Comment #	Comment Type	Date Received	(CAPP, PSAC,	Page #	Section #	Issue Description	Rationale	Suggested Modification	IRP Working Group Response	Date Completed
1	Editorial		CAPP	3	Figure 1	In Figure 1 the term IOW is used. It is not defined until page 5 of the document. The chart should be updated to define the term IOW (Identified Offset Wells) at least once in the figure so the reader does not have to search for the meaning on another page. Will help first time readers of the document. The document does a good job of this in Figure 3 on page 19 where it defines the Fracture Planning Zone (FPZ) and Special Consideration Wells (SCWs)			modified in Visio and replaced	8-Jan-16
2	Editorial		CAPP	6	24.1.4.3	On this page the document introduces a new term labeled REG. Since this document is considered a collection of Best Practices I question utilizing this term in a multi-jurisdictional document. For the purposes of this document it may be more appropriate to refer to this Alberta Regulation (Directive 83) as a best practice that shall be followed in other jurisdictions giving it the status of an IRP in all jurisdictions as well as its status as a regulation in Alberta.			The use of REG is common in IRPs (see preface pg. vii) . We've clarified usage in the Preface under Scope to note the origins of the document is in Alberta.	7-Jan-16
3	Technical	14-Sep-15	Regulator	General		The IRP does not address induced seismicity. Consider incorporating. Induced seismicity should definitely be included. Both BC and Alberta have regulated that fracture stimulation operations cease at a determined magnitude and a mitigation plan be approved by the regulator prior to resuming operations. Following a high magnitude seismic event, wellbore integrity must be re-assessed by pressure testing casing and potentially caliper logging to gauge any casing deformation that may have occurred. Subsequent milling may reduce yield strength and require modification of stimulation design for additional stages in the subject and offsetting wells. The IRP should discuss where/when you will encounter the highest (HDPmax), ie: screenout is likely highest downhole, P-test and flush likely at surface.			We added a section in the first chapter 24.1.4.4 Monitoring and Reporting of Seismicity. We've inserted BC and Alberta regs. Induced seismicity was included in the HR. Working group connected with AB, BC and SK regulators to preview. We've revised this new section given regulator feedback and added to the HR the pressure testing after an induced seismicity event	19-Jan-16
4	Editorial	14-Sep-15	Regulator	Title		This IRP should have a more specific title than simply 'Fracture Stimulation'. It should be more like 'Risk Identification during Fracture Stimulation Operations'.			No Change Because of the nature of the IRP's they need to have overarching titles that accommodate changes through review cycles.	5-Oct-15
5	Technical	14-Sep-15	CAPP	4	24.1.2.1	Using fracture 2 times the Xf to determine FPZ seems high	Operators should have a good idea of fracture half-length (Xf) as described in Step 1 **(MAXIMUM** extent of influence). Requiring operators to review wells beyond an FPZ of 2 times Xf seems excessive. In section 24.1.2.3 there is already a should statement to determine SCWs beyond FPZ taking things like fracture azimuth into consideration.	Consider changing FPZ radius to Xf (not double).	No change…in 24.3.2.1 the value of 2Xf is based upon the possibility of a planar single wing hydraulic fracture, and incorporates the organization's risk tolerance.	16-Nov
6	Technical	14-Sep-15	Regulator	5	1.4.3	Shallow well fracturing may not only have surface impacts but it could also have subsurface aquifer impacts as well as reservoir containment/conservation impacts.	While surface impacts are a significant risk with shallow fracturing they are not the only impacts to be managed.	Fracture stimulation operations near the top of bedrock or base of groundwater may result in a release of fluids to the surface, ***contamination of non-saline aquifers as well as reservoir containment related to conservation impacts.*** REG The Operator must adhere to Directive 083: Hydraulic Fracturing – Subsurface Integrity to prevent surface impacts, ***contamination of non-saline aquifers and conservation impacts*** when fracturing near the top of bedrock.	We recommend keeping shallow well fracturing discussion as proposed as we believe it addresses the concern adequately Additionally, added in 24.3.2 reference to "all" wells not only "energy" wells, included "water wells" in 24.3.2.3 Special Consideration Wells, and modified 24.3.3.1 Determine At-risk IOWs to include attention to both Subject Well and IOW hydraulic fracture geometry.	19-Jan-16

7	Technical	14-Sep-15	Regulator	6	24.1.4.3	The primary concern with shallow fracturing is protection of groundwater, not release of fluids to surface. In addition, non-industry readers may misinterpret the statement to overestimate the risks posed by shallow fracturing operations.		Recommend restating as follows: "When fracturing near the top of bedrock or base of groundwater, additional precautions are required to ensure that the hydraulic fracturing treatment remains confined to the target zone." Recommend deleting the words "to prevent surface impacts" from the reg statement and consider adding a reference to "relevant jurisdictional regulations".	included reference to "relevant jurisdictional regulation" after discussion, agreed that the comment regarding fracturing treatment remaining in the target zone is not specific to shallow well fracture stimulation. To address "remaining in the target zone" we included reference to "no impacts to reserves."	2-Nov
8	Technical	14-Sep-15	CAPP	9	Figure 4	Barrier Status for E, F, G, and H say closed when you are supposed to keep SCVF Open	SCVF must be kept open as per Oil & Gas Conservation Rules 6.100	For items E, F, G and H Barrier Status is changed from "C" to "O" (open)	commenter reviewed the Sanctioned version of Interwellbore Communication. The draft for review has interwellbore communication as chapter 3 where the schematic in question is now Appendix D. The comments of concern were corrected prior to industry review.	16-Nov
9	Technical	14-Sep-15	CAPP	9	Figure 4	Figure has "IOW Monitored (Y/N)" in top right corner of table. I'm not sure what IOW Monitored means in this scenario.	The only definition of monitoring is found in section 24.1.4.1.2 in which monitoring is in real time. In this sense, it is unlikely you would real time monitor the following: #4 - Production casing hanger seals - I don't know why you would monitor these seals in real time. If you leave the test port closed, then you will have a secondary barrier. #C&D - Flow Line & Valve - If your rod BOP is already closed (Primary flow), there is no need to monitor secondary barriers. #E-H - Surface Casing x Intermediate Casing annulus related - This line is never closed so you wouldn't monitor it.	Put "N" under IOW Monitored for items: 4, C, D, E, F, G and H	In the industry review draft the columns are blank with the intention that the use can complete the columns as appropriate to their operations	16-Nov
10	Editorial	09/13/2015	Consultant	10 10 69	24.2.2 24.2.3 Glossary	Inconsistent use of lower case/title case/upper case for the term "Subject Well integrity"	Use of inconsistent case is confusign for the reader	Ensure case consistency for all terms defined in text body and/or Glossary	To be addressed in final copyedit following DACC review.	19-Jan-16
11	Technical	14-Sep-15	Regulator	10	24.2.3	Don't like the 'barrier envelop' and 'barrier element' verbage. Isn't the concept of a barrier analysis something well established in industry already? Probably too late to change this…			The following quote from 24.2.3 clarifies the definition for barrier envelope and barrier element. The use of element and envelope was selected to be in align with the NORSOK D-10 document. Subject Well Integrity Assessment sets the framework for evaluating the current Subject Well Barrier envelope expected to receive and contain fracture fluids. The Subject Well barrier envelope refers to one or more barrier elements that prevent fluids from flowing unintentionally from the formation into the wellbore, into another formation or to the external environment. A barrier element refers to an individual equipment component or objects that together collectively comprise a barrier envelope. A barrier element as an object alone cannot prevent flow from one side to the other side of itself. A barrier envelope configured to contain fracture fluids will maintain subject well integrity through the fracture stimulation operation.	2-Nov
12	Editorial	14-Sep-15	CAPP	11	24.1.3.5	A link to the IRP 24 Hazard Register should be included in this section	Reading the IRP alone does not give clear indication of where to find IRP 24 Risk Register	Put link in section 24.1.3.5 to IRP 24 Hazard Register	Added link to the landing page	16-Nov

13	Technical	09/11/2015	Consultant	11	24.2.3.1	Step 2 description for determining AMP does not adequately convey complexity of casing design considerations. Also, AER Directive 010 is more appropariately referenced as a regulation instead of as an industry standard.	Step 2 should more accurately convey design complexity indicated in Appendix B. Directive 010 is a "regulation" rather than a "standard"	Revise Step 2 as: "The AMP is determined by analyzing a barrier element's Original Equipment Manufacturers' (OEM) specification/rating and then reducing this original pressure rating to compensate for the many service Factors affecting barrier performance. (See Appendix B for an expanded discussion of burst and collapse considerations.) This adjusted pressure is determined at the Subject Well Operator's discretion, is to be in alignment with the Subject Well Operator's risk tolerance, and must meet regulatory requirements such as AER Directive 010 minimum casing design requirements."	Amended Appendix B to reflect the suggested modifications	2-Nov
14	Technical	09/13/2015	Consultant	11	24.2.3.1	Step 2 assumes that performance of each barrier element can be satisfactorily predicted based on the OEM's specification/rating and compensation for age and service. While it is desirable to be universally true, the actual element properties might vary significantly within the OEM's specifications, and some of those variations might have combined (synergistic effects) on the element performance	IRP should draw the reader's attention to the importance of actual properties and their (potential) combined effects	Revise Step 2 as per Comment 1 above, with extra wording as in blue font: "The AMP is determined by analyzing a barrier element's Original Equipment Manufacturers' (OEM) specification/rating and the element's product property variations, and then reducing this original pressure rating to compensate for the many service factors affecting barrier performance. (See Appendix B for an expanded discussion of burst and collapse considerations.) This adjusted pressure is determined at the Subject Well Operator's discretion, is to be in alignment with the Subject Well Operator's risk tolerance, and must meet regulatory requirements such as AER Directive 010 minimum casing design requirements."	We have included everyting except the product property variations. This is addressed in Directive 10.	2-Nov
15	Technical	14-Sep-15	Regulator	12	2.3.2	Long distance pressure communication has been attributed to the existence of natural fractures or matrix high perm streaks.	Need to identify these potential conduits to identify SCW.	Geological Conditions - include high permeability streaks due to natural fractures or matrix perm such as conglomerate intervals	added geological conditions in Appendix C, fracture length determination and adjusted bullets in 24.2.3.2 to include high permeability streaks, natural fracs and conglomerates	2-Nov-15
16	Technical	14-Sep-15	Regulator	12	2.3.2	Specific identification of the need to address casing connection adequacy.	Casing connection failures are occurring.	Potential failure modes …. Include bullet: Review adequacy of casing connection design and installation.	included consideration for connections and installation under "potential failure modes",and added into Step 2: barrier element analysis.	2-Nov-15
17	Technical	14-Sep-15	Regulator	12	24.2.3.2	"reviewing of installed/original casing design…." Is not a potential failure mode. Should be reworded or eliminated.			moved this bullet up to Step 2: barrier element analysis and included connection and installation	2-Nov-15
18	Technical	14-Sep-15	Regulator	15	2.5	A pressure relief system might be utilized to protect a secondary barrier and manage the consequences of a primary barrier failure. The re4lif system needs to have a flow capacity to relieve and contain potential failure flow. Automated systems pose potential restrictions that could result in pressures exceeding barrier ratings (AMP).	Inadequately sized relief systems may result in failure of a secondary barrier and loss of containment of failure flow.	An IRP statement should state a relief system shall be designed to accommodate worst case flow situations.	No changes made: The section was written around the encompassing IRP statements under the IOW Well Control Plan that tell the reader they shall have a well control plan that reflects the IOW risk assessment. The Well control practices are intended as a set of practices Operators may consider to develop an appropriate well control plan. Regarding a relief system designed to accommodate worst case scenario, the document already suggests "maximum potential flow rate of fluid"	16-Nov-15
19	Technical	14-Sep-15	Regulator	13	24.2.3.4	Barrier envelope limitations examples should include screenout and sand concentrations.			No modification made. This is covered in Appendix B specifically AMP, maximum burst and collapse pressures include calculations for maximum hydrostatic pressure difference (i.e., screenout at max sand concentration).	26-Nov-15
20	Technical	09/16/2015	CAPP	13	24.2.3.3	In section 24.2.3.3, prior to the bold (IRP) section on page 13 to state that "operators in Alberta and British Columbia are required by regulation, in specific regions, to manage the risk of induced seismicity from Hydraulic Fracturing via site specific risk assessment, monitoring and control measures. While induced seismicity is not necessarily an inter-wellbore communication issue many of the hazard management approaches are similar, as there can be un-anticipated communication to the formations being fractured that can lead to seismic events."		In section 24.2.3.3, prior to the bold (IRP) section on page 13 to state that "operators in Alberta and British Columbia are required by regulation, in specific regions, to manage the risk of induced seismicity from Hydraulic Fracturing via site specific risk assessment, monitoring and control measures. While induced seismicity is not necessarily an inter-wellbore communication issue many of the hazard management approaches are similar, as there can be un-anticipated communication to the formations being fractured that can lead to seismic events."	added a section in Chapter one 24.1.4.4 Monitoring and Reporting Induced Seismicity and created a link to this section in an added bullet to the "potential failure modes" in 24.2.3.2 Fracture Stimulation Factors. Also added "induced seismicity to the HR.	1-Dec-15

21	Technical	14-Sep-15	Regulator	14	24.2.4.2	Monitoring – the part of the sentence: 'observing trend lines for specific activity during fracture operations' should be re-written. Assuming they mean pressure and rate plots during fracing. This is a simple enough concept that the sentence should be written so that the reader does have to assume.			Adjusted term to refer to pressure and rate monitoring.	26-Nov-15
22	Technical	14-Sep-15	Regulator	17	24.3	"Offset wells are most likely designed with well integrity for its production phase and may require risk reduction measures if interwellbore communication is probable." Probable implies likely i.e. >50% chance of occurring. This sets the threshold for risk reduction too high. Consider deleting "if interwellbore communication is probable." or replacing "probable" with "possible". Agree.		Consider deleting "if interwellbore communication is probable." or replacing "probable" with "possible". .	Changed to "possible"	26-Nov-15
23	Technical	14-Sep-15	Regulator	20	24.3.2	IOW determination needs to include all energy wells including all wells licensed by an energy regulator. The list of well states may not include all states for some of these wells.	IOW determination must include all energy related wells.	Identified Offset Wells (IOWs) are all **energy related** offset wells….	Modified the leading sentence as follows: These include all wells in any state, such as, but not limited to: Added clarification for orphan well.	26-Nov-15
24	Technical	14-Sep-15	Regulator	21	24.3.2.2	Offset wells may have been fractured as well increasing the possibility of communication to the well outside of the FPZ	Offset well location should include its fracture half length encroaching into the FPZ.	Once the FPZ is determined, identify and map each offset well that intersects the FPZ including the half wing fracture length of the offset well.	Added bullet to SCWs (24.3.2.3) to include wells with fracture half-lengths that may intersect the FPZ, in 24.3.3.1 (at-risk IOWs) add reference to IOWs that have hydraulic fracture geomentry, also included a definition for hydraulic fracture geometry in the glossary: The maximum lateral and vertical extension of hydraulic fluids as a result of fracture stimulation.	26-Nov-15
25	Technical	14-Sep-15	Regulator	22	24.3.2.3	Long distance pressure communication to manned operations (drilling) has occurred and the operations were not aware and prepared for the communication kick	SCW risk identification distances need to be increased where pressure containment risk is uncertain.	edit: possible pressure communication paying particular attention to the identification of high permeability streaks edit: **IRP The Subject Well Operator shall determine SCW's beyond the FPZ *using a conservative distance considering the uncertainty with reservoir communication.* addition: Distance guidelines for SCW identification would help. Suggestion: FPX x X(3 to 5?) times for high reservoir uncertainty, FPZ x Y (2 to 3?) times for low reservoir uncertainty.**	we have added to the bulleted list in 24.3.3.1 Determine at-risk IOWs • wells with fracture half-lengths that may intersect the FPZ • wells being drilled with planned trajectories that intersect the FPZ (not necessarily during fracture operations) The suggested distance guideline is intended as a safety factor to encourage operators to look beyond the FPZ. We believe we've addressed this by discussing wells that are drilled or planned to intersect the FPZ. If done properly, with the frac azimuth, the SCW up to 4 times Xf must be evaluated. We address uncertainty of Xf in Appendix C. there is a link to it in 24.3.2.3 in 24.3.2 IOW Determination we also included reference to "active operations (manned and unmanned)	10 Dec and 28 Jan
26	Technical	14-Sep-15	Regulator	22	24.3.2.3	Fracture azimuth (including available microseismic results)			added to the bullet as follows (consider surface and subsurface monitoring data such as microseismic data)	10-Dec-15
27	Editorial	09/11/2015	Consultant	23	24.3.3.1	First paragraph discusses identifying minimal risk wells. Second paragraph discusses wells that cannot be considered minimal risk wells. Third paragraph goes back to discussing minimal risk wells.	Improve logic flow of this section	Change order of first and second paragraph, i.e. begin this section with "Wells that require risk assessment include: IOWs that penetrate the Subject Well target zone IOWs that terminate near the Subject Well target zone"	Changed the order as suggested	5-Oct-15
28	Technical	09/11/2015	Consultant	23	24.3.3.1	Third paragraphs says "… determined not at-risk for reasons other than the parameters listed above…", but the only parameter discussed above for determining a well being not at risk is the Subject Well Operator's risk tolerance.	Rationale for classifying any well as "not at-risk" should be documented (or the Subject Wells Operator's "risk tolerance" should be clearly defined and documented).	Revise third paragraph to "If an IOW is determined not at-risk, then it is recommended to document a rationale for classifying the well not at-risk."	Deleted "for reason other than the parameters listed below"	5-Oct-15
29	Technical	09/13/2015	Consultant	23	24.3.3.1	The second sentence in the first paragraph is unclear as to whether or not the word "may" applies to both the first and the second occurrence of the word "require"	Reword to achieve clarity	Reword a part of the subject sentence as follows: "…may not require a barrier analysis and may not require any actions…"	Changed wording to say may not required any actions	5-Oct
30	Editorial	14-Sep-15	Regulator	24, 67	Glossary	Correction manufactures' to manufacture's		Correction manufactures' to manufacture's	Fixed on page 67, 24 11 and 51	5-Oct-15

31	Technical	14-Sep-15	Regulator	26	3.3.5	The Hazard Register should be the reference for the risk of long distance communication. This section could high light this fact.	Ensure the Risk register is used and is up to date.	Addition: The hazard register contains the latest information of recognized hazards.	Comment 1 in Hazard register for interwellbore communication reflects this	10-Dec-15
32	Technical	14-Sep-15	Regulator	27	24.3.4	Consider adding a section to address orphan wells or wells where there is no viable operator. Agreed.		Consider adding a section to address orphan wells or wells where there is no viable operator. Agreed.	Added a note Note to 24.3.4. IOW Well Control Plan, added an explanatory footnote to 24.3.6 Operator's Consulation IRP statement and aligned the glossary term IOW Well Operator.	28-Jan
33	Technical	14-Sep-15	Regulator	29	24.3.5	Do not understand the point of the final paragraph (paragraph 4) before section 24.3.5.1 to limit consultation with IOW operators until risks have been mitigated. Early consultation will help to decide which mitigation options can be considered. There is no logical reason to constrain when consultation can happen. Recommend deleting the paragraph. Agree. It is somewhat redundant with the second paragraph.		Recommend deleting the paragraph.	Deleted paragraph consultation can happen at any point. The intention of this section is to remind the SW Operator that appropriate well control practices have been considered and included in communicaiton to IOW Operators to minimize the risk of interwellbore communcaiton causing a well control event .	10-Dec-15
34	Technical	09/11/2015	Consultant	31	24.3.6	Subject Well Operator determines which wells are considered IOW. Subject Well Operator also determines which IOW are "at risk" based on Subject Well Operator's risk tolerance. However, risk tolerance of Subject Well Operator may differ from risk tolerance of IOW Operators.	All IOW Operators should be notified/consulted, not just operators of IOW that Subject Well Operator classifies at being "at risk"	Revise second bullet point as: "to inform the IOW Operator of the Subject Well Operator's pending fracture stimulation, and"	This could be impossible given the potential number of wells that may be above and out of zone of the SW Operator's planned operation. The work of determining 'at-risk' wells is intended to give the SW Operator a rigorous method to reduce the set rather than a random pick and choose.	10-Dec-15
35	Editorial	14-Sep-15	Regulator	32	24.3.6	4th bullet point is redundant with the 2nd and somewhat the 3rd. Recommend deleting it.		Recommend deleting it.	Deleted this bullet and shifted the bullets around subtly	10-Dec-15
36	Technical	14-Sep-15	Regulator	33	24.4	Sentence 2, paragraph 2. Recommend rewording as "Activities associated with multi-well leases may result in increased activity and congestion surrounding a well."		Recommend rewording as "Activities associated with multi-well leases may result in increased activity and congestion surrounding a well."	Suggested modification incorporated.	10-Dec-15
37	Editorial		CAPP	9	Figure 2	In Figure 2 the term AMP is not defined in the figure. The first time it is defined is on page 11. The term should be defined in the chart like "Adjusted Maximum Pressure (AMP)". This would help first time readers understand the document better.			Modified in Visio and replaced	8-Jan-16
38	Editorial	14-Sep-15		46	24.4.3.2	Should be 'known'			Fixed	5-Oct-15
39	Editorial	14-Sep-15	Regulator	49	4.3.2	*Correct know to known*		The surface operations hazard scenarios in the IRP 24 Hazard Register offer industry-know***n*** surface hazards	Fixed	5-Oct-15
40	Technical	09/13/2015	Consultant	51	24.4.4.2	Environmental effects will impact the "iron" stress-strain response, chemical degradation, and corrosion-cracking resistance.	Environmental factors might have substantial impacts on the "iron"	Add "degradtion due to environmental impacts" to the bullet list	Added chemical / environmental degradation	24-Nov-15
41	Technical	09/13/2015	Consultant	51	24.4.4.2	The term "iron" seems to relate to downhole tubulars and other steel components regardless of their iron content. Does it cover corrosion-resistant alloy with little iron content?	Applicability unclear	Clarify definition of the term "iron" as used in the IRP	Created a definition for iron and figure added to SWI and SO .	19-Jan-16
42	Technical		CAPP	13	24..2.3.2	Possible lack of consistency between operators when determining the deration of AMP for age and service		Maybe there should be a "sharing" site for operators to de rate the AMP (adjusted maximum pressure) based on age, etc. This could give a more realistic industry interpretation, and more accurate allow us to manage risk. For example, if the well is drilled and cased but sitting for so many months before frac'ing, what's the real risk associated with this? How much do we have to de rate the barrier envelop or elements (liner, stage tool, etc.) to get a realistic understanding of the AMP?	No modifications made. This can be a challenge. Provided burst and collapse calculations in Appendix B. This this is not exhaustive, but meant to provide guidance. IRPs are not intended to be prescriptive documents rather guidance documents that define factors to be taken into consideration.	7-Jan-16
43	Technical		CAPP	21	24.3.2.1	The use of only 2Xf when more than 2 ports or clusters are being simultaneously stimulated may not be enough of a buffer. This can be an issue if limited entry calculations are not correct or if there is a large stress differential along the section they this can lead to the fracture only going into one section.			No modification made.This can be an issue. It is covered in Appendix C: Modeling Fracture Half-Length. Step 1 in 24.3.2.1 refers to Appendix C.	7-Jan-16

44	Technical	14-Sep-15	Regulator	59	Appendix B	Strongly disagree with the first sentence. 'IRP 24 presupposes that a well design and casing are in place before a fracture stimulation program is developed.' The well design and casing should be chosen BASED on the fracture stimulation program in all new wells. This concept would eliminate a lot of potential failures such as casing failures, thread leaks etc. This is a Fracture Stimulation IRP (not a drilling IRP) and therefore should emphasize the importance of designing the well based on the stimulation program, not the other way around. The sentence should be reworded to align with the similar sentence in the first paragraph of 24.2 (page 7) or should be clearly stated that it is refereeing to an IOW or that by 'well design' they mean stimulation design. Strongly agree.		The sentence should be reworded to align with the similar sentence in the first paragraph of 24.2 (page 7) or should be clearly stated that it is refereeing to an IOW or that by 'well design' they mean stimulation design.	Reworked first paragraph in Appendix B and adjusted page 7 to reflect notes below: In all new wells, the well design and casing should be chosen based on the fracture stimulation as well as drilling program requirements. Including both concepts would ensure the well is designed for all activities expected on the well not just either the stimulation or drilling requirements.	10-Nov-15
45	Editorial	09/11/2015	Consultant	59	Appendix B	Text on page 60 and 61 refer to "Factors above" but this is not explicitly defined	Improve clarity, be explicit	Revise second paragraph as: "Consider the following Factors (casing conditions) that may reduce the maximum allowable load below the OEM pressure rating:"	Amended to highlight factors as well as reword paragraph in Appendix B	5-Oct-15
46	Technical	09/13/2015	Consultant	59	Appendix B	Temperature impacts both the casing properties and loading	The various impacts of temperature should be explicitly listed	Revise the second last bullet to say: "temperature (including impacts on casing material properties and loading)	adopted as suggested	10-Nov-15
47	Technical	09/11/2015	Consultant	60	Appendix B, Burst and Collapse	No reference on how to determine burst and collapse rating of casing.	IRP will be more helpful if it includes additional relevant references	Under Burst and Collapse heading, add reference to API 5C3 and AER Directive 10	Reference to footnotes added along with reference to API 5C3	10-Nov-15
48	Editorial	09/13/2015	Consultant	60	Appendix B	The second sentence in the last bullet under "Barrier Matallurgy" seems to either be missing the word "that" before the word "are", or have the "are" word redundant	Grammtical correction	Reword accordingly	added "that"	5-Oct-15
49	Technical	09/13/2015	Consultant	60, 61	Appendix B	Same as Comment 5 above, except I believe that the nature of the comment is technical.	Applicable factors have to be clearly identified and referenced	Clarify which factors apply to which considerations.	Revisited "factors" and defined as "factors influencing maximum allowable loads". Adjusted reference to factors through the Appendix B	10-Nov-15
50	Editorial	09/13/2015	Consultant	60, 61	Appendix B	Inconsistent use of case for "factors" or "Factors"	The referenced factors must be uniquely defined	Use consistent case	used lower case where appropriate	2-Nov-15
51	Technical		CAPP	23	24.3.3.1	Determination of At-Risk IOWs should include at all times require a barrier analysis due to the fact that this could be the determining factor for it characterization. Just because the IOW is not in the target zone it does not mean that there are not instances where communication could happen. This would be the case when 2 wells are relatively close horizontally but are in different formations. For example, the Wilrich and Falher in which large fractures are being pumped. Another case would be the re-fracture of an old field where the wellbore construction would be in question. It would be very important to look at all of the wells in the area to make sure that everything in in order. This section feels like a loop hole that could be problematic.			Modified as follows to include in the descriptor for at-risk wells • IOWs that penetrate or have hydraulic fracture geometry (maximum lateral and vertical extension, see Glossary) in the Subject Well target zone • IOWs that terminate or have hydraulic fracture geometry near the Subject Well target zone	7-Jan-16
52	Editorial	09/11/2015	Consultant	61	Appendix B, Burst and Collapse	Spelling error in first paragraph	Typographical error	Change "exiting" to "existing"	changed to existing	5-Oct-15
53	Technical	14-Sep-15	Regulator	62	Appendix B	Note suggests pressure relief is set a few mPa higher than the anticipated surface working pressure. Is milli-pascal intended or is it mega pascals		If Mega pascal is intended then edit to MPa.	Fixed	5-Oct-15
54	Editorial	09/11/2015	Consultant	62	Appendix B, Burst and Collapse	Extra letter "x" in variable definition of HDPmax	Typographical error	Delete extra "x"	Deleted extra X	5-Oct-15
55	Editorial	09/11/2015	Consultant	62	Appendix B, Burst and Collapse	In last sentence, there is a capitalization error in the pressure units	Typographical error	Change "mPa" to "MPa"	Changed	5-Oct-15
56	Editorial		CAPP	23	24.3.3	Are the steps for an IOW barrier analysis the same as for the Subject Well barrier analysis of section 24.2.3.1			Both determine a flowpath (subtly differently), but then they follow the same steps to establish and AMP. Added Step 4 regarding groundwater protection to the Subject Well Barrier Envelope Analysis.	7-Jan-16

57	Technical		CAPP	24	24.3.3.2	In Section 24.3.3.2 the document is suggesting that an IOW barrier envelope analysis should be performed on all At-Risk IOW. If the at risk well IOW is involves a different operator, the document contains an IRP on page 31 that outlines the consultation process and collaborative conversations that must take place. This is definitely taking the current process of communication to the next level. I can see this being a hard slog until all industry understands and adopts the IRP.			The industry and the regulator felt recommended practices on consultation requirements were in order.	7-Jan-16
58	Technical		CAPP	26	24.3.3.3	Without having sufficient understanding of interwellbore communication history, area stress mapping, and among other things a sufficient understanding of specific formation rock mechanics, the determination of risk proximity would be nothing other than a gut feeling. It is not realistic to assume that all producers in the province will go through all of the necessary work in order to make a properly understood scientific determination. Because of this, the section is very ambiguous and could lead to justification of short-cutting due to cost or timing in order to not properly prepare IOWs. For this reason I would not have this section in there at all and would rather see all wells with in the FPZ treated equally until we as an industry have a better understanding.			This section has to stay to tier risk of communication to prioritize the investigation/analysis of an IOW for factors like horizontal maximum stress direction and fracture height/length(geometry).	7-Jan-16
59	Technical		CAPP	32	24.3.6	Just as the Subject Well Operator has to provide a minimum amount of data for the fracture operations, it should be added that the IOW Operator has to provide a minimum amount of data about the specific well in question. Through our own experience and through talking with others in the industry, some operators feel that by saying only “No” to operations, is an acceptable level of communication even if their well may not be a risk. As previously mentioned, without having the barrier analysis done before the determination of At-Risk Wells, it is not possible to make an accurate classification of a well that would be within the target zone let alone outside of it. It is by having this information before the At-Risk Assessment that wells will not be improperly handled.			Added that IOW Operator needs to reply with a minimum amount of data. Phrased it as "publically available" data as follows: • Provide all publically available wellbore data (e.g., survey, tubulars, cement tops, stimulation)	13-Jan-16
60	Editorial		CAPP	32	24.3.6	While the IRP suggests a time frame of at least 15 days for consultation by the Subject well operator it only suggested an expeditious response by the identified offset well operator. This has led to some extended IOW response times which have delayed projects		suggest setting a required response time by the IOW operator	Refined the consultation request suggested timeline to 30 days for SW Operator to initiate and response from IOW Operator to respond within 15 days. Included a footnote for the suggested 30 days that with good relations between parties consultation could move more quickly. Also included reference to the IOW Operator to establish a corporate notification process.	7-Jan-16
61	Technical	14-Sep-15	Regulator	33	24.4	Recommend changing the IRP statement to a REG statement. While the general statement to minimize hazards may not point to a specific regulation, it speaks to the guiding principle of regulation and could reference multiple provisions in oil and gas, environmental and OHS regulations.		Recommend changing the IRP statement to a REG statement.	No modifications made. REG statements in IRPs are defined as follows in the preface, "REG statements include “must” as a verb and are supported and linked to related regulations. Compliance to REG statements is mandatory according to jurisdictional regulations. " The intention of this IRP is to set the basis for the flow diagram that follows in Figure 6. Similar IRP statements begin each chapter to set the structure and premise for each flow diagram.	7-Jan-16
62	Technical	10/21/2015	CAPP	33	24.3.6	What is to stop an offset operator from not communicating back with Subject well operator? How do you know which person to call at IOW operator company - is there a documented list that AER CAPP maintains?	Very little incentive for IOW to be rational - have encountered several times. Sometimes people being contacted know nothing about fracturing - choose to ignore	- lay out responsibilities and response times for IOW. What happens when they don't respond? - create a list within AER of responsible main contacts with each operator -What is timing beyond which offset operator lack of communication is deemed as 'approved' '- there is no teeth when offset operator doesnt respond or cooperate with millions of dollars of equipment and lease at risk	Included recommended timelines as well as a requirement for contact information to be readily available. The IRP statement does include "Assign a competent individual with knowledge of the IOW(s) in question." The IRP is not a regulatory document. These documents are intended for the industry to collaborate to determine guidelines.	7-Jan-16

63	Editorial		CAPP	33	24.4	The comment here is similar to my comment 2. The document uses the designation of REG instead of IRP to reference an Alberta Regulation in a document that will be applied in several provinces. I am not sure the discussions that were involved in creating this approach but my comment is similar to comment 2. If this is an Industry Recommended Practice we should say that the Operator shall have an Emergency Response Plan. A best practice ERP would include all the elements that are defined in Directive 071. In this case there is a statement in the REG that indicates the operator should operate in accordance with the "relevant jurisdictional regulations" which is appropriate to say.			No modifications made. The use of REG is common in IRPs (see preface pg. Vii) . We've clarified usage in the Preface under Scope to note the origins of the document is in Alberta.	7-Jan-16
64	Editorial		CAPP	35	Figure 6	In Figure 6, if the answer to the question: "Are Surface Operation Risks Minimized?" is No. Should the arrow not feed back to the question into the question until the answer is Yes then you would follow the flow chart through the lower box labelled 24.4.5 then proceed to the Fracture Stimulation Design circle?			No modifications made. The flow for change management is displayed correctly.	7-Jan-16
65	Technical		CAPP	37	24.4	Throughout the document the situation of high pressure with low volume safety is discussed, but at no time is low pressure with high volume safety dealt with. Some examples of situations where low pressure can be dangerous would be an air-can blowing proppant on location and CO2 or N2 hoses. There should be a section in the document that addresses the dangers of low pressure systems and how they also need to be respected.			Added reference to low pressure equipment in the "elevated hazard areas"	7-Jan-16
66	Technical		CAPP	37	24.4	A reference to IRP 4, pumping flammable fluids, should be included in the document somewhere.			Reviewed all reference to related IRPs and added sections to Subject Well Integrity and Surface Operations as a new headings in each chapter that provide hyperlinks to additional resources.	13-Jan-16
67	Editorial		CAPP	62	Appendix B	In the "Note" at the bottom of the page, it should read MPa not mPa. The correct SI abbreviation for mega is a capital M.			Suggested modification incorporated.	10-Nov-15
68	Editorial		CAPP	68	Glossary	In the definition for Licensee, Alberta and BC are referenced. Saskatchewan also utilizes the term licensee, it may be a good idea to reference them as well in this definition so they do not feel left out.			Saskatchewan definition incorporated into the glossary	2-Dec-15
69	Technical		CAPP	37	24.4	A discussion on temporary frac wellheads and wellhead isolation tools, should be discussed. These tools may give a false sense of surface protection.			The Subject Well Integrity section covers topics from the frac iron down. This includes the wellhead. Included a reference to IRP 5 in 24 .2.3.4. The section 24.2.4.3 Upgrade Barrier Envelope discusses strategies to upgrade limitations to barriers. This section was complemented from Subject Well Integrity chapter with a corresponding bullet in 24.4.6.2 During Fracture stimulation Operations • Take appropriate actions on the Subject Well to reduce the hazards when approaching the **Subject Well's** or an IOW's adjusted maximum pressure (i.e., go to flush, stop pumping, relieve pressure, etc.).	13-Jan-16
70	Technical		CAPP	51	24.4.4.2	Temperature limitations of the treating iron should be added to the list of concerns that the service provider should consider for their iron management plan. This is important when dealing with fluids such as LPG when ambient temperatures fall below zero and normal pumping conditions when pumping CO2. Even though these fluids have been pumped in iron for a number of years there may not have been any engineering studies done on the capabilities of the iron under these circumstances.			added a bullet referencing temperature and OEM specs on temperature limitations.	13-Jan-16

71	Editorial		CAPP	54	24.4.6.1	Should the wording in the second IRP on the page be in bold print to keep it consistent with the other IRP statements in the document?			No modification made. This IRP statement is not bold because it is a "should" not a "shall" statement. This is explained in the Preface of the document	13-Jan-16
72	Editorial		CAPP	55	24.4.6.2	Same comment as comment 2 and 5. Refer to Directive 83 as a best practice.			Clarified usage in the Preface under Scope to note the origins of the document is in Alberta. The use of REG is common in IRPs (see preface pg. vii)	7-Jan-16
73	Technical		CAPP	55	24.4.6.2	There should be a distinction between allowing the iron to have "Jack" in the line and to be "allowed to move freely". Jack is an important aspect in order to allow the line to not have stress cracking, connection loss and rate efficiency, having free movement can lead to the iron having moving in an uncontrolled manner such as what happened earlier in the year. It is for this reason, that this topic should be expanded to explain proper rig-in procedures and the use of ground restraints while pumping energized fluids.			Added additional content in two locations: 24.4.6.1 Pre-Fracture Stimulation a bullet reminding personnel to be aware that "• Treating iron is rigged-in to allow for normal movement (jacking) while minimizing wear points during pumping operations." 24.4.6.2 During Fracture Simulations a bullet reminding personal to "o to ensure the treating iron can move freely (jacking) while paying attention to potential wear points."	13-Jan-16
74	Technical	14-Sep-15	Regulator	56	24.4.6.2	6th bullet point – Rates can not exceed the AMP. Delete rate and just have 'pressures are not to exceed…..'		Delete rate and just have 'pressures are not to exceed…..'	Pressure and rate are now separate bullet.	13-Jan-16
75	Technical		CAPP	59	Appendix B	Under "Axial Loads" the varying density of fracturing slurries should also be a consideration that may reduce the maximum allowable load.			Adopted as suggested	10-Nov-15
76	Editorial		CAPP	62	Appendix B	HPmax is defined at the end of appendix B but there is no use or explanation of it in the document anywhere. This should be discussed under the "Maximum burst and collapse pressures" sections			No modifications made. Need to keep Hpmax in as it is defined within HDPmax	10-Nov-15
77	Technical		CAPP	63	Appendix C	Please see note for Section 24.3.2.1. More than 2 clusters or ports should also be in the list of scenarios in which 2Xf may be underestimated.			Bullet point added to Appendix C: • anticipated multiple fractures taking fluid and only one fracture receives the total volume	10-Nov-15
78	Technical	09/13/2015	Consultant	56	24.4.6.2	The last section bullet requires that "rates and pressures are not to exceed AMP"	The rate and AMP are incompatible for comparison.	If it is intended to include both the rates and such maintained so that the AMP is not exceeded". Otherwise, delete the word "rates" from the existing text	Pressure and rate are now separate bullet.	13-Jan-16
79	Technical		CAPP	56	24.4.6.3	The Post-Fracture Stimulation section is quite light compared to Pre-Frac		For the Post Frac period, notification to concurrent operations such as Pad drilling, perforating adjacent wellbores may be required	Added reference to notify concurrent operations and at-risk IOW Operators when frac-operations are complete.	13-Jan-16
80	Editorial		Consultant	63	Appendix B	illustrate equation variables on a diagram			No modifcations made. Appendix B is a sample calculation that will not be applicable in all cases. The addition of an illustation in Appendix B, may make the reader feel obliged to use only the calcuations, or rely solely on the calcuations and miss other steps in the barrier analysis.	19-Jan-16
81	Technical		Regulator	General		Recommend adding a section on reporting of interwellbore communication events. This is required by D-83 and other regulators. Agreed. Suggest add as follows; Regulatory agencies in Alberta and BC have requirements and systems in place for the reporting of interwellbore communication events. These databases will support continued understanding of event occurrences and prudent stimulation designs to mitigate hazardous incidents.			Added a REG statement to the start of interwellbore communication and included a bullet under Wellsite Supervisor responsibilites during fracture stimulation.	13-Jan-16
82	Technical		Regulator	General		IRP should discuss wellbore construction design. The only guidance that exists is concerned with drilling with the exception of Dir 10 that states 'Postdrilling operations, such as fracturing, must be considered' and Directive 83. Dir 83 mentions the requirement to document safety factors and adjusted max pressures but there is no guidance as to what the safety factors should be or why/how to adjust max pressure. Maybe the [Regulator] should lead the way on this.			A discussion of wellbore construction is out of scope for IRP 24. D010 is limited, but well construction may deserve an IRP of its own. A REG statement and IRP statement was added to 24.4.6 discussing casing integrity testing and pressure testing pre-, during and post fracc IRP 24 Co-Chairs will review with DACC the need for an IRP regarding well construction that is more holistic than just fracture stimulation.	19-Jan-16
83	Editorial		CAPP	12	Appendix B	· Step 3 remove the last sentence which is in parentheses as it has already been applied to all barriers in Step 2. (See Appendix B for suggested calculations to understand existing well envelope burst and collapse.)			Retained the reference to appendix B, but directed the reader to the Barrier Envelope calculations only as suggested calculations	10-Nov-15

84	Technical	14-Sep-15	CAPP		IRP 24 Hazard Register	Hazard Register does not seem to be a finished technical product	The Hazard Register has several deficiencies: -"Surface Operations" Tab has no relation to this current IRP version (Interwellbore Communication) -No context for HSSE & NPT columns. Are these numbers supposed be related to a risk matrix? -In "Subject Well Integrity", all items should all be reviewed. In particular, Item 7, 12, 13, 15, are too specific. Item 16 is too simplified.	Remove "Surface Operations Tab". Review "Subject Well Integrity" and "Interwellbore" tabs.	It appears the commentor was viewing an old version of the HR that did not include SWI and SO.	19-Jan-16
85	Technical		CAPP	63	Appendix B	• As and engineer, I like Appendix B as it shows the concepts behind the many corrections that could come in to play to set AMP and ultimately setting both the maximum surface pumping pressure and the equipment shut down. However the calculations to nail down many of the reduction factors suggested are beyond many producing companies and even industry capabilities. • I am concerned on how one does that derating (for corrosion one can log to see metal loss and calculate accordingly but how does one estimate and derate for geological faulting or pressure communication between wells – I don't know of any industry papers showing those calculations) • The last set of equations for "Maximum burst and collapse pressure" o Are we really trying to set maximum burst or are we (in a backwards way) trying to set maximum surface treating pressure and set the stop pumping pressure. o Up to this point most equations may be possible producing companies with a large enginnering operation. But the final few eaquations that want us to take in account reaction time error and instrument error become very specific that perhaps only a few equipment design engineers can actually put a number to. In closing I would suggest Appendix B could remain if we could construct a leading sentence/paragraph suggesting one should consider the concepts but are not expected to do rigourous calculation.			Worked to clarify how the calculations are organized and emphasized that this is one methodology to calulcate. In Step 2 of 24.2.3.1 stipulates the pressure is determined at the SW operators discretion / risk tolerance	10-Nov-15
86	Technical	10/21/2015	CAPP		entirety	no upfront clear chapter or appendix that states what documentation is clearly required to be acceptable from an audit trail	85 page document is very long, but it is a good document. Have a section called - documentation requirements	-include section for documentation requirements clearly outlines to operator what they need to do to meet minimum doc requirements. Also suggest stating what is required in the field vs the office.	No modifications made. The focus of the IRP does not surround documentation, rather an risk-based approach to fracture stimulation to minimize risk. Providing a list of documentation could lead the reader to fulfill documentation "requirements" rather than exploring how this risk-based approach could be integrated into the organization.	19-Jan-16
87	Technical	14-Sep-15	Regulator	17	24.3	I think they should get rid of the term 'energy' when refereeing to offset wells ('offset energy wells'). Shouldn't we be concerned with all wells? Why is this term necessary? First of only 2 sentences that it shows up. Are water source wells energy wells?			Removed energy wells because the use of "energy" is not all-encompassing. Removing "energy" allows for the inclusion of disposal and water wells. "Energy" removed from intro paragraph of 24.3 from 24.3.2 the statement preceding the bulleted list. Added openhole to this list. Finally, the glossary term for offset well was modified to remove the word energy so, "Any offset well that is proximal to the Subject Well	2-Dec-15
88	Technical	14-Sep-15	Regulator	17	24.3	Interwellbore communication it not something to be strictly avoided, as may result in poor reserves recovery. Suggest add a statement as follows; Interwellbore communication can be an indicator of effective reservoir stimulation and potential reserves recovery.		Suggest add a statement as follows; Interwellbore communication can be an indicator of effective reservoir stimulation and potential reserves recovery	The introductory paragraph has been modified: In some cases interwellbore communication can be planned to enhance reservoir stimulation. This chapter presents a process to determine at-risk offset wells, complete a barrier envelope analysis at an offset well and adapt well control planning appropriately for both planned and unplanned interwellbore communication.	26-Nov-15

89	Technical	10-Dec	Regulator			Consider the addition of a pressure testing guide to confirm integrity pre and post frac			Included a REG statement regarding casing integrity in 24.4.6 fracture Stimulation Execution. Added an IRP 'should' statement, " The Subject Well Operator should ensure the AMP is not exceeded pre-, during or post fracture stimulation operations. Note. Ensure pressure is relieved after the pressure test is completed."	19-Jan-16
90	Technical	10-Dec	Industry			Offset well licensees may not respond in a timely manner to a frac notification. 24.3.6 to include guidance on timeframes on how the consultation should be conducted including use of multiple contacts and persistent documented attempts and the resultant correspondence.		Suggested: a well publicized corporate communcation and a time duration	added to 24.3.6	10-Dec-15
91	Technical	10-Dec	Industry			Awareness of manned subsurface well operations at a risk distance from the frac operation		a drive-around	Included consideration for a drive-around in 24.4.6.1 Pre-fracture Stimulation as part of Wellsite Supervisor responsiblities. Also included reference to consider "active operations (manned and unmanned)" in 24.3.2 IOW Determination.	19-Jan-16
92	Technical	10-Dec	Industry		24.3.6	Awareness of manned subsurface well operations at a risk distance from the frac operation		Offset Well licensee shall advice SW licensee of any impending operations	Added this bullet to IOW consultation IRP · Disclose any impending operations at the offset well that may be influenced by the proposed fracture stimulation.	19-Jan-16
93	Technical	10-Dec	Industry			Awareness of manned subsurface well operations at a risk distance from the frac operation		Offset Well Licensee of manned operations should monitor the frac notification operation list and would have to contact the SWL for offset well risk information.	Added this bullet to both SW and IOW consultation IRP · Establish communication contacts at the field level between the Operators, for pre-, during and post-fracture stimulation notification. · Engage in collaborative consultation with the goal of developing a mutually-agreeable IOW Well Control Plan.	19-Jan-16
94	Technical	10-Dec	Industry			Awareness of manned subsurface well operations at a risk distance from the frac operation		Industry set-up a frac operations data base. Includes FPZ. Third party organizations were suggested as possibilities.	No modifications made. This is not within the scope and intention of an IRP. Suggest this be initiated by the AER since there is infrastructure already in place for spudding. Perhaps a similar approach may be appropriate and leveraged for frac initiations notifications. IRP 24 Co-Chairs will bring this forward to DACC.	19-Jan-16
95	Technical	10-Dec	Industry			SW Operations Controls in consideration of Special Consideration Manned Operations Wells		Develop distance guidance and recommended controls for SCW offset distances. A possible Traffic light approach with distance. A new descriptor for this risk area is required to differentiate it from the FPZ. An option: Pressure Planning Zone (PPZ)	This is addressed with in 24.3.3.1 Determine At-Risk IOWs with the following two bullets: • IOWs that penetrate or have hydraulic fracture geometry (maximum lateral and vertical extension, see Glossary) in the Subject Well target zone • IOWs that terminate or have hydraulic fracture geometry near the Subject Well target zone	19-Jan-16
96	Technical	10-Dec	Industry			While geologic parameters are identified as risk factors in IRP 24, linkage to communication event distances needs to be advanced to provide a better risk assessment. This correlation is critical to defining PPZs.		AER prepares operations exclusion zone requirement based on impact interpreted PPZ. AER was specifically asked that the interwell bore communication data be made available to industry.	No modifications made. Perhaps this is more appropriate for an IRP regarding drilling planning after fracture stimulations IRP 24 Co-Chairs to bring this forward to DACC.	19-Jan-16