Miller, Ed

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Sent: Friday, February 10, 2012 9:53 AM
To: Miller, Ed
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Subject: Flooding Evaluation Man Hour Estimate
Attachments: SECY Item 2 1 and 2 3 Manhour Estimates Revision 2.xls

Ed;

The Flooding Task Force man hour estimates for walkdowns, evaluations, and integrated assessment are attached for your information. The following provides a context for the estimates.

- The Flooding Task Force developed these estimates based on experience and vendor input. The task force is comprised of senior engineers and engineering managers from around 15 utilities. They have extensive experience in engineering analysis and walkdowns. A few of the task force members have also done or managed flood evaluations. The estimates have gone through several rounds of comment and revision by task force members.
- The vendor manhour estimates for evaluations were based on input from vendors who have done these evaluations for COLs and some existing plants. The task force was briefed by 4 vendors during one of our meetings in January and subsequently received manhour estimates from 3 of them. The high and low values from this vendor input were used to create the spreadsheet.
- The estimates for the vendor flood evaluations for the different types of sites were developed by assuming that the sites needed the following types of evaluations:
    - Complex sites (two flood hazards): research + PMP + river flood + surge/seiche + tsunami + ice effect + wave runup
    - River sites with dams: research + PMP + river flood + dam failure + ice effect + wave runup
    - River sites with no dams: research + PMP + river flood ice effect
    - Coastal sites: research + PMP + surge/seiche + tsunami + wave runup
    - Lake sites: research + PMP + surge/seiche + wave runup
    - Land bound sites: research + PMP
    - Sites with COL docketed: research (and gap analysis) + PMP
- The flood evaluations will need significant utility support and processing as detailed in the spreadsheet
- Since we have not written the integrated analysis guidance yet, we made this estimate based on what we believe the guidance will address and related work will entail.

We believe that the estimates are representative of the level of effort that will be required. Note in particular the estimate for vendor work on flood evaluations (approximately 1.5 to 4.5 man years for the average evaluation); this will be a particular challenge due to the limited resources for this kind of work.

Thanks for taking our input.

Jim Riley

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Walkdown Manhour Estimate

Flood walkdown scope activities	Number of personnel assigned	Number of weeks for the task	Number of hours per week	Man hours totals	Man hours totals -15 %	Man hours totals +15%	Calendar Days
Station - Develop Guidance and Training	2	6.0	40	480	408	552	42.0
Station - Review of BD / Develop Scope	2	6.0	40	480	408	552	42.0
Station - Build Scaffold (assume 10)	4	2.0	40	320	272	368	
Station Open/reseal Cable chase Manhole covers (assume 20)	2	4.0	40	320	272	368	
Station - Complete and Document Required Training	5	1.0	40	200	170	230	7.0
Station Perform Walkdown	4	8.0	40	1280	1088	1472	56.0
Station - Results Review and Disposition	2	8.0	40	640	544	736	56.0
Station - Prepare and Approve Response	2	8.0	40	640	544	736	56.0
							total days
							259.0
							man/years
Total estimated resources for a 2 unit site (the units are identical)				4360	3706	5014	2.1
Total estimated resources for a single unit site would be 70% of the effort of a 2 unit site				3052	2594	3510	1.5
Total estimated resources for a 3 unit site would be 130% of the effort of a 2 unit site				5668	4818	6518	2.7
Total estimated resources for a 2 unit site (the units are significantly different from each other). 2 times single unit site				6104	5188	7020	2.9
Number of single unit sites	28						
Number of 2 unit sites	31						
Number of significantly different 2 unit sites	2						
Number 0f 3 unit sites	3						
				Avg	Low	High	
Industry average flood walkdown effort per site				**3904**	**3318**	**4489**	

Evaluation Manhour Estimate

Vendors

Flood Evaluation Vendor activities	Low estimate	High Estimate	Average
Site walkdown and research	200	500	350
Local precipitation (PMP)	1000	1600	1300
River flood (PMF)	1000	5000	3000
Dam failure	600	2000	1300
Ice effect	200	1500	850
Surge and seiche	400	2500	1450
Tsunami	200	3500	1850
Wave run-up	1000	2000	1500
Sites with COL Docketed	1200	2100	1650
Complicated sites (on coast or lake with nearby river)	4000	16600	10300
River site with dams	4000	12600	8300
River site with no dams	2400	8600	5500
Coastal site	2800	10100	6450
Lake site	2600	6600	4600
Land bound site	1200	2100	1650
Number of sites with COL Docketed	11		
Combined hazard complicated sites	6		
Number of river sites with dams	20		
Number of river sites without dams	8		
Number of coastal sites	9		
Number of lake sites	9		
Number of land bound sites	1		
	Low	High	Avg
Industry avg man hrs for vendor flood eval effort per site	**2909**	**9311**	**6110**

Utilities

Flood Evaluation Utility Activities
Compile Design Basis Flood Data/Information - Review of Vendor Products

Activity	Man-Hour Range	Man-hour Low	Man-Hour High
1. Collect current FSAR and any past updates a. Review applicable Regulatory Guides	20	20	20
2. Review flood evaluation sections of FSAR: a. Section 2.4, other as appropriate b. Determine from item a. what calculations should be made to support flood analysis	24	24	24
3. Collect supporting calculations: a. All supporting calculations available/ or what is missing b. Determine if calculations meet current QA requirements.	16 - 80	16	80
4. Evaluate what additional work is needed from vendor: a. All calculations have to be updated - non-QA b. Analysis that were not done for the licensing basis c. Develop list of work elements that will be required. d. Develop RFP to define work for vendor bid	40 - 160	40	160
5. Bidding process: a. Pre-bid meeting to define work b. Establish critiera for vendor selection c. Review of bids and selection	48 - 120	48	120
	Total	148	404
Owner Calcuation Review (1 Calculation) 1. Review of individual calculation for completeness, consistent with QA requirements, and technical content. 2. Prepare list of comments/questions for resolution by vendor 3. Follow-up review of calculations for comment resolution 4. Complete calcuation internal sign-off as required by QA requirements.	32 - 48/calc		
Estimated Calcuations/Flood Analysis (20 - 70) Low End 10 Calc/Study	320 - 480	320	480

High End 70 Calc/Study	2240 - 3360	2240	3360
Calculations are assumed to be broken into smaller pieces for review: e.g., Unit hydrographs, inflows, storm selection, dam rating curves, model calibrations, and PMF/PMH etc. are all separate calculations; Note: High end is based on TVA re-evaluations. TVA sites have 70 total calculations but since on the same river system, many of the calculations are shared between the 3 operating sites.			
Alternately, use 30% of the vendor effort		873	2793
Write response to 50.54(f) letter		320	640

Industry average flood evaluation effort per site: (some sites could be considerably higher)		Low	High	Average
	Utility manhrs	1341	3837	2589
	Vendor manhrs	2909	9311	6110

Integrated Assessment

Flooding Hazards Vulnerabilities evaluation - Utilizing Integrated Assessment Guidance	Number of personnel assigned	Number of weeks for the task	Number of hours per week	Man hours totals	Man hours totals -30 %	Man hours totals +50%
Evaluate and document operability and reportabiity issues that arise during analysis using current day acceptance criteria (Assume 6 issues require 2 people for 2 weeks each)	2	12.0	40	960	672	1440
Identify and screen for feasibility, modifications to protect plant equipment to a new PMF design basis level using Integrated Assessment strategy	2	12.0	40	960	672	1440
Perform scoping analysis of selected prevention modifications to develop +/- 50% cost estimates	5	16.0	40	3200	2720	4800
Identify and screen for feasibility, modifications to mitigate the consequeces a new PMF design basis level Integrated Assessment strategy	2	12.0	40	960	816	1440
Perform scoping analysis of selected mitigation modifications to develop +/- 50% cost estimates	5	16.0	40	3200	2720	4800
Select strategy for protection and mitigation of the PMF design basis	3	8.0	40	960	816	1440
Develop Integrated Assessment strategy with Protection and Mitigation of PMP event	3	4.0	40	480	408	720
Obtain approval of strategy	2	4.0	40	320	272	480
Prepare and Approve Response	2	4.0	40	320	272	480
Total estimated resources for a site requiring protection and mitigation				**11360**	**9368**	**17040**
Total estimated resources for a site requiring protection				**6960**	**5628**	**10440**

Industry average integrated assessment effort per site assuming even split between protection only and protection and mitigation	9160