 1J6009, 1J6010/Trowel grade overlay
1J6009	CONDUIT/1 1/2 Flex	N/A	Radiant Energy Heat Shield	18 inch/Runs together w/1J6010 (WR 03245-92)/Trowel grade overlay
1J6010	CONDUIT/1 1/2 Flex	N/A	Radiant Energy Heat Shield	18 inch/Runs together w/1J6009 (WR 03246-92)/Trowel grade overlay
1JU038	J-BOX/30X6X6	N/A	Radiant Energy Heat Shield	5.5 sq. ft.
1JU039	J-BOX/30X6X6	N/A	Radiant Energy Heat Shield	5.5 sq. ft.
1JU043	J-BOX/36X24X12	N/A	Radiant Energy Heat Shield	22 feet/supports - 8 sq. ft.
1JU044	J-BOX/30X8X15	N/A	Radiant Energy Heat Shield	11.25 sq. ft.
1JU077	J-BOX/36X6X6	N/A	Radiant Energy Heat Shield	6.5 sq. ft.
1U1062	CONDUIT/1 1/2	N/A	Radiant Energy Heat Shield	6 inch
1U1104	CONDUIT/4	N/A	Radiant Energy Heat Shield	6 inch
1U1116	CONDUIT/3	N/A	Radiant Energy Heat Shield	8 inch
1U1119	CONDUIT/2	N/A	Radiant Energy Heat Shield	10 feet
1U1260	CONDUIT/1 1/2	N/A	Radiant Energy Heat Shield	6 inch
1U1263	CONDUIT/2 Flex	N/A	Radiant Energy Heat Shield	4 inch
1U1347	CONDUIT/3/4	N/A	Radiant Energy Heat Shield	4 feet
1U1E6A	CONDUIT/2	N/A	Radiant Energy Heat Shield	10 inch
1U1K5C	CONDUIT/4	N/A	Radiant Energy Heat Shield	6 inch/
1U2063	CONDUIT/3/4 Flex	N/A	Radiant Energy Heat Shield	6 inch
1U3081	CONDUIT/3/4 Flex	N/A	Radiant Energy Heat Shield	12 inch
1U3A2C	CONDUIT/1	N/A	Radiant Energy Heat Shield	3 feet/unscheduled J-Box 6 x 6 x 5 - 1.3 sq. ft.
1U3E1C	CONDUIT/3	N/A	Radiant Energy Heat Shield	6 inch
1U3J1H	CONDUIT/3/4	N/A	Radiant Energy Heat Shield	14 feet/supports 10.5 sq. ft.
1U3M1H	CONDUIT/1-1/2 Flex	N/A	Radiant Energy Heat Shield	6 inch
1U3M1Q	CONDUIT/3/4 Flex	N/A	Radiant Energy Heat Shield	6 inch
1U6008	CONDUIT/3 Flex	N/A	Radiant Energy Heat Shield	6 inch
1U6029	CONDUIT/3	N/A	Radiant Energy Heat Shield	6 inch
1U6036	CONDUIT/1 1/2	N/A	Radiant Energy Heat Shield	12 feet/Runs together w/1J6004, WR 03248-92/Trowel grade overlay
1UJ042	J-BOX/36X12XB	N/A	Radiant Energy Heat Shield	RWST Valve House/12 sq. ft.
2J1042	CONDUIT/4	N/A	Radiant Energy Heat Shield	12 inch
2J1048	CONDUIT/3/4	N/A	Radiant Energy Heat Shield	9 inch (at elbow)
2J1B1L	CONDUIT/1 1/2	N/A	Radiant Energy Heat Shield	6 inch

TABLE 2 (Continued)

WCGS Applications of Thermo-Lag 330-1 Material  
Required to Meet Regulatory Guide 1.75 Requirements

Component	Type/Size	Hours	Purpose	Remarks
2J2033	CONDUIT/3	N/A	Radiant Energy Heat Shield	4 feet
2J3017	CONDUIT/2Flex	N/A	Radiant Energy Heat Shield	24 inch
2U1014	CONDUIT/4	N/A	Radiant Energy Heat Shield	6 inch
2U1023	CONDUIT/1-1/2 Flex	N/A	Radiant Energy Heat Shield	6 inch
2U1B1G	CONDUIT/1 1/2	N/A	Radiant Energy Heat Shield	6 inch
2U1B1K	CONDUIT/3	N/A	Radiant Energy Heat Shield	6 inch
2U3005	CONDUIT/1	N/A	Radiant Energy Heat Shield	6 inch
2U3016	CONDUIT/2	N/A	Radiant Energy Heat Shield	9 feet 6 inch/supports - 2 sq. ft.
2U3019	CONDUIT/3/4	N/A	Radiant Energy Heat Shield	12 feet/supports - 1 sq. ft.
2U3019	CONDUIT/3/4	N/A	Radiant Energy Heat Shield	15 feet
2UJ022	J-BOX/36X12X8	N/A	Radiant Energy Heat Shield	RWST Valve House/12 sq. ft.
3J1029	CONDUIT/3	N/A	Radiant Energy Heat Shield	6 inch
3J1033	CONDUIT/1 1/2	N/A	Radiant Energy Heat Shield	43 feet/supports 1 sq. ft./unscheduled J-Box 3.5 sq. ft.
3J1049	CONDUIT/3/4	N/A	Radiant Energy Heat Shield	3 feet w/supports 1.5 sq. ft.
3J1050	CONDUIT/3/4	N/A	Radiant Energy Heat Shield	6 feet 6 inch
3J1050	CONDUIT/3/4 Flex	N/A	Radiant Energy Heat Shield	4 feet
3J1051	CONDUIT/3/4	N/A	Radiant Energy Heat Shield	3 feet w/supports
3U1010	CONDUIT/1 1/2	N/A	Radiant Energy Heat Shield	6 feet 6 inch
3U1B3C	CONDUIT/4	N/A	Radiant Energy Heat Shield	6 inch
3U1B8C	CONDUIT/4	N/A	Radiant Energy Heat Shield	19 inch
4C8G3A	CONDUIT/1 1/2	N/A	Radiant Energy Heat Shield	12 inch
4C8J1W	CONDUIT/4 Flex	N/A	Radiant Energy Heat Shield	6 inch
4G2A1A	CONDUIT/2	N/A	Radiant Energy Heat Shield	23 feet/supports - 17 sq. ft.
4G2A1B	CONDUIT/4	N/A	Radiant Energy Heat Shield	27 feet/supports - 17 sq. ft.
4G2A1C	CONDUIT/4	N/A	Radiant Energy Heat Shield	27 feet
4G2A1F	CONDUIT/1	N/A	Radiant Energy Heat Shield	23 feet
4J1035	CONDUIT/1	N/A	Radiant Energy Heat Shield	Rigid & Flex/11 inch (2 pcs), 4 inch, 7 inch, 33 inch total
4J1039	CONDUIT/3/4 Flex	N/A	Radiant Energy Heat Shield	12 inch
4J1099	CONDUIT/1 1/2	N/A	Radiant Energy Heat Shield	10 feet
4J1101	CONDUIT/3/4	N/A	Radiant Energy Heat Shield	20 feet
4J1103	CONDUIT/3/4	N/A	Radiant Energy Heat Shield	20 feet
4J1106	CONDUIT/1 1/2	N/A	Radiant Energy Heat Shield	6 feet 6 inch
4J1115	CONDUIT/1	N/A	Radiant Energy Heat Shield	45 feet
4J1118	CONDUIT/1 Flex	N/A	Radiant Energy Heat Shield	18 inch
4J1141	CONDUIT/1 Flex	N/A	Radiant Energy Heat Shield	6 inch
4J1C1Z	CONDUIT/1-1/2	N/A	Radiant Energy Heat Shield	6 inch
4J1J19	TRAY/6 x 12	N/A	Radiant Energy Heat Shield	2 feet
4J3002	CONDUIT/3/4	N/A	Radiant Energy Heat Shield	11 inch
4J3020	CONDUIT/2 Flex	N/A	Radiant Energy Heat Shield	24 inch
4J6008	CONDUIT/1 1/2	N/A	Radiant Energy Heat Shield	12 feet 6 inch/Runs w/4U6054/Trowel grade overlay
4U1039	CONDUIT/1 1/2	N/A	Radiant Energy Heat Shield	3 feet
4U1115	CONDUIT/1 1/2	N/A	Radiant Energy Heat Shield	6 inch
4U1152	CONDUIT/4	N/A	Radiant Energy Heat Shield	6 inch
4U1211	CONDUIT/1 Flex	N/A	Radiant Energy Heat Shield	6 inch
4U1220	CONDUIT/2	N/A	Radiant Energy Heat Shield	6 inch
4U1228	CONDUIT/1	N/A	Radiant Energy Heat Shield	6 inch
4U1245	CONDUIT/1	N/A	Radiant Energy Heat Shield	4 feet/support 1.5 sq. ft./J-Box - 9 sq. ft.
4U1246	CONDUIT/1	N/A	Radiant Energy Heat Shield	6 inch
4U1253	CONDUIT/1	N/A	Radiant Energy Heat Shield	6 inch
4U1254	CONDUIT/3	N/A	Radiant Energy Heat Shield	9 feet/supports
4U1260	CONDUIT/1 1/2	N/A	Radiant Energy Heat Shield	12 feet
4U1304	CONDUIT/1 1/2 Flex	N/A	Radiant Energy Heat Shield	8 inch
4U1331	CONDUIT/3/4 Flex	N/A	Radiant Energy Heat Shield	15 inch



TABLE 2 (Continued)  
WCGS Applications of Thermo-Lag 330-1 Material  
Required to Meet Regulatory Guide 1.75 Requirements

Component	Type/Size	Hours	Purpose	Remarks
4U1335	CONDUIT/3/4	N/A	Radiant Energy Heat Shield	9 inch
4U1340	CONDUIT/1-1/2 Flex	N/A	Radiant Energy Heat Shield	6 inch
4U1348	CONDUIT/	N/A	Radiant Energy Heat Shield	6 inch
4U1351	CONDUIT/3/4 Flex	N/A	Radiant Energy Heat Shield	6 inch
4U1C4X	CONDUIT/1	N/A	Radiant Energy Heat Shield	15 inch
4U2008	CONDUIT/1 Flex	N/A	Radiant Energy Heat Shield	8 inch
4U3033	CONDUIT/2 Flex	N/A	Radiant Energy Heat Shield	12 inch
4U3A1J	CONDUIT/3/4	N/A	Radiant Energy Heat Shield	10 feet
4U3A2K	CONDUIT/2	N/A	Radiant Energy Heat Shield	10 feet
4U3B2U	CONDUIT/1	N/A	Radiant Energy Heat Shield	3 feet/support - 1.5 sq. ft.
4U3B6E	CONDUIT/2	N/A	Radiant Energy Heat Shield	4 inch
4U3C4G	CONDUIT/1 1/2	N/A	Radiant Energy Heat Shield	10 feet
4U3D5R	CONDUIT/4	N/A	Radiant Energy Heat Shield	5 feet
4U4004	CONDUIT/2	N/A	Radiant Energy Heat Shield	98 feet
4U6030	CONDUIT/1-1/2	N/A	Radiant Energy Heat Shield	6 inch
4U6054	CONDUIT/1	N/A	Radiant Energy Heat Shield	12 feet 6 inch/Runs w/4J6008/Trowel grade overlay
5C2004	CONDUIT/3/4 Flex	N/A	Radiant Energy Heat Shield	6 inch
5C3074	CONDUIT/1 1/2 Flex	N/A	Radiant Energy Heat Shield	8 inch
5J1029	CONDUIT/3/4	N/A	Radiant Energy Heat Shield	6 inch
5J1130	CONDUIT/3/4 Flex	N/A	Radiant Energy Heat Shield	6 inch
5J1150	CONDUIT/3/4 Flex	N/A	Radiant Energy Heat Shield	6 inch
5J1181	CONDUIT/1 1/2	N/A	Radiant Energy Heat Shield	2 feet
5J1223	CONDUIT/1 1/2	N/A	Radiant Energy Heat Shield	6 inch
5J1C1C	CONDUIT/4	N/A	Radiant Energy Heat Shield	6 inch
5J1M1F	CONDUIT/3	N/A	Radiant Energy Heat Shield	6 inch
5J2A1R	N/A	N/A	Radiant Energy Heat Shield	2 feet/Air Drop Cable
5J3140	CONDUIT/3	N/A	Radiant Energy Heat Shield	6 feet
5J3150	CONDUIT/1	N/A	Radiant Energy Heat Shield	18 inch
5J6017	CONDUIT/1-1/2 Flex	N/A	Radiant Energy Heat Shield	6 inch
5SDI01AA	N/A	N/A	Radiant Energy Heat Shield	24 inch/Monitor SD-RE-13/Air Drop Cable
5SDI01CA	N/A	N/A	Radiant Energy Heat Shield	15 inch/Monitor SD-RE-23/Air Drop Cable
5SDI01FA	N/A	N/A	Radiant Energy Heat Shield	24 inch/Monitor SD-RE-18/Air Drop Cable
5SDI02HA	N/A	N/A	Radiant Energy Heat Shield	15 inch/Monitor SD-RE-38/Air Drop Cable
5SDI03BB	N/A	N/A	Radiant Energy Heat Shield	24 inch/Monitor SD-RE-40/Air Drop Cable
5U1155	CONDUIT/3/4	N/A	Radiant Energy Heat Shield	6 inch
5U1250	CONDUIT/3/4 Flex	N/A	Radiant Energy Heat Shield	13 inch
5U2HIJ	CONDUIT/1 Flex	N/A	Radiant Energy Heat Shield	6 inch
6C3004	CONDUIT/2	N/A	Radiant Energy Heat Shield	6 inch
6C3015	CONDUIT/1 1/2 Flex	N/A	Radiant Energy Heat Shield	12 inch
6C3087	CONDUIT/1-1/2	N/A	Radiant Energy Heat Shield	6 inch
6C8J1B	CONDUIT/1 Flex	N/A	Radiant Energy Heat Shield	14 inch
6G3002	CONDUIT/4	N/A	Radiant Energy Heat Shield	6 inch
6J1136	CONDUIT/3/4	N/A	Radiant Energy Heat Shield	6 inch
6J1137	CONDUIT/1 Flex	N/A	Radiant Energy Heat Shield	8 inch
6J1140	CONDUIT/3/4	N/A	Radiant Energy Heat Shield	6 inch
6J2A1B	CONDUIT/1	N/A	Radiant Energy Heat Shield	6 inch
6J3038	CONDUIT/1	N/A	Radiant Energy Heat Shield	18 inch
6J5B4B	CONDUIT/1 1/2	N/A	Radiant Energy Heat Shield	1 foot 3 inch
6J5E1J	CONDUIT/1 1/2	N/A	Radiant Energy Heat Shield	6 inch
6J5E1J	CONDUIT/3/4	N/A	Radiant Energy Heat Shield	8 inch
6J7B4B	CONDUIT/1	N/A	Radiant Energy Heat Shield	16 inch (2 each)
6J8C3E	CONDUIT/4	N/A	Radiant Energy Heat Shield	6 inch
6J8C4F	CONDUIT/4 Flex	N/A	Radiant Energy Heat Shield	6 inch

TABLE 2 (Continued)

WCGS Applications of Thermo-Lag 330-1 Material  
Required to Meet Regulatory Guide 1.75 Requirements

Component	Type/Size	Hours	Purpose	Remarks
6SDI02AA	N/A	N/A	Radiant Energy Heat Shield	15 inch/Monitor SD-RE-25/Air Drop Cable
6SDI02GA	N/A	N/A	Radiant Energy Heat Shield	24 inch/Monitor SD-RE-12/Air Drop Cable
6U1126	CONDUIT/3/4 Flex	N/A	Radiant Energy Heat Shield	6 inch
6U3112	CONDUIT/1-1/2	N/A	Radiant Energy Heat Shield	6 inch
6U3H1N	CONDUIT/1/2	N/A	Radiant Energy Heat Shield	6 inch
6U5014	CONDUIT/2	N/A	Radiant Energy Heat Shield	6 inch
6U5D4G	CONDUIT/1	N/A	Radiant Energy Heat Shield	3 feet/supports
6U5D9X	CONDUIT/3/4	N/A	Radiant Energy Heat Shield	18 inch
6U7A1N	CONDUIT/2	N/A	Radiant Energy Heat Shield	2 feet
ABHY18A	CONDUIT/1 Flex	N/A	Radiant Energy Heat Shield	6 inch
ABLY7A/BB	CONDUIT Flex/3/4	N/A	Radiant Energy Heat Shield	6 inch
ABLY7A/BB	CONDUIT Flex/3/4	N/A	Radiant Energy Heat Shield	10 feet
BMHV1	CONDUIT Flex/3/4	N/A	Radiant Energy Heat Shield	(2) 6 inch/unscheduled J-Box 12 x 12 x 6 - 4 sq. ft.
N/A	CONDUIT/1	N/A	Radiant Energy Heat Shield	6 inch/Non-class Security Conduits
N/A	CONDUIT/1 Flex	N/A	Radiant Energy Heat Shield	6 inch/Unscheduled Flex between 1U4006/5U4562
N/A	CONDUIT/1 Flex	N/A	Radiant Energy Heat Shield	6 inch/Unscheduled Flex between 4U4007/5U4563
N/A	CONDUIT/1 Flex	N/A	Radiant Energy Heat Shield	6 inch/Unscheduled Flex F/44011
N/A	CONDUIT/1-1/2	N/A	Radiant Energy Heat Shield	6 inch/Unmarked Comm. Con. at 4B1H60
N/A	CONDUIT/1/2 Flex	N/A	Radiant Energy Heat Shield	6 inch/Unscheduled Flex F/1U4005 (T7.7', 11" ETE)
N/A	CONDUIT/1/2 Flex	N/A	Radiant Energy Heat Shield	6 inch/unscheduled Flex between 1U4005/5J4085
N/A	CONDUIT/1/2 Flex	N/A	Radiant Energy Heat Shield	6 inch/Unscheduled Flex between 4U4007/5J4085
N/A	CONDUIT/3/4	N/A	Radiant Energy Heat Shield	6 inch/EMT LIGHTING CONDUIT
N/A	CONDUIT/3/4	N/A	Radiant Energy Heat Shield	6 inch/Field routed lighting conduit
N/A	CONDUIT/3/4 Flex	N/A	Radiant Energy Heat Shield	6 inch/EJ HCV8825/Galtronics
N/A	CONDUIT/3/4 Flex	N/A	Radiant Energy Heat Shield	6 inch/Unscheduled Flex between 1U4008/4U4010
N/A	CONDUIT/3/4 Flex	N/A	Radiant Energy Heat Shield	6 inch/Unscheduled Flex between 1U4005/4U4007
N/A	CONDUIT/3/4 Flex	N/A	Radiant Energy Heat Shield	6 inch/Unscheduled Flex for EPHV8878D
N/A	CONDUIT/3/4 Flex	N/A	Radiant Energy Heat Shield	12 inch/Heat trace Flex at TB15302
N/A	CONDUIT/3/4 Flex	N/A	Radiant Energy Heat Shield	6 inch/Unscheduled Flex F/1U4013
N/A	CONDUIT/3/4 Flex	N/A	Radiant Energy Heat Shield	6 inch/Unscheduled Flex F/1U4011
N/A	CONDUIT/3/4 Flex	N/A	Radiant Energy Heat Shield	6 inch/Unscheduled Flex between 1U4011/4U4014
N/A	CONDUIT/3/4 Flex	N/A	Radiant Energy Heat Shield	6 inch/Unscheduled Flex between 1U4011/1U4014
N/A	CONDUIT/3/4 Flex	N/A	Radiant Energy Heat Shield	6 inch/Unscheduled Flex between 1U4006/5J4086
N/A	CONDUIT/3/4 Flex	N/A	Radiant Energy Heat Shield	6 inch/Unscheduled Flex between 1U4006/4U4008
N/A	CONDUIT/3/4 Flex	N/A	Radiant Energy Heat Shield	6 inch/Unscheduled Flex between 1U4005/5U4563
N/A	CONDUIT/3/4 Flex	N/A	Radiant Energy Heat Shield	6 inch/Unscheduled Flex F/1U4005 (T7, 6'-6"E TE)
N/A	CONDUIT/3/4 Flex	N/A	Radiant Energy Heat Shield	6 inch/Unscheduled Flex from 4U4007
N/A	CONDUIT/3/4 Flex	N/A	Radiant Energy Heat Shield	6 inch/Unscheduled Flex between 4U4007/5J4085/See WR 00370-94
N/A	CONDUIT/3/4 Flex	N/A	Radiant Energy Heat Shield	6 inch/Unscheduled Flex F/4U4008
N/A	CONDUIT/3/4 Flex	N/A	Radiant Energy Heat Shield	6 inch/Unscheduled Flex F/4U4015