



U. S. Chemical Safety and Hazard Investigation Board RECOMMENDATIONS STATUS CHANGE SUMMARY

Report:	Xcel Energy Hydroelectric Plant Penstock Fire
Recommendation Number:	2008-0 1-I-CO-R 13
Date Issued:	August 25, 2010
Recipient:	RPI Coating, Inc. (RPI)
New Status:	R13: Closed -Acceptable Action
Date of Status Change:	April 10, 2013

Recommendation Text:

Revise your confined space entry program and practices. At a minimum

- a. Require continuous monitoring for flammable atmospheres at appropriate locations and elevations within a confined space where work activities involve the use of flammables or where flammable atmospheres may be created.*
- b. Prohibit entry or require evacuation of a confined space if the atmospheric concentration of flammable vapors is 10 percent of the LEL or higher.*
- c. Ensure that confined spaces such as penstocks be managed as permit-required that are so large or part of a continuous system that they cannot be fully characterized from the entry point. Ensure that such spaces are monitored for hazardous atmospheres both prior to entry and continuously in areas where entrants are working.*
- d. Ensure that evacuation plans for penstocks that have only one egress point provide for alternative escape routes and/or refuge chambers.*
- e. Ensure the implementation of a written confined space rescue preplan for each designated permit space. Address staging and methods of rescue for each designated permit space including whether a rescue team is required to standby outside the space. Require that confined space rescue teams be standing by at the permit spaces where the hazards pose an immediate threat to life or health including the hazard of a potential flammable atmosphere.*

Board Status Change Decision:

A. Rationale for Recommendation

On October 2, 2007, five contract workers from RPI Coating, Inc. were killed and three others injured when a flash fire erupted inside a drained penstock at the Xcel Energy, Inc. Cabin Creek hydroelectric power plant in Georgetown, Colorado. Workers were using spraying equipment to apply a protective epoxy coating to the interior walls of the penstock. When the spraying equipment malfunctioned, workers used methyl ethyl ketone (MEK), a flammable solvent, to clean the equipment. During the cleaning operation, MEK vapors ignited and flashed. The resulting fire trapped the fatally injured workers deep inside the penstock. Attempts made by local volunteer firefighters to rescue the trapped workers were unsuccessful.

As part of its investigation, the CSB examined RPI's confined space entry program and concluded it did not effectively establish safe limits for flammable atmospheres in confined

spaces, require appropriate atmospheric monitoring in penstocks and other large and continuous confined spaces, or require rescue preplans for confined spaces with only one egress point. A recommendation was issued to RPI to address these deficiencies in their confined space entry program.

B. Response to the Recommendation

In May 2012, RPI reported that it had revised its written confined space entry program to address the five elements contained in the CSB recommendation. A review of the supporting documents submitted by RPI confirmed that the changes had been made to require continuous monitoring for flammable atmospheres; prohibit entry or require evacuation if atmospheric concentration of vapors reaches 10% of the LEL or higher; require that penstocks and other large or continuous system spaces are managed as permit-required confined spaces; ensure that alternative escape routes or refuge chambers are provided in escape plans for penstocks that have only one egress point; and ensure that written rescue preplans are provided for all permit spaces.

C. Board Analysis and Decision

As RPI's revised written confined space entry program addresses all the elements listed in CSB Recommendation No. 2008-01-I-CO-R13, the Board voted to change the status to: "Closed—Acceptable Action."