Nuclear Operating Company
South Texas Project Electric Generating Station P.O. Box 289 Wadsworth, Texas 77483

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10CFR50.12
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U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555

South Texas Project
Units 1 and 2
Docket Nos. STN 50-498, STN 50-499
Letter of Intent to Request an Exemption from
10CFR50, Appendix J, for Type A Leakage Testing

This is a letter of intent to inform you that the South Texas Project plans to submit a request for exemption from the requirements of 10CFR50, Appendix J, "Primary Reactor Containment Leakage Testing for Water Cooled Power Reactors," for Integrated Leakage Rate Testing (Type A testing). The South Texas Project intends to include a Technical Specification amendment to delete the current references to Integrated Leakage Rate Testing and associated visual examinations. The planned request for exemption from Integrated Leakage Rate Testing requirements and the associated Technical Specification changes are attached for the Nuclear Regulatory Commission's consideration.

The planned exemption request results from the determination that integrated leakage rate testing at the South Texas Project is not necessary. Test experience demonstrates that the Unit 1 and Unit 2 reactor containment buildings are essentially leak tight, are in good material condition, and are maintained in good condition through an effective inspection and surveillance program. The current Appendix J Type B and Type C testing programs would not be modified by this planned exemption and would continue to effectively detect leakage through containment components and containment penetrations.

As described in the planned exemption request, analysis using the South Texas Project Probabilistic Risk Analysis demonstrates that integrated leakage rate testing makes an insignificant contribution to risk reduction at the South Texas Project. The change in the level of risk is outweighed by the continued burden of conducting Type A testing. Exemption from integrated leakage rate testing and the associated Technical Specification change will not increase the risk of exceeding 10CFR100 criteria or pose an increased risk to public health and safety, and are consistent with the common defense and security as required by 10CFR50.12 (a)(1). If approved, exempting the South Texas Project from Type A testing will result in savings in dose to personnel performing the test as well as in time required to complete the outage.

The South Texas Project would appreciate an opportunity to meet with the Nuclear Regulatory Commission staff in the near future to discuss this issue.

A017

If you should have any questions concerning this matter, please contact Mr. Michael Lashley at (361) 972-7523 or me at (361) 972-8757.

J. J. Sheppard
Vice President,
Engineering & Technical Services

PLW/

Attachments:
1) Draft Request for Exemption from the Integrated Leakage Rate Testing Requirements of 10CFR50, Appendix J
2) Draft Revision to Technical Specifications

cc:

Ellis W. Merschoff
Regional Administrator, Region IV
U.S. Nuclear Regulatory Commission
611 Ryan Plaza Drive, Suite 400
Arlington, Texas 76011-8064

John A. Nakoski
Project Manager, Mail Code 0-4D3
U. S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Cornelius F. O'Keefe
c/o U. S. Nuclear Regulatory Commission
P. O. Box 910
Bay City, TX 77404-0910

A. H. Gutterman
Morgan, Lewis & Bockius
1800 M. Street, N.W.
Washington, DC 20036-5869

M. T. Hardt/W. C. Gunst
City Public Service
P. O. Box 1771
San Antonio, TX 78296

A. Ramirez/C. M. Canady
City of Austin
Electric Utility Department
721 Barton Springs Road
Austin, TX 78704

Jon C. Wood
Matthews & Branscomb
One Alamo Center
106 S. St. Mary's Street, Suite 700
San Antonio, TX 78205-3692

Institute of Nuclear Power
Operations - Records Center
700 Galleria Parkway
Atlanta, GA 30339-5957

Richard A. Ratliff
Bureau of Radiation Control
Texas Department of Health
1100 West 49th Street
Austin, TX 78756-3189

D. G. Tees/R. L. Balcom
Houston Lighting & Power Co.
P. O. Box 1700
Houston, TX 77251

Central Power and Light Company
ATTN: G. E. Vaughn/C. A. Johnson
P. O. Box 289, Mail Code: N5012
Wadsworth, TX 77483

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555-0001

ATTACHMENT 1

DRAFT REQUEST FOR EXEMPTION FROM THE INTEGRATED LEAKAGE RATE TESTING REQUIREMENTS OF 10CFR50, APPENDIX J

DRAFT REQUEST FOR EXEMPTION FROM THE INTEGRATED LEAKAGE RATE TESTING REQUIREMENTS OF 10CFR50, APPENDIX J

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SOUTH TEXAS PROJECT
UNITS 1 AND 2
DRAFT REQUEST FOR EXEMPTION FROM THE INTEGRATED LEAKAGE RATE TESTING REQUIREMENTS OF 10CFR50, APPENDIX J

1.0 Description of Requested Exemption

Pursuant to 10CFR50.12, the South Texas Project requests an exemption from the requirements of 10CFR50 Appendix J for performing Integrated Leakage Rate Tests to confirm reactor containment leak-tightness. This request only applies to Type A tests. The existing Appendix J Type B and Type C testing programs are not being modified by this request. Type B and Type C tests will continue to be conducted in accordance with Appendix J and the associated Technical Specifications.

In addition, the South Texas Project proposes changes to the Technical Specifications to remove references to Appendix J Integrated Leakage Rate Testing.

The South Texas Project previously submitted a proposed exemption to 10CFR50 ("Request For Exemption to Exclude Certain Components from the Scope of Special Treatment Requirements Required by Regulations," dated July 13, 1999 (NOC-AE-000518)). The proposal included a request for an exemption to 10CFR50 Appendix J for Type C tests of low safety significant containment isolation valves and other safety-related components that are low safety significant or are non-risk significant. The South Texas Project withdraws that portion of the proposed exemption.

2.0 Background

2.1. Reactor Containment Design

With the containment design provisions described in Appendix 1, the Nuclear Regulatory Commission concluded the following in the South Texas Project Safety Evaluation Report:

- The South Texas Project has met 10 CFR 50.55a and GDC 1 with respect to ensuring that the concrete containment is designed, fabricated, erected, constructed, tested and inspected to quality standards commensurate with its safety function by meeting the recommendations of regulatory guides and industry standards.
- The South Texas Project has met GDC 2 by designing the concrete containment to withstand the most severe earthquake that has been established for the site with sufficient margin and the combinations of the effects of normal and accident conditions with the effects of environmental loadings such as earthquakes and other natural phenomena.

- The South Texas Project has met GDC 4 by ensuring that the design of the concrete containment is capable of withstanding the dynamic effects associated with missiles, pipe whip, and fluid discharge.

- The South Texas Project has met GDC 16 by designing the concrete containment so that it is an essentially leak-tight barrier to prevent uncontrolled release of radioactive effluents to the environment.

- The South Texas Project has met GDC 50 by designing the concrete containment to accommodate, with sufficient margin, the design leakage rate and the calculated pressure and temperature conditions resulting from accident conditions, and by ensuring that the design conditions are not exceeded during the full course of the accident condition. In meeting these design requirements, the South Texas Project has used the recommendations of regulatory guides and industry standards.

The containment construction practices and design provisions used at the South Texas Project have resulted in low-leakage containment structures.

2.2. Current Regulatory Requirements

10CFR50 Appendix J specifies the leak-rate test requirements for primary reactor containments. The test requirements of Option A and Option B ensure that: (a) leakage through containment or systems and components penetrating containment does not exceed allowable leakage rates specified in the Technical Specifications; and (b) integrity of the containment structure is maintained during its service life. Type A tests measure the containment system overall integrated leakage rate. Type B pneumatic tests detect and measure local leakage rates across pressure-retaining, leakage-limiting boundaries. Type C pneumatic tests measure containment isolation valve leakage rates.

Option B of Appendix J identifies the performance-based requirements and criteria for preoperational containment integrity and subsequent periodic leakage-rate testing. The South Texas Project has adopted Option B.

3.0 Request for Exemption

Pursuant to 10 CFR 50.12(a), the Nuclear Regulatory Commission may grant exemptions from the requirements of regulations that are authorized by law, will not present undue risk to the public, and are consistent with the common defense and security. The Nuclear Regulatory Commission will not, however, consider granting an exemption to a requirement unless special circumstances are present. This exemption request meets the special circumstances described in paragraphs 50.12(a)(2)(ii) and 50.12(a)(2)(vi):

- **The proposed exemption is authorized by law.**

  The Atomic Energy Act authorizes the Commission to grant exemptions from the Commission's regulations. No law requires containment integrated leakage rate testing. Consequently, the proposed exemption is authorized by law.

- **The proposed exemption will not present an undue risk to public health and safety.**

  There are adequate alternative means to assure that the South Texas Project containments meet applicable leakage limits, and cessation of Type A testing will not result in a significant increase in risk to the public health and safety.

- **The proposed exemption is consistent with the common defense and security.**

  The proposed exemption relates solely to Type A leakage rate testing of the South Texas Project containment and does not pertain to the security or safeguards plans. Therefore, it does not have any affect on the common defense and security.

- **Special circumstances are present.**

  Section 50.12 identifies various bases on which the Commission may find that special circumstances are present. This exemption request, as discussed below, meets section 50.12(a)(2)(ii) because application of the Integrated Leakage Rate Testing requirements is not necessary to achieve the underlying purpose of such testing. This request meets section 50.12(a)(2)(vi) because material circumstances are present that were not considered when the regulation was adopted.

4.0 Justification for Exemption/Special Circumstances

4.1 Application of the Regulation is Not Necessary to Achieve the Underlying Purpose of the Rule [10CFR50.12(a)(2)(ii)]

The purpose of Appendix J is to ensure that: (a) leakage through the primary reactor containment and systems and components penetrating primary containment shall not exceed allowable leakage rate values as specified in the technical specifications or associated bases; and (b) periodic surveillance of reactor containment penetrations and isolation valves is performed so that proper maintenance and repairs are made during the service life of the containment, and systems and components penetrating primary containment. Previous Type A tests confirmed that the South Texas Project reactor containment structures meet acceptance requirements for leakage rates. However, these requirements can be fulfilled without conducting Type A testing by maintaining the good material condition of the containment, continuing to conduct Type B testing, and performing Type C testing of containment isolation valves for systems in direct communication with containment atmosphere.

4.1.1. Summary of Integrated Leakage Rate Test Results

To date, three Type A tests have been performed on Unit 1 and two Type A tests have been performed on Unit 2. There is considerable margin between these Type A test results and the Technical Specification 4.6.1.2 limit of 0.75% L_a, where L_a is equal to 0.3% by weight of the containment air per day at the peak accident pressure. These test results demonstrate that both South Texas Project Unit 1 and Unit 2 have a low leakage containment. Two different testing methods were employed in performing these tests: the mass point leakage rate method and the total time leakage rate method. The results of both test methods are reported in the following table and in Appendix 2 for each of the five Type A tests conducted to date at the South Texas Project.

Unit	Mass Point Leakage (%)	Total Time Leakage (%)	Acceptance Limit (%)	Test Pressure (psig)
1	0.0320	0.0321	0.225	37.4
1	0.0668	0.1336	0.225	39.5
1	0.0208	0.0139	0.225	44.5
2	0.034	0.034	0.225	38.3
2	0.0765	0.0681	0.225	44.6

4.1.2 Assurance of Containment Structural Capability

The major reason for performing a Type A leakage rate test on a primary reactor containment is to verify the structural capability of the containment. A Type A test can detect containment leakage due to a loss of structural capability (i.e., structural degradation or an improper containment modification). All other sources of containment leakage are detected by the Type B and C tests. Loss of containment structural capability is a very unlikely event for the South Texas Project due to the good material condition of the containment structures, containment testing and inspection programs required by 10CFR50.55a and modification control programs. These attributes and programs accomplish the purpose of the Appendix J Type A test.

The high quality of the existing material condition of the containment structures, liner, and liner coatings provides assurance of the structural capability of the containments.

Structural degradation of containment is a gradual process that occurs due to the effects of pressure, temperature, radiation, chemical, or other such effects. Such effects are identified and corrected when the containment structure is periodically tested and inspected to verify structural integrity under Section 4.6.1.6 of the Technical Specifications and Subsections IWE and IWL of the ASME Section XI code. The surveillance required by Section 4.6.1.6 includes tendon testing and inspection of end anchorages and concrete surfaces for abnormal cracking or grease leakage. The Section XI testing and examination program under Subsection IWL codifies the surveillance requirements of Section 4.6.1.6 and adds certain additional requirements, such as rules for repairs and replacements and NDE personnel qualification requirements for visual examiners. Subsection IWE adds visual examination requirements for the containment liner, seals, gaskets, bolting, etc. These Technical Specification surveillance and code test and examination requirements provide a high degree of assurance that any degradation of the containment structure will be detected and corrected before it can produce a containment leak path.

Modifications altering the containment structure are infrequent and would receive extensive review to ensure containment capabilities are not diminished. The South Texas Project design change control program and the 10CFR50.59 program provide assurance that such safety significant modifications are reviewed adequately.

4.1.3. Continuation of Type B and C Tests

The existing Type B and C testing program is not being modified by this exemption request and will continue to effectively detect containment leakage caused by degradation of active containment isolation components (e.g., valves) and sealing material within containment penetrations.

Type B leakage rate testing is performed to detect:

- penetration seal leakage, including airlock door seals;
- doors with resilient seals or gaskets except for seal welded doors;
- penetrations that incorporate resilient seals, gaskets, or sealant compounds;
- piping penetrations fitted with expansion bellows; and
- electrical penetrations fitted with flexible metal seal assemblies.

Type B tests to identify leakage of such components will not be affected by deletion of Integrated Leakage Rate Testing.

Type C leak rate testing is performed to verify the leak tightness of containment isolation valves which:

- provide either a potential or direct connection between the outside and the primary reactor containment atmosphere under normal operation;
- are required to close automatically upon receipt of a containment isolation signal in response to controls intended to effect containment isolation; and
- are required to operate intermittently under post-accident conditions.

Leakage through these valves can be caused by leaking valve seals, isolation valve closure failure, or failure to return a penetration to its normally closed condition following maintenance. Type C local leakage rate testing will detect leakage through containment isolation valves for these initiating events. Following maintenance on a containment isolation valve, a Local Leakage Rate Test is performed followed by an independent valve alignment verification to ensure that leakage remains within acceptable levels. Type C tests will not be affected by deletion of Integrated Leakage Rate Testing requirements.

Industry experience indicates that 97% of the failures associated with Type A tests are found to occur at penetrations covered by either Type B or Type C tests (NUREG-1493). The remaining 3% of Type A test failures were for leakage rates only marginally above the currently prescribed limits for integrated leakage rates. Therefore, continued overall leak tightness of the active containment components is expected to be provided by the existing Type B and C testing program.

The South Texas Project has had no Type A test failures in Unit 1 or Unit 2. Increases in containment leak rate have been attributable to leaks in Type B and Type C penetrations.

4.1.4. NRC Containment Leakage Monitoring Program

Another program that provides ongoing monitoring and review of containment leakage rates and trends is the NRC Containment Leakage Monitoring Program for Type B and Type C tests. This program is discussed in NEI 99-02 (Draft) issued by the Nuclear Energy Institute in April 1999. As part of the NRC's revised licensee assessment process, licensees will be required to submit performance assessment data to the NRC each quarter. One of the performance indicators will be monthly documentation of containment leakage, as measured by the highest monthly total of Type B and Type C minimum path leakage results, reported as a percentage of the design basis leak rate (L_a). This licensee reporting requirement will ensure that a high level of awareness and visibility is attached to the containment leakage data. Significant increases in the leakage rate will be promptly assessed and corrected by the South Texas Project.

4.1.5 Operational Containment Venting

During power operation, instrument air leaks from air-operated valves inside containment and pressurizes the containment building. Instrumentation monitors containment pressure and annunciates conditions approaching the limits allowed by the Technical Specifications. On a periodic basis, the containment building is vented to the atmosphere to comply with Technical Specification 3.6.1.4 limits on containment pressure (i.e., between -0.1 and +0.3 psig). This cycling of the containment pressure during operation amounts to a periodic integrated pressure test of the containment at a low differential pressure. Although not as significant as pressure resulting from a Design Basis Accident, the fact that the containment can be pressurized by leakage from air-operated valves provides a degree of assurance of containment structural integrity (i.e., no large leak paths can exist anywhere in the containment structure). This feature is a complement to visual inspection of the interior and exterior of the containment structure discussed in Section 4.1.2 for those areas that may be inaccessible for visual examination for degradation.

4.2 Material Circumstances Are Present That Were Not Considered When The Regulation Was Adopted [10CFR50.12(a)(2)(vi)]

4.2.1 Containment Structural Integrity

The historical Type A test results demonstrate that South Texas Project Unit 1 and Unit 2 have low leakage containments. Of the five Type A tests performed to date at the South Texas Project, the test results have ranged from 0.0139% to 0.1336% per day with an average test result of 0.0512% per day. These test results are well below the acceptance limit of 0.225% per day and the design limit of 0.3% per day.

There are no mechanisms that would adversely affect the structural capability of the containment, which is the only leakage mode not identified by the Type B and C tests. Absent actual accident conditions, structural deterioration of containment due to temperature, radiation, chemical or other such effects is a gradual phenomenon requiring extended periods of time to impact containment integrity. There will be multiple opportunities to detect any such degradation by the periodic visual inspections required by Technical Specification surveillance 4.6.1.6 and by code inspections, as described in Section 4.1.2. Therefore, any such degradation will be detected before it can cause a detectable leak.

4.2.2 Probabilistic Impact

Plant specific probabilistic risk assessments were not available and therefore were not considered when the regulation requiring compliance with Appendix J was adopted. Overall plant risk due to containment leakage is relatively small, given the small probability of containment leakage itself. The predominant mechanical contributor to the Large Early Release Frequency (LERF) is failure to isolate the large supplemental purge penetrations in the unlikely event that a purge is in progress during the accident. This contributor would not be impacted by this exemption request and Technical Specification changes. Cessation of Type A testing could increase the probability of a Small Containment Leakage Failure. However, this increased probability has been shown to result in a very small increase in the calculated population dose for the South Texas Project.

The Integrated Leakage Rate Test program serves to verify that the assumptions used in the UFSAR Chapter 15 Design Basis Accident Analysis concerning doses at the site boundary are maintained. If the containment leakage is less than the Integrated Leakage Rate Test limit, then under Chapter 15 Accident Analysis the dose to the public at the site boundary is less than the 10CFR100 limits.

The South Texas Project Probabilistic Risk Assessment (PRA) is a full Level 2 analysis of Core Damage Frequency (CDF) and Containment Response including Large Early Release Frequency (LERF) and Small Early Release Frequency. The results for LERF are dominated by sequences caused by a phenomenon called Induced Steam Generator Tube Rupture (ISGTR). ISGTR occurs when the secondary side of the steam generators dry out after a core damage event with the reactor coolant system intact at high pressure. High temperature gases from the degraded core circulate through the RCS, heating up the steam generator tubes to the point of failure. The Induced Steam Generator Tube Rupture sequences are primarily caused by core damage scenarios that involve loss of all station AC power (Station Blackout). The Integrated Leak Rate Test does not test this pathway through the steam generators.

The dominant cause of large early containment failure in the South Texas Project PRA is not affected by Integrated Leakage Rate Testing. The leading mechanical cause of containment bypass failure is failure of the supplementary containment purge to isolate during an accident sequence. This penetration is 18 inches in diameter and is also not affected by the Integrated Leakage Rate Test program. The Integrated Leakage Rate Test, as it relates to the PRA, is to verify that there is no pre-existing "large hole" through the containment. The Integrated Leakage Rate Test program thus affects the likelihood of a Small Containment Leakage Failure in the PRA analysis.

The South Texas Project has performed a probabilistic risk assessment for the Unit 1 and Unit 2 containments assuming no further Integrated Leakage Rate Testing, utilizing and expanding on the methods described in NUREG-1493, "Performance-Based Containment Leak-Test Program". See Appendix 3. These calculations show that cessation of Integrated Leakage Rate Testing will not affect either the likelihood of a containment failure following a core-damage event or the Large Early Release Frequency. However, cessation of Integrated Leakage Rate Testing could increase the probability of a Small Containment

Leakage Failure. 10CFR100 criteria for projected population dose will not be exceeded as a result of this change.

4.3 NRC Guidance on Use of Probabilistic Risk Assessment

Utilization of this risk insight to assess the need for a continued requirement to perform Integrated Leakage Rate Testing is consistent with the NRC guidance in Regulatory Guide 1.174 for risk-informed decision-making.

4.3.1 Current regulations

The proposed change is an exemption from the requirement to perform Integrated Leakage Rate Testing. 10CFR50 Appendix J specifies the leak-rate test requirements for primary reactor containments. The test requirements of Option A and Option B ensure that: (a) leakage through containment or systems and components penetrating containment does not exceed allowable leakage rates specified in the Technical Specifications; and (b) integrity of the containment structure is maintained during its service life. Option B of Appendix J identifies the performance-based requirements and criteria for preoperational containment integrity and subsequent periodic leakage-rate testing. The South Texas Project has adopted Option B.

Included in this request are Technical Specification changes removing references to Integrated Leakage Rate Testing (Attachment 2).

4.3.2 Defense-in-depth maintained

Type A tests measure the containment system overall integrated leakage rate. Type B pneumatic tests detect and measure local leakage rates across pressure-retaining, leakage-limiting boundaries. Type C pneumatic tests measure containment isolation valve leakage rates. Appendix J requirements can be fulfilled without conducting Type A testing by maintaining the good material condition of the containment, performing periodic visual inspections of the containment as discussed in section 4.1.2, continuing to conduct Type B testing, and performing Type C testing of containment isolation valves for systems in direct communication with containment atmosphere. Therefore, defense-in-depth is maintained.

4.3.3 Sufficient safety margins are maintained

This change does not affect any accident parameters discussed in the South Texas Project UFSAR. Containment leakage rate requirements described in the current licensing basis for South Texas Project systems, structures and components will continue to be met. Equipment functionality, reliability and availability will be unaffected by this change.

4.3.4 Proposed changes in risk, both individual and cumulative, are small and do not cause the NRC Safety Goals to be exceeded.

Plant specific probabilistic risk assessments were not available and therefore were not considered when the regulation requiring compliance with Appendix J (10CFR50.54(o)) was adopted. Overall plant risk due to containment leakage is relatively small, given the small probability of containment leakage itself. The predominant mechanical contributor to the Large Early Release Frequency is failure to isolate the large supplemental purge penetrations in the unlikely event that a purge is in progress during the accident. This contributor would not be impacted by this exemption request and Technical Specification changes. As discussed in Section 4.2.2, cessation of Type A testing could increase the probability of a Small Containment Leakage Failure. This increased probability has been shown to result in a very small increase in the calculated population dose for the South Texas Project. However, the increased calculated population dose is bounded by 10CFR100 limits. Therefore, the exemption would not cause a change in risk, or cause the NRC Safety Goals to be exceeded.

4.3.5 Need for Monitoring of Impact of Proposed Change

The South Texas Project containment buildings are low leakage structures. It is unlikely that significant leaks will develop that would not be identified through examinations not changed by this exemption; consequently, a monitoring program beyond that already implemented is not needed to provide timely feedback and corrective action related to this exemption.

4.4 Cost Effectiveness

NUREG-1493, Chapter 7, analyzed several alternatives for modifying the Integrated Leakage Rate Test program as presently required. Alternative 14 maintains the current Appendix J acceptance criteria and reduces the Integrated Leakage Rate Test frequency to once each 20 years and relaxes Local Leakage Rate Tests to "lower-reliability" penetrations only during refueling outages. This reduced industry's baseline costs by $670 million at a 5% discount rate and $457 million at a 10% discount rate. Alternative 15 relaxes the current Appendix J acceptance criteria and reduces the Integrated Leakage Rate Test frequency to once each 20 years and relaxes Local Leakage Rate Tests to "lower-reliability" penetrations only during refueling outages. This reduced industry's baseline costs by $673 million at a 5% discount rate and $458 million at a 10% discount rate.

The cost savings associated with an exemption from Integrated Leakage Rate Testing requirements are substantial. The South Texas Project estimates each Integrated Leakage Rate Test costs approximately $1.75M. This estimate includes $1.2M for replacement power for the three days of lost critical path time during the refueling outage. At the current ten year inspection frequency, the

South Texas Project can save $8.7M (uninflated dollars) by not performing Integrated Leakage Rate Tests over the next thirty years.

5.0 Conclusions

Continuing to perform Appendix J Integrated Leakage Rate Testing at the South Texas Project is not necessary to assure the continuing structural capability of the containment structures. Granting the South Texas Project an exemption from any further Integrated Leakage Rate Testing and approval of the proposed Technical Specification changes is justified both on technical and regulatory bases. The deterministic and probabilistic justifications presented demonstrate the marginal value of Integrated Leakage Rate Testing at the South Texas Project and substantiate that this testing represents a hardship or unusual difficulty without a compensating increase in the level of quality or safety.

SOUTH TEXAS PROJECT
UNIT 1 AND UNIT 2
REACTOR CONTAINMENT DESIGN AND CONSTRUCTION

Each South Texas Project containment is a fully continuous, steel-lined, post-tensioned, reinforced concrete structure consisting of a vertical cylinder with a hemispherical dome, supported on a flat foundation mat. The cylinder and dome are post-tensioned with high-strength unbonded wire tendons. The dimensions of the containment are: 150-foot inside diameter, 239-1/4 foot inside height to the top of the dome, with 4-foot cylinder wall thickness, 3-foot dome thickness, and 18-foot mat thickness. The top of the foundation mat is 41-1/4 feet below grade.

A continuous welded steel liner plate is provided on the entire inside face of the containment to limit release of radioactive materials into the environment. The nominal thickness of the liner in the wall and dome is 3/8-inch. A 3/8-inch-thick plate is used on top of the foundation mat and is covered with a 24-inch concrete fill slab. An increased plate thickness up to two inches is provided around all penetrations and for the crane girder brackets.

An anchorage system is provided to prevent instability of the liner. For the dome, the anchorage system consists of meridional structural tees, circumferential angles, and plates. A system of vertical and circumferential stiffeners is provided for the cylinder, using structural angles, channels, and plates.

Leak chase channels and angles are provided at the bottom liner seams which, after construction, are inaccessible for leak tightness examination due to the 2-foot interior fill slab.

The cylindrical wall is reinforced with conventional steel reinforcing bars throughout the structure. The bars are placed in a horizontal and vertical pattern in each face of the cylinder wall. Additional bars are provided around penetrations and in the buttresses to resist local stress concentrations. Radial shear reinforcement is provided throughout, and tangential shear reinforcement is provided where required.

The reinforcement in the dome is provided in a meridional and circumferential pattern up to 45 degrees from the spring line, with the remaining area being reinforced using a grid pattern. Reinforcement is provided on both faces of the dome wall. Radial ties are provided to both resist radial shear and prevent delamination of the dome under pre-stressing.

SOUTH TEXAS PROJECT UNIT 1 AND UNIT 2
PRIOR INTEGRATED LEAKAGE RATE TEST RESULTS

South Texas Project Unit 1:

The pre-operational Type A test was successfully completed on March 26, 1987, with the following results: 1) a mass point leakage rate of 0.0320% per day, and 2) a total time leakage rate of 0.0321% per day. Both values represent the as-found 95% upper confidence limit. These results are well under the acceptance limit of 0.225% per day (0.75 L_a). The test was performed at an initial test pressure of 52.08 psia (approximately 37.4 psig).

The first periodic Type A test was successfully completed on January 10, 1991, and the required local leakage rate tests for the analysis were completed on March 4, 1991,with the following results: 1) a mass point leakage rate of 0.0668% per day, and 2) a total time leakage of 0.1336% per day. Both results are at the as-found 95% upper confidence limit. The test was performed at an initial test pressure of 54.18 psia (approximately 39.5 psig), which represents an increase in the calculated accident pressure from the original test. These results are also well below the acceptance limit.

The second periodic Type A test was successfully completed on March 10, 1995, and the required local leak rate tests for the analysis were completed on April 7, 1995, with the following results: 1) a mass point leakage rate of 0.0208% per day, and 2) a total time leakage of 0.0139% per day. Both results are at the as-found 95% upper confidence limit. The test was performed at an initial test pressure of 59.196 psia (approximately 44.5 psig). These results are also well below the acceptance limit.

South Texas Project Unit 2:

The pre-operational Type A test was successfully completed on September 28, 1988, with the following results: 1) a mass point leakage rate of 0.034% per day, and 2) a total time leakage rate of 0.034% per day. Both values represent the as-found 95% upper confidence limit. These results are well under the acceptance limit of 0.225% per day (0.75 L_a). The test was performed at an initial test pressure of 52.994 psia (approximately 38.3 psig).

The first periodic Type A test was successfully completed on September 24, 1991, and the required local leakage rate tests for the analysis were completed on November 12, 1991, with the following results: 1) a mass point leakage rate of 0.0765% per day, and 2) a total time leakage of 0.0681% per day. Both results are at the as-found 95% upper confidence limit. The test was performed at an initial test pressure of 59.336 psia (approximately 44.6 psig), which represents an increase in the calculated accident pressure from the original test. These results are also well below the acceptance limit.

NUREG-1493 PERSPECTIVE

In September 1995, the NRC published NUREG-1493, "Performance-Based Containment Leak-Test Program," which analyzed the effects of containment leakage on the health and safety of the public and the benefits realized from mandated containment leak rate testing. Chapter 5 of NUREG-1493 presents analyses using NUREG-1150 results for Surry and Zion. In these analyses, containment leakage failure represented approximately 0.1% of the latent cancer risks from reactor accidents at assumed leakage rates of up to 1% per day.

The uncertainties in the results for small containment leakage failure are dominated by the results for other containment failure modes (i.e., Large Early Release).

Analysis

Sets of sensitivity analyses were performed using the current South Texas Project Level II PRA. These analyses serve to confirm the results presented in NUREG-1493. Three sensitivity cases that set the likelihood of a small containment leakage failure from 1.0 to the PRA-calculated value were performed to measure the upper bound population doses for the South Texas Project. Under normal conditions, the likelihood of a Small Early Release in the current South Texas Project PRA is:

5.67 E-07 per reactor year

If the containment is guaranteed to fail (containment isolation failure set to 1.0), the Small Early Release Frequency rises to:

9.10 E-06 per reactor year

With containment isolation failure set at 0.1, the Small Early Release Frequency is:

2.34 E-06 per reactor year

Containment failure in the PRA is assessed under various radioactive release categories. These categories are defined in the South Texas Project Level 2 Probabilistic Safety Assessment and Individual Plant Examination Table 4.8.1-2.

The frequency of these release categories is collected and mapped to the Release Category Groups defined in NUREG-4551 for the Zion Level II PRA. The Zion demographic and power density information is compared to the equivalent information for the South Texas Project and a set of conversions estimated. These conversions are used to map the sensitivity calculations for the likelihood of small containment leakage failure to population doses. The population dose results for the three sensitivity cases are summarized below.

- Base Case — 20.8 person-rem/reactor year at fifty miles
- CI at 0.1 — 20.8 person-rem/reactor year at fifty miles
- CI at 1.0 — 22.3 person-rem/reactor year at fifty miles

As can be seen from the results, the change in population dose at South Texas Project for assumed small containment leakage failures varies by less than 7% from the base case to the assumed guaranteed failure case. This is because the population dose from an assumed core damage event is dominated by the Large Early Release Frequency which is in turn dominated by Induced Steam Generator Tube Rupture sequences.

<u>Conclusion:</u>

Cessation of Integrated Leakage Rate Testing will not affect either the likelihood of a containment failure following a core-damage event or the Large Early Release Frequency. However, cessation of Integrated Leakage Rate Testing could increase the probability of a Small Containment Leakage Failure. 10CFR100 criteria for projected population dose will not be exceeded as a result of this change.

ATTACHMENT 2

DRAFT REVISION TO TECHNICAL SPECIFICATIONS

DRAFT REVISION TO TECHNICAL SPECIFICATIONS

1.0 Background

The South Texas Project proposes changes to the Technical Specifications to remove references to Appendix J Integrated Leakage Rate Testing. The changes are for consistency with the exemption requested pursuant to 10CFR50.12 from the requirements of 10CFR50 Appendix J for performing Integrated Leakage Rate Tests to confirm reactor containment leak-tightness.

This request only applies to Type A tests. The existing Appendix J Type B and Type C testing programs are not being modified by this request. Type B and Type C tests will continue to be conducted in accordance with Appendix J and the associated Technical Specifications.

2.0 Description of Changes

Taking exemption to the Integrated Leakage Rate Testing requirements of Appendix J will require revision of the following South Texas Project Technical Specifications:

- Table 3.3-6, Action 31
- Limiting Condition for Operation 3.6.1.2
- Surveillance Requirement 4.6.1.2
- Section 3/4.6.1.2 - Bases
- Section 3/4.6.1.6 - Bases
- Specification 6.8.3(j)

Changes to these Technical Specifications delete references to Appendix J Type A testing from the Limiting Conditions for Operation, Surveillance Requirements, the Bases, and from the description of the Containment Leakage Rate Testing Program under Administrative Controls. These changes are applicable to both Unit 1 and Unit 2. The specific changes to the South Texas Project Technical Specifications requested by this submittal are attached.

3.0 Safety Evaluation

3.1 Regulatory Requirements

The purpose of 10CFR50 Appendix J is to ensure that: (a) leakage through the primary reactor containment and systems and components penetrating primary containment shall not exceed allowable leakage rate values as specified in the technical specifications or associated bases; and (b) periodic surveillance of reactor containment penetrations and isolation valves is performed so that proper maintenance and repairs are made during the service life of the containment, and systems and components penetrating primary containment.

Under current requirements, a Type A test must be conducted (1) after the containment system has been completed and is ready for operation and (2) at a periodic interval based on the historical performance of the overall containment system as a barrier to fission product releases to mitigate the consequences from reactor accidents. A general visual inspection of the accessible interior and exterior surfaces of the containment system for structural deterioration which may affect the containment leak-tight integrity must be conducted prior to each test, and at a periodic interval between tests based on the performance of the containment system. The leakage rate must not exceed the allowable leakage rate (L_a) with margin, as specified in the Technical Specifications. The test results must be compared with previous results to examine the performance history of the overall containment system to limit leakage.

3.2 Alternate Approach

Type A leak rate tests are performed on a primary reactor containment to verify the structural capability of the containment. A Type A test can detect containment leakage due to a loss of structural capability (i.e., structural degradation or an improper containment modification). All other sources of containment leakage are detected by the Type B and C tests.

Loss of containment structural capability is a very unlikely event for the South Texas Project due to the good material condition of the containment structures, containment testing and inspection programs required by 10CFR50.55a and modification control programs. Previous Integrated Leakage Rate Tests (Type A) have confirmed that the South Texas Project reactor containment structures meet acceptance requirements for leakage rates. However, these requirements can be fulfilled without conducting Type A testing by maintaining the good material condition of the containment, continuing to conduct Type B testing, and performing Type C testing of containment isolation valves for systems in direct communication with containment atmosphere. These attributes and programs accomplish the purpose of the Appendix J Type A test.

3.3 Containment Integrity

The capability of the containment structure to maintain leak-tight integrity and to provide a predictable environment for operation of Engineered Safety Feature systems is ensured by a comprehensive design, analysis, and testing program that includes consideration of:

1. Peak containment pressure and temperature associated with the most severe postulated accident coincident with the Safe Shutdown Earthquake, and

2. Maximum external pressure to which the containment may be subjected as a result of inadvertent containment system operations that potentially reduce containment internal pressure below outside atmospheric pressure.

There are no mechanisms that would adversely affect the structural capability of the containment, which is the only leakage mode not identified by the Type B and C tests. Absent actual accident conditions, structural deterioration of containment due to temperature, radiation, chemical or other such effects is a gradual phenomenon requiring extended periods of time to impact containment integrity. There will be multiple opportunities to detect any such degradation by the periodic visual inspections required by Technical Specification surveillance 4.6.1.6 and by ASME Code inspections. Therefore, any such degradation will be detected before it can cause through-containment leakage.

3.4 Probabilistic Risk Assessment

Overall plant risk due to containment leakage is relatively small, given the small probability of containment leakage itself. The predominant mechanical contributor to the Large Early Release Frequency is failure to isolate the large supplemental purge penetrations in the unlikely event that a purge is in progress during the accident. This contributor would not be impacted by this exemption request and Technical Specification changes. Cessation of Type A testing could increase the probability of a Small Containment Leakage Failure. However, this increased probability has been shown to result in a very small increase in the calculated population dose for the South Texas Project. Therefore, the exemption would not cause a change in risk, or cause the NRC Safety Goals to be exceeded.

3.5 Population Dose

Deletion of Type A testing for the South Texas Project will result in an increased probability of a Small Containment Leakage Failure. This results in a small increase (approximately 1.5 person-rem) in the calculated population dose for the South Texas Project in the event of an actual containment failure. However, this increased risk of radiation exposure is very small and is counterbalanced by a decrease in radiation exposure to plant staff and contractors and a decrease in safety hazards by not performing the tests.

3.6 Personnel Safety and Occupational Exposure

During the most recent Integrated Leakage Rate Test at the South Texas Project, plant and contractor personnel received approximately 0.6 person-rem of radiation dosage performing activities associated with this test. Additionally, plant staff and contractor personnel are exposed to significant personnel safety hazards (e.g., handling pressurized gases and high elevation fall dangers) in performing these tests. Elimination of future Integrated Leakage Rate Testing at the South Texas Project would remove these personnel safety hazards and reduce the level of occupational radiation exposure.

4.0 <u>Implementation</u>

The South Texas Project requests that the effective date of this Technical Specification change be 30 days after Nuclear Regulatory Commission approval, but not later than July 1, 2000, in order to facilitate scheduling for the outage in March 2001. Although this request is neither exigent nor an emergency, prompt review by the Nuclear Regulatory Commission is requested.

NO SIGNIFICANT HAZARDS CONSIDERATION DETERMINATION

Pursuant to 10CFR50.91, this analysis provides a determination that the proposed change to the Technical Specifications to delete requirements for Integrated Leakage Rate Testing does not involve any significant hazards consideration as defined in 10CFR50.92.

Criterion 1: The proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

Leakage rate testing does not serve to prevent an accident from occurring; therefore, this proposed change deleting Integrated Leakage Rate Testing does not involve a significant increase in the probability of a previously evaluated accident.

Type A tests are capable of detecting both local leak paths and gross containment failure paths. An increase in the consequences of an accident would be an increase in the amount of radioactive material released to the atmosphere due to an undetected leak path. However, Type A testing is not needed to ensure leakage rates through containment penetrations are acceptable. Experience at the South Texas Project demonstrates that excessive containment leakage paths are detected by Type B and C Local Leakage Rate Tests. Administrative controls govern maintenance and testing of containment penetrations such that the probability of excessive penetration leakage due to improper maintenance or valve misalignment is very low.

- Following maintenance on any containment penetration, a Local Leakage Rate Test is performed to ensure acceptable leakage levels.
- Following a Local Leakage Rate Test on a containment isolation valve, an independent valve alignment check is performed.
- The structural capability of the containments is assured by the existing material conditions, testing and inspection programs, and modification control programs.
- Operational venting of containment demonstrates that the containment structures are free of significant leakage paths.
- The containment is subjected to a visual examination in accordance with 10CFR50.55a.

Therefore, this proposed amendment does not involve a significant increase in the probability or consequences of any accident previously evaluated.

Criterion 2: The proposed change does not create the possibility of a new or different kind of accident from any previously evaluated.

This proposed change will not affect normal plant operations or configuration, nor will it affect leak rate test methods or test schedules for Type B or Type C testing. The continued performance of Type B and C testing in combination with required containment surveillances and code inspections will assure the Technical Specification limiting conditions for containment leakage rate and structural capability will continue to be met. Because this proposed Technical Specification amendment would not change the design, configuration, or method of operation of the plant, this proposed change does not create the possibility of a new or different kind of accident from any previously evaluated.

Criterion 3: The proposed change does not involve a significant reduction in the margin of safety.

The purpose of the existing Integrated Leakage Rate Testing is to help ensure that releases of radioactive materials are restricted to those leak paths and leak rates assumed in accident analyses. Removing Integrated Leakage Rate Testing from Technical Specifications at the South Texas Project will not affect containment leak rate testing by Type B and C Local Leakage Rate Tests. Performance of the Type B and C tests is sufficient to meet the performance objectives of 10CFR50, Appendix J. Therefore, the required test methods for detecting local containment leak paths and leak rates are unaffected by this proposed change. Deletion of Type A testing for the South Texas Project does not increase the level of public risk due to loss of capability to detect and measure containment leakage or loss of containment structural capability. Other containment testing methods and inspections will assure all limiting conditions of operation will continue to be met. The margin of safety inherent in existing accident analyses is maintained.

Conclusion

Based on the evaluation provided above, the proposed change does not involve a significant hazards consideration and will not have a significant effect on the safe operation of the plant. Therefore, there is reasonable assurance that operation of the South Texas Project in accordance with the proposed revised Technical Specifications will not endanger the public health and safety.

PROPOSED REVISIONS TO TEHNICAL SPECIFICATION PAGES

TABLE 3.3-6 (Continued)

ACTION STATEMENTS

ACTION 31 - With less than the Minimum Channels OPERABLE requirement, operation may continue for up to 30 days provided grab samples of the containment atmosphere are obtained and analyzed at least once per 24 hours. ~~Grab samples are not required to be obtained for the duration of containment pressurization for an Integrated Leak Rate Test (ILRT) provided that a grab sample is obtained and analyzed at the start of depressurization of containment following the ILRT.~~

ACTION 32 - (Not Used)

ACTION 33 - (Not Used)

ACTION 34 - Must satisfy the ACTION requirement for Specification 3.4.6.1.

CONTAINMENT SYSTEMS

CONTAINMENT LEAKAGE

LIMITING CONDITION FOR OPERATION

3.6.1.2 Containment leakage rates shall be limited in accordance with the Containment Leakage Rate Testing Program.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTION:

With ~~either the measured overall integrated containment leakage rate or~~ the measured combined leakage rate for all penetrations and valves subject to Types B and C tests exceeding the allowances in the Containment Leakage Rate Testing Program, restore the ~~overall integrated leakage rate and the~~ combined leakage rate for all penetrations subject to Type B and C tests to within the allowances in the Containment Leakage Rate Testing Program within 1 hour or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

SURVEILLANCE REQUIREMENTS

4.6.1.2 Perform ~~required visual examinations and~~ leakage rate testing in accordance with the Containment Leakage Rate Testing Program.

The provisions of Specification 4.0.2 are not applicable.

3/4.6 CONTAINMENT SYSTEMS

BASES

3/4.6.1 PRIMARY CONTAINMENT

3/4.6.1.1 CONTAINMENT INTEGRITY

Primary CONTAINMENT INTEGRITY ensures that the release of radioactive materials from the containment atmosphere will be restricted to those leakage paths and associated leak rates assumed in the safety analyses. This restriction, in conjunction with the leakage rate limitation, will limit the SITE BOUNDARY radiation doses to within the dose guidelines values of 10 CFR Part 100 during accident conditions.

3/4.6.1.2 CONTAINMENT LEAKAGE

The limitations on containment leakage rates ensure that the total containment leakage volume will not exceed the value assumed in the safety analyses at the peak accident pressure, P_a (41.2 psig). ~~As an added conservatism, the measured overall integrated leakage rate is further limited to less than or equal to 0.75 La before returning the Unit to service following performance of the periodic test to account for possible degradation of the containment leakage barriers between leakage tests.~~

The surveillance testing for measuring Type B and C leakage rates is consistent with the requirements of 10 CFR Part 50, Appendix J, Option B, and in accordance with the Containment Leakage Rate Testing Program.

3/4.6.1.3 CONTAINMENT AIR LOCKS

The limitations on closure and leak rate for the containment air locks are required to meet the restrictions on CONTAINMENT INTEGRITY and containment leak rate. Surveillance testing of the air lock seals provides assurance that the overall air lock leakage will not become excessive due to seal damage during the intervals between air lock leakage tests. The surveillance testing for measuring leakage rates is consistent with the requirements of 10 CFR Part 50, Appendix J, Option B and in accordance with the Containment Leakage Rate Testing Program.

3/4.6.1.4 INTERNAL PRESSURE

The limitations on containment internal pressure ensure that: (1) the containment structure is prevented from exceeding its design negative pressure differential with respect to the outside atmosphere of 3.5 psig, and (2) the containment peak pressure does not exceed the design pressure of 56.5 psig during LOCA or steam line break conditions.

The maximum peak pressure expected to be obtained from a LOCA or steam line event is 41.2 psig (P_a). The limit of 0.3 psig for initial positive containment pressure will limit the total pressure to 41.2 psig, which is less than design pressure and is consistent with the safety analyses.

3/4.6.1.5 AIR TEMPERATURE

The limitations on containment average air temperature ensure that the overall containment average air temperature does not exceed the initial temperature condition assumed in the safety analysis for a LOCA or steam line break accident. Measurements shall be made by fixed instruments, prior to determining the average air temperature.

3/4.6.1.6 CONTAINMENT STRUCTURAL INTEGRITY

This limitation ensures that the structural integrity of the containment will be maintained comparable to the original design standards for the life of the facility. Structural integrity is required to ensure that the containment will withstand the maximum pressure of 41.2 psig (P_a) in the event of a LOCA or steam line break accident. The measurement of containment tendon lift-off force, the tensile tests of the tendon wires, and the visual examination of tendons, anchorages and exposed interior and exterior surfaces of the containment, ~~and the Type A leakage test~~ are sufficient to demonstrate this capability.

The Surveillance Requirements for demonstrating the containment's structural integrity are in compliance with the recommendations of Regulatory Guide 1.35, "Inservice Inspection of Ungrouted Tendons in Prestressed Concrete Containment Structures," and proposed Regulatory Guide 1.35.1, "Determining Prestressing Forces for Inspection of Prestressed Concrete Containments," April 1979.

The required Special Reports from any engineering evaluation of containment abnormalities shall include a description of the tendon condition, the condition of the concrete (especially at tendon anchorages), the inspection procedures, the tolerances on cracking, the results of the engineering evaluation, and the corrective actions taken.

3/4.6.1.7 CONTAINMENT VENTILATION SYSTEM

The 48-inch containment purge supply and exhaust isolation valves are required to be sealed closed during plant operations since these valves have not been demonstrated capable of closing during a LOCA or steam line break accident. Maintaining these valves sealed closed during plant operation ensures that excessive quantities of radioactive materials will not be released via the Containment Purge System. To provide assurance that these containment valves cannot be inadvertently opened, the valves are sealed closed in accordance with Standard Review Plan 6.2.4 which includes mechanical devices to seal or lock the valve closed, or prevents power from being supplied to the valve operator.

The use of the containment purge lines is restricted to the 18-inch purge supply and exhaust isolation valves since, unlike the 48-inch valves, the 18-inch valves are capable of closing during a LOCA or steam line break accident. There-

PROCEDURES AND PROGRAMS (Continued)

j) Containment Leakage Rate Testing Program

A program shall be established to implement the leakage rate testing of the primary containment as required by 10 CFR 50.54(o) and 10 CFR Part 50, Appendix J, Option B, as modified by approved exemptions. This program shall be in accordance with the guidelines contained in Regulatory Guide 1.163, "Performance-Based Containment Leak-Testing Program", dated September 1995.

Peak calculated primary containment internal pressure for the design basis loss of coolant accident (LOCA), P_a is 41.2 psig.

The maximum allowable primary containment leakage rate, L_a, is 0.3% of primary containment air weight per day.

Leakage rate acceptance criteria are:

a. ~~Primary containment overall leakage rate acceptance criterion is < 1.0 L_a. During the first unit start-up following testing in accordance with this program,~~ the leakage rate acceptance ~~criteria are~~ criterion is < 0.60 L_a for the combined Type B and Type C tests, ~~and < 0.75 L_a as-left and < 1.0 L_a as-found for Type A.~~

b. Air lock testing acceptance criteria for the overall air lock leakage rate is < 0.05 L_a when tested at > P_a.

The provisions of Surveillance Requirement 4.0.2 do not apply to the test intervals specified in the Containment Leakage Rate Testing Program.

The provisions of Surveillance Requirement 4.0.3 apply to the Containment Leakage Rate Testing Program.

k) Configuration Risk Management Program (CRMP)

A program to assess changes in core damage frequency and cumulative core damage probability resulting from applicable plant configurations. The program should include the following:

1) training of personnel,

2) procedures for identifying plant configurations, the generation of risk profiles and the evaluation of risk against established thresholds; and

2) provisions for evaluating changes in risk resulting from unplanned maintenance activities.