February 23, 2001

Mr. Mark E. Warner
Vice President - TMI Unit 1
AmerGen Energy Company, LLC
P.O. Box 480
Middletown, PA 17057

SUBJECT: TMI-1 - AMENDMENT RE: EXIGENT TECHNICAL SPECIFICATION CHANGE REQUEST NO. 309, NUCLEAR SERVICES RIVER WATER SYSTEM (TAC NO. MB1187)

Dear Mr. Warner:

The Commission has issued the enclosed Amendment No. 229 to Facility Operating License No. DPR-50 for the Three Mile Island Nuclear Station, Unit 1 (TMI-1), in response to your application dated February 14, 2001, as supplemented February 16, and 19, 2001.

The amendment would allow a one-time exception to the system configuration and maintenance requirements in Technical Specification (TS) 3.3.2 related to the nuclear service river water (NR) system at TMI-1, in order to allow a proposed up to 14-day repair of a leaking underground concrete pipe. The requirements of TS 3.3.1.4 to have two NR pumps OPERABLE would be unchanged. During the 14-day repair period, the NR pumps flow would be realigned to pass through a portion of the non-seismic secondary services river water system.

A copy of the related safety evaluation is also enclosed. Notice of Issuance will be included in the Commission's biweekly *Federal Register* notice.

Sincerely,

/RA/

Timothy G. Colburn, Senior Project Manager, Section 1
Project Directorate I
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-289

Enclosures: 1. Amendment No. 229 to DPR-50
2. Safety Evaluation

cc w/encls: See next page

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AMERGEN ENERGY COMPANY, LLC

DOCKET NO. 50-289

THREE MILE ISLAND NUCLEAR STATION, UNIT NO. 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 229
License No. DPR-50

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

   A. The application for amendment by AmerGen Energy Company, LLC (the licensee), dated February 14, 2001, as supplemented February 16 and 19, 2001, 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 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-50 is hereby amended to read as follows:

   (2) Technical Specifications

   The Technical Specifications contained in Appendix A, as revised through Amendment No. 229, are hereby incorporated in the license. The AmerGen Energy Company, LLC shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of its date of issuance and shall be implemented within 30 days of issuance. Compensatory actions 1 through 6 listed on page 5 of 14 of enclosure 1 to the licensee's February 14, 2001, application shall be implemented prior to cross-connecting the nuclear services river water and secondary services river water systems and performing repairs on the nuclear services river water system pipe.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

Marsha Gamberoni, Chief, Section 1
Project Directorate I
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical Specifications

Date of Issuance: February 23, 2001

ATTACHMENT TO LICENSE AMENDMENT NO. 229

FACILITY OPERATING LICENSE NO. DPR-50

DOCKET NO. 50-289

Replace the following page of the Appendix A Technical Specifications with the attached revised page. The revised page is identified by amendment number and contains marginal lines indicating the areas of change.

Remove	Insert
3-23	3-23

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 229 TO FACILITY OPERATING LICENSE NO. DPR-50

AMERGEN ENERGY COMPANY, LLC

THREE MILE ISLAND NUCLEAR STATION, UNIT 1

DOCKET NO. 50-289

1.0 INTRODUCTION

By letter dated February 14, 2001, as supplemented February 16 and 19, 2001, AmerGen Energy Company, LLC (the licensee), submitted a request for approval of changes to the Three Mile Island Nuclear Station, Unit 1 (TMI-1), Technical Specifications (TSs). The February 16 and 19, 2001, letters provided additional clarifying information which did not change the initial proposed no significant hazards consideration determination or expand the amendment beyond the scope of the original notice (Harrisburg, PA, *Patriot News*, February 18-20, 2001).

The requested changes would allow a one-time exception to the system configuration and maintenance requirements in TS 3.3.2 related to the nuclear service river water (NR) system at TMI-1, in order to allow a proposed up to 14-day repair of a leaking underground 30-inch concrete pipe in the NR system. The requirements of TS 3.3.1.4 to have 2 (of the 3) NR pumps OPERABLE would be unchanged. During the 14-day repair period, the NR pumps flowpath would be realigned to pass though a portion of the non-seismic secondary services river water (SR) system.

2.0 BACKGROUND

The licensee discovered an approximate 20-gallon-per-minute leak in the underground piping which runs between the pump house where the NS and SR pumps are located and the heat exchanger vault. The licensee plans to isolate the leak, and perform repairs while operating, with the NR and SR system cross-connected, and with 2 of the 3 SR pumps supplying the water for both the NR and SR systems. The NR pumps would be lined up to start upon receipt of a valid engineering safeguards actuation signal.

The licensee has evaluated the seismic adequacy of the portion of the SR piping which will be used to supply water to the NR system heat exchangers, provided a risk assessment of the proposed change and evaluated the effect of the system configuration during the proposed repair period. In addition, the licensee has proposed compensatory measures related to operation of the NR system in the proposed configuration, that would be in effect during the repair.

3.0 EVALUATION

The NR system provides cooling water to 4 nuclear services (NS) heat exchangers and 2 intermediate closed (IC) heat exchangers during normal and emergency conditions. The IC

system is required for power operation but is not required for accident mitigation, thus it does not perform any safety function. The NS system cools the following components:

Control Building Chillers
Ventilation Coolers for the NS and DC Pump Rooms
Reactor Building Normal and Emergency Fan Motors
Emergency Feedwater Pump Room Coolers
Spent Fuel Pump Room Coolers
Reactor Coolant System (RCS) and Once-Through Steam Generator (OTSG) Sample Coolers
OTSG Drain Coolers
Reactor Coolant Pump (RCP) Seal Return Coolers
RCS Make-Up Pump Motor Coolers
Spent Fuel Pool Coolers
Waste Gas Compressors
Miscellaneous Waste Evaporators

The plant was designed so that the NR system piping can be cross-connected to the SR system in the event that the NR pumps are lost. The cross-connect method is described in the plant's emergency procedures and discussed in Updated Final Safety Analysis Report (UFSAR), Section 9.6.1, but is not credited in the design-basis accident analysis. Once the systems are cross-connected, either the NR or SR pumps can accommodate the heat loads of both the NR and SR systems. The NR system components are designed as nuclear safety-related and seismic Class I. The SR system is nonsafety-related and nonseismic. While the NR piping is isolated and being repaired, the NR and SR systems will be cross-connected, so that river water will be supplied to both the NS and IC heat exchangers through the 30-inch underground nonsafety-related SR piping. Even though the section of SR system piping that will be used for the cross-connect during the NR piping repair is nonseismic, it was designed and installed essentially the same as the NR system piping in accordance with AWWA (American Water Works Association) Standard C301-64 for underground prestressed concrete piping. Therefore, the licensee expects that the portion of SR piping will perform with the same reliability as the NR piping during a seismic event.

The licensee evaluated the capability of either the NR or SR pumps to supply adequate cooling water for both normal and emergency conditions. The evaluation concluded that with river water temperature less than 50 °F, 2 NR pumps or 2 SR pumps can provide adequate flow to the NS heat exchangers. If an operating pump trips, a standby pump is designed to automatically start. If the standby pump fails to start, valve SR-V-2 will be closed to isolate non-essential heat loads to re-establish adequate flow and preclude pump runout.

Both the NR and SR pumps are available following a loss of offsite power. During a design-basis loss-of-coolant accident with loss of offsite power (LOOP) and a single failure, all of the NR and SR pumps will shut down. Two of the three NR pumps will receive an engineered safeguards start signal and will automatically start once the associated 1E electrical bus is powered by its respective emergency diesel generator (EDG). In addition, the SR pumps can be manually loaded onto the EDGs from the control room, if necessary.

Based on a review of the licensee's evaluation, the Nuclear Regulatory Commission (NRC) staff agrees that cross-connecting the NR and SR systems to supply the NS and IC heat exchangers via the nonsafety-related SR piping will provide adequate cooling water. The design and installation of the nonsafety-related SR piping is the same size and type as the NR underground piping, and will supply the same amount of cooling water through the SR piping as would be expected from the NR piping.

The components that provide the highest heat load for the NR system are the pump motor coolers. These coolers provide heat removal for the RCP oil and air coolers, which represents over 50 percent of the NS system heat load. During the NR pipe repair, the licensee committed to shut down the reactor and trip the RCPs if the NS system outlet temperature cannot be maintained below 85 °F. The licensee stated that this action provides conservative margins to protect the RCP motors and maximizes NS system availability for other cooling requirements. The natural circulation mode of cooling (with RCPs tripped) is a design mode of reactor operation that is bounded by UFSAR Chapter 14 accident analysis, and has been demonstrated by tests and also following a LOOP in June 1997. However, compensatory actions to recover the NR system would be taken to limit the time the plant would be in the natural circulation mode. The NRC staff agrees that tripping the reactor and RCPs are appropriate compensatory actions if the NS outlet temperature cannot be maintained.

The licensee stated that the control building chillers, the spent fuel pool pump room ventilation coolers, and the spent fuel pool coolers could operate for a substantial time (72 hours for the control building chillers and 10 days for the spent fuel pool pump room coolers and spent fuel pool coolers) on a loss of NR system cooling. Since the NR system can be restored within 30 minutes by starting additional pumps or isolating non-essential loads, there is adequate time to restore cooling to these systems. The NRC staff agrees that adequate time is available to restore cooling to these components should a loss of NR cooling occur.

Make-up pump MU-P-1B, which is cooled by the NS system, is the normally operating RCS make-up pump, and is also one of the high-pressure injection pumps. During the repair to the NR piping, MU-P-1B will not be selected for high-pressure injection. MU-P-1B is not required for engineered safeguards (ES) operation. MU-P-1A and MU-P-1C will be operable and selected for ES. These two pumps will be aligned for cooling from the decay river water system, and will not require cooling from the NR system. If a problem with the NS temperature occurs because of the repair work on the NR system, MU-P-1A will replace MU-P-1B as the normal make-up pump, and MU-P-1B will be shut down to reduce heat load on the NS system. The NRC staff considers the licensee’s actions regarding MU-P-1B to be acceptable and the compensatory measures associated with MU-P-1B (discussed below) to be appropriate.

The licensee stated that the RCP seal return coolers and waste gas compressors are designated as non-essential components in the UFSAR, which can be isolated from the safety-related portion of the NS system by closing a single isolation valve NS-V-32. The NRC staff agrees that these components are non-essential and isolation of the these components to reduce NS heat load is acceptable.

The NRC staff agrees with the licensee’s assessment that the remainder of the components listed above (and in Attachment 1 to the technical specification change request (TSCR)) will not be affected by a loss of cooling water from the NR system.

3.1 Seismic and Structural Evaluation of the SR Piping and Components

The NRC staff reviewed the licensee’s application and its response dated February 19, 2001, to the staff’s request for additional information to assess the seismic capability and structural integrity of the SR system and adequacy of the licensee’s methodology for determining the SR system seismic capacity to determine if there would be any effect on the ability to safely shutdown the plant considering a loss of cooling water from the NR system.

In support of its assessment that the capability of cross-connected piping and components of the SR system that will be relied upon during repair to the NR system is equivalent in design/construction and seismic capacity to that of the NR system, the licensee performed a walkdown of the systems using the methodology presented in the Generic Implementation

Procedure (GIP/Reference). Although not specifically applicable to piping systems, the use of the GIP methodology is judged by the staff as appropriate for evaluating seismic ruggedness of component supports, anchor integrity, and seismic Category II/I interaction potential of operating plant equipment (e.g., pumps, valves, supports and anchorages), provided the guidelines and caveats stipulated in the GIP is followed. Specifically, the licensee implemented:

a) a walkdown of the applicable and accessible portion of the SR and NR systems including review and identification of any potential seismic Category II/I interaction or instances of large relative displacements, which could impair the pressure boundary integrity of the systems,

b) a table top review of pertinent system drawings to assess the ruggedness of design and construction,

c) an inspection of the 30-inch SR header located in the Auxiliary Building Heat Exchanger Vault, including the piping-to-anchorage at the wall penetrations and the 30-inch SR supply header to the wall penetration (the licensee concluded that they are constructed and supported in a manner comparable to the contiguous seismic Category I NR piping),

d) an inspection of the SR-V-2 valve which would be closed to isolate portions of the SR system during a postulated seismic event (the licensee judged, on a qualitative basis, that the valve is adequate to remain capable of being manually operated after a safe-shutdown earthquake (SSE) to isolate nonseismic Category I system piping in the Turbine Building), and

e) a review of existing analyses performed by Hopper and Associates that indicates the maximum pipe stress under combined loads (deadweight, pressure and SSE) to be within the code allowable stress.

The licensee concluded that the above-ground piping is adequate to perform the intended function during and after a postulated SSE. Based on the above, as well as the NRC staff's past experience with unresolved safety issue A-46 multi-plant equipment seismic adequacy reviews, the NRC staff agrees with the licensee's conclusion. Therefore, the licensee's

determination that the above-ground portions of the SR system that will be relied upon during the NR piping repair are adequate to perform their intended function, is acceptable.

In its assessment of the 30-inch SR system underground prestressed concrete cylinder pipe (PCCP) between the heat exchanger vault (HEV) and the intake screen and pump house (ISPH), the licensee maintains that it is identical in specification, design and construction to the seismic Category I NR system pipe. For example:

a) Both piping systems are 30 inches in diameter, laid at the same elevation of 290'-0", approximately 12 feet below grade,

b) Material for both piping systems were purchased from the same vendor, i.e., Price Brothers Co., and both piping systems are installed in the same manner based on the same design standard (AWWA, C301),

c) All of the pipe runs were laid with the same backfill material (sand) that was placed in thin layers and compacted to achieve a required bearing capacity, density and moisture content for both piping systems, and

d) Additional analysis performed by the design Architect/Engineer for the NR piping included this portion of SR piping, which showed that the maximum stress due to combined loads including seismic was within the code allowable.

Based on the above considerations and similarity comparison between the SR and NR systems, the licensee concluded that the portion of the SR system that will be relied upon during the NR repair and the in-line components are equivalent to the seismically qualified configurations of the NR system and are adequate to supply the cooling water normally supplied by the NR system during the repair. The NRC staff finds the licensee's conclusion reasonable and acceptable.

The licensee concluded in its February 14, 2001, application that there would be no unacceptable consequences if the NR system were lost, since compensatory actions would be taken including restoring river water flow to the NS heat exchangers, starting additional NR or SR pumps or isolating the portion of the SR system that was not evaluated for seismic capability by closing valve SR-V-2. During a conference call held on February 16, 2001, between the licensee and the NRC staff, the licensee was asked if the plant can be safely shutdown given an SSE induced failure or collapse of the SR system PCCP section located between the ISPH and HEV. In its February 19, 2001, response, the licensee affirmed that with the loss of NR indefinitely, the plant could be safely shutdown to at least a hot shutdown condition. Given the extremely low probability of indefinitely losing the PCCP piping due to an SSE and the fact that there is ample time for the licensee to implement compensatory actions to respond to the loss of the SR PCCP, the NRC staff finds the licensee's assertion of its ability to bring the plant to hot shutdown condition reasonable.

Based on its review of the licensee's submittal, and the supplemental information provided, the NRC staff has determined that the proposed change can be granted with reasonable assurance that both the structural integrity and seismic capability of the affected SR system components will be maintained during the requested 14-day repair period.

3.2 Risk Assessment

The licensee evaluated the potential risk impacts of continuing power operation for up to 14 days with the SR system and NR system cross-connected to provide normal operating or accident NS flow requirements. Cross-connecting the NR system with the SR system provides additional Class 1E powered pumps, i.e., the SR pumps, available for supplying water if required, which increases the availability of the system. However, the system may be negatively affected by the additional piping and components as possible failure mechanisms. These new piping failures are passive failures with low failure rates. Assuming the cross-connect evolution could cause additional failures that lead to a loss of the NR system, the probabilistic safety analysis of this system configuration showed an increase in core damage frequency of 5.9E-6 with a resultant incremental conditional core damage probability (ICCDP) of 2.2E-7 for a 14-day duration (AmerGen Calculation C-1101-531-E220-018, enclosed in the licensee's February 16, 2001, letter, provides details of the risk calculations). This ICCDP value of 2.2E-7 is below the Regulatory Guide 1.177 threshold of 5.0E-7 that is considered small for a single TS allowed outage time change.

The licensee identified compensatory measures listed below that will be taken prior to and during the repair of the leaking pipe. The NRC staff concludes that these compensatory measures are adequate to manage the small risk of the system configuration during the repair period.

Based on these considerations and the projected maximum duration of time for completing the repair or replacement of the pipe does not exceed 14 days, the NRC staff concludes that the operation of the facility in this proposed system configuration involves minimal safety impact.

3.3 Compensatory Actions

The licensee will take several actions to minimize the chances of NR system failure during the repair process. Prior to cross-connecting the NR and SR system piping, the licensee will: (1) verify that the valves used to isolate the leaking NR system pipe are leak tight; (2) open the breakers to the valves involved in the cross-connect and isolation of non-safety loads to prevent inadvertent repositioning; (3) verify that make-up pumps MU-P-1A and MU-P-1C will be operable for engineered safeguards actuation with cooling supplied by the decay closed cooling water system; (4) prohibit maintenance activities on the NR (other than the pipe repair) and SR systems while they are cross-connected; (5) station an operator in the auxiliary building to manually close valve SR-V-2 (to isolate non-essential heat loads), if directed by the control room; and (6) verify that river water temperature is less than 50 °F before cross-connecting the NR and SR systems. The NRC staff agrees that the proposed compensatory actions are appropriate for minimizing the potential for NR system failure during the planned repair activity. Therefore, the NRC staff is, as specified in the licensee's proposed change to TS 3.3.2, and as discussed with the licensee, conditioning our approval of the licensee's proposed change by including the proposed above compensatory actions as requirements.

In addition, the licensee will conduct continuous monitoring of system pressures and temperatures and alarms to detect any gross leakage, and perform periodic system walkdowns, at least once per day, to verify the integrity of the system. The repair location will be inspected each shift to ensure that the isolation valves remain acceptably leak tight.

Based on the review of the licensee's submittal, the NRC staff has determined that the licensee's TSCR will have insignificant or no impact on the systems and components cooled by the NR system. The limited duration of the repair activity in conjunction with the compensatory measures that are proposed provide adequate assurance that the NR system cooling function will be maintained. Therefore, the licensee's proposed change is acceptable

4.0 EXIGENT CIRCUMSTANCES

The NRC staff has made a determination that exigent circumstances exist with regard to issuance of a license amendment, in response to the licensee's application dated February 14, 2001, as supplemented by letters dated February 16, and 19, 2001, as defined in Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.91(a)(6). In this regard, the licensee only recently became aware of the leak in the NR piping (on or about February 10, 2001) and expeditiously submitted an amendment application to perform repairs of the pipe while at power to avoid an unnecessary plant shutdown and an additional plant thermal transient. TS 3.3.2 would otherwise require the plant to be placed in hot shutdown in order to perform the repairs. Additionally, the licensee has evaluated the risk associated with the repair at power as essentially the same as repair while shutdown, and the licensee requests approval on an exigent basis to take advantage of favorable river water temperatures which minimize the impact of the repair and minimize the potential for further piping degradation while awaiting approval of the requested change.

5.0 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 consideration 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. As required by 10 CFR 50.91(a), the licensee has provided its analysis of the issue of no significant hazards consideration, which is presented below:

1. Operation of the facility in accordance with the proposed amendment would not involve a significant increase in the probability or consequences of an accident previously evaluated.

   The Nuclear Services River Water pumps remain operational and capable of performing their intended safety function. The Secondary Services River Water System (SR) is capable of supporting the required Nuclear Services River Water System (NR) normal and post accident cooling water flow requirements as specified in the TMI Unit 1 Updated Final Safety Analysis Report (UFSAR). The critical portions of the SR System piping supporting the proposed operating configuration are essentially equivalent in design and construction to the safety related NR System piping. Compensatory action will ensure adequate cooling by the NR system if there is a seismic event. Operator actions to restore NR flow will ensure there are no unacceptable consequences. The proposed change results in an insignificant increase in the TMI Unit 1 incremental conditional core damage probability for the 14 day duration.

   Therefore, the proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. Operation of the facility in accordance with the proposed amendment would not create the possibility of a new or different kind of accident from any accident previously evaluated.

   As described in the TMI Unit 1 Updated Final Safety Analysis Report (UFSAR), one of the design functions of the Secondary Services River Water System is to supply water to the Nuclear Services and Intermediate Services heat exchangers if the normal supply from the Nuclear Services River Water Pumps is lost. The two systems will still be operated as described in the UFSAR when they are cross-connected to allow repair of the damaged piping section. This configuration does not create a new accident initiator. In addition, the loss of [the] Nuclear Services system was evaluated and there is ample time to perform any required compensatory actions.

   Therefore, the proposed change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. Operation of the facility in accordance with the proposed amendment would not involve a significant reduction in a margin of safety.

   The Nuclear Services River Water Pumps remain operational and capable of performing their intended safety function. The Secondary Services River Water Piping, using either NR or SR pumps is capable of supporting the required Nuclear Services River Water System normal and post accident cooling water flow requirements. Compensatory action will ensure adequate cooling by the NR system if there is a seismic event. Therefore, the ability to safely shutdown the plant is assured.

   Therefore, the proposed change does not involve a significant reduction in a margin of safety.

Based on the above considerations, the NRC staff concludes that the amendment meets the three criteria of 10 CFR 50.92. Therefore, the staff has made a final determination that the proposed amendment does not involve a significant hazards

consideration.

6.0 STATE CONSULTATION

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

7.0 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 . 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 made a final finding that the amendment involves no significant hazards consideration. 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.

8.0 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.

9.0 REFERENCE

Seismic Qualification Utility Group (SQUG), Generic Implementation Procedure for Seismic Verification of Nuclear Plant Equipment, Rev. 2, Corrected June 28, 1991.

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Date: February 23, 2001

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