



Hopkinton Liquefied Natural Gas

Concerns of Safety/ Security



# Topics covered

- LNG – Introduction
- Liquefaction
- Hopkinton LNG facility
- Plant operations
- Timeline – LNG tanks
- Eversource reports and exclusion zone, Thermal event, and quality concerns
- Emissions and safety concerns – hazardous gases
- Safety and security threats
- Timeline - Legacy farms construction
- Concerns and questions raised – unanswered questions

# LNG - Introduction

**Liquefied natural gas or LNG** means natural gas or synthetic gas having methane (CH<sub>4</sub>) as its major constituent which has been changed to a liquid.

**LNG facility** means a pipeline facility that is used for liquefying natural gas or synthetic gas or transferring, storing, or vaporizing liquefied natural gas.

**LNG plant** means an LNG facility or system of LNG facilities functioning as a unit.

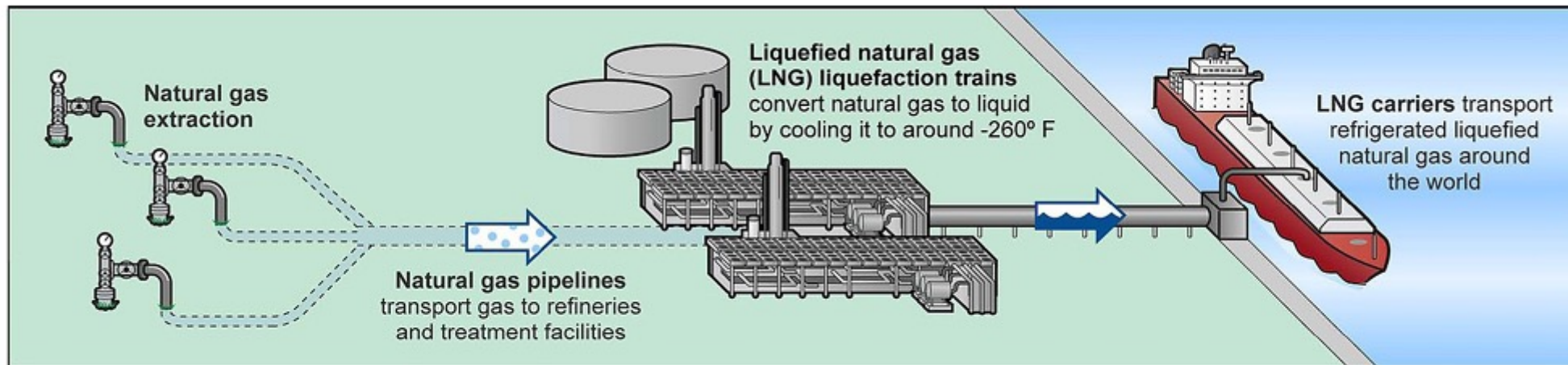
- Liquefied Natural Gas (LNG) is methane that is filtered (or “purified” - industry term) and supercooled to -260° F, turning it from gas to liquid.
- Liquefaction reduces the gas’s volume by 600 times, making storing and transporting it in large quantities easier.
- LNG is primarily methane, a greenhouse gas 86 times more potent at trapping heat than carbon dioxide over its first 20 years in the atmosphere
- LNG is odorless, colorless, and light, so it floats on water (rainwater). LNG will NOT burn as a liquid.
- **Production:** Horizontal hydraulic fracturing, or fracking, is an extraction process that injects highly pressurized water and chemicals underground to fracture rock formations.

<https://www.ecfr.gov/current/title-49/subtitle-B/chapter-I/subchapter-D/part-193#193.2181>

<https://psr.org/wp-content/uploads/2019/11/LNG-WHITE-PAPER-11262019.pdf>

<https://www.petro-online.com/>

# LNG – Liquefaction introduction



Source: GAO. | GAO-16-104

The liquefaction process itself requires a high amount of energy. This, in combination with gas releases and leaks from the gas wellsite and the compressor stations that keep gas flowing through the pipelines, results in an estimated 12-13 percent of the original fuel being lost or consumed throughout the entire LNG supply chain.<sup>2</sup>

<https://psr.org/wp-content/uploads/2019/11/LNG-WHITE-PAPER-11262019.pdf>

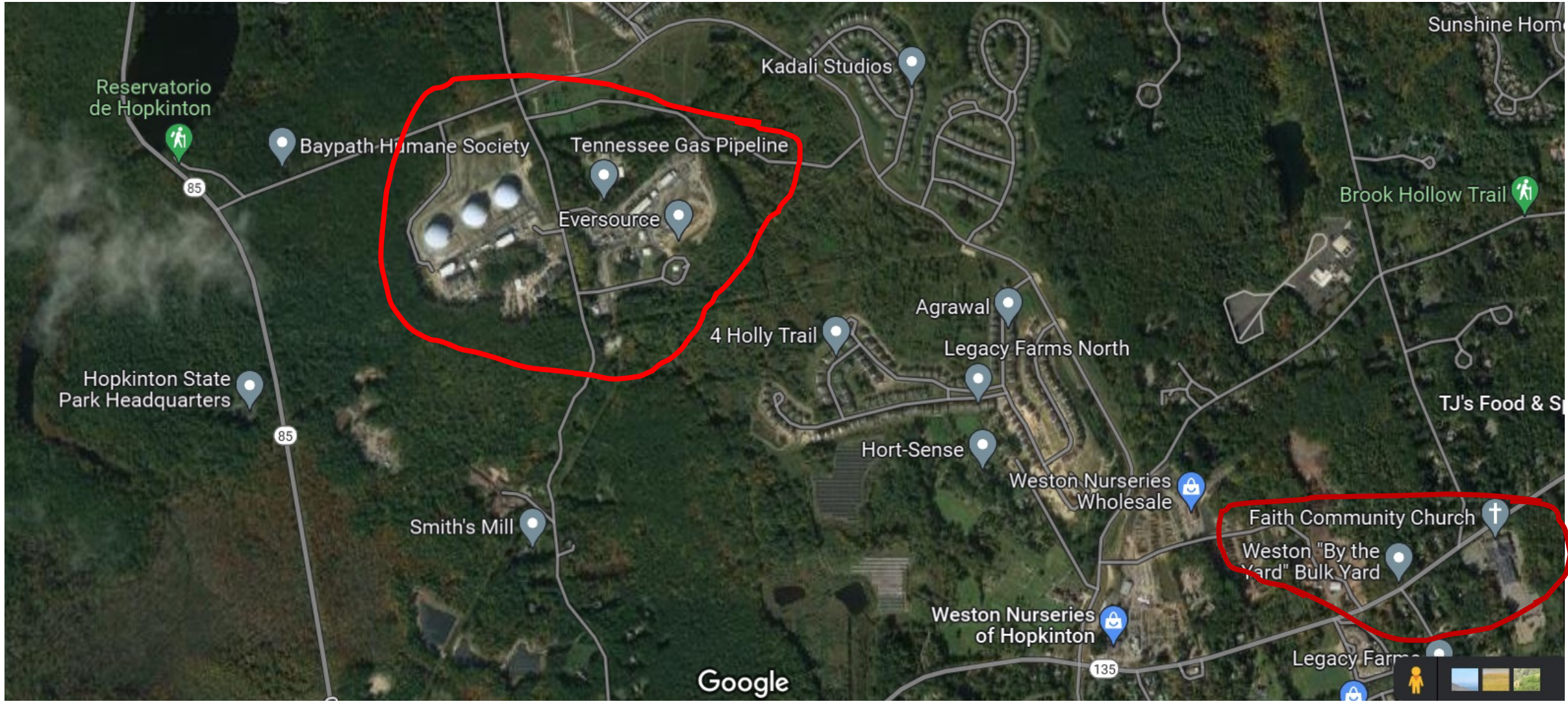


- Emissions of methane and toxic gases can occur when fracked gas is transported via pipelines, which are subject to leaks and explosions.
- Leaks also occur from compressor stations and pipelines. To be liquified, the fracked gas must undergo a process that removes CO<sub>2</sub>, mercury and some heavy hydrocarbons to create an end product that is primarily methane, which is then supercooled into a liquid.
- **Little public research has been conducted as to where the byproducts of the concentration or “purification” process go. These chemicals may cause serious harm.**
- **Xylylene and Mercury are well-known neurotoxins; exposure in utero can result in lifelong impairments in cognitive thinking, memory, language, and attention.**
- The presence of LNG terminals also leads to poorer air quality.
- **The facilities emit volatile organic compounds (VOCs), nitrous oxides, Benzene, Carbon sulfide, Xylene, Naphthalene, hazardous air pollutants, and greenhouse gases. VOCs contribute to smog, which worsens asthma and can make people vulnerable to illnesses such as pneumonia.**
- **Wolf Eagle Environment tested the air quality in Dish, Texas; the levels of many of these chemicals/hazardous materials exceeded the federal guidelines.**
- In addition, the increase in traffic from trucks and tankers, often fueled by diesel, adds to air pollution.
- “LNG terminals are often sited in areas that fail to meet National Ambient Air Quality Standards, these extra air pollutants exacerbate the health risks that already face heavily burdened communities”.



<https://hopnews.com/legacy-farms-residents-at-risk-from-failed-mitigation-system/>





Reservatorio de Hopkinton

Baypath Humane Society

Tennessee Gas Pipeline

Kadali Studios

Eversource

Brook Hollow Trail

4 Holly Trail

Agrawal

Legacy Farms North

Hopkinton State Park Headquarters

TJ's Food & S

Hort-Sense

Weston Nurseries Wholesale

Smith's Mill

Faith Community Church

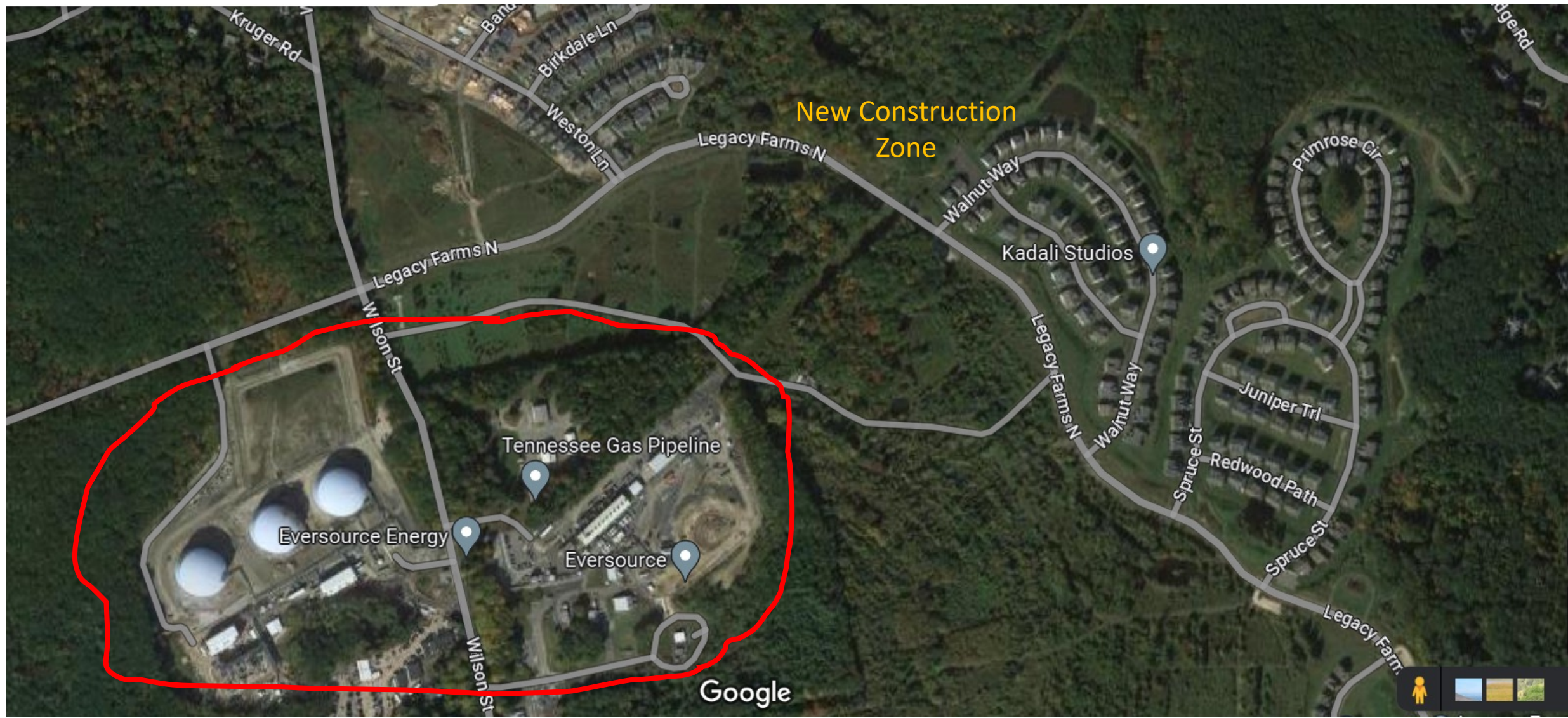
Weston "By the Yard" Bulk Yard

Weston Nurseries of Hopkinton

Legacy Farms

Google





New Construction Zone

Eversource Energy

Tennessee Gas Pipeline

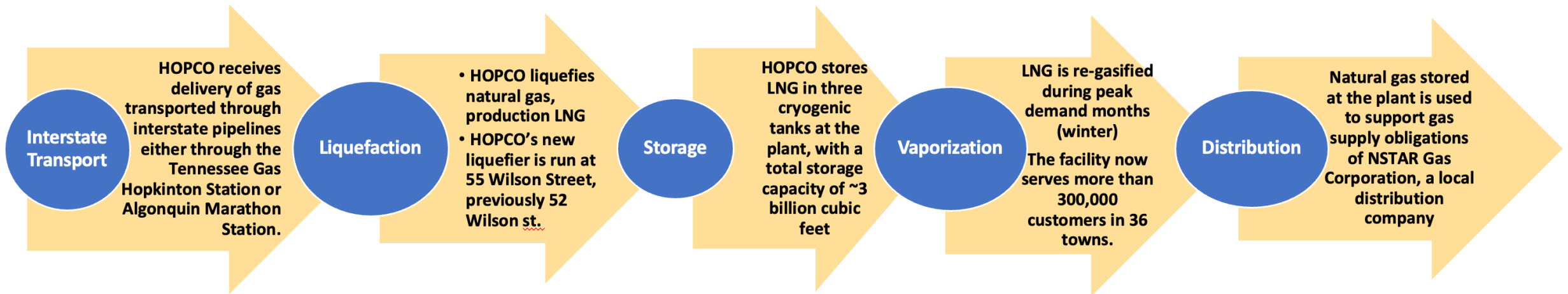
Eversource

Kadali Studios

Google



# Hopkinton LNG Plant Operations



Liquefaction Replacement Project: The project received final approval from the DPU on December 21, 2018.

The new liquefaction facility construction began in the spring of 2019.

Final commissioning - expected to be completed by the end of 2023.

<https://www.eversource.com/content/residential/about/transmission-distribution/projects/massachusetts-projects/hopkinton-lng-liquefaction-replacement-project>

May 4, 2023 – Fire department drill to check the facility of the NEW liquefaction facility ONLY.

# HOP LNG - TIMELINE

1967-  
1975

- Hopkinton LNG Corporation, which contracts with the NSTAR Gas Company, a subsidiary of Eversource Energy owns the HopCo facility - Worcester Gas and Light Company built LNG storage tanks.
- The three cryogenic storage tanks have surpassed their anticipated lifespan (40 years); two are now over 52 years old, and one is 49 years old.

1983

- 16-foot crack in one of the tanks (Tank B?)

2002

- Natural gas (“gas”) explosion (“incident”), occurred at approximately 1:41 a.m. on July 24, 2002 - The incident resulted in the death of two young girls and extensive damage to the multi-family dwelling at 65 Main Street, Hopkinton (“dwelling” or “structure”) <https://www.mass.gov/doc/hopkinton>

2015

- Federal regulations changed – requiring a dike for each tank, the Hop LNG is grandfathered in (exception because it’s an old facility)

Dec 2017

- Thermal Anomaly – Tank B – Eversource notified the town in August 2018

2019

- The town initiated a public records request in 2019 to the Department of Public Utilities

2023

- May 4<sup>th</sup> – Fire safety drill – only the new liquefaction factory



## Facility Background

- Constructed in 1967 the Hopkinton Liquefied Natural Gas (“LNG”) Facility provides supplemental capacity to constrained pipelines, serves as an emergency supply independent of interstate gas, and maintains seasonal price stability for Eversource gas customers.
- Connected to Eversource’s gas distribution system, the Facility serves approximately 300,000 customers in 36 towns, making up 42% of our customer’s supply on the coldest days of the year.

## Project Justification

- Age and obsolescence are a risk to the performance and reliability of the Facility. It should be upgraded in order to ensure continued reliability.
- Much of the equipment is no longer supported by the original manufacturers. Most components must be reverse engineered and fabricated specific for the Facility when replacement parts are necessary.
- Fuss & O’Neill an independent contractor hired by Eversource indicated that much of the infrastructure for the subject facility was designed for a life expectancy of about 40 years, so that the tanks were approaching the end of their expected life.
- Mr. James Davis from Eversource indicated that there are “no plans to replace the facility’s three tanks,” even though they were nearly 50 years old. Because they were still operational, they were considered “in good condition,” according to testimony from James Davis.

The plant is the largest “peak-shaving” LNG facility in New England, the biggest storage facility east of Mississippi.

“The plant is old and is no longer best suited for its present location”.

Much of the plant’s equipment is at or past its useful life.

# Thermal Anomaly – Tank B - 2018

- Thermal Anomaly – the tanks are designed to keep the LNG at a constant temperature of minus 260 degrees, but there was an abnormal drop in temperature in December 2017 (moisture seen on the outside of the tanks).
- Although the tanks are insulated, a small amount of warming occurs, causing the LNG cargo to evaporate as it reaches its boiling point. This natural evaporation, known as boil-off, is unavoidable, and the generated boil-off gas (BOG) must be removed to preserve the tanks' pressure.
- The town was not informed because DPU handles LNG tanks, and DPU mentioned that Eversource doesn't have to inform the town due to confidentiality privileges. "Unless I directly ask for information, the company does not provide it to me."
- Has this changed? Because in the recent drill, it was disappointing that the fire department did not inspect or have any interest in learning about temperature anomalies or asking about issues pertaining to the tanks.
- Now that more than 2000 residents live very close to the tanks!



# Temperature fluctuations – Tank B

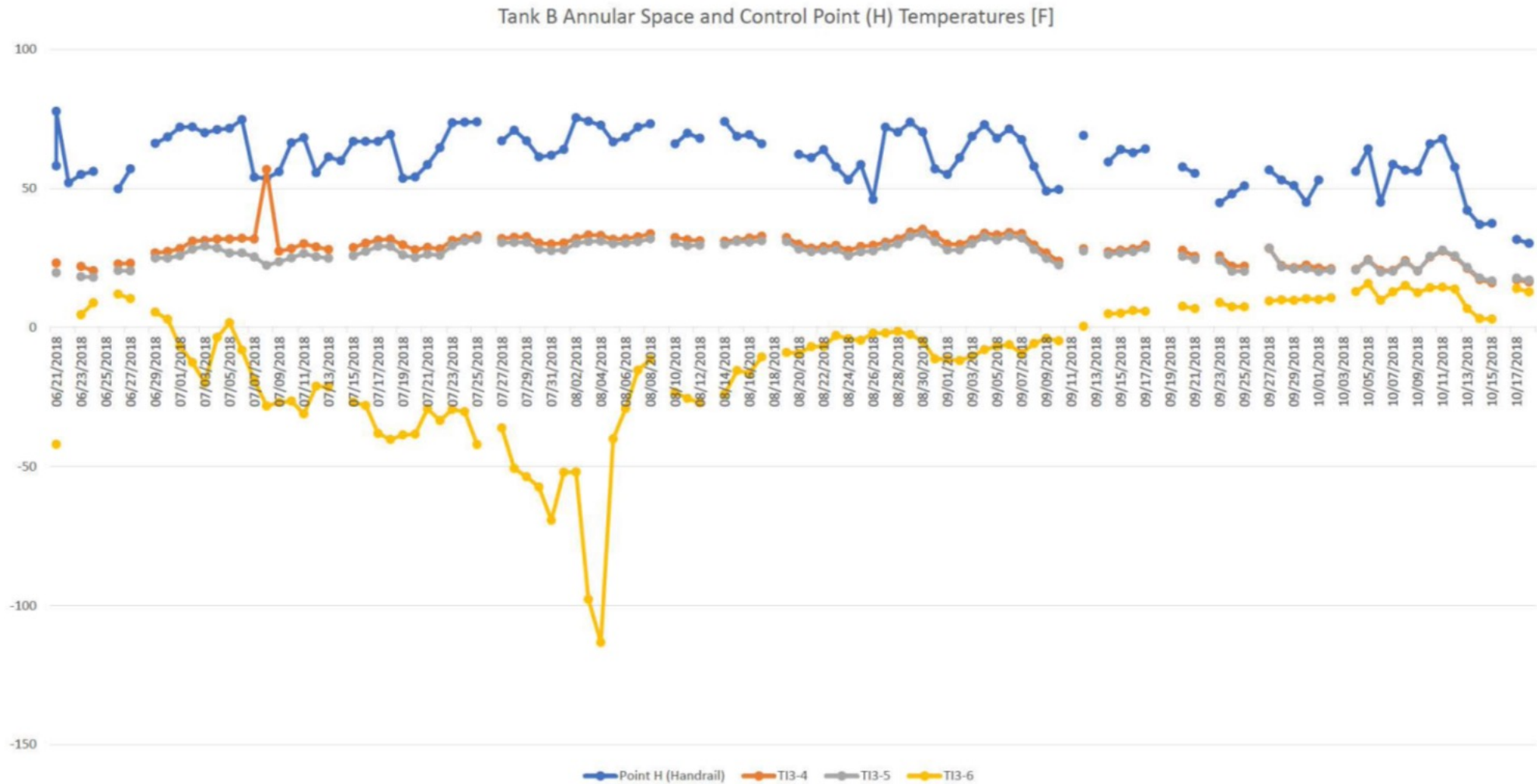




Figure 1. Image of the pipeline road crossing under Wilson St. at the NSTAR facility. Note that any LNG spill from the pipeline will collect in the depression on the right side (west) of the road. Arrows indicate the pipeline impact point identified by Smith & Burgess and the depression.



# Discussions about Legacy Farms community

**Feb 9, 2016-Report of Smith & Burgess Project #0639** Town of Hopkinton commissioned an engineering study to evaluate the Hopkinton LNG Corp. natural gas storage facility on Wilson St. The purpose of the study was to estimate the area of potential natural gas vapor dispersion in the event of a catastrophic event at that facility. As specifically requested, the analysis modeled a “worst-case” outcome for two separate failure scenarios related to the tanks and the associated piping. A negative review of the LNG facility

**March 29, 2016** - Peer Review Report of Sanborn Head & Associates, Inc., – disagreed with the report, indicating that they are extreme scenarios.

**April 1, 2016** – The response of Smith & Burgess – indicated that they were told to present the worst-case scenario and mentioned that Sanborn Head is neglecting the risks and dangers.

**April 8, 2016** - Roy McDowell – Legacy Farms LLC - Exponent Failure Analysis Associates reviewed both Smith & Burgess and Sanborn Head & Associates reports - the modeling reported by Smith & Burgess in their February 9, 2016, report is inaccurate, incorrect, and does not meet the standard expectations for this type of analysis in the LNG industry.

# Legacy Farms community – Planning Board



**Aug 2016 – Pulte**  
Homes of New England and Legacy Farms LLC – applied for a site review and approval request with the Hopkinton planning board to build the legacy farms community.

**2016 – ioMosaic**, a firm contracted by Legacy Farm LLC/ Roy McDowell, the legacy farms landowner, submitted a document to the town: to assess the risks to their proposed housing development from the neighboring LNG facility.

Their assessment showed that the **risks posed by the LNG facility** to the housing development are **negligible**.

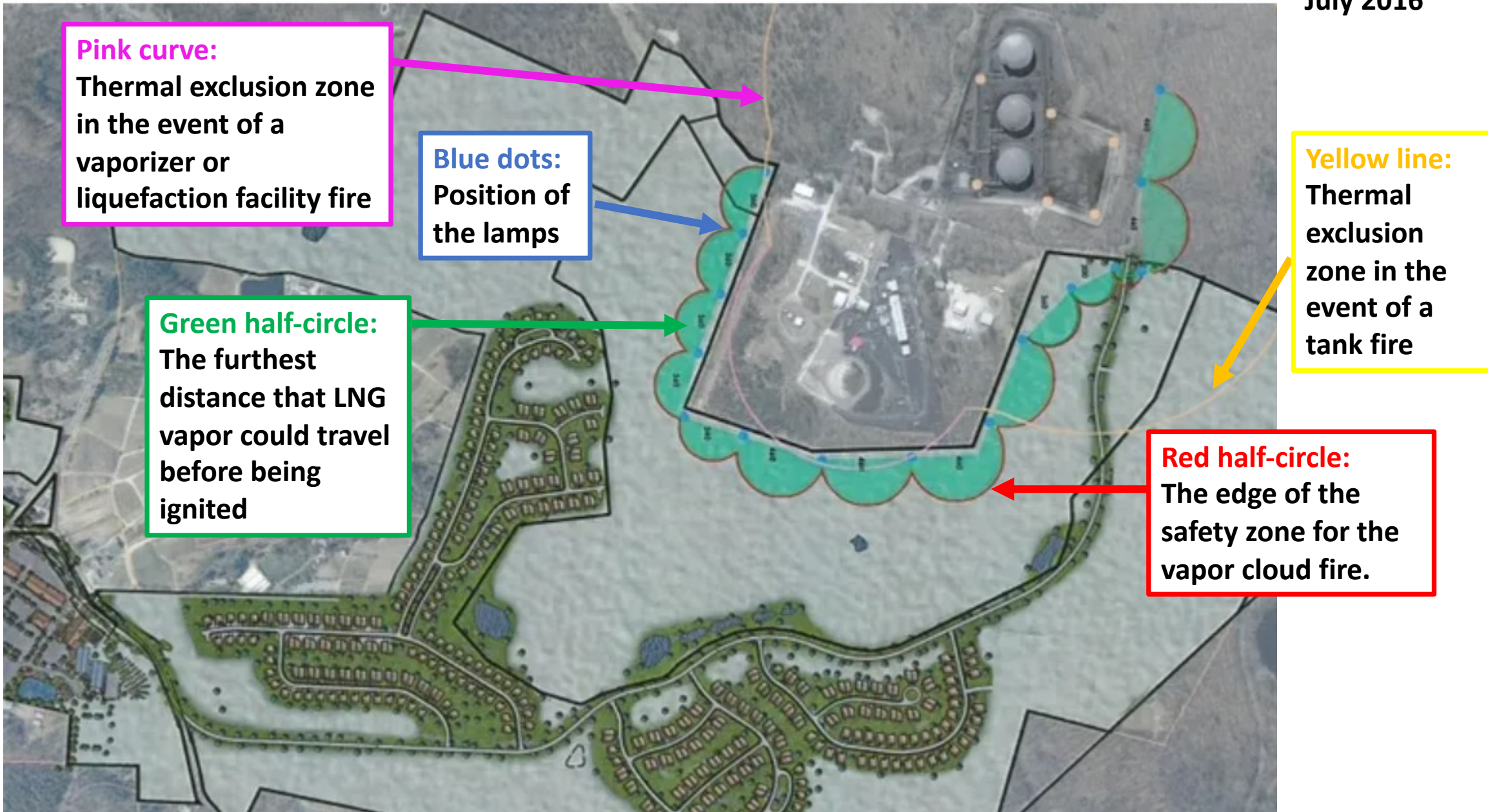
But Legacy Farms LLC proposed to **install continuous, decorative, open-flame gas lighting**. The lighting poles to ensure the ignition of any LNG vapor cloud that reaches the facility boundaries where the lamps are situated would ignite the flame would travel back to the tanks at a speed of 10 to 15 m/s leading to a pool fire of LNG in the dike.

The pool fire will continue to burn until the fire **consumes all the contents of the tanks**. As a result, a vapor cloud fire will not be able to reach beyond the LNG facility boundaries.

Hopkinton **planning board approved the construction of new homes**. The LOA (land-owners association) was supposed to oversee the functioning of the lamps.



July 2016





The Trails 55+ New  
Construction Zone



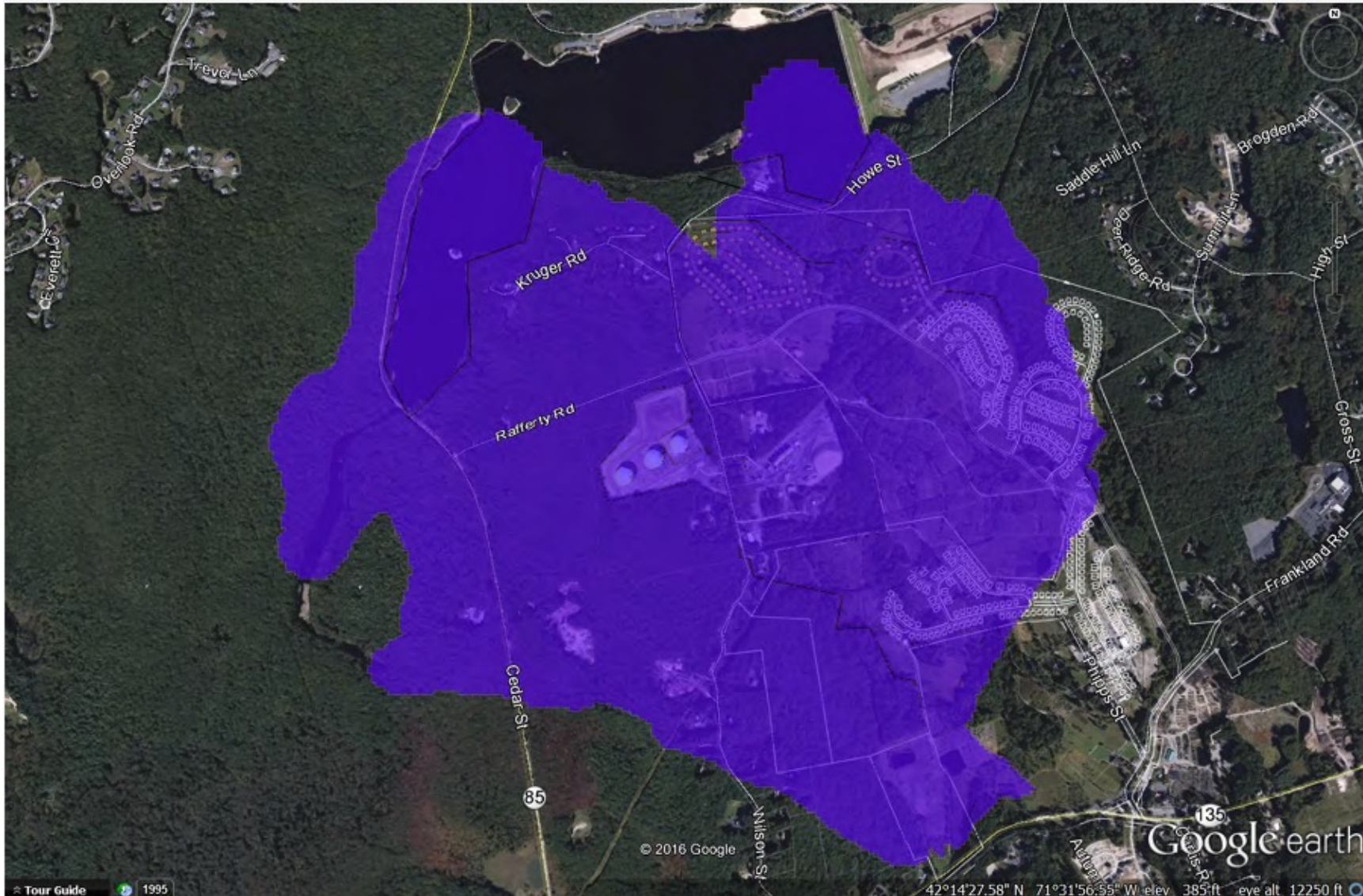
Google



# Concerns - Tanks

- As per the 1978 – US DOE report - an assessment of LNG safety and environmental issues shows that Hopkinton LNG has the most tanks (3) of any Peak Shaving facility and one of the lowest distances to the property line allowed.
- The dike height, 10 feet, is also one of the lowest of any facility. Sump volume, at 1,700 feet, is lower than many other facilities with a single tank.
- **Question:** Has any of this been upgraded in the intervening years? The document also describes vapor generation and dispersion from an accidental spill.
- The wind in Hopkinton almost always comes from the Northeast (past the LNG facility and toward Legacy Farms). This is one of the reasons the network of burn-back gas lamps was installed.

# LNG spill dispersion scenario report



5	4	The potential resistance to vapor transport caused by forested areas
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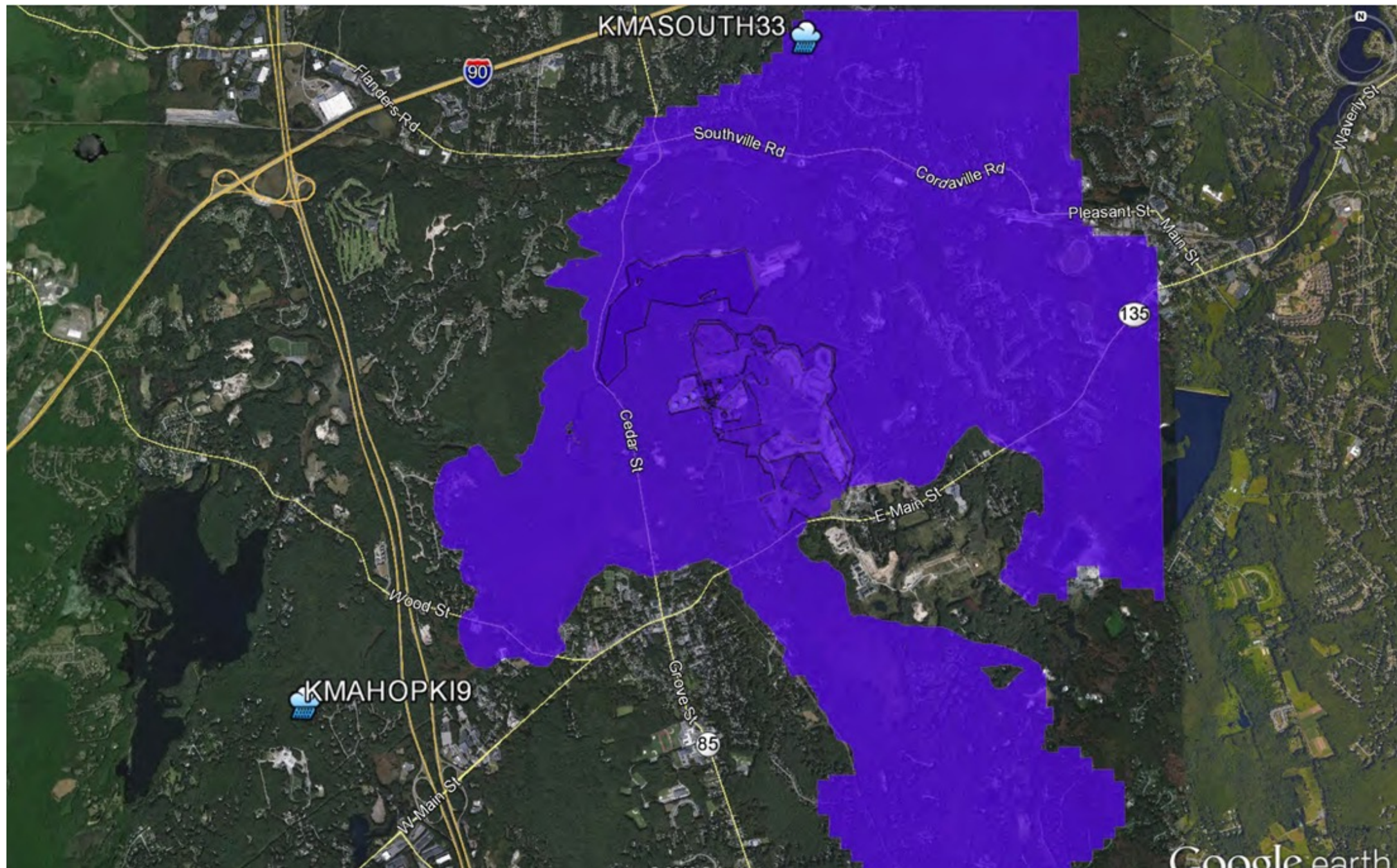
2

April 1, 2016

Response to Sanborn Head Technical Review Report

#	Page	Sanborn Head Remark
		in the near vicinity of the Eversource terminal is not explicitly considered. Smith & Burgess addresses this resistance through specification of surface roughness lengths that will affect the way in which wind speed increases with height in the atmosphere, but because cold natural gas vapor stays near the ground (until it mixes with enough air), the flow around individual trees can potentially slow the progress of vapor plumes and introduce additional turbulence/dispersion.





<https://ehop.org/2016/04/hopkinton-lng-dispersion-report-worst-case-scenario-for-emergency-planning-purposes/>



KMASOUTH33



Southville Rd

Cordaville Rd

Pleasant St

Union St

Waverly St

Cedar St

E Main St

135

85

KMAHOPKI9

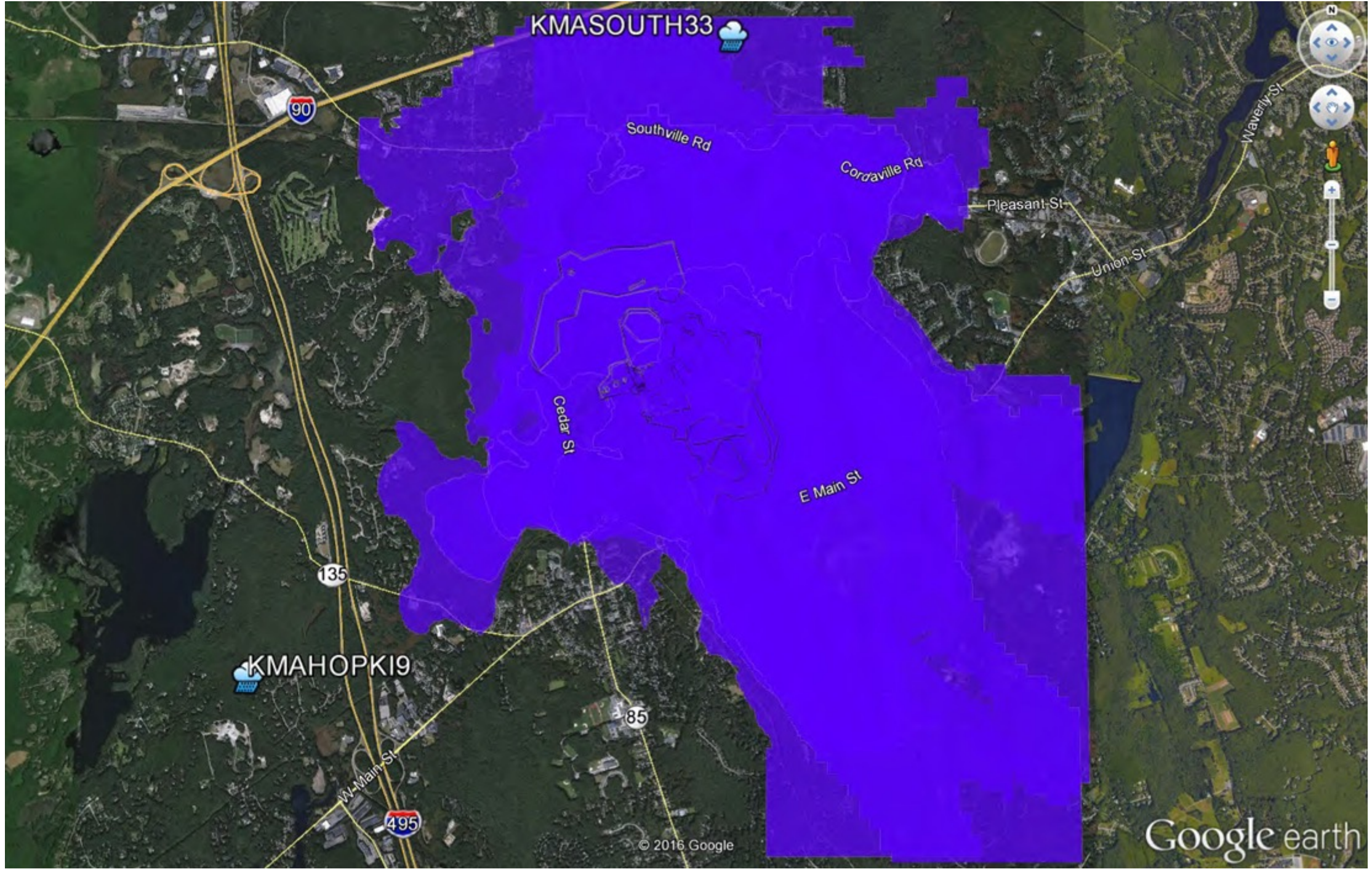


W Main St

495

© 2016 Google

Google earth





# Safety and security threats

LNG is a volatile and potentially explosive material, so plants pose challenges to safety.

In 2014 in Plymouth, Washington, LNG processing equipment exploded, injuring five employees while leaking enough gas to prompt the evacuation of residents within a two-mile radius. The incident highlights serious gaps in oversight of the LNG industry: The injuries were not reported, since the employees were able to leave the hospital the same day. Shrapnel from the explosion pierced multiple storage tanks causing LNG leaks. However, these leaks went unreported. Why? The accidents are not in the reportable category because, when LNG comes in contact with the air, it evaporates. Thus the leaks are never reported as “spills”.<sup>12</sup>



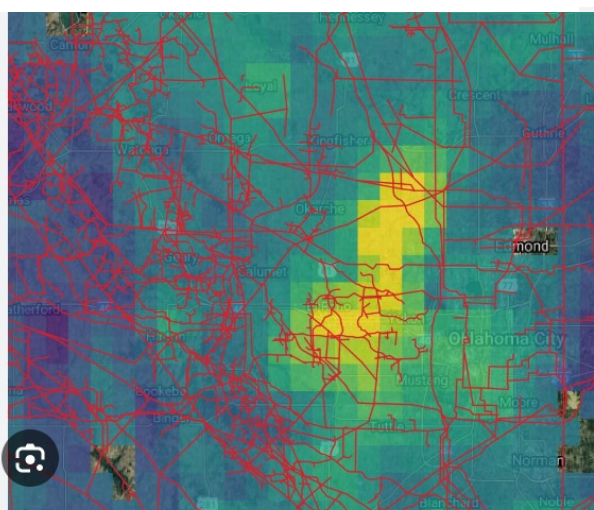
Methane cloud spotted from space came from Williams pipeline – Bloomberg  
<https://seekingalpha.com/news/3784367-methane-cloud-spotted-from-space-came-from-williams-pipeline-bloomberg>

- “The company does not know much methane was released during the work, but Geoanalytics firm Kayrros estimates an emissions rate of 14 tons/hour of methane was needed to generate the plume.
- Georgia and **federal pipeline safety regulations do not require pipeline operators to report emission releases when they are intentional or related to pipeline maintenance and repairs”.**

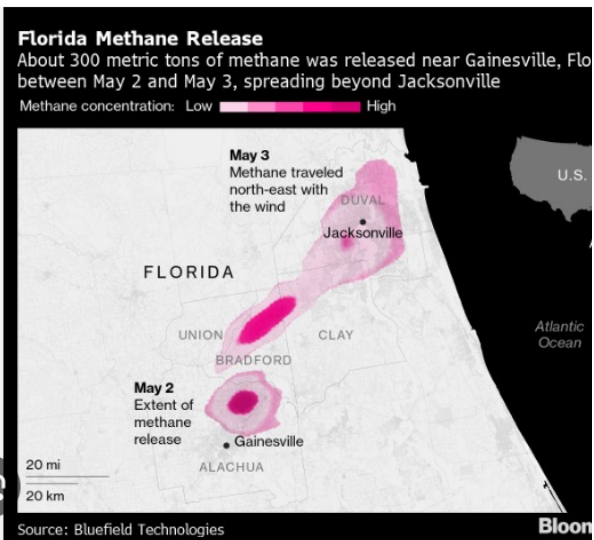
<https://pgjonline.com/news/2023/april/williams-mplx-wes-dj-gathering-reach-settlement-with-epa-doj-over-methane-leaks>

<https://www.bnnbloomberg.ca/powerful-methane-cloud-seen-by-satellite-came-from-georgia-pipe-1.1701747>

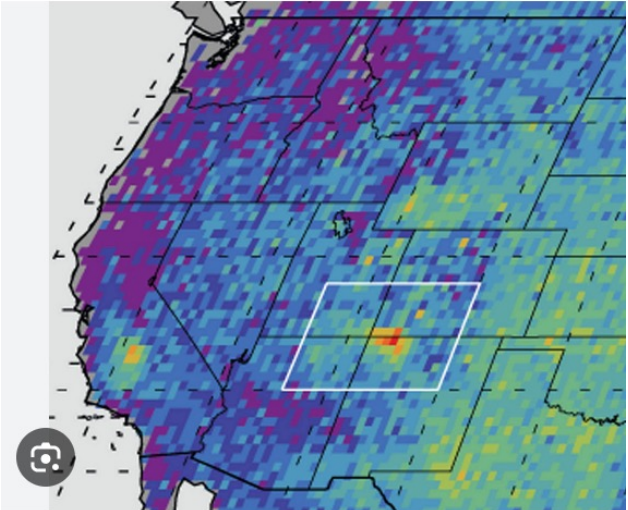
<https://psr.org/wp-content/uploads/2019/11/LNG-WHITE-PAPER-11262019.pdf>



Methane Cloud Spotted Near Oklahoma Natural Gas Pipelines - Bloomberg



Florida Offers Pipeline Clue in Mystery of Giant Methane Leak - Bloomberg



New study confirms (again): New Mexico's methane hot spot largely tied to oil and...



Powerful Methane Cloud Seen by Satellite Came From Georgia Pipe - Bloomberg

The Biden administration said on 4-20-2023 that it had agreed on separate settlements worth about \$25 million in total with three natural gas processors to reduce air pollution across 12 states, including in communities disproportionately hit by health-harming emissions.

The settlements announced by the Department of Justice and the Environmental Protection Agency require three companies — Williams Companies Inc., MPLX LP and WES DJ Gathering LLC — to pay a combined \$9.25 million in civil penalties and make about \$16 million in improvements at plants and compressor stations.

<https://pgjonline.com/news/2023/april/williams-mplx-wes-dj-gathering-reach-settlement-with-epa-doj-over-methane-leaks>



# Questions

- Mr. James Blackburn from Eversource mentioned in a recent interview that as per 49 CFR 193, each tank does not require to have its own containment. But the only one dike, is many times filled with rainwater, has Eversource put in place pipes and drain systems to remove the rainwater.

“Mobile and temporary LNG facilities for peak shaving application, for service maintenance during gas pipeline systems repair/alteration, or other short-term applications need not meet the requirements of this part if the facilities are in compliance with applicable sections of NFPA–59A–2001 (incorporated by reference, see § 193.2013)”.

## § 193.2057 Thermal radiation protection.

Each LNG container and LNG transfer system must have a thermal exclusion zone in accordance with section 2.2.3.2 of [NFPA–59A–2001](#) (incorporated by reference, see [§ 193.2013](#)) with the following exceptions:

- (a) The thermal radiation distances must be calculated using Gas Technology Institute's (GTI) report or computer model GTI–04/0032 LNGFIRE3: A Thermal Radiation Model for LNG Fires (incorporated by reference, see [§ 193.2013](#)). The use of other alternate models which take into account the same physical factors and have been validated by experimental test data may be permitted subject to the Administrator's approval.
- (b) In calculating exclusion distances, the wind speed producing the maximum exclusion distances shall be used except for wind speeds that occur less than 5 percent of the time based on recorded data for the area.
- (c) In calculating exclusion distances, the ambient temperature and relative humidity that produce the maximum exclusion distances shall be used except for values that occur less than five percent of the time based on recorded data for the area.

*[Amdt. 193–17, 65 FR 10958, Mar. 1, 2000, as amended by Amdt. 193–18, 69 FR 11336, Mar. 10, 2004; Amdt. 193–22, 75 FR 48604, Aug. 11, 2010; Amdt. 193–25, 80 FR 182, Jan. 5, 2015]*

49 CFR Part 193 (up to date as of 5/25/2023)  
Liquefied Natural Gas Facilities: Federal Safety Standards

49 CFR 193.2051

## Subpart B—Siting Requirements

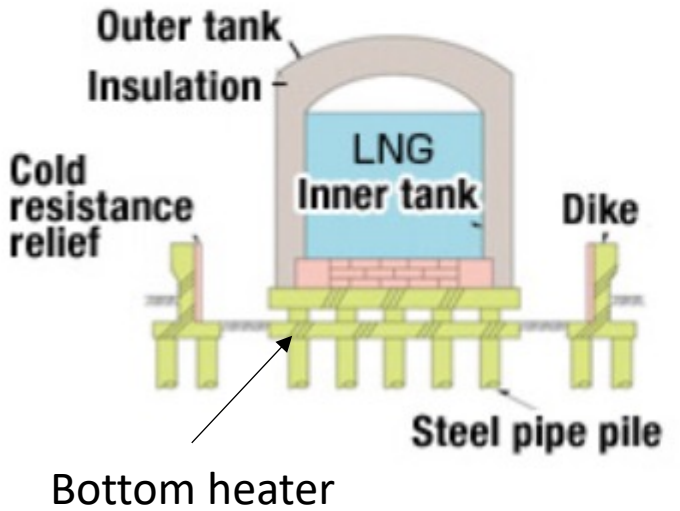
### § 193.2051 Scope.

Each LNG facility designed, constructed, replaced, relocated or significantly altered after March 31, 2000 must be provided with siting requirements in accordance with the requirements of this part and of NFPA 59A (incorporated by reference, see [§ 193.2013](#)). In the event of a conflict between this part and NFPA–59A–2001, this part prevails.

*[Amdt. 193–17, 65 FR 10958, Mar. 1, 2000, as amended by Amdt. 193–18, 69 FR 11336, Mar. 10, 2004; Amdt. 193–25, 80 FR 182, Jan. 5, 2015]*

# The concrete wall surrounding the dike

Double-walled metal LNG tank



Concrete wall

# LNG storage tank ~40 years old- decommissioned

The LNG underground storage tank of the Arzew ALGERIA – (Mediterranean climate), was the last underground storage tank in the frozen ground in the world still in service until July 2004; since its first operation in 1965, although it had successfully undergone good service conditions (over 40 years), developed some natural problems (distortion, cracks, and inflation of the surrounding ground), working conditions problems (LNG leaks) and structural problems (disorders of the roof structure).

## PROBLEMS OF SIMILAR INGROUND STORAGE TANKS

### a) **Transcontinental Gas Pipes Line Corporation**

A LNG tank in excavation installed close to New Jersey (Hackensack) underwent problems of exploitation following an increase of the boil off pressure. These problems were significant enough to require its decommissioning.

### b) **British Gas (Canvey Island, England)**

Cracks at approximately 60 ft (18 m) depth between the four tanks created leaks between them.

The boil off from the four tanks greatly exceeded the anticipated 0.12 % of the tank content per day. This boil off stabilised at approximately 0.5% to 1 % per day of tank contents.

### c) **Tennessee Gas Pipeline Company (Hopkington, Massachusetts)**

At Hopkington two tanks had been constructed.

The major problem was cracks in the rock and communication at 100 foot of depth between the two tanks.

As they were constructed entirely in rock, they have been left empty for their decommissioning after purging with cold nitrogen.



# Questions

**Emergency Response Guide – Did Eversource prepare one? And share it with the town?**

**Has the town received ERG and ERP from Eversource, and has the fire department developed an evacuation plan accordingly? Is it available? Does it include information on a potential tank leak/crack leading to a catastrophe? Is there a plan to review tank B's condition annually?**

**Who will be testing the air quality annually? Can we ensure the air quality is clean enough to raise children? Can MassDEP guarantee safety? Eversource air quality permit expired in 2017.**

**Can DPU, PHMSA, Eversource, and the town management guarantee that there won't be any leaks or issues related to the tanks?**

**Will the fire department ensure that the mitigation system set up by Legacy farms LLC – LOA - Roy McDowell is functioning?**

4. The Smith & Burgess Report ignores the probability of failure of LNG storage tanks. The catastrophic failure rate for one of the LNG tanks is 5/10,000,000 years. The cumulative failure rate for all three tanks is 1.5/1,000,000 years. A person living in the town of Hopkinton is more likely to be injured due to a magnitude 7 earthquake which has a return frequency of 12/1,000,000 years.

Order the Company to provide reasonable funds to retain an independent consultant to provide technical assistance to the Fire Department to review the Company's "bounding scenario" for a catastrophic tank failure or other major emergency at the facility, as well as other relevant data in support of creating an evacuation plan.

Order the Company to participate annually in evacuation planning exercises as reasonably requested by the Town.

Order the Company to include the Hopkinton Fire Chief in all future email or other written communications with the DPU and PHMSA concerning the Tank B thermal anomaly.

Thank you for giving us the opportunity to voice  
our concerns!!!