## PMSummerColpEM Resource

**From:** Steve Pope [spope@islinc.com]
**Sent:** Monday, December 15, 2008 1:56 PM
**To:** Angelo Stubbs; SummerCOL Resource; David Shum
**Cc:** Greg Hofer
**Subject:** Fwd: RE: VC Summer  Phase I Review (Task Order 44) SRP 3.5.1.4
**Attachments:** Summer_TER_3.5.1.4_DRAFT.doc

FYI - info to the hearing file.  This is an interim work product and not ISL's deliverable at this stage.

Steve

X-Orig-To: spope@islinc.com
X-Virus-Scanned: OK, w
X-Spam-Flag: NO
X-Spam-Score: 0
X-Spam-Level:
X-Spam-Status: No, score=x tagged_above=-100 required=6 WHITELISTED tests=[]
X-Originating-Ip: [65.55.34.84]
From: Greg Hofer <gghofer@hotmail.com>
To: <spope@islinc.com>
CC: Abe-WORK Zeitoun <azeitoun@scainc.com>
Subject: RE: VC Summer  Phase I Review (Task Order 44) SRP 3.5.1.4
Date: Thu, 11 Dec 2008 22:59:49 -0500
Importance: Normal
X-OriginalArrivalTime: 12 Dec 2008 03:59:49.0803 (UTC) FILETIME=[1461EFB0:01C95C0E]

Hi Steve,

I uploaded the Draft TER to the website as requested and I've also attached it to this email.

Please be aware that since TER Subsection 3.5.1.4 is a part of TER Section 3.5.1, the write-up was formatted to be inserted into the developed Summer TER Section 3.5.1.  The Bellefonte TER Section 3.5.1 was used as the template, and except for the inserted material, Draft TER should not be considered accurate.  Text that was deleted from the template is shown in Bold Red Double Strikethrough.  Text that was added to the template is shown in Bold Blue Double Underline.

Please take a look at the draft and let me know if you need any changes.

Greg

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Date: Tue, 9 Dec 2008 09:12:55 -0500
To: gghofer@hotmail.com
From: spope@islinc.com
Subject: RE: VC Summer Phase I Review (Task Order 44) SRP 3.5.1.4
CC: azeitoun@scainc.com

Great, thanks, Greg.

Steve

At 09:02 AM 12/9/2008, Greg Hofer wrote:

> Hi Steve,
>
> I had started developing the TER for 3.5.1.4, but I was waiting for David's comments. I will have it done later this week.
>
> Greg

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> Date: Tue, 9 Dec 2008 08:38:19 -0500
> To: gghofer@hotmail.com
> From: spope@islinc.com
> Subject: Fwd: RE: VC Summer Phase I Review (Task Order 44) SRP 3.5.1.4
> CC: azeitoun@scainc.com
>
> Greg: Have you developed the DRAFT TER as well? That should go with the RAI; you don't have to resend the RAI to anyone at this stage; I will forward the TER and RAI in one package. You should have the Chapter 3 SER template to develop the DRAFT TER input for 3.5.1.4 (I sent to you in October). Please upload your product to the following folder: http://spot.infosyslabs.com:8081/sites/NewReactorsTO6_BOP_Lee/default.aspx under the Document Library in the folder Summer Phase I PSER Inputs.
>
> Let me know if you have any questions.
>
> Also, please review Rev. 17 of the DCD for any changes to the SCOL Section 3.5.1.4. You can find that at this link:
>
> http://spot.infosyslabs.com:8081/sites/NewReactorsGeneralInformation/default.aspx under the Document Library in the AP1000 subfolders.
>
> Thanks.
>
> Steve
>
> X-Orig-To: spope@islinc.com
> X-Virus-Scanned: OK, w
> X-Spam-Flag: NO
> X-Spam-Score: 0
> X-Spam-Level:
> X-Spam-Status: No, score=0 tagged_above=-100 required=6 WHITELISTED
> tests=[none]
> X-Originating-Ip: [148.184.176.41]
> X-IronPort-AV: E=Sophos;i="4.33,740,1220241600";
> d="scan'208,217";a="33531647"
> From: David Shum <David.Shum@nrc.gov>
> To: Greg Hofer <gghofer@hotmail.com>
> CC: "spope@islinc.com" <spope@islinc.com>, Abe-WORK Zeitoun

<azeitoun@scainc.com>, Angelo Stubbs <Angelo.Stubbs@nrc.gov>
Date: Tue, 9 Dec 2008 06:59:38 -0500
Subject: RE: VC Summer  Phase I Review (Task Order 44) SRP 3.5.1.4
Thread-Topic: VC Summer  Phase I Review (Task Order 44) SRP 3.5.1.4
Thread-Index: AclGx7x2J8SpejQKScmpkSZuJ5zlDQTLW7lw
Accept-Language: en-US
X-MS-Has-Attach:
X-MS-TNEF-Correlator:
acceptlanguage: en-US

Greg:  I've reviewed your draft RAI for VC Summer Phase I Review (Task Order 44) SRP 3.5.1.4.  It looks OK to me.  Please go ahead and submit it.  Thanks !  David

From: Greg Hofer [mailto:gghofer@hotmail.com]
Sent: Friday, November 14, 2008 9:13 PM
To: David Shum
Cc: spope@islinc.com; Abe-WORK Zeitoun; Angelo Stubbs
Subject: VC Summer Phase I Review (Task Order 44) SRP 3.5.1.4

Hi Mr. Shum,
Please find attached my draft RAI.
This is a MS Word file.
Yours truly,
Greg Hofer



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**Hearing Identifier:** VCSummer_COL_Public
**Email Number:** 87

**Mail Envelope Properties** (6.0.0.22.2.20081215135424.0420b360)

**Subject:** Fwd: RE: VC Summer Phase I Review (Task Order 44) SRP 3.5.1.4
**Sent Date:** 12/15/2008 1:56:23 PM
**Received Date:** 12/15/2008 1:56:34 PM
**From:** Steve Pope

**Created By:** spope@islinc.com

**Recipients:**
"Greg Hofer" <gghofer@hotmail.com>
Tracking Status: None
"Angelo Stubbs" <Angelo.Stubbs@nrc.gov>
Tracking Status: None
"SummerCOL Resource" <SummerCOL.Resource@nrc.gov>
Tracking Status: None
"David Shum" <David.Shum@nrc.gov>
Tracking Status: None

**Post Office:** pop.islinc.com

| **Files** | **Size** | **Date & Time** |
|---|---|---|
| MESSAGE | 5349 | 12/15/2008 1:56:34 PM |
| Summer_TER_3.5.1.4_DRAFT.doc | 114752 | |

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

**Since TER Subsection 3.5.1.4 is a part of TER Section 3.5.1, this write-up was formatted to be inserted into the developed Summer TER Section 3.5.1. The Bellefonte TER Section 3.5.1 was used as the template, and except for the inserted material, TER below should not be considered accurate. Text that was deleted from the template is shown in ~~Bold Red Double Strikethrough~~. Text that was added to the template is shown in Bold Blue Double Underline.**

3.5.1 MISSILE SELECTION AND DESCRIPTION

3.5.1.1Introduction

SSCs important to safety are protected against internally generated missiles (outside containment), in accordance with Section 3.5.1.1 of the SRP. The missiles generated outside containment by rotating or pressurized (high-energy fluid system) equipment are included.

The design credits only safety-related systems to establish and maintain safe-shutdown conditions. The safety-related systems and components needed to bring the plant to safe shutdown, including the main control room and the recirculating service water system, are located inside the containment shield building and the auxiliary building. Both buildings are seismic Category I nuclear island structures having thick structural concrete walls that provide internal and external missile protection. No non-safety-related systems or components that require protection from missiles are housed in these buildings.

All SSCs that are necessary to perform safety functions are to be protected against damage from the following:

- Internally generated missiles (outside containment)
- Internally generated missiles (inside containment)
- Turbine missiles
- Missiles generated by tornadoes and extreme winds
- Site proximity missiles (except aircraft)
- Aircraft hazards

3.5.1.2 Summary of Application

In the Summer COL FSAR Section 3.5, “Missile Protection,” the applicant incorporated by reference Section 3.5, “Missile Protection,” of the AP1000 DCD, Revision 16 without any departures. Section 3.5 of the DCD includes Subsection 3.5.1, “Missile Selection and Description,” which addresses Subsections 3.5.1.1, “Internally Generated Missiles (Outside Containment),” 3.5.1.2, “Internally Generated Missiles (Inside Containment),” 3.5.1.3,”Turbine Missiles,” ~~3.5.1.4, “Missiles Generated by Natural Phenomena,”~~ 3.5.1.5,” Missiles Generated by Events Near the Site,” and 3.5.1.6, “Aircraft Hazards.” The corresponding SRP Sections include Sections 3.5.1.1, “Internally Generated Missiles (Outside Containment),” 3.5.1.2, “Internally Generated Missiles (Inside Containment),” 3.5.1.3,”Turbine Missiles,” 3.5.1.4, “Missiles Generated by Tornadoes and Extreme Winds,” 3.5.1.5,” Site Proximity Missiles (Except Aircraft),” and 3.5.1.6, “Aircraft Hazards.”

In addition, in FSAR Section 3.5, the applicant provided the following standard supplemental information items in Subsection 3.5.1.3, “Turbine Missiles”:

- COL information item STD SUP 3.5-1 states that the potential for a turbine missile from another AP1000 plant in close proximity has been considered for the Summer Nuclear Plant Units 3 & 4, in accordance with RG 1.115.

- COL information item STD SUP 3.5-2, states that the turbine system maintenance and inspection program is discussed in Subsection 10.2.3.6.

Also, in FSAR Section 3.5, the applicant provided the following site specific information items to resolve COL information item 3.5-1 (COL action item 3.5.1.5-1):

- COL information item VCS COL 3.5-1 in FSAR Subsection 3.5.1.5, “Missile Generated by Events Near the Site,” states that the missiles generated by events near the site are evaluated in Subsection 2.2.3. Based on the criteria of 10-6 occurrences per year in the DCD Section 2.2, the applicant concludes that no changes to the AP1000 design are required for an external accident leading to severe consequences.

- COL information item VCS COL 3.5-1 in FSAR Subsection 3.5.1.6, “Aircraft Hazards,” states that based on the discussion in this section, the applicant concludes that the aircraft crash hazard probability can be qualitatively shown to be much lower than the calculated value. Therefore, the aircraft hazards pose no undue risk to the health and safety of the public.

[**NOTE TO THE REVIEWER:** COL information item 3.5-1 (COL action item 3.5.1.5-1) has also been partially addressed in TR 05, APP-GW-GLR-020, “Wind and Tornado Site Interface Criteria,” Rev. 2 and the applicable changes are incorporated into the DCD, Revision 16.]

**Finally in FSAR Section 3.5.1.4, “Missiles Generated by Natural Phenomena,” the applicant incorporated by reference Section 3.5.1.4 of AP1000 DCD, Revision 16 (17?) with the following supplemental information VCS SUP 5.5-2) appended to the end DCD Section 3.5.1.4:**

> **“A postulated automobile tornado missile impact above the height of 30 feet above grade on the nuclear island was evaluated. It was determined that the nuclear island structural integrity is maintained. The structural shear stress caused by this postulated automobile impact with a horizontal velocity of 105 mph or vertical velocity of 74 mph is within the allowable stress of 112.8 psi. All ductility factors are below 10, which is the acceptable limit, with the largest being approximately 2.6.”**
>
> **“Based on this evaluation, the massive high-kinetic energy missile (4000 pound automobile) identified in DCD Subsection 3.5.1.4 is not limited to 30 feet above site grade elevation. This evaluation conforms to the guidance of Regulatory Guide 1.76, Revision 1, ‘Design-Basis Tornado and Tornado Missiles for Nuclear Power Plants.’”**

**Based on this supplemental information, the NRC staff requests the following:**

**RAI [3.5.1.4-1]**

**In Section 3.5.1.4 (VCS SUP 3.5-2), the applicant states that a postulated automobile missile is considered for all elevations of Summer Units 2 and 3 facilities and not just limited to elevations up to and including 30 feet above grade. Since this is a change from the standard AP-1000 DCD, please provide the following information:**

- **Identify all structures, systems, and components (SSCs) that are located on the exterior of the facilities (i.e., intakes, exhausts, vents, valves, piping, etc.) that are higher than 30 feet above grade and require tornado missile protection.**

- **Provide the location of these SSCs by building, elevation and General Arrangement Drawing.**

- **Delineate how these SSCs will be further protected against the postulated impact of a postulated automobile missile, without impairing the safety-related functions of these SSCs.**

- **Since this additional tornado missile protection has the potential of causing additional static and dynamic loads during a postulated seismic event, please provide a preliminary assessment on how these additional loads affect the seismic integrity of the facilities.**

3.5.1.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is documented in Section 3.5 of NUREG-1793, "Final Safety Evaluation Report Related to Certification of the AP1000 Standard Design," September 2004. (Regulatory basis of the subsequent change will be documented in NUREG-1793, Supplement [insert supplement #]).

In addition, the regulatory basis for acceptance of the COL information addressing COL information item 3.5-1 (COL action item 3.5.1.5-1) is established on the development of site-specific parameters and verification of bounding conditions to the DCD interface criteria for missile generation, site arrangement, and building construction. The design of AP1000 safety-related structures for protection against missiles using acceptable procedures meets the requirements of GDC 2.

Other acceptance criteria are based on the guidance provided in the following RGs:

RG 1.76 on design-basis tornado and tornado missiles for nuclear power plants.
RG 1.91 on evaluation of explosions postulated to occur on transportation routes near nuclear power plants.
RG 1.115 on protection against low trajectory turbine missiles, Sections C.1 and C.3.
RG 1.117 on tornado design classification, Position C.1 through C.3.

3.5.1.4 Technical Evaluation

The NRC staff reviewed conformance of Section 3.5 of the Summer COL FSAR to the guidance in RG 1.206, Section C.III.1, Chapter 3, C.I.3.5.1, "Missile Selection and Description." The NRC staff's review of Section 3.5 of the Summer COL FSAR finds that the applicant appropriately incorporates by reference Section 3.5 of the AP1000 DCD, Rev. 16. [Section 3.5 of the AP1000 DCD was revised in Revision 16 and is being reviewed by the staff under docket number 52-006. The NRC staff's technical evaluation of the information incorporated by reference related to missile protection of safety related SSCs will be documented in Section 3.5.1 of a supplement to NUREG-1793.]

The staff review of this application is limited to the following:

- STD SUP 3.5-1 and STD SUP 3.5-2 addressing the design of safety related SSCs from turbine missiles.
- VCS COL 3.5-1 (COL Action Item 3.5.1.5-1) addressing missiles generated by events near the site including aircraft hazards.
- **Resolution of RAI [3.5.1.4-1] addressing the additional tornado missile protection of SSCs located above 30 feet above grade.**

COL Standard Information Items

COL standard information items STD SUP 3.5-1 and STD SUP 3.5-2 address turbine missiles in Section 3.5.1.3 of the FSAR.

COL standard information STD COL 3.5-1 and STD COL 3.5-2 involve plant specific missiles generated by turbines at Summer Nuclear Plant Unit 3 & 4.

The NRC staff reviewed the COL information items STD COL 3.5-1 and STD COL 3.5-2 related to turbine missiles included under Section 3.5.1.4 of the Summer COL.

[Insert technical review material]

COL Information Item

COL information item 3.5-1 (COL action item 3.5.1.5-1) addresses missiles generated by events near the site including aircraft hazards included in Sections 3.5.1.5 and 3.5.1.6 of the FSAR.

The applicant provided additional information in VCS COL 3.5-1 to resolve COL information item 3.5-1. COL Information Item 3.5-1 has been partially addressed in TR 05, APP-GW-GLR-020, "Wind and Tornado Site Interface Criteria," Rev. 2 and the applicable changes are incorporated into the DCD, R16. The work that has been done is summarized in the following paragraph:

> Technical Report APP-GW-GLR-020 includes evaluation of generic wind and tornado loadings on structures, discussion of missiles generated by tornadoes and extreme winds, and evaluation of other buildings for collapse and missile generation.

The information item activities completion activities required of the Combined License applicant are defined in APP-GW-GLR-020. These activities include development of site-specific parameters and verification of bounding conditions, site arrangement, and building construction. Completion of these activities by the Combined License applicant will complete the information item.

The commitment was also captured as COL Action Item 3.5.1.5-1 in Appendix F of the NRC staff's FSER for the AP1000 DCD (NUREG-1793), which states:

> The COL applicant will provide site-specific information that the site is protected against those external events that produce missiles that are more energetic than the tornado missiles postulated for design of the AP1000 reactor, or additional analyses of the AP1000 capability to protect against the specific hazard.

In FSAR Section 3.5, the applicant provided the following site specific information items to resolve COL information item 3.5-1 (COL action item 3.5.1.5-1):

- COL information item VCS COL 3.5-1 in FSAR Subsection 3.5.1.5, "Missile Generated by Events Near the Site," states that the missiles generated by events near the site are evaluated in Subsection 2.2.3. Based on the criteria of 10-6 occurrences per year in the DCD Section 2.2, the applicant concludes that no changes to the AP1000 design are required for an external accident leading to severe consequences.

- COL information item VCS COL 3.5-1 in FSAR Subsection 3.5.1.6, "Aircraft Hazards," states that based on the discussion in this section, the applicant concludes that the aircraft crash hazard probability can be qualitatively shown to be much lower than the calculated value. Therefore, the aircraft hazards pose no undue risk to the health and safety of the public.

The NRC staff reviewed the COL information item VCS COL 3.5-1 related to missiles generated by events near the site included under Sections 3.5.1.5 and 3.5.1.6 of the Summer COL.

[Insert technical review material]

3.5.1.5 Post Combined License Activities

At the conclusion of the review, this section will identify any applicable COL holder activities or follow-up actions for the NRC staff.

3.5.1.6 Conclusion

**With the exception of the information needed to resolve RAI [3.5.1.4-1], the** ~~**The**~~ NRC staff concludes that the information pertaining to Summer COL FSAR Section 3.5.1 is within the scope of the design certification and adequately incorporates by reference Section 3.5.1, "Missile Selection and Description," of the AP1000 DCD, and is thus acceptable. In addition, the staff has compared the additional COL information within the application to the relevant NRC regulations, acceptance criteria defined in NUREG-0800, Section 3.5.1, and other NRC regulatory guides and concludes that the applicant is in compliance with the NRC regulations. COL information items STD SUP 3.5-1, STD SUP 3.5-2, and VCS COL 3.5-1 involving design of safety related SSCs from turbine missiles and those generated by events near the site are adequately addressed by the applicant and can be considered closed. In conclusion, **with the exception of the information needed to**

**resolve RAI [3.5.1.4-1],** the applicant has provided sufficient information for satisfying [applicable regulations]. Conformance with these guidelines provides an acceptable basis for satisfying, in part, the requirements of GDC 2.