PMSTPCOL PEmails

From: Elton, Loree [leelton@STPEGS.COM]
Sent: Monday, May 03, 2010 8:33 AM
To: Joseph, Stacy
Cc: STPCOL
Subject: RE: RAIs 14.03.02-8 and -9
Attachments: STP34_U7-C-STP-NRC-100061.pdf

Stacy,

It is STP letter # U7-C-STP-NRC-100061. Copy attached.

Loree

From: Joseph, Stacy [mailto:Stacy.Joseph@nrc.gov]
Sent: Friday, April 30, 2010 8:41 AM
To: Elton, Loree
Cc: STPCOL
Subject: RE: RAIs 14.03.02-8 and -9

Loree,

Can you also send me the serial number for the STP letter submitting the response for 06.04-2? I am having trouble locating it in ADAMS and need to update our RAI system.

Thank you,

Stacy Joseph

From: Elton, Loree [mailto:leelton@STPEGS.COM]
Sent: Wednesday, April 28, 2010 11:22 AM
To: Eudy, Michael; Joseph, Stacy
Cc: Cashell, George S; Chappell, Coley
Subject: RAIs 14.03.02-8 and -9

Mike and Stacey,

Per your conversation with Coley on the open item call, please find attached the letters with the responses to the referenced RAIs.

Loree

Loree Elton
Licensing, STP 3 & 4
leelton@stpegs.com
361-972-4644

Hearing Identifier: SouthTexas34Public_EX
Email Number: 2185

Mail Envelope Properties (C7F098E3C31A0141A02043F0B8E656EE26928B4407)

Subject: RE: RAIs 14.03.02-8 and -9
Sent Date: 5/3/2010 8:33:18 AM
Received Date: 5/3/2010 8:33:23 AM
From: Elton, Loree

Created By: leelton@STPEGS.COM

Recipients:
"STPCOL" <STP.COL@nrc.gov>
Tracking Status: None
"Joseph, Stacy" <Stacy.Joseph@nrc.gov>
Tracking Status: None

Post Office: exgmb1.CORP.STPEGS.NET

Files	Size	Date & Time
MESSAGE	1005	5/3/2010 8:33:23 AM
STP34_U7-C-STP-NRC-100061.pdf	82223	

Options
Priority: Standard
Return Notification: No
Reply Requested: No
Sensitivity: Normal
Expiration Date:
Recipients Received:

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

March 17, 2010
U7-C-STP-NRC-100061

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 Request for Additional Information

Attached is the response to an NRC staff question included in Request for Additional Information (RAI) letter number 320 related to Combined License Application (COLA) Part 2, Tier 2, Section 6.4. This completes the response to the letter. The attachment addresses the response to the RAI question listed below:

RAI 06.04-2

There are no commitments in this letter.

If you have any questions regarding this response, please contact Scott Head at (361) 972-7136, or Bill Mookhoek at (361) 972-7274.

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

Executed on 3/17/2010

Mark A. McBurnett
Vice-President, Oversight and Regulatory Affairs
South Texas Project Units 3 & 4

jet

Attachment:
RAI 06.04-2

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

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Kevin Pollo
L. D. Blaylock
CPS Energy

RAI 06.04-2

QUESTION:

In response to NRC RAI 06.04-1 (eRAI#3321) Supplement 1, the applicant submitted the required sensitivity analyses results for the toxic gas concentrations inside the control room. The analyses were performed using ALOHA computer code, and the results showed that the toxic gas concentrations due to the potentially hazardous chemicals stayed below their Immediately Dangerous to Life and Health (IDLH) values. However, the NRC staff performed its own confirmatory analysis of the STP 3&4 control room habitability using HABIT (EXTRAN and CHEM) computer code in accordance with Regulatory Guide 1.78. The staff's confirmatory calculations using HABIT showed that among the hazardous chemicals listed in Tables 2.2S of the FSAR; Acetic Acid (Water Transport), Gasoline (Water Transport), Sodium Hypochlorite (Onsite Storage), 1-Hexene (Offsite Storage), and Acetic Acid (Offsite Storage) did pose toxic gas threat to the control room habitability. The HABIT simulations showed that the release of anyone of these chemicals into the atmosphere would lead to its gas concentration exceeding the IDLH level inside the control room (CR) after the resulting gas cloud reaches the CR intake. The review of the applicant's response to eRAI#3321 also raised questions about ALOHA code's ability to analyze liquid spills of large quantities of chemicals, such as the ones involved in STP 3 & 4. It appears that ALOHA code is limited to a maximum 31,400 m^2 puddle area and 220 metric tons of liquid spills.

In response to RAI 06.04-1 Supplement 1, the applicant stated that a maximum puddle area of 31,400 square meters was assumed based on code limitations, for some of the chemicals analyzed. The staff finds this justification to be insufficient, as its confirmatory analysis has shown that puddle area is a sensitive parameter and the concentration of toxic gases in the control room can exceed the IDLH level for certain larger puddle areas. The applicant must provide a justification for the assumed maximum puddle area of 31,400 square meters and why it is appropriately conservative; and update various chapters of the FSAR as appropriate. The staff, additionally, requests a description of the analysis methodology used by the applicant to assess the chemicals where the quantities exceeded ALOHA's 220 metric-ton limit on liquid spills.

RESPONSE:

This response addresses each of the identified issues where a response was requested, as follows:

- Section 1.0 provides a description of the analysis methodology used to assess the quantities of postulated chemical releases that exceed 220 metric tons.
- Section 2.0 explains the basis for the puddle size selections. For some cases, a puddle size of 31,400 square meters—the maximum puddle size allowable in ALOHA—was used because, when considering site conditions, the formation of any postulated puddle, either actual or assumed for conservatism, would not exceed an area of 31,400 square meters (diameter of 656 feet).

- Section 3.0 provides further justification for the actual or assumed maximum puddle areas that were utilized for each of the five postulated scenarios identified in the RAI, including the basis for any assumptions and why these assumptions are appropriately conservative.

It is expected that this will resolve the differences between the FSAR and confirmatory calculations.

1.0 Analysis Methodology For Large Spill Quantities (Greater Than 220 Metric Tons)

The ALOHA software does allow the input of the identified maximum quantity of spilled liquid in each postulated scenario. In some instances, when the STP Units 3 & 4 toxic gas concentration analyses were performed, quantities expressed in mass units (e.g., 9,999,999 pounds or 4,536 metric-tons) were first converted to a quantity expressed as a volume (e.g., cubic meters or gallons) for entry into the program. Thus, no limitations on spill quantities were experienced with use of the ALOHA program.

Additionally, when dealing with large volumes, such as those presented in the sensitivity analysis, a line source release such as that modeled in ALOHA allows for a more realistic scenario versus a point source release modeled in programs such as HABIT.

2.0 Puddle Sizes in the Postulated Scenarios Would Not Exceed 31,400 Square Meters

An important input to the calculations for the toxic gas concentration values in the FSAR is an evaluation to determine a conservative puddle size for each of the scenarios—this would include consideration of the site topography and other confining elements. Further justification is provided in Section 3.0 regarding this evaluation which includes identification of the natural boundaries or other confining elements, such as river banks for water spills or containment berms for chemical storage tanks.

As detailed in Section 3.0, in each of the five postulated scenarios, when consideration is given to the natural or constructed boundaries, an appropriate puddle size diameter assumption for each of the postulated scenarios would yield a puddle area less than 31,400 square meters. Whether the actual puddle size was used, or a larger value assumed for conservatism, none of the control room toxic gas concentrations for these chemicals exceeded the determined toxicity limits for the control room. Section 3.0 below addresses the specific assumptions and methodology regarding puddle size and provides justification as to why they are appropriately conservative.

3.0 Justification For the Assumptions and Methodology For Each Postulated Scenario

The RAI identifies five postulated scenarios where the NRC's confirmatory calculations resulted in values that were higher than FSAR values and exceeded the identified toxicity limit in the control room for that scenario. Further justification is provided for the puddle sizes used for each of the chemicals, including those where the maximum value allowed by the ALOHA software was used, and an explanation of why these assumed values are appropriately conservative. It is expected that this explanation and justification will resolve the differences between the values in the FSAR and the confirmatory calculations.

3.1 Acetic Acid (Water Transport)

The postulated scenario involves the release of 500,000 gallons of acetic acid during river transport of the chemical. The analysis assumed a puddle size of 31,400 square meters, equating to a puddle diameter of 656 feet. In addition, because of the specific gravity of acetic acid, it was conservatively assumed that the spill occurred on land.

3.1.1 Justification of Puddle Size

Specific Gravity of Acetic Acid

The United States Coast Guard (USCG) provides information concerning releases of chemicals into waterways in its Hazard Assessment Handbook by determining their hazard calculation codes. Regarding acetic acid, the USCG lists acetic acid as having a hazard assessment code "APQ", which has the following properties:

- Soluble in water
- Liquid at ambient temperature
- Boiling temperature greater than ambient

Given these characteristics and because acetic acid has a specific gravity greater than one (1.051), the USCG handbook (Reference 1) states that most of the toxic chemical will dissolve in the water and sink. This conclusion is further supported by the ALOHA analysis. As detailed in RAI 06.04-1 Supplement 1, in order to analyze acetic acid, a conservative assumption was made that the chemical spilled onto the ground rather than into the waterway—as ALOHA provides a warning that acetic acid would sink, and therefore evaporation can not be calculated.

Confining Elements—River Banks

Based on using a conservative assumption that acetic acid would spill on a dry river bed, the river banks were considered as the confining element. When defining a puddle diameter consideration of the topography or other confining elements (such as berms) should be accounted for—especially for releases of this magnitude where large radii of the spilled chemicals would not be plausible. In this instance—where the spill occurs on the Colorado River—the banks would act as berms on each side. The Colorado River is approximately 225 to 300 feet wide at the nearest point of approach to STP Units 3 & 4. Thus, a diameter of 656 feet is conservative for this scenario.

3.1.2 Summary—Acetic Acid (Water Transport)

Assuming a puddle size area of 31,400 square meters (puddle diameter of 656 feet) is conservative for this postulated scenario because:

- Since acetic acid has a specific gravity greater than one (1.051), most of the toxic chemical will dissolve in the water and sink, thus, assuming a puddle size of this dimension along with the assumption that the spill occurs on the land, is conservative.
- The Colorado River is approximately 225 to 300 feet wide at the nearest point of approach to STP Units 3 & 4. Thus, a diameter of 656 feet is conservative for this scenario.

Therefore, the resulting analysis for a spill of approximately 500,000 gallons of acetic acid on land with a puddle diameter of 656 feet is conservative for this postulated scenario. As indicated, this analysis confirmed that a toxic gas concentration in the control room would not exceed the determined toxicity limit for this chemical.

3.2 Gasoline (Water Transport)

The postulated scenario involves the release of 1,680,000 gallons of gasoline during river transport of the chemical. The analysis assumed a puddle size of 31,400 square meters, equating to a puddle diameter of 656 feet.

3.2.1 Justification of Puddle Size

Confining Elements—River Banks

When defining a puddle diameter consideration of the topography or other confining elements (such as berms) should be accounted for—especially for releases of this magnitude where large radii of the spilled chemicals would not be plausible. In this instance—where the spill occurs on the Colorado River—the banks would act as berms on each side. The Colorado River is approximately 225 to 300 feet wide at the nearest point of approach to STP Units 3 & 4. Thus, a diameter of 656 feet is conservative for this scenario.

Dispersion of Spill Over a Large Area—Spill Length

The USCG handbook (Reference 1) defines a recommended hazards approach for chemicals, such as gasoline, that are instantaneously spilled into a narrow water body. It indicates that instantaneous spills occurring on a narrow flowing water body can be expected to form a circular pool which will grow until it reaches the confining banks. Thereafter, the spill will continue to grow along the water body until it reaches a maximum length. The river banks will act as a confining element in one direction and the length of the spill can be calculated using the methodology presented in the USCG's Hazard Assessment Handbook. (Reference 1)

For a gasoline spill of 1,680,000 gallons, the calculated length of the spill would be 66,442.4 feet or 10.9 nautical miles (12.5 miles) downstream, assuming an average water

body width of 250 feet. Thus, the chemical would disperse over such a large area and result in a thin spill thickness size of 1 cm (or less as determined by the USCG handbook). (Reference 1)

3.2.2 Summary

Assuming a puddle size area of 31,400 square meters (puddle diameter of 656 feet) is conservative for this postulated scenario because:

- The Colorado River is approximately 225 to 300 feet wide at the nearest point of approach to STP Units 3 & 4. Thus, a diameter of 656 feet is conservative for this scenario.
- If a spill occurred over such a large area to account for a thin spill size of 1 cm (or less as determined by the USCG handbook), the chemical would spread and disperse over a large area. Thus, the puddle endpoints would be farther away from the point of concern (STP Units 3 & 4 control rooms).

Therefore, the resulting analysis for a spill of approximately 1,680,000 gallons of gasoline with a puddle diameter of 656 feet is conservative for this postulated scenario. As indicated, this analysis confirmed that a toxic gas concentration in the control room would not exceed the determined toxicity limit for this chemical.

3.3 Sodium Hypochlorite (Onsite Storage)

Sodium hypochlorite is stored onsite at STP Units 1 & 2 in a 7,200 gallon cooling water intake sodium hypochlorite tank, located 2,559 feet from the nearest control room for STP Units 3 & 4. Assuming a puddle size area of 2,725.5 square meters is conservative for this postulated scenario because:

- No chemical berm was assumed, so the total volume of the tank, 7,200 gallons, is assumed to flow into a circular puddle 1 cm thick.
- A thickness of 1 cm is assumed, thus the analyzed puddle area, 2,725.5 square meters, is less than 31,400 square meters.

On the basis of these assumptions, the calculated control room toxic gas concentration will be less that the determined toxicity limit for this chemical.

3.4 1-Hexene (Offsite Storage)

The analyzed chemical, 1-hexene, is stored in a tank at the nearby OXEA industrial site surrounded by a berm. Thus, in order to account for confining elements, the puddle area was limited by the area of the berm.

A puddle size area of 10,800 square feet is appropriate, because the chemical berm was considered when determining the puddle size for this analysis. (The 1-hexene tank is surrounded by a berm with dimensions of 120 feet by 90 feet by 40 inches high—10,800 square feet.) This puddle size is less than 31,400 square meters.

On the basis of this input, the calculated control room toxic gas concentration will be less that the determined toxicity limit for this chemical.

3.5 Acetic Acid (Offsite Storage)

Acetic Acid is stored at the OXEA plant, 22,841 feet (4.32 miles) from the nearest control room for STP Units 3 & 4. The analysis assumed the release of 9,999,999 pounds of acetic acid. A spill area of 31,400 square meters (or a spill diameter of 656 feet) was assumed.

Assuming a puddle size area of 31,400 square meters is conservative for this postulated scenario because:

- The quantity of the release is based on the release of 9,999,999 pounds of acetic acid. This quantity was obtained from the plant's 2005 SARA Title III, Tier II reports which reported the maximum quantity as a range of 1,000,000 to 9,999,999 pounds. For conservatism, the upper value of the range, 9,999,999 pounds, was analyzed.
- The plant's Risk Management Program (RMP) database information for OXEA/Celanese indicates that chemical storage is located in tank farm areas with secondary containment sufficient to handle spills. (Reference 2) Aerial imagery confirms tank farm areas are grouped in areas smaller than a 656 ft radius.

When considering site conditions such as confining elements (e.g., secondary containment structures), a spill area of 31,400 square meters (or a spill diameter of 656 feet) was assumed for conservatism. As indicated, this analysis confirmed that a toxic gas concentration in the control room would not exceed the determined toxicity limit for this chemical.

3.6 Overall Summary

- The ALOHA software allowed the input of the identified maximum quantities of spilled liquid for each postulated chemical spill scenario. In some instances quantities expressed in mass units were first converted to a volume quantity for entry into the program. Thus, no limitations on spill quantities were experienced with use of the ALOHA program for each of the identified postulated scenarios.
- For each of the five postulated scenarios, when consideration is given to the natural or constructed boundaries, an appropriate puddle size diameter assumption for each of the postulated scenarios would yield a circular puddle area less than 31,400 square meters. Whether the actual puddle size was used, or a larger value assumed for conservatism, none of the control room toxic gas concentrations for these chemicals exceeded the determined toxicity limits for the control room.

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

References:

1. Department of Transportation, United States Coast Guard, *CHRIS: Hazard Assessment Handbook,* December 12, 1977.

2. Risk Management Plan, *Right-to-Know Network Database*, available at: http://www.rtknet.org/db/rmp/rmp.php?combined_name=celanese&datype=T&reptype=f&detail=4&submit=GO , accessed March 1, 2010.

3. U.S. EPA and NOAA, ALOHA® User's Manual, February 2007.