**Risk Modeling Work Group Agenda and Notes**

**Location of Meeting**: API, 1220 L Street, NW, Washington, DC 20005

**Meeting Purpose**: Facility Risk Modeling

**Date:** Wednesday, November 30 - Thursday, December 1

**Attendees:** Participants listed at the conclusion of this document.

**Meeting Action Items (identified by “\*\*” in the notes)**

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| --- | --- | --- | --- |
| **Item** | **Description** | **Responsible** | **Complete** |
| 1 | Determine location of March 7-9, 2017 meeting – CenterPoint Energy, Houston, Texas | PHMSA | X |
| 2 | Distribute draft deliverables schedule and definitions to full RMWG | PHMSA | X |
| 3 | Provide comments on draft Consequences and Definitions material by end of December, 2016. | RMWG |  |
| 4 | Identify potential speakers on application of risk analysis results and associated risk tolerance/acceptability. | PHMSA/Mark Hereth |  |
| 5 | Suggest speakers related to data management for next RMWG (Data) meeting | - Saulters (API 1178)  - Osman (TRC)  - \*\* Steve Nanney (coordinate with trades regarding TRC) | X |
| 6 | Prepare draft industry survey related to data completeness in preparation for the next RMWG (Data) meeting. | Westrick/Trades |  |

**Agenda and Meeting Notes [Action items indicated by \*\*]**

Wednesday, November 30

1. Introductions / Safety Moment (Stuart Saulters, Steve Nanney)
   1. Introduction of Attendees, Safety Moment, Meeting Logistics and Timing

Ladder safety – Be careful with the holiday decorating! [Maintain three points of contact.]

Outside fire conditions – Be aware of ignition sources, particularly in dry Fall weather.

Social media safety alerts for public areas such as schools/colleges, can work very effectively. [Pat Westrick family experience at Ohio State University.]

1. Past Business (Chris McLaren)
   1. Meeting minutes from last meeting distributed via e-mail and posted to the RMWG portion of the PHMSA Pipeline Technical Resources (PTR) site (<http://primis.phmsa.dot.gov/rmwg/meetings.htm>). Any edits/changes? *None identified.*

*Keith Leewis noted as requested in the August meeting there is a ballot issue for the definition of “threat” as part of the B31.8/B31.8S revision process*.

* 1. Review of open past meeting action items:
* Investigate potential involvement in comment process for PHMSA R&D project DTPH56-14-00004 “Improving Models to Consider Complex Loadings, Operational Considerations and Interactive Threats” (McLaren). *Report is in the final draft comment phase; will keep action item (Consequences meeting) open*.
* Contact NTSB with respect to industry-assigned risk modeling recommendations to see if the RMWG technical document may be helpful in closing the recommendations. Include listing of applicable NTSB Recommendations in appendix of guidance document for time being for completeness (Saulters/Kurilla/INGAA/Kuhtenia). *Team noted the need to continue tracking of this topic to see if the RMWG risk modeling document can be used to help close this item. Keep action item (Consequences meeting) open*.
* Investigate if CSA paper on human factors is available for RMWG distribution. (Westrick). *Document is available on-line from CSA at no cost from* [www.shop.csa.ca](http://www.shop.csa.ca) *(type “EXP248-2015” into the search field). [Action item complete.]*

1. Timing of next meeting in TBD and subsequent meetings (Steve Nanney)
   1. Per Doodle survey: March 7-9, 2017. *2nd best option was the week of 2/21/2017. No objection; meeting will be take place on the March date.*

*Potential locations: GTI (Chicago), Colonial (Atlanta), Houston. \*\* PHMSA to decide and advise the group of the final location. Subsequent team discussion indicated the meeting will be hosted by CenterPoint Energy in Houston, TX.*

* 1. “Doodle survey” will be used to assist in determining the overall schedule for the remaining meetings so that travel arrangements can be made and assignments re-scheduled, as appropriate.
  2. Overview of deliverables discussed *(\*\* Distribute draft deliverable schedule and definitions section to full RMWG (done)). Intent is to have the full document available after the March meeting, in time for a final meeting to review the final draft in detail. [Industry noted preference of getting consequence comments back to PHMSA no sooner than end of December; PHMSA is okay with this date.]*
  3. *Team question with respect to any changing of PHMSA priorities with the change of administrations relative to the priority of RMWG work. Not expected for this work given the continuing relevance of associated NTSB recommendations, etc.*

1. RMWG Work Product Review (Chris McLaren)
   1. Provided overview of PHMSA response to industry comments on the initial likelihood material. Team discussion:
      * + *Hereth: With respect to threats, will be hard not to use the PHMSA incident cause categories as that is where industry data will be aligned to.*
        + *Noted availability of GTI report(s) related to interactive threats that may also be a useful reference. [In addition to the two different available Kiefner reports on this topic.]*
   2. Address comments on draft RMWG Technical Guidance documents content to-date
      * + *\*\* Industry to provide consolidated comments on the initial Consequence draft by the end of December, 2016.*
   3. Overview of initial draft Definitions section
      * + *Leewis provided comments based on in-process B31.8/B31.8S 2016 changes.*
        + *Team discussion related to term quantitative vs. probabilistic. As the terms appear to be somewhat muddy in usage, the team noted the importance of clearly defining these terms for the context of pipeline risk modeling in the technical guidance document.*
        + *\*\* RMWG to provide comments on draft by end of December, 2016.*
   4. General team discussion:
      * + *Shahani (TransCanada) – Recommends the Risk Modeling document address the topic of numeric risk acceptability/tolerability for quantitative risk modeling results. Team noted the consequence meeting had touched on this topic; will address in the document, but likely more of a discussion of the associated process of operator-defined acceptability values vs. PHMSA defining specific acceptance/tolerance values.*

*Leewis (B31.8S) – Mathematical probability in numeric risk acceptability/tolerability for quantitative risk modeling results applies well to judge exclusion zones when designing new construction rather than revisiting existing systems; overall point of the risk modeling exercise is to prioritize the preventive measures and mitigation measures and decide on those annual activities so that implementation improves safety and reliability, so allow a range of risk assessment methodologies including as simple as possible (especially for smaller pipeline operators).*

*Gomes (Cheniere) – Good to know tolerability up-front, so can plan accordingly (can be semi-quantitative as well as fully quantitative).*

*Osman (INGAA) – Noted importance of a process for defining acceptability/tolerance regardless of particular modeling approach vs. a specific value that is driven by a specific quantitative type of approach.*

*Youngblood (INL) – Looking for an actual value, or as an overall safety goal? Team – guidance document should address process operators can take for determining risk acceptability vs. the specific approach to be taken and/or specific number.*

*Team noted potential need to address this topic as a specific item for a future team meeting.* ***\*\* Mark Hereth to ID potential speakers on this topic*.**

1. Technical Presentation #1: Facility Risk Modeling Approaches (Mike LaMont; New Century)

*Risk management/mitigation is inherent to everyday life.*

*Facilities – Compressor stations (blast radius important with respect to IM rule); hazardous liquid facilities (pump stations, tank farms) (migration to HCAs important with respect to IM rule).*

*Facilities tend to be very different from one to the other, and are often fundamentally different than line pipe. Hard to adapt line pipe risk analysis directly to facility risk. Risk model for facility often involves a different approach than for line pipe. The configuration of facilities usually rules out ILI, hydrotest, and DA as integrity assessments and other inspection tools are required.*

*Regulatory drivers/objectives – Parts 192/195 require evaluation of facility risk. Other regulatory agencies involved (and not consistent with each other include EPA and OSHA.*

*Overview of current risk modeling approaches – Risk is the usual probability of an event occurring and the negative outcome from that event (likelihood\*consequences equation).*

*Approaches fall into three basic categories: Risk screening, Index/semi-quantitative, and quantitative*

*Risk screening: Come up with a qualitative matrix of level of consequences based on SME judgment. [Note: Industry currently losing a lot of tribal knowledge due to retirements, etc.]*

*Risk rank facilities, and decide which represent which ones are too high, decide what to do to reduce that perceived risk. Decision requirements are not defined in the regulations, so operators have a lot of discretion.*

*Basic Facility Screening: SME matrix (safety, environmental, compliance, operations availability, cost, etc.), come up with likelihood in terms of once/year, once/2 years, once per 5 years, etc. for each category.*

* *Decision criteria – group assets, provide POF for each group, drives P&M measure evaluations.*
* *Threats: equipment/non-pipe, corrosion, outside/natural force, security, operations, other, etc. Examine each to see if have had past issues, and apply weighting factors accordingly based on SME judgment and get a relative risk score. Then look at potential P&M measures.*

*Asset-Based Risk Analysis: Look at threats to similar types of assets, not the facility as a whole (e.g., tanks only, manifolds only, etc.); no overall facility comparisons.*

* *Do asset-specific risk screening looking at threats and assigning risk factors and generate risk scores.*

*Asset Operational Dependability approach (looking at asset reliability): Asset risk screening, preventive maintenance program; generate risk scores for each group of assets. Then look at reliability analysis from actual operational history and try to determine the operational health of those assets (and how to improve).*

*Risk Tolerance approach: Determine tolerable risk level and maintain operations below those levels. Asset-based. API 353, API 1160. Look at the usual types of threats and generate risk scores based on probability score and consequence score.*

*Overall facility risk limitations: Consequence analysis commonly incomplete (attitude seems to be “could affect anyway, so don’t look further:), heavy SME input reliance, limited actionable results from screening models, model results for different assets that use different methods not always comparable.*

*Conclusions: Risk modeling approaches are inherently inconsistent; additional work often needed on consequence analysis; continue to leverage other regulatory program risk efforts; more robust models needed to drive action.*

*Team discussion:*

* *See much usage of quantitative approaches? Yes, but not very granular (e.g., only for pressure vessels); used for overall facility risk evaluations? Some starting to do this, but not well advanced.*
* *Leewis – ASME PCC-3 or API 570, and API 580/581 are all risk inspection methodologies available to help in the integrity and risk assessment of facilities. Typical facilities are very congested above and below ground level making the usual pipeline integrity assessment inspections difficult and alternative inspections are necessary.*
* *McLaren – How to use API 353? Utilize as a force multiplier in looking at what can affect receptors. Do not see much use of air dispersion modeling. See much examination of things like HVL overpressure impact? Not often.*
* *Westrick – Important to have one model to address all regulatory requirements vs. essentially doing over for each agency. Grouping of assets important to avoid prioritizing by order of discovery vs. highest risk. Reliability is an important consideration; organizations often silo reliability vs. risk/compliance personnel; there is often a lot of good information that can be shared for mutual benefit (especially for the integrity/compliance knowledge).*
* *McLaren – How handle operational complexity/human reliability? Say is a critical factor in facility risk, but not well modeled by current approaches. Do operators look at human factor-related events and feed back into P&M evaluations? Do see this to some degree; also look at procedural evaluations and occasionally put into facility risk evaluations. See much in the way of MOC considerations? Often do not get down into the level of facility operational nuances. How combine overall facility risk when using the asset grouping approach? Do not often do this, but instead look at reducing the risk for each asset group; in theory, could assign a relative risk rank to the various assets in a facility to see spatial risk dependence within the facility, but have not done so to-date.*
* *Saulters – Noted the need to be careful with “operational error”-caused events to make sure are really human error before applying the data to a risk model.*
* *Stephens (Kinder Morgan) – Facility records can be problematic if have gone through one or more acquisitions. Also noted that facilities vary from very small to large, so approach needs to be scalable (i.e., may be counterproductive to put a complex process in place for small facilities). Team noted that even small facilities can have large consequences/risk, so need to look at risk vs. just the size of the facility.*
* *McLaren – How to handle unknown data? Assume worst-case? Stephens – Deal with issues as they come up. Often apply a “high” risk if unknown, particularly for acquired assets where do not always have good records. Is gathering additional data a potential P&M measure? Yes, as doable.*
* *Leewis – How does one handle facility pipe assessments when hydrotests, and ILI are not practical? Difficult challenge for operational/reliability requirements and small diameter lines. Other integrity assessments such as ECDA using CP readings, etc. are helpful. The usefulness of hydro testing for facility piping is considered doubtful and onerous (only tells you pipe was good on that particular day). Remember inspection alone does not make an integrity assessment! Also, using worst case estimates rather than the actual distribution tends to skew the result leading to incorrect decisions.*
* *McLaren – Things like vibration analysis useful?*
* *White (PGE): Cyclic fatigue often important close to pumps/compressors, and do not want to put water into system at those points. Have had to divide facility into many sections for a hydro strength test/MAOP verification exercise, which introduced risk in and of itself. [Team also noted that fittings can be an issue when doing facility hydro testing]*
* *Leewis confirmed that the code requires Class 3 designs for piping. The extra wall thickness is precisely there to reduce the initiation of fatigue by cyclic thermal and mechanical strains.*
* *Stephens – $50,000 threshold for NRC reporting is not a practical threshold as even minor work on breakout tanks cost more than that.*

*Lamont - Facility risk approach can vary by each company’s “need”. If just code compliance, may differ than if want to use for other/additional purposes.*

1. Technical Presentation #2: PG&E Facility Risk Management (Terry White, Troy Rovella; PG&E)

*Group is responsible for reliability and integrity management inside the fence. [Note: Use “station” interchangeably with “facility.”]*

*Leewis: Note that the pipeline codes define facilities as launchers and receivers, valves, meter stations, and other assemblies never the idea of pump and compressor stations or the kinds of facilities discussed today. Definitions will be needed to help future discussions.*

*Have accomplished various certifications – PAS 55 (European standard for asset management, analogous to ISO 55001; overseen by Lloyd’s of London), ISO 55001, API 1173, RC 14001. Noted these certifications have helped in relationship with state regulatory agencies. Any other companies that have done this? None known by PGE; some appear to be working on it.*

*PGE has eight “asset families” for their systems – gas storage, compression & processing, transmission pipe, measurement and control, distribution mains, distribution services, customer-connected equipment, CNG/LNG. Each has an asset manager.*

*Pipeline vs. Station differences – Line pipe focus is on integrity risks; station focus must address reliability (operates properly) and integrity risks. In aggregate for PGE, facilities have a significantly smaller footprint – PIR ~ 1% of pipeline assets; total pipe length is ~ 1% of total line pipe, 60% of station features accessible for maintenance and inspection.*

*Fleet Level Management of Risk: Have an Enterprise Integrated Planning Process – starts with Risk Register results and ends in detailed project analysis. Fleet level perspective looks for low frequency high consequence type of events.*

*Evaluate risk at the fleet level – tools include Risk Register (identify, evaluate, and prioritize risk), Threat matrices (identify fleet level mitigation programs), additional assessment of risk and mitigations (for highest-risk type of events; e.g., incorrect op’s causing downstream line failures), and Asset management (including long-term compression investment plan). Update annually.*

*Note: State of California moving toward risk-based rate cases - $ spent/unit of risk mitigated*

*Foundation of Risk Register is B31.8S (despite its lean toward line pipe). Aggregate into one composite risk “score”? No, but look at scenarios and assign a likelihood category (seven), then assign consequence categories (six) – algorithm weights the respective categories. Apply across all of gas and power operations, so can compare with other assets across the company. Have about 20-40 risks for each asset family.*

*Asset families are “calibrated” to make sure the results make sense at various levels of PGE; this enables comparisons across the company.*

*Now have a separate Facilities IMP (based on PRCI).*

*Station Level Managing of Risk: Various activities address risk – condition assessment, operational testing and repairs, PSM, project prioritization, additional programs (e.g., gas quality monitoring, etc.).*

*Utilize Station Score Sheet and Component Score Sheet (does not involve the Risk Register type of low frequency high consequence analysis done for the fleet level assets).*

*Look at similar stations scores in aggregate (divide into thee subgroups) to identify performance for further attention (i.e., look at the highest risk scoring stations first for P&M measures). If below a “target score” threshold, may not require focused attention.*

*Station scores challenging to do for the first time. Now automating for continual use; intend to update annually. Station level risk calculated: Probability of failure based on equipment fragility data, asset condition, station configuration, location and operational data. Consequence of failure based on occupancy counts and system connectivity. [Still working on approach for compression assets.]*

*Component Level Managing of Risk: In process. Includes Facility Integrity Verification Process (IVP). Engineering Critical Assessment (ECA) – Phase 1 using relative risk ranking and operational constraints to help determine order of evaluations. [Helps provide apples to apples between component risk and line pipe risk.]*

*ECA Phase 2 – Greater emphasis on probabilistic, rather than deterministic, modeling. End result is an evaluation of the benefits of NDE (including advanced techniques) relative to hydrostatic strength testing (have had real operational issue with hydro strength testing).*

*PGE global issues/opportunities – a) individual utilities have no or few occurrences of high consequence events limiting the ability to perform quantitative or probabilistic risk analysis. A universal set of industry level data is needed, and b) equipment failure rate data is not available to determine likelihood of failure. Determination of component or design risk is not precise.*

*Noted that obsolescence management is an ongoing challenge across the system.*

1. Technical Presentation #3: Phillips 66 Facility Risk Approaches (Matt Crist, Kevin Ostergren; Phillips 66)

*Equipment & Inspection Group handles facility pipe that a pig cannot get to. Presentation covered an ongoing first-round process (started in 2014).*

*Utilize a Facility Integrity Risk Assessment (FIRA) tool. Results leads to a Scope of Work (SOW). Then implement NDE execution and operations mitigation. Then FIRA re-evaluation to start evaluation cycle over again.*

*Risk assessment tool is a likelihood vs. consequence risk matrix (5x5). Likelihood of failure is based solely on external corrosion and internal corrosion (will evaluate adding others later after the first round of evaluations has been completed). Consequence is HCA, product type, manned/unmanned sites, business impact.*

*LOF: 2 Threats, 4 sub-threats, 5 likelihood categories, 11 likelihood elements.*

*Weighting factors for LOF based on in-house evaluations. Unknown data points are assigned the highest risk until data can be obtained.*

*Have separate candidate actions for mitigation of internal corrosion and external corrosion.*

*Utilize a variety of high effectiveness NDE inspections and surveys to reduce risk.*

*Overall process starts with LOF and applies the FIRA tool. Look to make sure effectiveness of mitigations is assured, including advanced NDE methods. NDE is targeted based on risk of specific corrosion monitoring locations, based on COF. Apply a risk-based inspection frequency of 3-10 years, corrected by a corrosion based frequency (if shorter).*

*Non-pipe aspects of facilities? Have a separate tank management program to address tanks (noted are also at manned facilities), line pipe in facility was the largest unknown, so concentrated on line pipe first (e.g., unmanned crude pump stations – does not include pumps in those locations, as that is handled by a different reliability organization).*

*Team discussion:*

* *Any use of ground penetrating radar? None to-date. Mainly rely on discussions with operations personnel.*
* *Has P66 done much CP upgrades, re-work, etc.? Not part of the presenter’s area of responsibility. Kinder Morgan noted that CP can be a significant challenge in large tank facilities. Also noted the use of vapor phase corrosion inhibitors for tanks to protect between volume of double tank bottoms where CP is not working well (PRCI is investigating).*

*P66 noted that one area of emphasis is buried USCG jurisdictional lines – put permanent guided wave collars on approximately ten lines. Have found one indication to-date that has been remediated. Noted the need to keep a careful eye on advanced NDE data reported by vendors; P66 looks closely at qualifications of vendors and sometimes has vendors qualify on known test pipe sections.*

*To-date, P66 has not had much communication between facilities and line pipe integrity personnel; currently improving the communication between the various asset integrity groups.*

* *Kinder Morgan approach for facility management approach? Stephens: Use a relative risk matrix for asset groups (valves, pipe, tanks, etc.). Look at each of those groups separately to manage risk. Use a Terminal Risk Assessment Program (TRAP) developed for KM by a consultant for Gulf of Mexico assets.*

Thursday, December 1

1. Safety Moment (Stuart Saulters/Steve Nanney)

*Parking lot vehicle/pedestrian safety is important during the holiday season. In addition, always be careful with respect to driving after holiday parties.*

1. Technical Presentation #4: Risk Assessment and Risk Models: An Activity or a Process?  
    (Leonard Gomes; Cheniere Energy)

*Overall goal – 4 P’s: Profit, Plant, Process, People (Stephen Covey)*

*Basis for compliance – Meet minimum standards, or go beyond that?*

*Relevant regulations/standards – DOT-PHMSA, NFPA, ASME B31*

*RAGAGEP: OSHAA PSM, EPA-RMP, BSEE-SEMS, Safety Case (UKHSE; NOPSEMA), API 1173, IEC 61508/61511: SIL*

*Variety of drivers to accomplish the goals – internal and external. Context must be managed to be successful.*

*Use PHA throughout the facility life cycle. Type of PHA depends on factors such as size and complexity of facility, nature of process, etc.*

*PHA success factors include active stakeholder engagement/input, adequate facility information, systematic process, good documentation of process and auditable results. Potential pitfalls include complacency, lack of understanding of the plant process, inadequate documentation of assumptions/uncertainties/etc.*

*Use one common 5x5 matrix for all PHA approaches. Necessary to have a corporate common set of “results” from the various analytical tools to provide a common understanding of how the respective results compare.*

*Types of PHA used by Cheniere: HAZID (What-If/Checklist), HAZOP, LOPA/SIL (safety integrity level) (semi-quantitative), and FMEA.*

*Supporting technical studies include: Human factors, dispersion & consequence modelling, fire & explosion analysis, facilities siting study, emergency systems survivability analysis, QRA.*

*Various approaches must work within a sustainability model (plan, do, check, act).*

*Define a risk baseline to identify and implement improvement actions. Documented in the Risk Register.*

*Risk analysis (risk matrix) -> risk evaluation (tolerability criteria, ranked risks) -> risk treatment (ID and implement improvement actions). This process is documented in the Risk Register (including justification/details). Note: PHA’s are inputs to the risk analysis vs. being a part of the risk analysis.*

*Have a “lessons learnt” process – tool not yet implemented. Risk assessments and risk models are an ongoing process.*

*Team discussion:*

* *Risk tolerability established by who? Overall company policy, done internally, approved at the executive level. Apply outside criteria to establish? Descriptors in various approaches across industry of risk matrices are very similar, but not exactly the same, so is important for each organization to define their own particular level.*

*Should be regulator defined? Say no, regulator should require a process, but not prescriptive thresholds/criteria. I.e., what should be done, vs. how to do it.*

* *Have limited amount of line pipe (~ 90 miles in place, constructing ~ 60 additional miles). Intend to apply PHA approach to line pipe? Yes; use same risk matrix for results, but use different process/model approaches.*
* *Shahani: Comparison of risk between line pipe and facilities can be viewed as from the receptor standpoint, so risk should be comparable between the two. [Operator should be able to define a common set of risk output results.]*
* *Applicability of ALARP (as low as reasonably practicable)? Generally requires quantitative analysis to apply. Challenge is how to baseline, especially for impact categories such as community impact, etc.*
* *Lever: Start with BPMN (Business Process Modeling and Notation) standard (*[*www.bpmn.org*](http://www.bpmn.org)*) to define what is actually meant by the various terms/verbiage.*
* *Spillers: Importance of common understanding of risk thresholds and what they mean is important throughout any organization.*
* *White: How communicate relatively low frequency event importance to an organization? Say rather than focus on numerical values, focus more on available controls and keeping those controls effective.*
* *Lever: Important to model uncertainty directly (distribution) and work to reduce that uncertainty over time.*
* *Rovella (PGE): Any processes to assure that emergency systems actually work and are available for use by operations? Have control manager that oversees testing/maintenance/performance/ reliability/availability of those systems.*

1. Review of Technical Presentations & Team Discussion (CJ Osman, Dane Spillers)
   1. Technical presentation #1 (Lamont):
   * *Risk matrices for various “consequence” categories follow a similar pattern, regardless of the type of consequence involved.*
   * *Potential consequences (i.e., impact on receptors) from facilities are the same as for line pipe, regardless of differences in analytical approaches.*
   * *Grouping of similar assets is analogous to segmenting of linear pipe (similar characteristics).*
   * *Threats are similar for facilities and line pipe.*
   * *Facilities have the additional consideration of reliability issues in addition to integrity. Team noted that tracking data collection for component failures is a challenge to achieve consistent data (personnel tend to define failure modes differently if not strictly defined).*
   * *Example shown for a gas facility was considering that pipeline into/out of the facility, but not explicitly considering the rest of the facility. Is this typical? Team appeared to agree this is often the practice. Leewis noted B31.8 definition of pipeline includes the high pressure manifolds but not the rotating equipment nor the controls and instrumentation*.
   1. Technical presentation #2 (PGE)
   * *Line pipe vs. station differences. Need to be careful to eliminate issues that stay within the facilities vs. events that can affect offsite receptors.*
   * *Facility risk also includes reliability and integrity risks.*
   * *Team: Facilities can also affect things like impacts including the integrity of downstream systems if fail.*
   * *Enterprise Integrated Planning Process is a good example of a high-level process overview (perhaps can be incorporated into the Technical Guidance Document).*
   * *Station-level risk scoring – tail of the distribution is the area of concern/interest; is generally true of most risk modeling.*
   * *Comments with respect to availability/sharing of data is important to note, especially in looking to the next RMWG Data meeting. TransCanada*
   * *Youngblood: A use case for risk modeling may be applicable to topics such as whether hydro testing of facility piping introduces risk versus reduces risk – modeling should be able to show that other methods such as NDE can be more effective than hydro’ing the lines?*
   1. Technical presentation #3 (Phillips66)
   * *Likelihood of Failure model structure included two specific threats, but a large variety of supporting elements that require supporting data.*
   * *Risk analysis can draw from both HCA and non-HCA data sources. Important to use what is available.*
   * *Relationship between risk analysis and eventual P&M measures is important, as this is the end goal of using risk models – to actually reduce risk.*
   1. Technical presentation (Cheniere)
   * *PHA selection is customized to the specifics of the facility being analyzed*
   * *Successful PHA/risk modeling should be as systematic and self-consistent as possible.*
   * *PHA/risk modeling potential pitfalls include inadequate documentation.*
   * *Sustainability of risk analysis, keeping up to date, integrating with overall risk management is important.*
   * *Risk model (Risk Register in this case) needs to be able to support the identification and implementation of actions taken to reduce risk.*
   * *A good risk model supports the ultimate strength and effectiveness of company operations.*
   * *Baseline of risk provides the opportunity to determine deviations.*
   * *Allen (IURC): Need to be mindful of small operator’s ability to implement risk modeling – small companies prefer prescriptive requirements; large companies prefer performance requirements. Team: Guidance should be able to accommodate both.*
2. Risk Modeling Data (lead-in for next meeting) (Vincent Holohan, Dane Spillers)

Team discussion:

*Nanney: Data needs have been identified for a long time (B31.8S, etc.), so why is it still such a topic of identified weakness for risk modeling (true, a crutch, operators actually doing better than is thought, finding more issues than anticipated, etc.)? Team: Good topic for next meeting; \*\* would be useful to conduct some sort of survey in prep for next meeting with respect to data completeness (MPL (Westrick) willing to participate).*

* *Steere: Data quality is important in addition to data availability.*
* *Steere: How to best incorporate SME’s into the data process – both generation of data and validation of data derived from SME’s.*
* *Clayton: Document guidance should address use of available data sets and potential for misapplication of apparent data correlations.*
* *Spillers: Development of probability distributions for available data; when best to use distributions?*
* *Data quality considerations – especially for 3rd party data/industry sets.*
  + *Relevance of original data context*
  + *Local data vs. global data*
    - *Includes index model weighting factors*
    - *Assumed failure rates (x% of a data set apply to a certain frequency)*
* *Data management (API 1178 standard under development); potential speaker from that committee?*
* *Youngblood: INL has a lot of data efforts related to nuclear operating experience data; may be useful to have an INL speaker describe that experience and lessons learned.*
* *Lever: Willing to discuss data topics based on GTI experience and projects.*
* *Data management: CJ Osman to suggest speaker from TRC and/or an associated operator.*
* *Hereth: Modeling of uncertainty an important topic; suggested Lever presentation.*
* *Shahani: Suggest covering how to look for gaps in risk analysis, identify what you do not know, etc. Requested team members to suggest speakers. INL may have relevant experience in looking at operating experience on this topic. INPO may be relevant perspective on this topic.*

*PHMSA noted desire to hear from operators on use/perspective on application of risk model results. Trade groups may suggest speakers; suggested TransCanada discuss application of quantitative results to actions such as P&M measures.*

* 1. Topics suggested by PHMSA for Data Meeting:
     1. Data availability vs. risk model needs.
     2. Operator experience with data upgrades to provide adequate input to risk models.
     3. Opportunity for enhanced industry data sharing.
  2. Suggested Topics for Data Meeting from General Team Discussion:
     1. Integration of data; Correlations; More carefully comb your data; Data quality – be careful of drawing false conclusions (correlation vs. causation).
     2. Incorporation of SME into data, and quality of data from an SME.
     3. Data Integration.
     4. Probability Distribution of Data to Understand Data Uncertainty.
     5. What to do when you have only a small amount of data? What is too little?
     6. Outside Sources of Data, and Data quality. What do we collect? PODS?
     7. Data is conditional in some ways. How can we inform operators on how to best handle this?
     8. Local vs. Global Data. Failure rates are very different. Studies? Meta data from PODS?
     9. Preventive measures and mitigative measures.
     10. Data Management – API 1178 (in development)?
     11. Risk tolerance/acceptability examples and expectations.
     12. How do we cover gaps in data?
     13. Which attributes are operators commonly “turning off”? Is there a methodology for when an attribute will not be considered for inclusion in the risk algorithm? Is the criteria based on unknown or incomplete data for an attribute?
  3. Potential Speakers suggested for Data Meeting (March 7-9, 2017)
     1. Bob Youngblood to suggest INL speaker on Performance Data Analysis for the NRC.
     2. Ernest Lever – volunteered to speak for any needs; Modeling for Uncertainty suggested by team discussion.
     3. Preventive measures and mitigative measures – Mark Hereth to suggest AGA Operator(s) to present.
     4. Application of risk analysis results / risk acceptability and tolerance – Shahani Kariyawasam was volunteered by team discussion, possibly for probabilistic type of modeling.
     5. Data Management – Stuart Saulters may suggest a speaker related to API 1178 development; CJ Osman to suggest speaker from TRC and/or associated operator.
     6. Data Management – Discuss degree of utilization and migration of available data sets (e.g., PODS used by an operator) in risk models – e.g., decision criteria for excluding specific data. \*\* Steve Nanney to coordinate with trades regarding reaching out to TRC.

1. Identify potential presenters for topics at upcoming meetings (Vincent Holohan, Dane Spillers)
   1. Meeting #5: Data – *See above discussion for agenda item #11*.
   2. Meeting #6: Conclusion – *TBD*
2. Exit De-briefing (Steve Nanney)
   1. Any needs from scribe for exit notes? *None identified.*
   2. Any group member comments on the conduct of the meeting and any improvements that could be implemented? None identified.

**Attachment 1 – Meeting Participants (\* indicates remote participant)**

|  |  |  |
| --- | --- | --- |
|  | **Name** | **Company** |
|  | Charlie Childs | Kinder Morgan |
|  | Shahani Kariyawasam | TransCanada |
|  | Christopher (CJ) Osman | INGAA |
|  | Mark Hereth | INGAA |
|  | Steve Allen | URC of Indiana (NAPSR) |
|  | Mark Clayton | CenterPoint Energy |
|  | Jacob Steere\* | Consumers Energy |
|  | Mason Matthews\* | Athens Utilities Gas (APGA) |
|  | Bob Youngblood | Idaho National Laboratory |
|  | Stuart Saulters | API |
|  | Mohamed Elaoudiy | Phillips 66 |
|  | Pat Westrick | Marathon |
|  | Brandon Cavendish | Colonial |
|  | Vinnie Holohan | PHMSA |
|  | Chris McLaren | PHMSA |
|  | Dane Spillers | PHMSA |
|  | Steve Nanney | PHMSA |
|  | Keith Leewis | B31.8S rep (Leewis & Associates) |
|  | Ernest Lever | GTI |
|  | David Kuhtenia | Cycla |
|  | Andy McClymont | Cycla |
|  | Bobby Fristoe | Philipps66 |
|  | Leonard Gomes | Cheniere |
|  | Kevin Ostergren | Philipps66 |
|  | Matt Crist | Philipps66 |
|  | Mike LaMont | Integrity Plus |
|  | Danielle Stephens | Kinder Morgan Liquid Terminals |
|  | Jim Bentley | Marathon Pipeline |
|  | Terry White | PGE |
|  | Troy Rovella | PGE |