PMSTPCOL PEmails

From: Sent: To: Subject: Attachments: Rocky Foster Thursday, August 28, 2008 9:49 AM Prosanta Chowdhury; Dan Barss; STPCOL FW: RAI Responses ABR_AE_08000065.pdf

Gentlemen,

Attached is STP's response, ABR AE 080000065, which responds to RAIs 13.03-1 through 69 with the exception of RAIs 13.03-53 and 13.03-62 of various NRC Letters. As always, please provide your determination of completeness and resolution to me within 30 days and any associated input information for the SER for this area.

Thanks,

Rocky

From: George Wunder
Sent: Thursday, August 28, 2008 9:21 AM
To: Raj Anand; Rocky Foster; Tekia Govan; Adrian Muniz; Stacy Joseph; Tom Tai
Subject: FW: RAI Responses

This letter answers questions from chapterss 2 and 13, so there is ambiguity as to which PM should forward it to the STPCOL mail box. Please remember that in such cases there is NO PROBLEM with sending it more than once. In this case, I will send it. Also, when you forward a message to the STPCOL mailbox, use the "Other Actions" tab and select "Forward as Attachment."

Thanks,

George

From: Bannert, Scott [mailto:sabannert@STPEGS.COM]
Sent: Wednesday, August 27, 2008 5:42 PM
To: Adrian Muniz; Belkys Sosa; George Wunder; Loren Plisco; Raj Anand; Rocky Foster; Tekia Govan; Tom Tai
Subject: RAI Responses

Please find attached a courtesy (information only) electronic copy of an RAI response letter with attachments. The letter includes RAI responses for STP 3 & 4 COLA Part 2, Tier 2 Sections 2.4S, 2.5S, and 13.3. The official paper copy was sent overnight according to the letter addressee list.

If you have any questions, please contact Coley Chappell at (361) 972-4745 or Bill Mookhoek at (361) 972-7274.

Scott Bannert

Probabilistic Risk Assessment Developer Regulatory Affairs STP Units 3 & 4 South Texas Project, 4000 Avenue F Bay City, TX 77414

(361) 972-4762 (office) (361) 972-4751 (fax) (979) 418-2422 (cell) sabannert@stpegs.com Hearing Identifier:SouthTexas34Public_EXEmail Number:709

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Subject:	FW: RAI Responses
Sent Date:	8/28/2008 9:48:48 AM
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From:	Rocky Foster

Created By: Rocky.Foster@nrc.gov

Recipients:

"Prosanta Chowdhury" <Prosanta.Chowdhury@nrc.gov> Tracking Status: None "Dan Barss" <Dan.Barss@nrc.gov> Tracking Status: None "STPCOL" <STP.COL@nrc.gov> Tracking Status: None

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South Texas Project Electric Generating Station 4000 Avenue F – Suite A Bay City, Texas 77414 –

August 27, 2008 ABR-AE-08000065

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U. S. Nuclear Regulatory Commission Attention: Document Control Desk One White Flint North 11555 Rockville Pike Rockville MD 20852-2738

South Texas Project Units 3 and 4 Docket Nos. 52-012 and 52-013 Response to Requests for Additional Information

Reference: Letter, R. Anand to G. Gibson, "Request for Additional Information Letter No. 33 Related to the SRP Section 02.04.04 for the South Texas Combined License Application," dated May 12, 2008 (ML081340408)

Attached are responses to NRC questions included in Request for Additional Information (RAI) letter numbers 34, 40, 44, 49, 50, 51, 56, and 57 related to COLA Part 2 Tier 2 Sections 2.4S, 2.5S, and 13.3. This submittal includes responses to the following RAI questions:

02.04.05-2 and 02.04.05-3 02.04.08-1 and 02.04.08-2 02.04.13-10 02.05.01-3 and 02.05.01-14 02.05.02-12 and 02.05.02-16 02.05.03-1 13.03-1 through 13.03-69 with the exception of 13.03-53 and 13.03-62

When an RAI question response indicates a change to the STP 3&4 COLA, the change will be incorporated into the next routine revision of the COLA following NRC acceptance of the question response.

The response to RAI question 2.04.04-3 (included in the referenced RAI letter) will be submitted to the NRC staff by November 13, 2008. Response date is extended due to the reordering of priorities between support for COLA Revision 2 submittal and RAI responses.

There are no commitments in this letter.

If you have any questions regarding the attached responses, please contact me at (361) 972-4626, or Bill Mookhoek at (361) 972-7274.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on August 27, 2008

Greg Gibson Manager, Regulatory Affairs South Texas Project, Units 3 & 4

sab

Enclosures:

- A. CD: File FIGURE 1-2 (Question 13.03-13)
- B. CD: Files STP-SOURCE-GEOM.DAT and FRAC_BY_SOURCE.TXT (Question 02.05.02-16)

Attachments:

28. Question 13.03-28 1. Ouestion 13.03-01 29. Question 13.03-29 2. Question 13.03-02 30. Ouestion 13.03-30 3. Question 13.03-03 4. Question 13.03-04 31. Question 13.03-31 5. Ouestion 13.03-05 32. Ouestion 13.03-32 6. Question 13.03-06 33. Question 13.03-33 34. Question 13.03-34 7. Question 13.03-07 35. Question 13.03-35 8. Question 13.03-08 9. Question 13.03-09 36. Question 13.03-36 10. Question 13.03-10 37. Question 13.03-37 11. Question 13.03-11 38. Question 13.03-38 12. Question 13.03-12 39. Question 13.03-39 13. Question 13.03-13 40. Question 13.03-40 41. Question 13.03-41 14. Ouestion 13.03-14 15. Question 13.03-15 42. Question 13.03-42 16. Question 13.03-16 43. Question 13.03-43 17. Question 13.03-17 44. Ouestion 13.03-44 18. Question 13.03-18 45. Question 13.03-45 19. Ouestion 13.03-19 46. Question 13.03-46 47. Question 13.03-47 20. Question 13.03-20 21. Question 13.03-21 48. Question 13.03-48 22. Ouestion 13.03-22 49. Ouestion 13.03-49 23. Question 13.03-23 50. Question 02.04.05-2 24. Question 13.03-24 51. Question 02.04.05-3 52. Question 02.05.02-12 25. Question 13.03-25 26. Ouestion 13.03-26 53. Ouestion 02.05.02-16 27. Question 13.03-27 54. Question 02.04.08-1

55. Question 02.04.08-2 56. Question 02.05.01-14 57. Ouestion 02.04.13-10 58. Question 13.03-50 59. Question 13.03-51 60. Question 13.03-52 61. Question 13.03-54 62. Ouestion 13.03-55 63. Question 13.03-56 64. Question 13.03-57 65. Question 13.03-58 66. Question 13.03-59 67. Question 13.03-60 68. Question 13.03-61 69. Question 13.03-63 70. Question 13.03-64 71. Question 13.03-65 72. Question 13.03-66 73. Ouestion 13.03-67 74. Question 13.03-68 75. Question 13.03-69 76. Question 02.05.01-3 77. Question 02.05.03-1

ABR-AE-08000065 Page 3 of 3

cc: w/o attachment except* (paper copy)

Director, Office of New Reactors U. S. Nuclear Regulatory Commission One White Flint North 11555 Rockville Pike Rockville, MD 20852-2738

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

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

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

*Steven P. Frantz, Esquire A. H. Gutterman, Esquire Morgan, Lewis & Bockius LLP 1111 Pennsylvania Ave. NW Washington D.C. 20004

*George F. Wunder *Raj Anand *Rocky D. Foster Two White Flint North 11545 Rockville Pike Rockville, MD 20852 (electronic copy)

*George F. Wunder *Raj Anand *Rocky D. Foster Loren R. Plisco U. S. Nuclear Regulatory Commission

Steve Winn Eddy Daniels Joseph Kiwak Jim von Suskil NRG South Texas 3/4 LLC

Jon C. Wood, Esquire Cox Smith Matthews

J. J. Nesrsta R. K. Temple Kevin Pollo L. D. Blaylock CPS Energy

QUESTION:

EVACUATION TIME ESTIMATE (ETE): ETE-1: Subject: Reconciling population projections in ETE (and EP) with those of the FSAR and ER [Basis: 10 CFR 52.79(a); Appendix E to 10 CFR 50, Section IV; RG 1.206] Reconcile the population projections given in the ETE (and EP) with those of the FSAR and ER: FSAR Section 2.1S.3, provides different baseline and projected future values, using State of Texas county projections for the Year 2040 to determine an exponential increase rate constant (The Environmental Report also uses the FSAR population numbers in Section 2.5.1, Table 2.5-2.). It appears that the 10-mile resident population differs, the accounting for employees at OXEA, Equistar, and the STP differ. It is not possible to separate out the hotel/motel, recreation area, marina, and seasonal residents in the FSAR presentation, but they are not the same as in the ETE. Explain the differences.

RESPONSE:

Population estimates used in COLA Part 2, FSAR, Chapter 2, were prepared by Bechtel Corporation. Bechtel estimated the population within the <u>10 mile radius</u> of STP for year 2000, including both residents (2828) and transients (3486 (FSAR 2.1S.3.3.1)), at 6314 (FSAR 2.1S.3.1).

Population estimates used in COLA Part 5, Emergency Plan (EP), were independently prepared by KLD Associates, Inc. KLD estimated the population within the <u>10 mile Emergency Planning</u> <u>Zone</u> of STP for year 2000, including both residents (2875 (ETE Figure 3-2 and EP Figure I-1)) and transients (3577 (ETE Figure 3.4)), at 6452.

The independent estimates of year 2000 population prepared by Bechtel Corporation and KLD Associates differed by approximately 2%. Considering the variations in techniques, survey results, and assumptions used when making estimates of resident and transient populations, the small difference in the population estimates prepared by independent contractors provides a high degree of confidence that both estimates are sufficiently accurate to be acceptable for their intended use.

QUESTION:

EVACUATION TIME ESTIMATE (ETE): ETE-2: Subject: Missing information on communities [Basis: 10 CFR 52.79(a); Appendix E to 10 CFR 50; NUREG-0654 FEMA-REP-1, Rev. 1, November 1980, App. 4, Sec. I] Provide missing information on communities: Section 1.2 states that Figure 1-1 identifies the communities in the area; however, this does not include communities. Include the communities on Figure 1-1.

RESPONSE:

STP Evacuation Time Estimate Revision 1, Section 1.2, "The South Texas Project Site Location," includes Figure 1-1, which shows the region surrounding the STP out to the city of Bay City. Revision 2 of the ETE will reflect the region surrounding the STP out to metropolitan Houston. The cities in the vicinity of STP – Matagorda, Palacios and Bay City –are labeled on Figure 1-1 Revision 2.

Figure 3-1 in Revision 2 shows the STP Emergency Planning Zone and the Shadow Region that extends out to 15 miles from STP. The cities within this area – Matagorda, Palacios, Bay City, Markham, Blessing– are labeled. All Zones are shown and labeled, and all major highways (Routes 35, 71 and 60) are identified.

QUESTION:

EVACUATION TIME ESTIMATE (ETE): ETE-3: Subject: Information on MCR and political boundaries [Basis: 10 CFR 52.79(a); Appendix E to 10 CFR 50; NUREG-0654 FEMA-REP-1, Rev. 1, November 1980, App. 4, Sec. I.A] (1) The current base map for all of the GIS-type figures appears to be outdated – none include the Main Cooling Reservoir (MCR). Provide updated maps to include the MCR. (2) Provide a separate updated map that identifies the political boundaries in the area.

RESPONSE:

- (1) NUREG-0654, Section 1.A of Appendix 4, requires inclusion of a detailed map that identifies transportation networks, topographical features and political boundaries. There is no guidance for ETE maps to include features that are not relevant to the ETE, such as the main cooling reservoir, which is within the STP owner controlled area.
- (2) The entire STP emergency planning zone (EPZ) is within Matagorda County; consequently, there are no political boundaries that lie within the EPZ.

QUESTION:

EVACUATION TIME ESTIMATE (ETE): ETE-4: Subject: Additional information on assumptions [Basis: 10 CFR 52.79(a); Appendix E to 10 CFR 50; NUREG-0654 FEMA-REP-1, Rev. 1, November 1980, App. 4, Sec. I.B] Provide additional information to support assumptions: (1) Clarify why Section 2.3, number 3b states 70% of households will await the return of a commuter, but Table 6-4 identifies a maximum value of 50% residents with commuters. Identify which value was used in the ETE calculation. (2) Clarify whether traffic control points in Section 3.2, assumption #7 were considered in the ETE calculation. The assumption states these should be established along routes to the Reception Centers to facilitate traffic flow. Clarify whether local emergency response agencies, such as Bay City police, have agreed to establish traffic control at the positions indicated. Identify the effect this would have on the ETE if the assumed traffic control points are not implemented.

RESPONSE:

(1) STP will revise Section 2.3, "Study assumptions, Part 3b, to more accurately describe the analysis assumptions by making the following changes:

70% of those households in the EPZ with commuters will await the return of a commuter before beginning their evacuation trip, based on the telephone survey results.

(2) The ETE calculations do not rely upon any traffic control points (TCP) to be manned. The estimates of capacity which are used by the IDYNEV model, and documented in Appendix K, are based upon the factors described in Section 4 and the observations made during the road survey. It is assumed that these capacity estimates are not enhanced nor compromised by the establishment of a TCP at an intersection. As detailed in Section 9, the functions to be performed in the field at TCPs are to (1) facilitate evacuating traffic movements; and (2) discourage those movements that would move travelers closer to the Power Station. The personnel manning these TCPs will also serve a surveillance function to inform the EOC of any problems that they observe in the vicinity or are related to them by evacuees. The local emergency response agencies have certified that they have reviewed the ETE.

The ETE calculations make no assumptions about the manning of TCPs and ACPs and the ETE are not dependent on the establishment of TCPs and access control points (ACPs). Therefore, manpower and equipment shortages have no effect on ETE calculations. These issues are considered as part of the county emergency plans.

QUESTION:

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EVACUATION TIME ESTIMATE (ETE): ETE-5: Subject: Additional information on methodology [Basis: 10 CFR 52.79(a); Appendix E to 10 CFR 50; NUREG-0654 FEMA-REP-1, Rev. 1, November 1980, App. 4, Sec. I.C] Provide additional information on the methodology: 1) The report identifies PCDYNEV as the tool used for the travel time computation, but none of the underlying algorithms of the system have been included. Provide a general description of the algorithms. 2) Clarify the phrase in Section 7.3 "relatively few evacuation routes service the remaining demand". This may be a terminology issue, but in fact all evacuation routes are available to service the remaining demand.

RESPONSE:

 Appendices A through D present general descriptions of the IDYNEV System; Appendix C focuses on PC-DYNEV.NUREG/CR-4873 and NUREG/CR-4874 document studies undertaken to assess the validity of the DYNEV model for use in calculating ETE and describe the algorithms used in the DYNEV model. These descriptions are at a level of detail and complexity beyond the needs of an ETE document. Additional references are provided in footnotes on page 4-2.

KLD Associates, the consulting company that developed the ETE applies the I-DYNEV system as one analysis tool. This tool is used to identify points of congestion and locations where traffic control points (TCPs) could be helpful to the evacuating public. By analyzing the results of the simulation, locations where TCPs may be necessary to control traffic volumes under evacuation conditions are identified. The model is executed iteratively to appropriately represent the operating conditions of an evacuation.

The iterative procedure described above does not attempt to "optimize" traffic operations at an intersection, but rather represents a reasonably efficient operation under evacuation conditions. The establishment of a TCP at an intersection could well provide for greater operational performance than is represented by the calibrated DYNEV model. Thus, if all TCPs are manned in a timely manner by experienced personnel, it is possible that the ETEs predicted by the model might be somewhat longer than achievable in the real world under these ideal circumstances. It was assumed that ETEs should represent reasonable expectations but not optimal expectations.

2) STP will modify the opening statement in Section 7.3 to read:

Evacuation is a continuous process, as implied by Figures 7-3 and 7-4. Another format for displaying the dynamics of evacuation is depicted in Figure 7-5. While all routes remain available for evacuees, only a few of these routes will be needed towards the end of the evacuation

QUESTION:

EVACUATION TIME ESTIMATE (ETE): ETE-6: Subject: Additional information on transient population [Basis: 10 CFR 52.79(a); Appendix E to 10 CFR 50; NUREG-0654 FEMA-REP-1, Rev. 1, November 1980, App. 4, Sec. II]

1) Provide additional information on the development of the transient population estimates: Page 3-8 and 3-9 identify values for the transient population that do not equal the values in Table 3-3. The population is identified for facilities including the golf course, harbor, lighthouse RV park, Riverside Park and Campgrounds, hotels and motels, seasonal homes, Matagorda Beach, and the Matagorda Bay Nature Park. Explain the differences between the total for the facilities listed and Table 3-3 which summarizes the values. 2) Provide clarification of Table 3-4: Table 3-4 provides an estimate for the Non-EPZ employees. A Zone 12 is listed on this table that appears to be an error as there are only 11 zones elsewhere. Clarify.

RESPONSE:

1. Upon review of the estimates provided on pages 3-8 and 3-9 with those presented in Table 3-3 on page 3-10 STP did not identify any discrepancies in these estimates and Table 3-3.

The sum of those estimates from pages 3-8 and 3-9 is 2,607 which include the estimates for Matagorda Beach and Jetty Park and Matagorda Bay Nature Park. In Table 3-3 Matagorda Beach and Jetty Park and Matagorda Bay Nature Park are presented as a separated line item below Table 3-3 and should be added to the totals identified in this table. Adding the sum of 2,037 from Table 3-3 plus 570 from the "Matagorda Beach" line item the total transients will equal 2,607. Based on this evaluation STP does not plan on making any changes to the ETE related to this portion of the RAI.

2. STP identified Zone 12 as indicated in Table 3-4 is an error. It will be deleted in the next revision of the ETE Report. The following text will be deleted from Table 3-4 as shown below.

Table 3-4. Summary of Non-EPZ Employees by Zone					
Zone	Total Non-EPZ Employees	Employee Vehicles			
1	1,003	993			
2	27	27			
3	163	161			
4	0	0			
5	0	0			
6	0	0			
7	0	0			
8	0	0			
9	0	0			
10	0	0			
11	0	0			
12	θ	θ			
TOTAL	1,193	1,181			

QUESTION:

EVACUATION TIME ESTIMATE (ETE): ETE-7: Subject: Additional information on assumptions [Basis: 10 CFR 52.79(a); Appendix E to 10 CFR 50; NUREG-0654 FEMA-REP-1, Rev. 1, November 1980, App. 4, Sec. II.A] Provide additional information on the assumptions related to persons that require public assistance: The routes for individuals requiring public transit are identified, but there is no mention of how transit dependent individuals get from their residence to these bus routes. Provide information on the means by which these individuals are assumed to get themselves to the transit routes and clarify that the time required for this action is included in the ETE.

RESPONSE:

The transit dependent evacuees are identified as those individuals that have no access to private transportation, then those who are ambulatory would be expected to walk to the routes set up by the county.

As discussed on Page 8-6, it is estimated that the first bus will arrive at the EPZ route about 2 hours and 30 minutes after the advisory to evacuate. The mobilization time estimates (Table 5-1, Distribution D) indicate that ³/₄ of all evacuees will have completed their preparatory activities in that time frame. Given that these transit-dependent people will have to walk some distance 'x' from their residence, it is reasonable to assume that they will limit the items they take with them. It therefore follows that preparation time will likewise be less than for those with access to private vehicles. As a result, the arrival of these transit dependant evacuees at the bus route is expected to proceed the estimated arrival time of the buses.

QUESTION:

EVACUATION TIME ESTIMATE (ETE): ETE-8: Subject: Additional information on transient and peak population [Basis: 10 CFR 52.79(a); Appendix E to 10 CFR 50; NUREG-0654 FEMA-REP-1, Rev. 1, November 1980, App. 4, Sec. II.B] 1) Provide additional information for the transient population: a) Assumption number 6 states that there are 5000 people on the beach, the peak population of the beach is identified as 6,000 in Section 3, and a beach population of 1,130 is listed in Table 3.3. Clarify which value was used in the ETE calculations. If more than one were used, clarify which scenarios each value was used in. b) The FSAR mentions additional parks in the EPZ: Baycel Golf Club, FM 251 River Park (Wadsworth Park), and the Mad Island Wildlife Management Area. Clarify whether transients in these parks have been included in the ETE. c) The ETE estimates a seasonal (summer-home) population of 2817 based on a 1994 report, while the FSAR states that it is 1864 based on USCB estimates. Are the USCB and ETE methods for estimating seasonal residents the same? d) The ETE mentions that estimates of nonresident employees were provided by the Matagorda County emergency Management Office. Appendix E identifies large employers as special facilities. But Section 8 does not identify large employers as special facilities. The reported number of employees differs markedly between the FSAR and ETE. Clarify where the employer evacuees were considered, and how many, in the calculation? 2) Provide additional information on the peak population used in calculating the ETE: Table 6.5 presents a summary that is generally consistent with other tables; however, it is not stated how this table was used in the calculation. Section 5 states that the peak population within the EPZ approximates 6,850 people; clarify if Table 6.5 presents the number of vehicles modeled. Clarify whether the percentages in Figure 7.1 were invoked upon the values from table 6.5. Clarify how Figure 7.1 "Assumed Evacuation Response" was integrated into the ETE calculation.

RESPONSE:

 a) The transient population identified on page 3-9, reflect the average number of visitors on a weekend to Matagorda Beach estimated as 1,000 people driving 500 vehicles. As shown in Table 3-3 on page 3-10, the total number of transient vehicles on Matagorda Beach was 570 which is the sum of the 500 vehicles on the beach plus the 70 vehicles estimated for the Nature Park. Additionally, the 1,130 transients listed in Table 3-3 is the sum of the 1,000 transients estimated on an average weekend plus the 130 transients at the Nature Park.

It is also stated that on a holiday weekend there can be as many as 6,000 people on or near the beach – the 1,000 people who are usually there plus an additional 5,000 people. The totals shown in Table 3-3 for transients are the totals used in the ETE calculations for all scenarios other than Scenario 11. Scenario 11 deals with the additional 2,500 vehicles used to transport the "surge" of 5,000 visitors on a holiday weekend. This is indicated in Table 6-5 on page 6-7 for Scenario 11.

b) The Baycel Golf Club is located approximately 5 miles north of STP and is a private 9hole course that draws most of its members from within the EPZ. The Baycel Club, Inc. is a non-profit organization headquartered in Bay City. The Wadsworth Park is a small park located near the center of Wadsworth and services the local community. Neither of these facilities attracts a material number of transients from outside the EPZ.

The Mad Island Wildlife Management Area (WMA) is located approximately 9 miles east of Collegeport and is to the south of the power plant. The major activity there occurs during the hunting season, with access to the area permitted only on the weekends: (1) for two weeks in September, teal hunting; (2) from the end of October through January, duck hunting; (3) last weekend in September, alligator hunt; (4) on three weekends in February and March, feral hog hunt. It is estimated by WMA personnel that there may be 30 people there on Saturday, 20 people on Sunday. Some of these people are from the EPZ while others are attracted to the area from outside the EPZ. The hunts take place between 4:00 AM and noon. Even assuming that all of the hunters are from outside the EPZ, it is clear that the estimated maximum of 15 vehicles would not have an effect on ETE. Based on this discussion the transient population from Mad Island was not considered in the ETE calculation.

- c) The estimate of seasonal population was taken from the previous ETE report which was published in 1994. As documented therein, the seasonal population was obtained from the 1990 U.S. Census Bureau data. The data for both the FSAR and ETE is from the USCB however, they are from different years..
- d) Table 3-4 summarizes the estimates of non-EPZ employees. The figures in this table correspond to those on page E-2. The ETE distinguishes between the total employment within the EPZ and those employees who live outside the EPZ. This distinction probably accounts for the difference between the estimates of the FSAR and ETE. The major employers are listed on page E-2; the number of employees at each is shown there and in Table 3-4.
- 2. Table 6-5 presents a listing of the number of vehicles that are evacuated for each of the 12 scenarios if the entire Emergency Planning Zone (EPZ-R03) is advised to evacuate. The figures in Table 6-5 assume that 100% of the people within the EPZ will evacuate and that a percentage of the residents in the shadow area will likewise evacuate. The percentages, applied to the shadow area residential population, are shown in Column 6 of Table 6-4 for each of the 12 scenarios.

For all other evacuation regions, the percentages of Figure 7-1 apply. To illustrate how this is done, consider the following examples:

• Suppose Region R10 is advised to evacuate. In this circumstance, 100% of the population of all classifications within Zones 1 and 3 (see Table 6-2) are assumed to evacuate. Fifty percent of those people who are within Zones 2, 4 and 5 are assumed to evacuate as well; these zones are outside R10 but within 5 miles of STP. Thirty-five percent of those within

the remaining zones within the EPZ, plus all those on Matagorda Beach are also assumed to evacuate. Finally, the appropriate percentage of those within the shadow region, as given in Table 6-4 (depending upon the scenario), will evacuate from the shadow region, as well.

• Now consider an advisory to evacuate Region R20. One hundred percent of the people within Zones 1 through 5 plus Zone 7 are assumed to evacuate (see Table 6-2). Fifty percent of those within the remaining zones as well as all those on Matagorda Beach are assumed to evacuate. Since Region R20 has its sector extending to the EPZ boundary, there are no zones which lie beyond the farthest extent of this sector and within the EPZ boundary; consequently, the figure of 35% shown in Figure 7-1 does not apply in this case. Note that the treatment of population in the shadow area is independent of the region to be evacuated.

As noted on page 6-1 there is a total of 264 "evacuation cases." Each such evacuation case has an associated number of vehicles consisting of a combination of those within the evacuation region (100% assumed), those within the EPZ but outside the region advised to evacuate (either 35% and/or 50% in accord with the policy shown in Figure 7-1, and those voluntary evacuees from the shadow area. KLD's UNITES software, which is a graphical user interface supporting the DYNEV model, performs the necessary calculations to produce the correct number of vehicles evacuating from each origin node, depending upon the region to be evacuated, the scenario and the location of the origin either within the EPZ or within the shadow region. The wide range of ETE values in, say, Table 7-1c reflects the range of evacuating vehicles in each evacuation case. Finally, the temporal rates at which vehicles enter the highway network from each origin depends upon the classification of population as shown in Table 5-1 and graphically presented in Figure 5-3. The UNITES software generates the input stream for the IDYNEV model based upon the inputs presented in Sections 5 and 6.

QUESTION:

EVACUATION TIME ESTIMATE (ETE): ETE-9: Subject: Additional information on special facility population [Basis: 10 CFR 52.79(a); Appendix E to 10 CFR 50; NUREG-0654 FEMA-REP-1, Rev. 1, November 1980, App. 4, Sec. II.C] Additional information is needed to support the analysis of the special facility population: Clarify why the basis for loading school children in 5 minutes is the same as loading of public transportation buses as described in Section 8.3 which references the HCM 2000. School bus loading is quite different. Teachers must have children seated and accounted for prior to leaving, whereas public buses do not wait for all parties to sit prior to driving.

RESPONSE:

By observation, school children are generally more agile than adults, particularly senior citizens, and that boarding time is at least comparable to adults. Exhibit 27-9 of the 2000 Highway Capacity Manual indicates that 2.0 seconds per person is a reasonable time for boarding a bus while alighting service times are indicated at 1.7 to 2.0 seconds per person. Example No. 1 on page 27-36 of the HCM assumes a more conservative 3.0 seconds per passenger for boarding and 2.0 seconds for alighting per passenger. In recognition of the fact that some evacuees may be carrying bulky packages, an estimate of 2 - 4 seconds per passenger was adopted as documented on page 8-5.

Applying the upper bound of 4 seconds to an estimate of 60 children per bus, will yield a total boarding time of 4 minutes. Over this time, it can be expected that all children will have been seated. Additionally, the teacher will count the children as they board the bus. This provides for the teacher to have at least one minute to board the bus and check the children prior to departure.

QUESTION:

EVACUATION TIME ESTIMATE (ETE): ETE-10: Subject: Additional information on subarea and on use of evacuee quantities [Basis: 10 CFR 52.79(a); Appendix E to 10 CFR 50; NUREG-0654 FEMA-REP-1, Rev. 1, November 1980, App. 4, Sec. II.D] 1) Provide additional information on the subarea descriptions: Explain where the 'Affected Downwind Sectors' in column two of Table 6-1 are located. 2) Provide additional information on how quantities of evacuees were actually used in the calculation of the ETE: a) Clarify how the percentages of evacuees in Figure 2-1 were allocated within the calculations. Inform if any calculations were performed for a 100% evacuation of the EPZ. b) Clarify where in Table 6.5 the vehicles of employees involved in constructing the new plant are included. The definitions for Table 6.4 would indicate that these are included in the Special Events column. If so, clarify why the vehicles do not appear to be 'in addition' to the special event population. c) In Table 6.5, clarify what the school buses are for in Scenarios 1 and 2 which are summer scenarios. d) Section 7.1 states that both voluntary and shadow evacuations are assumed to take place (or "shelter in place") over the same time frame. Clarify how shelter in place is used in this context and how this affects the ETE calculation. e) Provide the population used to calculate the shadow evacuation identified in Section 7.1.

RESPONSE:

Column 2 in Table 6-1 entitled "Affected Downwind Sectors" is in error and will be removed. As shown on page three (3) of this response.

Table 6-1 presents the properties of 32 wind directions; with each direction defined by a sector with a central angle of 11° (some sectors have a central angle of 12°). Each of these sectors is then superposed on the EPZ map shown in Figure 6-1. This exercise identifies the zones that need to be evacuated in the event there is an accident with the wind blowing in the indicated direction. The identity of these zones depends upon the nature of the accident; that is, whether the protective action recommendation calls for the evacuation of a circular area (of 2-, 5-, or 10-mile radius); or an area that takes the form of a keyhole configuration which either consists of a circular area with a 2-mile radius and a sector extending to 5 miles, or a circular area of 5-mile radius with a sector extending to 10 miles (actually, to the EPZ boundary).

It is seen by examining the third, fifth and seventh columns of Table 6-1 that these three circular regions are comprised of the same zones regardless of wind direction. That is, the circular regions are (of course) independent of wind direction. The keyhole zones, however, are dependent on wind direction.

For example, consider the first row in Table 6-1 which defines the evacuation zones in the event the wind direction is from 355° to 5° . The eleventh column (second from the right) identifies the zones contained within the keyhole evacuation area that includes the 5-mile circular area and a sector downwind to the EPZ boundary. In accord with

NUREGCR/6863, the sector portion of a keyhole evacuation region has a central angle of 67.5°. If we superpose the sector defined in Column 1, Row 1 onto the keyhole configuration defined in Column 11, then the resulting area of the keyhole configuration would include Zones 1 through 5, 8 and 9. This is defined as KLD region R11 and is shown graphically in Appendix H on page H-12. If we now examine the second row of Table 6-1, where the wind "from" direction is between 6° and 16°, performing the same superposition yields the same set of zones. The same statement applies for Rows 3 through 5 in Table 6-1. These five wind directions defined in Column 1 of Rows 1 through 5 define the same keyhole configuration which is labeled R11 and involve the same set of zones.

This kind of analysis is applied for all 32 wind directions which, in aggregate, form a complete circle of 360° . The end result is the compilation of regions R1 through R22 which are defined in Table 6-1 in terms of the underlying zones and graphically in Table 6-2. Note that Region 11 covers the wind direction (355° to 50° , Table 6-2) that is the aggregate of the wind directions of the first 5 sectors listed in rows 1-5 of Table 6-1. Appendix H presents maps of each of the 22 regions and shows the relationship between regions and zones in a graphical format.

- 2. a. The response to ETE-8 describes how the percentages of evacuees in Figure 2-1 (which is identical to Figure 7-1) were allocated within the calculations. The calculations for Region R03 represent a 100% evacuation of the EPZ for all 12 scenarios.
 - b. Column 7 of Table 6-5 is entitled "Special Events;" Scenarios 11 and 12 are defined as "special" in Table 6-3:
 - Scenario 11 covers the case of the additional 5,000 people on the beach discussed earlier, which are represented by 2,500 additional vehicles in Column 7 of Table 6-5 for Scenario 11.
 - The "special" Scenario 12 addresses the additional vehicles present within the EPZ due to new plant construction, as indicated in Table 6-3. The number of associated vehicles is shown in Column 7, Scenario 12 of Table 6-5. These two special scenarios are mutually exclusive: there will be no construction taking place on holiday weekends. Therefore, it would be inappropriate to add the construction workers' vehicles to the peak holiday vehicles as suggested in the comment.
 - c. The two school buses identified in Table 6-5 for Scenarios 1 and 2, even though these are summer scenarios, were allowed for transportation in the event there were children in summer camp or summer school.
 - d. Upon further review of the last sentence in the first paragraph of Section 7.1.we have determined that the parentheses statement (or 'shelter in place') is not applicable to support the evacuation calculation. The following revision to this sentence will be included in the next revision to the ETE:

"Both voluntary and shadow evacuations are assumed to take place (or 'shelter in place) over the same time frame from within the impacted area."

e. The number of vehicles estimated to voluntarily evacuate from within the shadow region is given in Column 6 of Table 6-5 for all 12 scenarios. These numbers are independent of the regions to be evacuated. The estimated population within the Shadow Region is 27,613 persons.

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				EVACUATE ZONES			EVACUATE KEY HOLE ZONES				
WIND DIRECTION FROM IS BETWEEN	AFFECTED DOWNWIND SECTORS	2 Mile Radius	KLD REGION	5 Mile Radius	KLD REGION	10 Mile Radius	KLD REGION	2 Mile Radius & 5 Miles Downwind	KLD REGION	5 Mile Radius and 10 Miles Downwind	KLD REGION
355° to 5°	H, J, K	1	R1	1, 2, 3, 4, 5	R2	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11	R3	1	R1	1, 2, 3, 4, 5, 8, 9	R11
6° to 16°	H, J, K, L	1	R1	1, 2, 3, 4, 5	R2	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11	R3	1	R1	1, 2, 3, 4, 5, 8, 9	R11
17º to 28º	J, K, L	1	R1	1, 2, 3, 4, 5	R2	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11	R3	1	R1	1, 2, 3, 4, 5, 8, 9	R11
29° to 39°	J, K, L, M	1	R1	1, 2, 3, 4, 5	R2	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11	R3	1, 4	R4	1, 2, 3, 4, 5, 8, 9	R11
40° to 50°	K, L, M	1	R1	1, 2, 3, 4, 5	R2	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11	R3	1, 4	R4	1, 2, 3, 4, 5, 8, 9	R11
51° to 61°	K, L, M, N	1	R1	1, 2, 3, 4, 5	R2	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11	R3	1, 4, 5	R5	1, 2, 3, 4, 5, 8, 9, 10	R12
62° to 73°	L, M, N	1	R1	1, 2, 3, 4, 5	R2	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11	R3	1, 4, 5	R5	1, 2, 3, 4, 5, 9, 10	R13
74º to 84º	L, M, N, P	1	R1	1, 2, 3, 4, 5	R2	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11	R3	1, 4, 5	R5	1, 2, 3, 4, 5, 9, 10	R13
85° to 95°	<u>M, N, P</u>	1	R1	1, 2, 3, 4, 5	R2	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11	R3	1, 4, 5	R5	1, 2, 3, 4, 5, 9, 10	R13
96° to 106°	M, N, P, Q	1	R1	1, 2, 3, 4, 5	R2	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11	R3	1, 4, 5	R5	1, 2, 3, 4, 5, 9, 10, 11	R14
107º to 118º	N, P, Q	1	R1	1, 2, 3, 4, 5	R2	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11	R3	1, 5	R6	1, 2, 3, 4, 5, 9, 10, 11	R14
119º to 129º	N, P, Q, R	1	R1	1, 2, 3, 4, 5	R2	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11	R3	1, 5	R6	1, 2, 3, 4, 5, 9, 10, 11	R14
130° to 140°	P, Q, R	1	R1	1, 2, 3, 4, 5	R2	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11	R3	1, 5	R6	1, 2, 3, 4, 5, 10, 11	R15
141° to 151°	P, Q, R, A	1	R1	1, 2, 3, 4, 5	R2	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11	R3	1, 2, 5	R7	1, 2, 3, 4, 5, 10, 11	R15
152° to 163°	Q, R, A	1	R1	1, 2, 3, 4, 5	R2	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11	R3	1, 2, 5	R7	1, 2, 3, 4, 5, 10, 11	R15
164º to 174º	Q, R, A, B	1	R1	1, 2, 3, 4, 5	R2	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11	R3	1, 2, 5	R7	1, 2, 3, 4, 5, 6, 10, 11	R16
175° to 185°	R, A, B	1	R1	1, 2, 3, 4, 5	R2	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11	R3	1, 2	R8	1, 2, 3, 4, 5, 6, 11	R17
186° to 196°	R, A, B, C	1	R1	1, 2, 3, 4, 5	R2	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11	R3	1, 2	R8	1, 2, 3, 4, 5, 6, 11	R17
197º to 208º	A, B, C	1	R1	1, 2, 3, 4, 5	R2	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11	R3	1, 2	R8	1, 2, 3, 4, 5, 6, 11	R17
209° to 219°	A, B, C, D	1	R1	1, 2, 3, 4, 5	R2	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11	R3	1, 2	R8	1, 2, 3, 4, 5, 6, 11	R17
220° to 230°	B, C, D	1	R1	1, 2, 3, 4, 5	R2	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11	R3	1, 2	R8	1, 2, 3, 4, 5, 6	R18
231° to 241°	B, C, D, E	1	R1	1, 2, 3, 4, 5	R2	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11	R3	1, 2, 3	R9	1, 2, 3, 4, 5, 6, 7	R19
242° to 253°	C, D, E	1	R1	1, 2, 3, 4, 5	R2	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11	R3	1, 2, 3	R9	1, 2, 3, 4, 5, 6, 7	R19
254° to 264°	C, D, E, F	1	R1	1, 2, 3, 4, 5	R2	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11	R3	1, 2, 3	R9	1, 2, 3, 4, 5, 6, 7	R19
265° to 275°	D, E, F	1	R1	1, 2, 3, 4, 5	R2	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11	R3	1, 2, 3	R9	1, 2, 3, 4, 5, 6, 7	R19
276° to 286°	D, E, F, G	1	R1	1, 2, 3, 4, 5	R2	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11	R3	1, 2, 3	R9	1, 2, 3, 4, 5, 6, 7	R19
287° to 298°	E, F, G	1	R1	1, 2, 3, 4, 5	R2	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11	R3	1, 3	R10	1, 2, 3, 4, 5, 7	R20
299° to 309°	E, F, G, H	1	R1	1, 2, 3, 4, 5	R2	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11	R3	1, 3	R10	1, 2, 3, 4, 5, 7, 8	R21
310° to 320°	F, G, H	1	R1	1, 2, 3, 4, 5	R2	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11	R3	1, 3	R10	1, 2, 3, 4, 5, 7, 8	R21
321° to 331°	F, G, H, J	1	R1	1, 2, 3, 4, 5	R2	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11	R3	1, 3	R10	1, 2, 3, 4, 5, 7, 8	R21
332° to 343°	G, H, J	1	R1	1, 2, 3, 4, 5	R2	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11	R3	1	R1	1, 2, 3, 4, 5, 7, 8	R21
344° to 354°	G. H. I. K	1	R1	1.2.3.4.5	R2	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11	R3	1	R1	1. 2. 3. 4. 5. 7. 8. 9	R22

Table 6-1 Definition of Evacuation Regions

QUESTION:

EVACUATION TIME ESTIMATE (ETE): ETE-11: Subject: Reconciling details of figures [Basis: 10 CFR 52.79(a); Appendix E to 10 CFR 50; NUREG-0654 FEMA-REP-1, Rev. 1, November 1980, App. 4, Sec. II.E] Figure 10-1 indicates 2 public Reception Centers (one in Bay City and one in Palacios). Figure 10-2 indicates 4 Reception Centers (including a second in Bay City and one in Markham). Neither indicates the school Reception Center in Blessing. Reconcile these figures.

RESPONSE:

Figures 10-1 and 10-2 in Revision 1 of the ETE both identify the same two reception centers in Bay City and in Palacios, respectively. However, Figure 10-2 identifies an additional two Reception Centers. The two additional Reception Centers are improperly labeled in Figure 10-2, these should have been labeled 'Host Schools.'

Section 10 of the ETE addresses evacuation routes and reception centers in regard to resident population evacuation. Therefore, the two 'Host Schools' on Figure 10-2 have been removed in Revision 2 to the ETE. This error was identified during subsequent internal reviews of the ETE and has been corrected in Revision 2 of the ETE to be submitted with the next COLA Revision.

QUESTION:

EVACUATION TIME ESTIMATE (ETE): ETE-12: Subject: Additional detail on analysis of travel times and congestion [Basis: 10 CFR 52.79(a); Appendix E to 10 CFR 50; NUREG-0654 FEMA-REP-1, Rev. 1, November 1980, App. 4, Sec. III] Provide additional detail on the analysis of travel times and congestion: 1) Explain how Figures 7-3 and 7-4 as referenced in Section 7.3 imply that evacuation is a continuous process. 2) Explain how Figure 7.5 indicates the rate at which traffic flows out of the indicated area as stated in Section 7.3. 3) Following the example in Section 7.4 does not yield the result of 4 hours as indicated. Clarify whether REGION R10 in the example should have read "REGION R21" which would correspond to a time of 3:30 rather than 4 hours as indicated. 4) Explain how the traffic management plan identified in Section 9 and Appendix G was integrated into the ETE calculation. Does the time estimate depend upon these controls being in place? Clarify whether the priority for establishing traffic control points (Section 9) has been agreed to by local and state response agencies. 5) There are 28 traffic control points identified in the Attachment D. State of Texas Emergency Management Plan and there are 10 traffic control points identified on Figure G-1. Clarify which arrangement is used in the ETE calculation. Clarify if county or state officials reviewed and concurred with the traffic control point arrangements in the ETE.

RESPONSE:

1. The first sentence of Section 7.3 referencing Figures 7-3 and 7-4 was intended to reflect traffic congestion movement over time. The congestion will continually move towards the outer bounds of the 10 Mile EPZ as individuals evacuate. The intent was to reflect this movement as dynamic and continuous. The reference to Figure 7-5 is intended to graphically reflect the evacuation process over time. At some point in time, there are relatively few evacuating vehicles remaining to evacuate from the EPZ. At that point, towards the end of the evacuation, the curves become parallel to time (i.e., horizontal) thus indicating the concluding segment of a continuous dynamic process. After further review of this paragraph STP has determined to replace the text on page 7-3 as indicated below:

Evacuation is a continuous process, as implied by Figures 7.3 and 7.4. Another format for displaying the dynamics of evacuation is depicted in Figure 7.5 Figure 7-5 indicates that evacuation is a continuous, dynamic process.

- 2. The slopes of these curves at any point in time indicate the rate of evacuation expressed in terms of thousands of vehicles per minute, given the scales used in the plot. Traffic flow rate is commonly expressed as vehicles per unit of time.
- As noted in the RAI the cited REGION 10 in Revision 1 of the ETE should be REGION 21. The example presented on pages 7-5 and 7-6 has been identified during subsequent reviews of the ETE and corrected in Revision 2 of the ETE to be submitted with the next COLA Revision.

4. The ETE calculations do not rely upon any TCP to be manned. The estimates of capacity which are used by the IDYNEV model, and are documented in Appendix K, are based upon the factors described in Section 4 and upon the observations made during the road survey. It is assumed that these capacity estimates are not enhanced nor compromised by the establishment of a TCP at an intersection. As detailed in Section 9, the functions to be performed in the field at TCPs are to (1) facilitate evacuating traffic movements; and (2) discourage those movements that would move travelers closer to the Power Station. The personnel manning these TCPs will also serve a surveillance function to inform the EOC of any problems that occur in the vicinity or problems related to them by evacuees.

The ETE are not dependent on the establishment of TCPs and ACPs. Therefore, manpower and equipment shortages have no effect on ETE calculations.

The local governments have reviewed the traffic management plan and have provided their concurrence.

5. As noted above, the traffic control points do not influence the ETE calculations. Those TCPs are identified by KLD staff as the result of the field survey and the results provided by the evacuation model, IDYNEV. They are considered to be of primary importance in expediting the movement of evacuees from the EPZ. We recommend that these TCPs be manned first by the agencies. Of course, the local response agencies have the responsibility of identifying those locations which are most appropriate for controlling evacuation traffic and may well have considered additional locations as resources permit. All locations identified by KLD are included in the Texas EMP.

QUESTION:

EVACUATION TIME ESTIMATE (ETE): ETE-13: Subject: Additional information and map [Basis: 10 CFR 52.79(a); Appendix E to 10 CFR 50; NUREG-0654 FEMA-REP-1, Rev. 1, November 1980, App. 4, Sec. III.A] 1) Provide additional information to clarify the evacuation routes: The evacuation routes shown on Figure 10-2 do not correspond to the routes presented in Attachment 5 of Chapter 2 of the State of Texas Emergency Management Plan. Clarify which set of evacuation routes would be used. 2) Provide an additional map or maps that include the roadway network with legible nodes: a) Provide a map or maps that include the nodes identified in Appendix K. A larger scale may be necessary. b) Provide a roadway map that includes the sector and quadrant boundaries. c) The existing node network on Figure 1.2 appears to be missing a segment south and east of the plant. A node is represented with inputs from two directions and no output segments. d) Investigate whether the link-node map used for the evacuation time estimates includes the connection at the south-east corner of the main cooling reservoir (MCR). e) The node network of Figure 1-2 includes a segment that is not illustrated in Figure I-1 of the STP 3&4 Emergency Plan Figure I-1 and the 11/20/2003 map of "Designated Evacuation Routes, Traffic and Access Control Points" in the Texas Emergency Management Plan Tab 1 Chapter 2 Attachment 5. Confirm that Bear Ranch Road (CR248) connects with Brimsteader Road (CR241), south of the route intersection with Chinquadin Road (CR 262). f) Clarify what width was used for a 'Full Lane'. Explain why lane widths do not vary within the EPZ?

RESPONSE:

- 1. A comparison of the evacuation routes shown in Figure 10-2 with those of the cited map in the Texas Emergency Management Plan (EMP) reveals that the ETE routes include somewhat more roads than do the EMP routes. For example, the ETE utilizes FM 2853 in the northeast quadrant of the EPZ and FM 521 east of Wadsworth; these are good paved roads suitable for evacuation. The most prominent difference is that the EMP identifies the Colorado River as an evacuation route, but does not identify it as a river; the ETE only shows highways on Figure 10-2. The routes shown in Figure 10-2 would be used in an evacuation.
- 2.a,b) Provided with this response is an annotated version of Figure 1-2 in electronic format (Enclosure A to these responses). This will allow the user to scale the map at his/her convenience. Each node on the map will be labeled so that the listing in Appendix K can be related to the map. This map in electronic form will include the sector boundaries as well as the boundaries of all zones within the EPZ along with their numerical identities. This effort will also correct any omissions or inappropriate directional indications noted in the comment, to ensure that the end product will reflect the evacuation network as modeled by IDYNEV. The electronic Figure 1-2 (Enclosure A) will include responses to items c), d) and e) in this RAI.

f) In Appendix K, the term "full lanes" is used to identify the number of lanes that extends over the entire length of the roadway segment or link; it does not pertain to lane width. Many network links are widened with additional lanes near the downstream intersection (e.g., left-turn bays, right-turn bays, additional through lanes). These additional lanes are all properly represented by the input stream for the I-DYNEV system.

Lane widths certainly do vary from one link to the next and even within one link, as do shoulder width, grade, and horizontal curvature. In accord with NUREG-0654, Appendix 4, Section IIIB, the estimation of capacity (expressed as saturation flow rate in the fifth column of the table in Appendix K) is based on the narrowest section of the roadway segment. The free-flow speed shown in Appendix K is based upon observation of traffic movements during the field survey; these estimates do not necessarily comport with the speed advisory signing. Lane widths were observed but not measured during the field survey.

QUESTION:

EVACUATION TIME ESTIMATE (ETE): ETE-14: Subject: Additional information on roadway segment [Basis: 10 CFR 52.79(a); Appendix E to 10 CFR 50; NUREG-0654 FEMA-REP-1, Rev. 1, November 1980, App. 4, Sec. III.B] Provide additional information on the roadway segment characteristics: Clarify for Appendix K what value was used for lane width. Identify where the narrowest roadway sections exist within the roadway network and explain how this was factored into the calculation.

RESPONSE:

As documented on page 20-3 of the Highway Capacity Manual, the capacity of a two-lane highway is 1700 passenger cars per hour for each direction of travel. The road survey has identified several segments which are characterized by adverse geometrics which are reflected in reduced values for both capacity and speed. These may be identified by reviewing Appendix K.

Link capacity is an input to IDYNEV which calculates the ETE.

Lane widths do vary from one section of road to another. When there is a material change in lane widths along a road that factor is identified and recorded during the field survey. This leads the analyst to insert a node into the link-node diagram that separates one section of roadway from the next to represent the difference in lane width and estimated capacity. Other factors that are considered in defining link boundaries are changes in grade, changes in pavement (which can influence speed and capacity), and changes in geometry such as horizontal curves. The ETE also considered changes in land use; for example, when a road enters a built up area with a lower speed limit, then a node is inserted to mark this change in land use and free speed. All of these factors are considered when estimating the link-specific values of capacity and free speed which are input to the IDYNEV system.

QUESTION:

EVACUATION TIME ESTIMATE (ETE): ETE-15: Subject: Additional information on adverse weather [Basis: 10 CFR 52.79(a); Appendix E to 10 CFR 50; NUREG-0654 FEMA-REP-1, Rev. 1, November 1980, App. 4, Sec. IV.A] 1) Additional information is needed on the adverse weather condition: a) Explain why dense fog which is experienced in coastal settings, including Matagorda County, is not considered an adverse weather case. b) The previous ETE for Units 1 & 2 also included consideration of flooding. Because of the low, flat nature of the local terrain, and the rural nature of the road network, flooding may be a problem. Flood potential is not discussed anywhere in the ETE report, although it is noted in Section 1.3 that flood warning signs were noted during the field survey of the road network. Some of the designated evacuation routes cross rivers and/or smaller streams. Explain why localized flooding could not be an impediment to evacuation. 2) Provide a basis for the adverse weather times in Table 7.1C and D: a) In Table 7.1C, for R06 and R07, there is a reduction in evacuation time from 2:50 to 2:40 between normal conditions and adverse for the Summer weekend midday scenario. Clarify if this is a mistake or provide a basis on why adverse weather would reduce the evacuation time. b) In Table 7.1D explain why adverse weather does not affect the evacuation times for any scenario.

RESPONSE:

1. a) The impact of fog on traffic flow can vary widely from "benign" to "impassable." Empirical data indicate that fog is most prevalent from August through March; the summer months of April through July are generally characterized by low incidence of fog. Empirical data¹ indicates that for visibility in fog greater than 1,000 feet, there is no measurable effect on vehicle speed; for visibility between 500 and 1,000 feet, there is a reduction of approximately 7% in speed within the fog; for visibility of less than 500 feet, the reduction in speed is approximately 15%. An earlier study² analyzed the relationship between vehicle speed and visibility under fog conditions covering two events in 1996. These indicated that the mean speed of travel during fog events characterized by very low visibility, declined by 8 km/hr (about 5 mph), a decline of about 7½ % relative to the base condition when visibility was about 10 km (6.2 miles).

It is seen that the impact of fog on traffic operations is related to the visibility at ground level that is available to motorists. If one assumes that the percent reduction of capacity is comparable to the percent reduction in speed (a reasonable assumption), then the above data suggests that the rain scenarios are applicable to fog conditions as well.

^{1.} Kyte, Michael, et al, "Effect of Environmental Factors on Free Flow Speed," Transportation Research Circular E-C018, 4th International Symposium on Highway Capacity.

^{2.} Liang, Wei Lien, et al, "Effect of Environmental Factors on Driver Speed – A Case Study," Transportation Research Record 1635, Transportation Research Board.

Based on the reduction in capacity and free speed due to fog, a review of Table 7-1C reveals that the reduction of free speed and of capacity to account for rain does not translate into a material difference in ETE relative to good weather.

Additionally, it is the responsibility of the County Emergency Management authorities to assess the safety of a fog condition; if the fog in a particular area of the EPZ is considered to be unsafe for travel, then the protective action recommendation may in fact be "shelter in place" for that area until the fog lifts sufficiently to provide acceptable visibility for travel.

- b) The subject of flooding was discussed with local Emergency Management personnel. The County Emergency Management Coordinator acknowledged that flooding was a problem in the past however; highway reconstruction had eliminated the problem. Consequently, flooding was not considered as part of the ETE based on these inputs.
- a) Table 7-1C of Revision 1 to the ETE does reflect an error in the reduction in the evacuation time between normal conditions and adverse for summer weekend midday. This error was identified during subsequent internal reviews of the ETE and has been corrected in Revision 2 of the ETE to be submitted with the next COLA Revision.
 - b) As shown in Figure J-5, the graphical representations of the evacuation travel times indicate a long flat (i.e., nearly zero flow rate) "tail" of the evacuation time distributions. This indicates that the volume of traffic over the last hour or so of the evacuation is extremely low with few, if any, vehicle interactions on the highway network. Under those conditions, the only effect that could produce a difference in ETE due to rain is the 10% reduction in free speed over the travel distance. Given the relatively short travel difference (less than 10 miles), a speed reduction of 10% does not translate into an increase in travel time of 5 minutes relative to the base condition of no rain. Consequently, all of the ETE scenarios will not be affected at the 100% level.

QUESTION:

EVACUATION TIME ESTIMATE (ETE): ETE-16: Subject: Additional information to clarify assumptions [Basis: 10 CFR 52.79(a); Appendix E to 10 CFR 50; NUREG-0654 FEMA-REP-1, Rev. 1, November 1980, App. 4, Sec. IV.A] Provide additional information to clarify the underlying assumptions on evacuation scenarios: a) Clarify why in table 6.5, the shadow evacuation has 3 values (33%, 49%, and 50%) while Figure 2.1 indicates a maximum shadow evacuation of 30%. b) Employees are identified primarily as plant personnel. Clarify if the plant does reduce to 15% staff during scenarios 3, 4, 5 and 8, 9, 10, 11.c) Clarify why Table 6.4 indicates that 50% of households are residence with commuters in Scenario 1.Whereas assumption 3b in Section 2 states that 70% of households have commuters that will return. d) Table 2 in Appendix 4 of NUREG-0654 shows the desired format for presenting the data and results for each type of evacuation. Each of the evacuation time components is presented along with the total evacuation time. Explain if the methodology used does not allow separating the evacuation time for permanent residents and transients.

RESPONSE:

- a) Figure 2-1 indicates that 30% of the population within the shadow region will "voluntarily" elect to evacuate they are outside the plume exposure pathway of the EPZ. As discussed in the footnote entitled, "Shadow" on page 6-6, the population within the shadow region is comprised of residents and employees. We estimate the number of employees in the shadow region to have the same proportion relative to residents, as we have determined for the EPZ. This proportion is the ratio of 1186 vehicles for employees (shown for Scenarios 6 and 7 in Column 4 of Table 6-5) to the total number of evacuating vehicles used by residents (904 + 890 = 1794, listed in Columns 2 and 3 for Scenarios 6 and 7). This ratio is equal to 0.661. Thus, the total population of residents plus employees within the shadow region is 1.661 x the number of residents. Multiplying 1.661 by 0.3 (the percentage assumed to evacuate) yields 0.50 or the 50% figures shown in Column 6 of Table 6-4 for Scenarios 6 and 7. For Scenarios 1, 2 and 12, the calculation is as follows: $0.661 \times 0.96 + 1 = 1.635$ which multiplies 0.3 to yield 0.49. This is expressed as 49% in the column entitled "Shadow" in Table 6-4. Using the same approach for the remaining scenarios, we take the product of 0.661 and 0.15 and add 1 to yield 1.099. Multiplying this by 0.3 yields 0.33, or 33% listed in Column 6 of Table 6-4.
- b) This is an accurate assessment for the scenarios listed by the NRC in the RAI. A 15% staffing is typical during off hours, normal schedule at STP is four (4) ten (10) hour days Monday –Thursday.

c) As shown in Figure F-6, 50% of households have no commuters. This is the figure shown in Column 3 of Table 6-4 for Scenario 1. As noted in the last paragraph on page F-7, 70% of participants who have commuters in their household, claim that they would await the return of other family members before evacuating and 30% indicated that they would not await the return of other family members. Section 2.3 <u>Study Assumptions</u> 3.b. will be clarified as follows:

70 Percent of those households in the EPZ with commuters will await the return of a commuter before beginning their evacuation trip, based on the telephone survey results.

d) Table 2 of Appendix 4 of NUREG-0654 provides an example of presenting the Summary of Results of Evacuation Times Analysis. The Tables presented in the STP ETE using the 12 scenarios under different times of the day and weather conditions are suitable for application and depiction of the STP ETE results. Additionally, the Tables presented in the STP ETE reflect actual Protective Action Recommendation scenarios, for example 2 mile radius and 5 mile downwind (commonly referred to as 'keyhole').

Appendix 4 of NUREG 0654 IIB identifies the transient population as a 'population segment along with the permanent population subgroup using automobiles constitute the general general population group for which an evacuation time estimate shall be made.' The evacuation process involves the "mixing" of transient vehicles with resident and employee vehicles. The evacuation routes are common for all three classifications. Since the traffic stream is a blend of these vehicles, it is not feasible to separate the evacuation times for each classification. The design of the ETE is to determine the aggregate time for all evacuees.

QUESTION:

EVACUATION TIME ESTIMATE (ETE): ETE-17: Subject: Additional information on various items [Basis: 10 CFR 52.79(a); Appendix E to 10 CFR 50; NUREG-0654 FEMA-REP-1, Rev. 1, November 1980, App. 4, Sec. IV.B] 1) Provide additional information to clarify the development of trip generation times: For the events and activities described in Figure 5-1, explain why item number 2 (aware of accident) is not necessary to include in sequence (b) for residents and in sequence (d). 2) Provide additional information on the on road travel times and delay times: a) Figures 7.3 thru 7.5 indicate Level of Service F (congestion) at 45 minutes, 1.5 hours, and 2.5 hours after advisory to evacuate. Clarify which scenario these Figures represent. Clarify if congestion occurs during other scenarios. Clarify when congestion is alleviated. b) Provide estimates of the delay times at the intersections of State Highway 60 with routes 2668. 521 (north and south interchanges), and Ingram Street in Matagorda. 3) Provide additional information on the assumptions used in developing the ETEs for the non car owning public: Section 8.3 states that buses should be dispatched for transit dependent people after those people have mobilized and are in a position to board the buses. Explain how the time estimate for mobilizing these buses was derived. Explain how the local authorities would inform the transit dependent public the time at which buses should be expected to arrive. 4) Provide additional details for the non-auto owning population: Provide a basis for the assumption that the speed for buses is 30 mph as indicated in Figure 8.6A. According to the HCM, 2000 when stopping and loading twice per mile are included; speeds of 15 mph would be more realistic. Clarify how these speeds can be achieved when buses are mixed with evacuating traffic and traveling through multiple traffic control points. Clarify how many stops the buses are expected to make. Clarify how long a bus is expected to wait for individuals at the bus stops. Explain why the chronology in Figure 8.1 does not include time to notify drivers and time for drivers to travel to bus depot, pick up the bus and receive routing instructions. Provide a basis for unloading the bus in 5 minutes as shown in Figure 8.6A and discussed in Section 8.3. This appears aggressive for individuals who are likely carrying belongings for 3 days. Explain why the ETE for the second wave in Table 8.6A and B is not an aggregate value inclusive of the time for the first wave. Alternately, provide a total ETE for the transit dependent population. 5) Provide information on any special services that might be initiated to serve this population subgroup: a) The emergency planning brochure states that disabled residents that may need help in an evacuation register with the Matagorda County Chapter of the Red Cross. Those who require assistance during a disaster should place an orange "Assistance Needed" card in their window. Clarify whether any non-ambulatory special needs individuals have been identified in the population? Clarify whether Matagorda County has received any requests that might require special vehicles to support mobilization and transportation transit dependent individuals. Clarify, if necessary, whether the time to obtain transportation, mobilize and transport the nonambulatory subgroup has been included in the ETE calculation. b) Because of the limited number of bus routes (effectively 2), there is considerable distance to potential pick-up points from individual homes. Explain (i) where assembly locations are designated, and (ii) how transit-dependent individuals get to the assembly points. 6) Provide additional information on the assumptions used in developing the ETE for special facilities: a) Clarify the number of buses and drivers needed to evacuate the schools. b) Clarify the mobilization time for buses and

drivers. Section 8.3 states that drivers remain at or near the school throughout the day. The State of Texas Emergency Management Plan indicates some buses could come from Bay City or Palacios. Clarify if the time to notify drivers, time for drivers to mobilize, and drive to the schools has been considered. c) Table 8.4A indicates bus speeds of 45 mph for school buses. Clarify how these speeds can be achieved when mixed with evacuating traffic and traveling through multiple traffic control points. Clarify how the congestion indicated on Figures 7.3 and 7.4 affect the speed of the buses. d) Provide information about the ability to quickly shut down and evacuate the Celanese/OXEA and Lyondell/Equistar chemical facilities, and the necessity of any residual staff, and whether these considerations are included in Section 5, Distribution No. 2. e) There is a small community just east of the main cooling reservoir (MCR) with no direct road access ("Exotic Isle"). Explain why this should not be considered to be a "special facility". 7) Provide additional information about permanent resident and transient evacuation times: A variant of the NUREG-0654 format is used. Explain if there is a difference in the evacuation times for permanent residents and transients (the methodology used may not allow it)

RESPONSE:

- 1. KLD has reviewed and will revise the presentation of Figure 5-1 to clarify the description of the underlying mobilization process. This new version is given below and will be included in the next revision of the ETE.
- 2. a) Figures 7-3 and 7-4 indicate the locations experiencing Level of Service (LOS) F at 45 minutes, and at 1 hour and 15 minutes after the Advisory to Evacuate. The first paragraph of Section 7.2, describes that these figures apply for the evacuation of the entire EPZ (Region R03) for good weather conditions (Scenario 3). While congestion does occur for some other scenarios and regions, those that are shown on Figures 7-3 and 7-4 are the most severe (for good weather). For Scenario 3, the congestion dissipates at approximately 1 hour and 30 minutes after the advisory to evacuate.
 - b) Revisions to Figures 7-3 and 7-4 will annotate these two figures with the delay times along the approaches that are experiencing LOS F. These revised figures will appear in the next revision of the ETE.
- 3. The mobilization times for the bus drivers is described on page 8-1. The mobilization preparation is described as: bus drivers must be notified; drivers must travel to bus depot; and must be briefed.

The county plan and procedures describe the process local authorities would use to inform the transit-dependent public. Additionally, page 5-2 discusses briefly advisories and notification processes.

4. The ETE estimated a "run" speed of 30 mph as indicated in Figure 8-6A. This run time does not take into effect the time required to pick up passengers; an additional 15 minutes per route is estimated as "pickup time." Thus, the total travel time for Route 1 is 13 + 15 minutes. For this short route the average speed, including the effect of stopping to service evacuees, is 13.5 mph. For Route 2 the average speed is about 21 mph while that

for Route 3 is about 13 mph. These are reasonable estimates which are consistent with the suggested speed of 15 mph provided by the commenter; the shorter the route, the lower the speed because of more frequent stopping. The run speed of 30 mph is conservative when compared with the free speeds listed in Appendix K. We will change the title in Table 8-6 from "Route Travel Time" to "Run Travel Time" to more accurately reflect the data.

Additional details are provided in the response to ETE-7 describing transit dependent evacuees proceeding the arrival time of the bus. Therefore, bus wait times are expected to be minimal

The chronology of Figure 8-1 presents the activity, $A \rightarrow B$, as "Driver Mobilization." Driver Mobilization is described on page 8-1. As indicated there, it is expected that bus drivers must be alerted, must travel to the bus depot and be briefed.

As discussed in our response to ETE-9, the "alighting service times" are estimated at 1.7 to 2 seconds per person in the HCM. Even assuming a maximum of 60 passengers per bus, this figure yields a total discharge time of 2 minutes. Our estimate of 5 minutes assigns the factor of $2\frac{1}{2}$ to account for the expectation that passengers will have luggage with them that will slow the process.

The "second wave" performed by the buses that have already evacuated the school children is estimated to "launch" some 70 minutes after the advisory to evacuate. This estimate is given by adding the figures in Table 8-6A that appear in Columns 8, 9 and 10. These buses then return to the EPZ, travel their respective routes picking up transit-dependent evacuees and then reverse direction and travel to the relocation area. For Route 1 the total time elapsed since the Advisory to Evacuate until these evacuees reach the relocation center, is the figure shown: 115 minutes or 1:55 (hr:min). This is an "aggregate value inclusive of the time for the first wave."

Note that the term "second wave" applies to the buses performing this service; chronologically, these buses actually travel the route before the buses that are mobilized from the surrounding areas and identified as the "Single Wave." It is reasonable to expect that the transit-dependent evacuees would take less time to prepare for their walk to the bus route since they are limited to take only those belongings they can physically carry during the walk to the bus route. Thus, the second traversal of buses along these routes, which takes place between 2½ and 3 hours after the Advisory to Evacuate, should service all those transit-dependent people who have not been serviced by the earlier buses. Consequently, the total ETE under good weather according to Table 8-6A is 3:20, while that for the rain scenario (Table 8-6B) is 3:45. We shall revise the discussion on page 8-7 along the lines discussed above. In addition, we shall include the discussion that follows under Item 5, which follows.

5. a) The buses that complete the "second wave" will be available for additional assignments at a time roughly 2 hours after the Advisory to Evacuate. These buses can then be deployed as needed to service the homebound people who have no private

vehicles, nor the ability to walk to the pickup routes. Over the period of 2 hours following the Advisory to Evacuate, it is reasonable to assume that the homebound transit-dependent will have made their needs known through telephone communication; this would allow responder agencies to compile a schedule of pickups as needed. These buses can then be dispatched after their second wave is completed to pick up the remaining people within the EPZ. The estimated ETE of 3:20 shown in Table 8-6A will therefore account for this pickup of homebound transit-dependent, as well, since this third sweep should not take materially longer than 1 hour. The implementation details are the responsibility of the emergency response agencies and are not considered explicitly in the ETE. As noted earlier, the discussion on page 8-7 will be expanded to include the above discussion of homebound transit-dependent persons.

b) As noted earlier, we recommend that the pickups would be "flag-stops" rather than designated locations. Those ambulatory transit-dependent persons who live at a considerable distance from the routes designated by the emergency response agency can register by telephone to be picked up by the "third wave" buses discussed above.

6. a) As stated in Table 8-2, the total number of buses and bus drivers is 12. This figure assumes that most of the staff members at the schools will evacuate in their own private vehicles and that none of the students will be picked up by their parents after the Advisory to Evacuate is given. The discussion given in Section 8.2 also assumes that there are no absentees that day.

b) The mobilization time which includes the drive to the schools is estimated at 30 minutes, as discussed on page 8-4 and shown in the second column of Tables 8-4.

c) The estimated speeds are based upon the model outputs. The Matagorda Elementary School students have the longest distance to travel to the EPZ boundary on their way to the relocation center in Bay City, a distance of 15 miles. As shown on Figure 7-3, there is some congestion in the immediate vicinity of the city of Matagorda at 45 minutes after the Advisory to Evacuate. This is the approximate time at which the buses would be traveling along Route 60 towards Bay City. The model output does reveal that the speeds in the immediate vicinity of the school are approximately 12 mph for a distance of 0.16 mile. The remainder of the trip, however, is at speeds that range from 30-70 mph. The total trip is undertaken at an average speed of 45 mph. The figure used, 45 mph, is therefore justified by a detailed analysis of the traffic environment at the time the buses make the evacuation trip from Matagorda Elementary School. The evacuation of the Tidehaven Schools, to Markham and to Blessing, experience no exposure to congestion. Their average speed could exceed 45 mph. Free flowing school buses, however, generally travel at lower speeds than private vehicles; therefore, a mean speed of 45 mph is appropriate.

d) As stated on page 5-6, distribution 2 reflects data obtained directly by the telephone survey. This distribution shows some employees require up to an hour and a half before they leave their place of employment. As noted in the discussion on that page, "personnel or farmers responsible for equipment would require additional time to secure
their facility." No specific attempt was made to determine how long it would take to shut down special equipment and maintain security at the cited installations by employees who remain on-site.

e) Exotic Isle is a 35-acre residential community which is located on an island in the Colorado River that can be accessed by tram or barge. It is anticipated that when fully developed it will contain only 15 homes with one permanent resident. Dockage is provided for private boats. Therefore, access to the mainland for residents of this small community is always available and would allow the residents to evacuate in the same timeframe as residents elsewhere within the EPZ. NUREG-0654 defines special facilities "… such as hospitals and industrial centers" and schools. Exotic Isle, as a small residential community, does not qualify in our view as a special facility.

7. As mentioned earlier, Table 2 in Appendix 4 of NUREG-0654 does not specify a separate evacuation time for transients. This is probably due to the recognition that vehicles carrying transients, residents and employees will mix on the highway system during the evacuation process. As such, it is not possible to distinguish between different classes of vehicles as members of the evacuating traffic environment. Such a separation of ETE for these population segments is not required by the guidance.



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Figure 7-3. Traffic Congestion at 45 Minutes after the Advisory to Evacuate

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Figure 7-4 Traffic Congestion at 1 Hour and 15 Minutes after the Advisory to Evacuate



QUESTION:

EVACUATION TIME ESTIMATE (ETE): ETE-18: Subject: Additional information on evacuation, and on State/ County planners [Basis: 10 CFR 52.79(a); Appendix E to 10 CFR 50; NUREG-0654 FEMA-REP-1, Rev. 1, November 1980, App. 4, Sec. V] 1) Provide additional information to support the time required for confirmation of evacuation: a) The requirement states the "time required for confirmation of evacuation shall be estimated". Clarify why the time for 80% of the population to evacuate is relevant. Provide an estimate of the time needed to confirm that the evacuation is complete. b) The ETE states that the confirmation time is suggested and that the county may have its own approach. Clarify whether the time for confirming the evacuation been agreed upon by the responsible county officials? Provide information to support that the time required to obtain the personnel needed to confirm the evacuation has been included in the time estimate. Provide information on the time and resources needed to obtain telephone numbers for the EPZ which are necessary prior to beginning the telephone survey. c) Provide information on the effect of intelligent transportation systems (ITS), dynamic message signs, and highway advisory radio, on the ETE as identified in Section 9. Explain if these systems were considered in the time estimate. If these were considered, clarify whether these systems and equipment are available within the EPZ. 2) Provide additional information on the involvement of State and county emergency planners and local and state police: Clarify whether state and local organizations involved in emergency response reviewed the entire ETE plan or just the traffic control plan. Clarify, whether state and local organizations provided any comments. Include any comments and resolution of such comments in the ETE document.

RESPONSE:

a) The time for 80% of the population to evacuate is not relevant in the context of 1. the recommended confirmation procedure. As stated on page 12-1, "we believe it is reasonable to assume for the purpose of estimating sample size that at least 80% of the population within the EPZ will comply with the advisory to evacuate" [emphasis added]. This assumption yields a sample size of 246 households for a confidence level of 95% and an allowable margin of error of 5%. If we had assumed that only 10% of the population would not comply, then the required sample size would be somewhat smaller: 184 households, as stated on page 12-2. If, at the completion of this telephone survey, 20% of the respondents had not yet begun the evacuation trip, then it would be necessary to perform the confirmation process again at a later time. Assuming that the first round of calls scheduled to begin $2\frac{1}{2}$ hours after the Advisory to Evacuate results in a favorable outcome (i.e., fewer than 20% of the population remain at that time), then the total time to complete this confirmation process depends on the number of people who are available to perform this action. The total number of person-hours is estimated at 7; therefore, if 7 people are available, the entire process will take 1 hour. If, say, only 3 people were available, then the process would take approximately 2:20.

- b) The questions related to the county approach for confirming the evacuation address implementation issues rather than ETE estimates. Procedural criteria for emergency response implementation identify the County Emergency Coordinator as tracking the status of the evacuation.
- c) With respect to the application of ITS in contributing to the emergency response, we provide the following references:
 - National ITS Architecture Team, "Disaster Response and Evacuation User Service, and Addendum to the ITS Program Plan," July 15, 2003. www.itsdocs.fhwa.dot.gov/jpodocs/repts_pr/14064.html
 - Booz Allen Hamilton, Literature Search for Federal Highway Administration (ITS-JPO), Assessment of State of the Practice and State of the Art in Evacuation Transportation Management, Contract No. DTFH61-01-00183, February, 2006.

ITS Systems were not considered in the calculation of evacuation time estimates.

2. The local organizations involved with the Emergency Planning effort in Matagorda County have reviewed and commented on the entire ETE. These comments have been incorporated into the ETE where agreed to between STP, KLD, and county Emergency Coordinators. These comments were not specifically identified as either STP or county when presenting comments to KLD for incorporation into the ETE. The comments were agreed to through a series of face to face meetings over time between STP and county coordinators in a collegial effort. The final ETE does contain the local emergency response comments submitted as part of the final report.

No COLA revision is required as a result of this RAI response.

QUESTION:

ONSITE EMERGENCY PLAN: SITE-1: Subject: Formatting "Table of Contents" [Basis: 10 CFR 50.47(b); Appendix E to 10 CFR 50] Refer to the Emergency Plan "Table of Contents": 1) Provide a formatted "Table of Contents" with a header identifying "Section", "Title" "Page", etc. 2) 5.3 is titled "Threshold Value Technical Basis"; provide clarification on what the threshold values are for, 3) Section 5.5, 5.6.1, 5.6.2, 5.6.3, 5.7, 5.8: clarify for which organization(s) these items are referenced

RESPONSE:

- 1) STP will reformat the Emergency Plan's Table of Contents to include the Section, Title, and Page in Revision 2 to the Emergency Plan, as shown on the next page.
- 2) STP will revise the title of Section 5.3 from "Threshold Value Technical Basis" to "Emergency Action Level Basis," which is more descriptive of the purpose of Section 5.3. The EAL Basis document Section 5.3 will be revised in its entirety to comply with the current version of NEI 99-01 Revision 5 and will be submitted with revision 2 of the COLA. The cover sheet for COLA Part 5.3 with the marked-up and replacement text is provided as shown on page 3 of this RAI response.
- 3) The sections heading for section 5.5, 5.6.1, 5.6.2, 5.6.3, 5.7, 5.8: will be clarified as shown in the response to 1) above.

5.0 Table of Contents

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5.3 Emergency Action Levels

South Texas Project

Units 3 and 4

Threshold Value Emergency Action Level

Technical Basis

QUESTION:

ONSITE EMERGENCY PLAN: SITE-2: Subject: Verification of citation [Basis: 10 CFR 50.47(b); Appendix E to 10 CFR 50] Emergency Plan Section "A Introduction", Section C.3 and some other Sections cite "NUREG-0654/Federal Emergency Management Agency Report-1, Rev. 1". The title of this citation appears wrong; verify the exact title of this citation and provide correction.

RESPONSE:

The title of the citation "NUREG-0654/Federal Emergency Management Agency Report-1, Rev. 1" will be changed to "NUREG-0654/FEMA-REP-1, Rev. 1". This change will be reflected in Emergency Plan Sections A, C.3, E.3, J.10.1, M, and Addendum N-1.

The following marked-up and replacement text will be inserted in the above identified Emergency Plan Sections:

"NUREG-0654/Federal Emergency Management Agency Report-1, Rev. 1" "NUREG-0654/FEMA-REP-1, Rev. 1".

QUESTION:

ONSITE EMERGENCY PLAN: SITE-3: Subject: Clarification on EPZ population distribution [Basis: 10 CFR 50.47(b); Appendix E to 10 CFR 50] Section "A.7 Station Population Areas" refers to Table A-1 and states: "The estimated population based on a 2000 census, within the two (2) mile radius of the Station is 0, and within the five (5) mile radius is 580". It appears that the number 580 applies to the total population of emergency planning zones 1 through 5 appearing in Table A-2. Clarify how "580" applies to the population within five (5) mile radius.

RESPONSE:

STP will revise Section A.7 of the Emergency Plan to show the estimated population within the five (5) mile radius as 391, as shown below:

A.7 Station Population Areas

The area surrounding the Station is sparsely populated. Table A-1 contains the population distribution data within a ten (10) mile radius of the Station divided by sectors. The estimated population, based on a 20020census, within the two (2) mile radius of the Station is 0, and within the five (5) mile radius is 580 391. The largest population concentration is approximately 12 miles north-northeast of the Station in Bay City, which is outside the 10-mile Emergency Planning Zone. The estimated 2002 residential population within the ten-mile radius is 2,875. Table A-2 provides a distribution population density by zones.

QUESTION:

ONSITE EMERGENCY PLAN: SITE-5: Subject: Clarification on references to procedures [Basis: 10 CFR 50.47(b); Appendix E to 10 CFR 50] Previous references to some procedures (e.g., 0EPR01-ZV-IN01 in Emergency Plan, Section D.1 and Section D.2) have been struck out. Provide clarification if those procedures have been altogether eliminated, or replaced with new procedures, and if so, provide new references in the appropriate locations of the Emergency Plan.

RESPONSE:

STP will revise Sections D.1 second paragraph and D.2 third paragraph first and second sentences, as indicated below, of the Emergency Plan to include a specific reference to Emergency Response Procedure 0ERP01-ZV-IN01, "Emergency Classification," in lieu of a description of the procedure. Procedure 0ERP01-ZV-IN01 has not been eliminated and remains in effect. The following marked-up and replacement text will be inserted in the above identified Emergency Plan Sections:

D.1 Event Classifications second paragraph:

The technique for evaluation and classification of emergencies at the Station, based on specific observable data or Control Room instrumentation, is delineated in Emergency response Procedures for 0ERP01-ZV-IN01, Emergency Classification.

D.2 Safety features third paragraph first and second sentences:

Emergency Response Procedures for 0ERP01-ZV-IN01, Emergency Classification, and Tables D-1 and D-2 provide initiating conditions that lead to an Emergency Action Levels and associated emergency classification. Emergency Response Procedures for 0ERP01-ZV-IN01, Emergency Classification, contains process parameter instrumentation and corresponding values, equipment status, and non-process conditions and events for identifying the initiating conditions and events that constitute the Emergency Action Level for each classification.

QUESTION:

ONSITE EMERGENCY PLAN: SITE-6: Subject: Confirmation and conclusion on a 50.54(g) review [Basis: 10 CFR 52.79(41), 10 CFR 52.79(b)(4)(last sentence), 10 CFR 50.54(q); RG 1.206, Section 13.3.2] RG 1.206, Section C.I.13.3.2 Emergency Plan Considerations for Multiunit Sites states: If the new reactor is located on, or near, an operating reactor site with an existing emergency plan (i.e., multiunit site), and the emergency plan for the new reactor includes various elements of the existing plan, the application should do the following: (2) Include a review of the proposed extension of the existing site's emergency plan pursuant to 10 CFR 50.54(q), to ensure that the addition of a new reactor(s) would not decrease the effectiveness of the existing plans and the plans, as changed, would continue to meet the standards of 10 CFR 50.47(b) and the requirements of Appendix E to 10 CFR Part 50. Note: Reference is made to the conference call of 10/29/07, 3:15 p.m. with Mr. Fred Puleo, representing the applicant: The applicant said they had performed a review of proposed extension of the existing site's emergency plan pursuant to10 CFR 50.54(q), and determined that the addition of two new reactors would not decrease the effectiveness of the existing plans. This statement is not included in the application, and explicit documentation in support of this does not exist. Provide a statement confirming that a review of the proposed extension of the existing site's emergency plan pursuant to 10 CFR 50.54(q) was performed, and it was determined that the addition of two new reactors would not decrease the effectiveness of the existing plans, and the plans as changed, would continue to meet the standards of 10 CFR 50.47(b) and the requirements of Appendix E to 10 CFR Part 50.

RESPONSE:

The 50.54(q) evaluation checklist is enclosed below as the response to this RAI.

No COLA revision is required as a result of this RAI response.

Emergency Plan Revision				
Emergency Plan Revision Checklist Page 1 of 5				

Proposed revisions to the STP Emergency Plan shall be checked against each of the following checklist items. The Reviewer shall answer each checklist item by initialing in the space provided. Any item answered YES shall be described in full detail. Provide supplemental sheets, as required.

10 CFR 50.54(q) states, in part:

The nuclear power reactor licensee may make changes to these plans without Commission approval only if the changes do not decrease the effectiveness of the plans and the plans, as changed, continue to meet the standards of 10 CFR 50.47(b) and the requirements of Appendix E of this part. NUREG 0654/FEMA-REP-1, Rev. 1 provides specific guidance in regard to the requirement of these standards.

- a) Does the revision affect this standard?
- b) Does the revision decrease the effectiveness of the STP Emergency Plan?
- c) Bases for answer to a) and/or b).

Standards

- 1. Primary responsibilities for emergency response by the licensee and State and County organizations within the Emergency Planning Zones have been assigned, the emergency responsibilities of the various supporting organizations have been specifically established, and each principal response organization has staff to respond and to augment its initial response on a continuous basis
 - a) YES X NO (If NO, skip b and c)
 - b) YES _____ NO <u>X</u> N/A
 - c) BASES: Editorial changes to revise a federal agency name and add a description of Advanced Boiling Water Reactor (ABWR) Vendor.
- 2. Onshift licensee responsibilities for emergency response are defined, adequate staffing to provide initial facility accident response in key functional areas is maintained at all times, timely augmentation of response capabilities is available and the interfaces among various onsite response activities and offsite support and response activities are specified.
 - a) YES X NO (If NO, skip b and c)
 - b) YES _____ NO <u>X</u> N/A
 - c) BASES: <u>Several wording clarifications. Clarification that TSC can be activated earlier than at</u> an alert. Some staffing now required to be in place in 60 min. instead of 75 min.

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- 3. Arrangements for requesting and effectively using assistance resources have been made, arrangements to accommodate State and County staff at the licensee's Emergency Operation Facility have been made, and other organizations capable of augmenting the planned response have been identified.

 - a) YES _____ NO _X (If NO, skip b and c)

 b) YES _____ NO _____ N/A

 c) BASES: _____
- An emergency classification and emergency action level scheme, the basis of which include facility 4. system and effluent parameters, is in use by the licensee, and State and County emergency management plans call for reliance on information provided by facility licensees for determinations of minimum initial offsite response measures.
 - a) YES_X____ NO _____ NO __X (If NO, skip b and c)
 - b) YES _____ N/A
 - c) BASES: Adoption of NEI 99-01 Revision 5 guidance for Units 3 and 4 for the classification of accidents. This is the latest industry guidance approved by the NRC and represents an improvement in effectiveness.
- Procedures have been established for notification, by the licensee, of State and County response 5. organizations and for notification of emergency personnel by all organizations; the content of initial and follow-up messages to response organizations and the public has been established; and means to provide early notification and clear instruction to the populace within the plume exposure pathway Emergency Planning Zone (EPZ) have been established.
 - a) YES _____ NO X (If NO, skip b and c)
 - b) YES _____ NO ____ N/A c) BASES: _____
- Provisions exist for prompt communications among principal response organizations to emergency 6. personnel and to the public.
 - a) YES _____ NO <u>X</u> (If NO, skip b and c)
 - _____ NO _____ N/A b) YES
 D)
 TES _____
 NU _____
 N/A

 c)
 BASES: _____

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Information is made available to the public on a periodic basis on how they will be notified and what their initial actions should be in an emergency (e.g., listening to a local broadcast station), the principal points of contact with the news media for dissemination of information during an emergency (including the physical location or locations) are established in advance, and procedures for coordinated dissemination of information to the public are established.

a)	YES	NO X	(If NO, skip b and c)
b)	YES	NO	N/A
c)	BASES:		

- Adequate emergency response facilities and equipment to support the emergency response are 8. provided and maintained.
 - NO_ a) YES X (If NO, skip b and c)
 - NO XN/A b) YES ______
 - c) BASES: Changes to accommodate separate Unit 3 & 4 OSC, TSC, and Plant Information Data Systems
- 9. Adequate methods, systems, and equipment for assessing and monitoring actual or potential offsite consequences of a radiological emergency condition are in use.
 - NO _____ NO __X__ (If NO, skip b and c) a) YES X
 - b) YES N/A
 - c) BASES: Relocation of some detailed technical information related to the location of the seismic monitoring equipment back to the UFSAR.
- 10. A range of protective actions have been developed for the plume exposure pathway EPZ for emergency workers and the public. Guidelines for the choice of protective actions during an emergency, consistent with Federal guidance, are developed and in place, and protective actions for the ingestion exposure pathway EPZ appropriate to the locale have been developed.
 - a) YES _____ NO <u>X</u> (If NO, skip b and c) b) YES _____ NO ____ N/A

 - c) BASES:

Emergency Plan Revision				
Emergency Plan Revision Checklist Page 4 of 5				

- 11. Means for controlling radiological emergency exposures, are established for emergency workers. The means for controlling radiological exposures shall include exposure guidelines consistent with EPA Emergency Worker and Lifesaving Activity Protective Action Guidelines.
 - a)
 YES X
 NO
 (If NO, skip b and c)

 b)
 YES X
 NO X
 N/A

 - c) BASES: Minor editorial wording changes

12. Arrangements are made for medical services for contaminated injured individuals.

- a) YES _____ NO X (If NO, skip b and c) b) YES _____ NO ____ N/A _____ N/A

13. General plans for recovery and reentry are developed.

- a) YES _____ NO X (If NO, skip b and c) N/A
- NO _____ b) YES _____
- c) BASES:
- 14. Periodic exercises are conducted to evaluate major portions of emergency response capabilities, periodic drills are conducted to develop and maintain key skills, and deficiencies identified as a result of exercises or drills are corrected.
 - a) YES _____ NO <u>X</u> (If NO, skip b and c)
 - b) YES _____ NO ____ N/A
 - c) BASES:

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- Radiological emergency response training is provided to those who may be called on to assist in an emergency.
 - a) YES _____ NO X___ (If NO, skip b and c)
 - b) YES _____ NO ____ N/A
 - c) BASES: ______
- Responsibilities for emergency plan development, review, and distribution are established, and planners are properly trained.
 - a) YES _____ NO _X (If NO, skip b and c) b) YES _____ NO ____ N/A
 - c) BASES: _

REVIEW FINDINGS: The STP Emergency Plan is revised to accommodate new Advanced Boiling Water Reactor Units 3 and 4. In-plant facilities, organization, staffing, training and procedures will be separate for Units 3 and 4 and meet the same standards as in the existing plan. The latest industry and NRC guidance for Emergency Classification (NEI-99-01-Rev.5) has been adopted for Units 3 and 4. Accident assessment and protective response meet the same standards as the existing plan. Radiological exposure control, media relations, recovery and reentry are likewise not changed. The Emergency Plan has clarified that emergency personnel contact information must be verified in addition to being updated on a quarterly basis. From an overall perspective, drills and exercises for four units will provide more experience and training for offsite support functions such as the Joint Information Center. It is judged that some of these changes will actually improve effectiveness of the plan and collectively there will be no decrease in effectiveness of the Emergency Plan as a result of this revision.

REVIEWER: m REVIEW APPROVAL: Supervisor, Licensing Units 3 and 4

DATE: 8/12/08 DATE:

QUESTION:

ONSITE EMERGENCY PLAN: SITE-7: Subject: Verification of Appendix E cross reference [Basis: 10 CFR 50.47(b); NUREG-0654, FEMA-REP-1, Rev. 1, November 1980] Several NUREG-0654 Evaluation Criteria cross references to Appendix E, IV, that is provided in "Attachment 1 Cross Reference" to Emergency Plan, appear to be less or not appropriate; for example, "Attachment 1 Cross Reference" identifies Appendix E, IV.A.6 as being applicable to NUREG-0654 Criterion A.1.a. Appendix E, IV.A.8 appears more appropriate in this case. Verify this and all cross references and provide correction, or provide justification to retain the statement as written.

RESPONSE:

STP has revised the Emergency Plan Attachment 1-Cross Reference for NUREG-0654 Criterion A.1.a from Appendix E, IV.A.6 to Appendix E, IV.A.8.

STP has reviewed the Cross References for applicability to the criterion in 10CFR50 Appendix E, IV. Changes will be incorporated to ensure the appropriate cross references are provided.

The revised Emergency Plan, Attachment 1-Cross Reference is provided as an enclosure below to this response. The below revised Cross Reference also incorporates additional RAI Responses.

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Attachment 1 Cross Reference

A. Assignment of Responsibility (Organization Control)

Planning Standard- 50.47(b)(1)

Primary responsibilities for emergency response by the nuclear facility licensee, and by State and local organization within the Emergency planning Zones have been assigned, the emergency responsibilities of the various supporting organizations have been specifically established, and each principal response organization has staff to respond and to augment its initial response on a continuous basis.

	NUREG-0654-Evaluation Criteria	Plan Section	Appendix E IV	RAIs	Other Documents
1a	Each plan shall identify the State, local, Federal and private sector organizations (including utilities), that are intended to be part of the overall response organization for Emergency Planning Zones.	B.1, B.2, B.3, B.4, B.5	<i>A.6-8</i>		
b.	Each organization and sub-organization having an operational role shall specify its concept of operations, and its relationship to the total effort.	B.1, F B.2, B.3, B.4, B.5, B.6	<i>A</i> .7		
С.	Each plant shall illustrate these interrelationships in a block diagram.	Fig. B-1, C- 1, C-5			
d.	Each organization shall identify a specific individual by title who shall be in charge of the emergency response.	B.6, C.1, C.3	A.2.c		
е.	Each organization shall provide for 24-hour per day emergency response, including 24 hour per day manning of communications links.	B.2, B.3, B.4, B.5, C.3	A.2	GGNS 13.3-16	LOAs
2a	Each organization shall specify the functions and responsibilities for major elements and key individuals by title, of emergency response, including the following: Command and Control, Alerting and Notification, Communications, Public Information, Accident Assessment,	B.1, B.2, B.3, B.4, C.2, C.3, E, G, H, K	A.4	GGNS 13.3-13 GGNS	

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			Appendix E		Other
	NUREG-0654-Evaluation Criteria	Plan Section	IV	RAIs	Documents
	Public Health and Sanitation, Social Services, Fire and Rescue, Traffic Control, Emergency Medical Services, Law Enforcement, Transportation, Protective Response (including authority to request Federal assistance and to initiate other protective actions), and Radiological Exposure Control. The description of these functions shall include a clear and concise summary such as a table of primary and support responsibilities using the agency as one axis, and the function as the other. (See Section B for licensee).	Table B-1 Figure B-1		13.3-14	
<i>b</i> .	Each plan shall contain (by reference to specific acts, codes or statutes) the legal basis for such authorities.	State Plan			
3.	Each plan shall include written agreements referring to the concept of operations developed between Federal, State, and local agencies and other support organizations having an emergency response role within the Emergency Planning Zones. The agreements shall identify the emergency measures to be provided and the mutually acceptable criteria for their implementation, and specify the arrangements for exchange of information. These agreements may be provided in an appendix to the plan or the plan itself may contain descriptions of these matters and a signature page in the plan may serve to verify the agreements. The signature page format is appropriate for organizations where response functions are covered by laws, regulations or executive orders where separate written agreements are not necessary.	А, В		GGNS 13.3-7	LOAs
4.	Each principal organization shall be capable of continuous (24-hour) operations for a protracted period. The individual in the principal organization who will be responsible for assuring continuity of resources (technical, administrative, and material) shall be specified by title.	B.4, C.1, C.3, C.4			

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B. Onsite Emergency Organization

Planning Standard-50.47(b)(2)

On-shift facility licensee responsibilities for emergency response are unambiguously defined, adequate staffing to provide initial facility accident response in key functional areas is maintained at all times, timely augmentation of response capabilities is available, and the interfaces among various onsite response activities and offsite support and response activities are specified.

	NUREG-0654-Evaluation Criteria	Plan Section	Appendix E IV	RAIs	Other Documents
1.	Each licensee shall specify the onsite emergency organization of plant staff personnel for all shifts and its relation to the responsibilities and duties of the normal staff complement.	C.3 1.1, 2.1	A.2.a A.2.b	VEGP 13.3-8	GL 82-33
2.	Each licensee shall designate an individual as emergency coordinator who shall be on shift at all times and who shall be the authority and responsibility to immediately and unilaterally initiate any emergency actions, including providing protective action recommendations to authorities responsible for implementing offsite emergency measures.	C.1, C.2, C.3, C.4.1, C.4.9	A.2.c		
3.	Each licensee shall identify a line of succession for the emergency coordinator position and identify the specific conditions for higher level utility officials assuming this function.	C, C.3, C.3.1, C.4, C.4.1, C.4.9			
4.	Each licensee shall establish the functional responsibilities assigned to the emergency coordinator and shall clearly specify which responsibilities may not be delegated to other elements of the emergency organization. Among the responsibilities which may not be delegated shall be the decision to notify and to recommend protective actions to authorities responsible for offsite emergency measures.	C.2			
5.	Each licensee shall specify the positions or title and major tasks to be performed by the persons to be assigned to the functional areas of	C.3, C.4,	A.2		GL 82-33

	NUPEC 0654 Evaluation Critoria	Dian Section	Appendix E	D A Is	Other Decuments
	emergency activity. For emergency situation Crhera be made for all shifts and for plant staff members, both onsite and away from the site. These assignments shall cover the emergency functions in Table B-1 entitled, Minimum Staffing Requirements for Nuclear Power Plant Emergencies. The minimum on-shift staffing levels shall be as indicated in Table B-1. The licensee must be able to augment on-shift capabilities within a short period after declaration of an emergency. This capability shall be as indicated in Table B-1.	Table C-1	A.3 B.4		Documents
6.	Each licensee shall specify the interfaces between and among the onsite functional areas of emergency activity, licensee headquarters support, local services support, and State and local government response organization. This shall be illustrated in a block diagram and shall include the onsite technical support center and the operational support (assembly) center and the licensee's near-site Emergency Operations Facility (EOF).	Figure F-1	<i>A.3</i>		
7.	Each licensee shall specify the management, administrative, and technical support personnel who will augment the plant staff as specified in the table entitled Minimum Staffing Requirements for Nuclear Power Plant Emergencies, (Table B-1) and in the following areas:	C.4 Table C-1	A.5		
а.	logistics support for emergency personnel, e.g., transportation, communications, temporary quarters, food and water, sanitary facilities in the field, and special equipment and supplies procurement;	<i>C.4.7, C.4.12</i> <i>F.8.3</i>	A.5		
<i>b</i> .	technical support for planning and reentry/recovery operations;	L.6	Н		
с.	management level interface with governmental authorities, and	C.4.9, C.4.13	E.9		

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				1 42	
	NUREG-0654-Evaluation Criteria	Plan Section	Appendix E IV	RAIs	Other Documents
d.	release of information to news media during an emergency (coordinated with governmental authorities).	K.5, K.7, K.8			
8.	Each licensee shall specify the contractor and private organizations who may be requested to provide technical assistance to and augmentation of the emergency organization.	B.5	A.5		
9.	Each licensee shall identify the services to be provided by local agencies for handling emergencies, e.g., police, ambulance, medical, hospital, and fire-fighting organizations shall be specified. The licensee shall provide for transportation and treatment of injured personnel who may also be contaminated. Copies of the arrangements and agreements reached with contractor, private, and local support agencies shall be appended to the plan. The agreements shall delineate the authorities, responsibilities, and limits on the actions of the contractor, private organization, and local services support groups.	B.4, B.5, B.5.7, J.5	A.6		

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C. Emergency Response Support and Resources

Planning Standard- 50.47(b)(3)

Arrangement for requesting and effectively using assistance resources have been made, arrangements to accommodate State and local staff at the licensee's near-site Emergency Operations Facility have been made, and other organizations capable of augmenting the planned response have been identified.

	NUREG-0654-Evaluation Criteria	Plan Section	Appendix E IV	RAIs	Other Documents
1.	The Federal government maintains in-depth capability to assist licensees, States and local government through the Federal Radiological Monitoring and Assessment Plan (formerly Radiological Assistance Plan (RAP) and Interagency Radiological Assistance Plan (IRAP)). Each State and licensee shall make provisions for incorporating the Federal response capability into its operation plan, including the following:				
а.	specific persons by title authorized to request Federal assistance; see A.1.d., A.2.a.	B.4.10	A.8	VEGP 13.3-39	
<i>b</i> .	specific Federal resources expected, including expected times of arrival at specific nuclear facility sites; and	B.4.10, B.4.11, B.4.12		GGNS 13.3-10	
с.	specific licensee, State and local resources available to support the Federal response, e.g., air fields, command posts, telephone lines, radio frequencies and telecommunications centers.	G.4, G.6, G.8, G.13, G.14 Addendum E-1			
2a.	Each principal offsite organization may dispatch representatives to the licensee's near-site Emergency Operations Facility. (State technical analysis representative at the near site EOF are preferred.)	B.2.1, G.8			
<i>b</i> .	The licensee shall prepare for the dispatch of a representative to principal offsite governmental emergency operations centers.	G.7			

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				1 42	
	NUPEC 0654 Evaluation Critaria	Plan Section	Appendix E	P A Is	Other Documents
	NOREG-0054-Evaluation Chiefia	1 iun Section	11	Л/Н 5	Documents
3.	Each organization shall identify radiological laboratories and their	G.9, J.12		GGNS	
	general capabilities and expected availability to provide radiological monitoring and analyses services which can be used in an emergency.	Table H-1		13.3-7	
4.	Each organization shall identify nuclear and other facilities,	B.2, B.3, B.4,		VEGP	
	organizations or individuals which can be relied upon in an emergency to	B.5, B.6, G.9		13.3-1	
	provide assistance. Such assistance shall be identified and supported by			VEGP	
	appropriate tetters of agreement.			13.3-2	
				GGNS	
				13.3-9	

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D. Emergency Classification System

Planning Standard-50.47(b)(4)

A standard emergency classification and action level scheme, the bases of which include facility system and effluent parameters, is in use of the nuclear facility licensee, and State and local response plans call for reliance on information provided by facility licensees for determinations of minimum initial offsite response measures.

	NUREG-0654-Evaluation Criteria	Plan Section	Appendix E IV	RAIs	Other Documents
1.	An emergency classification and emergency action level scheme as set forth in Appendix 1 must be established by the licensee. The specific instruments, parameters or equipment status shall be shown for establishing each emergency class, in the in-plant emergency procedures. The plan shall identify the parameter values and equipment status for each emergency class.	Table D-1 Table D-2 (Generalized Description)	B.1	VEGP 13.3-3 GGNS 13.3-18 GGNS 13.3-19 GGNS 13.3-21	BL 05-02
2.	The initiating conditions shall include the example conditions found in Appendix 1 and all postulated accidents in the Final Safety Analysis Report (FSARS) for the nuclear facility.	Table D-1 Table D-2 (Generalized Description)		VEGP 13.3-3	BL 05-02
3.	Each State and local organization shall establish an emergency classification and emergency action level scheme consistent with that established by the facility licensee.	N/A O.2	В		
4.	Each State and local organization should have procedures in place that provide for emergency actions to be taken which are consistent with the emergency actions recommended by the nuclear facility licensee, taking into account local offsite conditions that exist at the time of the emergency.	<i>State Plan</i> <i>County Plan</i> 1.6, 1.6.1, 1.6.2			

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E. Notification Methods and Procedure

Planning Standard-50.47(b)(5)

Procedures have been established for notification, by the licensee of State and local response organizations and for notification of emergency personnel by all response organizations; the content of initial and follow-up message to response organizations and the public has been established; and means to provide early notification and clear instruction to the populace within the plume exposure pathway Emergency Planning Zone have been established.

		NUREG-0654-Evaluation Criteria	Plan Section	Appendix E IV	RAIs	Other Documents
-	1.	Each organization shall establish procedures which describe mutually agreeable bases for notification of response organizations consistent with the emergency classification and action level scheme set forth in Appendix 1. These procedures shall include means for verification of messages. The specific details of verification need not be included in the plan.	E.1		VEGP 13.3-44	
	2.	Each organization shall establish procedures for alerting, notifying, and mobilizing emergency response personnel.	E.1, E.2, E.3, E.4	С		
	3.	The licensee in conjunction with State and local organizations shall establish the contents of the initial emergency messages to be sent from the plant. These measures shall contain information about the class of emergency, whether a release is taking place, potentially affected population and areas, and whether protective measures may be necessary.	E.1	D		
	4.	Each licensee shall make provisions for follow-up messages from the facility to offsite authorities which shall contain the following information if it is known and appropriate:	E.1, E.2	D		
	а.	location of incident and name and telephone number (or communications channel identification) of caller;	E.1			

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				8-	
	NUREG-0654-Evaluation Criteria	Plan Section	Appendix E IV	RAIs	Other Documents
<i>b</i> .	date/time of incident;	E.1			
с.	class of emergency;	E.1			
d	type of actual or projected release (airborne, waterborne, surface spill), and estimated duration/impact times;	E.1			
е.	estimate of quantity of radioactive material released or being released and the points and heights of releases;	E.1			
f.	chemical and physical form of released material, including estimates of the relative quantities and concentration of noble gases, iodines and particulates;	E.1			
g.	meteorological conditions at appropriate levels (wind speed, direction (to and from), indicator of stability, precipitation, if any);	E.1			
h.	actual or projected dose rates at site boundary; projected integrated dose at site boundary;	E.1			
i.	projected dose rates and integrated dose at the projected peak and at 2, 5 and 10 miles, including section(s) affected;	E.1			
<i>j</i> .	estimate of any surface radioactive contamination inplant, onsite or offsite;	E.1, E.2			
k.	licensee emergency response actions underway;	E.1			
l.	recommended emergency actions, including protective measures;	E.1			
m.	request for any needed onsite support by offsite organizations; and	E.1			

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	NUREG-0654-Evaluation Criteria	Plan Section	Appendix E IV	RAIs	Other Documents
n.	prognosis for worsening or termination of event based on plant information.	E.1			
5.	State and local government organizations shall establish a system for disseminating to the public appropriate information contained in initial and follow-up messages received from the licensee including the appropriate notification to appropriate broadcast media, e.g., the Emergency Alert System (EAS).	E.3, E.4	D.1		
6.	Each organization shall establish administrative and physical means, and the time required for notifying and providing prompt instructions to the public within the plume exposure pathway Emergency Planning Zone. (See Appendix 3). It shall be the licensee's responsibility to demonstrate that such means exist, regardless of who implements this requirement. It shall be the responsibility of the State and local governments to activate such a system.	E.1, E.2, E.3, E.4	D.1		
7.	Each organization shall provide written messages intended for the public, consistent with the licensee's classification scheme. In particular, draft messages to the public giving instructions with regard to specific protective actions to be taken by occupants of affected areas shall be prepared and included as part of the State and local plans. The role of the licensee is to provide supporting information for the messages. For ad hoc respiratory protection see Respiratory Protective Devices Manual American Industrial Hygiene Association, 1963 pp. 123-126.	E.1, E.4			

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F. Emergency Communications

Planning Standard-Other Documents.47(b)(6)

Provisions exist for prompt communications among principal response organizations to emergency personnel and to the public.

	NUREG-0654-Evaluation Criteria	Plan Section	Appendix E IV	RAIs	Other Documents
1.	The communication plans for emergencies shall include organizational titles and alternates for both ends of the communication links. Each organization shall establish reliable primary and backup means of communication for licensees, local, and State response organizations. Such systems should be selected to be compatible with one another. Each plan shall include:				
а.	provision for 24-hour per day notification to and activation of the State/local emergency response network; and at a minimum, a telephone link and alternate, including 24-hour per day manning of communications links that initiate emergency response actions.	E.1, E.3	D.3		
<i>b</i> .	provision for communication with contiguous State/local governments within the Emergency Planning Zones;	E.1			
С.	provision for communications as needed with Federal emergency response organizations;	E.1, E.2, E.3			10 CFR 73.71
d.	provision for communications between the nuclear facility and the licensee's near-site Emergency Operations Facility, State and local emergency operations centers, and radiological monitoring teams;	Addendum E-1			BL 80-15
е.	provision for alerting or activating emergency personnel in each response organization; and	E.2 Addendum E-1	С		BL 05-02

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	NUREG-0654-Evaluation Criteria	Plan Section	Appendix E IV	RAIs	Other Documents
f.	provision for communication by the licensee with NRC headquarters and NRC Regional Office Emergency Operations Centers and the licensee's near-site Emergency Operations Facility and radiological monitoring team assembly area.	Addendum E-1 B.4.12, E.2		GGNS 13.3-28	BL 80-15 GL 91-14 50.72(a)(3) 50.72(a)(4) 50.72(c)(3)
2.	Each organization shall ensure that a coordinated communication link for fixed and mobile medical support facilities exists.	<i>E.2</i>	<i>E.7</i>		
3.	Each organization shall conduct periodic testing of the entire emergency communications system (see evaluation criteria H.10, N.2.a and Appendix 3).	Addendum E-1, N-1, E.3		VEGP 13.3-41	IN 85-44

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G. Public Education and Information

Planning Standard-50.47(b)(7)

Information is made available to the public on a periodic basis on how they will be notified and what their initial actions should be in an emergency (e.g., listening to a local broadcast station and remaining indoors), the principal points of contact with the news media for dissemination of information during an emergency (including the physical location or locations) are established in advance, and procedures for coordinated dissemination of information to the public are established.

	NUREG-0654-Evaluation Criteria	Plan Section	Appendix E IV	RAIs	Other Documents
1.	Each organization shall provide a coordinated periodic (at least annually) dissemination of information to the public regarding how they will be notified and what their actions should be in an emergency. This information shall include, but not necessarily be limited to:				
а.	educational information on radiation;	K.1	D.2		
<i>b</i> .	contact for additional information;	K.1	D.2		
с.	protective measures, e.g., evacuation routes and relocation centers, sheltering, respiratory protection, radioprotective drugs; and	K.1	D.2		
d.	special needs of the handicapped.	K.1			
2.	The public information program shall provide the permanent and transient adult population within the plume exposure EPZ an adequate opportunity to become aware of the information annually. The programs should include provision for written material that is likely to be available in a residence during an emergency. Updated information shall be disseminated at least annually. Signs or other measures (e.g., decals, posted notices or other means, placed in hotels, motels, gasoline stations and phone booths) shall also be used to disseminate to any transient population within the plume	K.1, K.1.3, K.2, K.3, K.4	D.2	VEGP 13.3-4 GGNS 13.3-31 GGNS 13.3-32	Public Information Brochure

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			Appendix E		Other
	NUREG-0654-Evaluation Criteria	Plan Section	IV	RAIs	Documents
	exposure pathway EPZ appropriate information that would be helpful if an emergency or accident occurs. Such notices should refer the transient to the telephone directory or other source of local emergency information and guide the visitor to appropriate radio and television frequencies.				
3a	Each principal organization shall designate the points of contact and physical location for use by news media during an emergency.	K.5, K.9, G.6			
<i>b</i> .	Each licensee shall provide space which may be used for a limited number of the news media at the near site Emergency Operations Facility.	G.6			
4a	Each principal organization shall designate a spokesperson who should have access to all necessary information.	K.5.5			
<i>b</i> .	Each organization shall establish arrangements for timely exchange of information among designated spokesperson.	K.8			
с.	Each organization shall establish coordinated arrangements for dealing with rumors.	K.10			
5.	Each organization shall conduct coordinated programs at least annually to acquaint news media with the emergency plans, information concerning radiation, and points of contact for release of public information in an emergency.	K.4.1		GGNS 13.3-33	

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H. Emergency Facilities and Equipment

Planning Standard- 50.47(b)(8)

Adequate emergency facilities and equipment to support the emergency response are provided and maintained.

	NUREG-0654-Evaluation Criteria	Plan Section	Appendix E IV	RAIs	Other Documents
1.	Each licensee shall establish a Technical Support Center and an onsite operations support center (assembly area) in accordance with NUREG-0696, Revision 1.	G.2, G.3	<i>E.8</i>		GL 82-33
2.	Each licensee shall establish an Emergency Operations Facility from which evaluation and coordination of all licensee activities related to an emergency is to be carried out and from which the licensee shall provide information to Federal, State and local authorities responding to radiological emergencies in accordance with NUREG-0696, Revision 1.	<i>G.4</i>	E.8		GL 82-33
3.	Each organization shall establish an emergency operations center for use in directing and controlling response functions.	State Plan County Plan			
4.	Each organization shall provide for timely activation and staffing of the facilities and centers described in the plan.	C.4, E.2			
5.	Each licensee shall identify and establish onsite monitoring systems that are to be used to initiate emergency measures in accordance with Appendix 1, as well as those to be used for conducting assessment. The equipment shall include:			VEGP 13.3-45	
а.	geophysical phenomena monitors, (e.g., meteorological, hydrologic, seismic);	H.1.2, H.1.6, Table H-1			
<i>b</i> .	radiological monitors, (e.g., process, area, emergency, effluent, wound	H.1.4, H.1.5,	<i>E.2</i>		

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	NUREG-0654-Evaluation Criteria	Plan Section	Appendix E IV	RAIs	Other Documents
	and portable monitors and sampling equipment);	Table H-1			
с.	process monitors, (e.g., reactor coolant system pressure and temperature, containment pressure and temperature, liquid levels, flow rates, status or lineup of equipment components), and	H.1.3, Table G- 3			
d.	fire and combustion products detectors.	H.1.1, Table H-1			
6.	Each licensee shall make provision to acquire data from or for emergency access to offsite monitoring and analysis equipment including:				
а.	geophysical phenomena monitors, (e.g., meteorological, hydrologic, seismic);	Table H-1			
b.	radiological monitors including ratemeters and sampling devices. Dosimetry shall be provided and shall meet, as a minimum, the NRC Radiological Assessment Branch Technical Position for the Environment Radiological Monitoring Program; and	H.1.4, H.1.5, H.1.7, H.1.8, H.1.9, J.10, Table G-3	E.2		
С.	laboratory facilities, fixed or mobile.	G.9			
7.	Each organization, where appropriate, shall provide for offsite radiological monitoring equipment in the vicinity of the nuclear facility.	G.9, Table H-1	<i>E.2</i>		
8.	Each licensee shall provide meteorological instrumentation and procedures which satisfy the criteria in Appendix 2, and provisions to obtain representative current meteorological information from other sources.	H.1.6			
9.	Each licensee shall provide for an onsite operations support center (assembly area) which shall have adequate capacity, and supplies, including, for example, respiratory protection, protective clothing, portable	G.2	E.1		GL 82-33
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	NUREG-0654-Evaluation Criteria	Plan Section	Appendix E IV	RAIs	Other Documents
	lighting, portable radiation monitoring equipment, cameras and communications equipment for personnel present in the assembly area.				
10.	Each organization shall make provisions to inspect, inventory and operationally check emergency equipment/instruments at least once each calendar quarter and after each use. There shall be sufficient reserves of instruments/equipment to replace those which are removed from emergency kits for calibration or repair. Calibration of equipment shall be at intervals recommended by the supplier of the equipment.	Table G-1			
11.	Each plan shall, in an appendix include identification of emergency kits by general category (protective equipment, communications equipment, radiological monitoring equipment and emergency supplies).	Table G-1	E.1		
12.	Each organization shall establish a central point (preferably associated with the licensee's near-site Emergency Operations Facility), for the receipt and analysis of all field monitoring data and coordination of sample media.	Н.2	E.2		

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I. Accident Assessment

Planning Standard- 50.47(b)(9)

Adequate methods, systems and equipment for assessing and monitoring actual or potential offsite consequences of a radiological emergency condition are in use.

	NUREC 0654 Evolution Criteria	Dires Contines	Appendix E	D 4 L	Other
1.	Each licensee shall identify plant system and effluent parameter values characteristic of a spectrum of off-normal conditions and accidents, and shall identify the plant parameter values or other information which correspond to the example initiating conditions of Appendix 1. Such parameter values and the corresponding emergency class shall be included in the appropriate facility emergency procedures. Facility emergency procedures shall specify the kinds of instruments being used and their capabilities.	Table D-1 Table D-2 (Generalized Description)		KAIS	Documents
2.	Onsite capability and resources to provide initial values and continuing assessment throughout the course of an accident shall include post- accident sampling capability, radiation and effluent monitors, in-plant iodine instrumentation, and containment radiation monitoring in accordance with NUREG-0578, as elaborated in the NRC letter to all power reactor licensees dated October 30, 1979.	H.1, J.10, Table H-1	E.2		
3.	Each licensee shall establish methods and techniques to be used for determining:				
а.	the source term of releases of radioactive material within plant systems. An example is the relationship between the containment radiation monitor(s) reading(s) and radioactive material available for release from containment.	J.11 J.10.1	E.2		

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	NUPEC 0654 Evaluation Critoria	Dlan Section	Appendix E	P A Is	Other Documents
<i>b</i> .	the magnitude of the release of radioactive materials based on plant system parameters and effluent monitors.	J.11 J.10.1			Documents
4.	Each licensee shall establish the relationship between effluent monitor readings and onsite and offsite exposures and contamination for various meteorological conditions.	J.11 J.10.1			
5.	Each licensee shall have the capability of acquiring and evaluating meteorological information sufficient to meet the criteria of Appendix 2. There shall be provisions for access to meteorological information by at least the near site Emergency Operations Facility, the Technical Support Center, the Control Room and an offsite NRC center. The licensee shall make available to the State suitable meteorological data processing interconnections which will permit independent analysis by the State, of facility generated data in those States with the resources to effectively use this information.	H.1.6	E.1	VEGP 13.3-12	
6.	Each licensee shall establish the methodology for determining the release rate/projected doses if the instrumentation used for assessment are offscale or inoperable.	I.4 H.2			
7.	Each organization shall describe the capability and resources for field monitoring within the plume exposure Emergency Planning Zone which are an intrinsic part of the concept of operations for the facility.	H.2 , H.3			
8.	Each organization, where appropriate, shall provide methods, equipment and expertise to make rapid assessments of the actual or potential magnitude and locations of any radiological hazards through liquid or gaseous release pathways. This shall include activation, notification means, field team composition, transportation, communication,	Н.3 -Н.2			

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	NUREG-0654-Evaluation Criteria monitoring equipment and estimated deployment times.	Plan Section	Appendix E IV	RAIs	Other Documents
9.	Each organization shall have a capability to detect and measure radioiodine concentrations in air in the plume exposure EPZ as low as 10-7 uCi/cc (microcuries per cubic centimeter) under field conditions. Interference from the presence of noble gas and background radiation shall not decrease the stated minimum detectable activity.	J.11			
10.	Each organization shall establish means for relating the various measured parameters (e.g., contamination levels, water and air activity levels) to dose rates for key isotopes (i.e., those given in Table 3, page 18) and gross radioactivity measurements. Provision shall be made for estimating integrated dose from the projected and actual dose rates and for comparing these estimates with the protective action guides. The detailed provisions shall be described in separate procedures.	<u>Н.З</u> Н.2			
11.	Arrangements to locate and track the airborne radioactive plume shall be made, using either or both Federal and State resources.	H.3 H.2			

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J. Protective Response

Planning Standard-50.47(b)(10)

A range of protective actions have been developed for the plume exposure pathway EPZ for emergency workers and the public. Guidelines for the choice of protective actions during an emergency, consistent with Federal guidance, are developed and in place, and protective actions for the ingestion exposure pathway EPZ appropriate to the locale have been developed.

	NUREG-0654-Evaluation Criteria	Plan Section	Appendix E IV	RAIs	Other Documents
1.	Each licensee shall establish the means and time required to warn or advise onsite individuals and individuals who may be in areas controlled by the operator, including:				
а.	Employees not having emergency assignments;	F.3, I.1, I.2, I.3			
b.	Visitors;	F.3, I.1, I.2, I.3			
с.	Contractor and construction personnel; and	F.3, I.1, I.2, I.3			
d.	Other persons who may be in the public access areas on or passing through the site or within the owner controlled area.	I.1, I.2, I.3			
2	Each licensee shall make provisions for evacuation routes and transportation for onsite individuals to some suitable offsite location, including alternatives for inclement weather, high traffic density and specific radiological conditions.	F.5, I.3		GGNS 13.3-37 GGNS 13.3-38	
3.	Each licensee shall provide for radiological monitoring of people evacuated from the site.	F.5, I.3, J.6			
4.	Each licensee shall provide for the evacuation of onsite non-essential personnel in the event of a Site or General Emergency and shall provide	F.5, I.3, J.6			BL 05-02

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NUREG-0654-Evaluation Criteria	Plan Section	Appendix E IV	RAIs	Other Documents	
capability at or near the monitoring point specified in					
provide for a capability to account for all individuals ^f the emergency and ascertain the names of missing 0 minutes of the start of an emergency and account duals continuously thereafter.	F.3, I.2, I.3				
for individuals remaining or arriving onsite during e provisions for:					
piratory protection;	J.9				
ve clothing; and	J.3				
otective drugs, (e.g. individual thyroid protection).	J.9				
establish a mechanism for recommending protective priate State and local authorities. These shall include Levels corresponding to projected dose to the	I.4, I.5		GGNS 13.3-40	BL 05-02 RIS 2004-13	

	NUREG-0654-Evaluation Criteria	Plan Section	IV	RAIs	Documents
	a decontamination capability at or near the monitoring point specified in <i>J.3.</i>				
5.	Each licensee shall provide for a capability to account for all individuals onsite at the time of the emergency and ascertain the names of missing individuals within 30 minutes of the start of an emergency and account for all onsite individuals continuously thereafter.	F.3, I.2, I.3			
6.	Each licensee shall, for individuals remaining or arriving onsite during the emergency, make provisions for:				
а.	Individual respiratory protection;	J.9			
b.	Use of protective clothing; and	J.3			
С.	Use of radioprotective drugs, (e.g. individual thyroid protection).	J.9			
7.	Each licensee shall establish a mechanism for recommending protective actions to the appropriate State and local authorities. These shall include Emergency Action Levels corresponding to projected dose to the population-at-risk, in accordance with Appendix 1 and with the recommendations set forth in Tables 2.1 and 2.2 of the Manual of Protective Action Guides and Protective Actions for Nuclear Incidents (EPA-400-R-92-001). As specified in Appendix 1, prompt notification shall be made directly to the offsite authorities responsible for implementing protective measures within the plume exposure pathway Emergency Planning Zone.	I.4, I.5		GGNS 13.3-40	BL 05-02 RIS 2004-13
8.	Each licensee's plan shall contain time estimates for evacuation within the plume exposure EPZ. These shall be in accordance with Appendix 4.	I.6.1			

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	NUREG-0654-Evaluation Criteria	Plan Section	Appendix E IV	RAIs	Other Documents
9.	Each State and local organization shall establish a capability for implementing protective measures based upon protective action guides and other criteria. This shall be consistent with the recommendations for EPA regarding exposure resulting from passage of radioactive airborne plumes, (EPA-400-R-92-001) and with those of DHEW (DHHS)/FDA regarding radioactive contamination of human food and animal feeds as published in the Federal Register of December 15, 1978 (43 FR 58790).	State Plan			
10.	The organization's plans to implement protective measures for the plume exposure pathway shall include:				
а.	Maps showing evacuation routes, evacuation areas, preselected radiological sampling and monitoring points, relocation centers in host areas, and shelter areas; (identification of radiological sampling and monitoring points shall include the designators in Table J-1 or an equivalent uniform system described in the plan);	Figures I-1, I-2, H.2			
b.	Maps showing population distribution around the nuclear facility. This shall be by evacuation areas (licensees shall also present the information in a sector format):	Figure I-1			
С.	<i>Means for notifying all segments of the transient and resident population;</i>	E.3 Figure E-1		VEGP 13.3-13	
d.	Means for protecting those persons whose mobility may be impaired due to such factors as institutional or other confinement;	State Plan County Plan			
е.	Provisions for the use of radioprotective drugs, particularly for emergency workers and institutionalized persons within the plume exposure EPZ whose immediate evaluation may be infeasible or very	State Plan County Plan			

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	NUREG-0654-Evaluation Criteria	Plan Section	Appendix E IV	RAIs	Other Documents
	difficult, including quantities, storage, and means of distribution.				
f.	State and local organizations' plans should include the method by which decisions by the State Health Department for administering radioprotective drugs to the general population are made during an emergency and the pre-determined conditions under which such drugs may be used by offsite emergency workers;	State Plan County Plan			
g.	Means of relocation;	State Plan County Plan			
h.	Relocation centers in host areas which are at least 5 miles, and preferably 10 miles, beyond the boundaries of the plume exposure emergency planning zone; (See J.12).	State Plan County Plan			
i.	Projected traffic capacities of evacuation routes under emergency conditions;	State Plan County Plan			
<i>j</i> .	<i>Control of access to evacuated areas and organization responsibilities for such control;</i>	State Plan County Plan			
k.	Identification of and means for dealing with potential impediments (e.g., seasonal impassability of roads) to use of evacuation routes, and contingency measures;	State Plan County Plan			
l.	Time estimates for evacuation of various sectors and distances based on a dynamic analysis (time-motion study under various conditions) for the plume exposure pathway emergency planning zone (See Appendix 4); and	County Plan			
m.	The bases for the choice of recommended protective actions from the	Addendum I-1	В		

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	NUREC 0654 Evolution Criteria	Dian Cartina	Appendix E	D 4L	Other Decouver
	plume exposure pathway during emergency conditions. This shall include expected local protection afforded in residential units or other shelter for direct and inhalation exposure, as well as evacuation time estimates.	Plan Section		KAIS	Documents
11.	Each State shall specify the protective measures to be used for the ingestion pathway, including the methods for protecting the public from consumption of contaminated food-stuffs. This shall include criteria for deciding whether dairy animals should be put on stored feed. The plan shall identify procedures for detecting contamination, for estimating the dose commitment consequences of uncontrolled ingestion, and for imposing protection procedures such as impoundment, decontamination, processing, decay, product diversion, and preservation. Maps for recording survey and monitoring data, key land use data (e.g., farming), dairies, food processing plants, water sheds, water supply intake and treatment plants and reservoirs shall be maintained. Provisions for maps showing detailed crop information may be by including reference to their availability and location and a plan for their use. The maps shall start at the facility and include all of the 50-mile ingestion pathway EPZ. Up-to-date lists of the name and location of all facilities which regularly process milk products and other large amounts of food or agricultural products originating in the ingestion pathway EMZ. Planning Zone, but located elsewhere, shall be maintained.	State Plan			
12.	Each organization shall describe the means for registering and monitoring of evacuees at relocation centers in host areas. The personnel and equipment available should be capable of monitoring within about a 12 hour period all residents and transients in the plume exposure EPZ arriving at relocation centers.	State Plan County Plan			

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K. Radiological Exposure Control

Planning Standard-50.47(b)(11)

Means for controlling radiological exposures, in an emergency, are established for emergency workers. The means for controlling radiological exposures shall include exposure guidelines consistent with EPA Emergency Worker and Lifesaving Activity Protective Action Guides.

			Appendix E		Other
	NUREG-0654-Evaluation Criteria	Plan Section	IV	RAIs	Documents
1.	Each licensee shall establish onsite exposure guidelines consistent with EPA Emergency Worker and Lifesaving Activity Protective Actions Guides (EPA-400-R-92-001) for;				
а.	removal of injured persons;	J.1.1		GGNS 13.3-30	
b.	undertaking corrective actions;	J.1.1		GGNS 13.3-39	
с.	performing assessment actions;	J.1			
d.	providing first aid;	J.1			
е.	performing personnel decontamination;	J.1	E.3		
f.	providing ambulance service; and	J.1	E.6		
g.	providing medical treatment services.	J.1	<i>E.7</i>		
2.	Each licensee shall provide an onsite radiation protection program to be implemented during emergencies, including methods to implement exposure guidelines. The plan shall identify individual(s), by position or title, who can authorize emergency workers to receive doses in excess of 10 CFR Part 20 limits. Procedures shall be worked out in advance for	J.1		GGNS 13.3-49	

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			Appendix E		Other
	NUREG-0654-Evaluation Criteria	Plan Section	IV	RAIs	Documents
	permitting onsite volunteers to receive radiation exposures in the course of caring out lifesaving and other emergency activities. These procedures shall include expeditious decision making and a reasonable consideration of relative risks.				
3.a	Each organization shall make provision for 24-hour-per-day capability to determine the doses received by emergency personnel involved in any nuclear accident, including volunteers. Each organization shall make provisions for distribution of dosimeters, both self-reading and permanent record devices.	J.2			
b.	Each organization shall ensure that dosimeters are read at appropriate frequencies and provide for maintaining dose records for emergency workers involved in any nuclear accident.	J.2			
4.	Each State and local organization shall establish the decision chain for authorizing emergency workers to incur exposures in excess of the EPA General Public Protective Action Guides (i.e., EPA PAGs for emergency workers and lifesaving activities).	N/A			
5.a.	Each organization as appropriate, shall specify action levels for determining the need for decontamination.	J.3	E.3		
<i>b</i> .	Each organization, as appropriate, shall establish the means for radiological decontamination of emergency personnel wounds, supplies, instruments and equipment, and for waste disposal.	J.5	E.3		
6	Each licensee shall provide onsite contamination control measures including:				
<i>a</i> .	area access control;	J.3			

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	NUREG-0654-Evaluation Criteria	Plan Section	Appendix E IV	RAIs	Other Documents
<i>b</i> .	drinking water and food supplies;	J.4			
с.	criteria for permitting return of areas and items to normal use, see Draft ANSI 13.12.	J.3			
7.	Each licensee shall provide the capability for decontaminating relocated onsite personnel, including provisions for extra clothing and decontaminants suitable for the type of contamination expected, with particular attention given to radioiodine contamination of the skin.	J.5, J.8 J.6			

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L. Medical and Public Health Support

Planning Standard-50.47(b)(12)

Arrangements are made for medical services for contaminated injured individuals.

			Appendix E		Other
	NUREG-0654-Evaluation Criteria	Plan Section	IV	RAIs	Documents
1.	Each organization shall arrange for local and backup hospital and medical services having the capability for evaluation of radiation exposure and uptake, including assurance that persons providing these services are adequately prepared to handle contaminated individuals.	B.4.5, J.5	E.5		
2.	Each licensee shall provide for onsite first aid capability.	F.6, G.11, J.5	<i>E.4</i>		
3.	Each State shall develop lists indicating the location of public, private and military hospitals and other emergency medical services facilities within the State or contiguous States considered capable of providing medical support for any contaminated injured individual. The listing shall include the name, location, type of facility and capacity and any special radiological capabilities. These emergency medical services should be able to radiologically monitor contamination personnel, and have facilities and trained personnel able to care for contaminated injured persons.	State Plan			
4.	Each organization shall arrange for transporting victims of radiological accidents to medical support facilities.	B.4, B.5.7, F.7, J.5	E.6		

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M. Recovery and Reentry Planning and Post-Accident Operations

Planning Standard-50.47(b)(13)

General plans for recovery and reentry are developed.

	NUREG-0654-Evaluation Criteria	Plan Section	Appendix E IV	RAIs	Other Documents
1.	Each organization, as appropriate, shall develop general plans and procedures for reentry and recovery and describe the means by which decisions to relax protective measures (e.g., allow reentry into an evacuated area) are reached. This process should consider both existing and potential conditions.	L.1, L.2, L.3, L.4, L.5, L.6	Н		
2.	Each licensee plan shall contain the position/title, authority and responsibilities of individuals who will fill key positions in the facility recovery organization. This organization shall include technical personnel with responsibilities to develop, evaluate and direct recovery and reentry operations. The recovery organization recommended by the Atomic Industrial Forum's Nuclear Power Plant Emergency Response Plan dated October 11, 1979, is an acceptable framework.	<i>L.6</i>	Н		
3.	Each licensee and State plan shall specify means for informing members of the response organizations that a recovery operation is to be initiated, and of any changes in the organizational structure that may occur.	L.7			
4.	Each plan shall establish a method for periodically estimating total population exposure.	L.4		VEGP 13.3-11	

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N. Exercises and Drills

Planning Standard-50.47(b)(14)

Periodic exercises are (will be) conducted to evaluate major portions of emergency response capabilities, periodic drills are (will be) conducted to develop and maintain key skills, and deficiencies identified as a result of exercises or drills are (will be) corrected.

	NUREG-0654-Evaluation Criteria	Plan Section	Appendix E IV	RAIs	Other Documents
1a	An exercise is an event that tests the integrated capability and a major portion of the basic elements existing within emergency preparedness plans and organizations. The emergency preparedness exercise shall simulate an emergency that results in offsite radiological releases which would require response by offsite authorities. Exercises shall be conducted as set forth in NRC and FEMA rules.	N.1	F.1		
b	An exercise shall include mobilization of State and local personnel and resources adequate to verify the capability to respond to an accident scenario requiring response. The organization shall provide for a critique of the annual exercise by Federal and State observers/evaluators. The scenario should be varied from year to year such that all major elements of the plans and preparedness organizations are tested within a five-year period. Each organization should make provisions to start an exercise between 6:00 p.m. and midnight, and another between midnight and 6:00 a.m. once every six years. Exercises should be conducted under various weather conditions. Some exercises should be unannounced.	N.1	F.1		
2	A drill is a supervised instruction period aimed at testing, developing and maintaining skills in a particular operation. A drill is often a component of an exercise. A drill shall be supervised and evaluated by a qualified drill instructor. Each organization shall conduct drills, in				

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			Appendix E	D (I	Other
	addition to the annual exercise at the frequencies indicated below:	Plan Section	IV	KAIS	Documents
а	Communication Drills- Communications with State and local governments within the plume exposure pathway Emergency Planning Zone shall be tested monthly. Communications with Federal emergency response organizations and States within the ingestion pathway shall be tested quarterly. Communications between the nuclear facility, State and local emergency operations centers, and field assessment teams shall be tested annually. Communication drills shall also include the aspect of understanding the content of messages.	N.1, Addendum N-1			
b	Fire Drills- Fire drills shall be conducted in accordance with the plant (nuclear facility) technical specifications.	Addendum N-1	F.1.iv		
С	Medical Emergency Drills-A medical emergency drill involving a simulated contaminated individual which contains provisions for participation by the local support services agencies (i.e., ambulance and offsite medical treatment facility) shall be conducted annually. The offsite portions of the medical drill may be performed at part of the required annual exercise	Addendum N-1	F.1.vii F.1.vi		
d	Radiological Monitoring Drills-Plant environs and radiological monitoring drills (onsite and offsite) shall be conducted annually. These drills shall include collection and analysis of all sample media (e.g., water, vegetation, soil and air), and provisions for communications and record keeping. The State drills need not be at each site. Where appropriate, local organization shall participate	Addendum N-1	F.1.iii		
е	Health Physics Drills		F.1.iii		

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	NUREG-0654-Evaluation Criteria	Plan Section	Appendix E IV	RAIs	Other Documents
	(1) Health Physics drills shall be conducted semi-annually which involve response to, and analysis of, simulated elevated airborne and liquid samples and direct radiation measurements in the environment. The State drills need not be at each site.	Addendum N-1			
	(2) Analysis of inplant liquid samples with simulated elevated radiation levels shall be included in Health Physics drills annually. These drills will include appropriate radiation protection and contamination controls.	Addendum N-1			
3	Each organization shall describe how exercises and drills are to be carried out to allow free play for decision making and to meet the following objectives. Pending the development of exercise scenarios and exercise evaluation guidance by NRC and FEMA the scenarios for use in exercises and drills shall include but not be limited to, the following:		F.1		
a	<i>The basic objective(s) of each drill and exercise and appropriate evaluation criteria:</i>	N.1.1, N.2			
b	The date(s), time period, place(s) and participating organization	Addendum N-1, N.2.2,			
с	The simulated events;	N.2			
d	A time schedule of real and simulated initiating events	N.2			
e	A narrative summary describing the conduct of the exercises or drills to include such things as simulated casualties, offsite fire department assistance, rescue of personnel, use of protective clothing, deployment of radiological monitoring teams, and public	N.2			BL 05-02

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	NUREG-0654-Evaluation Criteria	Plan Section	Appendix E IV	RAIs	Other Documents
	information activities; and				
f	A description of the arrangements for and advance materials to be provided to official observers.	N.2.2			
4	Official observers from Federal, State or local governments will observe, evaluate, and critique the required exercises. A critique shall be scheduled at the conclusion of the exercise to evaluate the ability of organizations to respond as called for in the plan. The critique shall be conducted as soon as practicable after the exercise, and formal evaluation should result from the critique.	N.1, N.2.2			
5	Each organization shall establish means for evaluating observer and participant comments on areas needing improvement, including emergency plan procedural changes, and for assigning responsibility for implementing corrective actions. Each organization shall establish management control used to ensure that corrective actions are implemented.	N.1	F.2	VEGP 13.3-10	

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O. Radiological Emergency Response Training

Planning Standard-50.47(b)(15)

Radiological emergency response training is provided to those who may be called on to assist in an emergency.

	NUREG-0654-Evaluation Criteria	Plan Section	Appendix E IV	RAIs	Other Documents
1.	Each organization shall assure the training of appropriate individuals.				
а.	Each facility to which the plant applies shall provide site specific emergency response training for those offsite emergency organizations who may be called upon to provide assistance in the event of an emergency.	М.8		GGNS 13.3-55	
<i>b</i> .	Each offsite response organization shall participate in and receive training. Where mutual aid agreements exist between local agencies such as fire, policy and ambulance/rescue, the training shall also be offered to the other departments who are members of the mutual aid district.	N/A			
2.	The training program for members of the onsite emergency organization shall, besides classroom training, include practical drills in which each individual demonstrates ability to perform his assigned emergency function. During the practical drills, on-the-spot correction of erroneous performance shall be made and a demonstration of the proper performance offered by the instructor.	М.6	F.2		
3.	Training for individuals assigned to licensee first aid teams shall include courses equivalent to Red Cross Multi-Media.	М.7			

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4.	Each organization shall establish a training program for instructing and qualifying personnel who will implement radiological emergency response plans. The specialized initial training and periodic retraining programs (including the scope, nature and frequency) shall be provided in the following categories:	1 iun Section	17	KAIS	Documents
а.	Directors or coordinators of the response organizations;	М.3	F.1.i		
<i>b</i> .	Personnel responsible for accident assessment;	<i>M.4</i>	F.1.ii		
с.	Radiological monitoring teams and radiological analysis personnel;	<i>M.4</i>	F.1.iii		
d.	Police, security and fire fighting personnel;	M.3, M.8	F.1.iv		
е.	Repair and damage control/correctional action teams (onsite);	М.3	F.1.v		
f.	First aid and rescue personnel;	M.1, M.4	F.1.vi		
g.	Local support services personnel including Civil Defense/Emergency Service personnel;	М.8			
h.	Medical support personnel;	<i>M.4</i>			
i.	Licensee's headquarters support personnel;	М.З	F.1.viii		
<i>j</i> .	Personnel responsible for transmission of emergency information and instructions.	M.4			
5.	Each organization shall provide for the initial and annual retraining of personnel with emergency response responsibilities.	M.2.3			

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P. Responsibility for the Planning Effort: Development, Periodic Review and Distribution of Emergency Plans.

Planning Standard-50.47(b)(16)

Responsibilities for plan development and review and for distribution of emergency plans are established, and planners are properly trained.

	NUREG-0654-Evaluation Criteria	Plan Section	Appendix E IV	RAIs	Other Documents
1.	Each organization shall provide for the training of individuals responsible for the planning effort.	М.2	G		
2.	Each organization shall identify by title the individual with the overall authority and responsibility for radiological emergency response planning.	0.1	G		
3.	Each organization shall designate an Emergency Planning Coordinator with responsibility for the development and updating of emergency plans and coordination of these plans with other response organizations.	0.1	G		
4.	Each organization shall update its plan and agreements as needed, review and certify it to be current on an annual basis. The update shall take into account changes identified by drills and exercises.	0.2, 0.3			
5.	The emergency response plans and approved changes to the plans shall be forwarded to all organizations and appropriate individuals with responsibility for implementation of the plans. Revised pages shall be dated and marked to show where changes have made.	0.1		GGNS 13.3-56	
6.	Each plan shall contain a detailed listing of supporting plans and their source.	Attachment 2, A.2, B.2, B.2.1, B.2.2, B.3			

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			4 11 12		
			Appendix E		Other
	NUREG-0654-Evaluation Criteria	Plan Section	IV	RAIs	Documents
7.	Each plan shall contain as an appendix listing, by title, procedures required to implement the plan. The listing shall include the section(s) of the plan to be implemented by each procedure.	Attachment 2		VEGP 13.3-5	
8.	Each plan shall contain a specific table of contents. Plans submitted for review should be cross-referenced to these criteria.	Table-of- Contents			
9.	Each licensee shall arrange for and conduct independent reviews of the emergency preparedness program at least every 12 months. (An independent review is one conducted by any competent organization either internal or external to the licensee's organization, but who are not immediately responsible for the emergency preparedness program). The review shall include the emergency plan, its implementing procedures and practices, training, readiness testing, equipment, and interfaces with State and local governments. Management controls shall be implemented for evaluation and correction of review findings. The results of the review, along with recommendations for improvements, shall be documented, reported to appropriate licensee corporate and plant management, and involved Federal, State and local organizations, and retained for a period of five years.	0.3, 0.4		VEGP 13.3-5(d)	10CFR50.54(t)
10.	Each organization shall provide for updating telephone numbers in emergency procedures at least quarterly.	Addendum E-1			

QUESTION:

ONSITE EMERGENCY PLAN: SITE-8: Subject: Verification of statements [Basis: 10 CFR 50.47(b)(1); NUREG-0654, FEMA-REP-1, Rev. 1, November 1980: Criterion A.1.a] 1) Last line of Section B.4.7 "Matagorda County Sheriff's Office" of the Emergency Plan states "..in approximately thirty minutes, on a 24 hours a day basis". This response time is not specified in the Letter of Agreement (LOA) between the applicant and the Matagorda County Sheriff's Office. Verify this statement and provide correction, or provide justification to retain the statement as written. 2) The first sentence of Section B.4.8 "United States Coast Guard (Corpus Christi)" of the Emergency Plan states "..and if necessary, aircraft and surface craft during emergency situations that may develop at the Station". No statement regarding "aircraft and surface craft" appears in the Letter of Agreement (LOA) between the applicant and the United States Coast Guard (Corpus Christi). Verify this statement and provide correction, or provide justification to retain the statement as written. 3) The first sentence of Section B.4.9 "United States Coast Guard (Galveston)" of the Emergency Plan states "..traffic control on the Colorado River and other navigable waters in the vicinity of the Station by use of marine warnings, and if necessary, aircraft and surface craft during emergency situations that may develop at the Station". No such statement appears in the Letter of Agreement (LOA) between the applicant and the United States Coast Guard (Galveston). Verify this statement and provide correction, or provide justification to retain the statement as written. The last sentence of Section B.4.9 "United States Coast Guard (Galveston) "of the Emergency Plan states "...within approximately four hours, on a 24 hours a day basis". This response time is not specified in the Letter of Agreement (LOA) between the applicant and the United States Coast Guard (Galveston). Verify this statement and provide correction, or provide justification to retain the statement as written. 4) Section B.4.10 of the Emergency Plan "Resources of Other Federal Agencies", mentions "Federal National Response Plan". This title does not appear correct. Verify this and provide correction, or provide justification to retain the statements as written.

RESPONSE:

1) STP determined that the Letter of Agreement (LOA) between STP and the Matagorda County Sheriff's Office will ensure the appropriate level of support required during an emergency and will revise the last line of Section B.4.7, "Matagorda County Sheriff's Office," to be consistent with the LOA as shown below:

B.4.7 Matagorda County Sheriff's Office

The Matagorda County Sheriff's Office by letter of agreement will assist the Station in responding to an emergency. The Emergency Management Plan for Matagorda County identifies the responsibilities for the Sheriff's Office as law enforcement, evacuation/traffic control, communications, warning/notifications and maintenance of the Matagorda County Emergency Operations Center. The Matagorda County Sheriff's Office will respond to requests to provide assistance during emergency or drill/exercise situations that develop at the Station. The Matagorda County Sheriff's Office has the

capability to respond to a request for assistance from the Station in approximately thirty minutes, on a 24 hours a day basis.

2) STP determined that the LOA between STP and the United States Coast Guard (Corpus Christi) will ensure the appropriate level of support required during an emergency and will revise will revise Section B.4.8, "United States Coast Guard (Corpus Christi)," to be consistent with the LOA as shown below:

B.4.8 United States Coast Guard (Corpus Christi)

The United States Coast Guard, by Letter of Agreement will provide vessel traffic control on the Colorado River and other navigable waters in the vicinity of the Station by the use of marine warnings ,and if necessary, aircraft and surface craft during emergency situations that may develop at the Station. The Coast Guard responds to requests, from the Matagorda County Sheriff's Office, for assistance from Corpus Christi District. Estimated time of response for the Coast Guard is within approximately four hours, on a 24 hours a day basis.

3) STP determined that the Letter of Agreement (LOA) between STP and the United States Coast Guard (Galveston) will ensure the appropriate level of support required during an emergency and will revise will revise Section B.4.9, "United States Coast Guard (Galveston)," to be consistent with the LOA as shown below:

B.4.9 United States Coast Guard (Galveston)

The United States Coast Guard, by Letter of Agreement will provide assistance vessel traffic control on the Colorado River and other navigable waters in the vicinity of the Station by the use of marine warnings, and if necessary, aircraft and surface craft during emergency situations that may develop at the Station. The Coast Guard responds to requests, from the Matagorda County Sheriff's Office, for assistance from Galveston District. Estimated time of response for Tthe Coast Guard is available within approximately four hours, on a 24 hours a day basis.

4) STP will revise Section B.4.10, "Resources of Other Federal Agencies," to references to the "National Response Framework (NRF)" instead of the "Federal National Response Plan." The following marked-up and replacement text will be inserted in Section B4.10:

B.4.10 Resources of Other Federal Agencies

The resources of Federal agencies appropriate to the emergency condition will be made available in accordance with the Federal Radiological Emergency Response Plan. Federal National Response Plan. National Response Framework. The Station Emergency Director is specifically authorized to request Federal assistance on behalf of the Station under the provisions of the Federal Radiological Emergency Response Plan. Federal National Response Plan, Nuclear Radiological Incident Annex. National Response Framework. The Station Emergency Director requests Federal assistance by contacting the NRC. In addition to the NRC, agencies other than those with a Letter of Agreement with the Station that may become involved are the Department of Energy, the DHS-Federal Emergency Management Agency, and the Environmental Protection Agency. These Agencies have the capability of responding to a declared emergency at the Station in approximately twelve hours, on a 24 hours a day basis.

QUESTION:

ONSITE EMERGENCY PLAN: SITE-9: Subject: COM EP-1 "Commitment Summary"; NSSS vendor [Basis: 10 CFR 50.47(b)(1); NUREG-0654, FEMA-REP-1, Rev. 1, November 1980: Criterion A.1.a] 1) Refer to ABR-AE-07000004, Attachment 3, page 13 of 13, COM EP-1 "Commitment Summary". It will be appropriate to incorporate, in the narrative appearing in Section B.5.2 of the Emergency Plan, a statement regarding signing of a "Letter of Agreement (LOA)" with the NSSS vendor. 2) Per Figure F-2 of the Emergency Plan, General Electric (GE) appears to be the NSSS vendor for the proposed Units 3 & 4. Verify this and provide a response.

RESPONSE:

 STP will revise the Station Emergency Plan, Section B.5.2, "ABWR Nuclear Steam Supply Services," consistent with the role of Toshiba Corporation as the NSSS for STP Units 3 and 4. The following marked-up and replacement text will be inserted in Section B.5.2:

B.5.2 <u>ABWR Nuclear Steam Supply</u>

Services provided by an ABWR NSSS vendor during an emergency event at STP will be obtained once an appropriate contract award has occurred. The vendor will be required to establish a contract with the Station to provide general services related to nuclear steam supply operation during and following an accident situation. The vendor will be required to provide the capability to respond on a 24 hours per day basis. (COM EP-1)

B.5.2 Toshiba

Toshiba Corporation has established a contract with the Station to provide general services related to nuclear steam supply operation during and following an accident situation. Toshiba provides a capability to respond on a 24 hours per day basis.

2) STP will revise the Station Emergency Plan, Figure F-2, "Emergency Response Facilities Communications Pathway Typical," consistent with the role of Toshiba Corporation as the NSSS for STP Units 3 and 4. The following marked-up and replacement text will be inserted in Section Figure F-2.



Figure F-2 Emergency Response Facilities Communications Pathway Typical Functional Diagram Alert, Site Area, and General Emergencies

QUESTION:

ONSITE EMERGENCY PLAN: SITE-10: Subject: Letter of Agreement with OXEA Chemicals [Basis: 10 CFR 50.47(b)(1); NUREG-0654, FEMA-REP-1, Rev. 1, November 1980: Criteria A.1.a and B.9] Section B.5.4 of the Emergency Plan mentions "OXEA Chemicals". The narrative in this section cites "separate Letters of Agreement". However, no Letter of Agreement (LOA) is found in the application or the Emergency Plan between the applicant and OXEA Chemicals. Provide LOA with OXEA Chemicals to address the requirement of NUREG-0654 Criteria A.1.a and B.9, or justify why it is not included.

RESPONSE:

STP Station Emergency Plan, Section B.5.4, states that a Letter of Agreement (LOA) between STP and OXEA Chemicals (Bay City Plant) requires that OXEA notify the Station of emergencies occurring at their plants which could involve offsite chemical releases. A copy of this LOA is provided below.

No COLA revision is required as a result of this RAI response.

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STPNOC EP DEPT

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OXEA Corporation • 2001 FM 3057 • Bay City, TX 77414



OXEA Corporation



Telephone: 979/241-4000 Fax: 979/241-4279 www.oxea-chemicals.com

SEP-001-08 January 29, 2008

Ms. Lurinda Barton STP Nuclear Operating Company Offsite Program Manager P. O. Box 289 Wadsworth, Texas 77483

Ref: Letter of Agreement with STP Nuclear Operating Company (STPNOC)

Dear Ms. Barton:

This letter of agreement is provided to assist with the emergency preparedness program at the South Texas Project (STP). In that capacity, the Bay City Plant will make an effort to inform the South Texas Project control room of any release, air or surface, of a chemical which may affect the environment of the South Texas Project. Our intention would be to notify your facility as soon as possible following our determination of the release and its potential impact upon the South Texas Project.

A sample listing of the chemicals stored, used or produced at the Bay City Plant follows:

Vinyl Acetate
Acetic Acid
Butanol
Propanol
Heptanoic Acid
Pelargonic Acid

Ethylene Propylene Carbon Monoxide Hydrogen Heptanal Nonanal Butyraldehyde Propionaldehyde Normal Butyl Acetate Propyl Acetate Iso Butyl Acetate Acetaldehyde

We acknowledge the intent of the STP Nuclear Operating Company to construct two additional units at the existing STP site.



P.02

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-2-

January 29, 2008

We request that we be notified of releases from the South Texas Project which might have an adverse effect upon our operations. Notification should be made to our Security Office at (979) 241-4046 or (979) 245-2932. They remain 24-hour numbers, which are available 365 days a year. We realize that a notification from STPNOC may be a duplication of a notification from Matagorda County officials.

Sincerely,

SEP-001-08

teren Parker

Steven E. Parker Site Manager

SEP/jg

QUESTION:

ONSITE EMERGENCY PLAN: SITE-11: Subject: Letters of Agreement [Basis: 10 CFR 50.47(b)(1); NUREG-0654, FEMA-REP-1, Rev. 1, November 1980: Criterion A.1.a] 1) Section B.5.8 of the Emergency Plan cites a Letter of Agreement (LOA) from the Institute of Nuclear Power Operations (INPO); however, this LOA is not addressed to the applicant; also, it does not provide for "24 hours a day basis" support. Revise the LOA with INPO and resubmit, or provide justification to retain the current version. 2) Refer to Section B.5.9 of the Emergency Plan. Provide a copy of the endorsement on Nuclear Energy Liability Insurance procured from the American Nuclear Insurers (ANI) indicating inclusion of the proposed Units 3 and 4 in the policy, or provide a statement regarding the expected time of obtaining a new or revised policy to include Units 3 and 4. 3) In Section B.5.11 of the Emergency Plan, the text cites a Letter of Agreement (LOA) with Areva NP Inc. to "...provide assistance in the radio analyses of environmental samples or personnel dosimetry..." The LOA submitted with the application does not mention "personnel dosimetry". Provide a revised copy of the LOA with Areva NP Inc. or provide justification to retain the current version. 4) Revise Section B.5.17 of the Emergency Plan to reflect the Letter of Agreement (LOA) with Matagorda County Environmental Health. Also reflect in this Section response "on a 24 hour per day basis", or provide justification to retain the statement as written.

RESPONSE:

1) Emergency Plan, Section B.5.8, states "Institute of Nuclear Power Operations by Letter of Agreement will provide assistance in acquiring the help of other organizations in the industry on a 24 hours a day basis. In addition, INPO will provide assistance, utilizing its own resources, as requested and as appropriate."

STP Nuclear Operating Company is a member utility of the Institute of Nuclear Power Operations (INPO). INPO Manual 03-001, Section 1, describes INPO's capabilities and commitment to support member utilities in an emergency situation, including the ability to mobilize and provide INPO support on a 24 hour basis. Emergency Plan, Section B.5.8, and the Letter of Agreement between INPO and member utilities dated September 30, 2006 (Part 5, Emergency Plan, Section 7) provide adequate assurance of INPO support on a 24 hour basis based on STP's status as a member of INPO and INPO's procedural commitments to support member utilities on a 24 hour basis.

2) Emergency Plan, Section B.5.9, states "The Station maintains a policy with American Nuclear Insurers. American Nuclear Insurers has agreed to assume responsibility, except where excluded by the policy, for promptly assisting members of the public whom may be adversely affected by an incident at the Station."

As stated in the Office Memorandum, dated February 1, 2007, STP Nuclear Operating Company currently purchases Nuclear Energy Liability Insurance for its nuclear units from American Nuclear Insurers (ANI), which includes provisions for support from ANI consistent with those described in Emergency Plan, Section B.5.9. It is anticipated that Nuclear Energy Liability Insurance for STP Units 3 and 4, when required, will include provisions equivalent to those currently maintained between STP Nuclear Operating Company and ANI.

3) Emergency Plan, Section B.5.11, states "Areva NP Inc. by Letter of Agreement will provide assistance in the radioanalyses of environmental samples or personnel dosimetry as requested."

STP will revise Emergency Plan, Section B.5.11, to delete that statement that Areva NP Inc. will provide assistance with personnel dosimetry as part of the emergency response effort. The following marked-up and replacement text will be inserted in Section B.5.11.

B.5.11 Areva NP inc.

Areva NP Inc.:by Letter of Agreement will provide assistance in the radioanalyses of environmental samples or personnel dosimetry as requested.

4) Emergency Plan, Section B.5.17, states "Matagorda County Environmental Health by Letter of Agreement, will provide radiological supplies, equipment, monitoring and decontamination for the offsite response organization."

STP will revise Emergency Plan, Section B.5.17, consistent with the LOA between Matagorda County Environmental Health and STP, dated September 13, 2006, as shown below.

B.5.17 Matagorda County Environmental Health

Matagorda County Environmental Health by Letter of Agreement, will assist the Station on a 24 hours per day basis, or as needed, during an emergency situation at the Station by assisting the American Red Cross in opening and operating a Reception Center(s) and a monitoring and decontamination facility or facilities when the need arises. Matagorda County Environmental Health will provide radiological supplies, equipment, monitoring and decontamination for the offsite response organization. Matagorda County Environmental Health will maintain the necessary inventory of supplies to accommodate such an operation, based on STP staff and financial assistance.

QUESTION:

ONSITE EMERGENCY PLAN: SITE-12: Subject: Text for maintaining clarity [Basis: 10 CFR 50.47(b)(1); NUREG-0654, FEMA-REP-1, Rev. 1, November 1980: Criterion A.1.a] Refer to Plan Section B.6.2, 2nd bullet: "Upon declaration of a classified emergency," has been inserted at the beginning of this bullet. It will be appropriate to add "by the Station's Unit-specific Emergency Director" (or a similar statement) after the inserted text in order to maintain clarity, since "The Station's Emergency Director initiates a declaration of Unusual Event, Alert, Site Area Emergency, or General Emergency." has been struck out.

RESPONSE:

STP will revise the Station Emergency Plan, Section B.6.2, to amend the second bullet to include the clarification "by the Station's Unit-specific Emergency Director."

The following text changes will be made to Section B.6.2 second bullet:

 <u>Upon declaration of a classified emergency</u>, by the Station's Unit-specific Emergency Director, ∓ the State is notified of an emergency at the Station by the Station's Emergency Director via a call to the Department of Public Safety Communication Center located at Disaster District Sub 2C, Pierce, Texas, on the dedicated ringdown telephone.

QUESTION:

ONSITE EMERGENCY PLAN: SITE-13: Subject: Plan Section and NUREG-0654 cross reference [Basis: 10 CFR 50.47(b)(1); NUREG-0654, FEMA-REP-1, Rev. 1, November 1980: Criterion A.1.b] "Attachment 1 Cross Reference" to Emergency Plan identifies Plan Section B.1 as being responsive to NUREG-0654 Criterion A.1.b. However, Plan Section B.1 does not specify "its (each organization's) concept of operations, and its (each organization's) relationship to the total effort". It appears that Plan Sections B.2 through B.6 address the relevant requirement. Verify this cross reference and provide correction, or provide justification to retain the statement as written.

RESPONSE:

STP revised the Station Emergency Plan, Attachment 1, Cross Reference, A. "Assignment of Responsibility (Organization Control)," to specify that NUREG-0654-Evaluation Criterion A.1.b is addressed by Station Emergency Plan Sections B.2 through B.6 as a replacement for Section B.1.

The revised Emergency Plan, Attachment 1, Cross Reference is provided as a part of the response to RAI 13.03-24.

QUESTION:

ONSITE EMERGENCY PLAN: SITE-14: Subject: Assignment of Unit Supervisor; responsibilities of Plant Operators [Basis: 10 CFR 50.47(b)(1); NUREG-0654, FEMA-REP-1, Rev. 1, November 1980: Criterion A.1.c]1) Figure C-1 identifies "Offsite Communicator (5)". According to the legend provided, Plant Operators fill these positions. Emergency Plan Section "C.3.7 Plant Operators" identifies 6 responsibilities for onshift Plant operations personnel, and then adds "A Plant Operator is assigned to report to the affected unit's control room upon any declaration of the Emergency Plan to act as the State/County Communicator". Explain why this responsibility is not conflicting to the 6 previously identified responsibilities.

RESPONSE:

Figure C-1 identifies "Offsite Communicator (5)". The legend provides, Plant Operators fill these positions. Emergency Plan Section "C.3.7 Plant Operators" identifies 6 responsibilities for onshift Plant operations personnel. Table C-1 provides the minimum staffing criteria for onshift operations personnel required to support both plant operations and emergency response actions. Section B.5.17 will be revised as provided below to clarify these requirements:

C.3.7 Plant Operators

The onshift Plant Operations personnel (Licensed and Non-Licensed) are responsible for:

- Operations of all reactor-related equipment;
- Coordination of activities affecting Station structures, systems and components;
- Equipment clearances;
- Activation of fire brigade and emergency care medical teams;
- Identification of emergency classifications;
- Initiating notification of the Emergency Response Organization.

A Plant Operator is assigned to report to the affected unit's control room upon any declaration of the Emergency Plan to act as the State/County Communicator. The State/County Communicator is not required to perform plant operator duties while filling this position. The Staffing identified in Table C-1 is provided to support Emergency Plan and plant operation response requirements. Those Plant Operators not assigned onshift duties in the operation of the units by the Emergency Director report to the Operations Support Center at an Alert or higher emergency classification. The Emergency Director can utilize the Plant Operators via the Acting Operations Support Center Coordinator.

QUESTION:

ONSITE EMERGENCY PLAN: SITE-15: Subject: Consistency between header and text [Basis: 10 CFR 50.47(b)(1); NUREG-0654, FEMA-REP-1, Rev. 1, November 1980: Criterion A.1.d] The header for Plan Section C.3.6 needs to be consistent with the inserted text.

RESPONSE:

The header for Plan Section C.3.6 will be changed to be consistent with the inserted text.

The following text changes will be made to Section C.3.6:

C.3.6 The-ENS Communicator duties may be performed by the following:

The onsite ENS Communicator reports to the Control Room at an Unusual Event or higher emergency classification and initiates communications with the Nuclear Regulatory Commission.

Deluties may be performed by the following:

- Personnel currently or previously licensed by NRC,
- SRO Management Certified Personnel.
QUESTION:

ONSITE EMERGENCY PLAN: SITE-16: Subject: Clarification for Figure B-1 [Basis: 10 CFR 50.47(b)(1); NUREG-0654, FEMA-REP-1, Rev. 1, November 1980: Criteria A.1.c, A.2a] Figure B-1 of the Emergency Plan identifies National Response Plan as a "LEAD ORGANIZATION" (see legend at the bottom of the Figure B-1). A plan cannot serve as an organization. Provide proper nomenclature or provide justification to retain the statement as written.

RESPONSE:

Figure B-1 of the Emergency Plan identifies National Response Plan as a "LEAD ORGANIZATION" based on the legend provided at the bottom of the Figure. The original text 'Federal Emergency Response Team' will be restored within this text box and the 'National Response Plan' will be removed. The following replacement text will be inserted in Section Figure B-1.





QUESTION:

ONSITE EMERGENCY PLAN: SITE-17: Subject: Clarification for Table B-1 [Basis: 10 CFR 50.47(b)(1); NUREG-0654, FEMA-REP-1, Rev. 1, November 1980: Criterion A.2.a] Emergency Plan, Section "B Assignment of Responsibility" refers to Table B-1. This table identifies "Department of State Health Services" (DSHS) as an organization and "Bureau Chief" as the "Individual in Charge" for that organization. Clarify if the title of the Chief of DSHS is "Bureau Chief" or the "Bureau Chief" belongs to another organization which is a Bureau under DSHS.

RESPONSE:

Emergency Plan, Section B, "Assignment of Responsibility," refers to Table B-1. This table identifies "Department of State Health Services" (DSHS) as an organization and "Bureau Chief" as the "Individual in Charge" for that organization. The title of the individual in charge of DSHS was "Bureau Chief". This title was carried over from the predecessor organization (Bureau of Radiation Control) to the DSHS and this title has since been changed to 'Radiation Program Officer'.

Table B-1 will be revised to reflect the new title of 'Radiation Program Officer' and 'Bureau Chief' will be deleted. The following marked- up and replacement text will be inserted in Section Table B-1.

TABLE B-1Page 1 of 1RESPONSIBLE PRIMARY ORGANIZATIONS

Organizations	Individual in Charge
South Texas Project Electric Generating Station	Emergency Director
State of Texas	Governor
State of Texas Emergency Management Council	Chairperson, Emergency Management Council
Governor's Division of Emergency Management	State Coordinator
Department of State Health Services	Bureau Chief Radiation Program Officer
Matagorda County Emergency Management Organization	Emergency Management Director (County Judge or Mayor(s) and County Commissioners)
Bay City Emergency Management Organization	Mayor
City of Palacios Emergency Management Organization	Mayor
Matagorda County Sheriff's Office	Sheriff

QUESTION:

ONSITE EMERGENCY PLAN: SITE-18: Subject: Plan Section and NUREG-0654 cross reference [Basis: 10 CFR 50.47(b)(1); NUREG-0654, FEMA-REP-1, Rev. 1, November 1980: Criterion A.2.a] Emergency Plan, Section B.1 should be included in the Plan Section reference (Attachment 1 Cross Reference) for NUREG-0654 Criterion A.2.a.

RESPONSE:

The NUREG-0654 Cross Reference Table Criterion A.2.a has been revised to include a reference to Emergency Plan Section B.1.

The revised Emergency Plan, Attachment 1, Cross Reference is provided as a part of the response to RAI 13.03-24.

QUESTION:

ONSITE EMERGENCY PLAN: SITE-19: Subject: OSC activation [Basis: 10 CFR 50.47(b)(1); NUREG-0654, FEMA-REP-1, Rev. 1, November 1980: Criterion A.2.a] In Plan Section "C.4.8 Operations Support Center Coordinator", identify when the Operations Support Center (OSC) Coordinator reports to OSC; this is needed for consistency with the narratives of other facilities listed under C.4

RESPONSE:

Plan Section "C.4.8 Operations Support Center Coordinator", does not identify when the Operations Support Center (OSC) Coordinator reports to OSC. This will be revised for consistency with the narratives of other facilities listed under C.4. Section C.4.8 will be revised as provided below:

C.4.8 Operations Support Center Coordinator

The Operations Support Center Coordinator reports to the Operations Support Center at an Alert or higher and assumes responsibility for Operations Support Center activities and ensures accountability of the Operations Support Center is maintained. The Operations Support Center Coordinator ensures that emergency teams formed and dispatched are properly briefed and their status monitored, resources and personnel to perform Operations Support Center activities are adequate, and adequate communications and information flow is maintained with the Technical Support Center. The Operations Support Center Coordinator ensures that deviations from Station procedures and NRC regulations are approved by the Emergency Director.

QUESTION:

ONSITE EMERGENCY PLAN: SITE-20: Subject: Addressing of stipulations in NUREG-0654 [Basis: 10 CFR 50.47(b)(2); NUREG-0654, FEMA-REP-1, Rev. 1, November 1980: Criterion B.3] 1) Emergency Plan Section C.3, cross-referenced in "Attachment 1 Cross Reference" as addressing part of NUREG-0654 Criterion B.3, does not identify "a line of succession" as stipulated in the Criterion. Include in C.3 additional text to address this, or provide justification to retain the statement as written. 2) Emergency Plan Sections C.4.1 and C.4.9, cross-referenced in "Attachment 1 Cross Reference" as addressing part of NUREG-0654 Criterion B.3, do not identify "specific conditions" as stipulated in NUREG-0654 Criterion B.3. Include in C.4.1 and C.4.9 additional text to address this, or provide justification to retain the statement as written.

RESPONSE:

NUREG -0654, Part II.B, "Onsite Emergency Organization," Criterion 3 specifies that "Each licensee shall identify a line of succession for the emergency coordinator position and identify the specific conditions for higher level utility officials assuming this function."

STP Emergency Plan, Section C, "Organizational Control of Emergencies," specifies that "The emergency duties of the Onshift Response Organization are transferred to the Emergency Response Organization as the emergency response facilities are activated." Section C further clarifies that "Personnel relieving Emergency Response Organization positions will follow guidance contained in their position based procedures."

Based on these statements in Section C, the cross reference to NUREG-0654 Criterion B.3 has been changed to include Emergency Plan Section 'C'. With this addition the criteria will then be fully met.

The revised Emergency Plan, Attachment 1, Cross Reference is provided as a part of the response to RAI 13.03-24.

QUESTION:

ONSITE EMERGENCY PLAN: SITE-21: Subject: Apparent inconsistencies in staff augmentation statements [Basis: 10 CFR 50.47(b)(2); NUREG-0654, FEMA-REP-1, Rev. 1, November 1980: Criterion B.5, and Table B-1] [NOTE: In response to the questions on minimum staffing and augmentation, information contained in the following publicly available document, particularly Attachment 2 ("Smart Application Template for Requesting Emergency Plan Changes Related to On-Shift Staffing Levels and Augmentation Times"), may be utilized: "SUMMARY OF MEETING WITH THE NUCLEAR ENERGY INSTITUTE REGARDING THE DEVELOPMENT OF A SMART APPLICATION TEMPLATE RELATED TO ON-SHIFT STAFFING LEVELS AND AUGMENTATION TIMES CHANGES" (NRC ADAMS Accession Number ML042530011; dated September 9, 2004)] 1) Section C. 4 of the Emergency Plan states: "Those members of the Emergency Response Organization who are not on site at the time of the emergency shall be able to augment the Onshift Response Organization within approximately 60 to 75 minutes of being notified as specified in Table C-1(prior to fuel load) to provide manning levels recommended in NUREG-0654." According to "Attachment 1: Cross Reference", Table C-1 of the Emergency Plan is responsive to NUREG-0654, Table B-1 (see NUREG-0654 Criterion B.5). There are differences between NUREG-0654 Table B-1 and Emergency Plan Table C-1, and additional information is being requested as follows: a) Explain why 30-minute "Capability for Additions" is not included in Table C-1. Per NUREG-0654, 30minute augmentation is identified for Functional Areas "Notification/ Communication", "Radiological Accident Assessment and Support of Operational Accident Assessment", "Plant System Engineering, Repair and Corrective Actions", and "Protective Actions (In-Plant)". Justify how and indicate where the identified additional staffing need and/or function are satisfied; b) In the struck-out Table C-1, a column existed with the title "AVAILABLE 75 MINUTES#". Explain why this column was deleted, and justify how and indicate where the resulting changes are addressed; c) The note with "#" at the end of Table C-1 says: "Although such a short response time may be achieved in many cases, it is not possible to assure this response time in every instance.". Elaborate which cases and under what conditions this stipulation will be used, and why a disclaimer to program capabilities is necessary in relation to NUREG-0654; d) Under Major Functional Area "Radiological Accident Assessment and Support of Operational Accident Assessment", 2 personnel onshift were identified for Major Task "onsite/offsite surveys". Justify how and indicate where the identified additional staffing need and/or function are satisfied in comparison to any unit requirements for HP expertise (per Tech. Specs. or other specific requirements); e) Under Major Functional Areas "Radiological Accident Assessment and Support of Operational Accident Assessment" and "Protective Actions (In-Plant)", NUREG-0654 identifies 7 HP (RP) Tech.-specific positions to be available within 30 minutes. Table C-1 does not provide clear staffing to satisfy this need within 30 minutes, but does identify 11 HP (RP) Tech.-specific positions available to respond within 60 minutes. Justify how and indicate where the identified staffing need and/or function are satisfied for the 30minute positions; f) Under Major Functional Area "Plant System Engineering, Repair and Corrective Actions", NUREG-0654 identifies one "Core/ Thermal Hydraulics" position for Major Task "Technical Support" to be available within 30 minutes. Table C-1 identifies one "Nuclear Engineer" to be available within 60 minutes. This is contrary to the stipulation in

NUREG-0654. Justify how and indicate where the identified additional staffing need and/or function are satisfied; g) Under Major Functional Area "Plant System Engineering, Repair and Corrective Actions", two Shift Technical Advisors (STAs) are identified with "**", meaning "These positions may be covered by onshift personnel assigned other functions". Provide justification to support this statement, including license amendment approval if the STA position criteria have been altered; 2) Section C.4, page C-6, of the Emergency Plan discusses staff augmentation allowable time "...within approximately 60 to 75 minutes of being notified as specified in Table C-1(prior to fuel load)..": a) Neither NUREG-0654 Table B-1 nor Emergency Plan Table C-1 provides an option for 75-minute addition capability (i.e., "AVAILABLE 75 MINUTES #" option). Refer to Section C.4 and explain how the extended period of time for staff augmentation following declaration of an emergency provides an acceptable alternative to 10 CFR 50.47(b)(2) requirements, as exemplified by guidance in NUREG-0654, and then revise Table C-1 to reflect this change; b) "..60 to 75 minutes of being notified.." is an open-ended initiation of staff augmentation. Revise this statement to be consistent with 10 CFR 50.47(b)(2)requirements, as amplified by guidance in NUREG-0654, or explain how this provides an acceptable alternative to 10 CFR 50.47(b)(2) requirements, as exemplified by guidance in NUREG-0654. 3) Explain the reference regarding "(prior to fuel load)". Are there expectations that emergency response organization complements or activation times will change following fuel load?

RESPONSE:

- 1)
- a) NUREG 0654/FEMA REP-1, Table B-1 establishes an on-shift staffing goal of 13 individuals in key functional areas. Table B-1 sets a goal to have an additional 11 personnel respond within 30 minutes of the declaration of an emergency. At that point in time (30 minutes) Table B-1 goals would have a total of 24 personnel onsite. In STP's revision to Emergency Plan Table C-1 the Plan commits to having 35 personnel onsite from on-shift positions and an additional 21 respond at 60 minutes for a total of 56 personnel onsite at 60 minutes. For the first 60 minutes STP has on site an excess of 11 personnel of the Table B-1 goal of a 24.
- b) In the struck-out Table C-1, a column existed with the title "AVAILABLE 75 MINUTES#" the staffing within this column has been subsumed into the new Table C-1 available in 60 minutes column.
- c) The indication of the "#" on the bottom of page C-16 on Table C-1 is not to imply the capabilities for consistent response is not achievable. The "#" is to denote that there may be extenuating circumstances where activation of Emergency Response Organization may be delayed. An example that may cause a delay could be a 'Hostile Action'.
- d/e) STP maintains three (3) Health Physics positions on-shift as indicated in Table C-1. This total is in excess of the one (1) minimum identified in NUREG 0654/FEMA REP-1, Table B-1. Table B-1 also identifies a 30 minute augmentation of four (4) HP Technicians for a total of seven (7) HP (RP) Technician positions. The four (4) person deficit at the 30 minute mark is not a significant detriment considering the on-shift

personnel during the early stages of an emergency should be more effective initially than personnel arriving from offsite. At the 60 minute mark a total of 11 HP (RP) technicians are available meeting the goal of Table B-1 at this point.

- f) The Shift Technical Advisor (STA) assigned to the On-shift Response Organization is trained in basic core damage analysis, has no other ERO responsibilities and can provide core and thermal hydraulic performance assistance during the early stages of an emergency.
- g) The "**" is a verbatim indication of the defined criteria in NUREG 0654 Table B-1 which is located on the on-shift column.
- 2) Section C.4, page C-6, of the Emergency Plan discusses staff augmentation allowable time "...within approximately 60 to 75 minutes. The timeliness of facility activation within approximately 75 minutes is an editorial error in changing the activation times. This activation time was a carryover from the Unit 1 and 2 Emergency Plan and was not modified when the Site Emergency Plan (Units 1-4) was prepared. The 'within approximately 75 minute' activation time will be revised within Section C.4 to 'within approximately 60 minutes' as indicated below:
- STP currently has no expectations to change the ERO complements or activation times following fuel load. The reference "prior to fuel load" will be deleted from the text of Section C.4 as indicated below:

C.4 Emergency Response Organization

Those members of the Emergency Response Organization who are not on site at the time of the emergency shall be able to augment the On-shift Response Organization within approximately 60 to 75 minutes of being notified as specified in Table C-1 (prior to fuel load) to provide manning levels recommended in NUREG-0654.

QUESTION:

ONSITE EMERGENCY PLAN: SITE-22: Subject: Inconsistency and footnotes clarification involving minimum staffing [Basis: 10 CFR 50.47(b)(2); NUREG-0654, FEMA-REP-1, Rev. 1, November 1980:Criteria B.5, B.7] 1) Describe how the minimum staffing availability described in Table C-1 aligns with identified minimum staffing positions in Figures C-2, C-3, C-4, and C-5. 2) Explain the meaning and application for the "#" and "##" footnotes under Table C-1, page C-16. For the "#" reference, are you implying that the capability for consistent response capabilities is not in place? For the "##" reference, will this be a collateral duty of operations staff minimally required by Technical Specifications? Will other unit operations staff be collaterally used for emergency response functions? Please discuss detailed examples for application of these footnotes.

RESPONSE:

1) The table provided below describes the cross references between Figures C-2, C-3, and C-4 with Table C-1 Minimum Staffing Requirements.

Minimum Staffing	Table C-1 Functional Area	Table C-1 Response Time	
Figure C-2			
TSC Manager	Radiological Accident Assessment and	Call out 60 Minutes	
	Support of Operational Accident		
	Assessment		
TSC Communicator	Notification/Communications	Call out 60 Minutes	
Operations Communicator	Notification/Communications	Call out 60 Minutes	
Electrical Engineer	Plant System Engineering	Call out 60 Minutes	
Mechanical Engineer	Plant System Engineering	Call out 60 Minutes	
Nuclear Engineer	Plant System Engineering	Call out 60 Minutes	
Figure C-3			
Plant Operations	Plant Operations and Assessment of	Call out 60 Minutes	
	Operational Accident Aspects		
Chemical Analysis	Radiological Accident Assessment and	Onshift	
	Support of Operational Accident		
	Assessment		
Electrical Maintenance	Repair and Corrective Actions	Onshift	
Mechanical Maintenance	Repair and Corrective Actions	Onshift	
I&C Technician	Repair and Corrective Actions	Onshift	
Radiation Protection	Radiological Accident Assessment and	Call out 60 Minutes	
	Support of Operational Accident		
	Assessment		
Figure C-4			
Offsite Field Team	Protective Actions	Call out 60 Minutes	

2) The indication of the "#" on the bottom of page C-16 is not to imply the capabilities for consistent response is not achievable. The "#" is to denote that there may be extenuating circumstances where activation of Emergency Response Organization may be delayed. An example that may cause a delay could be a 'Hostile Action'.

The "##" provides clarifying information related to the qualifications of the Emergency Response Organization member called out to staff this position. This position is identified as an ERO call-out available within 60 minutes. The position on the ERO Roster is filled by a <u>day staff</u> employee with operations experience. Based on this clarification, STP has determined that detailed examples are not necessary for this footnote.

QUESTION:

ONSITE EMERGENCY PLAN: SITE-23: Subject: Alignment of activation times [Basis: 10 CFR 50.47(b)(8); NUREG-0654, FEMA-REP-1, Rev. 1, November 1980: Criteria H.1 & 2; NUREG-0696, Rev. 1] Explain the alignment of identified activation times for emergency response facilities in Sections G.2, G.3, and G.4 of the STP 3 & 4 Emergency Plan, specifically, the meaning of "fully activated" for the OSC "within approximately 75 minutes after notification of an Alert", for the TSC "within approximately 75 minutes after notification of an Alert", and the EOF "within approximately 75 minutes of declaration of Site Area Emergency or higher". Provide an explanation for the difference among the three above facilities in the initiation of the activation clock and the difference between the timeliness of full facility activation and the minimum staffing positions and response times in Table C-1.

RESPONSE:

"Activated" is intended to mean that the facility is capable of performing its intended function, including assembly of the minimum staffing specified in Table C-1. STP will revise the Emergency Plan, Section G.2, "Operations Support Center," Section G.3, "Technical Support Center," and Section G.4, "Emergency Operations Facility," to specify that each facility is "designed to be activated within approximately 60 minutes." This change will eliminate the ambiguity created by the use of the term "fully activated" and eliminate a discrepancy between Emergency Plan Sections G.2, G.3 and G.4 and Table C-1, which specifies that minimum staffing requirements are achieved in approximately 60 minutes.

The following marked-up and replacement text will be inserted in Section G.2 last paragraph:

G.2 Operations Support Center

The Operations Support Center is designed to be fully activated within approximately 75 60 minutes after notification of an Alert, in conjunction with the Technical Support Center. Radiation levels in and around the Operations Support Center are assessed during radiological events.

The following marked-up and replacement text will be inserted in Section G.3 last paragraph:

G.3 Technical Support Center

Each Technical Support Center is designed to be fully activated within approximately 75 60 minutes after notification of an Alert, in conjunction with activation of the Operations Support Center. The Technical Support Center may activate simultaneously with activation of the Operations Support Center.

The following marked-up and replacement text will be inserted in Section G.4 second paragraph:

G.4 Emergency Operations Facility

The Emergency Operations Facility provides for management of overall Station emergency response, coordination of radiological and environmental assessment, determination of recommended offsite protective actions, and coordination of emergency response activities with Federal, State, and County authorities. The Emergency Operations Facility can be fully activated within approximately 75 60 minutes of declaration of Site Area Emergency or higher. When activated, the Emergency Operations Facility will be staffed by Emergency Response personnel.

QUESTION:

ONSITE EMERGENCY PLAN: SITE-25: Subject: Addressing of stipulations in NUREG-0654 [Basis: 10 CFR 50.47(b)(2); NUREG-0654, FEMA-REP-1, Rev. 1, November 1980:Criterion B.7.a] Emergency Plan Sections C.4.7 and C.4.12, cross-referenced in "Attachment 1 Cross Reference" as addressing NUREG-0654 Planning Standard B.7.a, are not explicit on areas of logistics support covered (transportation, communications, etc., as stipulated in NUREG-0654 Planning Standard B.7.a). Include in C.4.7 and C.4.12 additional text to address this, or provide justification to retain the statement as written.

RESPONSE:

NUREG -0654, Part II.B, "Onsite Emergency Organization," Criterion B.7a, specifies that "each licensee shall specify the corporate management, administrative, and technical support personnel who will augment the plant staff ... in the following areas: a. logistics support for emergency personnel, e.g., transportation, communications, temporary quarters, food and water, sanitary facilities in the field, and special equipment and supplies procurement."

The reference to Emergency Plan, Sections C.4.7 and C.4.12, in "Attachment 1 Cross Reference" as addressing requirements in NUREG-0654, Part IIB, Criterion B.7.a, is inaccurate. Section F.8.3 of the Emergency Plan identifies the "Procurement/Resources Supervisor, Assistant Support Organization Director and Administrative Manager" as providing the required logistics support . Logistics support is described as food, lodging, and transportation which is identified as examples of support required in the NUREG-0654 Planning Standard.

STP revised "Attachment 1 Cross Reference" to identify that NUREG-0654, Part IIB, Criterion B.7.a, requirements are satisfied as described in Emergency Plan, Section F.8.3, and references C.4.7 and C.4.12 are deleted.

The revised Emergency Plan, Attachment 1, Cross Reference is provided as a part of the response to RAI 13.03-24.

QUESTION:

ONSITE EMERGENCY PLAN: SITE-26: Subject: Identification of NSSS vendor [Basis: 10 CFR 50.47(b)(2); NUREG-0654, FEMA-REP-1, Rev. 1, November 1980:Criterion B.8] COM EP-1 is associated with Emergency Plan Section B.5.2. The vendor for the ABWR Nuclear Steam Supply Services (NSSS) has not been identified; however, per Figure F-2 of the Emergency Plan, General Electric (GE) appears to be the NSSS vendor for the proposed Units 3 & 4? Identify NSSS vendor to address the requirement of NUREG-0654 Planning Standard B.8 or provide justification to retain the statement as written.

RESPONSE:

 STP will revise the Station Emergency Plan, Section B.5.2, "ABWR Nuclear Steam Supply Services," consistent with the role of Toshiba Corporation as the NSSS for STP Units 3 and 4. The following marked-up and replacement text will be inserted in Section B.5.2:

B.5.2 <u>ABWR Nuclear Steam Supply</u>

Services provided by an ABWR NSSS vendor during an emergency event at STP will be obtained once an appropriate contract award has occurred. The vendor will be required to establish a contract with the Station to provide general services related to nuclear steam supply operation during and following an accident situation. The vendor will be required to provide the capability to respond on a 24 hours per day basis. (COM EP-1)

B.5.2 Toshiba

Toshiba Corporation has established a contract with the Station to provide general services related to nuclear steam supply operation during and following an accident situation. Toshiba provides a capability to respond on a 24 hours per day basis.

2) STP will revise the Station Emergency Plan, Figure F-2, "Emergency Response Facilities Communications Pathway Typical," consistent with the role of Toshiba Corporation as the NSSS for STP Units 3 and 4.

Figure F-2 revisions are identified in RAI response 13.03-26.

QUESTION:

ONSITE EMERGENCY PLAN: SITE-27: Subject: Plan Section cross reference [Basis: 10 CFR 50.47(b)(3); NUREG-0654, FEMA-REP-1, Rev. 1, November 1980:Criterion C.1.a] Refer to Attachment 1 Cross Reference table: For NUREG-0654, Criterion C.1.a, reference to Emergency Plan Section B.4.10 seems more appropriate than B.4. Verify this cross reference and provide correction, or justification to retain the statement as written.

RESPONSE:

The NUREG-0654 Cross Reference Table Criterion C.1.a reference to Emergency Plan B.4 has been changed to Emergency Plan B.4.10.

The revised Emergency Plan, Attachment 1, Cross Reference is provided as a part of the response to RAI 13.03-24.

QUESTION:

ONSITE EMERGENCY PLAN: SITE-28: Subject: Plan Section cross reference [Basis: 10 CFR 50.47(b)(3); NUREG-0654, FEMA-REP-1, Rev. 1, November 1980:Criterion C.1.c] Refer to Attachment 1 Cross Reference table: For NUREG-0654, Criterion C.1.c, reference to Emergency Plan Section G.8 appears to be irrelevant; however, reference to G.14 seems appropriate. Verify this cross reference and provide correction, or provide justification to retain the statement as written.

RESPONSE:

The NUREG-0654 Cross Reference Table Criterion C.1.c reference to Emergency Plan G.8 has been changed to Emergency Plan G.14.

The revised Emergency Plan, Attachment 1, Cross Reference is provided as a part of the response to RAI 13.03-24.

QUESTION:

ONSITE EMERGENCY PLAN: SITE-29: Subject: Laboratory capabilities of Units 3 and 4, and of the mobile laboratory [Basis: 10 CFR 50.47(b)(3); NUREG-0654, FEMA-REP-1, Rev. 1, November 1980: Criterion C.3] 1) Station Emergency Plan Section G.9 Laboratory Facilities states: "The Station has radiological and radiochemistry laboratories located in each unit." Confirm if proposed Units 3 and 4 each will have such laboratory facilities as well. 2) The last sentence of the first paragraph under G.9 uses terminology "The radiological station". Explain what this means. 3) The second bullet after the first paragraph under G.9 refers to "A mobile radiological laboratory". Provide information to ascertain same or better capabilities of this laboratory to perform analyses of samples from the Station. 4) Table H-1, Page 4 of 4, subheader: "Typical Offsite Assessment Equipment and Facilities". Explain why the sub-header changes from "Onsite" to "Offsite"

RESPONSE:

- Station Emergency Plan Section G.9 Laboratory Facilities states: "The Station has radiological and radiochemistry laboratories located in each unit." These laboratories will be provided and located in all four Units at STP. These facilities will be necessary to meet the criteria specified in FSAR Chapter 13.04S, Operational Programs required by the NRC.
- 2) The last sentence of the first paragraph under G.9 uses terminology "The radiological station". The wording "radiological station" is a transposition of wording and will be corrected to read "Station radiological and radiochemistry..." as described in the opening sentence to this Section.

The following marked-up and replacement text will be inserted in Section G.9:

G.9 Laboratory Facilities

The Station has radiological and radiochemistry laboratories located in each unit. The facilities are designed to provide quick and efficient analyses of samples from the Station process systems, Reactor Coolant System, and secondary systems. The specific instruments that are incorporated in the systems utilized for core damage assessment are certified to perform their intended functions in an accident environment with abnormal chemistry and radiation parameters. Environmental monitoring sample analysis can also be performed in either unit's facilities. The physical separation of the units will allow the facilities in the unaffected unit to be used as a backup. The Station radiological radiological station and radiochemical laboratory facilities may be supplemented by the use of the following:

• A mobile radiological laboratory set up at the staging area at the Bay City Civic Center and operated by the Department of State Health Services;

- The laboratory facilities of neighboring nuclear facilities as coordinated by the Institute of Nuclear Power Operations;
- Areva NP INC.; and
- TXU Power (Letter of Agreement).
- 3) The second bullet after the first paragraph under G.9 refers to "A mobile radiological laboratory". The mobile laboratory provided by the State of Texas has the capabilities to provide:
 - Gamma spectroscopy,
 - Alpha spectroscopy, and
 - Alpha and Beta liquid scintillation counting.

The mobile laboratory has been favorably evaluated by FEMA within the last six years during a plume exposure or ingestion pathway exercise. The procedures for operation of the mobile lab are maintained by the State of Texas.

4) Corrected in Revision 1 to the COLA

QUESTION:

ONSITE EMERGENCY PLAN: SITE-30: Subject: Quick termination of most NOUEs [Basis: 10 CFR 50.47(b)(4); NUREG-0654, FEMA-REP-1, Rev. 1, November 1980: Criterion D.1] Emergency Plan Section D.1, middle of last paragraph on page D-1 states: "It should be noted that most of the listed initiating conditions for the Unusual Event classification are events that can be expected to be terminated quickly, and therefore, the notification process may occur after the event has been corrected." Provide clarification supporting the assumption that most of the listed Unusual Events will be terminated within 15 minutes of declaration.

RESPONSE:

STP will revise Station Emergency Plan, Section D.1, to delete the statement that "It should be noted that most of the listed initiating conditions for the Unusual Event classification are events that can be expected to be terminated quickly, and therefore, the notification process may occur after the event has been corrected."

The following marked-up and replacement text will be inserted in Section D.1:

D.1 Event Classifications

The spectrum of possible emergency events at the Station is categorized into the following four (4) emergency classifications, based on the recommendations of NUMARC/NESP-007, Methodology for Development of Emergency Action Levels, January, 1992, Rev. 2 and <u>NEI-99-01 Rev. 5:</u>

- Unusual Event
- Alert
- Site Area Emergency
- General Emergency

The technique for evaluation and classification of emergencies at the Station, based on specific observable data or Control Room instrumentation, is delineated in Emergency Response Procedures for 0ERP01-ZV-IN01, Emergency Classification.

The severity of the emergency classification increases in the order they are listed above from an Unusual Event to a General Emergency. Since the severity of the emergency may change with time, an emergency may be upgraded from one classification level to another. Incidents will typically be classified in a lower emergency classification at first and then escalated to a higher classification if the situation deteriorates. Each of the four emergency classifications has characteristic Emergency Action Levels for various parameters. These levels consist of specific values of various Station parameters such as instrument indications and system status that are used to classify the emergency and to initiate notification and activation of the appropriate members of the Station Emergency Response Organization. After the initial declaration of an emergency classification, the individual serving the lead function (i.e., Emergency Director) will perform a continuing assessment of the situation to determine whether the emergency classification must be upgraded.

The rationale for the Unusual Event and Alert classifications is to provide early and prompt notification of minor events which could lead to more serious consequences given operator error or equipment failure or which might be indicative of more serious conditions which are not yet fully realized. It should be noted that most of the listed initiating conditions for the Unusual Event classification are events that can be expected to be terminated quickly, and therefore, the notification process may occur after the event has been corrected. The Site Area Emergency classification reflects conditions where some significant releases are likely or are occurring, but where major core damage is not indicated based on current information. The General Emergency classification involves actual or imminent substantial core degradation or melting with the potential for loss of containment integrity.

QUESTION:

ONSITE EMERGENCY PLAN: SITE-31: Subject: Addressing of FSAR postulated accidents by ICs [Basis: 10 CFR 50.47(b)(4); NUREG-0654, FEMA-REP-1, Rev. 1, November 1980: Criterion D.2] Provide verifying statement that the generalized initiating conditions (ICs) listed in tables D-1 and D-2 cover all postulated accidents in the Final Safety Analysis Report (FSAR).

RESPONSE:

STP reviewed the STP Unit 1 and 2 UFSAR and Unit 3 & 4 COLA and determined that the generalized initiating conditions will address all postulated accidents identified in the FSAR and COLA.

QUESTION:

ONSITE EMERGENCY PLAN: SITE-32: Subject: Addressing of NUREG-0654 Criteria [Basis: 10 CFR 50.47(b)(4); NUREG-0654, FEMA-REP-1, Rev. 1, November 1980: Criteria D.3, D.4] Although NUREG-0654 Criteria D.3 and D.4 are applicable to State and local plans, from a safety point of view and since emergency plans are "integrated", applicant's emergency plan should include a statement to verify that State and local plans have indeed addressed these. Provide a response to indicate if the Station plan has mentioned this, or provide justification to support why it is not necessary.

RESPONSE:

NUREG-0654, Criterion D.3, states that "Each State and local organization shall establish an emergency classification and emergency action level scheme consistent with that established by the facility licensee."

The STP Station Emergency Plan, Section O.2, requires that the Station's Emergency Action Levels (EAL) used for classifications of emergencies be submitted to the state and county for review on an annual basis. Section O.2 also requires that comments from this review be discussed between the various organizations and incorporated into the procedure, if appropriate. This requirement for an annual review and incorporation of comments provides assurance that state and local organization emergency classification and emergency action level scheme used by state and local organizations is consistent with that established in the STP Station Emergency Plan, consistent with the requirements in NUREG-0654, Criterion D.3.

NUREG-0654, Criterion D.4, states that "Each State and local organization should have procedures in place that provide for emergency actions to be taken which are consistent with the emergency actions recommended by the nuclear facility licensee, taking into account local offsite conditions that exist at the time of the emergency."

The STP Station Emergency Plan, Sections I.6, "Public Notification," I.6.1, "Public Shelter and Evacuation," and I.6.2, "Special Needs Groups," describe the procedures in place (e.g., Matagorda County Emergency Management Plan) that provide for emergency actions to be taken which are consistent with the emergency actions recommended in accordance with the STP Station Emergency Plan. These sections identify that the Matagorda County plan and procedures accommodate the necessary notifications to the general public. Additionally, the Evacuation Time Estimate (ETE), addresses adverse weather condition evacuation times that are taken into consideration (as cited in the Emergency Plan Section I.6.1) by the county during an evacuation. STP Station Emergency Plan, Sections I.6, I.6.1, and I.6.2, explain how the recommendations in NUREG-0654, Criterion D.4, are integrated into the STP Station Emergency Plan.

QUESTION:

ONSITE EMERGENCY PLAN: SITE-33: Subject: Content of notification message forms [Basis: 10 CFR 50.47(b)(5); NUREG-0654, FEMA-REP-1, Rev. 1, November 1980: Criterion E.3] Refer to Emergency Plan Section E.1 (which is provided as a cross reference to NUREG-0654 Criterion E.3); confirm if the forms for messages, which are included in Emergency Response Procedure 0ERP01-ZV-IN02 and sent from the Station to offsite agencies, contain information outlined in NUREG-0654 Criterion E.3.

RESPONSE:

NUREG-0654, FEMA-REP-1, Rev. 1, November 1980, Criterion E.3, requires that initial and follow-up emergency messages sent from the plant to contain:

- Information about the class of emergency,
- whether a release is taking place,
- potentially affected population and areas, and
- whether protective measures may be necessary.

Procedure 0ERP01-ZV-IN02, "Notifications to Offsite Agencies," requires the use of an 'Offsite Notification Message Form,' which will ensure that the requirements of NUREG-0654, Criterion E.3, are met for initial and follow-up emergency messages. A copy of the 'Offsite Notification Message Form' is provided below.

F

STP 1	STP 1690 (04/05) SOUTH TEXAS PROJECT ELECTRIC GENERATING STATION										
Rev.	Rev. 14 OFFSITE NOTIFICATION MESSAGE FORM										
Rol	coll call:										
	DPS Pierce	rda County	Time								
Α	1. Communicator: (name)										
L	$\Box \text{ Unit 1} \Box \text{ Unit 2}$										
W	2. This is a drill This is <u>NOT</u> a drill										
Α	3. Message Number Origin	nating From:	\Box CR \Box TSC	□ EOF							
Y	4. Emergency Classification:	□ New	□ Unchanged								
S	Declared at: Date:	Time:									
	Unusual Event Alert Site Area	a Emergency	General Emergency	□ Terminated							
	5. Radiological release in progress:	∃Yes □No									
С	C 6. Recommended Protective Actions:	□ New	□ Unchanged								
0) A. \Box No recommended protective actions at this	time									
M	A B. L Recommended protective actions are:										
P T	1. Evacuate zones:										
	2. Sneller zones:	2. Shelter zones:									
E	5. Sectors affected.	3. Sectors affected:									
I F	7. Department of State Health Services (I	$(\Box N_{c})$	in recommendations in	o above:							
Ľ	8 Event Description:	w D Unchanged									
	Classification Path/Initiating Condition:	8. Event Description: Image: New Ima									
	Explain:										
F	F9. Meteorological data: \Box Ne	w 🛛 Unchanged	ł								
0	A. Wind direction from Degree	es Wind spe	ed MPH								
L	B. Stability Class (Check One):		$C \square D \square E$	$\Box F \Box G$							
L	\Box C. Precipitation (Check One): \Box No.	$\begin{array}{ccc} \text{ne} & \Box \text{ Rain} & \Box \text{ S} \\ \hline \end{array}$	Sleet \Box Snow \Box Ha	il 🗆 Fog							
0	D 10. Release Involves: \Box No	ew 🛛 Unchange	d								
W	A. LI Radiological release in progress: Ex	hrs. Started: Date	Started: Date Time								
	B. L Radiological release which has ended: Du	iration:hr	s. Terminated: Date	e 1 ime							
^P	2 11. Remarks:										
	A 12 Approved:		Data	Time							
	(Drint/Sign) Emorgan	ov Director									
L	L (Print/Sign) Emergency Director										

RAI 02.04.05-2

QUESTION:

Provide an explanation of why a wind stress correction factor of 1.1 was used when, as stated in FSAR Section 2.4S.5.2.3.1, Page 2.4S.5-4, "the stresses introduced into the air by the drops can be 10-20% of the wind stress."

<u>RESPONSE</u>:

The selection of a wind stress correction factor of 1.1 was based on p. 34 of Reference 1, which states that:

"The last value of 1.1 is a wind-stress correction factor (WKCOR). This increases Van Dorn's (1953) wind-stress factor by 10 percent to account for the additional stress caused by energy imparted to the sea due to precipitation."

The information provided in Reference 1 was developed for Probable Maximum Hurricane (PMH) conditions and is considered conservative. A wind stress correction factor of 1.1 is also used for all of the bathystrophic Probable Maximum Storm Surge estimates in Regulatory Guide 1.59 (Table C.1-Table C.20, pp. 1.59-46 to 1.59-65).

No COLA revision is required as a result of this RAI response.

References:

1. "Storm Surge on the Open Coast: Fundamentals and Simplified Prediction," Technical Memorandum No. 35, Bodine, B.R., U.S. Army Corps of Engineers Coastal Engineering Research Center, 1971.

RAI 02.04.05-3

QUESTION:

Explain why the HEC-RAS backwater analysis was not carried out for the Little Robbins Slough through the Palacios Bay.

<u>RESPONSE</u>:

As shown in the figure below, Little Robbins Slough is a shallow multi-channel tidal slough. With the probable maximum storm surge, the channel is completely submerged and drowned out, thereby resulting in negligible water surface slope for backwater calculations. Therefore, the Colorado River was used for backwater calculations.



USGS Quadrangle showing Little Robbins Slough and Colorado River relative to STP 3 & 4 MCR.

RAI 02.05.02-12

QUESTION:

According to Section 2.5 S.2.4.1, there are two sources, 124 and 126, from the Law Engineering Team, which contributed 99% of the total seismic hazard to the site (Figure 2.5S.2-3). Source 126 covers the STP COLA site with a maximum magnitude (mb) distribution of 4.6 (0.9) and 4.9 (0.1). The closest distance from source 124 to the site is about 124 km and the magnitude distribution is 4.9 (0.3), 5.5 (0.5) and 5.8 (0.2).

Please explain why the published EPRI hazard results "are not low" in comparison to the results from other ESTs.

<u>RESPONSE</u>:

Section 2.5 S.2.4.1 should have stated that the EPRI hazards for the Law Engineering team are not as low as would be expected in comparison to the hazards from the other ESTs. If the host source generates no earthquakes with mb>5.0, and the nearest adjacent source is 124 km distant and generates earthquakes with mb>5.0 with only probability 0.7, the 15th fractile hazard should be effectively zero. However, the EPRI hazards for the Law Engineering team are $\sim 10^{-10}$ for the 15th fractile hazard, for all amplitudes. Current hazard results indicate that the Law Engineering team's mean hazard for PGA=100 cm/s² should be about 4 orders of magnitude below other teams, but the corresponding EPRI hazard is only about 2 orders of magnitude below other teams. Thus we conclude that the EPRI hazards from the other ESTs. This difference is attributed to undocumented assumptions in the EPRI-SOG analysis regarding Mmax values in the Law sources.

COLA Section 2.5 S.2.4.1 (Third Paragraph) will be revised as follows:

Comparisons with some of the EPRI EST results were problematic, because some teams adopted distributions of maximum magnitude (Mmax) for sources in the region of the site that included values less than mb 5.0. For these values of Mmax, the current hazard calculations indicate an annual frequency of exceedance of zero, because the lowerbound magnitude for calculations was mb 5.0. Thus, for some lower percentiles the indicated hazard is zero, yet the EPRI (Reference 2.5S.2-1) results indicate a finite hazard for that case. For one team (the Law team), the host source has all values of Mmax below 5.0, and an adjacent source (about 100 km from the site) has a distribution of Mmax values that extends below 5.0. For this team the current calculations indicate very low hazard, but the published EPRI (Reference 2.5S.2-1) results are not as low as would be expected in comparison to the hazards from the other EST teams. All differences for these teams are attributable to cases in which Mmax values extend below 5.0, or to cases where seismicity parameters were missing from EPRI computer files in degree cells adjacent to the site. These differences were not resolved in detail because the Mmax values of all seismic sources are reassessed (increased above 5.0) in this project (see Subsection 2.5S.2.4.3) and new seismicity parameters are calculated for all degree cells adjacent to the site using an updated seismicity catalog (see Subsection 2.5S.2.1).

RAI 02.05.02-16

QUESTION:

Provide boundary coordinates and mean hazard curves (1, 2.5, 5 and 10 Hz) for those source zones whose combined hazard contribution exceeded "99%" of the total hazard, from each of the six EPRISOG Earth Science Teams.

<u>RESPONSE</u>:

The attached electronic file STP-SOURCE-GEOM.DAT (Enclosure B) contains the boundary coordinates for the EPRI-SOG Earth Science Teams, as follows:

Bechtel:BZ1, BZ2Dames & Moore:20, 25, C08Law Engineering:124, 126Rondout:51Woodward-Clyde:Background B43Weston Geophysical:107

The header line for each source contains the team name and source identifier, with the number of coordinates indicated in columns 64-65.

The attached electronic file FRAC_BY_SOURCE.TXT (Enclosure B) contains mean hazard curves by team and by source, for the 10 seismic sources listed above, for 1 Hz, 2.5 Hz, 5 Hz, and 10 Hz.

RAI 02.04.08-1:

QUESTION:

Provide details of estimates of wind setup, wave height, and runup elevations estimated at eight locations along the MCR embankment.

<u>RESPONSE</u>:

The wind setup, wave height, and runup elevation were estimated at eight locations along the MCR embankment as discussed in Rev 0 of FSAR Subsection 2.4S.8 to assess the wind-wave effects from a 2-year wind condition, which was postulated to occur coincidentally with the maximum still water level in the MCR resulting from the probable maximum precipitation (PMP) event. This combined 2-year wind and PMP scenario was conservatively adopted from the design criteria specified in Section 10.2.3 ANSI/ANS-2.8-1992 (Reference 1) for a safety-related cooling reservoir, even though the MCR, an existing facility, does not support any safety-related function and is not relied upon to supply safety-related water for STP 3 & 4.

The wave height and wave runup determinations conducted to support Rev 0 of FSAR Subsection 2.4S.8 followed primarily the methodologies presented in the USACE Coastal Engineering Manual (CEM) (Reference 2). Further details of the wind-wave setup and runup analysis are provided below:

Maximum Still Water Level

As stated in Rev 0 of FSAR Subsection 2.4S.8.2.2, the maximum still water level in the MCR during a PMP event was predicted to be about 52.6 feet MSL. This maximum water level was estimated by routing a 72-hour local PMP through the reservoir using the same MCR stage-storage relationship and the spillway discharge rating curve as in UFSAR for STP 1 & 2 (Reference 3). The 72-hour local PMP, developed to support the local intense precipitation flooding analysis for the STP 3 & 4 site, has a total rainfall depth of 55.6 inches. Discussions of the local PMP development are included in Rev 0 of FSAR Subsection 2.4S.2. The antecedent water level in the MCR, i.e., at the start of the PMP routing analysis, was assumed to be 49 feet MSL, which corresponds to the design normal maximum operating water level. The spillway gates were designed, and modeled accordingly, to open completely when the MCR water level reaches 49.5 feet MSL.

<u>Fetch</u>

The fetch to the each of the eight locations for the setup and runup estimates was taken as the longest uninterrupted over-water distance as shown in Figures 2.4S.8-2 to 2.4S.8-5 and listed in Table 2 below.

2-year Wind Speed and Wave Heights

- From Figure 1 of ANSI/ANS-2.8-1992 (Reference 1), the 2-year mean recurrence interval annual fastest mile wind speed, measured at 30 ft above the ground at the STP site, was estimated to be about 50 miles per hour.
- The duration of the fastest mile wind speed was obtained based on Figure II-2-2 of the CEM (Reference 2).
- The wind speeds were adjusted for the selected wind durations in accordance with Figure II-2-1 of the CEM (Reference 2),
- A factor of 1.2 was applied to convert the 2-year overland wind speed to over-water wind speed, in accordance with Section II-2-1, I, 3, c of the CEM (Reference 2).
- The significant wave heights and peak wave periods were estimated for the fetch lengths of the eight locations following the methodology described in the CEM (Reference 2) for fetch and duration limited waves.
- The 1% wave height was taken as 1.67 times the significant wave height (Reference 2).

An example calculation of significant wave height and peak period for the Spillway location is summarized in Table 1.

							Spectral	Significan	Significant
							Peak	t Wave	Wave
	Wind	Wind	Fetch		Required	Equivalent	Period,	Height,	Height,
Duration	Speed	Speed	Length	u*	Duration	Fetch	T _P	H _{M0}	H _{M0}
(sec)	(mph)	(m/s)	(m)	(m/s)	(sec)	(m)	(sec)	(m)	(ft)
1800	49.7	22.2	5793	1.0	4206	1227	1.7	0.4	1.5
3600	49.1	21.9	5793	0.9	4224	3444	2.4	0.7	2.4
5400	47.8	21.3	5793	0.9	4263	5793	2.9	0.9	3.0
7200	46.8	20.9	5793	0.9	4291	5793	2.8	0.9	3.0
8400	46.3	20.7	5793	0.9	4306	5793	2.8	0.9	2.9
9600	45.9	20.5	5793	0.9	4320	5793	2.8	0.9	2.9
10800	45.5	20.4	5793	0.9	4332	5793	2.8	0.9	2.9
4263	48.5	21.7	5793	0.9	4240	5793	2.9	0.9	3.1

Table 1: Significant wave height at the Spillway location (2-year wind condition).

Wind Setup, Wave Setup and Wave Runup

- The average bottom elevation of the reservoir is about 23 feet MSL.
- Wind setup was estimated using a one-dimensional storm surge equation recommended by Kamphuis (Reference 4).
- Wave setup and runup were calculated using the methodology based on deepwater wave length and the surf similarity parameter presented in Chapter II-4 of the CEM (Reference 2).
- The interior slope of the MCR embankments is 2.5 (horizontal) to 1 (vertical).

- A roughness correction factor of 0.85 was conservatively used to represent the rough surface of the embankments, which are protected by soil-cement layered in a stair stepped design.
- The maximum water level at the eight locations on the MCR embankment for the 2-year wind condition is therefore the total of the runup height and the wind setup height added to the maximum PMP still water elevation in the reservoir. The resulting maximum water levels at the eight locations along the MCR embankment, including the Spillway location, are summarized in Table 2:

Fetch End Location	Fetch (ft)	Significant Wave Height, H _{M0} (ft)	1% Wave Height, $H_{1/100}$ (ft)	Wind Setup (ft)	Wave runup, R (ft)
New Intake Structure	17,548	3.0	5.0	0.2	5.4
Make up Structure	13,773	2.7	4.5	0.1	4.7
Spillway	19,005	3.1	5.1	0.2	5.6
Southeast Embankment	16,464	2.9	4.8	0.2	5.2
South Embankment	17,332	3.0	4.9	0.2	5.3
Southwest Embankment	18,330	3.0	5.1	0.2	5.5
North Embankment	18,456	3.0	5.1	0.2	5.5
New Discharge Structure	18,376	3.0	5.1	0.2	5.5

Table 2: Summary Table of fetch, wind setup, wave height and runup at eight locations along the MCR embankment (2-year wind condition).

Further review of Subsection 2.4S.8.2.3 on embankment freeboard reveals that the wind setup and wave runup analysis presented to support the freeboard assessment of MCR are unnecessary, on the following basis:

- The MCR does not support any safety-related functions of STP 3 & 4.
- The MCR is an existing reservoir that was built and permitted for STP 1 & 2 and has been in operation since the1980s.
- For the dam safety evaluation, the design of the MCR and its embankments was supported by a freeboard analysis, which includes wind setup, wave setup an runup, as documented in the UFSAR for STP 1 & 2 (Reference 3).
- There is no physical modification to the MCR for STP 3 & 4 that will change the windwave runup and setup characteristics and the freeboard available in the reservoir.
- The new circulating water intake and outfall for STP 3 & 4 are not safety-related structures and will have no impact on the maximum water levels and the freeboard available in the MCR.
- The failure of the MCR embankment was established in Subsection 2.4S.4 as the design basis flood for STP 3 & 4 as it produces the maximum water level at the safety-related facilities. The flooding impact to the safety-related facilities of STP 3 & 4 caused by the

embankment failure bounds any flooding caused by the potential wave overtopping of the MCR embankments.

As a result of this RAI response, FSAR Subsection 2.4S.8.2.3 will be replaced with the following text and Figures 2.4S.8-2 thru 2.4S.8-5 will be deleted:

2.4S.8.2.3 Embankment Freeboard

The wind setup, wave height, and run-up elevation were determined for a 2-year wind speed with appropriately adjusted duration, in conjunction with the maximum still water level in the MCR. The wind setup elevation is estimated for a wind speed resulting from the Probable Maximum Hurricane (PMH) and the normal maximum operating level in the MCR. As shown in Figure 1 of ANSI 2.8-1992 (Reference 2.4S.8-3), the 2-year mean recurrence interval annual fastest mile wind speed measured 30 ft above ground at the STP site is 50 mph. From Subsection 2.4S.5, the overwater maximum wind speed of the PMH is estimated to be 137.5 knots or 158.2 mph. According to Reference 2.4S.8-4, page C-12, this value corresponds to the maximum 10-minute average wind speed measured at 32.8 ft (10 m) for a hurricane at rest. These values were adjusted for duration, wind speed above water, and fetch length, as applicable, before wave heights were determined.

The wind set-up, wave height, and run-up elevation were estimated at eight different locations along the MCR embankment. Six of the locations are similar to that considered in the STP 1 & 2 UFSAR (Reference 2.4S.8-1). These locations are: the STP 3 & 4 intake and discharge structures, the makeup outfall, the spillway, the southeast, south, southwest, and north embankments. Sketches of the fetch for each location are depicted in Figures 2.4S.8-2 to 2.4S.8-5.

Methodologies described in the U.S. Army Corps of Engineers, Coastal Engineering Manual (Reference 2.4S.8-5) and in Reference 2.4S.8-6 were used to determine the wave height, runup, and wind setup elevation at the embankment of the MCR. Also, appropriate checks were made to examine if the waves are duration-limited or fetch-limited. Finally, the waves were not limited by water depth (Reference 2.4S.8-5).

To obtain the maximum wave run-up elevation for the 2-year wind conditions on the MCR embankment, the wave run-up values based on the 1% wave height, were added to the maximum still water elevation of the MCR of 52.6 ft MSL determined in Subsection 2.4S.8.2.2, as recommended by ANSI 2.8-1992 (Reference 2.4S.8-3, Section 10.2.3). For all cases, the maximum water level due to wave run-up calculated is El. 58.38 ft MSL, which is significantly below top of embankment elevation and therefore sufficient freeboard is provided.

The average wind set-up value of 1.6 ft for the PMH was added to the normal maximum operating water level of the MCR of 49 ft MSL. The resulting stillwater level of 50.6 ft MSL is lower than the water level used in the analysis of the embankment breaching in Subsection 2.4S.4. The MCR is a nonsafety-related structure and the impacts of its failure on STP 3 & 4

have been addressed in Section 2.4S.4. All the safety-related structures are designed to withstand the flood levels of the postulated failure of the MCR embankment.

The freeboard analysis previously performed to support the original design of the MCR has been documented in details in Section 2.4.8 of the UFSAR for STP 1 & 2 (Section 2.4.8.2.3 of Reference 3). The maximum water level in the MCR including setup and wave runup was reported to be 65.2 feet MSL, which was predicted to occur on the south embankment. The top of the embankment elevation at this location is 66.9 feet MSL, thus providing about 1.7 feet of freeboard above the predicted maximum water level. All other locations along the MCR embankments were predicted to have a freeboard larger than 1.7 feet. The maximum MCR water level was generated by the probable maximum hurricane (PMH) wind that was assumed to occur simultaneously with a stillwater level of 49.0 feet MSL. The 49.0 feet MSL still water level corresponds to the normal maximum operating water level in the MCR.

The MCR is currently regulated by the Texas Commission of Environmental Quality (TCEQ). As part of the dam safety program, the MCR embankments have been inspected periodically by the TCEQ to assess safety.

References:

- 1. "Determining Design Basis Flooding at Nuclear Power Reactor Sites," ANSI 2.8 1992, Historical Technical Reference, American Nuclear Society, July 1992.
- 2. "Coastal Hydraulics Laboratory, EM1110-2-1100, Coastal Engineering Manual," U.S. Army Corps of Engineers, June 2006.
- "STPEGS Updated Final Safety Analysis Report (UFSAR) for Units 1 & 2," Revision 13.
- 4. J. William Kamphuis, Advanced Series on Ocean Engineering Volume 16, Introduction to Coastal Engineering and Management, World Scientific, 2000.

RAI 02.04.08-2:

QUESTION:

The STPEGS UFSAR (Units 1 and 2), Section 2.4.8.2.3, Embankment Freeboard, lists the maximum water surface elevation along the south embankment as 65.2 ft MSL under the effects of PMH winds actions on a normal MCR Stillwater surface elevation of 49 ft MSL. The STP 3 and 4 FSAR, Section 2.4S.8.2.3, "Embankment Freeboard", states that the maximum water level due to wave run-up under PMH winds is estimated as 58.38 ft MSL. Provide an explanation for the difference between these two estimates.

<u>RESPONSE</u>:

The STPEGS UFSAR (Units 1 and 2) (Reference 1), Section 2.4.8.2.3, Embankment Freeboard, lists the maximum water surface elevation along the south embankment as 65.2 ft MSL. This maximum MCR water level includes the wind-wave effects generated by the probable maximum hurricane (PMH) wind that was assumed to occur simultaneously with a normal maximum stillwater level of 49.0 feet MSL in the reservoir.

The Subsection 2.4S.8.2.3, "Embankment Freeboard", of Rev 0 of the FSAR 2.4S.8, states that the maximum water level was estimated to be about 58.38 feet MSL, which was predicted at the Spillway location. This maximum water level includes wind-wave effects from a 2-year wind condition, which was postulated to occur coincidentally with the maximum still water level in the MCR resulting from the probable maximum precipitation (PMP) event. The antecedent, or initial, water level in the MCR at the start of the PMP event is 49 feet MSL, corresponding to the normal maximum MCR operating water level. Details of the wind-wave setup and runup estimates for the combined 2-year wind and PMP event are provided in the response to RAI 02.04.08-1.

No COLA revision is required as a result of this RAI response.

References:

1. "STPEGS Updated Final Safety Analysis Report (UFSAR) for Units 1 & 2," Revision 13.
RAI 02.05.01-14:

QUESTION:

The first paragraph of Section 2.5S.1.2.4.3.1 states that the data "demonstrates that no new information has been developed to alter the conclusion of the UFSAR for STP 1 and 2 ... that no growth faults project to the surface through the STP site." In contrast, the second paragraph says that there is evidence of localized tilting and down-to-the-south monoclinal flexure of the ground surface above two growth faults within the 5-mile site radius. Please reconcile these two seemingly conflicting statements. Also, the UFSAR for STP 1 and 2 included an extensive discussion of possible subsidence in the site area due to withdrawal or injection of water, oil, and gas from wells in the area. If growth faults are present near the reservoir, describe the potential for future subsidence to [cause]¹ differential displacement across the faults.

RESPONSE:

There are two issues identified within this RAI question, which can be summarized as:

- 1. Reconcile the two seemingly conflicting statements about the location of growth faults relative to the site.
- 2. If growth faults are present near the reservoir, describe the potential for future subsidence to <u>cause</u> differential displacement across the faults.

These two issues will be addressed individually.

Issue 1

Subsection 2.5S.1.2.4.3.1 summarizes the conclusions described in Subsection 2.5S.1.2.4.2 regarding the characteristics of growth faults within the STP 3 & 4 site area. As stated in Subsection 2.5S.1.2.4.3.1, one of the main conclusions of Subsection 2.5S.1.2.4.2 is that, "no new information has been developed to alter the conclusion of the UFSAR for STP 1 & 2 ... that no growth faults project to the surface through the STP site." This statement is meant to explicitly refer to the "site" as defined in the introduction to Section 2.5: "the site is that area within 0.6 mi of the site location."

Subsection 2.5S.1.2.4.3.1 also restates the conclusion that, "there is *prima facie* evidence for localized, low relief tilting of the upper surface of the Beaumont Formation above growth fault Matagorda GMO and STP12I, just within the 5 mile site area radius." The statement "just within the 5 mile site area radius." The statement "just within the 5 mile site area radius." The statement "just within the 5 mile site area radius (i.e., the site). Also, these statements are referring to the location of a single growth fault (growth fault GMO/STP12I) that has been identified in both the original STP Units 1 & 2 UFSAR (Reference 1) and more recent subsurface mapping (see Subsection 2.5S.1.2.4.2.2.2); the statements are not meant to refer to two individual growth

¹ Bechtel assumes that "cause" was left out of NRC's question. The response is based on evaluating the potential for future subsidence to CAUSE differential displacement across the growth fault.

faults.

The apparent conflicting statements in Subsection 2.5S.1.2.4.3.1 are due to a lack of a clear distinction between site and site area in the text. The COLA text has been modified to better convey this conclusion.

The second paragraph in FSAR section 2.5S.1.2.4.3.1 will be replaced with the following text:

There is *prima facie* evidence for localized, low relief tilting of the upper surface of the Beaumont Formation above growth fault Matagorda GMO and STP12I, just within the 5 mile site area radius. The deformation is characterized by south-down monoclinal flexure of the land surface, and is distributed across horizontal distances of 180 ft. to 500 ft. Data acquired for this study clearly document the absence of discrete surface rupture above growth fault Matagorda GMO and STP12I. Topographic profiles surveyed at intervals over a distance of several miles document significant variability in the magnitude and width of the zone of tilting, suggesting that activity is not uniform along strike. Surface deformation above growth fault Matagorda GMO and STP12I does not approach within the STP 3 & 4 0.6-mile site radius.

There is *prima facie* evidence for localized, low relief tilting of the upper surface of the Beaumont Formation above growth fault Matagorda GMO/STP12I, just within the site area (5-mile radius) yet outside the site (0.6-mile radius). The deformation is characterized by south-down monoclinal flexure of the land surface, and is distributed across horizontal distances of 180 feet to 500 feet. Data acquired for this study clearly document the absence of discrete surface rupture above growth fault Matagorda GMO/STP12I. Topographic profiles surveyed at intervals over a distance of several miles document significant variability in the magnitude and width of the zone of tilting, suggesting that activity is not uniform along strike. Surface deformation above growth fault Matagorda GMO/STP12I does not approach within the 0.6-mile site radius of STP 3 & 4.

Issue 2

The question addressed with this issue is, as stated in the above RAI question, "if growth faults are present near the reservoir, describe the potential for future subsidence to [cause] differential displacement across the faults."

As discussed in detail in Subsection 2.5S.1.2.4.2 and the UFSAR for STP Units 1 and 2 (Reference 1), only one growth fault observed at depths shallower than 5000 feet projects to the surface within the area covered by Units 1 and 2, the proposed location of Units 3 and 4, or the cooling reservoir. This single fault, referred to as both Matagorda GMO and STP12I in Section 2.5 and here as fault GMO/STP12I, is observed within seismic reflection data up to a depth of 1000 feet and projects to the surface along the southern edge of the cooling reservoir. Fault GMO/STP12I does have a topographic expression that is likely indicative of Quaternary activity, but this surface expression does not extend to the reservoir (see discussion in Subsection 2.5S.1.2.4.2). Despite the lack of evidence of Quaternary activity of fault GMO/STP12I at the

edge of the reservoir, it is considered to be the only fault with the potential to cause differential subsidence at the reservoir because: (1) no other faults have a topographic expression indicative of Quaternary activity, and (2) there are no other faults within a depth of 5000 feet of the ground surface that project to within 2 horizontal miles of the reservoir.

The UFSAR for STP Units 1 and 2 (Reference 1) provides a comprehensive analysis of fluid withdrawal activities up until the early 1980s (see Subsections 2.5.1.2.9.6 and 2.5.1.1.6.6.7.2). The UFSAR documented no evidence of differential subsidence within the site area caused by fluid extraction or other mechanisms, and concluded that future withdrawal activities were unlikely to cause any subsidence.

Since the 1980s, fluid withdrawal has continued throughout the area surrounding growth fault GMO/STP12I. For hydrocarbon production (i.e., oil and gas) the Texas Railroad Commission maintains records of all extraction occurring within the state and provides an interactive database with which production data from 1993 to the present can be obtained (Reference 2). For groundwater withdrawal, the Texas Water Development Board maintains a database of approximately 130,000 water wells within the state (Reference 3). The data available from both of these resources within the region of growth fault GMO/STP12I are discussed below.

Figure 1 shows all of the hydrocarbon wells proximal to the growth fault GMO/STP12I surface projection that are available from the Railroad Commission database (Texas RRC, 2008). There are 69 wells that have reported hydrocarbon production since 1993. All of the wells produced gas with some also producing a minor amount of condensate. None of the wells have any reported oil production. The Texas RRC database reveals that over 55% of the production volume came from depths between 2500 and 4500 feet and that the total gas production from the wells is approximately 24 billion cubic feet (BCF).

By comparison, the total gas production from the four fields closest to Units 1 and 2 as reported in the UFSAR for STP Units 1 and 2 (Reference 1) was approximately 550 BCF with approximately 500 BCF of that production coming from the Collegeport-Citrus Grove field in the hanging wall of growth fault GMO/STP12I (located in the large cluster of wells approximately 2 miles south of the growth fault projection) (see Subsection 2.5.1.1.6.6.7.2 of the UFSAR). Based on the drastic difference in total production between all of the wells in the region of growth fault GMO/STP12I shown in Figure 1 and that reported in the UFSAR for the Collegeport-Citrus Grove field, it appears that significantly less gas has been produced within the region of growth fault GMO/STP12I following the construction of Units 1 and 2 than was produced prior to the construction.

The Texas Water Development Board maintains a database of approximately 130,000 water wells within the state of Texas (Reference 3). All of the wells from the database that are proximal to growth fault GMO/STP12I are shown in Figure 1. Based on TWDB data through 2008, the wells generally targeted the Chicot aquifer at shallow depths of several hundred feet and are used for livestock or public supply. Several of the wells are no longer used. The estimated yields are very low for those wells that have estimates (5 to 25 gallons per minute), suggesting that in aggregate these wells are capable of withdrawing only minor amounts of groundwater. In addition to these wells, there are groundwater production wells for STP Units 1

and 2 at the north end of the cooling reservoir (see Subsection 2.4S.12). These wells also withdraw water from the Chicot aquifer at depths of hundreds of feet and produce water at a rate of hundreds of gallons per minute.

As discussed in Subsection 2.5.S.1.2.4.2.2.2, stereo-paired aerial photographs of the site area taken before, during and after construction of STP Units 1 and 2 were analyzed for topographic features indicative of growth-fault-induced surface deformation. Slope breaks associated with growth fault GMO/STP12I (see Figure 2.5S.1-45) were observed in photos taken in 1958 and 1979. Field reconnaissance of growth fault GMO/STP12I in 2007 was similar to that observed in the aerial photos in 1958 and 1979. Cultural features (e.g., paved roads, fence lines, etc.) crossing GMO/STP12I were also investigated, and no obvious sign of deformation of the cultural features was noted. These observations indicate that there has been no noticeable surface deformation from movement on growth fault GMO/STP12I for at least the last 50 years.

The observation of no deformation combined with the record of gas and ground water withdrawal post-dating the Units 1 and 2 UFSAR demonstrate that it is very unlikely the current fluid withdrawal activities will cause differential subsidence along growth fault GMO/STP12I. Also, considering the conclusion of the UFSAR for STP Units 1 and 2 (Reference 1) that there is no potential for fluid-withdrawal induced subsidence at the site given production rates at the time, and the observation that gas withdrawal has decreased since construction of Units 1 and 2, it is concluded that it is highly unlikely that fluid withdrawal will cause differential subsidence across growth fault GMO/STP12I.

No COLA revision is required as a result of this RAI response to Issue 2.

References:

- 1. STPEGS, Rev 13, STPEGS Updated Final Safety Analysis Report, Units 1 and 2, Revision 13.
- 2. Texas RRC, 2008, Public GIS Map Viewer for Oil, Gas, and Pipeline Data: Austin, TX, Texas Railroad Commission (RRC), accessed in June 2008 (http://www.rrc.state.tx.us/gis/index.html).
- 3. TWDB, 2008, Texas Water Development Board (TWDB) Groundwater Database Downloads: Austin, TX, Texas Water Development Board online database, accessed in June 2008 (http://www.twdb.state.tx.us/publications/reports/GroundwaterReports/GWDatabaseReports/GWDatabaseReports/GWDatabaserpt.htm).

Question 02.05.01-14

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Figure 1. Wells in the Vicinity of Growth Fault GMO

RAI 02.04.13-10:

QUESTION:

Describe the mechanisms of and effects from floods other than that caused by the postulated breach of the MCR embankment on the Radwaste Building. Postulate the most severe accidental release of radionuclide liquid effluents to the surface water, and provide a conservative analysis of the contamination process for the postulated scenario.

<u>RESPONSE</u>:

The design basis flooding (DBF) elevation for the STP 3 & 4 site is determined by considering a number of different flooding scenarios. The flooding scenarios potentially applicable and investigated for the site include the following: local probable maximum precipitation (PMP) at the site, potential dam failures, probable maximum flood (PMF) on streams and rivers, probable maximum surge and seiche (PMSS), probable maximum tsunami (PMT), flooding due to ice effects, and flooding caused by channel diversions. In applicable cases the flooding scenarios were investigated in conjunction with other flooding and meteorological events, such as wind-generated waves and tidal levels, as recommended in the guidelines presented in ANSI/ANS 2.8-1992 (Reference 2.4S.2-9). Detailed discussions on each of these flooding events and how they were estimated are found in Subsections 2.4S.2 through 2.4S.7, and Subsection 2.4S.9. The estimated flood elevations are based on the site plan provided in the COL application.

The maximum water level due to a local PMP storm event is estimated and discussed in Subsection 2.4S.2. The maximum water level in the power block area due to a local PMP storm event is estimated to be at elevation 36.6 ft MSL. This level is higher than the ground floor elevation of approximately 35 ft MSL at the Radwaste Buildings for Unit 3 and Unit 4, where the postulated accident described in Section 2.4S.13.1.1 occurs. Therefore, a local PMP storm event could potentially pose a flooding risk to a Radwaste Building.

The impacts of postulated dam failures on the STP 3 & 4 safety-related systems, structures and components (SSCs) are discussed in Subsection 2.4S.4. Two aspects of flooding are considered. First, flood elevation at the site is investigated as a result of cascading failure of dams in the Colorado River basin and its tributaries upstream of the site. The resulting water level at the site is 32.5 ft MSL including coincidental wind set-up, and 41.9 ft including coincidental wind set-up and wave run-up. Second, the flood elevation at the site is investigated due to the failure of the Main Cooling Reservoir (MCR) embankment. A maximum flood elevation of 47.6 ft MSL was determined at the STP 3 & 4 site as a result of the MCR embankment breach. This flood elevation of 47.6 ft MSL also constitutes the DBF at the site.

Estimation of the PMF water level on the Colorado River is discussed in Subsection 2.4S.3. The maximum PMF water level for the Colorado River at the STP 3 & 4 site has been determined to be at elevation 26.3 ft MSL. However, including coincidental wind set-up and wave run-up, the water level at the site from the PMF would be about the same as the flood elevation due to cascading failure of dams in the upstream Colorado River basin (41.9 ft MSL). Both flooding scenarios could potentially pose a flooding risk to the Radwaste Building.

Flooding from the probable maximum surge and seiche as a result of the probable maximum hurricane (PMH) in the Gulf of Mexico is discussed in Subsection 2.4S.5. The maximum water level at the site due to the PMH is estimated to be elevation 31.1 ft MSL. Since this water level is lower than the water level of 32.5 ft for upstream dam failure (with coincidental wind set-up), the resulting maximum water level at the site after factoring in the wave run-up would be lower than 41.9 ft that was predicted for the upstream cascading dam failure event. However, the water level at the site due to the PMH, including coincidental wind set-up and wave run-up, is still higher than the entrance elevation to the Radwaste Buildings at STP 3 and 4. Therefore, maximum surge and seiche due to the PMH could potentially pose a risk of flooding the Radwaste Buildings.

Subsection 2.4S.6 describes estimation of the probable maximum tsunami water level. The maximum water level associated with a PMT at the STP 3 & 4 site is 16.3 ft MSL. Therefore, the PMT would not be a flood risk to the STP 3 & 4 site. As discussed in Subsections 2.4S.7 and 2.4S.9, ice effects and channel diversions, respectively, would not pose a flooding risk to the STP 3 & 4 site.

Of the several flooding mechanisms considered, other than a breach of the MCR embankment, the local PMP storm, a cascading failure of upstream dams in the Colorado River basin, the PMF, and the PMSS are the four mechanisms that have the potential to flood the Unit 3 and Unit 4 Radwaste Buildings. The local PMP storm potentially could result in release of the greatest concentration of radioactive material to the environment because the flood level from this event would be lower than that from the three other flood mechanisms and, therefore, would provide less dilution if the material were to escape the Radwaste Building.

Four of the five flooding scenarios with the potential to flood the Radwaste Building can be considered a slow-moving event for which advance notice would be available. For this reason, there would be opportunity to initiate operator action to mitigate potential flooding effects. Except during shipment of waste, doors to the Radwaste Building are normally closed to optimize performance of the HVAC system. Upon receiving a flood warning, plant procedures would require securing the doors and implementing other mitigating action such as sandbagging [COM 19.9-3]. Therefore, none of the flooding mechanisms considered present a credible risk of environmental contamination.

Reference:

2.4S.2-9 "Determining Design Basis Flooding at Power Reactor Sites," ANSI/ANS-2.8-1992, Historical Technical Reference, American Nuclear Society, July 1992.

The second paragraph of Section 2.4S.13.2 will be revised as follows:

The Radwaste Building is a reinforced concrete structure consisting of Seismic Category I substructure. As described in Section 3.4, the building does not contain safety-related equipment and is not contiguous with other plant structures except

through the radwaste piping and tunnel. In case of flooding, the building structure serves as a large sump which can collect and hold any leakage within the building. The medium and large radwaste tanks are housed in sealed compartments which are designed to contain any spillage or leakage from tanks that may rupture.

The following paragraphs will be inserted following the third paragraph of Section 2.4S.13.2:

The design basis flooding (DBF) elevation for the STP 3 & 4 site is determined by considering a number of different flooding scenarios. The potential flooding scenarios applicable and investigated for the site include the following: local probable maximum precipitation (PMP) at the site, potential dam failures, probable maximum flood (PMF) on streams and rivers, probable maximum surge and seiche (PMSS), probable maximum tsunami (PMT), flooding due to ice effects, and flooding caused by channel diversions. In applicable cases the flooding scenarios were investigated in conjunction with other flooding and meteorological events, such as wind-generated waves and tidal levels, as recommended in the guidelines presented in ANSI/ANS 2.8-1992 (Reference 2.4S.2-9). Detailed discussions on each of these flooding events and how they were estimated are found in Subsections 2.4S.2 through 2.4S.7, and Subsection 2.4S.9. The estimated flood elevations are based on the site plan provided in the COLA.

The maximum water level due to a local PMP storm event is estimated and discussed in Subsection 2.4S.2. The maximum water level in the power block area due to a local PMP storm event is estimated to be at elevation 36.6 ft MSL. This level is higher than the ground floor elevation of approximately 35 ft MSL at the Radwaste Buildings for Units 3 and 4, where the postulated accident described in Section 2.4S.13.1.1 occurs. Therefore, a local PMP storm event could potentially pose a flooding risk to a Radwaste Building.

The impacts of postulated dam failures on the STP 3 & 4 safety-related SSCs are discussed in Subsection 2.4S.4. Two aspects of flooding are considered. First, flood elevation at the site is investigated as a result of cascading failure of dams in the Colorado River basin and its tributaries upstream of the site. The resulting water level at the site is 32.5 ft MSL including coincidental wind set-up, and 41.9 ft including coincidental wind set-up and wave run-up. Second, the flood elevation at the site is investigated due to the failure of the Main Cooling Reservoir (MCR) embankment. A maximum flood elevation of 47.6 ft MSL was determined at the STP 3 & 4 site as a result of the MCR embankment breach. This flood elevation of 47.6 ft MSL also constitutes the DBF at the site.

Estimation of the PMF water level on the Colorado River is discussed in Subsection 2.4S.3. The maximum PMF water level for the Colorado River at the STP 3 & 4 site has been determined to be at elevation 26.3 ft MSL. However, including coincidental wind set-up and wave run-up, the water level at the site from the PMF would be about the same as the flood elevation due to cascading failure of dams in the upstream

Colorado River basin (41.9 ft MSL). Both flooding scenarios could potentially pose a flooding risk to the Radwaste Building.

Flooding from probable maximum surge and seiche as a result of the probable maximum hurricane (PMH) in the Gulf of Mexico is discussed in Subsection 2.4S.5. The maximum water level at the site due to the PMH is estimated to be elevation 31.1 ft MSL. Since this water level is lower than the water level of 32.5 ft for upstream dam failure (with coincidental wind set-up), the resulting maximum water level at the site after factoring in the wave run-up would be lower than 41.9 ft that was predicted for the upstream cascading dam failure event. However, the water level at the site due to the PMH, including coincidental wind set-up and wave run-up, is still higher than the entrance elevation to the Radwaste Buildings at STP 3 and STP 4. Therefore, maximum surge and seiche due to the PMH could potentially pose a risk of flooding the Radwaste Buildings.

Subsection 2.4S.6 describes estimation of the probable maximum tsunami water level. The maximum water level associated with a PMT at the STP 3 & 4 site is 16.3 ft MSL. Therefore, the PMT would not be a flood risk to the STP 3 & 4 site. As discussed in Subsections 2.4S.7 and 2.4S.9, ice effects and channel diversions, respectively, would not pose a flooding risk to the STP 3 & 4 site.

Of the several flooding mechanisms considered, other than a breach of the MCR embankment, the local PMP storm, a cascading failure of upstream dams in the Colorado River basin, the PMF and the PMSS are the four mechanisms that have the potential to flood the Unit 3 and Unit 4 Radwaste Buildings. The local PMP storm potentially could result in release of the greatest concentration of radioactive material to the environment because the flood level from this event would be lower than that from the three other flood mechanisms and, therefore, would provide less dilution if the material were to escape the Radwaste Building.

Other than the MCR breach, each of the four flooding scenarios with the potential to flood the Radwaste Building can be considered a slow-moving event for which advance notice would be available. For this reason, there would be opportunity to initiate operator action to mitigate potential flooding effects. Except during shipment of waste, doors to the Radwaste Building are normally closed to optimize performance of the HVAC system. Upon receiving a flood warning, plant procedures would require securing the doors and implementing other mitigating action such as sandbagging [COM 19.9-3]. Therefore, none of the flooding mechanisms considered present a credible risk of environmental contamination.

QUESTION:

SITE-54: Subject: EAL Threshold Values [Basis: 10 CFR 50.47(b)(4); Section IV.B of Appendix E to 10 CFR 50; NUREG-0654, FEMA-REP-1, Rev. 1, November 1980: Criterion D.1; SRP ACCEPTANCE CRITERIA: Requirements A and B; Acceptance Criterion 3] The "South Texas Project Units 3 and 4 Threshold Value Technical Basis" of the emergency action levels (EALs) scheme references "Revision 5 to NEI 99-01, Methodology for the Development of Threshold Values". The title of this reference document is not correct. The correct title of NEI 99-01, rev. 5 is "Methodology for Development of Emergency Action Levels," which was published in its final form on February 2008, ADAMS accession number ML080450149. The date of the latest resubmittal of the EAL Threshold Values document is January 15, 2008. The applicant's EAL Threshold Values document does not incorporate the final changes to Revision 5 of NEI 99-01 as stated by the applicant. Use the correct title of the reference document or justify why it should not be changed. Resubmit "South Texas Project Units 3 and 4 Threshold Value Technical Basis" document consistent with NEI 99-01, rev. 5 as referenced in the Emergency plan, or justify how the existing version meets industry commitment to the NRC on EAL scheme submittal with the COLA.

<u>RESPONSE</u>:

STP's response to RAI 13.03-19 addresses this RAI. The text in the EAL Threshold Values has been corrected to reflect NEI 99-01 Revision 5 dated February 2008 and will be submitted with the next revision to the COLA.

QUESTION:

<u>SITE-34</u>: Subject: Communications with NRC

[Basis: 10 CFR 50.47(b)(6); NUREG-0654, FEMA-REP-1, Rev. 1, November 1980: Criterion F.1.f; NUREG-0800, Chapter 13.3, SRP ACCEPTANCE CRITERIA: Requirements A and B; Acceptance Criteria 1, 2]

Refer to Emergency Plan Section E, Figure E-3 Emergency Communications Links. Explain why the NRC Regional Office Emergency Operations Center is not listed in the links.

RESPONSE:

In accordance with 10 CFR 50.72(a) the general requirements of notifying the NRC Operations Center via the Emergency Notification System state:

"The licensee shall notify the NRC immediately after notification of State or local agencies and not later than one hour after the time the licensee declares one of the Emergency Classes." [10 CFR 50.72(a)(3)]

STP Emergency Plan identifies notification to the NRC Operations Center in Section E-2 and B.4.12. STP understands that notification to Regional Offices will be accomplished through the NRC Operations Center using the bridge line capabilities of the ENS.

STP has revised Attachment 1 Cross Reference to the Emergency Plan F.1.f deleting the text 'Addendum E' and replacing with 'E.2, B.4.12'. Attachment 1 to the Emergency Plan is included as part of RAI response 13.03-24.

The STP 3 / 4 Emergency Plan has been revised as described above.

QUESTION:

<u>SITE-35</u>: Subject: Public Information Content

[Basis: 10 CFR 50.47(b)(7); NUREG-0654, FEMA-REP-1, Rev. 1, November 1980: Criterion G.1.a; NUREG-0800, Chapter 13.3, SRP ACCEPTANCE CRITERIA: Requirements A and B; Acceptance Criteria 1, 2]

Emergency Plan Section *K.1.3 Public Information Contents*, 1st bullet uses "may" instead of "shall" as stipulated in NUREG-0654 Criterion G.1.a. Revise text to reflect intent of this Criterion, or provide justification to retain the statement as written.

<u>RESPONSE</u>:

Emergency Plan Section K.1.3 will be revised as indicated below:

K.1.3 Public Information Contents

The public information shall may, include, but is not limited to:

QUESTION:

SITE-38: Subject: Label of Table

[Basis: 10 CFR 50.47(b)(8); NUREG-0654, FEMA-REP-1, Rev. 1, November 1980: Criterion H.5.c; NUREG-0800, Chapter 13.3, SRP ACCEPTANCE CRITERIA: Requirements A and B; Acceptance Criteria 1, 2]

Is there a Table, similar to Table G-3, for Units 3/4 that provides information on "Emergency Response Facilities Data Acquisition and Display System"? If there is, provide the location of this table? If there isn't, clarify where this information for Units 3/4 is provided.

<u>RESPONSE</u>:

The STP Emergency Plan does not contain a similar Table G-3 used to describe the Unit 3 and 4 computer system information. However, a text description is provided in Section G.14 page G-7.

QUESTION:

<u>SITE-39</u>: Subject: Clarification on Figures [Basis: 10 CFR 50.47(b)(8); NUREG-0654, FEMA-REP-1, Rev. 1, November 1980: Criterion H.1, H.9; NUREG-0800, Chapter 13.3, SRP ACCEPTANCE CRITERIA: Requirements A and B; Acceptance Criteria 1, 2]

Refer to Emergency Plan pages G-22 and G-23, and explain footers with "*" for Figures G-5 and G-6.

<u>RESPONSE</u>:

STP will revise STP Emergency Plan, Section G, Figures G-5 and G-6, to correct the error in the placement of the '*' text. The text on the bottom of both pages G-22 and G-23 should have been placed on the top of pages 23 and 24.

The revisions to pages G-22, G-23, and G-24 are attached



Figure G-5 Typical Emergency Operations Facility Page 1 of 1

*This layout applies to Unit 3 and 4 Operations Support Center located in the Service Buildings.

*This layout applies to Unit 3 and 4 Operations Support Center located in the Service Buildings.



*This layout applies to Unit 3 and Unit 4 Technical Support Centers located in the Service Buildings.

*This layout applies to Unit 3 and Unit 4 Technical Support Center located in the Service Buildings.



Figure G-7 Typical Technical Support Center* Page 1 of 1

QUESTION:

<u>SITE-40</u>: Subject: Reference to Initiating Conditions Table and EAL Document [Basis: 10 CFR 50.47(b)(9); NUREG-0654, FEMA-REP-1, Rev. 1, November 1980: Criterion I.1;NUREG-0800, Chapter 13.3, SRP ACCEPTANCE CRITERIA: Requirements A and B; Acceptance Criteria 1, 2]

Refer to Emergency Plan *Attachment 1 Cross Reference* for NUREG-0654 Criterion I.1, and explain why Table D-2 and "South Texas Project Units 3 and 4 EAL Threshold Value Technical Basis" document were not referenced in addressing this criterion.

<u>RESPONSE</u>:

STP has revised Attachment 1 Cross Reference to the Emergency Plan I.1 to included Table D-2. The revised Cross Reference has been included as part of the response to RAI 13.03-24.

QUESTION:

<u>SITE-41</u>: Subject: Plan Section Cross Reference

[Basis: 10 CFR 50.47(b)(9); NUREG-0654, FEMA-REP-1, Rev. 1, November 1980: Criteria I.3.a, I.3.b, I.4; NUREG-0800, Chapter 13.3, SRP ACCEPTANCE CRITERIA: Requirements A and B; Acceptance Criteria 1, 2]

Refer to Emergency Plan *Attachment 1 Cross Reference*. Apparently, Plan Section J.11 does not address NUREG-0654 Criteria I.3.a, I.3.b, and I.4. For example, J.11 does not provide "methods and techniques" in accordance with NUREG-0654 Criterion I.3. Revise Plan Section reference, or provide justification to retain the current reference.

<u>RESPONSE</u>:

STP has revised Attachment 1 Cross Reference to the Emergency Plan I.3.a, I.3.b, and I.4 deleting the text 'J.11' and replacing it with 'J.10.1'. Additionally, The level of detail in NUREG-0654, FEMA-REP-1, I.3.a, I.3.b and I.4; are described in station procedure 0ERP01-ZV-TP01, 'Offsite Dose Calculations.' The procedure is referenced in the Emergency Plan on page J-5, Section J.10.1 and Attachment 2 'Implementing Procedures' as implementing procedures of the Plan.

The revised Cross Reference has been included as part of the response to RAI 13.03-24.

QUESTION:

<u>SITE-42:</u> Subject: Plan Section Cross Reference [Basis: 10 CFR 50.47(b)(9); NUREG-0654, FEMA-REP-1, Rev. 1, November 1980: Criterion I.6; NUREG-0800, Chapter 13.3, SRP ACCEPTANCE CRITERIA: Requirements A and B; Acceptance Criteria 1, 2]

Refer to Emergency Plan *Attachment 1 Cross Reference*. Apparently, Plan Section I.4 does not address NUREG-0654 Criterion I.6. Revise Plan Section reference, or provide justification to retain the current reference.

<u>RESPONSE</u>:

STP has revised Attachment 1 Cross Reference to the Emergency Plan I.6 deleting the text 'I.4' and replacing it with 'H.2'. The revised Cross Reference has been included as part of the response to RAI 13.03-24.

QUESTION:

<u>SITE-43</u>: Subject: Plan Section Cross Reference

[Basis: 10 CFR 50.47(b)(9); NUREG-0654, FEMA-REP-1, Rev. 1, November 1980: Criterion I.7, I.8, I.10, I.11; NUREG-0800, Chapter 13.3, SRP ACCEPTANCE CRITERIA: Requirements A and B; Acceptance Criteria 1, 2]

Refer to Emergency Plan *Attachment 1 Cross Reference*. Plan Section H.3 could not be found in the submitted Emergency Plan. Revise Plan Section reference for NUREG-0654 criteria I.7, I.8, I.10, and I.11, or provide justification to retain the current reference.

<u>RESPONSE</u>:

STP has revised Attachment 1 Cross Reference to the Emergency Plan I.7, deleting the text 'H.3'. In addition, STP has revised Attachment 1 Cross Reference to the Emergency Plan I.8, I.10, and I.11 deleting the text 'H.3' and replacing it with 'H.2'. The revised Cross Reference has been included as part of the response to RAI 13.03-24.

QUESTION:

<u>SITE-44</u>: Subject: Clarification on response time [Basis: 10 CFR 50.47(b)(10); NUREG-0654, FEMA-REP-1, Rev. 1, November 1980: Criterion J.5; SRP ACCEPTANCE CRITERIA: Requirements A and B; Acceptance Criteria 1, 2]

Refer to Emergency Plan Section F.3 Assembly and Accountability, 2nd §, 3rd sentence: "The Emergency Response Procedure 0ERP01-ZV-IN04, Assembly and Accountability, is designed to achieve this emergency action within 30 minutes.". Clarify within 30 minutes of what.

<u>RESPONSE</u>:

STP Emergency Plan, Part F.3, "Assembly and Accountability," specifies the following:

The Emergency Director initiates the Assembly and Accountability process by directing the sounding of the Assembly Alarm and providing assembly instructions over the plant public address system. Personnel shall assemble in predetermined assembly areas identified in 0ERP01-ZV-IN04, "Assembly and Accountability."

Personnel assembling in the Protected Area of the Station are accounted for by the security computer system. Backup methods are provided in the event the security computer fails. The Emergency Response Procedure 0ERP01-ZV-IN04, Assembly and Accountability, is designed to achieve this emergency action within 30 minutes.

Emergency Response Procedure 0ERP01-ZV-IN04 implements this objective with the requirement: "Accountability shall be completed within 30 minutes of sounding the assembly alarm."

QUESTION:

<u>SITE-45:</u> Subject: Completeness of evacuation area figures [Basis: 10 CFR 50.47(b)(10); NUREG-0654, FEMA-REP-1, Rev. 1, November 1980: Criterion J.10.a; NUREG-0800, Chapter 13.3, SRP ACCEPTANCE CRITERIA: Requirements A and B; Acceptance Criteria 1, 2]

Figure I-1 in the Emergency Plan only shows evacuation areas; Figures I-1 and I-2 do not address the rest of the criterion or they are not visible. Provide clear Figures which show all the items required in NUREG-0654 Criterion J.10.a.

<u>RESPONSE</u>:

NUREG-0654, FEMA-REP-1, Rev. 1, Section J, "Protective Response Planning Standard," Part 10.a, specifies that the plans to implement protective measures for the plume exposure pathway shall include "Maps showing evacuation routes, evacuation areas, preselected radiological sampling and monitoring points, relocation centers in host areas, and shelter areas; (identification of radiological sampling and monitoring points shall include the designators in Table J-l or an equivalent uniform system described in the plan)."

Although the guidance indicates that the criteria are applicable to one or more organization, the intention of NUREG-0654, FEMA-REP-1, and Rev. 1 is to provide for an adequate state of emergency preparedness around STP. Based on this STP believes portions of this criteria are directly attributable to offsite agency planning (e.g. County Emergency Management Plan). STP has verified criteria identified in I.10.a are contained in the Offsite Agencies' Plans as applicable to those agencies (further described below).

STP does maintain an integrated map for the 10 mile-EPZ and preselected monitoring points which is contained within site procedure 0ERP01-ZV-TP02, 'Offsite Field Teams'. This procedure is also identified as an implementing procedure of the STP Emergency Plan in Section H.2.

STP has revised Attachment 1 Cross Reference to the Emergency Plan J.10.a, adding 'H.2' to this criterion. The revised Cross Reference has been included as part of the response to RAI 13.03-24.

STP COLA Part 5.6.2 submittal includes the State Emergency Plan, Tab 1, Chapter 2 to Annex D which provides the identified Evaluation Criteria NUREG 0654, Item J.10.a. Specific location of evacuation routes, evacuation areas, preselected radiological sampling and monitoring points, relocation centers in host areas, and shelter areas as follows:

Evacuation Routes: Annex D, Tab 1, Chapter 2, Attachment 5

Evacuation Areas (Emergency Response Zones):

Annex D, Tab 1, Chapter 2, Attachment 4

Pre-Selected Monitoring Points:

(Including identification of radiological sampling and monitoring points) Annex D, Tab 1, Chapter 2, Attachment 3

Relocation Centers & Shelter Areas: Annex D, Tab 1, Chapter 2, Attachments 9-10

No COLA changes are required in response to this RAI.

QUESTION:

<u>SITE-47:</u> Subject: Clarification in Plan Section [Basis: 10 CFR 50.47(b)(8); NUREG-0654, FEMA-REP-1, Rev. 1, November 1980: Criterion K.7; NUREG-0800, Chapter 13.3, SRP ACCEPTANCE CRITERIA: Requirements A and B; Acceptance Criteria 1, 2]

Plan Section J.5 is not explicit on "extra clothing and decontaminants" and "attention to radioiodine contamination". Provide a revised reference that addresses stipulations of NUREG-0654 Criterion K.7, or provide justification to retain the current reference.

<u>RESPONSE</u>:

STP has revised Attachment 1 Cross Reference to the Emergency Plan K.7 deleting the text 'J.5' and 'J.8' and replacing it with 'J.6'. The revised Cross Reference has been included as part of the response to RAI 13.03-24.

No additional COLA revisions are required as a result of this RAI response.

QUESTION:

<u>SITE-48</u>: Subject: Addressing Stipulations in Criterion

[Basis: 10 CFR 50.47(b)(15); NUREG-0654, FEMA-REP-1, Rev. 1, November 1980: Criterion O.4.d; NUREG-0800, Chapter 13.3, SRP ACCEPTANCE CRITERIA: Requirements A and B; Acceptance Criteria 1, 2]

Emergency Plan, Section M.8 does not specify "security" as identified in NUREG-0654 Criterion O.4.d. Identify where "security" is addressed for this Criterion.

<u>RESPONSE</u>:

NUREG-0654, FEMA-REP-1, Criterion O, "Radiological Emergency Response Training," Part 4, specifies that "Each organization shall establish a training program for instructing and qualifying personnel who will implement radiological emergency response plans," and, as specified in part 4.d, this requirement is applicable to "Police, security and fire fighting personnel."

STP Emergency Plan, Cross Reference Table O, "Radiological Emergency Response Training," Part 4, repeats the requirements in NUREG-0654, Criterion O, Part 4, with a specific requirement in part 4.d, to include "Police, security and fire fighting personnel," with the specific training requirements in Plan Section M.4. STP Emergency Plan, Section M.8, Offsite Training, requires that training for these personnel include procedures for notification, basic radiation protection, and their expected roles. For those local services support organizations who will enter the site, training also includes site access procedures. This training is intended for offsite personnel, who are not members of the plant staff.

At STP, security personnel are members of the plant staff and are designated on-shift personnel. These personnel are trained in accordance the requirements for Emergency Response training at the Station and are described in 0PGP03-ZT-0139, Emergency Preparedness Training Program.

STP has revised Attachment 1 Cross Reference to the Emergency Plan O.4.d adding the text 'M.3'. The revised Cross Reference has been included as part of the response to RAI 13.03-24.

QUESTION:

<u>SITE-49</u>: Subject: Addressing Stipulations in Criterion

[Basis: 10 CFR 50.47(b)(15); NUREG-0654, FEMA-REP-1, Rev. 1, November 1980: Criterion O.4.f; NUREG-0800, Chapter 13.3, SRP ACCEPTANCE CRITERIA: Requirements A and B; Acceptance Criteria 1, 2]

Emergency Plan, Section M.4 does not cover "rescue" as specified in NUREG-0654 Criterion O.4.f. Identify where "rescue" is addressed for this Criterion, since "First aid" and "rescue" personnel could be different.

<u>RESPONSE</u>:

NUREG-0654, FEMA-REP-1, Criterion O, "Radiological Emergency Response Training," Part 4, specifies that "Each organization shall establish a training program for instructing and qualifying personnel who will implement radiological emergency response plans," and, as specified in part 4.f, this requirement is applicable to "First aid and rescue personnel."

STP Emergency Plan, Cross Reference Table O, "Radiological Emergency Response Training," Part 4, repeats the requirements in NUREG-0654, Criterion O, Part 4, with a specific requirement in part 4.f, to included "First aid and rescue personnel," with the specific training requirements in Plan Section M.4. STP Emergency Plan, Section M.4, "Emergency Preparedness Training," describes the Emergency Preparedness Training Program for onsite and offsite emergency response personnel at the STP and explicitly lists offsite dose calculations, emergency communications, and emergency medical care as the specialized training applicable to the "First aid and rescue personnel."

STP 'First Aid' responders identified in Emergency Plan Section M.4.1 are at a minimum State certified Emergency Care Attendants (ECA). Station implementing procedure 0PGP03-ZT-0139, 'Emergency Preparedness Training' (identified in Plan Section M.1) identifies the certification required for this position. This certification has a specific State required curriculum which includes basic rescue techniques.

STP has revised Attachment 1 Cross Reference to the Emergency Plan O.4.f adding the text 'M.1'. The revised Cross Reference has been included as part of the response to RAI 13.03-24.

QUESTION:

<u>SITE-50:</u> Subject: Addressing Stipulations in Criterion [Basis: 10 CFR 50.47(b)(16); NUREG-0654, FEMA-REP-1, Rev. 1, November 1980: Criterion P.3; NUREG-0800, Chapter 13.3, SRP ACCEPTANCE CRITERIA: Requirements A and B; Acceptance Criteria 1, 2]

Identify where "rescue" is addressed for this Criterion, since "First aid" and "rescue" personnel could be different.

<u>RESPONSE</u>:

NUREG-0654, FEMA-REP-1, Criterion O, "Radiological Emergency Response Training," Part 4, specifies that "Each organization shall establish a training program for instructing and qualifying personnel who will implement radiological emergency response plans," and, as specified in part 4.f, this requirement is applicable to "First aid and rescue personnel."

STP Emergency Plan, Cross Reference Table O, "Radiological Emergency Response Training," Part 4, repeats the requirements in NUREG-0654, Criterion O, Part 4, with a specific requirement in part 4.f, to included "First aid and rescue personnel," with the specific training requirements in Plan Section M.4. STP Emergency Plan, Section M.4, "Emergency Preparedness Training," describes the Emergency Preparedness Training Program for onsite and offsite emergency response personnel at the STP and explicitly lists offsite dose calculations, emergency communications, and emergency medical care as the specialized training applicable to the "First aid and rescue personnel."

STP 'First Aid' responders identified in Emergency Plan Section M.4.1 are at a minimum State certified Emergency Care Attendants (ECA). Station implementing procedure 0PGP03-ZT-0139, 'Emergency Preparedness Training' (identified in Plan Section M.1) identifies the certification required for this position. This certification has a specific State required curriculum which includes basic rescue techniques.

STP has revised Attachment 1 Cross Reference to the Emergency Plan O.4.f adding the text 'M.1'. The revised Cross Reference has been included as part of the response to RAI 13.03-24.

QUESTION:

<u>SITE-51</u>: Subject: Addressing Stipulations in Criterion

[Basis: 10 CFR 50.47(b)(16); NUREG-0654, FEMA-REP-1, Rev. 1, November 1980: Criterion P.6; NUREG-0800, Chapter 13.3, SRP ACCEPTANCE CRITERIA: Requirements A and B; Acceptance Criteria 1, 2]

Emergency Plan, Attachment 2 does not identify "supporting plans" as specified in NUREG-0654 Criterion P.6. Provide location in the plan or other references where this Criterion is addressed.

<u>RESPONSE</u>:

Throughout the STP Emergency Plan there are several locations that identify "supporting plans". STP has revised Attachment 1 Cross Reference to the Emergency Plan P.6 adding the text 'A.2, B.2, B.2.1, B.2.2, B.3'. The revised Cross Reference has been included as part of the response to RAI 13.03-24.

QUESTION:

<u>SITE-52</u>: Subject: Addressing Stipulations in Criterion [Basis: 10 CFR 50.47(b)(16); NUREG-0654, FEMA-REP-1, Rev. 1, November 1980: Criterion P.7; NUREG-0800, Chapter 13.3, SRP ACCEPTANCE CRITERIA: Requirements A and B; Acceptance Criteria 1, 2]

Emergency Plan, Attachment 2 does not identify "plan sections" for certain procedures. Provide an updated version of Attachment 2 or justify the current one in addressing NUREG-0654 Criterion P.7.

RESPONSE:

Attachment 2 of the Emergency Plan will be revised as shown below:

Attachment 2 Implementing Procedures

Procedure		Plan Section
0ERP01-ZV-EF01	EOF Director	С
0ERP01-ZV-EF02	Deputy EOF Director	N/A
0ERP01-ZV-EF03	Radiological Director	С
0ERP01-ZV-EF04	Technical Director	С
0ERP01-ZV-EF07	Support Organization Director	С
0ERP01-ZV-EF08	Licensing Director	С
0ERP01-ZV-EF09	Procurement/Resources Supervisor	F
0ERP01-ZV-EF10	Offsite Field Team Supervisor	J
0ERP01-ZV-EF11	Records Supervisor	N/A
0ERP01-ZV-EF12	Communications Systems Supervisor	N/A
0ERP01-ZV-EF15	Dose Assessment Specialist	H, I, J
0ERP01-ZV-EF17	System Status Evaluator	N/A
0ERP01-ZV-EF18	Offsite Agency Communicator	N/A
0ERP01-ZV-EF19	Matagorda County EOC Liaison	N/A
0ERP01-ZV-EF20	State of Texas Liaison	N/A
0ERP01-ZV-EF21	Federal Response Agency Liaison	N/A
0ERP01-ZV-EF22	Emergency Operations Facility Liaison	N/A
0ERP01-ZV-EF24	Support Orientation Coordinator	N/A
0ERP01-ZV-EF25	Site Public Affairs Coordinator	K

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Procedure		Plan Section
0ERP01-ZV-EF26	Materials Engineer	N/A
0ERP01-ZV-EF27	Engineering Assistant	N/A
0ERP01-ZV-EF28	Assistant Support Organization Director	F
0ERP01-ZV-IN01	Emergency Classification	D, H
0ERP01-ZV-IN02	Notifications to Offsite Agencies	D, E, F, H, I
0ERP01-ZV-IN03	Emergency Response Organization Notification	E, F
0ERP01-ZV-IN04	Assembly and Accountability	F, I
0ERP01-ZV-IN05	Site Evacuation	F, I, J
0ERP01-ZV-IN06	Radiological Exposure Guideline	F, H, I, J
0ERP01-ZV-IN07	Offsite Protective Action Recommendations	H, I
0ERP01-ZV-OF01	Alternate Emergency Operations Facility Activation, Operation, and deactivation	G
0ERP01-ZV-OF02	Joint Information Center Activation, Operations, and Deactivation	С, G, К
0ERP01-ZV-OS01	OSC Coordinator	С
0ERP01-ZV-OS02	Assistant OSC Coordinator	С
0ERP01-ZV-OS03	Radiological Coordinator	С
0ERP01-ZV-OS04	Security Coordinator	С
0ERP01-ZV-OS05	Materials Handler	N/A
0ERP01-ZV-OS06	Emergency Teams	С
0ERP01-ZV-RE01	Recovery Operations	F, L
0ERP01-ZV-RE02	Documentation	L
0ERP01-ZV-SH01	Shift Supervisor	С, Н
0ERP01-ZV-SH02	Acting Radiological Manager	С
0ERP01-ZV-SH03	Acting Security Manager	С
0ERP01-ZV-SH04	Acting OSC Coordinator	С
0ERP01-ZV-TP01	Offsite Dose Calculations	F, H, I, J
0ERP01-ZV-TP02	Offsite Field Teams	H, I, J
0ERP01-ZV-TS01	TSC Manager	С
0ERP01-ZV-TS02	Assistant TSC Manager	N/A
0ERP01-ZV-TS03	Operations Manager	С
0ERP01-ZV-TS04	Radiological Manager	C, H, I, J
0ERP01-ZV-TS05	Chemical/Radiochemical Manager	N/A

Procedure		Plan Section
0ERP01-ZV-TS06	Maintenance Manager	С
0ERP01-ZV-TS07	Technical Manager	С
0ERP01-ZV-TS08	Security Manager	С
0ERP01-ZV-TS09	Administrative Manager	С
0ERP01-ZV-TS11	Engineering Supervisor	N/A
0POP04-ZO-0004	Personnel Emergencies	E, F, J
0PGP03-ZA-0106	Emergency Medical Response Plan	F, J
0PGP03-ZT-0139	Emergency Preparedness Training Program	Μ
0PGP05-ZV-0001	Emergency Response Exercises and Drills	M, N
0PGP05-ZV-0002	Emergency Response Activities Schedule	E, N
0PGP05-ZV-0003	Emergency Response Organization	C, F
0PGP05-ZV-0005	Emergency Response Program	Α, Ο
0PGP05-ZV-0006	Emergency Notification and Response System	С
0PGP05-ZV-0007	Prompt Notification System	E, G
0PGP05-ZV-0009	Emergency Facilities Inventories and Inspections	G, O
0PGP05-ZV-0010	Emergency Plan Revision	Α, Ο
0PGP07-ZA-0011	Communications System	Е
0PGP05-ZV-0011	Emergency Communications	E, G
0PGP05-ZV-0017	Severe Accident Management Guidelines	\mathbf{C}

QUESTION:

<u>SITE-53:</u> Subject: Addressing Stipulations in Criterion [Basis: 10 CFR 50.47(b)(16); NUREG-0654, FEMA-REP-1, Rev. 1, November 1980: Criterion P.10; NUREG-0800, Chapter 13.3, SRP ACCEPTANCE CRITERIA: Requirements A and B; Acceptance Criteria 1, 2]

Emergency Plan, Addendum E-1 does not explicitly address stipulations of NUREG-0654 Criterion P.10. Provide an updated version of Addendum E-1 or justify the current one in addressing this Criterion.

<u>RESPONSE</u>:

The level of detail in NUREG-0654, FEMA-REP-1, P.10, is included in station procedures 0PGP05-ZV-0002, "Emergency Response Activities Schedule," and 0PGP07-ZA-001, "Communications Systems." These procedures are referenced in the Emergency Plan in Section E, Addendum E-1, 3.2, "Operation," and Attachment 2, 'Implementing Procedures,' as implementing procedures of the Plan.

RAI 02.05.01-3:

QUESTION:

Section 2.5S.1.1.4.4.3 describes that "basement block bounding faults formed during the extensional episode have been interpreted within both the thick and thin transitional crust." Also, according to Figure 2.5S.1-15, the site region is underlain by thick and thin transitional crust. Thus, the geologic setting and tectonic history of much of the site region is similar to other regions where large historic earthquakes have occurred, such as Charleston, South Carolina. Please provide additional information on strong earthquake potential for thick and thin transitional crustal structures beneath the site region.

<u>RESPONSE</u>:

As outlined in Subsection 2.5S.2, the Electric Power Research Institute Seismicity Owners Group (EPRI-SOG) source model (Reference 1) comprises the base characterization of strong earthquake potential within the site region. A comprehensive review of all available information and data developed since the EPRI-SOG study was conducted as part of the STP 3 & 4 COLA effort. One focus of this review was the identification of any information or data that would alter the evaluations of the EPRI-SOG teams with respect to the strong earthquake potential of the site region, including the thick- and thin-transitional crust beneath the site region. The new information developed since the EPRI-SOG study includes new gravity and magnetic data, refined kinematic models for the opening of the Gulf of Mexico, earthquakes that occurred since the EPRI-SOG study, and revised models of the state of stress within the site region. All of this information is discussed and presented within Subsections 2.5S.1 and 2.5S.2, and, as stated in those sections, none of this information requires or motivates a revision to the EPRI-SOG characterization of strong earthquake potential for the site region with the exception of modifications to the maximum magnitude (Mmax) distribution for some Gulf Coastal Source Zones (see Subsection 2.5S.2.4.3). In particular, no new information developed since the EPRI-SOG study presents or hypothesizes the specific locations, orientations, and dimensions of potential faults within the thick- and thin-transitional crust beneath the site region. Given the lack of specific information about discrete faults that may be potential seismic sources, the contribution to ground shaking hazard at STP 3 & 4 from the Gulf coastal region is modeled by areal source zones, as defined and characterized in the EPRI-SOG study (Reference 1). Therefore, from the perspective of the strong ground motion characterization used for the STP 3 & 4 site, the documentation of the EPRI-SOG source characterizations (Reference 1) is the most comprehensive evaluation for the site region. These characterizations are summarized in Subsection 2.5S.2.2 and described in detail in the EPRI-SOG documentation (Reference 1). This position is further supported below.

As outlined in the introduction to Subsection 2.5S.2, the potential for strong ground motion at the STP 3 & 4 site, including areas underlain by thick- and thin-transitional crust, is characterized by the seismic source model used in the probabilistic seismic hazard analysis (PSHA) described in Subsection 2.5S.2. The basis for this source model and PSHA is guidance provided by the NRC in Regulatory Guide (RG) 1.208. This guidance states that the PSHA should be:

"...conducted with up-to-date interpretations of earthquake sources, earthquake recurrence, and strong ground motion estimation" (page 3).

RG 1.208 also states that:

"... seismic sources and data accepted by the NRC in past licensing decisions may be used as a starting point (for the PSHA)" (page 14).

According to RG 1.208, the EPRI-SOG study (References 2 - 4) is an acceptable starting-point source zone characterization. Therefore, the EPRI-SOG model was adopted as the starting model for STP 3 & 4.

The EPRI-SOG study provided a comprehensive assessment of seismic hazards for the central and eastern US (CEUS) that was developed using an expert elicitation process involving six independent earth science teams (ESTs) comprised of scientists recognized as experts in the fields of seismology, geology, and geophysics. Through the expert elicitation process, this study incorporated the range of uncertainty about the occurrence of future earthquakes and seismic sources within the CEUS. An explicit motivation for the EPRI-SOG study as stated within the preface to the source characterizations reports (Reference 1) was to assess the possibility for an earthquake similar to that which occurred near Charleston throughout the CEUS. Therefore, the resulting seismic source model for the CEUS can be viewed as representing the state of knowledge of the informed expert community at the time of the study with respect to the seismogenic potential of the CEUS crust, including the crust throughout the STP 3 & 4 site region.

However, RG 1.208 also states that site-specific geological, geophysical, and seismological studies should be conducted to determine if the EPRI-SOG source model adequately describes the seismic hazard for the site of interest given new data developed since acceptance of the original model. The regulatory guidance explicitly states that:

"The results of these investigations will also be used to assess whether new data and their interpretation are consistent with the information used in recent probabilistic seismic hazard studies accepted by NRC staff. If new data, such as new seismic sources and new ground motion attenuation relationships, are consistent with the existing earth science database, updating or modification of the information used in the site-specific hazard analysis is not required. It will be necessary to update seismic sources and ground motion attenuation relationships for sites where there is significant new information provided by the site investigation" (page C-1).

As outlined in Subsections 2.5S.1 and 2.5S.2, a comprehensive review was conducted to determine whether or not any new data or information exists that would require updating the EPRI-SOG source model for the STP 3 & 4 site. All of the updates made to the EPRI-SOG model are described in Subsection 2.5S.2; the changes within the site region included:

• Updating the Mmax distributions for source zones within the Gulf coastal region to

account for recent earthquakes within these zones that have magnitudes higher than the lower-bound Mmax value for the respective zone (see Subsection 2.5S.2.4.3);

- Updating the New Madrid Seismic Zone source model to account for new information developed since the EPRI-SOG study on the recurrence and magnitude of large earthquakes within that region (see Subsection 2.5S.2.4.4.2);
- Revising the smoothing parameters of the Dames & Moore South Coastal Margin source zone to more conservatively represent the hazard at the STP 3 & 4 site (see Subsection 2.5S.2.4.5.1); and
- Updating the southern extent of the EPRI-SOG source model to ensure that seismicity parameters were defined for the entire site region (see Subsection 2.S.2.4.5.2).

With these modifications to the original EPRI-SOG source characterizations (Reference 1), the source model used for the STP 3 & 4 PSHA can be viewed as representing the potential for strong earthquake ground motions from sources within the site region, including the thick- and thin-transitional crust, and is consistent with the characterization provided by the EPRI-SOG teams.

As stated in the RAI question, the STP 3 & 4 site region includes both thick- and thin-transitional crust developed during Mesozoic extension and rifting that resulted in the opening of the Gulf of Mexico. As discussed in Subsection 2.5S.1.1.4.4.3, the potential exists for basement faults associated with this Mesozoic extension and rifting to extend into or occur within the site region. To date, however, no geological or geophysical information has been published that documents the locations, dimensions, or orientations of any such faults because basement structures cannot be adequately imaged through the thick accumulations of salt and sediments within the Texas coastal plain and Gulf of Mexico. The ESTs that participated in the EPRI-SOG study were aware of these basic crustal divisions (e.g., thick- and thin-transitional crust) and potential structures (e.g., block-bounding basement faults), and the source model used in the STP 3 & 4 PSHA represents the EPRI-SOG evaluation of the earthquake potential for these poorly resolved structures. Since the EPRI-SOG study in 1986, no studies have effectively identified any of these potential basement structures or positively associated seismicity with any of the potential structures. Specifically, there is no new information about the locations, dimensions and orientations of basement faults with which to evaluate their potential for generating strong earthquakes and associated vibratory ground motion in the site region, beyond the information that was available to the ESTs during the EPRI-SOG study. Therefore, with the exception of the updates made to the EPRI-SOG source model described above, the EPRI-SOG source zones summarized within Subsection 2.5S.2.2 and fully presented within the EPRI-SOG documentation (Reference 1), characterize the strong earthquake potential for thick- and thintransitional crustal structures beneath the site region, given the current state of knowledge.
References:

- 1. EPRI, 1986, Seismic hazard Methodology for the Central and Eastern United States (NP-4726), Vol. 5-10, Electric Power Research Institute (EPRI).
- 2. EPRI, 1986-1989, Seismic hazard Methodology for the Central and Eastern United States (NP-4726), Vol. 1-3 & 5-10, Electric Power Research Institute (EPRI).
- 3. EPRI, 1989a, EQHAZARD Primer (NP-6452-D), Electric Power Research Institute (EPRI), prepared by Risk Engineering for Seismicity Owners Group and EPRI.
- 4. EPRI, 1989b, Probabilistic seismic hazard evaluations at nuclear plant sites in the central and eastern United States: resolution of the Charleston earthquake issue (NP-6395-D), Electric Power Research Institute (EPRI).

RAI 02.05.03-1:

QUESTION:

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Section 2.5S.3.1.1 under "Analysis of Seismic Reflection Data," states that all but two faults in the site area die out in Miocene or older strata, "and thus have not been active since Miocene time." However, such data show only that no displacement large enough to be imaged is present in Miocene and younger strata. Please explain how the seismic reflection data rule out displacements smaller than that of the resolution of the data, but large enough to cause damaging earthquakes.

<u>RESPONSE</u>:

The faults that are the subject of this RAI question and discussed in Section 2.5S.3.1.1 are growth faults. As discussed in detail in the UFSAR for STP Units 1 & 2 (Reference 1) and in Subsection 2.5S.1.2.4.2 of the STP 3 & 4 COLA, these growth faults are part of the Frio growth fault trend within the Texas Coastal Plain. Growth faults are non-tectonic faults and recognized in NRC Regulatory Guide 1.208 to not be sources of strong ground motion. This conclusion is supported by the USGS classification of growth faults as class B faults (see discussion in Subsections 2.5S.1.1.4.1.3 and 2.5S.1.1.4.4.5.4), research on capable and incapable fault sources (Reference 2), and the exclusion of growth faults as explicit seismic sources in seismic source characterizations of the Texas Coastal Plain (e.g.., References 3 - 8). Because the growth faults are not a potential seismic source, the seismic reflection data are not used to rule out displacements "large enough to cause damaging earthquakes" along the faults. As discussed in Subsection 2.5S.3.2.2, the seismic reflection data are only used to rule out potential surface deformation from aseismic slip on the growth faults.

No COLA revision is required as a result of this RAI response.

References:

- 1. STPEGS, Rev 13, STPEGS Updated Final Safety Analysis Report, Units 1 and 2, Revision 13.
- Hanson, K.A., Kelson, K.I., Angell, M.A., and Lettis, W.R., 1999, Techniques for Identifying Faults and Determining Their Origins: Washington, D.C., US Nuclear Regulatory Commission, NUREG/CR-5503, p. 461.
- 3. EPRI, 1986, Seismic hazard Methodology for the Central and Eastern United States (NP-4726), Vol. 5-10, Electric Power Research Institute (EPRI).
- 4. Petersen, M.D., Frankel, A.D., Harmsen, S.C., Mueller, C.S., Haller, K.M., Wheeler, R.L., Wesson, R.L., Zeng, Y., Boyd, O.S., Perkins, D.M., Luco, N., Field, E.H., Wills, C.J., and Rukstales, K.S., 2008, Documentation for the 2008 Update of the United States National Seismic Hazard Maps, v.1.1, U.S. Geological Survey, Open-file Report 2008-1128, 61 p.
- Savy, J.B., Foxall, W., and Bernreuter, D.L., 1998, Probabilistic seismic hazard characterization and design parameters for the Pantex plant, Hazards Mitigation Center, Lawrence Livermore National Laboratory, prepared for Mason and Hanger Corporation, UCRL-CR-132282, p. 93.
- 6. Wheeler, R.L., 1999, Fault number 924, Gulf-margin normal faults, Texas, in Quaternary fault and fold database of the United States, USGS. Available at: http://earthqakes.usgs.gov/regional/qfaults, accessed on 1/11/07.
- Wheeler, R.L., 2005, Known or Suggested Quaternary Tectonic Faulting, Central and Eastern United States—New and Updated Assessments for 2005, U.S. Geological Survey Open-File Report 2005-1336, p. 40.
- 8. Wheeler, R.L., and Crone, A.J., 2001, Known and suggested Quaternary faulting in the midcontinent United States: Engineering Geology, v. 62, p. 51-78.