The Light company
Houston Lighting & Power South Texas Project Electric Generating Station P. O. Box 289 Wadsworth, Texas 77483

October 30, 1990
ST-HL-AE-3378
File No.: G20.02.01
G2.06
10CFR50.90

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

South Texas Project Electric Generating Station
Units 1 and 2
Docket Nos. STN 50-498 and 50-499
Proposed Amendment to the Unit 1 and Unit 2
Technical Specifications to Replace
Spray Additive with Recirculation Fluid pH Control

Pursuant to 10CFR50.90, Houston Lighting & Power Company (HL&P) hereby proposes to amend its Operating Licenses NPF-76 and NPF-80 for the South Texas Project Electric Generating Station (STPEGS), Units 1 and 2, by incorporating the attached proposed change to the STPEGS Technical Specifications. The proposed change consists of replacing Technical Specification 3/4.6.2.2 "Spray Additive System" with a new specification entitled "Recirculation Fluid pH Control System" to be consistent with a planned plant modification which would eliminate the containment spray additive system. The proposed Technical Specification is included in Attachment 2.

HL&P has reviewed the attached proposed amendment pursuant to 10CFR50.92 and determined that it involves no significant hazards considerations. The basis for this determination is provided in the attachments. In addition, based on the information contained in this submittal and the NRC Final Environmental Assessment for STPEGS Units 1 and 2, HL&P has concluded that, pursuant to 10CFR51, there are no significant radiological or nonradiological impacts associated with the proposed action and the proposed license amendment will not have a significant effect on the quality of the environment. The STPEGS UFSAR will be revised in accordance with this change subsequent to the NRC approval.

The STPEGS Nuclear Safety Review Board has reviewed and approved the proposed changes.

In accordance with 10CFR50.91(b), HL&P is providing the State of Texas with a copy of this proposed amendment.

Your approval is requested so that this change can be implemented for each unit during the respective 1991 refueling outages.

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If the NRC should have any questions concerning this matter, please contact Mr. A. W. Harrison at (512) 972-7298 or myself at (512) 972-7921.

Warren H. Kinsey, Jr.
Vice President
Nuclear Generation

GCS/sgs

Attachments:
1. Significant Hazards Evaluation for the Replacement of the Spray Additive System with the Recirculation Fluid pH Control System
2. Mark-ups of Proposed Change to Technical Specifications
3. WCAP 12477, "Spray Additive Elimination Analysis for the South Texas Project"

cc:

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*NOTE: The above copies distributed without attachment 3, except as noted by asterisk (*).

Revised 10/08/90

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter	)	
	)	
Houston Lighting & Power	)	Docket Nos. 50-498
Company, et al.,	)	50-499
	)	
South Texas Project	)	
Units 1 and 2	)	

AFFIDAVIT

Warren H. Kinsey, Jr. being duly sworn, hereby deposes and says that he is Vice President, Nuclear Generation, of Houston Lighting & Power Company; that he is duly authorized to sign and file with the Nuclear Regulatory Commission the proposed replacement of Technical Specification 3/4.6.2.2 "Spray Additive System" with a new specification for "Recirculation Fluid pH Control System"; is familiar with the content thereof; and that the matters set forth therein are true and correct to the best of his knowledge and belief.

Warren H. Kinsey, Jr.
Vice President, Nuclear Generation

STATE OF TEXAS)
)
)

Subscribed and sworn to before me, a Notary Public in and for The State of Texas this 30th day of OCTOBER, 1990.

JACKIE A. GAULT
Notary Public, State of Texas
My Commission Expires 1-13-93

Jackie A. Gault
Notary Public in and for the
State of Texas

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ATTACHMENT 1

SIGNIFICANT HAZARDS EVALUATION FOR THE
REPLACEMENT OF THE SPRAY ADDITIVE SYSTEM
WITH THE RECIRCULATION FLUID pH CONTROL SYSTEM

SIGNIFICANT HAZARDS EVALUATION FOR THE REPLACEMENT OF THE SPRAY ADDITIVE SYSTEM WITH THE RECIRCULATION FLUID pH CONTROL SYSTEM

Background

The Containment Spray System design for STPEGS currently utilizes caustic (sodium hydroxide, NaOH) containment spray (pH 7.5 to 10.5) to assure the removal of radioactive iodine from the containment atmosphere following a large break LOCA. Airborne iodine must be removed to minimize the release to the environment due to containment leakage and thus assure that the offsite dose guidelines of 10CFR100 are met.

The Containment Spray System currently uses the Spray Additive Tanks (SAT) to provide the caustic containment spray. Technical Specifications require performing SAT related tests and maintenance. This testing and maintenance is resource intensive and the handling of concentrated sodium hydroxide solution requires special precautions due to its hazardous nature. Additionally, contamination of the primary grade water by sodium hydroxide leakage into the Reactor Coolant System has occurred at STPEGS. This contamination requires the use of the demineralizers to remove the contamination which depletes the resin. Higher dose rates can result from this contamination due to personnel exposure to the depleted resin and transmuted sodium hydroxide in the Reactor Coolant System.

Revision 2 to Standard Review Plan (SRP) section 6.5.2, "Containment Spray as a Fission Product Cleanup System" and industry precedence has made it possible for STPEGS to pursue design changes to isolate the Unit 1 and 2 spray additive systems. The methodology of SRP 6.5.2 (Rev. 2) identifies that post-accident removal of elemental iodine (the predominant form) from the LOCA containment atmosphere is essentially independent of spray pH. Thus, HL&P proposes to eliminate NaOH addition to containment spray. This change has been approved for use at Millstone 2, Palo Verde, San Onofre, Calvert Cliffs, Davis Besse and St. Lucie 2.

The removal of the spray additive does not eliminate the need for adjusting the pH of the Emergency Core Cooling System (ECCS) recirculation solution. To assure that the iodine removed by the sprays is retained in solution, to minimize chloride induced stress corrosion cracking of austenitic stainless steel components, and to minimize the hydrogen produced by the corrosion of galvanized surfaces and zinc-based paints, the long-term pH of the ECCS solution should be no less than 7.0. Since the initial pH of the boric acid ECCS solution, without spray additive, will be approximately 4.5, a chemical additive must be utilized to raise the pH of the solution in the containment sump.

Background (cont'd)

The proposed replacement for the liquid sodium hydroxide spray additive system consists of solid trisodium phosphate (TSP) stored in baskets strategically located in the post-LOCA flooded region of the containment (Figure 1.2-12). Additional detail is included in the attached WCAP-12477.

The initial containment spray will be boric acid solution from the refueling water storage tank which has a pH of approximately 4.5. As the initial spray solution and subsequently the recirculation solution comes in contact with the trisodium phosphate, the TSP dissolves raising the pH of the sump solution to an equilibrium value of ≥ 7.0.

WCAP 11611, "Methodology for Elimination of the Containment Spray Additive", was prepared for Westinghouse Owners Group (WOG) participants to assist in the evaluation for elimination of spray additive systems. Choosing this course of action, STPEGS has performed a plant specific analysis entitled WCAP 12477, "Spray Additive Elimination Analysis for the South Texas Project" which is provided in Attachment 3. It contains calculations of iodine removal coefficients and decontamination factors; also included are evaluations of the use of TSP for long term pH control, the potential for chloride induced stress corrosion cracking, hydrogen generation and equipment protection.

Offsite, Control Room, and Technical Support Center (TSC) dose calculations were revised for the design basis LOCA using the results of WCAP 12477, as well as the revised treatment of Control Room and FHB HVAC failures submitted in a STPEGS License Amendment Request dated July 14, 1989 (ST-HL-AE-2940). The results of the calculations are reflected in the attached tables.

Proposed Change

The proposed change is to replace Technical Specification 3/4.6.2.2 "Spray Additive System" and its basis with a specification entitled "Recirculation Fluid pH Control System" and basis as shown in the attachments.

Safety Evaluation

Passive pH Control System

The proposed Recirculation Fluid pH Control System will have the same function as the present Spray Additive System; i.e., to mitigate the effects of a loss of coolant accident. The change to a passive pH control system will eliminate the possibility of an active spray additive component failure. The proposed pH control system cannot initiate any accident evaluated in the Updated FSAR (UFSAR), since it is an accident mitigation system designed to function only when in contact with a liquid.

Safety Evaluation

Passive pH Control System (cont'd)

The proposed change eliminates the potential for contamination of primary grade water by sodium hydroxide leakage into the Reactor Coolant System. This leakage causes depletion of resin used to remove the contamination and can result in higher dose rates. The Spray Additive Tank will be drained and the associated valves will be closed upon implementation of the proposed change (Figure 6.2.2-1).

LOCA Dose

Proposed dose results are within 10CFR100 and Standard Review Plan (SRP) limits. The offsite Exclusion Area Boundary (EAB) and Low Population Zone (LPZ) dose limits are 300 rem for thyroid and 25 rem for whole body (gamma). The results for offsite thyroid and whole body (gamma) doses in Table 1 are within these limits. The offsite skin (beta) dose at the EAB is 0.01 rem above the current UFSAR value. The whole body dose at the EAB is 0.01 rem below the current UFSAR value.

The control room operator dose limits are 30 rem for thyroid and skin (beta) and 5 rem for whole body (gamma). The results in Table 1 for Control Room operator thyroid, skin, and whole body doses are within these limits. The Control Room operator thyroid dose is 3.41 rem above the current UFSAR value, remaining well within the acceptance limit of 30 rem.

The TSC dose limits are 30 rem for thyroid and skin (beta) and 5 rem for whole body (gamma). Again, the skin and thyroid doses are within the acceptance limit of 30 rem, with the larger of the two being the thyroid dose which is 4.99 rem above the current UFSAR value. The whole body (gamma) dose is lower than the current UFSAR value. The potential consequences of a LOCA are slightly above current UFSAR values, but remain below the limits set forth by 10CFR100 and the SRP.

Hydrogen Generation

WCAP 12477 evaluates the impact of the proposed change to the amount of hydrogen generated after a LOCA due to the replacement of spray additive. Of the possible hydrogen generation sources only aluminum and zinc corrosion are affected by this proposal. The proposed change will affect the pH by introducing an initial pH of 4.5 (borated water spray) followed by a pH range of 7.0 to 9.5, using TSP. This is effectively a lower pH than the current range of 7.5 to 10.0, using NaOH. The corrosion of aluminum decreases with decreasing pH, therefore, the hydrogen generation resulting from aluminum corrosion will decrease with the use of TSP. The corrosion of zinc and zinc enriched paints, which is highly dependent on temperature, is shown to be similar for the pH ranges of NaOH and TSP sprays. As a result, the amount of hydrogen generated after a LOCA is not increased and the margin of safety is unaffected.

Safety Evaluation

Equipment Qualification

The proposed change to a lower initial pH of 4.5 and lower equilibrium pH of 7.0 to 9.5 is expected to have no effect on equipment qualification or protective coatings, since both are currently analyzed for the more limiting condition of high pH for long time periods. A review will be performed to identify any materials for equipment qualification adversely impacted by the new pH environment. Any items identified as unsatisfactory will be replaced with material suitable for the new pH environment.

Determination of No Significant Hazards

Pursuant to 10CFR50.91, this analysis provides a determination that the proposed change to Technical Specifications does not involve significant hazards consideration as defined in 10CFR50.92.

(1) The proposed change does not involve a significant increase in the probability or consequences of accidents previously evaluated.

The proposed change to a Recirculation Fluid pH Control System does not increase the probability of accidents previously evaluated because the new system cannot initiate an accident because passive components would be used in place of active components and the system mitigates the consequences of an accident. The potential for failure of active components would be decreased by this proposal. Therefore, the proposed change does not increase the probability of any accident previously evaluated. The consequences of previously evaluated accidents do not significantly increase since doses remain within the acceptance criteria of 10CFR100 and SRP limits.

(2) The proposed changes do not create the possibility of a new or different kind of accident from any accident previously evaluated.

No new modes of operation are proposed and the proposed Recirculation Fluid pH Control System will provide the same function as the current spray additive system, to mitigate the effects of a LOCA. The proposed system would not be used during normal plant operations.

(3) The proposed changes do not involve significant reductions in the margin of safety.

The LOCA doses do not significantly increase and remain within the acceptance criteria of 10CFR100 and the SRP. Additionally, hydrogen generation is not increased and equipment qualification will remain within the acceptance criteria.

Conclusion

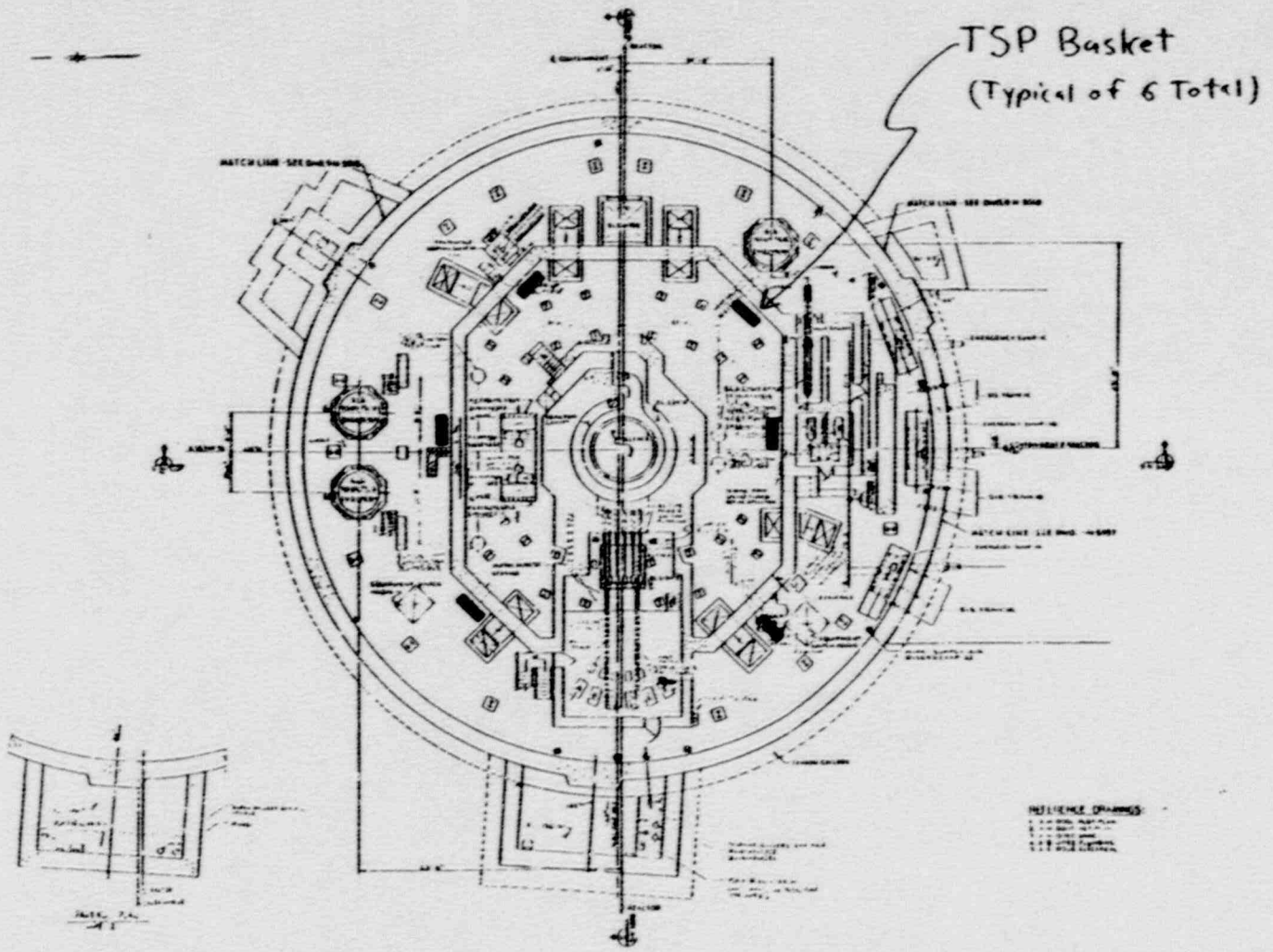
The replacement of Technical Specification 3/4.6.2.2 "Spray Additive System" with "Recirculation Fluid pH Control System" is acceptable because a passive post-accident mitigation system replaces an active system, the calculated dose results do not increase significantly, and the hydrogen generation analysis and equipment qualification remain valid. HL&P requests approval of the proposed changes.

Table 1

Offsite, Control Room, and TSC Proposed Doses vs. UFSAR Doses

	Thyroid (rem)	Whole-body Gamma (rem)	Skin Beta (rem)
Total Offsite Dose EAB (0-2 hours)	126.5 (143)	2.19 (2.2)	1.16 (1.15)
Total Offsite Dose LPZ (0-30 days)	58.42 (61.2)	0.68 (0.68)	0.43 (0.43)
Total Operator Dose, Control Room (0-30 days)	18.21 (14.8)	2.42 (2.43)	18.7 (18.7)
Total TSC Dose (0-30 days)	24.85 (19.86)	4.74 (4.88)	21.64 (21.62)

NOTE: Values in parenthesis are current UFSAR values.

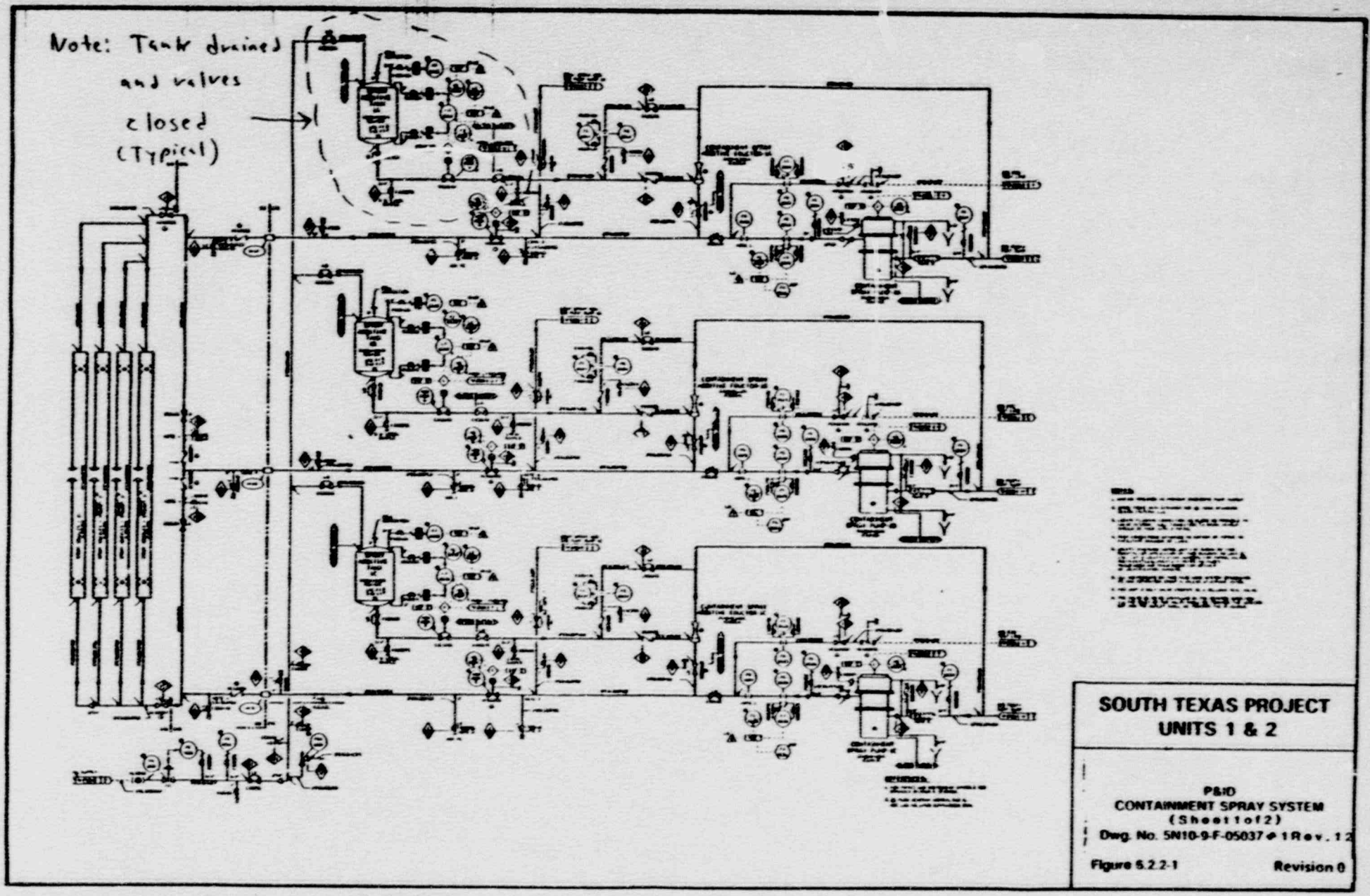


SOUTH TEXAS PROJECT
UNITS 1 & 2

GENERAL ARRANGEMENT
REACTOR CONTAINMENT BUILDING
PLAN EL. (-)11'-3" AREA G

Dwg. No. 6C18 9-N-05001 Rev. 8

Figure 1.2-12 Revision 0



SOUTH TEXAS PROJECT
UNITS 1 & 2

P&ID
CONTAINMENT SPRAY SYSTEM
(Sheet 1 of 2)
Dwg. No. 5N10-9-F-05037 ◆ 1 Rev. 12

Figure 6.2.2-1 Revision 0