



Raymond MacWhinnie
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157 Cordaville Road, Suite 3158
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10/4/21
File No. 4784.01/05

Re: Maintenance and Training Records Audit Summary – Easton, Marshfield, Ludlow & Lawrence LNG Facilities, Rev 1

Dear Ray:

Sanborn Head has completed the Maintenance and Training Records Audit of the Eversource Gas of Massachusetts (EGMA) Easton, Marshfield, Ludlow, and Lawrence LNG facilities for the years 2015 to 2019 when owned and operated by Columbia Gas of Massachusetts (CMA), a division of NiSource. The audit was conducted per the requirements of 49CFR193 and NFPA 59A, 2001 edition. The following provides a summary of the audit approach, identified record gaps, additional observations, and a list of recommendations to assist Eversource in efforts to improve the facility record keeping. Please refer to the attached detailed facility audit documents for additional information.

AUDIT APPROACH

Sanborn Head conducted the facility audits per the following approach for each facility:

- Conducted initial audit per review of record documents submitted by NiSource electronically and developed an initial record gap list.
- Transmitted the initial record gap list to NiSource with a request for information to address the gaps.
- Updated the initial audit and record gap list per the additional documentation provided electronically, transmitted an updated record gap list to NiSource with a request for a site visit to work to gather the missing records.
- Physically visit the facility to meet with plant personnel and review on-site files to gather any additional available documentation. Discuss with plant personnel other avenues to gather missing records such as the corrosion department and other departments who may hold the missing records or other documents to support confirmation that the records were complete.
- Receipt of final available records received by the NiSource team from other departments, finalize the audit, and prepare a summary report to outline the audit findings and recommendations.

IDENTIFIED RECORD GAPS

- Records are not available to provide evidence that components are taken out of service when their respective safety devices are taken out of service for maintenance.

However, although records do not support, it does appear the required action occurs per the following:

- Easton, Marshfield, and Lawrence plant personnel confirm they do lockout/tagout and isolate components when removing their safety devices from service for maintenance.
- Ludlow plant personnel indicate that although the equipment/component in question is isolated and taken out of service, they do not record a lockout/tagout of the component or equipment protected by the safety device.
- For Easton & Marshfield, records are not available to support the requirement that a minimum amount of fire control equipment is taken out of service at any one time and returned to service in a reasonable period of time.
- Some gaps identified are related to the length of time for which records are required to be maintained:
 - Corrosion related records are not available for the life of the facilities, as required by 49 CFR 193. This should include all cathodic protection conducted by the corrosion department and atmospheric corrosion inspections conducted or coordinated by plant personnel.
 - Retention of initial and every two-year training records for the duration of employment, plus one year, are not available for all employees as identified below. Other than the listed exceptions, detailed training records were available for all plant personnel every 2 years and no training gaps were noted.
 - Easton & Marshfield training records are only available from 1990 to the present date. One employee who retired within the last two years, and one current employee, began working at the Easton and/or Marshfield plants prior to 1990.
 - For Lawrence & Ludlow, employee NiSource start dates were not provided for employees, so verification of initial training was not possible. Additionally, the training binder for one former employee was not available. It is unclear if this employee falls under the purview of this audit, because their employment termination date was not provided.
 - For Easton & Marshfield, OQ Training records for employees performing maintenance tasks were not retained prior to 2010. OQ Training records for employees performing maintenance tasks were not available for Lawrence & Ludlow.
- Generator capacity tests are not performed under full plant load for Easton or Marshfield, as is required annually by 193.2613 (NFPA 59A 11.5.1.4, 11.5.1.5).
- Some gaps in plant maintenance records requiring a 5-year retention were identified. The maintenance record review was primarily based upon a review of the repetitive task (RT) records for each facility with plant daily inspection sheets filling in some gaps. Although most of the maintenance records appear to be present, indicating maintenance was largely performed as required by both CMA maintenance procedures and 49 CFR 193, there were some gaps identified for a limited number of items. The following provides a sampling:
 - Gaps in records for 1 year out of the 5 year required such as:
 - Easton

- UV/IR checks missing for 2 months in 2015
- Annual tank foundation survey record is missing for 2016
- Annual safety valve inspections for two SVs are missing in 2017.
- Marshfield
 - Monthly odorizer inspection missing for 1 month in 2015
 - Monthly vacuum pump test is missing for 1 month in 2015
- Lawrence
 - Documentation/tracking of relief valve retirements/replacements via WMS indicates three relief valves are unaccounted for in 2019
 - Monthly fire extinguisher inspections are missing in 2015 and 2016
- Ludlow
 - Annual safety valve inspections for five SVs are missing; three for 2018 only, and two for 2016 through 2019.
 - Monthly odorizer inspection missing for 1 month in 2015.
- Manual pull stations do not appear to be tested. These should be tested at the same intervals as other fire protection control systems at the facilities, not to exceed 6 months.
- The following fire protection control system components at Easton appear to be tested annually so do not meet the not to exceed 6-month requirement.
 - Fire panel
 - Combustible gas detectors
- A variety of process instrumentation did not have records available to meet the requirements of the CMA maintenance procedures such as orifice plates, and plant valves.
- Tank foundation survey records were incomplete for Marshfield, Ludlow, and Lawrence.
 - Marshfield - No record of tank survey for 2016, 2017, or 2018.
 - Ludlow - No records of tank survey for 2017.
 - Lawrence - No records for plant surveys were available.
- Completed commissioning forms for the generator replacement project in Ludlow were not available. This is required by 193.2619(b) (NFPA 59A 11.5.5.1) for systems out of service for 30 days or more.
- Marshfield, Lawrence, and Ludlow do not have records available for the atmospheric corrosion inspections of piping under insulation. This is required at intervals of every 3 years with retainage for the life of the facility.
- A written procedure for corrosion control for Ludlow was not available. This procedure is required for compliance with O&M Procedure requirements.
- Fire drills do not appear to be performed regularly at the Marshfield or Lawrence facilities.

ADDITIONAL OBSERVATIONS

- Up-to-date legible P&ID's were not available for the facilities. This prevented the confirmation that all components to be maintained were included in the records,

such as relief valves, without a lengthy facility walkdown. More importantly, P&ID documentation is an important and necessary support document to meet the operations, maintenance and training requirements of 49CFR193 and NFPA 59A (by reference).

- NFPA 59A, 2001 edition, specifically requires drawings to be maintained at the facility. The intent of this requirement are up-to-date drawings that support the requirements listed above which are a site plan, process flow diagram, P&ID's, electrical area classification, hazard detection/fire protection plan, and any other drawings necessary for operations, troubleshooting, maintenance, and training.
- NFPA 59A, 2019 edition, includes additional language that confirms the intent for the drawings to be up-to-date. Although the 2019 edition is not incorporated by reference, it is expected to be soon, and the only changes made between 2001 and 2019 are related to clarifying the original intent.

Supporting Code Excerpts:

NFPA 59A, 2001 edition

11.2 Basic Requirements. Each operating company shall meet the following requirements:

- (1) Have documented procedures covering operation, maintenance, and training
- (2) Maintain drawings, charts, and records of plant equipment
- (3) Revise the plans and procedures as experience dictates and as changes in operating conditions or plant equipment require
- (4) Establish a documented emergency plan
- (5) Establish liaison with appropriate local authorities such as police, fire department, or municipal works and inform them of the emergency plans and their role in emergency situations
- (6) Analyze and document all safety-related conditions for the purpose of determining their causes and preventing the possibility of recurrence

NFPA 59A, 2019 edition

18.2.2 The operating company shall meet all of the following procedures:

- (1) Document procedures and plans covering operation, maintenance, training, and security
- (2) Maintain up-to-date drawings, charts, and records of LNG facility equipment
- (3) Revise plans and procedures when operating conditions or LNG facility equipment are revised or as a result of lessons learned from an incident investigation
- (4) Ensure cooldown of components in accordance with 18.3.5
- (5) Establish a documented emergency plan
- (6) Establish liaisons with local authorities such as police, fire department, or municipal works to coordinate the emergency plans and their roles in emergency situations

(7) Analyze and document all safety-related incidents to determine their cause and prevent the possibility of recurrence

RECOMMENDATIONS

The following recommendations are offered for Eversource consideration to improve plant documentation and record keeping requirements.

- Update the Process Flow and Piping & Instrument Diagrams for all facilities to current conditions to meet the intent of NFPA 59A.
- Confirm the site plan, electrical area classification, and hazard detection/fire protection plan drawings are representative of current conditions.
- Develop a plan to improve the required corrosion protection record keeping so the LNG facility has access to the records that are maintained by the corrosion department.
- Develop and maintain a plant employee list at the facility, including hire and termination date, to allow confirmation of initial and every two-year training for the duration of employment, plus one year.
- Improve plant access or ease of obtaining records for employee OQ training records for employees performing corrosion related tasks at the LNG facility.
- Identify in the plant maintenance manual or procedures how to document/ record the following:
 - When components are taken out of service when their respective safety devices are taken out of service for maintenance.
 - Confirmation that a minimum amount of fire control equipment is taken out of service at any one time and returned to service in a reasonable period of time.
 - Qualified company or contracted personnel perform each maintenance task.
- Identify and execute plan to conduct an annual generator capacity test under full plant load or alternate load test to meet requirements of 49CFR193.2613 and NFPA 59A 11.5.1.4, 11.5.1.5.
- Update scheduled maintenance tasks for the following to ensure compliance with codes and the plant maintenance manual:
 - Fire protection control system components, including manual pull stations, fire panel, and combustible gas detectors, tested at intervals not to exceed 6 months.
 - Process instrumentation
 - Atmospheric corrosion inspections for above grade un-insulated and insulated piping.
 - Tank foundation surveys
- Develop or identify plan for where to save/upload test results for contractor performed maintenance tasks to improve record keeping and plant access or ease of obtaining records such as relief valve testing reports.
- Perform and document required fire drills at all facilities.

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Thank you for the opportunity to support Eversource on this effort. Please feel free to contact us with any questions.

Very truly yours,
SANBORN, HEAD & ASSOCIATES, INC.



Eric Bettencourt
Project Engineer



Heather James
Project Director

EDB/HNJ: edb

Encl. Marshfield and Easton Records Audits, Revision E, dated 1/19/21
Ludlow and Lawrence Records Audits Revision B, dated 1/19/21

cc: Larry Guy, Brian Normoyle, Craig Fonseca, Jessica Crosby



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Eric Bettencourt
Project Engineer



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EDB/HNJ: edb

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cc: Larry Guy, Brian Normoyle, Craig Fonseca, Jessica Crosby