



U.S. Department
of Transportation

**Research and
Special Programs
Administration**

400 Seventh Street, S.W.
Washington, D.C. 20590

FEB 22 2002

Mr. Joe Campbell
Process Engineer
Calvert City, KY Emulsions Plant
Air Products & Chemicals
246 Johnson-Riley Road
Calvert City, KY 42029

Ref. No. 02-0027

Dear Mr. Campbell:

This is in response to your January 28, 2002 letter concerning the monitoring of rail tank car unloading under the Hazardous Materials Regulations (HMR; 49 CFR Parts 171-180). Specifically, you ask whether the electronic monitoring system you describe in your letter would be adequate to meet the requirements of § 174.67(i) and electronic rail car unloading monitoring outlined in a formal interpretation of the regulations, 87-4-RSPA.

The system you describe includes a qualified, trained operator monitoring the unloading process via two video cameras, software that detects leaks through changes in the video image and physical conditions of the unloading process, and a system of ethylene vapor monitors. The computer imaging and vapor detection systems are connected to alarms to alert the operator of a leak and will automatically shut-off the unloading system. In addition, there is a hardwired shut-down switch in the control room that can be manually activated by the unloading operator.

The system that you describe appears to meet the 4 criteria outlined in the letter of formal interpretation, 87-4-RSPA:

- 1) An employee is made responsible for unloading and is familiar with the nature and properties of the material being unloaded;
- 2) The employee responsible for unloading is instructed in the procedures to be followed during unloading and in the event of an emergency, and has the authority and ability to halt the flow of product immediately and take emergency action;
- 3) In the event of an emergency, the system must be capable of immediately halting the flow of product or alerting the employee responsible for unloading; and



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174.67(i)

- 4) The monitoring device must provide immediate notification of any malfunction to the person responsible for unloading, or the device is checked hourly for malfunctions.

As you note in your letter, if the proposed non-human monitoring system becomes disabled or inoperable, the unloading operator must constantly observe the unloading operation.

I hope this satisfies your request.

Sincerely,



Delmer F. Billings
Chief, Standards Development
Office of Hazardous Materials Standards.

Air Products & Chemicals

Air Products & Chemicals
248 Johnson-Riley Road
Calvert City, KY 42029

Johnson
§174.67(i)
Rail/Unloading
02-0027

January 28, 2002

Mr. Edward Mazzullo
Office of Hazardous Materials Standards
USDOT/RSPA (DHM-10)
400 7th Street SW
Washington, DC 20590

Dear Sir:

I am working on a project to add remote monitoring capability to the ethylene railcar unloading system at our Calvert City, Kentucky polymers plant. Before I secure any capital funds for this project I would like to ensure that the project we have developed conforms to the applicable requirements, specifically 49 CFR 174.67 (i).

Ethylene is listed as a hazardous material and, as such, the governing regulation for tank car unloading is 49 CFR 174.67 (i). Sub-section (i) defines the attendance requirements as follows: "Tank cars may not be allowed to stand with unloading connections attached after unloading is completed. Throughout the entire period of unloading, and while car is connected to unloading device, the car must be attended by the unloader." Further, Interpretation 87-4-RSPA has been released which states in regard to 49 CFR 174.67 (i) that "it is acceptable to have a non-human monitoring system..." after which it defines a number of criteria that must be met:

- 1) an employee is made responsible for unloading and is familiar with the nature and properties of the material being unloaded;
- 2) the employee responsible for unloading is instructed in the procedures to be followed during unloading and in the event of an emergency and has the authority and ability to halt the flow of product immediately and take emergency action;
- 3) in the event of an emergency, the equipment used must be capable of immediately halting the flow of product or alerting the employee responsible for unloading;
- 4) the monitoring devices will provide immediate notification of its malfunction to the person responsible for unloading or the equipment may be checked hourly for malfunctions; and
- 5) in case of malfunction the device will no longer be relied upon and instead the individual responsible for unloading will constantly observe the unloading.

Please review our proposal below which incorporates the above requirements and comment as to compliance with the attendance requirements of 49 CFR 174.67 (i), interpretation 87-4-RSPA or other applicable regulations.

The unloading process will begin with—a qualified unloading operator physically connecting the railcar to our unloading system. The operator will initiate the unloading process while in attendance. There are two video cameras that will monitor the railcar being unloaded and the immediate unloading piping. These cameras will send a video feed signal to a control room located outside of the ethylene unloading area. In this control room the video feed will be displayed on a black and white monitor. The video display will be monitored by an operator in the control room who is trained in the hazards of ethylene and in the emergency response necessary to react to leaks or other upsets during the unloading process. The operator in the control room has a switch that is hardwired to shutdown the unloading process. The switch will be tripped if the monitoring operator observes any unacceptable conditions. In addition to having an operator monitor the video feed, we are installing leak detection software. This software looks at the video

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Image as a bitmap and measures the amount of white space (ethylene leaks will appear as a white cloud). The software then monitors the video signal for any increase in the amount of white space on the screen. If the amount of white space on the screen increases enough to indicate a leak, the computer will automatically shut down the unloading process and alert the operator to the alarming conditions.

In addition to the human and computer monitoring of the video feed signal from the unloading area, we will install eight ethylene vapor monitors (LELs-lower explosive limit detectors) around the unloading area. If these monitors detect a leak, the unloading process will be automatically shut down and the operator will receive an alarm indicating the leak condition.

The physical conditions of the unloading process (pressure, temperature, level) will also be monitored by the process control software. If any of these parameters deviate outside acceptable control limits the unloading process will be shut down and the operator alerted to the process deviation.

The safety systems described above are all designed to be fail safe; all valves fail closed, pumps fail off, and sensors and instruments fail high. Any loss of power or monitoring on these devices will cause the unloading process to be automatically shutdown and the operators alerted to the failure. If it is necessary to continue unloading following a malfunction of our proposed remote monitoring system, the unloading operator responsible for unloading will constantly observe the unloading of the tank car.

Our intent in developing this project is to meet our interpretation of 49 CFR 174.67 (l) and 87-4-RSPA as well as the spirit of "Ensuring that hazardous materials are safely unloaded and that... unloading can be halted rapidly."

I appreciate your time in evaluating our proposal and look forward to hearing from you soon. Please contact me with any questions or for clarification on any of systems described above.

Sincerely,

Joe Campbell 1/28/02

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