

Report on DCP Midstream

30 Summit Lock Road
Westfield, Massachusetts

August 30, 2010

Investigation Concerning Possible Unodorized or
Underodorized Propane Gas Distribution in the
Commonwealth



Prepared by
Massachusetts Department of Fire Services
Division of Fire Safety

Stephen D. Coan
State Fire Marshal

Overview

On Friday, July 30, 2010, at approximately 1220 hours, the Norfolk Fire Department received multiple calls for a reported explosion at 27-28 Wildwood Road, Norfolk, Massachusetts. Upon arrival, responding fire units found a severely damage condominium building, which consisted of two separate dwelling units. At the time of the explosion, one unit was occupied and other was near completion. As a result of the explosion, both units were destroyed and there were seven injuries and one fatality.

The explosion eventually progressed into a five-alarm rescue and fire mission. It took over an hour to remove victims from the debris and required the response of fire apparatus/manpower from 21 communities in Massachusetts. This incident resulted in a response of 21 engine companies, 2 ladder companies, 13 rescues, 112 fire personnel and support from Department of Fire Services (“DFS”) Incident Support Unit, the Rehab Support Unit, and other state and federal agencies.

As a result of the explosion and subsequent lab testing, which showed virtually no Ethyl Mercaptan present in the LP Gas tank, Norfolk Fire Department worked with Energy USA and began stain tube testing the remaining tanks at the complex. This testing showed under-odorized LP-Gas tanks. As a precaution, those tanks were closed and temporary tanks were brought to the site to be installed to operate in their place. During the temporary tank installation, stain tube testing was conducted on the LP-Gas that was just delivered and it too showed a deficient level of odorant. Additional testing was conducted on the delivery truck, which also showed a deficient level of odorant. Testing was also conducted at the Energy USA bulk facility in Taunton, MA, which once again showed a deficient level of odorant. As a result, the State Fire Marshal was contacted which started the investigation.

Initially it was thought that the source of the LP Gas at the Norfolk site came from the DCP Midstream facility at Westfield, MA. DFS worked with Energy USA to review their delivery records to their bulk facilities and the customer records of Energy USA. In addition, DFS worked with Norfolk Fire Department to review all their pertinent information, which showed that the Norfolk Fire Department issued the permit for storage on April 20, 2010 for the 1,000-gallon underground storage tank, that is the subject of the explosion. Energy USA records show the delivery to the subject tank was on April 29, 2010, for 200 gallons of LP-Gas. The underground tanks at this location are set up as a metered delivery, meaning that Energy USA fills the underground storage tank that feeds both condominium units at 27-28 Wildwood. As such, there is no individual receipt for the unit as each unit is metered and the residents are charged for their gas usage from the tank. According to Energy USA, a small amount of gas was delivered to the tank due to the construction area and the fact that the meters were not yet installed, resulting in a partial delivery. Energy USA records show no additional deliveries to this underground tank.

Since the last delivery to the subject tank was on April 29, 2010 and DCP Midstream located in Westfield, MA opened and made their first shipment on May 6, 2010, it is clear that the LP gas in the Norfolk tanks at the time of the explosion did not come from DCP Midstream Westfield and are not connected, as first thought.

On August 30, 2010, CCEO Kenneth Burdick, was dispatched to DCP Midstream located at 30 Summit Lock Road in the city of Westfield, MA. Upon arrival, he found the facility closed but returned the following morning on August 31, 2010 to review and discuss the possibility of under-odorized LP-Gas being distributed from that site. That morning, CCEO Burdick witnessed several stain tube tests conducted by DCP Personnel on the product remaining in the two aboveground storage tanks. Four stain tube tests were conducted and each time the results showed between 10 and 20 ppm of Ethyl Mercaptan.

During a review of the facilities operations, it was determined that the policy of DCP Midstream was to conduct a random stain tube test on each rail spur using the vapor test method to ensure that at least 5 ppm of Ethyl Mercaptan was available. However, records obtained from DCP Midstream did not readily show these tests being conducted. The remainder of the rail cars were ‘sniff’ tested.

At the time of the visit one railcar was present on site that DCP Midstream personnel had identified as lacking odorant. This rail car was placed to the side to return to the vendor. The information obtained by CCEO Burdick, in conjunction with the report by Norfolk Fire Department and Energy USA, was sufficient to issue a Cease and Desist Order to prohibit any further deliveries from the facility until a clear understanding could be reached as to the impact and possibility of under-odorized LP-Gas being present at downstream customers.

The Cease and Desist Order issued by CCEO Burdick effectively closed the Westfield facility as of September 1, 2010, as all the truck deliveries had been completed on August 31, 2010.

In order to facilitate a systemic review, the Attorney General’s Office (“AGO”) and DFS entered into an agreement with DCP Midstream, which eventually lead to the hiring of an Independent Examiner. The Independent Examiner determined that there was a probability that under-odorized propane entered the system, but he could not clearly link the under-odorized LP-Gas to the DCP Midstream facility. During the investigation, additional sources of under-odorized LP-Gas were discovered and remediated.

As a result of the investigation by the Commonwealth it was necessary to involve a number of federal and state agencies to review the LP-Gas supply in the Commonwealth, including the hiring of an Independent Examiner to bring the necessary resources to the investigation. Two additional issues have been referred to the federal agencies for further follow up regarding odorant fade in tanks and the supply issue of LP-Gas. The Commonwealth has concluded its investigation at this time.

The Initial Incident

A complete description of the incident, cause and origin investigation, and conclusions will be contained in the report being prepared by the Massachusetts State Police Fire/Explosion Investigation Unit (Case # 2010-117-1293).

Summary Conclusion of Cause and Origin¹

After a lengthy investigation into the origin/cause of the fire, it has been determined the probable cause was a leaking propane connection in the basement. However, the exact ignition source cannot be determined.

Investigators, employing the scientific method and standards of NFPA 921, conducted interviews, performed and documented an exhaustive scene reconstruction and reviewed all available evidence. Consideration was given to other potential ignition scenarios including incendiary causes or electrical and equipment malfunction.

Detailed information is contained in the Fire and Explosion Investigation Report.

¹ Summary, 2010-117-1293, MSP Fire & Explosion Investigation Section

Events Leading up to the Investigation

On Friday, July 30, 2010, at approximately 1220 hours, the Norfolk Fire Department received multiple calls for a reported explosion at 27-28 Wildwood Road, Norfolk, Massachusetts. Upon arrival, responding fire units found a severely damage condominium building, which consisted of two separate dwelling units. At the time of the explosion, one unit was occupied and other was near completion. As a result of the explosion, both units were destroyed and there were seven injuries and one fatality.

The explosion eventually progressed into a five-alarm rescue and fire mission. It took over an hour to remove victims from the debris and required the response of fire apparatus/manpower from 21 communities in Massachusetts. This incident resulted in a response of 21 engine companies, 2 ladder companies, 13 rescues, 112 fire personnel and support from Department of Fire Services (“DFS”) Incident Support Unit, the Rehab Support Unit, and other state and federal agencies.

Massachusetts State Police (“MSP”) investigators assigned to Office of the State Fire Marshal - State Police Fire & Explosion Investigation Section (“FIU”), performed the cause and origin investigation. The investigation was led by Sgt. Mark Varkas and investigators from the Norfolk Fire and Police Departments, and the Massachusetts State Police Crime Scene Services.

During the cause and origin investigation, questions were raised as to whether anyone could smell LP-Gas prior to the explosion. This question was ultimately resolved through lab testing. On August 13, 2010, liquid samples were taken from the underground LP-Gas tanks that provided gas to the destroyed complex. This sample was taken under the oversight of the Statewide Hazardous Materials Unit for the private investigators and insurance companies. These samples were sent to EFI Global Laboratory for chemical analysis.

On August 25, 2010, the lab report was returned to the Norfolk Fire Department, at which time Chief Bushnell contacted DFS Director of the Division of Fire Safety, Timothee Rodrique, the State Hazardous Material Response Unit, and Christine Foran, Chemist at EFI Global, to discuss the test results. The Chief learned from the discussion with the chemist that the sample taken from the tank showed virtually no Ethyl Mercaptan present, the chemical used to provide LP Gas its distinct odor for safety reasons.

As a result of the initial tests, DFS Code Compliance and Enforcement Supervisor, David Beaudin, assisted Chief Bushnell with writing an order to conduct testing on the remaining LP-Gas tanks at this condominium complex. Due to the timeframe contained in the order, Chief Bushnell was advised that liquid test could not be completed by the lab and results returned as required. As a result, it was agreed that an alternative colorimetric (stain tube) test was to be conducted to determine the presence of Ethyl

Mercaptan in the tanks; this would extend the timeframe in the order to complete the liquid sample testing of LP-Gas.

On August 30, 2010, Energy USA began stain tube testing at the condominium complex on the remaining LP-Gas tanks. This testing showed underodorized LP-Gas tanks and those tanks were closed off. Temporary tanks were brought to the site to be installed to operate the occupied dwelling units. During the temporary tank installation, stain tube testing was conducted on the LP-Gas that was just delivered (at approximately 1700 hours) and it showed a low level of odorant. Further testing was conducted on the delivery truck and it also showed a deficient level of odorant. As a result of the testing conducted by Energy USA and witnessed by Norfolk Fire Department, at approximately 1700 hours Chief Bushnell contacted both DFS Division of Fire Safety Director, Timothee Rodrique, and DFS Code Compliance and Enforcement Supervisor, David Beaudin, to review the results of the day. At that time, we were also informed that Energy USA was en route to their Taunton, MA facility to conduct further testing of the bulk tanks. At approximately 1900 hours, Chief Bushnell contacted Director Rodrique with the results of the testing at the Energy USA bulk facility in Taunton, MA, which showed a deficient level of odorant. At that point, State Fire Marshal Coan was notified and the investigation began.

The Investigation

Based upon the significant public safety impact due to the possibility of unodorized propane in the Commonwealth, State Fire Marshal Stephen D. Coan ordered the investigation and preparation of this report.

The information obtained from the work completed by the Norfolk Fire Department and Energy USA raised concerns. Energy USA indicated that as of August 30, 2010, the bulk of the LP-Gas located in their bulk storage tanks was from DCP Midstream located in Westfield, MA. Director Timothee Rodrique contacted State Fire Marshal Coan to apprise him of the situation. After discussion with State Fire Marshal Coan, a decision was made to send DFS Code Compliance and Enforcement Officer (“CCEO”), Kenneth Burdick, to DCP Midstream in Westfield, MA to try to determine the status of the facility and the level of odorant currently in the propane supply at the facility. State Fire Marshal Coan contacted the Massachusetts Attorney General’s Office (“AGO”) to advise of the current situation, of the explosion and fatality in Norfolk, and the possibility of under-odorized propane originating out of the DCP Midstream facility. At that time, DCP Midstream personnel indicated that their storage tanks are loaded and offloaded anywhere from three to five times a day, depending upon the season. This loading and unloading process is often referred to as “turning”.

August 30, 2010 – September 3, 2010

On August 30, 2010, CCEO Kenneth Burdick, was dispatched to DCP Midstream located at 30 Summit Lock Road in the city of Westfield, MA. Upon arrival at approximately 2100 hours, he found the facility closed. Officer Burdick was ordered to return to the

facility at 0700 hours on August 31, 2010 to review and discuss the possibility of under-odorized LP-Gas being distributed from that site.

On the morning of August 31, 2010, CCEO Burdick witnessed several stain tube tests conducted by DCP Personnel on the product remaining in the two aboveground storage tanks. Four stain tube tests were conducted and each time the results showed between 10 and 20 ppm of Ethyl Mercaptan.

During a review of the facilities operations, it was determined that the policy of DCP Midstream was to conduct a random stain tube test on each rail spur using the vapor test method to ensure that at least 5 ppm of Ethyl Mercaptan was available. However, records obtained from DCP Midstream did not readily show these tests being conducted. The remainder of the rail cars were ‘sniff’ tested.

At the time of the visit one railcar was present on site that DCP Midstream personnel had identified as lacking odorant. This rail car was placed to the side to return to the vendor. The information obtained by CCEO Burdick, in conjunction with the report by Norfolk Fire Department and Energy USA, was sufficient to issue a Cease and Desist Order to prohibit any further deliveries from the facility until a clear understanding could be reached as to the impact and possibility of underodorized LP-Gas being present at downstream customers.

The Cease and Desist Order issued by CCEO Burdick effectively closed the Westfield facility as of September 1, 2010, as all the truck deliveries had been completed on August 31, 2010.

DCP Midstream Westfield reopened with their first shipment of LP-Gas on May 6, 2010. Prior to that date, the Westfield facility had been closed and was under a nitrogen blanket during “moth balling”. This nitrogen blanket is commonly used when closing LP-Gas facilities and tanks to ensure no air or moisture enters the piping and tanks. The introduction of moisture to a LP-Gas system can lead to odorant loss during initial operations. In reviewing the DCP policy, it appears that the “moth balling” was done properly.

The DCP Midstream Westfield facility typically opens at approximately 0200 hrs to begin off loading the LP-Gas from rail cars into the two on site AST’s and closes at approximately 1600 hrs. Most deliveries are shipped by early morning. According to DCP Midstream personnel, between May 6, 2010 and August 31, 2010, the facility processed over 16.5 million gallons of LP-Gas. DCP Midstream is considered a middle handler of LP-Gas. DCP Midstream received and purchases odorized LP-Gas from a number of facilities; Aux Sable in East Morris, IL, Markwest Hydrocarbons Hydrocarbon City, KY and BP from Sarnia, Canada. This odorized LP-Gas arrives at the facility by railcar, which is then unloaded into the two ASTs located on the property for distribution to the New England area by tank trailer truck. Typically, DCP customers are larger LP-Gas distributors who then store and resell to various small LP distributors or directly to residential customers.

On August 31, 2010, at approximately 1800 hours CCEO Burdick, MSP Trooper Mazza and MSP Trooper Irwin who is assigned to the AGO visited DCP Midstream to ask a number of investigative questions. At the conclusion of the questions, additional vapor stain tube testing was completed, which all resulted in at least 10-ppm on a stain tube test.

On August 31, 2010, representatives from the DFS began trying to determine the appropriate testing method and appropriate test standards to show the proper level of odorant in LP-Gas. This was to determine a quantitative test versus the subjective test known as a "sniff-test," as required by NFPA 58 and contained in 527 CMR 6.00. A clear answer was never determined and the issue was left to the Independent Examiner. During this research, it was discovered that an issue common to the LP-Gas industry was 'odorant fade,' and it was determined further research was necessary.

On September 1, 2010, a meeting was held at the DFS with representatives of the Division of Fire Safety, Massachusetts State Police assigned to the Fire Investigation Unit, the Attorney General's office, and the Commercial Vehicle Enforcement Unit, New England Propane Gas Association, and DCP Midstream Personnel to discuss the possibility of under-odorized propane being distributed from the Westfield facility. Ahead of the meeting, DCP personnel were advised to bring all records associated with the facility regarding bills of lading, delivery records and testing records, all of which were produced at the meeting.

During the meeting, DCP Midstream personnel reviewed their policy on odorant levels and testing. DCP personnel indicated that Westfield facility personnel sniff test all railcars prior to off loading and that one railcar per spur is stain tube tested prior to off loading based on a random selection. In addition to the odorant test, testing is also completed to review for ammonia and hydrogen sulfide.

Finally during the meeting, a discussion ensued as to the correct level of odorant that should be obtained when conducting a stain tube test of the LP-Gas vapor. DCP Midstream personnel indicated that it was their policy to ensure a minimum of 5 ppm of Ethyl Mercaptan. The group discussed with DCP Midstream personnel the ability to increase the level of Mercaptan on their testing in order to lift the cease and desist order. Jeff Hurteau, DCP Manager, indicated that it would require a corporate approval to vary from the 5 ppm and generally the railcars are shipped to the facility 14 to 21 days prior to delivery (DCP Midstream does not have the ability to odorize propane at their Westfield site.). With the Cease and Desist in place, DCP Midstream personnel raised a concern about the LP-Gas already in route to the facility and its ability to store. After this meeting, in reviewing the records for DCP Midstream, it appeared that there were insufficient records regarding odorization testing prior to off loading. It was also determined that the DCP facility generally turns the product within their tanks anywhere from 3 to 5 times a day depending upon the time of year.

On or about September 1, 2010, a conference call was held between the State Fire Marshal, staff and the United States Chemical Safety and Hazard Investigation Board

(“CSB”) to determine if the CSB had any jurisdiction and/or could provide technical assistance in this investigation. CSB did not have available resources to assist but did try to provide technical assistance and contacts.

Based upon the DCP Midstream customer list, the New England Propane Gas Association (“NEPGA”) assisted in developing an available list of locations within Massachusetts that had bulk storage facilities. This was the initial list used for the review of odorant by state officials. NEPGA also assisted in the development of a self-identification form that was to be filled out and signed by the facility representative, which was to clearly identify and sign off that the odorant, as determined by the sniff test, met one of the following categories:

- Strong
- Normal
- Weak
- None

It was felt the facility representatives were most familiar with their product and therefore, should complete the sniff test and form.

On September 2, 2010, representatives from the DFS Division of Fire Safety, MSP assigned to the FIU and AGO, and representatives of the statewide Hazardous Materials Response Division, conducted a broad sweep of 53 identified bulk LP-Gas storage facilities. The purpose of the sweep was to witness plant employees conducting sniff tests and to determine if there was any further under-odorized LP-Gas in the system. As a result of this statewide sweep, five facilities voluntarily shutdown and one was ordered closed until further testing could be completed. These facilities were: Wrightington in Carver; Amerigas in Athol; Arrow Gas in Swansea; and EnergyUSA in Medway and Taunton. Amerigas in Hyannis was originally on the list, but was incorrectly identified. A second “sniff-test” was conducted in Hyannis, by Deputy Chief Melanson, which confirmed adequate odorant.

On September 2, 2010, MSP Trooper Maguire of the Commercial Vehicle Enforcement Unit, enlisted the assistance of Frederick Fraini of the Federal Railroad Administration (“FRA”), due to the transportation of unodorized LP-Gas by rail. FRA is investigating the transportation records of the LP-Gas since the bills of lading indicate the railcars were odorized, when in fact, they were not. In addition, the local representative of the U. S. Consumer Product Safety Commission (“CPSC”), Jason Twitchell, was contacted to determine their ability to assist in this investigation.

Due to a lack of available information on proper testing standards, it was decided that if a closed facility reached at least 10 ppm in a vapor test, it would be allowed to re-open and resume operations. In reviewing the DCP records, questions remained as to whether DCP personnel were conducting vapor or “flash” tests, as the two tests have substantially different results to show proper levels of odorant.

On September 2, 2010, a conference call was held with Fire Marshals from the New England states and New York State to brief them on our investigation, as it was clear that some of the product originating out of Westfield could have arrived in those states. As a result, each Fire Marshal's Office conducted varying reviews of the propane distribution system within their state. Initial reviews conducted by both New Hampshire and Connecticut revealed under-odorized LP-Gas in their respective states, which resulted in facility closures.

On September 3, 2010, DCP Midstream personnel conducted stain tube testing at Amerigas in Athol, and received a stain tube test of over 20 ppm, thereby allowing it to go back into operation. Dr. Roberts, a consultant hired by DCP Midstream to assist in this matter, also conducted testing at Wrightington Gas in Carver and determined that this facility had sufficient odorant. The other facilities remained closed pending additional testing.

Also on September 3, 2010, DCP personnel conducted testing at Arrow Gas in Swansea. Personnel received a reading of 15 ppm, which allowed the facility to re-open. It should be noted that the Swansea facility was also listed for review by the Independent Examiner and, based upon his testing, it was determined that the LP-Gas at the facility was under-odorized as it failed to meet the standards set by the Independent Examiner. It was later determined that DCP personnel had conducted a flash test and not a vapor test at this facility. This raises questions as to the testing methodology DCP personnel used in the past. As will be discussed later in this report, there is a very different standard for proper amounts of Ethyl Mercaptan when "vapor-tested" versus "flash-tested". This discovery seems to raise a greater possibility that under-odorized LP-Gas had entered the system through DCP Midstream, Westfield, MA.

September 6, 2010 – September 10, 2010

On September 8, 2010, the State Fire Marshal received a letter from Aux Sable in East Morris, IL indicating that certain shipments of propane shipped from its facility may have contained insufficient odorant. This letter indicated that these shipments could possibly be present in the following states: Maine, Massachusetts, New Hampshire, New York, North Carolina, Pennsylvania, Tennessee, Maryland, Virginia and Vermont. The letter further stated that Aux Sable had suspended the loading of odorized propane and ceased shipments of propane pending the results of an internal investigation.

On September 10, 2010, a conference call was held with the CPSC to discuss the ongoing LP-Gas issue within the Commonwealth, odorant fade, and their possible assistance and investigation.

September 13, 2010 – September 17, 2010

On September 14, 2010, a signed agreement was reached between DCP Midstream, the State Fire Marshal and the Attorney General's Office. This agreement allowed for the

hiring of Independent Examiner, J. Roger Craddock of Engineering Services, Inc., to complete an independent review of the distribution of LP-Gas by DCP Midstream, Westfield, MA as to the possibility of unodorized LP-Gas within the Commonwealth. In summary, the agreement required the Independent Examiner to investigate and issue findings regarding:

- All deliveries of supply to Westfield from May 6 forward, to determine as feasible whether supply was odorized, or at least, identify, review and analyze all available information concerning whether supply was odorized;
- All sales from Westfield from May 6 forward, to determine as feasible whether propane sold was odorized, or at least, identify, review and analyze all available information concerning whether supply was odorized;
- Identification of whom propane was sold to from May 6 forward and in what amounts; and
- A review based on those three analyses and testing of current supply.

The Independent Examiner was required to prepare a report to determine whether or not there was a reasonable probability that unodorized product was delivered from Westfield and, if so, identify as feasible, the current location of that propane in the distribution chain.

On September 15, 2010, a meeting was held with representatives of the Commonwealth and its expert/Independent Examiner, J. Roger Craddock, DCP Midstream, their attorney and their expert, Dr. John Roberts. The purpose of the meeting was to determine the protocol for testing and appropriate levels of Ethyl Mercaptan to be detected. It was determined that two test methodologies would be utilized during the testing. The first was a vapor test based upon ASTM D5303-97, and the second was for liquid testing based upon ASTM D1265-05. During the meeting, the Independent Examiner further agreed to a flash test that would require the withdrawal of liquid propane, which would be allowed to vaporize and then be tested by measurement of the vapor. The Independent Examiner, in conjunction with the DCP expert, identified and set the test protocol based on the ASTM standards and reached an agreement to the following levels of Ethyl Mercaptan based upon the federal standards injection rate and nationally recognized standards of 1lb/10,000 gallons.

The values used to determine proper odorization based on the tests are:

- Vapor Test: 5 ppm Ethyl Mercaptan
- “Flash Test”: 17 ppm Ethyl Mercaptan
- Liquid Test: 17 ppm Ethyl Mercaptan

In reality, the industry injects at higher rates than those identified above. Industry practice is to inject at an approximate rate of 1.5lb/10,000 gallons to assist in compensating for odor fade issues.

On September 16, 2010, the Independent Examiner's first team arrived to begin the examination of the possibility of under-odorized propane originating from the DCP Midstream facility in Westfield, MA. The final report issued by J. Roger Craddock, Principal of Engineering Services, Inc., is attached in Appendix A.

On September 17, 2010, Enterprise/Heritage Propane voluntarily contacted the AGO to advise them that they had tested their bulk storage facilities in Massachusetts and found that some of their bulk tanks and customer tanks contained under-odorized LP-Gas. Enterprise/Heritage Propane hired their own consultant to begin testing immediately when the possibility of unodorized propane surfaced in the news. This was standard practice for them as Enterprise/Heritage had been through the issue of underodorized propane before. Several of the bulk storage facilities that were self identified by Heritage Propane were not on the original DFS sweep list. Details surrounding the self-identification, test results, and remediation are contained in the report of the Independent Examiner.

The Norfolk Explosion and the Source of the LP-Gas

Concurrent with the investigation into the DCP Midstream Westfield, MA facility, was an investigation into the tank installation in Norfolk, MA, to determine the source of the LP-Gas.

DFS continued to work with Norfolk Fire Department and Energy USA to review its customer records. It was determined that the Norfolk Fire Department had issued the permit for storage on April 20, 2010 for the 1,000-gallon underground storage tank that is the subject of the explosion. Energy USA records show the delivery to the subject tank was on April 29, 2010 and for 200 gallons. The underground tanks at this location are set up as a metered delivery. This means that Energy USA fills the underground storage tank that feeds both condominium units at 27-28 Wildwood. As such, there is no individual receipt for the unit and each unit is metered and the residents are charged for their gas usage from the tank. Energy USA records show no additional deliveries to this underground tank. **Since the delivery to the subject tank was on April 29, 2010 and DCP Midstream located in Westfield, MA opened and made their first shipment on May 6, 2010, it is clear that the explosion and investigation in DCP Midstream Westfield are not connected, as first thought.**

It was determined that the LP-Gas in the Norfolk tank come from Energy USA and their shipments of LP-Gas from the Tempco facility located in Providence, RI. Due to the closing of the Tempco facility for major maintenance and repairs, the DCP Midstream Westfield facility was re-opened out of necessity and was to pick up Tempco's customers. During this investigation, it was learned that DCP Midstream was operating

the Tempco facility on a long-term lease.

The Tempco facility upon learning of the investigation voluntarily provided records showing shipping papers for the odorization of LP-Gas leaving the RI facility and delivered to the Energy USA facilities. A review of those records showed that at least 1lb. of Ethyl Mercaptan per 10,000 gallons was injected into each truck leaving their RI facility bound for Energy USA facilities.

Odorant Fade

During the initial research stages of the investigation, it was discovered that a phenomenon known as ‘odorant fade’ was a possibility in the Norfolk explosion and not from the supplier. This phenomenon has been noted since at least the 1950’s or earlier and is well known in the industry. Starting in 1985, the CPSC conducted independent studies of the issue. Although this phenomenon was discovered during the investigation, it was not reviewed as part of the DCP Midstream investigation.

The injection of ethyl mercaptan is important to public safety for both customers and first responders. The purpose of ethyl mercaptan is to provide a means to detect or smell a leak from the LP-Gas. The topic of odorant fade does not seem to garner much attention by the industry or regulators. The importance of available odorant is like having batteries to ensure working smoke alarms. If you don’t have the safety mechanisms in place, it can lead to injuries and deaths not only to those using LP-Gas, but to first responders who would be unaware of the danger.

Odorant fade is common in new LP tanks and tanks that have run dry or have been open to the air. Tanks that could have possible moisture due to being open or run dry and then filled with LP-Gas could have rust, which will react to the Ethyl Mercaptan producing disulfide products, thereby mitigating the effectiveness of the Ethyl Mercaptan. This chemical reaction is known as odorant fade. The reaction changes Ethyl Mercaptan into disulfide products.

As a result of this issue being raised during the investigation and the necessity to ensure the integrity of added odorant in the propane supply, the State Fire Marshal sought out the expertise of the U.S. Chemical Safety and Hazard Investigation Board (“CSB”). odorant is not deteriorated. State Fire Marshal Coan personally visited the CSB in Washington, D.C. and requested their assistance in further studying and ultimately in making recommendations to the industry and regulated communities to eliminate or minimize, to the greatest extent possible, the issue of odorant fade.

Code Analysis

Regulations concerning fire safety in buildings and the use and handling of flammable gases within the Commonwealth come from two primary sources, the State Plumbing and Gas Code (248 CMR) and the Massachusetts State Fire Code (527 CMR). This analysis will only be based upon the fire statutes and regulations in effect as of August 30, 2010,

as the investigation questioned the proper level of odorant within the LP Gas. The Plumbing and Gas Code has not been reviewed because it deals with the piping and appliance installation after the first stage regulator and does not affect the odorant level. The fire laws and regulations will be reviewed as applicable to the DCP Midstream bulk storage facility and odorization levels. These sections are enumerated below.

Massachusetts General Law Chapter 148 Fire Prevention

Chapter 148: Section 13. Licenses for land for explosives and inflammable materials; certificate of approval; record; certificate of registrations; fees; replacements and alterations of, and regulations for buildings; explosion hazard; appeals to marshal

Section 13 of this statute requires that the owners of property desiring to store explosives or inflammables on the property or within structures on the property first obtain a license from the local licensing authority. This section provides authority to the Board of Fire Prevention Regulations to prescribe amounts of these materials that may be stored without a license. Additionally, this section requires that a Certificate of Registration be issued by the town clerk on an annual basis when a license has been renewed.²

Records on file with the City of Westfield indicate that a license had been issued for the keeping, storing, manufacture or sale of inflammables or explosives in August of 1963. City records indicate the last time the license was issued an annual Certificate of Registration was in May of 1976 or May of 1979. The last issued registration had both of the above listed dates listed on the document.

Regulations in Effect on August 30, 2010

527 Code of Massachusetts Fire Regulations 1.00-50.00

527 CMR 6.00 - Liquefied Petroleum Gas Containers and Systems

6.07 (1) Installation Standards and Procedures

NFPA 58 Standards Adopted by Reference

(a) The standards prescribed by NFPA 58-1998 edition entitled Liquefied Petroleum Gas code are adopted as health and safety standards and shall apply according to their provisions, except that the NFPA Chapter 6 on Vehicular Transportation of LP-Gas and section 3-2.5 Installation of containers of roofs of buildings shall not apply.

NFPA 58-1998 edition:

² See Appendix 3 – Complete Section 13

6.07 (6) Distributing Points, Distributing Plants and Industrial Plants

- (a) *527 CMR 6.07(6) shall apply to:*
 - 1. *Distributing points of any capacity;*
 - 2. *Distributing plants of any capacity;*
 - 3. *Industrial plants of 2,000 gallons aggregate water capacity or more.*
- (b) *If loading or unloading is normally done during other than daylight hours, adequate lights shall be provided to illuminate storage containers, control valves, and other LP-Gas equipment.*
- (c) *Suitable roadways or means of access for extinguishing equipment, such as wheeled extinguishers or fire department apparatus, shall be provided.*
- (d) *The LP-Gas system shall be enclosed within an industrial type fence at least six feet high with at least two egress gates opening outward and remotely located from each other or be within an approved fence plant area and protected from tampering.*
- (e) *The LP-Gas system shall be protected against vehicle damage, with substantial bumper guards where necessary.*
- (f) *The storage, loading, unloading, cylinder and vehicle filling areas, and other strategic points shall be posted in accordance with 6.07(3)(e).*
- (g) *Only a qualified person shall dispense LP-Gas into any LP-Gas container.*

527 CMR 6.08(2) Storage License or Registration

- (b) *In accordance with the provisions of MGL c. 148 s. 13, 2,000 gallons of LP-Gas, in the aggregate, is hereby prescribed as the maximum amount that may be kept, stored, manufactured or sold, in one or more containers without a license or registration, or either of them, provided that a permit for the keeping, storage, manufacture or sale of LP-Gas has been obtained, except as hereinafter provided for.*
- (c) *When more than 2,000 gallons of LP-Gas will be stored, manufactured or sold, a license shall first be obtained from the local licensing authority by the owner or occupant of the premises in accordance with the provisions of MGL c. 148 s. 13.*
- (d) *The permit for the keeping, storage, manufacture or sale of LP-Gas must be obtained from the head of the fire department as provided by MGL c. 148 s. 10A and 23.*

Findings: The City of Westfield has issued the license and registration in accordance with applicable laws. The City of Westfield fire department had also issued a permit. In addition, the City of Westfield placed numerous conditions on the granting of the land license (MGL 148 s.13). These were not reviewed as part of the state investigation.

527 CMR 9 Tanks and Containers

527 CMR 9.03 Aboveground Storage Tanks Greater Tank 10,000 Gallons Capacity or Tanks Storing Combustible Liquids

- (b) In accordance with MGL 148 s. 37, no person shall construct, maintain or use any aboveground storage tank of more than 10,000 gallons capacity, for the storage of any fluid other than water, without first securing a permit therefore from the Marshal. The aboveground storage tank shall be constructed, installed and maintained in accordance with 527 CMR 9 and 502 CMR 5.

502 CMR 5.00 Permit Requirements and Annual Inspection Requirements of Aboveground Storage Tanks or containers of more than 10,000 gallons capacity.

5.06: Annual Inspection and Use Permit Requirements

(1) Pursuant to M.G.L. c. 148, § 37, all above ground storage tanks and containers subject to the requirements of 502 CMR 5.00 shall be inspected annually. Inspections shall be made of the premises, tanks, dikes and related equipment.

(2) A professional engineer who is registered in the Commonwealth or a person who has been certified according to API Standard 653 Appendix D or a person, who otherwise meets the minimum qualifications established by the Marshal, shall conduct the annual inspection. At least 14 days prior to the date of the intended inspection, the owner, operator or inspector of said tank or container shall notify the Marshal and the head of the local fire department of the date and time of the intended inspection. The Marshal shall be given the opportunity to observe or participate in the inspection process.

(3) Upon inspection, the owner or operator of a tank or container shall submit an annual inspection report on a form provided or approved by the Marshal. The report shall contain an affirmation by the qualified inspector that the facility was duly inspected, date of said inspection and a statement that the premises, tanks or containers, related equipment and dikes are in compliance with all applicable regulations. A separate report form shall be submitted for each individual tank or container on or before June 1, 2001 and on an annual basis thereafter.

(4) The Marshal may rely on the affirmations in the annual inspection report and, when satisfied as to accuracy of the report and safety of the subject tank or container, may issue the annual use permit. Said permit shall expire one year from the date of issuance, unless otherwise extended by the Marshal.

Findings: DCP Midstream has obtained their annual Use Permit for the Aboveground Storage tanks located at 30 Summit Lock Road Westfield, MA.

Referrals

FEDERAL AGENCIES

The State Fire Marshal and the Attorney General's Office reacted quickly to ensure public safety within its jurisdiction. The appropriate state agencies responded to the incident within the confines of their jurisdiction and staffing levels. It was imperative that the agreement to hire the Independent Examiner was reached, as the available resources within the state could not have completed this type of review, nor had the proper test equipment or resources to conduct the proper lab testing. It has become clear that the LP-Gas issue could affect multiple states as determined by receipt of the letter from Aux Sable. As such, with the conclusion of the Independent Examiner's report and the OSFM report, it is felt the only appropriate conclusion is to forward the work completed and work cooperatively with both the Federal Railroad Administration and the U.S. Consumer Product Safety Commission so that they may initiate any further investigation that each respective agency warrants. In addition, these groups have different regulatory authority and resources that may lead to a safer delivery of LP-gas.

In addition, State Fire Marshal Coan sought out the expertise of the CSB and requested their assistance in further studying and ultimately in making recommendations to the industry and regulated communities to eliminate or minimize, to the greatest extent possible, the issue of odorant fade. The goal of State Fire Marshal Coan was to highlight the importance of ensuring odorant remains in the LP-Gas for the safety of the public and first responders.

NATIONAL ORGANIZATIONS

The issue of odorant fade and the lack of national standards to guard against this from happening creates and promotes a serious public safety issue, especially for first responders. As a result, State Fire Marshal Coan will be requesting national organizations, such as: the International Association of Fire Chiefs, the International Association of Fire Fighters, and their respective state associations or partners to promote the necessity of further study on the issue of odorant fade to ensure appropriate public safety measures remain in place, as intended.

Conclusions and Recommendations

Summary

As a result of the investigation and that of the Independent Examiner, it was determined that there was a possibility that under-odorized LP-Gas had entered the supply chain within the Commonwealth. Although the exact source of under-odorized LP-Gas was unable to be related to DCP Midstream.

A number of issues were discovered during the investigation regarding the adoption of NFPA 58 through 527 CMR 6.00. A series of recommendations will be forwarded to the Board of Fire Prevention Regulations to further enhance the oversight of LP-Gas within the Commonwealth.

There was found to be no direct relationship between the explosion on July 30, 2010 in the Town of Norfolk and LP-Gas originating from its DCP Midstream facility in Westfield, MA.

Recommendations

- ❖ The information relative to appropriate test methods and appropriate levels of Ethyl Mercaptan to be detected by stain tube flash test and liquid test, contained in this report should be forwarded to the Board of Fire Prevention Regulations to be included in the State Fire Code.
- ❖ The information relative to odorant fade should be forwarded to the Board of Fire Prevention Regulations to determine if additional regulations are warranted to ensure the issues associated with odorant fade are minimized.
- ❖ The issue of odorant fade should be further studied and resolved by the US Consumer Product Safety Commission.

Appendix A