Enbridge Energy, Limited Partnership Lakehead Plan

Submitted to PHMSA
August 2 (Revised August 3), 2012

ENBRIDGE™

Enbridge Energy, Limited Partnership

LAKEHEAD PLAN

Prepared for and Submitted to the
Pipeline and Hazardous Materials Safety Administration
(PHMSA)

on August 3, 2012

In response to PHMSA Corrective Action Order
CPF No. 3-2012-5017H,
as Amended August 1, 2012

ENBRIDGE ENERGY, LIMITED PARTNERSHIP
LAKEHEAD PLAN ("PLAN")
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I. Executive Summary

On July 27, 2012, a pipeline leak was discovered on Enbridge Energy, LP's ("EELP") Line 14, approximately four miles downstream of Adams Station near Milepost ("MP") 232 in Adams County, Wisconsin. The pipeline was immediately shutdown, isolated and repaired in accordance with regulatory requirements and Company procedures. Line 14 is operated by Enbridge Liquids Pipelines Business Unit ("Enbridge LP") on behalf of EELP.

In response to the release the Pipeline and Hazardous Materials Safety Administration ("PHMSA") issued a Corrective Action Order ("CAO") on July 30, 2012. On August 1, 2012, EELP submitted a Restart Plan for consideration by PHMSA in accordance with the CAO.

In a letter dated August 1, 2012, PHMSA issued an Amendment to the CAO ("Amendment") that specified various additional requirements that EELP needs to fulfill before returning Line 14 to service. The Amendment requires that EELP submit for review and approval, a written plan that outlines specific actions and timelines for safety improvements to the Lakehead Pipeline System ("System"). EELP hereby submits this Lakehead Plan ("Plan") in response to the CAO Amendment.

The Plan details the specific initiatives, milestones and completion dates for the CAO Amendment Item 13, sections (a) – (l) as follows:

a) Organizational issues, safety culture and safety management system;
b) Facilities Response Plan;
c) Control Room Management;
d) Priorities for pipe replacement;
e) Training;
f) In-line inspection result interpretation;
g) Current engineering and probability of failure modeling;
h) Leak detection systems and sensor and flow measuring;
i) Valve replacement
j) Integrity verification;
k) Quality management system;
l) Other safety improvements

EELP will complete the actions required in the CAO and progress initiatives in accordance with the Plan and has retained an independent pipeline expert to assess and monitor EELP's adherence to this Plan.

EELP commits to have the pipeline expert oversee the creation, execution and implementation of the actions identified in the Plan which we believe will improve Enbridge's record of safety on the Lakehead Pipeline System. We believe that this Plan will also benefit the pipeline industry, as Enbridge also commits to participate in various industry initiatives to advance industry knowledge, tools and standards as set out in more detail in our Plan in relation to integration of ILI results, probability of failure modeling, safety culture/safety management and Emergency Response Planning.

Furthermore, Enbridge commits to address any deficiencies or risks identified in the pipeline expert's assessment. In order to properly address any such deficiencies or risks, additional discussion with PHMSA, the pipeline expert and Enbridge may be warranted to ensure appropriate interests and issues are taken into account.

EELP believes these measures in combination with self-initiated actions under various phases of implementation in response to recommendations from the July 2012 National Transportation Safety Board Final Report, meet the intent of the CAO amendment. Since 2011 EELP has implemented many improvements to its procedures and processes which are outlined and attached as Appendix A. These are incremental to the action items set out in this Plan.

Accordingly, EELP hereby requests approval from PHMSA to restart Line 14 in accordance with the Restart Plan and the Lakehead Plan. EELP trusts these Plans satisfy PHMSA's requirements and would be prepared to discuss any aspects of either in greater detail, if required.

II. Plan Initiatives - Lakehead Plan

A. Organization, Safety Culture and Safety Management System

The Enbridge organizational values are that employees demonstrate: Integrity, Safety and Respect in support of our Communities, the Environment, and Each Other. Enbridge Management is committed to reducing releases and safety incidents towards a goal of zero incidents and communicates that objective on a regular basis across the organization. Enbridge also places great value on a culture of continual learning in order to improve upon safety, compliance and processes. Lessons learned are shared with and between employee groups through bulletins, meetings and forums and with industry through association committees and regulatory workshops.

Development and Implementation of an Integrated Management System

Enbridge LP commenced an Integrated Management System review process in 2010 through an independent consultant. Since 2010, Enbridge LP, through its work with the independent consultant has been designing an Integrated Management System framework to best suit the activities of its operations. The Integrated Management System, when completed, will be the authoritative source of information for all levels in the organization on how Enbridge LP conducts its business. The principles upon which this IMS is built and its structure are designed to ensure that the Enbridge LP vision, business strategies, and values are implemented in a consistent and comprehensive manner throughout the entire LP organization. The IMS comprises the standard for all the policies, processes, and practices throughout the organization and provides transparency and line-of-sight management of systems, policies, processes, and practices.

The overall system is developed in alignment with ISO standards and all applicable regulatory standards. Once operating, the IMS will improve on compliance and safety as it will standardize investigations of incidents to ensure lessons learned are communicated appropriately to employees, contract workers and shared with industry. Additionally, lessons learned from such investigations will be used to create corrective actions, which may include procedural improvements within the various management systems.

1. Specific Actions, Tasks & Commitments

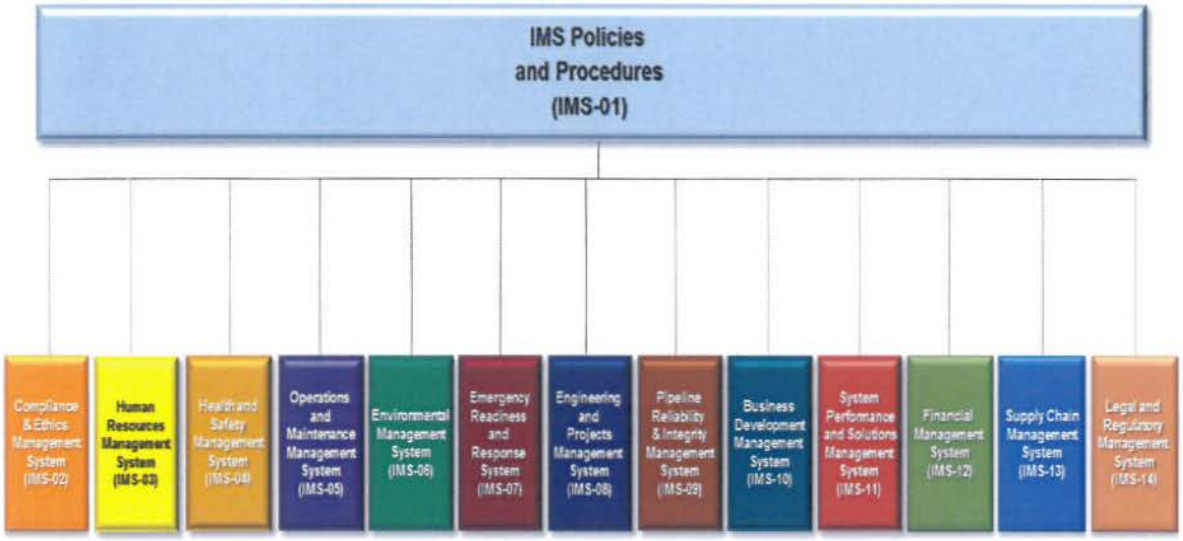
a. Core Elements of the Overall IMS Projects

- Development of the IMS management system
- Organizational design and alignment
- Identification and documentation of core business process
- Development of the individual elements of the overall IMS system as set out below:

Specific Elements in the development of the IMS

- Metrics (Recast and structured based on reorganization)
- IMS-01 Management System (Governance Guidelines)

- Management Systems Standards and Style Guide
- Training and Coaching (Orientation, Managing by Metrics, etc.)
- Core Business Process Development
- Individual Management System Development



2. Training

The overall training program is designed to inform the organization at appropriate levels and use of the key elements of the Integrated Management Systems. Key training programs for leaders are planned to include:

- Introduction to the Integrated Management System
- Managing within Your Own Management System
- Administering the Management System
- Department Specific Processes & Practices
- Departmental Risk Management & Planning
- Managing By Metrics
- Establishing the Process Baseline
- Root Needs Identification (Voice of Customer)
- Process Metrics
- Process Performance Analysis
- Developing Process Solutions
- Implementing Process Improvements

3. Milestones & Completion Dates For Specific Actions

- Metric Development and Roll out High Level Metrics - 3rd quarter 2012
- IMS -01 Development and roll out – 4th quarter 2012
- Management System Standards and Style guides – 3rd quarter 2012

- Training and Coaching (Orientation, Managing by Metrics, etc.) Initial training 4th quarter 2012
- Core Business Process Definition and Improvement – Ongoing
- Individual Management System Development
- Environmental Management System Roll-out completed 3rd Quarter 2012
- Compliance and Ethics Management System – Roll-out 3rd Quarter 2012
- Prioritization of Management System Development – 3rd Quarter 2012

Detailed Organizational Re-Design

As part of the integrated management system process, Enbridge Liquids Pipelines Business Unit ("Enbridge LP") announced organizational structure changes on July 19, 2012. As part of the process to achieve this reorganization, a detailed process is underway to focus on organizational mandate definition, critical departmental interfaces and relationships as well as functional clarification and accountability definition by department.

1. Specific Actions, Tasks & Commitments
   - High-level re-design
   - Review and revise department mandates
   - Validate department functions
   - Design/refine the organization structure at a departmental level
   - Determine functional accountabilities
   - Establish staffing requirements and job descriptions

2. Training
   - Orientation training for Organization Structure
   - Awareness training for mandates and roles and responsibilities
   - Functional Accountability Management Training (RASCI Management)
   - Management of Change orientation and implementation training

3. Milestones & Completion Dates For Specific Actions
   - High-level re-design – Completed: July 2012
   - Review and revise department mandates: Completion 3rd Quarter 2012
   - Validate department functions: 3rd Quarter 2012
   - Department level organization structure: 4th Quarter, 2012
   - Functional accountabilities: 4th Quarter 2012
   - Establish staffing requirements and job descriptions: Completion by 4th Quarter 2012

Safety Culture and Creation of a Safety Management System

In 2008, Enbridge recognized the need to understand and improve our safety culture. We undertook a benchmark assessment, utilizing the services of DuPont Sustainable Solutions

– specialists in the implementation of organizational and individual change management processes that can transform safety culture. The benchmark assessment showed areas where Enbridge LP was strong and also areas needing improvement. In 2010, the safety culture transformation began – with a scope of work that would build on strengths and address areas needing improvement.

Enbridge is committed to protecting the safety and health of our employees, our contractors and the public. Enbridge is committed to a goal of zero injuries, incidents or occupational illnesses. Striving for anything less than "zero", can lead to the false belief that injuries, incidents and occupational illnesses are acceptable. In every instance, following company policies and procedures is required to protect the health and safety of workers and the public.

1. Specific Actions, Tasks & Commitments

- The goal of the safety culture transformation is to develop a consistently high value for safety across Enbridge, reflected in the collective movement toward an Interdependent safety culture – a place where employees and contract workers are looking out for one another and working together.

  Scope of Work

  - Enhance Employee Safety Management
  - Establish Process Safety Management
  - Enhance Contractor Safety Management

- Enbridge is committed to preparing Health & Safety Principles that will be communicated through various mediums (live training, online training, desk drops, etc) to all employees and contract workers to continually stress the importance of Enbridge's Safety Culture and goal to reduce pipeline and safety incidents to zero.

- Enbridge has developed and implemented enterprise-wide Lifesaving Rules that are applicable to all employees and contract workers. These rules have been and will continue to be annually communicated by Executive Management to all employees and contract workers and they are founded on previous incidents at Enbridge and will protect people and save lives.

- Focus Areas include all Operating Regions, Control Centre, and Office & Off-the-job Safety.

- Further to Enbridge LP's focus on integrated management and the development of our Safety Culture, Enbridge LP is committed to the continuous improvement of our safety management system and in leading and participating in industry wide initiatives (such as API) focused on improving safety management system standards and practices.

2. Training

- Lifesaving Rules – all employees and contractors receive training annually.
- Safety Perception Survey Workshops – all employees and provisioned contractors discuss safety and develop action items.
- Safety that Works for Operations
- Safety Management Fundamentals
- Safety Observation Coaching
- Process Safety Management – process teams are receiving training in areas like Process Hazards Analysis, Management of Change and other PSM elements.
- Incident Investigations – Operations personnel receiving hands-on training for Incident Investigation tool. Lessons learned from these investigations will be shared, as appropriate, with employees, contract workers and industry.

3. Milestones & Completion Dates For Specific Actions

- Safety Culture Engagement in all Operations Regions – underway and to be completed by September 2012
- Establish Process Safety Management Teams
  - PSM Governance – September 2012
  - Incident Investigation – April 2012
  - Management of Change – April 2012
  - Process Safety Information / Process Hazards Analysis – October 2012
  - Pre Start-up Safety Reviews – January 2013
- Contractor Safety Management – Ongoing annually
- Office and Off-the-job Safety
  - Workplace EHS Teams in Edmonton, Calgary and Superior – since June 2012
  - Kick-off for Office and Off-the-job Safety – October 2012
- Evaluate safety culture progress with Safety Perception Survey – May 2013
- Lead and participate in the development of industry standards (example API) – ongoing
- Enhance Safety Management System – Q4 2013
- Develop Health & Safety Principles which will be communicated to all employees & contract workers - Q4 2013

B. Facilities Response Plan "FRP"

1. Specific Actions, Tasks & Commitments

- Emergency Response (ER) Capability Assessment - The Response Group (TRG), a well-known Emergency Response consulting firm headquartered in Houston, has been retained to complete a system-wide emergency response capability assessment. The assessment will focus on company capabilities and the state of readiness to respond and successfully contain potential releases. As part of this Assessment, EELP will review historic timelines with respect to discovery and response and will accordingly revise the capability assessment, plans and

procedures. EELP commits to provide PHMSA with a copy of the ER Capability Assessment.

- Emergency Response Plan Revisions – A project team has been assembled, with oversight from TRG, to review the emergency response procedures contained in Enbridge LP's Operation and Maintenance Procedures (O&MPs) Book 7, Parts I (general) & II (regional specific). The review is focused on content, usability and regulatory requirements for submission. Enbridge will organize a meeting with the independent pipeline expert and PHMSA to review the existing ER Plan. The independent pipeline expert will provide a report on its assessment of the ER Plan concurrently to EELP and PHMSA.

- Incident Action Plan (IAP) Tool Development - This task involves work by TRG to prepopulate IAP software with Enbridge LP-specific content, including: equipment locations, current control point information, tactical plan information, plan templates and contact/notification information.

- Emergency Response Job Aids Development - This task is focused on providing job aids to support the Regional ER teams, including: an incident management handbook; an exercise design guide; a tactical response guide; and, ICS role-specific guides.

- Emergency Response Drills – EELP commits to lead area response drills to involve communities, external agencies and local emergency responders along the Lakehead System in 2012/2013 and regularly thereafter. EELP commits to coordinate these drills and share our FRP for inclusion with Area and Regional Contingency Plans (National Incident Management System). The areas chosen for these drills will be prioritized in consultation with the independent pipeline expert and PHMSA.

- Enbridge Enterprise Emergency Response Team (E3RT) Exercise - A cross-Business Unit emergency response assist team was created to respond to potential Tier 3 incidents that require more resources than a single region, or business unit, can provide. The first major exercise for the E3RT will take place in September, 2012, in Houston. EELP commits to invite PHMSA and the independent pipeline expert to observe the E3RT Exercise.

- Crisis Management Plan Revisions - TRG has been contracted to evaluate the Crisis Management Plan and recommend improvements to streamline the plan and ensure consistency with the overall ER Plan.

- API/AOPL Emergency Response Strategy Workgroup – EELP commits to actively participate in industry initiatives (working committees, organizations, etc) and to influence change with the goal of continually improving industry standards and practices associated with emergency response management. EELP will share lessons learned and best practices around FRP with industry (ie .API working group) in relation to Enbridge's Emergency Response experiences.

2. Training

- ICS Training - Baseline ICS training will continue to be provided to response teams across Enbridge LP. The training courses being given include: ICS 100/200; ICS 300; Exercise Design; and Environmental Unit Lead Training.

- Tactical Training Plan Development - During 2012, the ER and Training groups will assess and evaluate tactical ER programs currently delivered across Enbridge LP Regions and develop a consistent ER training plan that covers tactical topics, such as: ER notification; ice slotting; boat handling; HAZWOPER; inland oil spill response; and boom deployment.

3. Milestones & Completion Dates For Specific Actions

Task	Completion Date
ER Capability Assessment	Q4 2012
Emergency Response Plan Revisions	Q4 2012
Incident Action Plan (IAP) Tool Development	Q4 2012
Emergency Response Job Aids Development • Incident Management Handbook and Exercise Guide • Tactical Response and ICS Guides	 Q4 2012 Q4 2013
Crisis Management Plan Revisions	Q4 2012
Enbridge Enterprise Emergency Response Team Exercise	Q3 2012
API/AOPL Emergency Response Workgroup	2012/13
Baseline ICS Training	Q1 2013
Tactical Training Plan Development	Q1 2013

C. Control Room Management

The Control Center Operations (CCO) has completed a significant number of changes and enhancements to its control room management and training over the past two years to position the control room in the best in class category and ensure the safety of our pipeline operations as outlined in Appendix A.

1. Specific Actions Tasks and Commitments:

   - Control Room Management (CRM): Enbridge LP has developed and implemented a comprehensive CRM plan as required by U.S. Code of Federal Regulations. The CCO is committed to address any issues identified during the PHMSA CRM audit earlier in the year and as outlined in the Notice of Amendment (NOA) dated July 6, 2012. Changes to the CRM Plan have already been implemented to address these areas of concern and the required response to the NOA will be filed with PHMSA before August 8, 2012. The CCO will also conduct an internal review of its CRM plan using a 3rd party consulting expert to ensure adherence and effectiveness. Scope of the review will include required staffing levels and performance metrics.

   - CCO Procedures Review and Enhancements: The CCO will conduct a review of its emergency and operating procedures and management systems for effectiveness and industry best practices. Actions plans will be developed and executed based on the recommendations.

   - CCO Safety Culture Enhancements: The CCO will continue work with DuPont on the current action plans to improve Safety Culture in the control center. Safety Culture Improvements Initiatives will continue through the newly formed CCO Safety Leadership Committee.

2. Training:

   - CCO Team Training & Operator Qualification Program Enhancements: The CCO will further enhance its training program to include semi-annual team training in the recognition of and response to emergency and unexpected conditions that include supervisory control and data acquisition system indications and Material Balance System software. The CCO will further enhance its Operator Qualification program to include all CCO staff involved in pipeline operational decisions.

3. Milestones & Completion Dates for Specific Actions:

Task	**Completion Date**
CRM Plan Notice of Amendment Response	August 8, 2012
CRM Plan Internal Review by 3rd Party	August 2013
CCO Procedures Review	December 2012
CCO Safety Culture Improvements – Current Action Plans	December 2012

CCO Safety Culture Improvements	Ongoing
CCO Team Training Development and Implementation	March 2013
CCO Operator Qualification Program Enhancements	March 2013

D. Priorities for Pipe Replacement

Background

Enbridge LP's pipe replacement analysis procedure evaluates feature density (crack, corrosion, and deformation), predicted feature growth, anticipated repairs, and high risk areas / HCA consideration. Asset management aspects such as future capacity requirements and pipeline system operability are also incorporated into the decision to utilize replacement as a pipeline remediation strategy. In 2011 and ongoing, Enbridge LP established a specific engineering team to evaluate replacement programs. This has resulted in the NPS 36 Line 6B Asset Plan for replacing 75 miles of pipeline starting in 2012.

1. Specific Actions, Tasks & Commitments

EELP will commit to the following actions as part of the Lakehead System CAO:

- Submit the 2013 and 2014 pipe replacement plan (based upon the pipe replacement analysis noted above) to PHMSA once final evaluations are complete.
- Pipe replacement strategy shall include a focus on eliminating incidents, targeting priority areas of high consequence, pipe downstream of pump stations, and pipe most at risk of failure.
- Coordinate a review of the 2013 and 2014 pipe replacement plan with PHMSA and the independent pipeline expert.
- In conjunction with ILI, EELP will assess hydrotesting in high risk areas (defined in the replacement plan) downstream of pump stations where pipe is not planned to be replaced. The results of that assessment will be shared with the independent consultant and PHMSA.
- Develop improvements to the probabilistic modeling methods which quantify the effect of pipe replacement on the overall Enbridge LP operational risk assessment profiles. Provide a report to PHMSA that describes the results relative to the 2013 replacement plan.

2. Training
   See Section J on Training

3 Milestones & Completion Dates For Specific Actions

- 2013 Lakehead System Pipeline Replacement Plan - Completed by December 31, 2012
- 2014 Lakehead System Pipeline Replacement Plan – Completed by December 31, 2013
- Improvements to Probabilistic Modeling - Completed by June 30, 2013; Implemented by 2014.
- Two reports - July 31, 2013 and March 31, 2014.

E. Training

Specific training is primarily embedded into each of the specific initiatives identified.

Enbridge is committed to ensuring a culture of learning that supports our Values. These Values provide balance not only in what we do, but also in how we do things. Enbridge has made a commitment to act according to the ideals described in our values. We have integrated our values into our various areas within our employee and leadership development course offerings. Our Enbridge Values include: Respect, Integrity and Safety.

To support development, performance and career progression, Enbridge actively invests in its people by providing a series of programs and courses for both employees and people leaders delivered through the Enbridge University curriculum (ENBU). The ENBU currently offers 80 courses under the following categories (faculties): Energy Studies, Business Excellence, Risk Management, Project Management, Leadership Development and Personal Excellence.

In addition to these offerings, employees are also required to take mandatory courses which include the Statement on Business Conduct (which is Enbridge's code of ethics), Lifesaving Rules, Health and Safety Management System (HSMS), Enbridge Values, Onboarding program, acceptable use of computing assets, maintaining respectful workplace, alcohol and drug free workplace policy, and fraud awareness training.

Enbridge supports training and development in order to enable its employees to remain current with advances in technology, practices and procedures and to develop the skillsets necessary to conduct their work.

F. In-Line Inspection Result Interpretation

Background

Since 2010, numerous changes in how crack in-line inspection data is interpreted have been applied. Enbridge LP has also enhanced and is committed to improving in-line inspection data integration methods and processes. See Appendix A for recent improvements. Key incremental improvement actions are identified below.

1. Milestones & Completion Dates For Specific Actions

- Develop updated in-line inspection data flow and quality assurance processes including formalized communication of any unreported defects that meet the detection threshold back to the ILI vendor with a documented investigation and review. Complete by Q4, 2012.

- Review current crack in-line inspection reporting requirements and identify opportunities to increase reporting parameters in order to improve interpretation of the results. Complete by Q2, 2013.

- Integrate Line 14 in-line inspection root cause analysis into the pipeline integrity programs. Complete by Q3, 2012.

- Building upon processes already implemented, complete an audit and process review on the in-line inspection vendor's analysis processes with the objective to confirm that lessons learned from earlier reviews and from the Line 14 in-line inspection root cause analysis are implemented and to identify any additional opportunities for improvement. The audit process will be developed by the end of Q4, 2012 with the audit to be conducted by Q1, 2013.

- Independent 3rd party review of Enbridge LP's dig selection criteria and growth modeling. Complete by Q1, 2013.

- Organize an industry review to develop the protocols for the overlay of multiple ILI data sets so as to improve integrity threat integration methods. Complete by Q4 2013.

- Conduct a comprehensive review of past Enbridge incidents where in-line inspection performance was identified as the root cause or a contributing factor. Complete by Q2, 2013.

- Commit to participate and lead in industry initiatives to define standards and protocols for crack identification technology and integration of ILI data improvements.

G. Current Engineering & Probability of Failure Modeling

Background

Enbridge LP gathers quantitative integrity information on its pipelines in order to calculate fitness-for-purpose (FfP) results for all pipe segments. The engineering methods are based on industry and regulatory codes and standards. The FfP information is integrated into the Enbridge LP overall operational risk assessment modeling. In 2010, Enbridge LP formed a dedicated team to focus on applying reliability engineering principles to support the FfP engineering methods as an innovative technique for enhancing probabilistic failure models.

Enbridge LP currently uses an index model to measure operational risk. Enbridge LP is in the process of transitioning to a more quantified risk model. This risk assessment tool is part of the risk management framework that follows the guidelines of the ISO 31000 standard. The long term strategy is to improve use of risk assessment results in the decision making process for risk control activities.

1. Specific Actions, Tasks & Commitments

- EELP commits to continue, as part of the FfP methodology, to review existing intervals for Inline Inspection for defect growth, engage the independent consultant in that review, and meet with PHMSA to assess the results.

- EELP will submit to PHMSA the developmental roadmap for applying reliability engineering principles to a liquid transmission pipeline system. March 31, 2013.

- EELP will modify the existing index model method to a quantitative risk assessment model. This quantitative risk assessment model will improve upon integration of integrity threats and other threats (such as third party damage, geohazard, etc) in order to more effectively assess risk and improve risk decision-making. August 31, 2013. The independent consultant will assess the model and provide recommendations concurrently to EELP and PHMSA.

- EELP is committed to the Pipeline Research Council International (PRCI) research programs for the review of pipe strength modeling and development of reliability assessment tools.

- EELP will take a leadership role in industry to create a standard of practices around threat identification, analysis and modeling to reduce the probability of incidents and to increase safety.

2. Training

See Section J on Training.

3. Milestones & Completion Dates For Specific Actions

- Reliability Roadmap – March 31, 2013
- Risk assessment tool with integrated probability of failure model - August 31, 2013
- EELP will commit to meet with the independent pipeline expert and PHMSA to review the existing index model periodically as the transition to a quantitative risk assessment model occurs – ongoing.
- PRCI - EELP will propose joint projects to advance threat identification, analysis and modeling.

H. Leak Detection Systems and Sensor & Flow Measuring

1. Specific Actions, Tasks & Commitments

Enbridge LP has made a number of significant improvements to our leak detection system recently and is continuously undertaking initiatives to improve the leak detection capabilities on our pipeline systems.

- Instrumentation Addition and Program Enhancements: A leak detection equipment design standard was initiated to optimize the performance of the existing Leak Detection system. As part of this, Enbridge LP has developed system performance targets for all pipelines. The maintenance management program has been reviewed and restructured to formalize the inventory and management of critical leak detection equipment. Enbridge LP is executing on a Leak Detection Instrumentation Improvement project that started in 2011 and will add flow meters, pressure and temperature sensors across our pipeline systems. The program over the next two years will add new flow meters, pressure transmitters and temperature transmitters to our pipelines. The instrumentation and their placements were determined by performing API1149 assessments on a set of alternatives for each pipeline.

- Leak Detection Technology Assessments: Enbridge LP is actively reviewing and testing different types of leak detection technologies to complement existing detection capabilities.

- Computational Pipeline Monitoring Evaluation: Enbridge LP is reviewing several other Computational Pipeline Monitoring systems that complement the existing Computational Pipeline Modeling system.

- Pressure Wave Leak Detection System Evaluation: Through the Pipeline Research Council Inc. (PRCI), Enbridge LP has committed to hosting the test of several vendor technologies that monitor the pressure wave created by different size leaks.

- Acoustic Inline Inspection Leak Detection Evaluation: Enbridge LP is committed to researching acoustic inline inspection leak detection technology and has recently conducted tests with a free flowing acoustic sensor that is run through the pipeline and identifies the acoustic emissions produced by smaller leaks

- External Leak Detection Sensor Evaluation: Enbridge LP is working with a research company to determine the viability of fiber optic cable, vapor tubes and other hydrocarbon sensing cables for leak detection in highly sensitive areas. The construction of a test apparatus will allow for the evaluation of these technologies under a variety of real world conditions.

- Aerial Based Leak Detection Evaluation: An initial test of several aerial based leak detection technologies has been completed. Five aerial based technologies were tested in Texas on Enbridge gas pipeline systems and with hydrocarbon liquids

products. The test was conducted in June 2012 and the report with recommendations is expected by the end of August 2012.

- The independent consultant will periodically report to PHMSA on the findings from leak detection technology trials and testing

- Enhancements to the Leak Detection System : Enbridge LP has committed to making the following changes to the Computational Pipeline monitoring system:
  - Dynamic alarm thresholds are being introduced on all systems to reduce or eliminate false alarms during transient conditions and to tighten leak sensitivity thresholds during normal or steady state conditions.
  - Leak detection system performance is predicted through API1149 methods, tested using techniques identified in API1130, through simulated leak tests, and through fluid withdrawal tests. Enbridge LP is committed to the development of simulators for all lines to facilitate CPM performance analysis.

- Enhancements to the Pipeline Control System: Enbridge LP has committed to making the following changes to the Pipeline Control system:
  - We have initiatives underway to improve controller decision support systems including developing tools to further support the analysis of abnormal conditions, column separation and for identification of leaks signatures. We are also implementing expert systems to support alarm analysis.
  - Enbridge LP is currently executing projects to improve our historical data storage and retrieval at terminal and pump stations, resulting in the archiving of critical data at a resolution frequency of approximately one second.
  - Enbridge LP is developing a Pipeline Control System strategy which will define recommendations and initiatives to improve the pipeline control system.
  - EELP commits to organize regular meetings with the independent pipeline expert and PHMSA to review these Program enhancements.

2. Training

Enbridge LP is committed to the implementation of team training objectives for Leak Detection Analysts and to the development of line specific simulators for the purposes of scenario based team training. EELP will commit to have the independent pipeline expert report on the training and review and assess the training.

3. Milestones & Completion Dates For Specific Actions

- Instrumentation Addition and Program Enhancements
  - Maintenance Management Program Enhancements Q1, 2013
  - Instrumentation Additions - 16 US pipelines with equipment in-service dates that range from Q2 – 2012 to Q2 - 2014.

- Leak Detection Technology Assessments
  - Computational Pipeline Monitoring Evaluation – Q4 2012
  - Acoustic Pressure Wave Leak Detection System Evaluation – Q4 2012

- Acoustic Inline Inspection Leak Detection Evaluation – Q4 2012
- External Leak Detection Sensor Evaluation – Q2 2013
- Aerial Based Leak Detection Evaluation – Q3 2012

- Enhancements to the Leak Detection System
  - Dynamic alarm thresholds Q4, 2012
  - Development of line specific simulators Q2, 2013

- Enhancements to the Pipeline Control System
  - Decision Support Tool and Expert Systems Q1, 2013
  - Improvements to Historical Archival Q1, 2013
  - Development of Pipeline Control System Strategy Q4, 2013

I. Valve Replacement

Enbridge LP relies on the use of emergency flow restriction devices (EFRD's) to minimize the amount of product released during an unplanned event. In the Lakehead System there are 445 remote control valves, 245 manual operated valves and 35 check valves. In the previous 3 years, EELP has installed or converted 25 valves in the system.

1. Specific Actions, Tasks & Commitments

- EELP had planned to install up to 31 additional EFRD valves by end of 2012, exceeding the past 3 years of the program. EELP will commit to meet with the independent pipeline expert and PHMSA to review this plan.

- In 2013 EELP plans on continued growth in the placement of EFRD's by automating or adding up to 40 valves. EELP will commit to meet with the independent pipeline expert and PHMSA to review this plan.

- Enbridge LP is developing a valve placement standard for which the entire system can be benchmarked with a view to optimizing valve placement distance. EELP will commit to meet with the independent pipeline expert and PHMSA to review this standard and related criteria.

- EELP commits on the Lakehead System to coordinate valve placements with leak detection tools for the purpose of enhancing leak detection capability through transducer placement.

- EELP commits to performing a valve analysis on the entire Lakehead System to look for areas of concern and then determine a long range plan for valve upgrades to the System. EELP will commit to meet with the independent pipeline expert and PHMSA to review this long range plan.

2. Training

Enbridge LP has a foundational development training program that focuses on safety, leadership and technical training.

3. Milestones & Completion Dates For Specific Actions

- Enbridge LP has included valve placement as a performance measure for all Liquids Pipelines employees.
- EELP will complete a valve analysis for the Lakehead System (Lines 1, 2, 3, 4, 5, 6A, 6B, 13, 14, 61, 64, 65, 67) by end of March 2013.
- EELP will coordinate a review of the 2012 and 2013 valve placement plans with the independent pipeline expert and PHMSA by mid-September, 2012.
- EELP will use the above analysis to develop a long range valve placement plan by end of May 2013. EELP will coordinate a review of the long range valve placement plan with the independent pipeline expert and PHMSA prior to finalization of that plan.

J. Integrity Verification

Background

Enbridge LP's primary method of integrity verification of its pipelines incorporates the use of multiple in-line inspection (ILI) technologies. Enbridge LP will employ techniques such as hydrotesting and direct assessments as appropriate to validate modeling techniques and ILI results.

1. Specific Actions, Tasks, Commitments & Milestones

- Prepare a Technology Improvement Plan with Enbridge LP ILI vendors including the incorporation of new technologies (e.g. EMAT). Review with PHMSA to incorporate input into the plan. Complete by March 31, 2013.
- Conduct an independent 3rd party review of Enbridge LP in-line inspection verification processes to ensure continued compliance with the new version of API 1163 expected in 2012. Complete by March 31, 2013.
- Complete a reliability engineering based review and analysis of variables that define current industry and regulatory safety margins and growth models including a comparison to other industries. The independent consultant, PHMSA and EELP will meet to review the results of that analysis. In addition, identify opportunities to share results of the above review with industry and regulators. EELP will commit to take a leadership role in incorporating improvements into standards and regulations. June 30, 2013 and ongoing.

- Conduct a reliability engineering analysis of the effectiveness of hydrotesting in conjunction with ILI. Utilize results from recently hydrotested Enbridge pipelines. December 31, 2013.

- Identify new or upcoming facility integrity standards or best practices and incorporate into the Enbridge LP Integrity Management System. Complete Q2, 2013.

2. Training

The Pipeline Integrity training program is comprised of four components:

- Core safety and policy - ensuring all safety policy and procedure requirements are met for role expectations as well as other policy items, such as Enbridge's Statement on Business Conduct,
- Department Function - a detailed Learning Map to ensure key elements are understood in the area of pipeline operation, Regulations and employee effectiveness,
- Role specific - which is specific technical training to ensure the required skills are present to meet the expectation of the Integrity Management System on a job function basis. All these requirements are measured through employee dialogue and the development of an Individual Development Plan, and
- The Pipeline Integrity and Engineering Department has launched a Foundational Development Program available for all employees. A Learning Map has been developed which outlines a common curriculum with both required and optional baseline training requirements, and is meant to serve as a foundational training program. The program focuses on three tracks of development aimed at base technical development, enhancing general skills and knowledge and leadership development.

Current Actions in this area include:

- Further refinement of training tracking and measurement
- The development of a comprehensive role specific technical training matrix to better align skill requirements and enhance decisions and information sharing among Pipeline Integrity employees. The plan to complete this work is December 2012.

K. Quality Management System

1. Specific Actions, Tasks & Commitments

Background

Enbridge LP has a Quality Management System (QMS) that addresses the key stages of a pipeline installation life cycle, focusing on engineering, procurement, construction, and commissioning. Elements of the program include the use of pre-qualified vendors, master service agreements with provisions for quality management, inspection, quality auditing, non-conformance reporting and corrective actions, and lessons learned. As part of the overall integrated management system, all management systems will have a quality

management approach to continually assess and improve processes and procedures in a comprehensive and interconnected manner. As part of the integrated management system initiative, the consultant retained has conducted a high-level gap analysis of the management systems and functional alignment.

Actions Proposed

- A gap analysis and improvement plan to address the management of our material supplier inspection. The independent consultant will review the results and provide their perspective to EELP and PHMSA concurrently.

- Improvement of our pipe mill quality standard. Specific to line pipe, there have been a number of improvements in Enbridge LP's quality management process since the period in which Line 14 was constructed.

    - Prequalification and periodic requalification of pipe mills using an ISO 19011 – type auditing process involving quality personnel as well as pipe line engineering staff
    - Prequalification and periodic requalification of steel mills which supply the pipe mills by qualified personnel in conjunction with consulting metallurgical expertise
    - 100% third party inspection during project mill runs by a stable, experienced inspection firm
    - Monitoring of pipe mill performance including internal production statistics and results of third party inspection

- Development of an Engineering Consultant Management Tool for Projects to enable more effective management of pipeline designers. This tool is intended to drive consistent application of best practices for managing consultants.
- QMS approaches may be applied to other services and products as identified during this review

<u>Milestones & Completion Dates For Specific Actions</u>

- Gap Analysis - Dec 2012
- Pipe Mill Quality Standard Improvements - Q2 2013
- Engineering Consultant Management Tool - Dec 2012

L. Other Safety Enhancements and Initiatives

Public Awareness:

1. Specific Actions, Tasks & Commitments

The following describes for the most part incremental public awareness activities to those previously initiated by EELP or required under existing regulations and standards.

- EELP is increasing the 811 awareness activities on a continuous basis with a goal of reducing third-party line strikes. EELP is participating in a nation-wide advertising campaign to promote the national one-call number on 811 Day (August 11) and increasing media advertising and outreach efforts with a specific target of running more than ten 811 ads and pitching 24 op-eds to newspapers across its systems for 811 Day 2012. EELP will provide a magnet featuring the emergency number and 811 to all excavators included in of our 2013 baseline mailing.

- EELP is holding meetings with excavators and executing phone campaigns (auto dialers) targeted at excavators in high-risk counties. EELP is formalizing a process for following up on line strikes and near misses to provide additional information to violators. Additionally, ELP will be providing third party emergency responders in its areas of operations with information on system specifics, best response practices and the potential consequences of releases.

- EELP will roll-out Enbridge-specific online emergency responder training to all identified (9,245) third party emergency response organizations in our counties of operation by the end of 2012. Further EELP will roll-out an in-person component to address key third party emergency response organizations with in-person emergency response training in 2013. EELP will also be formalizing a process to standardize the pipeline specific information provided to third party emergency responders.

- EELP will mail supplemental information (posters) to 911 dispatch centers and fire departments within its counties of operation by the end of 2012.

- EELP is educating the public on pipelines, signs of a leak and appropriate response and will run newspaper advertising in key areas along our pipeline systems as identified by region and district management and the Public Awareness Committee, beginning in 2012.

- Through the. Public Awareness Committee, which includes field operators, management, right-of-way, compliance, integrity and Public Affairs, EELP will continue to increase internal collaboration with the goal of improving the contribution of the Public Awareness Program to pipeline safety.

2. Training

EELP will roll-out company-specific online emergency responder training to approximately 2,500 third party emergency response organizations in its counties of operation by the end of 2012 to provide them with system-specific information, best response practices and the potential consequences of releases.

In 2013, EELP will roll-out online training to its employees, regardless of office location. The training will prepare employees to engage in contact with key stakeholder audiences, thereby increasing the safety of its pipeline systems.

3. Milestones & Completion Dates For Specific Actions

Task	**Completion Date**
811 Day Outreach – Collaborative Nationwide Advertising Campaign	August 11, 2012
Excavator Communications - Magnets	Q2 2013
Public Awareness ER Linked Training - Online Training - In Person Training	 Q4 2012 Throughout 2013
Line strike and near miss follow-up process	2013
Process to standardize pipeline specifics for Emergency Responders	2013
Supplemental posters to 911 dispatch centers and fire departments	Q4 2012
Key Stakeholder Public Awareness Annual Face-to-Face Meeting and additional PAC meetings	October 23, 2012 & Quarterly in 2013

- **Damage Prevention (Line Locating):**

1. Specific Actions, Tasks & Commitments

   - TALL Training: Roll out of Transmission Advanced Line Locating (TALL) Training program in all Regions during 2012.

   - Equipment: A component of TALL Training sees a move towards standardization of equipment. An equipment review, of line locating equipment, has been conducted and we will be moving towards reducing the models and type of locating equipment to between two and four acceptable units. This will allow employees to move between locations more efficiently.

   - Field Inspections: This 2013 initiative will see the Damage Prevention team from Enbridge LP going into the field and conducting field inspections on both line locating practices and ground disturbance practices. The field inspection program will look at:

     - Locating
     - Completion of relevant form(s)
     - Pre-locate, locate and post-locate activities & duties
     - Compliance with policy and procedure
     - Temporary Staking
     - Painting / marking / color codes
     - Compliance with policy and procedure
     - Ground Disturbance
     - Color codes
     - Compliance with policy and procedure

     The results of these field inspections will be communicated to Regions along with trending of incidents. Any procedures that may potentially need to be re-explored, following field inspections, will be discussed.

2. Training

TALL Training is an Enbridge LP line locate initiative for 2012 and onwards. The intention is to create a consistent and robust line locate training program. TALL Training also satisfies Operator Qualification requirements for line locating and temporary staking. Enbridge LP worked with third party subject matter experts to create the on-line learning and testing portions in accordance with CGA best practices and local regulations. Enbridge LP worked with subject matter experts to create the in-person field training component. Recertification is required every three years. The training consists of:

- On-line learning and testing (housed on internal eLMS system)
  - 10 modules specifically for line locating (covering: Transmission Pipelines, History, Systems and Uses; Error Producing Conditions and Preventative Procedures; Legislation and Damage Prevention; Information Sources and Visual Inspection; System Model, Infrastructure, Hazards, Safety and

Obstacles; Work Procedures; Direct Hook-Up Locating Methods; Inductive Locating Methods; Other Locating Methods; Problem Solving Skills; and Industry Examples of Incidents and Preventative Procedures)
    - 1 module for policy
    - End of module tests
    - 90 question quiz with pass rate set to 80%

- In-person field training
    - Over 2 days
    - Short classroom session to go over high level points; equipment use and maintenance; and field manuals; company policy and procedures learning and discussions
    - Right-of-Way (ROW) locates (or the simulation of ROW locates within a facility)
    - Congested area locates within a facility
    - Problem solving methodology
    - Checking and proving locates (including the use of GPS technology)
    - Abnormal Operating Conditions

Enbridge LP policy and procedure has been amended to reflect the new internal standard for line locating practices.

3. Milestones & Completion Dates For Specific Actions

- TALL Training: This training will be completed by March 2013 with ongoing certification thereafter.

- Equipment: In order to address the move towards standardization of equipment an update of policy and procedure will be required at the 2013 policy and procedure annual renewal.

- Field Inspections: Will commence in Q2 2013 and continue throughout 2013 and onwards.

- **Research, Development & Innovation**

A new departmental function has been created with a Director – level dedicated role, with a budget to identify, invest in, and develop innovative technologies and best practices to support Enbridge LP operations and the achievement of strategic goals, particularly those related to improved safety and reliability. This area will be responsible for promoting the adoption of novel technical solutions. It will design and execute a comprehensive Research and Development plan for accessing technology through research, product or process development, proofs of principle and field demonstration of commercially significant technology. This includes internal initiatives, working with functional departments in need of or pursuing new technologies, external opportunities, joint ventures and scientific collaborations. A focus of the R&D department will be to research tools and technology that

align with Enbridge's value around safety and to work towards a goal of zero safety and release incidents. Likewise, EELP is committed to sponsoring R&D through research associations like PRCI and leading research initiatives to enable both the company and the industry towards developing better models, tools, consensus standards, technology and procedures.

1. Milestones & Completion Dates For Specific Actions

Task	**Completion Date**
Research, Development & Innovation	
• Department setup and initial staffing	October 2012
• Draft comprehensive R & D plan	December 2012
• Review R&D plan with independent pipeline expert & PHMSA	March 2013
• Full member participation with PRCI	Ongoing

Appendix A - Improvements Undertaken Since 2011

Integrated Management System

Since 2009, Enbridge has embarked on improving its various management systems. In 2010, Enbridge retained a consultant to assist with identifying the various management systems, assessing each system and devising a process to integrate the various management systems. The IMS is being implemented in stages and is already implemented in various aspects, with further implementation to occur over the next year. While the overall Integrated Management System is being developed, the following documents have been created and the following presentations made as part of implementation:

- Integrated Management System Executive Committee Terms of Reference
- IMSEC Bulletins
- Tone at Top Messages and presentations
- Draft Integrated Management System Policy
- Draft Integrated Management System Table of Contents

Compliance & Ethics Management System

Enbridge has addressed Compliance & Ethics through a number of policies, processes, and practices that existed and were implemented prior to the Marshall incident. Examples of such policies include: the Statement on Business Conduct; Compliance Policy; Whistleblower Policy; and Internal Audit, Investigations & Review Policy, among others. Over the past two years, work has been ongoing to document and formalize all the existing Compliance and ethics policies, processes and practices into one management system that is comprehensive. While many of the processes and practices in the draft CEMS are already in place, a more formal communication and training plan will be put in place to implement the finalized CEMS.

Prior to commencing the IMS, Enbridge managed compliance and ethics through the following:

- Statement on Business Conduct annual certification
- Statement on Business Conduct annual online training commenced in 2009
- New employee orientation, includes compliance and ethics
- Compliance Policy
- Statement on Business Conduct
- Documents Policy
- Internal Audit, Investigation and Review Policy
- Whistleblower Policy
- Quarterly request to Directors and Vice Presidents to report material non-compliances
- Legal Updates circulated to employees
- Online Fraud Training for employees (2009)

As part of the IMS process a formal Compliance & Ethics Management System review and implementation process for improvements has been occurring since early 2010 and includes the following:

- Draft Compliance & Ethics Policy
- Draft Compliance & Ethics Management System
- Statement on Business Conduct annual certification
- Statement on Business Conduct annual online training
- New employee orientation, includes compliance and ethics
- People Leader training, includes compliance and ethics
- Compliance Policy
- Statement on Business Conduct
- Documents Policy
- Procedures Library
- Internal Audit, Investigation and Review Policy
- Whistleblower Policy
- Quarterly request to Directors and Vice Presidents to report material non-compliances
- Compliance Summit
- Legal Updates available to all employees and contract workers
- Tone at Top Messages & STIP scores
- Draft content for 2012 Online Fraud Training for employees and contract workers

Emergency Response

1. Emergency Response Support

   Creation of the Training and Emergency Response department– Manager led and reporting to Director Operations Services. Attached:

   - ER Organization Chart

2. For Incident Support Job Aids

   Created Incident Management Handbook IMH. This manual is used as a job aid during an incident and drills. It outlines how ICS works. This is given to all participants of ICS 100/200 & 300 training. Attached:

   - Enbridge Pipeline IMH BOOK 2011 Revision 1

3. ICS 201 Packet Form is an industry and US regulatory set of initial forms that lead into the Incident Action Plan. These forms are on the Operations Services SharePoint site and are now being used during incidents:

   - ICS_201-1 : Incident Briefing Map/Sketch
   - ICS_201-2: Summary of Current Actions
   - ICS_201-3: Organization Chart
   - ICS_201-4: Resource Summary
   - ICS_201-5: Site Safety and Control Analysis
   - ICS_202: General Response Objectives
   - ICS_205: Communication Plan
   - ICS_206: Medical Plan

- ICS_230: Meeting Schedule
- Notifications Report (template)
- Weather Report (template)

4. Training
   - ICS training certificates
   - We issue from TRG (The Response Group) Certificates of completion for:
     - ICS 100/200
     - ICS 300
     - Exercise Design (3 Courses Offered to date in Western, Central and Chicago Regions)
     - Environment Specific Training Completed for that Department
   - Regional Training stats

Region	ICS 100/200	ICS 300 (Formerly 300/400)	Total
Athabasca	9	2	**11**
Central	27	19	**46**
Chicago	75	34	**109**
Cushing	88	20	**108**
Eastern	75	16	**91**
EPND	30	14	**44**
EPSI	21	2	**23**
Northern	16	14	**30**
Superior	33	3	**36**
Western	24	2	**26**

5. Enterprise-Wide Team
   We have an Enterprise-wide team that meets regularly (every month or so) to discuss the creation of the team, members are currently being identified. Drill scheduled for 2 Days in Denver, 1 day training and 1 day drill, week of September 17th, 2012. Details still to be determined.

Safety Culture

1. Lifesaving Rules at Enbridge
   - Lifesaving Rules at Enbridge
   - Safety Perception Survey
   - Life Saving Rules Training Package
   - Lifesaving Rules Training Video
   - Additionally, Control Centre Operations is in the process of introducing three Golden Rules that are designed to complement the Lifesaving Rules at Enbridge but are focused on key areas of control centre operation: Safe Operating, When in Doubt - Shutdown, and Emergency Procedures.

2. Other Training:

Course/ Topic	Seminar Start	Audience	# Attended
Thinking Differently about Safety (Values-Ethics & Safety; Safety Culture & Discipline; Safety Management Systems)	12/8/2010	ELP Executive Leadership Team	
Concepts of Operational Excellence	1/13/2011	ELP Executive Leadership Team	
Felt Leadership	6/22/2011	Operations Department Managers- SVP Operations	
PSM Introduction	7/26/2011	Managers- Directors	10
Safety that Works for Operations Managers	8/9/2011	Managers- Directors	23
Safety that Works for Operations Managers	8/23/2011	Managers- Directors	32
Corporate Safety Governance and Strategic Planning	9/21/2011	SVP Ops/Eng & Senior Safety Directors from LP, MP, GD,GT	~15
Safety that Works for Operations Managers	11/15/2011	Managers- Directors	18
MP Safety Leadership/ SPS	11/17/2011	MP Executive Leadership Team	12
Safety Leadership Saturday	12/3/2011	ELP Executive Leadership Team	
Safety Management Fundamentals	1/30/2012	Supervisors	
Safety Management Fundamentals	3/14/2012	Supervisors	

Public Awareness Plan ("PAP")

Changes to PAP are the following:

1. Public Awareness Coordinator: A full-time position was added in late 2010 to manage the day-to-day activities of the Public Awareness Program, including oversight of the documentation database, employee training and enhanced supplemental activities.
2. Public Awareness Hotline: A toll-free number has been set-up for Public Awareness-related inquiries. The number was established after focus group results indicated

that audiences were confused about which regional office to call to request information. In the 2012 baseline brochures, only one telephone number is listed for non-emergency contact, 877-799-2650, versus listing several regional office numbers. The public can also request public awareness information through the previously established public awareness email address, USpublicawareness@enbridge.com.

PAP documents include:

- 2012 Brochures
- Congressional Contact Listing
- Copy of Public Awareness Review Protocols
- Copy of Magnets
- 2012 Calendar
- U.S. Safe Digging Month Summary
- National Safe Digging Month Radio Script
- Excerpt from the Superior Telegram; PA feature running April 11, 2012
- August 4,2011 letter to legislators from Mark Maki
- Dec. 14, 2011 letter to legislators from Mark Maki, enclosing Enbridge calendar
- PAC Sub-committee objectives
- PAP PHMSA audit exit interview
- Effectiveness Evaluation: 2011 Papers Research
- Emergency Responder Program Plan
- Liquids Legislator Mailing List
- Enbridge Pipeline Brochure Research
- Gas Legislator Mailing List

Pipeline Control Systems and Leak Detection (PCSLD)

1. Organization Structure Changes
    a. Creation of the Pipeline Control Systems and Leak Detection department in October, 2010 – Director led and reporting to Senior VP Pipeline Integrity & Engineering
    b. Single area of accountability in relation to leak detection capability, safe and reliable pipeline control systems and improved operator information systems.
    c. Incremental staff and contractor additions in 2010, 2011 and 2012 resulting in a doubling of the PCSLD workforce
    d. Creation of the Leak Detection department reporting to the Director, PCSLD. Department comprised of three teams: Maintenance and Integration, Assessment and Support, and Testing and Research.
    e. Creation of the Pipeline Control Systems department reporting to Director, PCSLD. Department comprised of three teams: SCADA Services, Control Systems CAN, and Control Systems USA
    f. Creation of Quality and Compliance department reporting to Director, PCSLD.

2. Process and Procedure Changes

   New Procedures - Four MBS Analyst procedures have been implemented, these include the Leak detection escalation process, Shift change sheet, Alternate leak detection recommendation procedure

   Efforts are underway to formalize existing practices through the identification and development of standard operating procedures

   Control Room Management - Procedures have been developed for the Control Room Management regulation, which have an implementation deadline of August 1st, 2012.

   Establishing a Quality Management System (QMS) which ensures effective execution of critical work activities meeting pre-defined quality objectives is underway

3. Training Changes
   The Leak Detection Analyst Training Program has been enhanced in several areas including On-The-Job training, Training Program Layout, Readiness Assessment, and Communications with CCO Personnel

4. Instrumentation Changes
   a. Assessments and planning of instrumentation additions and upgrades required to improve the performance of the leak detection system, and ensure it consistently meets or exceeds Enbridge internal performance targets has been completed

   b. The establishment of a maintenance management program is underway. This program will further enhance the existing program by formalizing the inventory and management of critical leak detection equipment

5. MBS Changes
   a. Continuous improvement plans have been developed and are being implemented to tune the Material Balance System (MBS) leak detection system for optimal performance

   b. A leak detection equipment design standard has been developed to ensure leak detection performance standards will be met on new pipelines

   c. Various initiatives are underway to assess commercially available leak detection technologies and determine if there are complementary strategies to further enhance leak detection performance

Pipeline Control (including Control Centre Operations "CCO")

- CCO Training (Enrolment Records Attached)
  - Admin On-Call
  - Column Separation Analysis Form
  - Column Separation Calculation
  - Orientation Fatigue Management
  - Supervisor Fatigue Training
  - Human Factors 1.1- Science of Sleep
  - Human Factors 1.2 –Fatigue Prevention
  - Human Factors 1.3-Fatigue Mitigation
  - Emergency Response
  - Incident Investigation
  - Introduction to Life Saving Rules
  - MBS Analysis and Communication
  - Pipeline Hydraulics I
  - Pipeline Hydraulics II
  - Respectful Workplace Training
- Pipeline Manoeuvres
  - Start Up
  - Shutdown
- Operating Standards Manoeuvres
  - General Operating Standards - Temporary Console Monitoring
  - General Operating Standards - Shift Change – Operators
- Operating Standards & Procedures Quality Management System (QMS)
- Pipeline Emergency Response Procedures
  - Material Balance System MBS Alarm
  - Suspected Column Separation
- CCO Operational Incident and Close Call Flow Chart
- CCO Operational Incident and Close Call Process
- Column Separation Analysis form
- Shift Change Form
- CCO On-Call Handbook
- CCO Fatigue Risk Management Handbook
- Control Room Management Plan
- Mentor Selection Worksheet
- CCO KPI Scorecard
- CCO Engagement Action Plan Final 05-03-11
- Transition of CCO to New Location 11-01-2011
- Control Centre Safety Culture Charter
- CCO Specific LifeSaving Rules Roll-out Communication

Integrity

The following procedure documents have been reviewed and revised:

- Wall thickness used for FfP calculations

- Including tolerance for FfP
- CF inter-linked length greater than 3 inches
- Risk Mitigation Criteria
- Tool Performance Validation
- Selection of cracks in corrosion, threat integration
- POD, POI, POS Trending
- FfP Outliers
- ILI Classification Outliers
- Inclusion of Outliers into Dig Selection
- SCC Growth Rates Checks