



BRD Ballot Update


API RBI User Group

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Status Summary

- Documentation Status (API 581):
 - Part 1 Overview of Risk – Draft for ballot 4th Qtr. 2006
 - + Part 1, Annex A - Details of PRD
 - Part 2 POF – Ballot due date August 2006
 - + Part 2, Annex A - Management Score audit tool
 - + Part 2, Annex B - Corrosion rate determination
 - Part 3 COF – Ballot due date August 2006
 - + Part 3, Annex A - Detailed background of Level 1 and Level 2 consequence modeler
 - Target API 581 release 2nd Qtr. 2007
- Third Party Review of Consequence modeler
 - Review is complete and draft conclusions received
 - Final report and recommendations due in late Fall

API 581 Ballot Status

- Part 2 Consensus (12-3-0-12)

Total Responses:	15
Total Ballots:	27
Response Rate (Affirmative / Total Ballots):	44% (> 50% req'd)
Approval Rate (Affirmative / (Affirmative+Negative)):	80% (> 67% req'd)
Consensus:	No

- Part 3 Consensus (12-2-1-12)

Total Responses:	15
Total Ballots:	27
Response Rate (Affirmative / Total Ballots):	44% (> 50% req'd)
Approval Rate (Affirmative / (Affirmative+Negative)):	86% (> 67% req'd)
Consensus:	No

- One response from EPERC

Ballot Summary

- 206 total comments
- 50% Technical and Editorial
- 3 Negatives for PoF
- 2 Negatives for CoF
- Resolution of 3rd party review

Comment Type	Number
Editorial	100
Technical	102
General	3
Other	1
Total	206

Conclusions/Recommendations

- Need plan for review and resolution of comments
- Timeline for completion of Parts 2 and 3 – 1/2007
- Part 1 ballot 1st Qtr. 2007
- Release of API 581 2nd Qtr. 2007

#	Voter/Commenter	Company	Section No. (e.g. 3.1)	Type of Comment	Comment (justification for change)	Proposed Change	Comment Resolution
1	Hearl Mead	Shell Global Solutions (US)	General	Technical	SEE DETAILED COMMENTS FROM TOM WYLIE'S WEB RESPONSE. In summary... 1) Need more background information on the GFFs used by the program. 2) There is not enough explanation on the statistical methods used to calculate the probability of failure. If API RP 581 is to be an open book methodology, then more detail needs to be added on what is actually used in the analysis. 3) The latest External Module has not been included in the ballot, so it does not match the software or the latest External ballot. 4) Inspection Effectiveness is handled differently by the software than what is written in the ballot. 5) There are a lot of errors that are probably typographical but if not fixed, will be incorrect technically.	SEE DETAILED COMMENTS FROM TOM WYLIE'S WEB RESPONSE.	
2	Roland Goodman	API	General	Editorial	It is not clear how the entire document will be structured when everything is put together. It seems that Part 2 is written as a separate stand-alone document. The document should be arranged to conform more closely with API's standard format for consistency.	1. The Scope, References, and Definitions sections should appear at the beginning of the entire document rather than an individual section. 2. The figures and tables should be incorporated into the body of each section where referenced. 3. Annexes A and B should be annexes to the entire document rather than a single section.	
3	Ken Gottselig	Lyondell Chemical Co.	General	Technical	Reason for negative 1. External sections do not reflect ballot approved earlier this year. 2. A measure wall loss based on a thinning inspection should only be applied to the art calculation for thinning and not external. We have recommended a methodology to do this. 3. Damage factors should be added regardless if thinning is local or general. This would match how the other damage factors are handled. Examples of 2 scenarios the current text would end up in a potentially very non-conservative approach are: a) In small bore piping, CUI is typically generalized; therefore if thinning was localized as you took only the max damage factor, the total damage factor would not reflect both mechanisms. b) If thinning is localized (>50 mils wall loss difference) to a large area, but general in nature, and CUI was widespread, then the total damage factor would not reflect both mechanisms.		
4	Scot Haines	Hess Corp	General	Technical	The equations referenced in the flow charts (for example figure 7.2) reference the wrong equations. In this case the equation should be #14 rather than 13. This is wrong on a majority of the flow charts.	Correct the references.	
5	John Britton	Det Norske Veritas (USA)	General	Editorial	Reference to "paragraphs" in the document	should reference "Section x.x.x" of the document	
6	James Riley	Chevron Corporation	General	Technical	Editorial comments will be issued to Lynne Kaley directly.	Editorial comments will be issued to Lynne Kaley directly.	
7	Emad El Roubi	Abu Dhabi Gas Liquefaction Co.	General	Technical	No exhaustive glossary of acronyms used in the document is inserted in first. It is strongly recommended to insert such a file to ease the reading and the understanding PTA : Polythionic acids TMSF page 19 ??? Art :damage factor parameter		
8	Emad El Roubi	Abu Dhabi Gas Liquefaction Co.	General	Technical	Are the Probability of Failure calculations included in the last version (version 8) of E2G software?		
9	Ken Gottselig	Lyondell Chemical Co.		2 Editorial	4 and 5 refer to API RP 581. remove RP change to API 581	remove RP change to API 581	
10	Stefano Pinca	Istituto Italiano della Saldatura		4 Technical	Does the "Probability of failure" mean FAILURE RATE (i.e event/time) or is it dimensionless (value from 0 to 1)?	Define the dimensions: events/year. Change the title of table 4.1 in Generic Failure Probability (Pfg) and add the dimensions (events/year)	
11	Tom Wylie	Shell Global Solutions (US)		4.1 Technical	1) Numerous typos; Management systems factor variable name is shown as F sub MF and F sub MS; "machismo" should be "mechanism"; "magenta" should be "management". (2) The variable name P sub fg has been used to represent the generic failure frequency; the variable name "gff" is used in Part 3 Consequence Analysis; need one variable name for the BRD.	1) Correct typos as noted. (2) Use "gff" to represent the generic failure frequency; change Part 2 to be consistent with Part 3.	
12	John Britton	Det Norske Veritas (USA)		4.1 Editorial	Misspellings	machismo to mechanism magenta to management	
13	Stefano Pinca	Istituto Italiano della Saldatura		4.1 Editorial		Eq.1: Change FMF with FMS. Delete "of failure" after Generic Failure Probability. Correct machismo and magenta (!!!)	
14	Ken Gottselig	Lyondell Chemical Co.		4.1 Editorial	Last sentence 3rd paragraph states: "The damage factor is applied on a component and damage machismo specific basis while the magenta systems factor is applied equally to all components within a plant." incorrect wording	change to The damage factor is applied on a component and damage mechanism specific basis while the management systems factor is applied equally to all components within a plant.	
15	Tom Wylie	Shell Global Solutions (US)		4.2 Technical	The Calculation of the Probability of Failure needs much more detail. If API RP 581 is to be an "open book" methodology, then the details of the statistical analysis used to calculate the probability of failure need to be included in the document.	Rewrite 4.2 to include details on the structural reliability models, statistical models, and expert judgment methods that are used by the software to calculate the probability of failure.	
16	John Britton	Det Norske Veritas (USA)		4.3 Technical	Significant changes in generic probabilities of failure for various components from previous version of API 581. Must state references for the new values not just "best available sources..." Where did this new data come from? If we publish this data it will become a future reference for generic failure frequencies.	Need to document the references used (per component) to arrive at the new generic probability of failure values.	
17	Tom Wylie	Shell Global Solutions (US)		4.3 Technical	Need to add references for the generic probabilities of failure listed in Table 4.1. The generic probabilities are the basis for the likelihood calculation and need to be clearly defined.	If a specific reference cannot be shown, then the logic behind the values as presented by Mike Conley's June 24, 2003 presentation should be clearly stated.	
18	John Britton	Det Norske Veritas (USA)		4.3 Editorial	Paragraph 1, second sentence add the word "be"	...likely to still "be" greater.....	
19	Tom Wylie	Shell Global Solutions (US)		4.3 Editorial	Types: 1st para: failure is used twice, need "be" in 2nd sentence.		
20	John Britton	Det Norske Veritas (USA)	4.4.2 d	Technical	Why would you sum the external factors? The 4 different external factors should be mutually exclusive or at the most just pick the largest factor.	Change equation 8 and paragraph d) to indicate that the largest value from the 4 factors would be the external factor.	
21	Ken Gottselig	Lyondell Chemical Co.	4.4.2.d	Technical	The external damage factor is shown as a summation in eqn 8. This is incorrect. For a single component you cannot have more than one of the four subfactors. That is, a component cannot be CS and have insulation and also not have insulation. the same applies for SS. Only one of the factors will be present for each subcomponent.	Revise equation and reword subpart.	

#	Voter/Commenter	Company	Section No. (e.g. 3.1)	Type of Comment	Comment (justification for change)	Proposed Change	Comment Resolution
22	Tom Wylie	Shell Global Solutions (US)	4.4.3	Technical	BRD states that "E" effective and "D" effective inspections are not applied when summing inspections to the next level; the software currently does apply the summing to "D" effective inspections.	Modify the BRD.	
23	John Britton	Det Norske Veritas (USA)	4.4.3	Editorial	Paragraph 3 sentence 1 - remove the word "in"is characterized for each	
24	Ken Gottselig	Lyondell Chemical Co.	4.5.1	Technical	2nd paragraph states: ...Compliance with PSM standards became mandatory in 1992 with the issue of OSHA 29 CFR 1910.119" Add US to this sentence. Also define PSM in nomenclature	Reword to: Compliance with PSM standards became mandatory in the United States in 1992 with the issue of OSHA 29 CFR 1910.119 Define PSM in nomenclature	
25	Ken Gottselig	Lyondell Chemical Co.	4.5.2.1	Technical	4th paragraph -- Score is defined here as the total number where as in 4.5.2.3 and equation 10 score is defined as a percentage. Need consistency.	Change 4.5.2.1 to define score as the percentage result. Also revise 4.5.3 to define score as a percentage The other option is to redefine score in 4.5.2.3 and rework equation 10 using score as a number not a percentage.	
26	Ken Gottselig	Lyondell Chemical Co.	4.5.2.2	Editorial	last sentence - "t" change to "ol"	change "t" to "ol"	
27	Ken Gottselig	Lyondell Chemical Co.	4.5.4 Table 4.1	Technical	It is not clear why that tank shell wall GFFs are different than a pressure vessel wall. Add a note to this table explaining why the Tank course GFFs are different than the vessel/finfan values.	Add a note to this table explaining why the Tank course GFFs are different than the vessel/ finfan values.	
28	Emad El Roubi	Abu Dhabi Gas Liquefaction Co.	4.5.4 Table 4.4		Management system evaluation is very similar (at least it looks similar) to the Asset Integrity Management System (Aims) being implemented in ADGAS and more generally		
29	Stefano Pinca	Istituto Italiano della Saldatura	5.5.3	Technical	For tank bottom tmin should be in accordance to tab.6.1 API653 (0.1in w/o RPB, 0.05in with RPB, reinforced lining)		
30	John Britton	Det Norske Veritas (USA)	5.5.3	Technical	Equation 11 does not go to Table 5.11 till remaining wall is less than Tmin + CA - this can be significant "damage" with no indication in software of a problem (no damage factor). Table 5.11 is still based on a % of total wall loss instead of a % of "acceptable" wall loss. Since Table 5.11 is the only place where the "damage states" from the previous version of API 581 are incorporated into the determination of the damage factor, there is a high likelihood of being non-conservative using this approach.	1. Incorporate damage state probabilities for Trd and CR prior to going to an equation like equation 11. 2. Rework equation 11 and table 5.11 so that a significant DF is observed when approaching Tmin.	
31	Tom Wylie	Shell Global Solutions (US)	5.5.3	Technical	Typo: 1st sentence reads that procedure is for caustic cracking - should be for thinning. Flow chart: Sequence of steps does not follow flow chart referenced in Fig 5.1. Step 4: Units are incorrect. For thicknesses shown, units should be "cm" instead of "in"		
32	Tom Wylie	Shell Global Solutions (US)	5.5.3	Technical	Adjustment for deadlegs - need to revise deadleg definition to be consistent with API 570 current definition only uses intermittent service.	Revise to API 570 definition.	
33	Ken Gottselig	Lyondell Chemical Co.	5.5.3	Editorial	1st sentence states "The following procedure may be used to determine the damage factor for caustic cracking, see Figure 5.1." This section is on thinning not caustic cracking reword	The following procedure may be used to determine the damage factor for thinning, see Figure 5.1.	
34	Ken Gottselig	Lyondell Chemical Co.	5.5.3.a	Technical	Step 1 is unclear as written suggest reword step 1 to "STEP 1 – Determine the number of inspections, and the corresponding inspection effectiveness category using paragraph 5.5.2 for all past inspections. Combine the inspections to the highest effectiveness performed using paragraph 4.4.3."	Reword to "STEP 1 – Determine the number of inspections, and the corresponding inspection effectiveness category using paragraph 5.5.2 for all past inspections. Combine the inspections to the highest effectiveness performed using paragraph 4.4.3."	
35	Ken Gottselig	Lyondell Chemical Co.	5.5.3.f	Editorial	States "STEP 7 – The damage factor for thinning, Df_thin, using Equation (12)." this is not clear reword	STEP 7 – Determine the damage factor for thinning, Df_thin, using Equation (12).	
36	Ken Gottselig	Lyondell Chemical Co.	5.6 Table 5.1	Technical	In a standard we should not use "default" that is a software term. I suggest rewording the comment to: Is the weld joint efficiency of the equipment per the code of construction	Rewording the comment to: Is the weld joint efficiency of the equipment per the code of construction	
37	John Britton	Det Norske Veritas (USA)	Table 5.1	5.6 Technical	Weld Joint Efficiency default should not be 1.0 (non-conservative)	Weld joint efficiency should default to 0.85	
38	Tom Wylie	Shell Global Solutions (US)	Table 5.1	5.6 Technical	Weld joint efficiency is shown as 1.0 for the default; software uses 0.85.	Revise BRD - 0.85 is the best default value.	
39	Tom Wylie	Shell Global Solutions (US)	Table 5.1	5.6 Editorial	Insulation is represented differently than shown in table - it is not a yes or no selection but a dropdown with a selection of insulation types.	Correct BRD to match software.	
40	John Britton	Det Norske Veritas (USA)	Table 5.2	5.6 Editorial	Need to include Furnace/ Heater as an equipment type		
41	Ken Gottselig	Lyondell Chemical Co.	5.6 Table 5.4	Technical	the definition for welded construction given is "Applicable to Atmospheric Storage tanks only, tanks may be welded or riveted construction. Is the component weld traced? (Yes or No)" reword	reword to "Applicable to Atmospheric Storage tanks only, tanks may be welded or riveted. Is the component welded? (Yes or No)"	
42	Tom Wylie	Shell Global Solutions (US)	Table 5.4	5.6 Other	Need to add Heat Tracing (Y/N) as row in table to match software; need to correct Welded Construction row - delete "Is the component weld traced." Also need to correct	See comments.	
43	Ken Gottselig	Lyondell Chemical Co.	Table 5.4	5.6 Editorial	the comment for maintained to API 653 states "Applicable to Atmospheric Storage tanks only, tanks may be welded or riveted construction. Is the tank maintained in accordance with API 653 weld traced? (Yes or No)" reword	"Applicable to Atmospheric Storage tanks only. Is the tank maintained in accordance with API 653? (Yes or No)"	
44	Ken Gottselig	Lyondell Chemical Co.	Table 5.7	5.6 Technical	The nonintrusive inspection example for "B" effectiveness has more requirements than the "A" effectiveness example. Should not "A" be more stringent than "B"	Reword	
45	Stefano Pinca	Istituto Italiano della Saldatura	Tab.5.11	5.6 Editorial	The difference between the upper and lower part of the table is not defined.	Change 1 INSP., 2 INSP., 3 INSP. with 4,5,6	
46	John Britton	Det Norske Veritas (USA)	Table 5.11	5.6 Editorial	bottom half of table should be for 4, 5 and 6 inspections	correct bottom half reference to correspond to 4, 5, 6 inspections	
47	Tom Wylie	Shell Global Solutions (US)	Table 5.11	5.6 Editorial	Number of inspections mislabeled in bottom half of table - should be 4, 5, and 6 inspections instead of the 1, 2, and 3 shown.	Correct table.	
48	Ken Gottselig	Lyondell Chemical Co.	Table 5.11 Table 5.12	5.6 Technical	Add an equation to Table 5.11 and Table 5.12 to calculate the A_rt factor in addition to the table.	Add an equation to Tables to calculate the A_rt factor in addition to the table.	
49	Stefano Pinca	Istituto Italiano della Saldatura	Table 5.12	5.6 Technical	As for Tank bottoms only 1 insp. is considered, delete "number" in notes		
50	Tom Wylie	Shell Global Solutions (US)	5.6 Editorial	5.6 Editorial	Add variable name to table title to make clearer.	Add F sub OM to table name, "Table 5.13 - On-Line Monitoring	

#	Voter/Commenter	Company	Section No. (e.g. 3.1)	Type of Comment	Comment (justification for change)	Proposed Change	Comment Resolution
51	Ken Gottselig	Lyondell Chemical Co.	Table 5.13 5.7	Technical	The lines from "Thickness" and "Time" should go to the block "Determine the Corrosion Rate" and not to "Determine tmin"	Adjustment Factors F sub OM". Remove lines from "Thickness" and "Time" to "Determine tmin" and add lines to "Determine the Corrosion Rate"	
52	James Riley	Chevron Corporation	Figure 1 5.7	Technical	There is no box in the flowchart for adjusting the damage factor for storage tanks (if applicable) although it is part of the procedure in the write-up.	Add this box.	
53	Emad El Roubi	Abu Dhabi Gas Liquefaction Co.	Figure 5.1 5.7	Technical	Is the corrosion rate given by on line monitoring or as per the definition in table 5.4 " The current rate of thinning calculated from thickness data, if available."		
54	Tom Wylie	Shell Global Solutions (US)	Figure 5.1 5.7	Editorial	Modify title to exclude tanks.	Figure 5.1 - "Determination of the Thinning Damage Factor Excluding Tanks"	
55	John Britton	Det Norske Veritas (USA)	6.7	Technical	Table 6.1 & 6.2 - Add Fiberglass (Tanks)		
56	John Britton	Det Norske Veritas (USA)	6.7	Technical	Table 6.3 - Age of lining comment - thorough visual may not be adequate (tank floor)	...thorough visual or other appropriate methods ...	
57	Emad El Roubi	Abu Dhabi Gas Liquefaction Co.	Table 6.1 6.7	Technical	Damage factor comment - paragraph 5 of what? Cement lining of sea water CS network to be added in this table.	...using section 5.	
58	Emad El Roubi	Abu Dhabi Gas Liquefaction Co.	7	General	What does SCC stand for Stress Corrosion Cracking or Steel Caustic Cracking as written later on. To be precised in glossary also though the most likely is Stress Corrosio Cracking		
59	James Riley	Chevron Corporation	7.3	Technical	The screening criteria only focus on carbon and low-alloy steel. However, API RP 571 specifically states that 300 Series SS is susceptible to caustic cracking.	The screening should include 300 Series SS.	
60	Tom Wylie	Shell Global Solutions (US)	7.5	Editorial	Typos - (1)...a Severity Index can be determined that a measure....Add "is" to sentence after "that" (2)devalued in last sentence should be "evaluated"		
61	Tom Wylie	Shell Global Solutions (US)	7.7	Editorial	Clarify definition for "age"	Should be "In-service time since the last inspection."	
62	Tom Wylie	Shell Global Solutions (US)	7.6.2	Technical	Delete second sentence in second paragraph - doesn't apply.	See comments.	
63	John Britton	Det Norske Veritas (USA)	7.6.2 and all other SCC XX.6.2	Editorial	Paragraph 2 - second sentence is not accurate. Is a cut and paste error from internal thinning.	Remove the second sentence	
64	Tom Wylie	Shell Global Solutions (US)	7.6.3	Editorial	Steps do not follow flow chart.	Revise BRD to follow flow chart.	
65	John Britton	Det Norske Veritas (USA)	7.6.3.a & all other SCC xx.6.3.a	Editorial	Reword sentence	... highest inspection effectiveness category using section....	
66	John Britton	Det Norske Veritas (USA)	7.6.3.b & all other SCC	Editorial	Why only where damage not found? If this is truly what is meant - add some explanation	...since the last inspection.	
67	John Britton	Det Norske Veritas (USA)	7.6.3.e & all other SCC xx.6.3.e	Editorial	Reword sentence	...highest inspection effectiveness determined...	
68	John Britton	Det Norske Veritas (USA)	7.9 Table 7.1 and other SCC	Editorial	Misspelling	"expert" change paragraph to section	
69	James Riley	Chevron Corporation	Figure 7.2 7.1	Technical	There should be a decision box to ask if cracking has been identified in a prior inspection. If the answer is "yes", then the flow arrow should proceed to the "High Susceptibility" end point. This would match the write- up in Subsection 7.5.	A decision should be added to the flow chart. NOTE: This applies to all figures in which the susceptibility should be "high" in cases where cracking is found.	
70	John Britton	Det Norske Veritas (USA)	Figure 7.2 & other SCC flow charts	Editorial	Last box misreference (off by one through all the SCC sections)	should reference equation (14)	
71	John Britton	Det Norske Veritas (USA)	8.2	Editorial	paragraph 5 references - "(see note)" - not clear where "note" is.	Label paragraph 8 (last paragraph of section) with a NOTE:	
72	James Riley	Chevron Corporation	Figure 8.1 8.2	Technical	API RP 571 states that cracking is most prevalent in MEA and DEA systems, not MEA and DIPA. It then states that DIPA performs better than MEA and DEA, but not as well	The document and the decision flow chart should match API RP 571.	
73	John Britton	Det Norske Veritas (USA)	8.3	Editorial	not caustic section	... susceptibility to Amine cracking.	
74	Tom Wylie	Shell Global Solutions (US)	8.3	Editorial	Typo - "caustic" needs to be changed to "amine".		
75	Tom Wylie	Shell Global Solutions (US)	8.5	Editorial	Devalued should be evaluated in second paragraph.		
76	John Britton	Det Norske Veritas (USA)	8.5 and all SCC xx.5	Editorial	incorrect wording	... should be evaluated using Fitness....	
77	Tom Wylie	Shell Global Solutions (US)	8.6.2	Technical	Delete second sentence in second paragraph - does not apply.		
78	John Britton	Det Norske Veritas (USA)	8.6.2	Editorial	not caustic section	paragraph 2 -activities for Amine cracking....	
79	Tom Wylie	Shell Global Solutions (US)	8.6.3	Editorial	Steps do not follow flow chart.	Modify BRD to match flow chart.	
80	John Britton	Det Norske Veritas (USA)	Table 8.1 8.9	Editorial	Misspelling and reference to caustic (2)	amine contractors to amine contactors amine injection residual amine	
81	Tom Wylie	Shell Global Solutions (US)	Table 8.1 8.9	Technical	Maximum process temperature row - delete comment "Consider local heating due to mixing if at a caustic injection point." Doesn't apply.		
82	Tom Wylie	Shell Global Solutions (US)	9.3	Technical	"Caustic" should be "sulfide stress".		
83	Tom Wylie	Shell Global Solutions (US)	9.4	Technical	"Amine" should be "sulfide stress"		
84	John Britton	Det Norske Veritas (USA)	9.4	Editorial	Not amine section	...of the SSC cracking....	
85	Tom Wylie	Shell Global Solutions (US)	9.5	Editorial	"Devalued" should be "evaluated".		
86	Tom Wylie	Shell Global Solutions (US)	9.6.2	Technical	Delete second sentence in second paragraph - it does not apply.		
87	Emad El Roubi	Abu Dhabi Gas Liquefaction Co.	9.8	Technical	No mention of the NACE MR 01 75 / ISO 15156? Is that normal?		
88	Tom Wylie	Shell Global Solutions (US)	9.6.3	Technical	Steps in BRD do not match flow chart.	Revise BRD to match flow chart.	
89	Tom Wylie	Shell Global Solutions (US)	Table 9.3 9.9	Editorial	Table misnumbered - should be 9.5.		
90	John Britton	Det Norske Veritas (USA)	10.2	Editorial	Paragraph 4 - don't have to be "small"	Remove the word small	
91	Tom Wylie	Shell Global Solutions (US)	10.4	Technical	"Amine" should be "HIC/SOHIC".		
92	John Britton	Det Norske Veritas (USA)	10.4	Editorial	Not amine section	... of the HIC-SOHIC damage factor	
93	Tom Wylie	Shell Global Solutions (US)	10.5	Editorial	"Devalued" should be "evaluated".		
94	Tom Wylie	Shell Global Solutions (US)	10.6.2	Technical	Second paragraph: "Sulfide stress" should be "HIC/SOHIC". Need to delete second sentence as it does not apply.		
95	Emad El Roubi	Abu Dhabi Gas Liquefaction Co.	10.8	Technical	No mention of the NACE MR 01 75 / ISO 15156? Is that normal?		
96	Tom Wylie	Shell Global Solutions (US)	10.6.3	Editorial	Steps in BRD do not match flow chart.	Revise BRD to match flowchart.	
97	John Britton	Det Norske Veritas (USA)	10.6.3.d	Editorial	I liked the comments included in this paragraph for HIC-SOHIC HF.	Include the second half of paragraph 15.6.3.d to 10.6.3.d	
98	James Riley	Chevron Corporation	Table 10.1 10.9	Technical	This table lists the steel product form (plate or pipe) as required data. However, this data is not used in either the look-up tables for the severity index or the determination of the	Determine if the steel product form will have an effect on the calculations and decide if it is required data.	
99	Tom Wylie	Shell Global Solutions (US)	Table 10.3 10.9	Technical	Note at bottom of table should be corrected.	Change "SSC" to "HIC/SOHIC".	
100	John Britton	Det Norske Veritas (USA)	11.3	Editorial	remove "contain"	...contains sour water...	
101	Tom Wylie	Shell Global Solutions (US)	11.4	Technical	"Amine" should be "carbonate"		

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102	John Britton	Det Norske Veritas (USA)	11.4	Editorial	not amine section	..of the carbonate cracking....	
103	Tom Wylie	Shell Global Solutions (US)	11.5	Editorial	"Devalued" should be "evaluated".		
104	Tom Wylie	Shell Global Solutions (US)	11.6.2	Technical	"Sulfide Stress" should be "carbonate"; delete second sentence as it does not apply.		
105	John Britton	Det Norske Veritas (USA)	11.6.2	Editorial	Not sulfide stress cracking section	...for carbonate cracking that...	
106	Tom Wylie	Shell Global Solutions (US)	11.6.3	Technical	Steps do not follow flow chart in BRD.	Revise steps to match flow chart.	
107	Tom Wylie	Shell Global Solutions (US)	12.4	Technical	"Amine" should be "PTA".		
108	John Britton	Det Norske Veritas (USA)	12.4	Editorial	not amine section	... of the PTA cracking...	
109	Tom Wylie	Shell Global Solutions (US)	12.5	Editorial	"Devalued" should be "evaluated"		
110	Tom Wylie	Shell Global Solutions (US)	12.6.2	Technical	"Sulfide stress" should be "PTA"; delete second sentence as it does not apply.		
111	John Britton	Det Norske Veritas (USA)	12.6.2	Editorial	not sulfide stress cracking section	...for PTA crcking...	
112	Tom Wylie	Shell Global Solutions (US)	12.6.3	Editorial	Steps in BRD do not match flow chart.	Revise BRD to match flow chart.	
113	John Britton	Det Norske Veritas (USA)	12.6.3.e	Editorial	not carbonate cracking	...for PTA cracking...	
114	James Riley	Chevron Corporation	12.9	Technical	Since this damage mechanism is most effectively inspected for during a shutdown, wording should be included that the inspection should occur before the unit start-up.	Wording should be included that the inspection should occur before the unit start-up.	
115	Emad El Roubi	Abu Dhabi Gas Liquefaction Co.	13	Technical	No mention anywhere of the risk due to presence of oxygen together with the chlorides. Should be emphasized.		
116	John Britton	Det Norske Veritas (USA)	13.1	Editorial	remove the second "cracking"	... Cracking (CLSCC) is covered....	
117	James Riley	Chevron Corporation	13.3 and Table 13.1	Technical	There should be no temperature "range" for applicability of CLSCC. In fact, vaporization occurs as the temperature increases which increases the susceptibility. If the screening criteria only include operating temperatures in this range, potential instances of this cracking mechanism may be missed. Table 13.1: The operating temperature is listed as the highest temperature, including not normal operating conditions. If the range of temperatures is used for screening, and the component normally operates within that range but has excursions outside of that range the user may input the higher temperature and exclude the possibility of CLSCC.	The temperature screening criterion should only list a minimum temperature and not an upper limit.	
118	Tom Wylie	Shell Global Solutions (US)	13.4	Technical	"Amine" should be "CISCC".		
119	John Britton	Det Norske Veritas (USA)	13.4	Editorial	not amine section	... of the CLSCC damage factor...	
120	Tom Wylie	Shell Global Solutions (US)	13.5	Editorial	"Devalued" should be "evaluated".		
121	John Britton	Det Norske Veritas (USA)	13.5, 13.6.2, 13.6.3, 13.6.3.e, 13.7	Technical	remove the word cracking after CLSCC	... for CLSCC is that....	
122	Tom Wylie	Shell Global Solutions (US)	13.6.1	Technical	"Carbonate" should be "CISCC".		
123	John Britton	Det Norske Veritas (USA)	13.6.1	Editorial	not carbonate cracking	... for CLSCC is shown...	
124	Tom Wylie	Shell Global Solutions (US)	13.6.2	Technical	"Sulfide stress" should be "CISCC"; delete second sentence.		
125	John Britton	Det Norske Veritas (USA)	13.6.2	Editorial	not sulfide stress cracking	... for CLSCC that are...	
126	Tom Wylie	Shell Global Solutions (US)	13.6.3	Technical	Steps do not follow flow chart.	Revise steps in BRD to match flow chart.	
127	John Britton	Det Norske Veritas (USA)	14	Editorial	throughout section remove the word cracking after HSC-HF		
128	John Britton	Det Norske Veritas (USA)	14.3	Editorial	not PTA section remove perpendicular lineconstruction is carbon.....susceptibility to HSC-HF.	
129	Tom Wylie	Shell Global Solutions (US)	14.4	Technical	"Amine" should be "HSC-HF"		
130	Tom Wylie	Shell Global Solutions (US)	14.5	Editorial	"Devalued" should be "evaluated".		
131	Tom Wylie	Shell Global Solutions (US)	14.6.2	Technical	"Sulfide Stress" should be "HSC-HF".		
132	John Britton	Det Norske Veritas (USA)	14.6.2	Editorial	not sulfide stress cracking	... for HSC-HF that are...	
133	Tom Wylie	Shell Global Solutions (US)	14.6.3	Technical	Steps do not follow flow chart; Step 5 references CISCC instead of HSC-HF.	Revise steps in BRD to match flow chart; correct Step 5.	
134	John Britton	Det Norske Veritas (USA)	14.6.3.e	Editorial	not CLSCC	...for HSC-HF, ...	
135	John Britton	Det Norske Veritas (USA)	15	Editorial	Remove the word cracking after HIC/SOHIC-HF throughout section		
136	John Britton	Det Norske Veritas (USA)	15.2	Editorial	"small blisters" in paragraph 4. Not necessarily small	remove the word small	
137	John Britton	Det Norske Veritas (USA)	15.3	Editorial	remove the line	...construction is carbon or...	
138	Tom Wylie	Shell Global Solutions (US)	15.4	Technical	"Amine" should be "HIC/SOHIC-HF"		
139	John Britton	Det Norske Veritas (USA)	15.4	Editorial	not amine cracking section	...of the HIC/SOHIC-HF damage	
140	Tom Wylie	Shell Global Solutions (US)	15.5	Editorial	"Devalued" should be "evaluated".		
141	Tom Wylie	Shell Global Solutions (US)	15.6.2	Technical	Second sentence in second paragraph does not apply - delete.		
142	Tom Wylie	Shell Global Solutions (US)	15.6.3	Technical	Steps do not follow flow chart.	Revise steps in BRD to match flow chart.	
143	James Riley	Chevron Corporation	15.6.3	Technical	Wording in this step notes that the susceptibility changes with respect to the product form. However, this logic is not built into either the look-up tables for the severity index nor the flowchart to determine damage factor.	Determine whether product form will affect the calculations and determine if it is required data.	
144	James Riley	Chevron Corporation	15.9	Technical	The table appears to be a carry-over from SCC since it includes "Brinell Hardness" and "PWH" as considerations for susceptibility.	This table should include "Sulfur Content" of the material instead.	
145	Tom Wylie	Shell Global Solutions (US)	16	Editorial	Ferritic is misspelled in title.		
146	Tom Wylie	Shell Global Solutions (US)	16.1	Editorial	Typo	"Cover" should be "covered".	
147	Tom Wylie	Shell Global Solutions (US)	16.3	Editorial	First sentence - add "for" after "evaluated".		
148	John Britton	Det Norske Veritas (USA)	16.5	Editorial	replace paragraph with section	... covered in section 5.	
149	Tom Wylie	Shell Global Solutions (US)	16.6.2	Technical	Delete second sentence of second paragraph - does not apply.		
150	James Riley	Chevron Corporation	16.6.3	Technical	The equation in this section should probably read as follows: age = max [0 , Calculation Date - Date] This would resolve any cases where the age could be a negative number. In addition, the term "Date Installed" needs to be defined as it is unclear whether it refers to the component or the coating on which the quality the modified date is based. In my opinion, it should refer to the date the coating of the applicable quality was applied.	Alter the equation and define "Date Installed".	
151	John Britton	Det Norske Veritas (USA)	16.6.3.e	Technical	misreferenced and reference to thinning not appropriate. Need to modify what is done in 5.5.3 with the external adjustment factors	Reference section 5.5.3 Modify 5.5.3 with external adjustment factors	
152	John Britton	Det Norske Veritas (USA)	Figure 16.1	Editorial	Reference to paragraph 5.4.5 is wrong. No such section	Reference to 5.5.3 with external adjustment factors	
153	James Riley	Chevron Corporation	Figure 16.1	Technical	This figure assumes that the program will calculate the external corrosion rate.	A decision block should be added that will allow the user to input a corrosion rate (as done in other modules) rather than have one	
154	James Riley	Chevron Corporation	17 Figure 17.1	Technical	This figure assumes that the program will calculate the external corrosion rate.	A decision block should be added that will allow the user to input a corrosion rate (as done in other modules) rather than have one calculated.	

#	Voter/Commenter	Company	Section No. (e.g. 3.1)	Type of Comment	Comment (justification for change)	Proposed Change	Comment Resolution
155	Tom Wylie	Shell Global Solutions (US)	17.2	Technical	(1) First paragraph temperature range does not match the latest external module. (2) Third paragraph - second to last sentence - not a true statement - we're using RBI to set intervals, not using arbitrary time based intervals. If in an arid environment at 1 MPY CL corrosion rate, there are not many companies who would do a CUI inspection for an expected loss of 5 mils. There should not be a recommendation in the BRD for this.	(1) Revise paragraph to fit the latest external module. (2) Delete second to last sentence in third paragraph.	
156	Tom Wylie	Shell Global Solutions (US)	17.3	Technical	Bullet (e) does not match latest external technical module.	Correct to match latest external technical module.	
157	John Britton	Det Norske Veritas (USA)	17.3	Editorial	reword first sentence expanded explanation given to penetrations and damaged insulation directly below.	...and/or systems are highly suspect...	
158	John Britton	Det Norske Veritas (USA)	17.3	Editorial	formatting - after section b) "The following are some examples of other....."	c) Other suspect areas that should.....	
159	John Britton	Det Norske Veritas (USA)	17.6 , 19.6	Technical	Have we approved the portion of CUI for Insulation type adjustment factor?	If so, it needs to be included in this section.	
160	Tom Wylie	Shell Global Solutions (US)	17.6.2	Technical	Second paragraph, second sentence doesn't apply.	Delete second sentence in second paragraph.	
161	Tom Wylie	Shell Global Solutions (US)	17.6.3	Technical	(1) Steps do not follow flow chart. (2) Missing step to correct for insulation type.	(1) Revise steps to follow flow chart. (2) Add step for insulation type to match software and external technical module.	
162	James Riley	Chevron Corporation	17.6.3	Technical	The equation in this section should probably read as follows: age = max [0 , Calculation Date – Date] This would resolve any cases where the age could be a negative number. In addition, the term "Date Installed" needs to be defined as it is unclear whether it refers to the component or the coating on which the quality the modified date is based. In my opinion, it should refer to the date the coating of the applicable quality was applied.	Alter the equation and define "Date Installed".	
163	John Britton	Det Norske Veritas (USA)	17.6.3.e	Technical	Incorrect reference	Need a modification of 5.5.3 with CUI adjustment factors	
164	Tom Wylie	Shell Global Solutions (US)	17.9	Technical	Flow chart is missing step for correction factor based upon insulation type.	Modify flow chart to include correction for insulation type.	
165	James Riley	Chevron Corporation	18.3	Technical	As in Section 13, there should not be a "range" for the screening criteria.	Remove the upper limit on temperature from the screening criteria.	
166	John Britton	Det Norske Veritas (USA)	18.4	Editorial	Reword sentence	...factor for external CLSCC is provided....	
167	Tom Wylie	Shell Global Solutions (US)	18.6.2	Technical	Second sentence of second paragraph does not apply	Delete second sentence to second paragraph.	
168	Tom Wylie	Shell Global Solutions (US)	18.6.3	Technical	Steps do not follow flow chart.	Modify steps to follow flow chart.	
169	James Riley	Chevron Corporation	18.6.3	Technical	The equation in this section should probably read as follows: age = max [0 , Calculation Date – Date] This would resolve any cases where the age could be a negative number. In addition, the term "Date Installed" needs to be defined as it is unclear whether it refers to the component or the coating on which the quality the modified date is based. In my opinion, it should refer to the date the coating of the applicable quality was applied.	Alter the equation and define "Date Installed".	
170	John Britton	Det Norske Veritas (USA)	18.8	Editorial	Date comment - should be component install date not insulation install date.	Date (Age) The date the component was installed or the date.....	
171	James Riley	Chevron Corporation	Table 18.1	Technical	Coating Quality - not under insulation (Section 19)	Coating Qualityapplied, for example:	
172	James Riley	Chevron Corporation	Table 18.1	Technical	Operating Temperature is not listed as required data although it is critical to susceptibility to CLSCC.	Add Operating Temperature to the table.	
173	James Riley	Chevron Corporation	Figure 18.1	Technical	This figure assumes that the program will calculate the external corrosion rate.	A decision block should be added that will allow the user to input a corrosion rate (as done in other modules) rather than have one	
174	Tom Wylie	Shell Global Solutions (US)	Table 18.3	Technical	Note does not make sense for SCC - note clear what the note is for.	Revise or delete note.	
175	James Riley	Chevron Corporation	19.3	Technical	As in Section 13, there should not be a "range" for the screening criteria.	Remove the upper temperature limit from the screening criteria.	
176	Tom Wylie	Shell Global Solutions (US)	19.6.2	Technical	Second sentence of second paragraph does not apply.	Delete second sentence of second paragraph.	
177	Tom Wylie	Shell Global Solutions (US)	19.6.3	Technical	(1) Steps do not follow flow chart. (2) Step 3-2 is incorrect; if insulation is below average condition, then susceptibility increases one level instead of decreases; if the insulation is above average condition, then the susceptibility should decrease one level rather than increase.	(1) Revise steps to follow flow chart. (2) Correct Step 3-2 per comment.	
178	James Riley	Chevron Corporation	19.6.3	Technical	The equation in this section should probably read as follows: age = max [0 , Calculation Date – Date] This would resolve any cases where the age could be a negative number. In addition, the term "Date Installed" needs to be defined as it is unclear whether it refers to the component or the coating on which the quality the modified date is based. In my opinion, it should refer to the date the coating of the applicable quality was applied.	Alter the equation and define "Date Installed".	
179	John Britton	Det Norske Veritas (USA)	19.6.3.a, c	Editorial	Incorrect reference	a) ...using paragraph 19.6.2 c) ...using Table 19.3 based	
180	John Britton	Det Norske Veritas (USA)	19.6.3.e, 19.7	Editorial	Remove the word cracking after CUI CLSCC		
181	James Riley	Chevron Corporation	19.8	Technical	Operating Temperature is not listed as required data although it is critical to susceptibility to CLSCC.	Add Operating Temperature to the required data table.	
182	Tom Wylie	Shell Global Solutions (US)	Table 19.1	Technical	Table does not match the external technical module and software.	Revise to match the external module.	
183	James Riley	Chevron Corporation	Table 19.1	Technical	This figure assumes that the program will calculate the external corrosion rate.	A decision block should be added that will allow the user to input a corrosion rate (as done in other modules) rather than have one	
184	Tom Wylie	Shell Global Solutions (US)	Figure 19.1	Technical	This figure assumes that the program will calculate the external corrosion rate.	A decision block should be added that will allow the user to input a corrosion rate (as done in other modules) rather than have one	
185	Tom Wylie	Shell Global Solutions (US)	20.3	Editorial	Missing "is" in 20.3a.		
186	John Britton	Det Norske Veritas (USA)	20.5	Editorial	Remove (44) reference to equation. List both equations as (43) with a large OR between them. Same calc - different units.		
187	John Britton	Det Norske Veritas (USA)	20.6.1, 20.6.2	Editorial	Three different references to "external" HTHA. HTHA is not an external damage mechanism.	Remove the word external	
188	Tom Wylie	Shell Global Solutions (US)	20.6.2	Technical	(1) Section references "external" HTHA. (2) Second sentence in second paragraph is incorrect for this damage mechanism.	(1) Delete "external" all references to HTHA. (2) Delete second sentence of second paragraph.	
189	John Britton	Det Norske Veritas (USA)	20.8 Table 20.1, 20.3	Technical	Remove reference to C-0.5Mo annealed and Normalized. Treat C-0.5Mo as Carbon steel.	Remove the line in Table 20.1 about C-0.5Mo	
190	Tom Wylie	Shell Global Solutions (US)	20.1, 20.3	Technical	Remove reference to C-0.5Mo annealed and Normalized. Treat C-0.5Mo as Carbon steel.	Remove the two lines in Table 20.3 about C-0.5Mo. Add C-0.5Mo to CS line. 'Carbon steel or C-0.5Mo'	
191	Tom Wylie	Shell Global Solutions (US)	21.2	Editorial	"Do" should be "due" in first sentence.		
192	John Britton	Det Norske Veritas (USA)	21.6.1	Editorial	not external HTHA	...factor for Brittle fracture is shown....	
193	John Britton	Det Norske Veritas (USA)	22.5	Editorial	Miss referenced	...see section 21.2, except that....	
194	John Britton	Det Norske Veritas (USA)	24.1	Editorial	Figure 24.1 mislabeled	...of the Sigma Phase Embrittlement Damage....	
195	John Britton	Det Norske Veritas (USA)	24.3	Editorial	not brittle fractureto sigma phase.	
196	John Britton	Det Norske Veritas (USA)	25.3	Editorial	not brittle fractureto mechanical fatigue.	
197	John Britton	Det Norske Veritas (USA)	25.4, 25.6.1	Editorial	not sigma phase	...factor for mechanical fatigue is...	
198	John Britton	Det Norske Veritas (USA)	25.6.3	Editorial	Not sigma phase, wrong figure reference	...for mechanical fatigue, see figure 25.1.	

#	Voter/Commenter	Company	Section No. (e.g. 3.1)	Type of Comment	Comment (justification for change)	Proposed Change	Comment Resolution
196	John Britton	Det Norske Veritas (USA)	25.6.3.c)2 & 3	Editorial	Remove the word than	...between 2 and 13... ...between 13 and...	
197	John Britton	Det Norske Veritas (USA)	25.6.3.f	Editorial	Change to STEP 6		
198	John Britton	Det Norske Veritas (USA)	25.8	Editorial	Should be Table 25.1 (Not 24.1) Not sigma phase	Table 25.1 - Data.....- Mechanical fatigue	
199	Emad El Roubi	Abu Dhabi Gas Liquefaction Co.	Annex A	General	This document looks deeply similar to Asset Integrity Reliability Management System (AIRMS) Scheme ADGAS is being implementing. As such, no comment will be made on this management work book.		
200	Emad El Roubi	Abu Dhabi Gas Liquefaction Co.	Annex B	Technical	As a general comment from LNG gas producer, this determination of corrosion rate is almost exclusively dedicated to refining industry, with very few item dealing with upstream. Only chapter which could be considered as relevant is chapter B13 CO2 Corrosion. No mention of corrosion rate when we have CO2 and H2S together.		
201	Scot Haines	Hess Corp	Annex B Table B.1	Technical	Under the action column the reference should be to B.X rather than A.X. Likewise the flow chart references are also incorrect. For example, Figure B.1 references table A.8		
202	John Britton	Det Norske Veritas (USA)	B.1.1	Editorial	need to add the input from corrosion specialist as an alternate source of corrosion rate.	end of first paragraph addusing Appendix A or estimated by a Corrosion specialist.	
203	Emad El Roubi	Abu Dhabi Gas Liquefaction Co.	B.8.5	Technical	Table B.39 and B.40M – Corrosion Rate of Carbon Steel in MEA / DEA and MDEA (mm/y): Deeply surprised by these high corrosion rate claimed.		
204	Emad El Roubi	Abu Dhabi Gas Liquefaction Co.	B.13	General	Strange this chapter does not show any bibliographic references. Also, no mention of organic acid which are fundamental in CO2 corrosion.		
205	Stefano Pinca	Istituto Italiano della Saldatura	B.13.2	Editorial		change sulfuric acid with carbonic acid	
206	John Britton	Det Norske Veritas (USA)	B.14.2.1	Editorial	Paragraph does not make sense as written.	replace "sulfuric acid service" with soil side. replace "process specialist" with "corrosion specialist"	
207	John Britton	Det Norske Veritas (USA)	B.14.2.2	Editorial	Reword sentence	replace "Soil Side" in heading with "Product side" replace "sulfuric acid service" with "product side"	
208	John Britton	Det Norske Veritas (USA)	B.14.2.2	Editorial	Need to make reference to Coatings and liners (Section 6) when discussing product side corrosion.		
209	John Britton	Det Norske Veritas (USA)	B.14.3.1.f	Editorial	reword second sentence	Delete "Single or RPB" from the beginning of the sentence	
					1. Part 2 Annex B Table B.1 under column 'Action' the reference is incorrect. 2. Part 2 Annex B Table B.2.6, B.3.6, B.4.6, etc. Figures All references are to Table A.X	1. Part 2 Annex B Table B.1 under column 'Action': In all cases change to B.X rather than A.X. 2. Part 2 Annex B Table B.2.6, B.3.6, B.4.6, etc Figures All references should be to B.X	

Editorial	100
Technical	102
General	3
Other	1
Total	206