May 7, 1997

Mr. C. Randy Hutchinson
Vice President, Operations ANO
Entergy Operations, Inc.
1448 S. R. 333
Russellville, AR 72801

SUBJECT: ISSUANCE OF AMENDMENT NO. 189 TO FACILITY OPERATING LICENSE NO. DPR-51 - ARKANSAS NUCLEAR ONE, UNIT NO. 1 (TAC NO. M98336)

Dear Mr. Hutchinson:

The Commission has issued the enclosed Amendment No. 189 to Facility Operating License No. DPR-51 for the Arkansas Nuclear One, Unit No. 1 (ANO-1). This amendment consists of changes to the Technical Specifications (TSs) in response to your application dated April 11, 1997 as supplemented by letter dated May 2, 1997. A Notice of Enforcement Discretion (NOED) related to the subject TS was issued verbally on April 9, 1997. The NOED is documented in a letter dated April 11, 1997.

The amendment, processed as an exigent change to the TSs, would permit steam generator tubes with intergranular attack indications that may exceed through-wall limits to remain in service until the next refueling outage.

A copy of our related Safety Evaluation is also enclosed. A Notice of Issuance will be included in the Commission's next biweekly Federal Register notice.

Sincerely,
Orig. signed by
George Kalman, Senior Project Manager
Project Directorate IV-1
Division of Reactor Projects III/IV
Office of Nuclear Reactor Regulation

Docket No. 50-313

Enclosures: 1. Amendment No. 189 to DPR-51
2. Safety Evaluation

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E. Adensam (EGA1)	W. Beckner	ACRS	J. Tsao
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Document Name: AR198336.AMD *See previous concurrence

OFC	PM/PD4-1	LA/PD4-1	OGC*	SC:EMCB*
NAME	GKalman/vw	CHawes CMH	MYoung BJB 5-1-97	TSullivan TS 7/97
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The amendment, processed as an exigent change to the TSs, would permit steam generator tubes with intergranular corrosion indications that may exceed through-wall limits to remain in service until the next refueling outage. In approving this amendment, we have relied on your commitment to operate the unit with a procedural limit of 0.1 gallons per minute (gpm), such that if the steam generator tube leakage exceeds 0.1 gpm the unit would be shut down. A footnote was added to TS 3.1.6.3.b to explain that the limit for leakage through the tubes of any one steam generator for plant operation will be 144 gallons per day (0.1 gpm) for the remainder of cycle 14, until the next refueling outage.

A copy of our related Safety Evaluation is also enclosed. A Notice of Issuance will be included in the Commission's next biweekly Federal Register notice.

Sincerely,

George Kalman, Senior Project Manager
Project Directorate IV-1
Division of Reactor Projects III/IV
Office of Nuclear Reactor Regulation

Docket No. 50-313

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Document Name: AR198336.AMD

OFC	PM/PD4-1	LA/PD4-1	OGC	SC:EMCB
NAME	GKalman/vw	CHawes		TSullivan
DATE	/ /97	/ /97	/ /97	5/2/97
COPY	YES/NO	YES/NO	YES/NO	YES/NO

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5/2/97

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

May 7, 1997

Mr. C. Randy Hutchinson
Vice President, Operations ANO
Entergy Operations, Inc.
1448 S. R. 333
Russellville, AR 72801

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A copy of our related Safety Evaluation is also enclosed. A Notice of Issuance will be included in the Commission's next biweekly Federal Register notice.

Sincerely,

George Kalman

George Kalman, Senior Project Manager
Project Directorate IV-1
Division of Reactor Projects III/IV
Office of Nuclear Reactor Regulation

Docket No. 50-313

Enclosures: 1. Amendment No. 189 to DPR-51
2. Safety Evaluation

cc w/encls: See next page

cc:

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& Chief Operating Officer
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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

ENTERGY OPERATIONS INC.

DOCKET NO. 50-313

ARKANSAS NUCLEAR ONE, UNIT NO. 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 189
License No. DPR-51

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Entergy Operations, Inc. (the licensee) dated April 11, 1997, as supplemented by letter dated May 2, 1997, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance: (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this license amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and Paragraph 2.C.(2) of Facility Operating License No. DPR-51 is hereby amended to read as follows:

   2. Technical Specifications

      The Technical Specifications contained in Appendix A, as revised through Amendment No. 189, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. The license amendment is effective as of its date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

George Kalman

George Kalman, Senior Project Manager
Project Directorate IV-1
Division of Reactor Projects III/IV
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical Specifications

Date of Issuance: May 7, 1997

ATTACHMENT TO LICENSE AMENDMENT NO. 189

FACILITY OPERATING LICENSE NO. DPR-51

DOCKET NO. 50-313

Replace the following page of the Appendix "A" Technical Specifications with the attached page. The revised page is identified by Amendment number and contains a vertical line to indicate the area of change.

REMOVE PAGE	INSERT PAGE
27	27
110ml	110ml

3.1.6 Leakage

Specification

3.1.6.1 If the total reactor coolant leakage rate exceeds 10 gpm, the reactor shall be shutdown within 24 hours of detection.

3.1.6.2 If unidentified reactor coolant leakage (exceeding normal evaporative losses) exceeds 1 gpm or if any reactor coolant leakage is evaluated as unsafe, the reactor shall be shutdown within 24 hours of detection.

3.1.6.3.a If it is determined that any reactor coolant leakage exists through a non-isolable fault in a reactor coolant system strength boundary (such as the reactor vessel, piping, valve body, etc., except steam generator tubes), the reactor shall be shutdown and a cooldown to the cold shutdown condition shall be initiated within 24 hours of detection.

3.1.6.3.b If the leakage through the tubes of any one steam generator equals or exceeds 500 gallons per day (0.347 gpm)*, a reactor shutdown shall be initiated within 4 hours and the reactor shall be in the cold shutdown condition within the next 30 hours.

* This limit has been reduced to 144 gallons per day (0.1 gpm) for the remainder of cycle 14.

3.1.6.4 Deleted

3.1.6.5 Action to evaluate the safety implication of reactor coolant leakage shall be initiated within 4 hours of detection. The nature, as well as the magnitude of the leak, shall be considered in this evaluation. The safety evaluation shall assure that the exposure of offsite personnel to radiation is within the guidelines of 10CFR20.

3.1.6.6 If reactor shutdown is required per Specification 3.1.6.1, 3.1.6.2, or 3.1.6.3 the reactor shall not be restarted until the leak is repaired or until the problem is otherwise corrected.

3.1.6.7 When the reactor is at power operation, three reactor coolant leak detection systems of different operating principles shall be in operation. One of these systems is sensitive to radioactivity and consists of a radioactive gas detector and an air particulate activity detector. Both of these instruments may be out-of-service simultaneously for a period of no more than 72 hours provided two other means are available to detect leakage and reactor building air samples are taken and analyzed in the laboratory at least once per shift; otherwise, be in at least Hot Standby within the next 6 hours and in Cold Shutdown within the following 30 hours.

3.1.6.8 Loss of reactor coolant through reactor coolant pump seals and system valves to connecting systems which

8. Unserviceable describes the condition of a tube if it leaks or contains a defect large enough to affect its structural integrity in the event of an Operating Basis Earthquake, a loss-of-coolant accident, or a steam line or feedwater line break as specified in Specification 4.18.4.c.

9. Tube Inspection means an inspection of the steam generator tube from the point of entry completely to the point of exit.

b. The steam generator shall be determined operable after completing the corresponding actions (plug or sleeve all tubes exceeding the plugging limit and all tubes containing through-wall cracks) required by Table 4.18-2 with the following exception:

Tubes with intergranular attack indications within the upper tube sheet with the potential of through-wall depths greater than the plugging limit may remain in service for the remainder of cycle 14.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 189 TO

FACILITY OPERATING LICENSE NO. DPR-51

ENTERGY OPERATIONS, INC.

ARKANSAS NUCLEAR ONE, UNIT NO. 1

DOCKET NO. 50-313

1.0 INTRODUCTION

On April 8, 1997, Entergy Operations Inc. (the licensee) reported to the staff in a teleconference that Arkansas Nuclear One, Unit 1 (ANO-1) was not in compliance with Technical Specifications (TSs) Section 4.18.5.b and a reactor shutdown would be required in accordance with TSs 4.0.3 and 3.0.3. The issue was related to in service steam generator tubes that contain intergranular attack (IGA) that is believed to exceed the TS repair limit. The licensee requested that the Nuclear Regulatory Commission (NRC) exercise discretion not to enforce compliance with the actions required in TS 4.18.5.b. By letter dated April 9, 1997, the licensee submitted its formal request for a Notice of Enforcement Discretion (NOED) pursuant to NRC's policy regarding exercise of discretion for an operating facility, as described in Section VII.C, of the General Statement of "Policy and Procedures for NRC Enforcement Actions" (Enforcement Policy), NUREG-1600. By letter dated April 11, 1997, the staff documented the issuance of the NOED to ANO-1. The NOED had been issued verbally on April 9, 1997, after the staff concluded that the licensee's technical basis for the request was satisfactory. Subsequent to the issuance of NOED, the licensee submitted an exigent TS amendment to TS 4.18.5.b on April 11, 1997. The proposed change would added to TS 4.18.5.b the following statement: "(t)ubes with intergranular attack within the upper tubesheet with the potential of through-wall depths greater than the plugging limit may remain in service for the remainder of cycle 14." Cycle 14 is scheduled to end in spring 1998.

Following discussions with the NRC staff, the licensee submitted a supplement to the exigent amendment request on May 2, 1997. TS 3.1.6.3.b requires the reactor shutdown if steam generator tube leakage exceeds 500 gallons per day. The supplement reduced the permissible tube leakage to 144 gallons per day for the duration of cycle 14. The supplement adds a more conservative requirement to the TSs to compensate for continued operation with tubes that may include IGA flaws that exceed TS limits. The supplement does not change the scope of the notice and does not change the significant hazards evaluation that was published in the Federal Register on April 15, 1997.

2.0 DISCUSSION

The ANO-1 TSs require that tubes having degradation greater than 40% through wall be repaired or removed from service. During the steam generator tube inspection in refueling outage (1R13) in December 1996, the licensee used the bobbin probe to size the depth of indications in the upper tubesheet that they attributed to IGA. Prior to the inspection, the licensee used Electric Power Research Institute guidelines to qualify an eddy current (EC) sizing technique specifically for measuring the depth of IGA indications. As a result of inspection, the licensee has left about 470 IGA indications in service because their depths were measured by EC at less than the TS repair limit of 40% through-wall. The licensee stated that the 470 IGA indications were located in the region of the tubes inside the upper tubesheet. The IGA indications with a depth greater than or equal to 40 percent through-wall, as measured by the qualified sizing technique, were removed from service.

During the outage, the licensee removed three tubes containing a total of 11 IGA indications for destructive examinations. The tubes were selected on the basis of indications that would have required repair or were near the repair limit. The licensee concluded based on EC measurements that the degradation in the three pulled tubes bounded the degradation of the tubes left in service with IGA in the upper tubesheet. After the burst test in the laboratory, the licensee compared the actual depths of degradation measured by destructive examinations to the depths measured by their eddy current technique during the inspection. The comparison yielded a systematic non-conservative bias of 3% to 50% for the IGA patches on these three tubes.

The discrepancy in the IGA measurements of the bobbin probe raised the concerns that some of the 470 indications remaining in service may contain indications exceeding the TS repair limit of 40% through wall. The proposed TS amendment would give ANO-1 an one-time authorization to operate with tubes having indications exceeding the TS limit for the remainder of the cycle.

ANO-1 uses two once through steam generators (model 177) fabricated by Babcock and Wilcox. Steam generator A contains 285 IGA indications and steam generator B contains 185 IGA indications in the upper tubesheet.

3.0 EVALUATION

The staff focused its review on whether the tubes containing the 470 indications would maintain adequate structural and leakage integrity during the remainder of cycle 14, given that some of these indications may exceed the TS repair limit.

Regulatory Guide (RG) 1.121 specifies that tube structural integrity may be demonstrated by subjecting the tube to the larger of three times the normal operating differential pressure or 1.4 times the main steam line break differential pressure. Tube leakage integrity may be demonstrated by subjecting the tube to the differential pressure the tube would experience under a postulated main steam line break.

The licensee performed pressure tests on the three removed tubes in accordance with RG 1.121 and reported that the tubes withstood pressures in excess of 10,000 psig without leaking or bursting. The three times normal operating differential pressure for ANO-1 is 3765 psig and the differential pressure tubes would experience under a postulated main steam line break is 2500 psid for ANO-1. The burst testing results indicate that substantial structural margin exists for pulled tubes with IGA indications.

In addition, in 1996, the licensee performed burst tests on laboratory prepared tubes in support of the IGA study. The burst test program consisted of nine tubes containing drilled through-wall holes up to 0.5 inches in diameter and one tube containing no defects. All tubes with the laboratory defects were tested within a simulated tubesheet. A test bladder was inserted into the tube specimen and placed over the drilled hole to prevent leakage so that a burst test could be conducted. Nine of the specimens burst at pressures greater than 10,941 psig. Each tube burst outside the tubesheet within the non-defected portion of the tubes. One tube reached a pressure of 9,577 psig but did not burst due to test bladder leakage. The burst test results indicated that the tubesheet provides sufficient support to preclude tube burst within the tubesheet.

The licensee compared the IGA indication data between cycle 12 and cycle 13 and found that IGA indications exhibited little or no growth. The licensee stated that review of tubesheet IGA eddy-current data prior to cycle 12 confirms the same observation. In addition, during May 1996, tubing in steam generator B was subjected to a differential pressure of about 2100 psig for several hours as a result of a feedwater transient. The structural and leakage integrity of the tubes were maintained during the event.

As mentioned above, the licensee tested pulled tubes with IGA indications that bounded the indications left in service. The test results showed that the pulled tubes satisfied the margins of RG 1.121. In addition, the existing IGA indications showed little or no growth. The staff concludes that the licensee has demonstrated that the IGA indications left in service would not significantly affect the structural or leakage integrity of the tubes for the remainder of the cycle.

In addition, the licensee stated that the worse case scenario resulting from the continued operation with the existing IGA flaws would be the development of a primary-to-secondary leak. To compensate for this leakage concern, the licensee added more conservative primary-to-secondary leakage criterion to the TSs. Permissible TS leakage criterion was decreased from 500 gallons per day to 144 gallons per day for the duration of cycle 14. TSs require reactor shutdown within 4 hours if the leakage criterion is exceeded. Additionally, the licensee revised procedure AOP 1203-023 to require reactor shutdown if confirmed tube leakage exceeds 100 gallons per day. The more stringent procedural limit is intended to provide assurance that the TS leakage limit is never exceeded.

ANO-1 has several monitors to detect steam generator tube leakage as a part of the defense-in-depth measures. The licensee uses monitors to detect radiation levels in the condenser off-gas and N-16 gamma levels in the secondary systems. The main steam high range radiation monitors provide input to the safety parameter display system (SPDS) for display in the front of the control room. The SPDS display will flash to alert the operators when a parameter causes the system to alarm such as during tube leakage. The control room also has alarms from other monitors to notify the operators if activity (leakage) is detected. The licensee has trained the operators to respond to primary-to-secondary tube leaks and ruptures. The training enables the operators to perform timely diagnosis and to take corrective actions as necessary to shut down the plant.

4.0 TECHNICAL CONCLUSION

The staff concludes that the licensee has provided information on the tubesheet IGA left in service that demonstrates that the structural and leakage integrity of the tubes in ANO-1 steam generators will be maintained for the remainder of cycle 14. The staff also concludes that tube leakage or burst would not be expected even in the unlikely event of a main steam line break.

Staff approval of the TS change to continue operation with IGA indications for the duration of cycle 14 is based on the conclusion that the inherent structural support provided by the tubesheet would preclude catastrophic tube failure. Should tube leaks develop in this region, the staff concludes that existing monitoring capabilities and the TS imposed conservative leakage limits minimize the likelihood for continued operation with undetected or excessive primary-to-secondary leakage.

5.0 EXIGENT CIRCUMSTANCES

The Commission's regulations, 10 CFR 50.91, contain provisions for issuance of amendments when the usual 30-day public notice period cannot be met. One type of special exception is an exigency. An exigency is a case where the staff and licensee need to act promptly and the staff has determined that the amendment involves no significant hazards considerations.

Under such circumstances, the Commission notifies the public in one of two ways: by issuing a Federal Register notice providing an opportunity for hearing and allowing at least two weeks for prior public comments, or by issuing a press release discussing the proposed changes, using the local media. In this case, the Commission used the first approach.

The licensee's initial application was noticed in the Federal Register on April 22, 1997, at which time the staff proposed a no significant hazards consideration determination. In the application, the licensee requested that the amendment be processed under exigent circumstances for the following reason. During the 1R13 refueling outage, an eddy current technique was used for the satisfactory completion of the ANO-1 steam generator inspection

surveillance. The technique used had been qualified per Appendix H of the EPRI "PWR Steam Generator Tube Examination Guidelines." This technique was used to depth size all intragranular attack flaws within the upper tubesheet. As required by the technical specifications, all upper tube sheet IGA indications with a depth size of greater than the plugging limit as determined by the qualified sizing technique, were also removed from service by plugging.

During the steam generator inspections, three tube samples containing upper tubesheet IGA flaws were removed from the "B" steam generator and sent offsite to be analyzed for future development of an alternate repair criteria and to further support the qualified eddy current sizing technique employed during refueling outages. The preliminary destructive examination results were recently received by the ANO staff. This data arrived approximately 5 months after the resumption of operation following the steam generator inspections that occurred during 1R13. These results indicate that the flaw depths do not correlate well with the depths sized using the qualified eddy current technique. Upon further review, ANO has determined that the application of the sizing criterion is no longer valid. With the qualified sizing technique invalidated, there is a potential that tubes could have been left in service with indications that have through-wall depths greater than the plugging limit specified in the technical specifications. This would be considered a condition that is not allowed by the technical specifications. Prior to the receipt of the preliminary destructive examination results, ANO had no reason to question the adequacy of the steam generator inspections that occurred during 1R13.

In order to continue plant operation in non-compliance with Technical Specification 4.18, enforcement discretion was verbally requested by the licensee and received from the NRC on April 9, 1997. Enforcement discretion was requested for a period of time necessary for the NRC to process this technical specification change which will allow continued operation in the current configuration for the remainder of the operating cycle. A Notice of Enforcement Discretion was issued for this purpose and limited to May 7, 1997, after which time the actions of TS 3.0.3 are required to be followed (i.e., the reactor would be required to be shutdown). Accordingly, the licensee promptly submitted its amendment application and requested that the proposed technical specification change be considered under exigent circumstances as described in 10 CFR 50.91(a)(6).

Accordingly, pursuant to 10 CFR 50.91(a)(6), the Commission has determined that an exigent situation exists and that failure to act in a timely way will result in an unnecessary shutdown of the plant. Further, the Commission has determined that the exigent situation is not due to the failure of the licensee to act in a timely manner.

6.0 FINAL NO SIGNIFICANT HAZARDS CONSIDERATION DETERMINATION

The Commission's regulations in 10 CFR 50.92 state that the Commission may make a final determination that a license amendment involves no significant hazards considerations if operation of the facility in accordance with the amendment would not (1) involve a significant increase in the probability or

consequences of an accident previously evaluated; or (2) create the possibility of a new or different kind of accident from any accident previously evaluated; or (3) involve a significant reduction in a margin of safety.

Operation of the facility in accordance with the proposed amendment will not involve a significant increase in the probability or consequences of an accident previously evaluated. A steam generator tube failure is a breach of the reactor coolant pressure boundary. This type of event is analyzed in the ANO-1 Safety Analysis Report (SAR). Proposed operation for the remainder of the fuel cycle with potential tube flaws that exceed 40% through-wall in the tube sheet region does not involve a significant increase in the probability or consequence of an accident previously evaluated. Tube flaws in the tube sheet region can develop into primary system leaks during the current fuel cycle however the potential for a catastrophic tube failure, an accident analyzed in the SAR, is reduced by the fact that the tube sheet serves as a structural support for the tube segments which may have flaws exceeding 40% through-wall. Licensee test results verify that catastrophic tube failures are not likely to occur in the tube sheet region. Tube leaks that could develop in the tube sheet region would be detected during operation and the reactor would be shut down well before the leakage could challenge the accident evaluations described in the SAR.

Operation of the facility in accordance with the proposed amendment will not create the possibility of a new or different kind of accident from any accident previously evaluated. This change does not introduce any new modes or methods of plant operation. The design and purpose of the steam generators is not affected by the proposed changes. In addition, a steam generator tube failure is already addressed in existing accident analysis.

Operation of the facility in accordance with the proposed amendment will not involve a significant reduction in a margin of safety. As noted above, operation with tube flaws in the tube sheet region does not significantly increase the probability or consequence of an accident previously evaluated. As a result, operation with tube flaws in the tube sheet region that may exceed 40% through-wall does not involve a significant reduction in a margin of safety. Should these flaws develop into actual reactor coolant leaks, the reactor would be shut down before any safety margins could be significantly reduced.

Based on the above considerations, the staff concludes that the amendments meet the three criteria of 10 CFR 50.92. Therefore, the staff has made a final determination that the proposed amendments do not involve a significant hazards consideration.

7.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Arkansas State official was notified of the proposed issuance of the amendment. The State official had no comments.

8.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 and changes surveillance requirements. The NRC staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendment involves no significant hazards consideration, and there has been no public comment on such finding (62 FR 19628). Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

9.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributor: J. Tsao

Date: May 7, 1997