HAZARD ORGANIZATION			ACCIDENT SEQUENCE				RISK ANALYSIS									RESIDUAL RISK ANALYSIS									CONTROL MEASURE MONITORING				
Hazard ID No.	Hazard Type (select)	Equipment / Area / System	Undesirable Event / Failure Modes	Cause	Consequence	Current Control Measures	Worker Severity Level (select)	Worker Freq. (select)	Worker Risk Level (auto)	Public Severity Level (select)	Public Freq. (select)	Public Risk Level (auto)	Enviro Severity Level (select)	Enviro Freq. (select)	Enviro Risk Level (auto)	Proposed Control Measures Under Consideration	Worker Residual Severity Level (select)	Worker Residual Freq. (select)	Worker Residual Risk (auto)	Public Residual Severity (select)	Public Residual Freq. (select)	Public Residual Risk (auto)	Residual Enviro Severity Level (select	Enviro. Freq. (select from list)	Enviro Risk Level (auto)	Control Measure Status (select)	Next Action Date	Type of Completed Control Measures (select)	Risk Reduction Comments / Documentation	Control Owner (name / group)
15	Work Environment: High Traffic	Common to ALL Existing Meters	Motor Vehicle Accident	Worker required to drive through heavy traffic to reach customer to perform meter reading, repair / service, and or disconnect service inj #1274 [2002] - Worker was rear ended, suffers pain between shoulder blades - Head on collision caused public death	Worker (meter techs, meter readers) injury Public injury	Worker Awareness & Training	S5 - Fatality	L4 - 1 / 1,000 years	4	S6 - Fatality	L3 - 1 / 10,000 years)	4				Energy (Not Demand) Smart meters - Option to use disconnect switch to disconnect and reconnect meter - there are other logistics problems with using the disconnect switch - Although visits will still be required for maintenance / repairs; however, frequency is believed to be dramatically reduced	S5 - Fatality	L3 - 1 / 10,000 years)	3	S6 - Fatality	L3 - 1 / 10,000 years)	4				In Service		Design Controls - Minimize		
15																Policy to mandate no work during rush hour	S5 - Fatality	L3 - 1 / 10,000 years)	3	S6 - Fatality	L3 - 1 / 10,000 years)	4				Still in Review		System Controls - Competence		
15																One designate driver with a group of meter installer	S5 - Fatality	L3 - 1 / 10,000 years)	3	S6 - Fatality	L3 - 1 / 10,000 years)	4				Still in Review		System Controls - Competence		
15																Don't rush - i.e. delay work when possible (no rush to finish all jobs by end of shift) - (don't pay worker at per unit rate basis)	S5 - Fatality	L3 - 1 / 10,000 years)	3	S6 - Fatality	L3 - 1 / 10,000 years)	4				Still in Review		System Controls - Competence		
15																Policy to implement "No accident incentives" - if worker has not MVA for a long time, provide bonus	S5 - Fatality	L3 - 1 / 10,000 years)	3	S6 - Fatality	L3 - 1 / 10,000 years)	4				Still in Review		System Controls - Competence		
16	Other	Common to ALL Existing Meters	Worker bit by dog	Required to perform meter reading, repair / service, and / or disconnect service at private properties with hostile dogs inj #1199 [2002], 1200 [2002], 1201 [2002], 1223 [2002], 1227 [2002], 1231 [2002], 1851 [2004], 2519 [2007], 2642 [2007] - meter reader bit by dog	Worker injury (soft tissue damage)	Training PPE (umbrella) Trouble customer database	S3 - Temporary disability	L7 - 1 / year	4							Energy (Not Demand) Smart meters - Option to use disconnect switch to disconnect and reconnect meter - there are other logistics problems with using the disconnect switch - Although visits will still be required for maintenance / repairs; however, frequency is believed to be dramatically reduced	S2 - Treatment by medical professiona l	L6 - 1 / 10 years	3							In Service		Design Controls - Minimize		
16																Tracking system on worker - Take action if worker does not respond within an anticipated time	S2 - Treatment by medical professiona l	L6 - 1 / 10 years	3							Still in Review		System Controls - Monitor		

HAZARD ORGANIZATION			ACCIDENT SEQUENCE				RISK ANALYSIS										RESIDUAL RISK ANALYSIS									CONTROL MEASURE MONITORING				
Hazard ID No.	Hazard Type (select)	Equipment / Area / System	Undesirable Event / Failure Modes	Cause	Consequence	Current Control Measures	Worker Severity Level (select)	Worker Freq. (select)	Worker Risk Level (auto)	Public Severity Level (select)	Public Freq. (select)	Public Risk Level (auto)	Enviro Severity Level (select)	Enviro Freq. (select)	Enviro Risk Level (auto)	Proposed Control Measures Under Consideration	Worker Residual Severity Level (select)	Worker Residual Freq. (select)	Worker Residual Risk (auto)	Public Residual Severity (select)	Public Residual Freq. (select)	Public Residual Risk (auto)	Residual Enviro Severity Level (select	Enviro. Freq. (select from list)	Enviro Risk Level (auto)	Control Measure Status (select)	Next Action Date	Type of Completed Control Measures (select)	Risk Reduction Comments / Documentation	Control Owner (name / group)
16																For any new account, customer is asked if they have a dog although a custoemr can acquire a dog after the account is established	S2 - Treatment by medical professional	L6 - 1 / 10 years	3							In Service		System Controls - Competence		
17	Other	Common to ALL Existing Meters	Worker exposed to physical and verbal abuse from hostile customers	Required to perform meter reading, repair / service, and / or disconnect service at private properties with violent / aggressive customers nm # 79258 [2009] - worker was threatened by customer during meter disconnect	Worker injury	Training Communication device Do not perform work alone Trouble customer database	S2 - Treatment by medical professional	L6 - 1 / 10 years	3							Energy (Not Demand) Smart meters - Option to use disconnect switch to disconnect and reconnect meter - there are other logistics problems with using the disconnect switch - Although visits will still be required for maintenance / repairs; however, frequency is believed to be dramatically reduced	S2 - Treatment by medical professional	L4 - 1 / 1,000 years	1							In Service		Design Controls - Minimize		
17																Tracking system on worker - Take action if worker does not respond within an anticipated time	S1 - First aid	L6 - 1 / 10 years	2							Still in Review		System Controls - Monitor		
17																BCH tracks bad customers to be able to warn workers ahead of time of problematic customers	S2 - Treatment by medical professional	L4 - 1 / 1,000 years	1							Still in Review		System Controls - Monitor		
18	Natural Event: Adverse Weather	Common to ALL Existing Meters	Worker exposed to harsh conditions	Worker required to routinely read meters on the field inj # (1140, 1153, 1168,1211, 1220, 1221, 1252, 1264, 1276, 1302) [2002], 1337 [2003], worker suffered bruises, hypertension, cuts, allergic reactions, and etc.	Worker injury (slip, trip, fall, frostbite, etc)	None identified	S3 - Temporary disability	L6 - 1 / 10 years	3							Energy (Not Demand) Smart meters - Option to use disconnect switch to disconnect and reconnect meter - there are other logistics problems with using the disconnect switch - Although visits will still be required for maintenance / repairs; however, frequency is believed to be dramatically reduced	S3 - Temporary disability	L4 - 1 / 1,000 years	2							In Service		Design Controls - Minimize		

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Hazard ID No.	Hazard Type (select)	Equipment / Area / System	Undesirable Event / Failure Modes	Cause	Consequence	Current Control Measures	Worker Severity Level (select)	Worker Freq. (select)	Worker Risk Level (auto)	Public Severity Level (select)	Public Freq. (select)	Public Risk Level (auto)	Enviro Severity Level (select)	Enviro Freq. (select)	Enviro Risk Level (auto)	Proposed Control Measures Under Consideration	Worker Residual Severity Level (select)	Worker Residual Freq. (select)	Worker Residual Risk (auto)	Public Residual Severity (select)	Public Residual Freq. (select)	Public Residual Risk (auto)	Residual Enviro Severity Level (select)	Enviro. Freq. (select from list)	Enviro Risk Level (auto)	Control Measure Status (select)	Next Action Date	Type of Completed Control Measures (select)	Risk Reduction Comments / Documentation	Control Owner (name / group)
19	Work Environment: Poor Accessibility	Common to ALL Existing Meters	Delayed emergency response	Meter located at a remote location - not knowing worker sustained an injury/ unable to access injured worker	Worker injury	None identified	S4 - Permanent disability	L4 - 1 / 1,000 years	3							Energy (Not Demand) Smart meters - Option to use disconnect switch to disconnect and reconnect meter - there are other logistics problems with using the disconnect switch - Although visits will still be required for maintenance / repairs; however, frequency is believed to be dramatically reduced	S4 - Permanent disability	L3 - 1 / 10,000 years)	2							In Service		Design Controls - Minimize		
																Not all meters are on the network. Ensure to connect as many of the remote meters onto the network to minimize need for travel	S0 - Near miss	L6 - 1 / 10 years	2							Still in Review		Design Controls - Minimize		
19																Tracking system on worker - Take action if worker does not respond within an anticipated time	S4 - Permanent disability	L3 - 1 / 10,000 years)	2							Still in Review		System Controls - Monitor		
																For oil fields, workers are required to measure Hydrogen Sulphur sensors										In Service		System Controls - Competence		
20	Other	Common to ALL Existing Meters	- Explosion and fire (meter faulted) - Projectiles off of the explosion	Different voltage meters can be installed into the same base nm # 82060 [2009] 347V meter blown out in a 600V service found on trouble call	Worker injury Public injury	Worker training	S5 - Fatality	L4 - 1 / 1,000 years	4	S6 - Fatality	L3 - 1 / 10,000 years)	4				Smart meter - Has auto range ability / auto sense - digital readout on meter can serve as a double check for installers	S0 - Near miss	L0 - 1 / 10,000,000 yrs	1	S1 - Near miss	L0 - 1 / 10,000,000 yrs	1				In Service		Design Controls - Eliminate		
																With Smart meters, significantly reduced the number of meter types from 200 to <15	S0 - Near miss	L0 - 1 / 10,000,000 yrs	1	S1 - Near miss	L0 - 1 / 10,000,000 yrs	1				In Service		Design Controls - Minimize		
21	System Failure: (Mechanical) Equipment Failure	Common to ALL Existing Meters	Worker exposed to arc flash	Meter base or meter failure when removing meter for repairs or maintenance inj # 1014 [1998], 1050 [1999], 2051 [2005] nm # 1008 [1998],1303 [2003], 1480 [2003], 1579 [2004], 1693 [2004], 1839 [2004], 65752 [2006], 76393 [2008], 77719 [2008]	Worker injury	PPE (safety glasses, rubber gloves) Meter Puller to install and remove meter CSA standard C22.2 No.115 *Meter Mounting Devices*	S3 - Temporary disability	L6 - 1 / 10 years	3							Standard procedure is to ask customer to open their main switch (remove the load), do the work with the meter, and then reinstate the load gradually	S3 - Temporary disability	L3 - 1 / 10,000 years)	2							In Service		Design Controls - Minimize		

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Hazard ID No.	Hazard Type (select)	Equipment / Area / System	Undesirable Event / Failure Modes	Cause	Consequence	Current Control Measures	Worker Severity Level (select)	Worker Freq. (select)	Worker Risk Level (auto)	Public Severity Level (select)	Public Freq. (select)	Public Risk Level (auto)	Enviro Severity Level (select)	Enviro Freq. (select)	Enviro Risk Level (auto)	Proposed Control Measures Under Consideration	Worker Residual Severity Level (select)	Worker Residual Freq. (select)	Worker Residual Risk (auto)	Public Residual Severity (select)	Public Residual Freq. (select)	Public Residual Risk (auto)	Residual Enviro Severity Level (select	Enviro. Freq. (select from list)	Enviro Risk Level (auto)	Control Measure Status (select)	Next Action Date	Type of Completed Control Measures (select)	Risk Reduction Comments / Documentation	Control Owner (name / group)
22	System Failure: (Mechanical) Equipment Failure	Common to ALL Existing Meters	Fire in meter base due to overheat	Arc occurred when meter is pulled from meter base. Excessive heat caused terminals to fuse together causing overcurrent	Worker injury Public injury	PPE (safety glasses, rubber gloves) Meter Puller to install and remove meter CSA standard C22.2 No.115 *Meter Mounting Devices*	S3 - Temporary disability	L5 - 1 / 100 years	3	S4 - Temporary disability	L5 - 1 / 100 years	3				Have fire extinguishers in trucks ready for small fire	S2 - Treatment by medical professional	L5 - 1 / 100 years	2	S3 - Treatment by medical professional	L5 - 1 / 100 years	3				Still in Review		System Controls - Respond		
Smart Meter: Design																													
23	System Failure: (Electrical) Equipment Failure	Smart Meter (residential, non-CT meters)	Meter: Thermal runaway	Resistant in connection (mechanical plunger type disconnect switch) causes high temperature rise (can goes up to 70/80 C at full load) - and high temperature causes higher resistance	Public injury Property damage	None identified				S6 - Fatality	L3 - 1 / 10,000 years)	4				Design to ANSI stds for disconnect switches - compliant to 5000 open / close cycles - in real operation, rarely will 1 meter be subjected to that many # of open / close cycles				S6 - Fatality	L0 - 1 / 10,000,000 yrs	2				In Service		Design Controls - Minimize	Need documentation from [redacted] s.22	
23																ITRON meter has a temperature sensor that is currently not activated. Worth while to investigate whether it can be activated to give information on internal temperature of the meters										Still in Review		System Controls - Monitor		
24	System Failure: (Electrical) Equipment Failure	Smart Meter (residential, non-CT meters)	Fire / meter failure	Condensation build-up on electronics in Smart Meter due to increase in temperature rise from disconnect switch	Public injury	None identified				S6 - Fatality	L3 - 1 / 10,000 years)	4				Perform accelerated life tests on the meters during detailed design phase				S6 - Fatality	L0 - 1 / 10,000,000 yrs	2				In Service		System Controls - Competence	s.22 Need documentation from [redacted]	
25	System Failure: (Mechanical) Equipment Failure	Smart Meter (residential, non-CT meters)	Fire / meter failure	When operated, switch stop at intermediate stage (neither open nor close), leads to arcing	Public injury Property damage	None identified				S6 - Fatality	L2 - 1 / 100,000 years	4				Design switch and test to ANSI specs. ITRON claimed mecanical geometry of disconnect switch makes it impossible for the switch to be stuck at an intermediate state				S6 - Fatality	L0 - 1 / 10,000,000 yrs	2				In Service		Design Controls - Minimize	s.22 Need documentation from [redacted] s.22	
																Perform test to ensure this phenomenon does not poses any hazards				S6 - Fatality	L0 - 1 / 10,000,000 yrs	2				In Service		System Controls - Competence	Need documentation from [redacted]	

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26	Other	Smart Meter	Disturbance of house hold electronics (i.e. baby monitors, phone, GFI, etc) or other public devices at same/similar frequency - confirmed cases of new Smart Meters interfering with GFIs, Garage Door Openers, Baby Monitors	Depending on communication infrastructure chosen, - meters may be communicating with one another to relate information back to BCH - meters may be communicating information directly to an access point back to BCH - meters may also be communicating with the home display unit	Public injury Bad BCH Reputation	None identified				S3 - Treatment by medical professional	L6 - 1 / 10 years	3				Passed Instrument Canada's regulations - completed Powertech Testing				S3 - Treatment by medical professional	L7 - 1 / year	4			In Service		Design Controls - Minimize	s.22 [redacted] o follow up / Need Powertech report	
26																Use different (licensed) frequency band				S3 - Treatment by medical professional	L0 - 1 / 10,000,000 yrs	1			Not Selected		Design Controls - Minimize	ITRON meters use unlicensed frequency band	
27			Operational failures resulting in a safety hazard	Any unknown or hidden failure modes in the meter design Deployment large # of new Smart Meters (~1 5 million) at one time in a short period of time	Public injury BCH reputation (recalls)	None identified				S6 - Fatality	L1 - 1 / 1,000,000 years	3				Plan deployment strategies by learning from other utility's deployment strategies or practices/ manufacturer's recommendation and failures modes									In Service		System Controls - Competence		
27																Staged deployment										Not Selected		System Controls - Competence	- time duration is too lengthy	
27																Use larger initial sample size (perform greater sample testing in the beginning to assure quality of meters)				S1 - Near miss	L5 - 1 / 100 years	1			In Service		Design Controls - Minimize	Extensive testing before installation Functionality / Security can be upgrade by pushing firmware through the network to upgrade every meter	
27																Rely on product warranty insurance (7 yrs)									Still in Review		System Controls - Competence		
Smart Meter: Deployment																													
28	Other	Deployment	MVA	Large deployment of meter techs to replace old meter with new meters across the province	Public injury Worker injury	Workers driver training Customer call centre to take calls from customers	S5 - Fatality	L5 - 1 / 100 years	4	S6 - Fatality	L5 - 1 / 100 years	5				1 designated driver / area with 1 vehicle carryings lots of meter tech	S5 - Fatality	L4 - 1 / 1,000 years	4	S6 - Fatality	L4 - 1 / 1,000 years	5				Not Selected		System Controls - Competence		
28																Driving training (BC Hydro Policy - not allowed to use any communication device while driving) for Contractors										Still in Review		System Controls - Competence		
28																CT meters will be done by BC Hydro existing contract force (who knows the danger of CT meters)														
28																incentive structures for workers (to ensure workers do not rush)														

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28																Apply BC Hydro policy to contractors as well (i.e. no hand-held devices while driving)														
28																Arrange and plan for customers to call Call Center if any problems after meter change out and not the Meter Tech														
29	Other	Deployment	Worker bit by dog	Required to enter private properties with hostile dogs to change out meter inj #1199 [2002], 1200 [2002], 1201 [2002], 1223 [2002], 1227 [2002], 1231 [2002], 1851 [2004], 2519 [2007], 2642 [2007] - meter reader bit by dog	Worker injury (soft tissue damage)	Training PPE (umbrella)	S3 - Temporary disability	L8 - 10 / year	5							Send notices to all home owners about meter change out time and request to have their dogs / animals restraints during that time	S3 - Temporary disability	L6 - 1 / 10 years	3							Still in Review		System Controls - Competence		
29																Workers to carry umbrellas or pepper spray, etc Train workers on use of these measures prior to deployment	S1 - First aid	L8 - 10 / year	3							Still in Review		System Controls - Competence		
29																Tracking system on worker - Take action if worker does not respond within an anticipated time	S2 - Treatment by medical professional	L8 - 10 / year	4							Still in Review		System Controls - Monitor		
29																Communicate problem household lists to contractors to warn or potential hazard at certain home site										Still in Review		System Controls - Competence	- review notes to ensure there isn't any privacy issues	
29																Update as recent conditions as possible before deployment to ensure the most up-todate information is available to the deployment contractors										Still in Review		System Controls - Competence		
29																Review privacy policy / access to information														
30	Other	Deployment	Worker attacked by hostile customers	Required to enter private properties with hos ile customers to change out meter	Worker injury	Training PPE (umbrella)	S2 - Treatment by medical professional	L7 - 1 / year	3							Communicate problem customer lists to contractors to warn or potential hazard at certain home site (include as part of meter instructions)														
30																For problematic area, reserve work for BC Hydro workers / usual contractors to better control situation														
30																Update as recent conditions as possible before deployment to ensure the most up-todate information is available to the deployment contractors														
30																Review privacy policy / access to information														

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31	Natural Event: Adverse Weather	Deployment	Worker exposed to harsh conditions	Worker required to change out meters in the field inj # (1140, 1153, 1168,1211, 1220, 1221, 1252, 1264, 1276, 1302) [2002], 1337 [2003], worker suffered bruises, hypertension, cuts, allergic reactions, and etc.	Worker injury (slip, trip, fall, frostbite, etc)	None identified	S3 - Temporary disability	L7 - 1 / year	4							Schedule meter change out timeframe to avoid local's harshest weather conditions Avoid meter change out during adverse weather (i.e. heavy snow, heavy wind, rain, etc)	S3 - Temporary disability	L5 - 1 / 100 years	3							Still in Review		Design Controls - Minimize		
32	System Failure: (Electrical) Equipment Failure	Deployment	Worker exposed to arc flash	Installing / pulling meter under load nm # 83004 [2010] - installing meter, arc flash - PLT sustained burns on forearm	Worker injury	Pulling meter underload (even 200A) is ok, no flash. Only flash when something shorted during the pulling process. PPE (safety glasses, rubber gloves) Always knock on door before pulling meters	S3 - Temporary disability	L6 - 1 / 10 years	3							Send notices to all home owners about meter change out time	S3 - Temporary disability	L4 - 1 / 1,000 years	2							Still in Review		System Controls - Competence		
32																Use Meter Puller														
32																Procedure: if meter appears overloaded (i.e. from reading meter) or meter appear to be part of grow-up, or tempered, or anything out of the ordinary, follow additional procedure (i.e. ask to shut off power before pulling meter)	S3 - Temporary disability	L4 - 1 / 1,000 years	2							Still in Review		System Controls - Competence		
33	System Failure: (Mechanical) Equipment Failure	Deployment	Worker exposed to arc flash	Meter base or meter failure when removing meter for change out Last year statistics from VI and LM, which is 70% of meters in province, ~ 40,000. There were only 8 meter base failures. inj # 1014 [1998], 1050 [1999], 2051 [2005] nm # 1008 [1998],1303 [2003], 1480 [2003], 1579 [2004], 1693 [2004], 1839 [2004], 65752 [2006], 76393 [2008], 77719 [2008]	Worker injury	PPE (safety glasses, rubber gloves) Face shield Meter Puller to install and remove meter	S3 - Temporary disability	L6 - 1 / 10 years	3							None identified													

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34	Human-Induced Event: Vandalism	Deployment	Worker exposed to fire/ explosion or other hazards during meter change-out	The old meter or meter base has been compromised in some way by customers and worker discovers it on site during meter change out to Smart Meters nm # 2009 [2005] - incorrect meter base installation, PLT flash burn, 71529 [2006], 73974 [2007]	Worker injury	PPE (safety glasses, rubber gloves) Face shield	S4 - Permanent disability	L5 - 1 / 100 years	3							Devise procedures to handle any theft, vandalism, and any other abnormal meter conditions during smart meter change-out / deployment (i.e. have work leaders standby and inform security when necessary)	S4 - Permanent disability	L3 - 1 / 10,000 years)	2							Still in Review		System Controls - Competence		
34																Cell phones or other communication device for emergencies. Wear appropriate ID.	S3 - Temporary disability	L5 - 1 / 100 years	3							Still in Review		System Controls - Respond		
35	Other	Deployment	Worker suffers stress and strain	Worker having a hard time fitting meter into the base (smart meter lighter in weight and meter prongs and bases are not good fit), difficult to use finger to open and close screw on ring (due to location of meter and ring condition)	Worker injury	Meter Puller to install and remove meter	S2 - Treatment by medical professional	L7 - 1 / year	3							Rubber meter hammer	S2 - Treatment by medical professional	L5 - 1 / 100 years	2							Still in Review		System Controls - Competence		
35																Use new self locking ring (for homes ~1.2 million), helps sit the new meter in and it's easy to install on meter (snap onto meter)	S2 - Treatment by medical professional	L4 - 1 / 1,000 years	1							Still in Review		Design Controls - Minimize		
36	Other	Deployment	Worker exposed to arc flash / explosion	Install meter and close in on an internal short / fault on the customer's side (more a problem or connect / re-connect or new installation) nm #1739 [2004], 74610 [2007] - PLT installed meter into dead short, failed to see short circuit light nm# 1572 [2004] - 120V on load side, arc flash nm #75042 [2007] - Trainee missed final check, load said fault	Worker injury	PPE (safety glasses, rubber gloves) Possible electrical inspector confirmation of no shorts / fault prior to installation Possible use multi-meter to check for shorts before meter connection	S4 - Permanent disability	L6 - 1 / 10 years	4							Have meter with disconnect switch open so that worker can push in meter, stand back, and use handheld device to remotely activate disconnect switch so that worker is out of the bite										Not Selected		Design Controls - Minimize	High security risk feature, Not possible until this issue is resolved in technology	
37	Other	Deployment	Explosion and fire (meter faulted) - Projectiles off of the explosion	Different voltage Smart Meters can be installed into the same base nm # 82060 [2009] 347V meter blown out in a 600V service found on trouble call	Worker injury Public Injury	worker training	S5 - Fatality	L5 - 1 / 100 years	4							New Smart Meters have auto-range capability and work the entire sweep of voltages required (1 meter fits all)										In Progress		Design Controls - Eliminate		

HAZARD ORGANIZATION			ACCIDENT SEQUENCE				RISK ANALYSIS									RESIDUAL RISK ANALYSIS									CONTROL MEASURE MONITORING				
Hazard ID No.	Hazard Type (select)	Equipment / Area / System	Undesirable Event / Failure Modes	Cause	Consequence	Current Control Measures	Worker Severity Level (select)	Worker Freq. (select)	Worker Risk Level (auto)	Public Severity Level (select)	Public Freq. (select)	Public Risk Level (auto)	Enviro Severity Level (select)	Enviro Freq. (select)	Enviro Risk Level (auto)	Proposed Control Measures Under Consideration	Worker Residual Severity Level (select)	Worker Residual Freq. (select)	Worker Residual Risk (auto)	Public Residual Severity (select)	Public Residual Freq. (select)	Public Residual Risk (auto)	Residual Enviro Severity Level (select	Enviro. Freq. (select from list)	Enviro Risk Level (auto)	Control Measure Status (select)	Next Action Date	Type of Completed Control Measures (select)	Risk Reduction Comments / Documentation	Control Owner (name / group)
38	Other	Deployment	- Explosion and fire (meter faulted) - Projectiles off of the explosion	New Smart CT meter and normal meter can be installed into the same base 1Ph and 3Ph CT meter can be installed into the same base Regular meter to CT meter base will cause dead short inj# 75023 [2007] - worker inserted meter when CT meter should have been installed and faulted nm # 82060 [2009] 347V meter blown out in a 600V service found on trouble call	Worker injury Public injury	Worker training (meter tech certified, trade qualification)	S5 - Fatality	L3 - 1 / 10,000 years)	3	S6 - Fatality	L3 - 1 / 10,000 years)	4				Proposed to use contractors to install typical <200A, 600V socket meters; while CT meters will only be installed by BCH specially trained workers	S5 - Fatality	L0 - 1 / 10,000,000 yrs	1	S6 - Fatality	L0 - 1 / 10,000,000 yrs	2				Still in Review		Design Controls - Minimize		
38																New CT meter has 5 jaws, physically different from self-contained meter (meter base is wired differently, so even if a meter is placed incorrectly, terminals will not be shorted) Incident may occur if worker did not recognize meter type as CT and just change out old CT with new self contained meter	S5 - Fatality	L0 - 1 / 10,000,000 yrs	1	S6 - Fatality	L0 - 1 / 10,000,000 yrs	2				Still in Review		Design Controls - Minimize		
38																Worker to be trained to put in adaptor plate first before installing the meter to avoid putting wrong meters into the wrong base														
39	Other	Deployment	Worker exposed to arc flash or contact electrical potential	Worker accidentally contacted energized components or cause ph-ph fault of energized components in the meter enclosure nm #75789 [2008] - PLT accidentally swung 1 metering wire into energized CTs nm #2407 [2006] - Meter tech contacted ph with other ph wire nm #1661 [2004] - test probe came loose and contacted energized part Inj #1105 [2001] - Meter tech contacted energized buss with uninsulated tool	Worker injury	Worker training Use of cover-ups	S4 - Permanent disability	L5 - 1 / 100 years	3							None identified													
40	Work Environment: High Electrical Potential	Deployment	Worker contacts line voltage while working with test block	~6 transformer meters in the system were not equipped with potential transformer, hence, worker would be working with primary voltage on the test block while expecting secondary voltage	Worker injury	None identified	S5 - Fatality	L2 - 1 / 100,000 years	3							Double check voltages before job	S5 - Fatality	L0 - 1 / 10,000,000 yrs	1							Still in Review		System Controls - Competence		

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41	Human-Induced Event: Theft	Deployment	Information/ Hydro lockbox key used for criminal activity (i.e. robbery)	[redacted]	Public injury (BCH reputation)	Procedure to make sure that the keys given to workers have been returned				S6 - Fatality	L2 - 1 / 100,000 years	4				Worker background check / contractor audits										Still in Review		System Controls - Competence		
41				s. 15												Screen through and limit the type of information given out to worker										Still in Review		System Controls - Competence		
41																Consider to remove lockboxes before, during or after deployment of SMI										Still in Review		Design Controls - Eliminate		
41																Inspector from BCH to supervise process										Still in Review		System Controls - Competence		
41																review key ring process before, during, and after deployment														
Smart Meter: Operation / Maintenance																														
42	Other	Smart Meter	Worker exposed to extensive electromagnetic radiation from meter communication	In a meter shop, lots of meters will be tested at one time everyday and meter tech is constantly exposed to the electromagnetic radiation from many meters every day	Worker injury Public injury	None Identified	S2 - Treatment by medical professional	L6 - 1 / 10 years	3							Wear PPE	S1 - First aid	L6 - 1 / 10 years	2							Not Selected		PPE - Personal Barrier	None necessary	
42																Test chamber for meters	S2 - Treatment by medical professional	L0 - 1 / 10,000,000 yrs	1							Not Selected		Design Controls - Eliminate	Non necessary	s.22
42																Work Procedure to limit exposure	S2 - Treatment by medical professional	L4 - 1 / 1,000 years	1							In Service		System Controls - Competence	[redacted] to provide a copy of the presentation that summarizes maximum power limit	
42																Zigbie switch is shipped turned OFF, LAN is also turned OFF										No Longer Required				
42																Inquire other utility of their experience in testing smart meters										No Longer Required				
43	System Failure: (Mechanical) Equipment Failure	Smart Meter (residential, non-CT meters)	Inoperable switch when operation is needed (i.e. stuck in intermediate state)	Switch was not used for a long time since installation (Once installed, meter is good for 8 yrs, for a normal account, the disconnect switch may never need to be activated for a long time)	Worker injury (need to disconnect customer with load, may draw arc) Public injury (may need to disconnect due to a fire hazard but could not) Property damage (same as public injury)	None Identified				S1 - Near miss	L4 - 1 / 1,000 years	1				Accelerated life test (lab testing)										In Service		System Controls - Competence	Need documentation from [redacted]	s.22

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43																During remote disconnect and reconnect, there is a feedback signal to confirm that the operation has been successfully completed or not. If remote operation is not successful, a manual disconnect will be initiated. Disconnec with optical probe is NOT allowed										In Service		System Controls - Competence		
43																Reconnect can be performed on site with optical probe, but may lead to more trouble. Best to just replace meter if reconnect is not successful										In Service		System Controls - Competence		s.22
44	Human-Induced Event: Theft	Smart Meter	Encouraged Theft or Vandalism activities Meter failures / Fire	With smart meters, no meter reading every 2 months is required. A meter may not get another visit from BCH until many years later as only samples will be tested / checked every 6 yrs. Criminals may take this as an opportunity to steal or vandalize meters	Property damage Revenue lost	None Identified	S5 - Fatality	L6 - 1 / 10 years	5	S6 - Fatality	L6 - 1 / 10 years	6				Schedule check / periodic inspections (including checking for site conditions) every 2 - 3 years for every meter	S1 - First aid	L5 - 1 / 100 years	1	S1 - Near miss	L5 - 1 / 100 years	1				Still in Review		System Controls - Competence		[redacted]
44																Meter equipped with accelerometer. If meter was de-energized and showed movement, then it can be a sign of temper and control center will be notified	S1 - First aid	L5 - 1 / 100 years	1	S2 - First aid	L5 - 1 / 100 years	2				In Service		System Controls - Monitor		
44																Code may need to be updated to ensure customer allow access to meters at all times, not just physical access, but electrical, radio, and network access										Still in Review		System Controls - Competence		s.22
45	Other	Smart Meter	MVA	Worker required to use some sort of hand-held device to communicate with smart meter while also driving in traffic	worker injury	Training										Follow BCH policy of no hand-held device or handsfree device while operating a vehicle										In Service		System Controls - Competence	Smart meters does not allow that kind of remote interface which also elimiate potential security issues	
46	Work Environment: Poor Accessibility	Smart Meter	Worker unable to locate meter	No operation required until a physical maintenance is required, which may have an extended period of time without anyone accessing the meter (vegetation may unknowingly grown blocking access)	Worker injury	None Identified	S3 - Temporary disability	L3 - 1 / 10,000 years)	2							Schedule check / periodic inspections (including checking for site conditions) every 2 - 3 years for every meter	S2 - Treatment by medical professional	L4 - 1 / 1,000 years	1							Still in Review		System Controls - Competence		[redacted]

HAZARD ORGANIZATION			ACCIDENT SEQUENCE				RISK ANALYSIS										RESIDUAL RISK ANALYSIS									CONTROL MEASURE MONITORING				
Hazard ID No.	Hazard Type (select)	Equipment / Area / System	Undesirable Event / Failure Modes	Cause	Consequence	Current Control Measures	Worker Severity Level (select)	Worker Freq. (select)	Worker Risk Level (auto)	Public Severity Level (select)	Public Freq. (select)	Public Risk Level (auto)	Enviro Severity Level (select)	Enviro Freq. (select)	Enviro Risk Level (auto)	Proposed Control Measures Under Consideration	Worker Residual Severity Level (select)	Worker Residual Freq. (select)	Worker Residual Risk (auto)	Public Residual Severity (select)	Public Residual Freq. (select)	Public Residual Risk (auto)	Residual Enviro Severity Level (select	Enviro. Freq. (select from list)	Enviro Risk Level (auto)	Control Measure Status (select)	Next Action Date	Type of Completed Control Measures (select)	Risk Reduction Comments / Documentation	Control Owner (name / group)
46																Procedure for workers: do not attempt to work on meter when meter is difficult to access										Still in Review		System Controls - Competence	s.22	
47	Work Environment: Poor Accessibility	Smart Meter	Worker unable to access meter	Electrical room used as a storage room (due to meter not being visited for an extended period of time)	Worker injury	None identified	S3 - Temporary disability	L5 - 1 / 100 years	2							Schedule check / periodic inspections (including checking for site conditions) every 2 - 3 years for every meter	S1 - First aid	L5 - 1 / 100 years	1							Still in Review		System Controls - Competence		[redacted]
48	System Failure: (Mechanical) Equipment Failure	Smart Meter	Fire / Explosion / Inadvertent energization of home-hold appliances Worker exposed to arc flash / explosion	- Undetermined state of switch - Unknown durability of switch after fault - Possible reconnection with electrical appliances in ON state nm # 1739 [2004], 74610 [2007] - PLT installed meter into dead short, failed to see short circuit light nm #1572 [2004] - 120V on load side, arc flash nm #75042 [2007] - Trainee missed final check, load side fault	Worker injury Public injury Property damage	PPE (safety glasses, rubber gloves) Possible electrical inspector confirmation of no shorts / fault prior to installation Possible use multi-meter to check for shorts before meter connection	S4 - Permanent disability	L4 - 1 / 1,000 years	3	S5 - Permanent disability	L4 - 1 / 1,000 years	4				Optional customer permissive switch. Switch will not reconnect if load-side voltage present.	S4 - Permanent disability	L1 - 1 / 1,000,000 years	2	S5 - Permanent disability	L1 - 1 / 1,000,000 years	2				Not Selected		Design Controls - Minimize	Customers may not know where or how to activate the switch. Or customer may just activate switch without removing load first	
48																Load Site Voltage Detection: Checks for voltage on load side: if present, switch cannot close. Optional reconnect only with customer intervention to prevent fires.	S4 - Permanent disability	L3 - 1 / 10,000 years)	2	S5 - Permanent disability	L4 - 1 / 1,000 years	4				In Service		Design Controls - Minimize	The LSV may not always work, especially for P261 meters. For other meters, as long as customer follows the code (i.e. to have transfer switch before generator), backfeed should not be present. LSV fail if customer didn't follow code	
48																Stand back and use handheld device to remote activate disconnect switch so that worker is out of bite (shipped with switch open)	S0 - Near miss	L4 - 1 / 1,000 years	1	S5 - Permanent disability	L4 - 1 / 1,000 years	4				In Service		System Controls - Competence		
48																Before reconnect, operator will state the safety warnnig to the customer (to open breaker, turn off appliances and lighting)	S4 - Permanent disability	L3 - 1 / 10,000 years)	2	S5 - Permanent disability	L3 - 1 / 10,000 years)	3				In Service		System Controls - Competence	Legal is reviewing fire warning language	