Village of Bensenville
Village Board Room
12 South Center Street
Bensenville, Illinois 60106
Counties of DuPage and Cook

MINUTES OF THE COMMUNITY & ECONOMIC DEVELOPMENT COMMITTEE MEETING
August 13, 2013

CALL TO ORDER: Chairman Jarecki called the meeting to order at 7:05 p.m.

PRESENT: Upon roll call by Deputy Village Clerk, Corey Williamsen, the following Board Members were present:

Chairman Jarecki, Bartlett, Janowiak, Ridder Wesseler

Absent: President Soto, O'Connell

A quorum was present.

Village Clerk, Ilsa Rivera-Trujillo was also in attendance.

Staff Present: Village Attorney, Pat Bond, Caracci, Cassady, DiSanto, F. Kosman, V. Kosman, Rysavy, Sloth, Viger, Williamsen

Approval of Minutes: The June 11, 2013 Community & Economic Development Committee minutes were presented.

Motion: Trustee Ridder made a motion to approve the minutes as presented. Trustee Bartlett seconded the motion.

All were in favor. Motion carried.

The June 18, 2013 Community & Economic Development Committee minutes were presented.

Motion: Trustee Wesseler made a motion to approve the minutes as presented. Trustee Bartlett seconded the motion.

All were in favor. Motion carried.

202 W. Irving Park Road:

Director of Community and Economic Development, Scott Viger, presented to the Committee an ordinance for a variance to reduce the required parking from 24 to 0 for the property located at 202 W. Irving Park Road (P&J Discount Cigarette Center Building), resulting from the IDOT acquision from Irving Park and York Road grade separation project.

Mr. Viger reviewed the results of the May 13, 2013 Community Development Commission meeting and indicated the Community Development unanimously recommended approval of the request. Mr. Viger stated Staff recommends approval of the request.

There were no questions from the Committee.

Motion: Trustee Ridder made a motion to approve this item for placement on a future Village Board Meeting Agenda for action as presented. Trustee Bartlett seconded the motion.

Roll Call: Ayes: Chairman Jarecki, Bartlett, Janowiak, Ridder, Wesseler

Nays: None

All were in favor. Motion carried.

211 W. Beeline Unit 1:

Director of Community and Economic Development, Scott Viger, presented to the Committee an ordinance requesting a conditional use permit to allow motor vehicle repair (major and minor) at the I-2 light industrial district property located at 211 W. Beeline Drive, Unit 1(Matejko Auto Service).

Mr. Viger reviewed the results of the June 24, 2013 Community Development Commission meeting and indicated the Community Development unanimously recommended approval of the request. Mr. Viger stated Staff recommends approval of the request.

Trustee Bartlett asked if truck traffic in the area would increase if the request was granted. Mr. Viger stated one of the requirements for the request is that work be performed on vehicles that weigh 8,000 or less, this would assist in the truck traffic in the area.

Motion: Trustee Bartlett made a motion to approve this item for placement on a future Village Board Meeting Agenda for action as presented. Trustee Ridder seconded the motion.

Roll Call: Ayes: Chairman Jarecki, Bartlett, Janowiak, Ridder, Wesseler

Nays: None

All were in favor. Motion carried.

200 S. Church Rd: Director of Community and Economic Development, Scott Viger, presented to the Committee an ordinance requesting a conditional use permit to erect an electronic message center sign at the Bensenville Library, located at 200 S. Church Road in a RS-5 high density single family residential district.

Mr. Viger reviewed the results of the June 24, 2013 Community Development Commission meeting and indicated the Community Development recommended denial of the request with a 3-3 vote. Mr. Viger stated Staff recommends approval of the request.

Village Attorney, Pat Bond, reviewed the rules and regulations for approving or denying the request based off the Community Development Commission recommendation and vote.

Trustee Bartlett asked when the sign would go dark. Mr. Viger stated Staff is recommending the sign go dark when the Library is closed.

Jill Rodriguez, Director of the Bensenville Library, addressed the Committee in regards to the Library's request for the EMC sign. Ms. Rodriguez submitted a statement to the Committee. The document has been attached to the minutes as "Exhibit A". Ms. Rodriguez also submitted an email from the Niles Library to the Committee. The document has been attached to the minutes as "Exhibit B".

Susan Diamond, Vice President of the Library Board, addressed the Committee with her support of the request.

Valarie Karr of 223 South Church Road addressed the Committee sharing concerns of the neighborhood in regards to the proposed EMC sign. Ms. Karr submitted a petition against the EMC sign to the Committee. The petition has been attached to the minutes as "Exhibit C".

Allen Devitt of 16W603 Third Avenue addressed the Committee sharing his support of the proposed EMC sign.

John Wassinger of 255 Church Road addressed the Committee sharing his support of the proposed EMC Sign.

Motion: Trustee Wesseler made a motion to approve this item for placement on a future Village Board Meeting Agenda for action as presented. Trustee Ridder seconded the motion.

Roll Call: Ayes: Chairman Jarecki, Bartlett, Janowiak, Ridder

Nays: Wesseler

Motion carried.

Text Amendment (Signs): Director of Community and Economic Development, Scott Viger, presented to the Committee an ordinance for a text amendment to sign regulations, dealing with both freestanding and wall signs, for Section 10-3 (monument sign) and Section 10-18 (sign regulations) of the Bensenville Village Code.

Mr. Viger reviewed the results of the June 24, 2013 Community Development Commission meeting and indicated the Community Development unanimously recommended approval of the request. Mr. Viger stated Staff recommends approval of the request.

There were no questions from the Committee.

Motion: Trustee Janowiak made a motion to approve this item for placement on a future Village Board Meeting Agenda for action as presented. Trustee Ridder seconded the motion.

Roll Call: Ayes: Chairman Jarecki, Bartlett, Janowiak, Ridder, Wesseler

Nays: None

All were in favor. Motion carried.

600 W. Devon: Director of Community and Economic Development, Scott Viger, presented to the Committee an ordinance for a conditional use permit and several variances related to a request from Blu Fuel to construct a diesel and liquefied natural gas (LNG) fleet fueling facility at 600 W. Devon Avenue in the I-2 light industrial district.

Mr. Viger reviewed the results of the July 8, 2013 Community Development Commission meeting and indicated the Community Development recommended approval of the request with a 6-1 vote. Mr. Viger stated Staff recommends approval of the request.

Thomas R. Burney of Schain, Burney, Banks & Kenny ltd presented to the Committee an overview of Blu Fuel's presentation. Mr. Burney submitted a copy of the presentation to the Committee. The presentation has been attached to the minutes as "Exhibit D". Mr. Burney indicated there was a minor change to the proposed site plan. Mr. Burney stated the proposed three structures on the property had moved from the east side of the property to the west side.

Jeff Middlebrook of Blu Fuel addressed the Committee regarding the operations and type of material used at Blu Fuel.

Christopher M. Lavoie of C.M. Lavioe & Associates, Inc. reviewed the proposed plan with the Committee.

Trustee Wesseler raised concern with traffic along Devon Avenue and the fact that trucks will be allowed to exit the property and travel west on Devon Avenue.

Jason Evans of Blu Fuel reviewed the process of the proposed operation with the Committee.

Trustee Bartlett shared his concerns regarding the traffic congestion at Ellis Street and Devon Avenue.

Paul F. Conarty of 1400 Fechner Circle, North Aurora presented a packet to the Committee addressing a number of issued created by the proposed requests. Mr. Conarty asked the Committee to review the information provided. The packet has been attached to the minutes as "Exhibit E".

Robert Treck, Chairman of Bell Fuels addressed the Committee with his concerns about the proposed site. Mr. Treck shared his objections with the Committee.

George Sweeny, President of Bell Fuels, addressed the Committee regarding Bell Fuels request to install a stoplight at Ellis Street and Devon Avenue. Mr. Sweeny stated Bell Fuels offered to pay for the instillation however; Cook County does not have plans to install a stoplight.

Motion: Trustee Wesseler made a motion to approve this item for placement on a future Village Board Meeting Agenda for action as presented. Trustee Janowiak seconded the motion.

Roll Call: Ayes: Chairman Jarecki, Janowiak, Ridder

Nays: Bartlett, Wesseler

Motion carried.

618 W. Green St: Director of Community and Economic Development, Scott Viger, presented to the Committee an ordinance for variance to allow a fence in the required corner side yard for the single family property located at 618 W. Irving Park Road.

Mr. Viger reviewed the results of the July 8, 2013 Community Development Commission meeting and indicated the Community Development unanimously recommended approval of the request. Mr. Viger stated Staff recommends approval of the request.

There were no questions from the Committee.

Motion: Trustee Ridder made a motion to approve this item for placement on a future Village Board Meeting Agenda for action as presented. Trustee Bartlett seconded the motion.

Roll Call: Ayes: Chairman Jarecki, Bartlett, Janowiak, Ridder, Wesseler

Nays: None

All were in favor. Motion carried.

Text Amendment Open Web Wood: Director of Community and Economic Development, Scott Viger, presented to the Committee an ordinance for a text amendment to allow open web wood trusses for nonresidential uses under certain circumstances.

There were no questions from the Committee.

Motion: Trustee Bartlett made a motion to approve this item for placement on a future Village Board Meeting Agenda for action as presented. Trustee Janowiak seconded the motion.

Roll Call: Ayes: Chairman Jarecki, Bartlett, Janowiak, Ridder, Wesseler

Nays: None

All were in favor. Motion carried.

Text Amendment Massage Therapy: Director of Community and Economic Development, Scott Viger, presented to the Committee an ordinance for Text Amendments to alter Section 10-3 (Administration and Enforcement Definitions) of the Village Code for Massage Therapy Salons and Section 10-7 (Commercial District) for Medical, Dental and Optometry Offices.

Mr. Viger reviewed the results of the July 22, 2013 Community Development Commission meeting and indicated the Community Development unanimously recommended approval of the request. Mr. Viger stated Staff recommends approval of the request.

Susan Le of 1201 W. Irving Park Road addressed the Committee with the current operation at the shop she manages. Ms. Le also stated her support for the proposed text amendment.

There were no questions from the Committee.

Motion: Trustee Ridder made a motion to approve this item for placement on a future Village Board Meeting Agenda for action as presented. Trustee Bartlett seconded the motion.

Roll Call: Ayes: Chairman Jarecki, Bartlett, Janowiak, Ridder, Wesseler

Nays: None

All were in favor. Motion carried.

AS SUBMITTED: Trustee Ridder asked for a discussion and update at a future Committee meeting regarding foreclosures and tall grass in Bensenville.

INFORMATIONAL ITEMS: There were no informational items.

ADJOURNMENT: Trustee Bartlett made a motion to adjourn the meeting. Chairman Jarecki seconded the motion.

All were in favor. Motion carried.

Chairman Jarecki adjourned the meeting at 9:34 p.m.

Corey Williamsen
Deputy Village Clerk
PASSED AND APPROVED by the President and Board of Trustees of the Village of Bensenville this 20th day August, 2013

EXHIBIT A
(5 PAGES)

read. think. dream. create.

bcpl

Bensenville Community
Public Library

August 13, 2013

TO: The Village Board / Community and Economic Development Committee

FROM: Jill Rodriguez, Library Director

RE: Conditional Use Permit – EMC

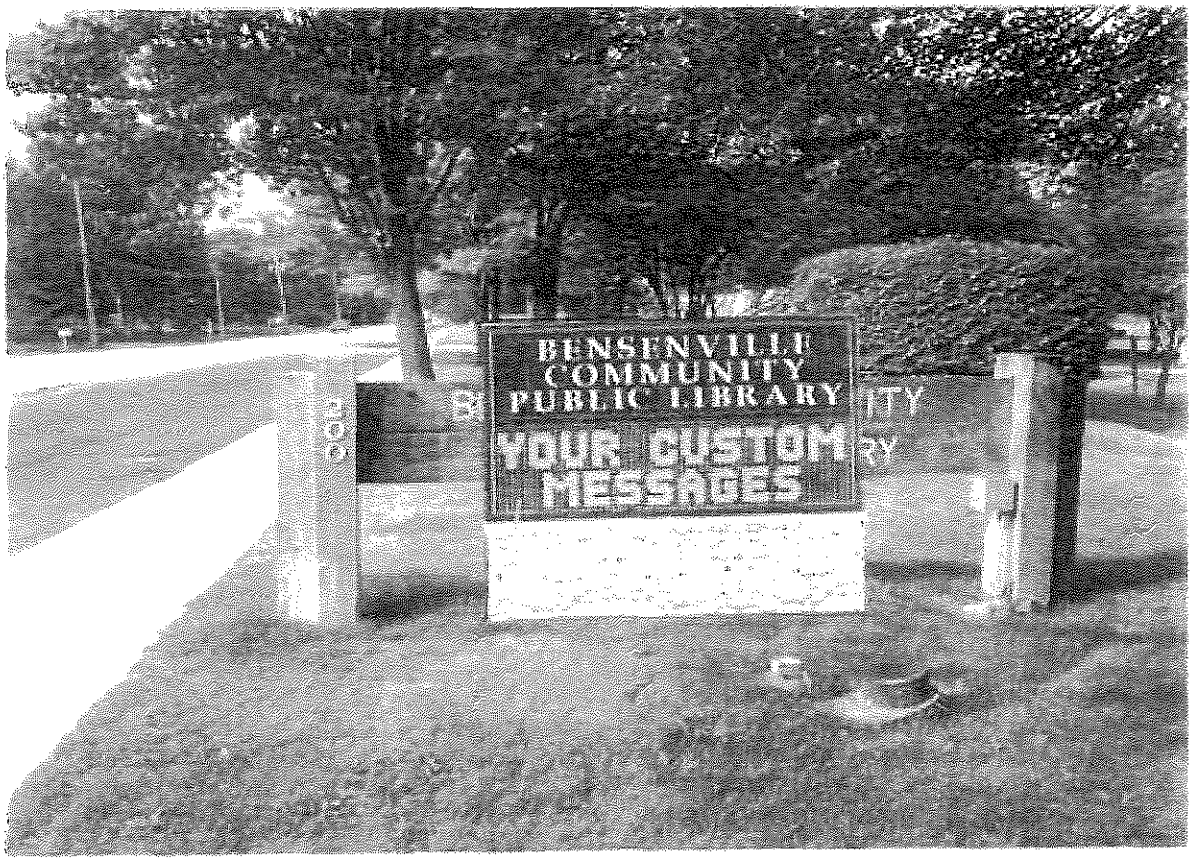
Thank you for hearing our request for a Conditional Use Permit to allow an electronic message sign on the Library property. As a matter of process, we:

- submitted the appropriate paperwork and met **all** of the requirements of the CDC and Village code; received a positive report from the Village Staff
- distributed a letter to the neighbors and spoke personally with as many as possible prior to the public hearing
- attended the public hearing on June 27 to present the information to the CDC
- subsequent to the concern by some neighbors, we posted a display in the Library and requested input from Library users
- met with the sign manufacturer to follow up on some technical issues and were assured that all of our requests regarding timers, dimmers and lighting levels were answered to our satisfaction.

At this time we would like to submit copies of items for your further review, attached, including:

- a picture of the new sign superimposed over the present sign. As you can see, the sign was designed to blend with the aesthetics of the Library grounds and building
- our statement of purpose for the sign project including information on the specific design of the sign we have selected
- a copy of the letter distributed to the Church Road neighbors
- a summary of comments from other libraries with electronic signs and a summary of public comments from the display

Our Consultant, Ken Kogut of Kogut & Associates is here with us as well to respond to any technical questions.



The proposed sign is smaller than the existing sign and blends with the Library's fieldstone façade.It is set further back from the property line as well.

The top portion, black with white back lit letters, omits very low light levels.

The message center portion has multi-color options as well as dimming capabilities, and full timer/scheduling options.

The street number, 200, will be affixed to the edge facing Church Road

read. think. dream. create.

bcpl

Bensenville Community
Public Library

Our Mission Statement

We believe that learning is lifelong and that all people deserve opportunities to pursue learning. Our purpose is to serve the informational, educational, cultural and recreational needs of all the district's residents, and we endeavor to support a community of readers. To enhance our purpose, we strive to be a ***dynamic, vital force in the development of the community***, to extend services to users and non-users through both traditional and progressive methods, and to maintain a warm, friendly and people oriented atmosphere.

The purpose of the electronic message sign

- To promote the programs, services, and resources your Library offers to meet the needs of people of all ages in our community ***to enrich their lives***
- To help us achieve strategic goals developed in 2011 to upgrade the building and grounds for safety and aesthetic purposes, with a commitment to being fiscally responsible
- To further the goals of your Library's Marketing Plan by using every possible medium to ***increase use*** of your Library and its resources

The elements of the Sign

- Sign is low to the ground; message center part stands at about 3 feet
- The top is white letters on black, meaning very little light is emitted from the top of the sign
- Stone base to blend with your Library's building and grounds
- Faces North and South, not at homes on Church Road
- Enhanced graphics package offers muted colors – not all red
- Dimmer allows us to control brightness
- Time Clock will turn the sign off at night
- Continue to be a "good neighbor" by responding to other concerns

THANK YOU

read. think. dream. create.

bcpl

Bensenville Community
Public Library

Follow up Notes on the Library's Electronic Message Sign

Public Comment

Comments in the Comment Box placed in the Library:

9 people commented that they liked the new sign concept (one asked that we also keep the old one)

2 said they preferred the current sign

No one commented at all on potential danger

Surveys

The Director surveyed other libraries to determine if they had digital signs and if so had they experienced any negative feedback.

4 responded that they had signs and only 1 said people had complained until they turned the brightness down and slowed the message frequencies.

Fenton has had no complaints about their sign

One Library Director whose Library has an electronic sign also lives on the corner of Church and Memorial and is very supportive of the Bensenville Library having an electronic sign.

Safety Issues

Comments were made that the digital signs cause accidents. We have done significant research, including citing some delineated in an article in the Chicago Tribune that is inconclusive, and found that there are arguments on both sides, depending on who conducts the research, whether the sign is on premises or on a major roadway, etc.

The Village Board has done their own analysis in preparation for allowing Conditional Use Permits for digital messaging signs and have determined that under certain conditions they require, safety is not an issue.

The safety issue is important to the Library as evidenced by our concern for the kids' safety after school (having a staff member outside every afternoon), by our constantly working with the school district on this issue. Perhaps the neighbors and the Library could work together to approach D2 and/or Police Department about changing speed limit, adding a crossing guard, etc.

Also, we have made every effort to accommodate neighbor's concerns about turning the sign to static at night, adding notes like "please drive safely" during the school rush, dimming the colors, etc.

Distributed to neighbors personally in June JR

read. think. dream. create.

bcpl

Bensenville Community Public Library

June 2013

Hi Neighbor

As you might have seen, the Village of Bensenville is holding a public hearing on a conditional use permit the Library has applied for to install a digital message sign in the front of the property on Church Road.

We are very excited about the opportunity to use this media as not only a directional marker for those people who have not been aware of the location of their Library, but also as a way to promote the many activities, programs and services the Library offers to the community.

In keeping with our commitment to the community to maintain a rustic, natural building that compliments the wooded property, we have designed the sign to blend with the building materials and style. Please see the drawing attached and note that the sign has a stone base, is low to the ground (only 6 feet high), that it will face north and south (not directly into the homes across the street) and that we will be using enhanced graphics to allow us to mute colors and designs. There will be NO flashing lights and we will have the sign timed so that we can turn it on and off at appropriate hours.

I hope that you will welcome the sign as an enhancement to the Library as we strive to be a "destination" for residents to come and ***"read. think. dream. create"*** as our logo says.

If you have any questions at all, please contact me at the Library, 630-766-4642, jrodriguez@benlib.org or on my cell phone 630-750-5432.

Thanks for your support!

Jill Rodriguez

EXHIBIT B
(1 PAGE)

Print | Close Window

Subject: Your new sign
From: Linda Weiss <lweiss@nileslibrary.org>
Date: Tue, Aug 13, 2013 12:31 pm
To: 'Jill Rodriguez' <jrodriguez@benlib.org>
Attach: image001.png

Hi, Jill,
I just want to let you know how happy I am to know that you are planning on a digital sign in front of the Library! The Bensenville Library is always so cutting edge and I have often wondered when you would take this step. Of course, I drive by the Library every day as I go to and from work, and as a neighbor and resident I should know what's going on at the Library. However, having a visible reminder each day will be great. And I love the design. It's so appropriate for the location.

As you know, the digital sign that I have at my Library is on a busy corner and much taller, but it fits our location. When we survey the community and ask how they heard about a program or event, the majority of responses are "the sign on the corner". And we have found many ways to use it for the community. Niles had quite a bit of flooding this year and we were able to communicate some important information. Last week we put up a message to remind the parents of 6th graders to check their reading lists! This met with some really positive feedback.

So congratulations on your vision for the Library and your very tasteful design!

Linda

Linda Weiss
Library Director
Niles Public Library District
6960 Oakton Street
Niles, IL 60714
847.663.6401

NILES PUBLIC LIBRARY

"Change is the process by which the future invades our lives". Alvin Toffler

Please consider the environment before printing this e-mail.

EXHIBIT C
(1 PAGE)

We the undersigned residents of the Village of Bensenville are **opposed** to the Bensenville Community Library's proposed electronic message board/sign.

We respectfully ask the Library Trustees to withdraw their approval request to the Village of Bensenville.

We respectfully ask the Village Board of Trustees to **deny** this request, if not withdrawn by the Bensenville Community Library.

Name	Address
[illegible] Johnson	243 So. Church Rd.
Tyson Kalozeros	1222 Elmhurst St.
Keith Johnson	243 S. CHURCH RD.
[illegible]	237 S Church Rd
Deborah N. Quick	237 S. Church Road
[illegible]	217 S Church Rd.
[illegible]	209 S. CHURCH RD
Doreen B. Dockery	193 S. Church Rd
Elvira Gomez	201 S. Church RD Ben.
Randy Weaks	223 A Church Rd.
Valerie K Kay	223 A Church Rd.
= 8 Homes	total

EXHIBIT D
(31 PAGES)

Blu.

good. clean. fuel.

Bensenville, Illinois

Liquefied Natural Gas Fueling Center

What is LNG?

LNG is natural gas in its liquid form.

LNG is natural gas cooled to around -260ºF.

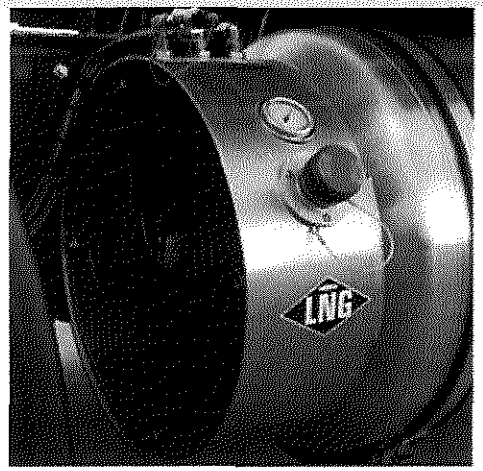
This shrinks the volume of the gas 600 times, making it easier to store, transport & utilize.

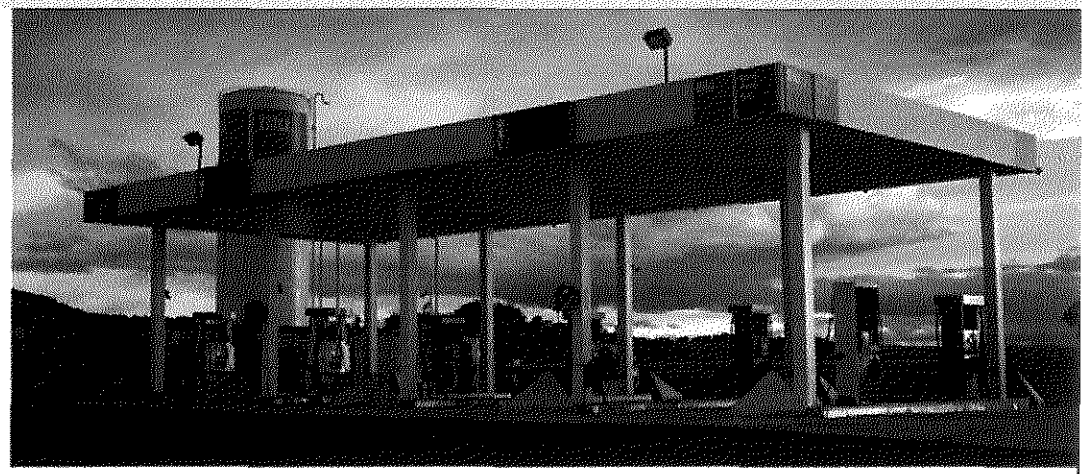
LNG Properties

Natural gas is the cleanest burning fossil fuel.

LNG is odorless, colorless, non-corrosive and non-toxic. Therefore, LNG will not pollute land or water resources.

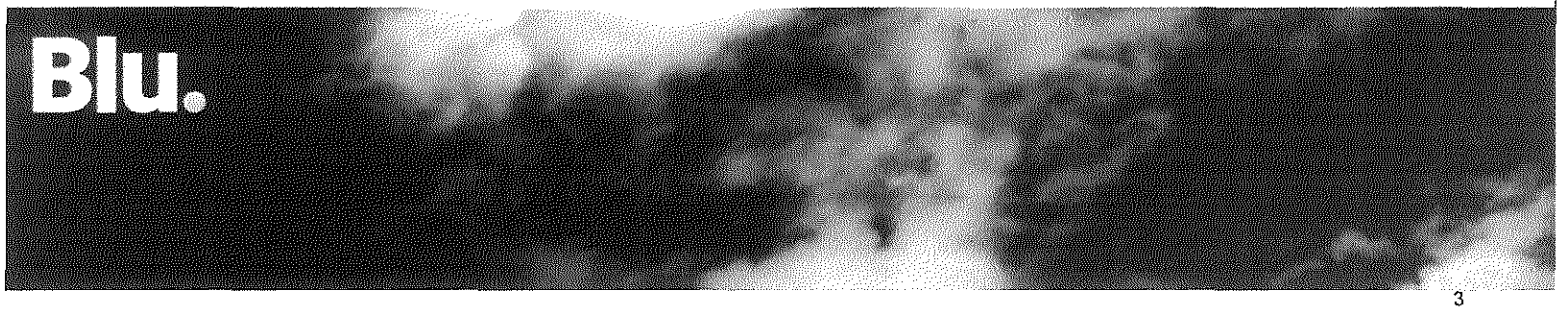
Transfuels, LLC d/b/a Blu LNG





LNG has 25% Lower Carbon Emission than Diesel

Blu. is advancing the U.S. natural gas vehicle fuel industry by establishing a national network of LNG fueling stations.



LNG Advantages

LNG Liquefied Natural Gas Is....

Inexpensive

LNG costs 33% less than diesel ($1.50 per diesel gallon equivalent savings), while delivering similar performance. In 2010 the USA spent $552 *billion* on oil and 61% of that was imported. A 33% savings could be an economic game changer for this country.

Environmentally Friendly and Green

Natural gas (LNG) is the cleanest burning fossil based fuel. A typical LNG truck will have 90% fewer Nox (nitrous oxide) and PM (particulate matter) emissions than a diesel truck, 100% fewer Sox (sulfur oxide) emissions, and 30% fewer GHG (green house gas) emissions. LNG burns cleaner resulting in less maintenance. Removing one diesel 18 wheeler and replacing it with an LNG engine it is the carbon footprint reduction equivalent of removing 324 automobiles off the road.

Safe Fuel

LNG is lighter than air. In the event of a spill, LNG disperses quickly without pooling on the ground creating a fire hazard like petroleum based fuels. It also has a higher ignition temperature making it less flammable than gasoline or diesel. LNG is also non-toxic and non-corrosive and will not contaminate ground water

Abundant Energy Security

The USA natural gas reserves contain 3X the energy as the Saudi oil fields. Using America's vast abundance of domestic natural gas is our best answer for reducing foreign oil dependence while increasing energy and national security.

The Business of Blu

1. Create LNG Supply

2. LNG Distribution

3. LNG Fuel Sales

4. LNG Truck Conversions

Blu National Fuel Facility Roll-out

Blu will open and operate 50 fueling locations in 2013

Blu Operations

- Blu provides a robust LNG fueling opportunity, focusing on LNG, for the heavy duty trucking industry.
- A Blu fueling facility is primarily an LNG fuel distribution point for day cab haulers, and does not cater to long haul, over the road, users. Blu also sells diesel as a secondary fuel for the convenience of its dual fuel customers.
- Blu is open 24 hours per day for the convenience of the trucking industry.
- There is adequate circulation and room for trucks to park for a brief period, but this is not an overnight parking facility.
- Fuel is dispensed from traditional fueling islands from LNG dispensers and diesel dispensers.
- Initially, the fueling facility will have a full time "life-safety" person on site to educate on safety issues.

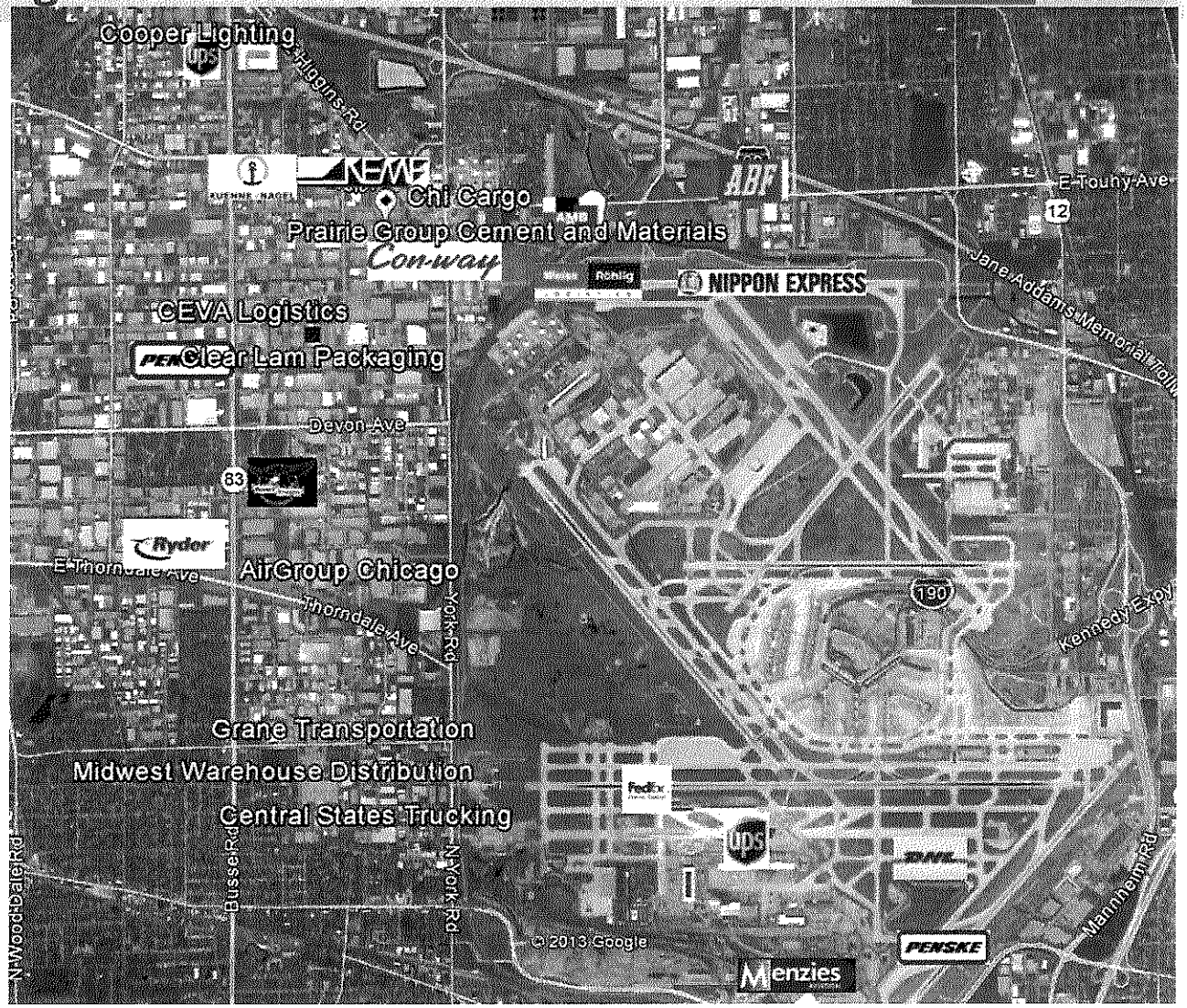
Bensenville is a Strong LNG Market

Trucks from

Bensenville
Wood Dale
Elk Grove
Chicago

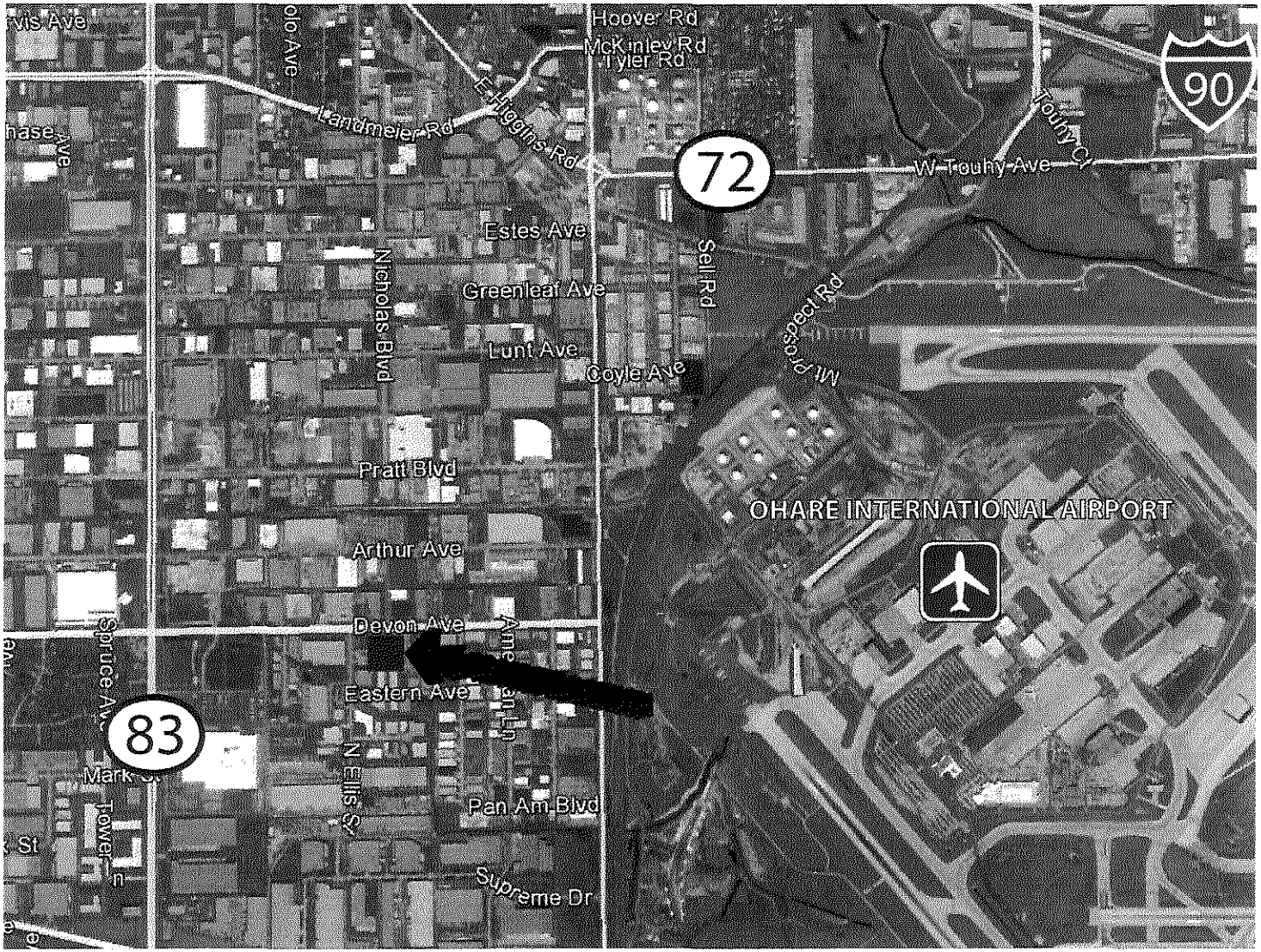
will use the facility

UPS has just ordered 700 LNG tractors to add to its existing LNG fleet.
Travel Centers of America recently announced it will locate LNG fueling facilities on its over-the-road truck stops.
Pilot has future LNG fueling facilities on some of its over-the-road truck stops



Location

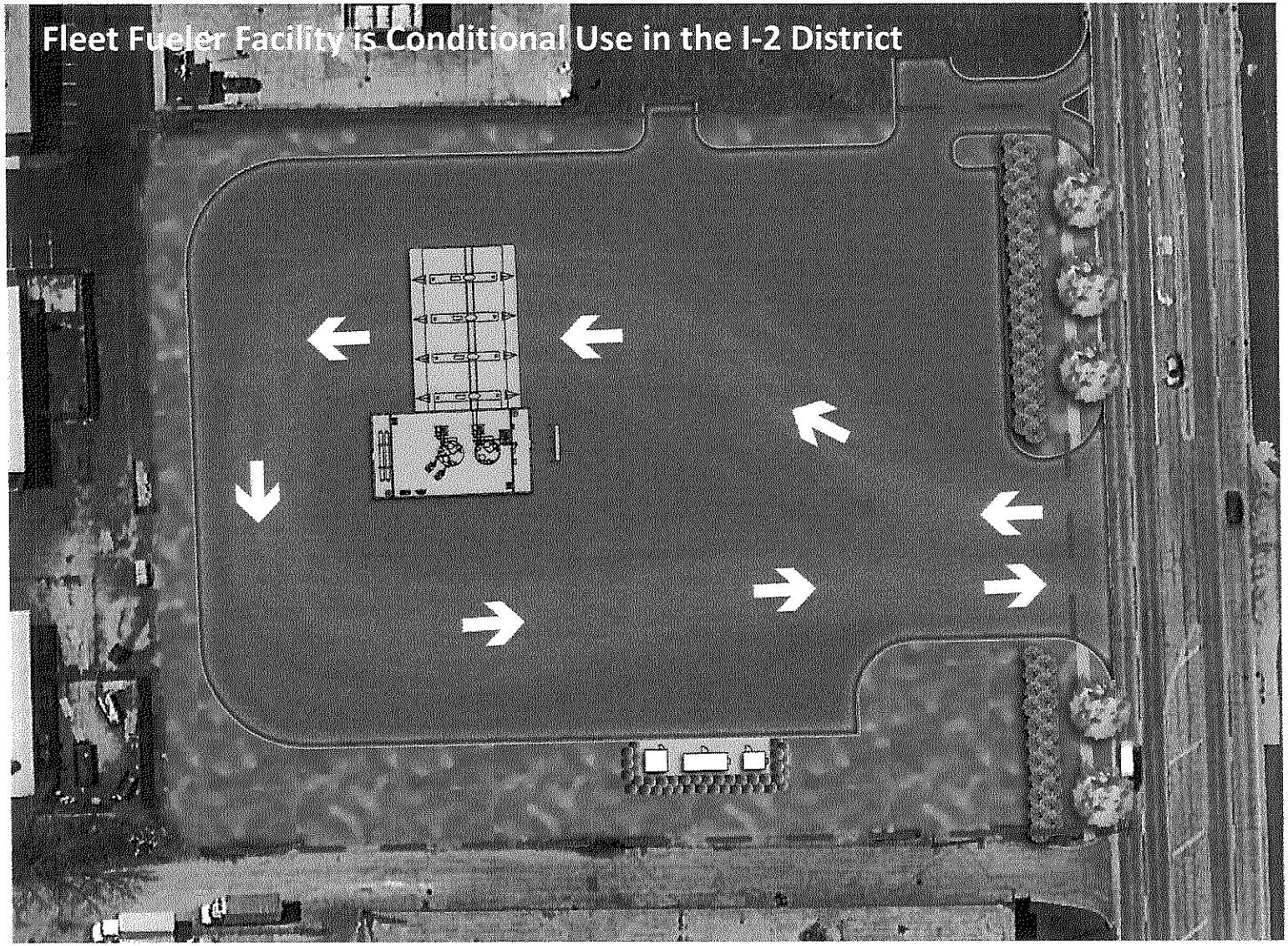
N


Hoover Rd
McKinley Rd
Tyler Rd
Landmeier Rd
E Higgins Rd
Estes Ave
Greenleaf Ave
Lunt Ave
Coyle Ave
Nicholas Blvd
Sell Rd
Mt Prospect Rd
Touhy Ct
W Touhy Ave
90
72
OHARE INTERNATIONAL AIRPORT
Pratt Blvd
Arthur Ave
Devon Ave
Eastern Ave
N Ellis St
Pan Am Blvd
Supreme Dr
Spruce Ave
Mark St
Tower Ln
83

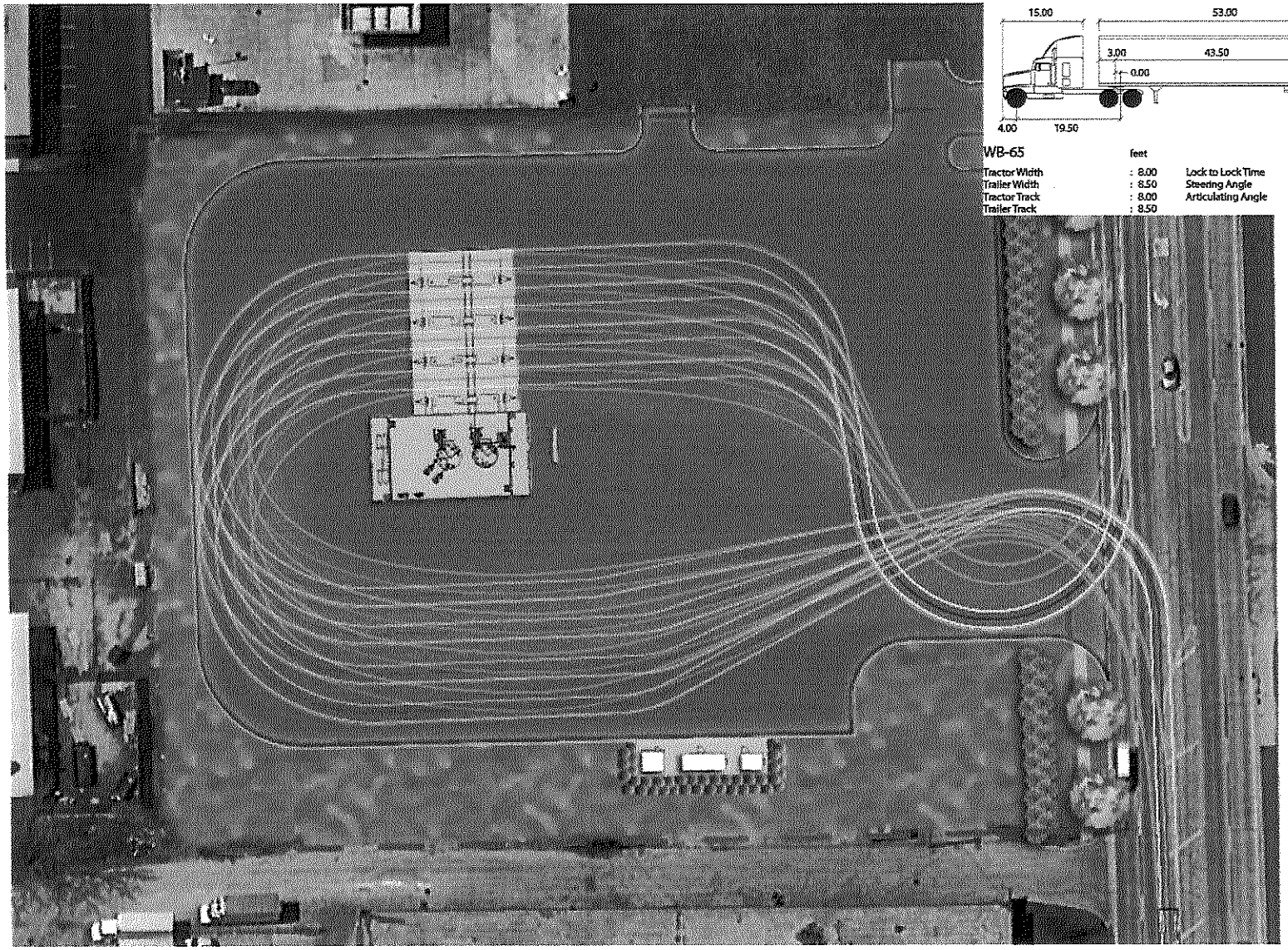
Zoned I-2

Fleet Fueler Facility- Site Plan

600 West Devon Avenue



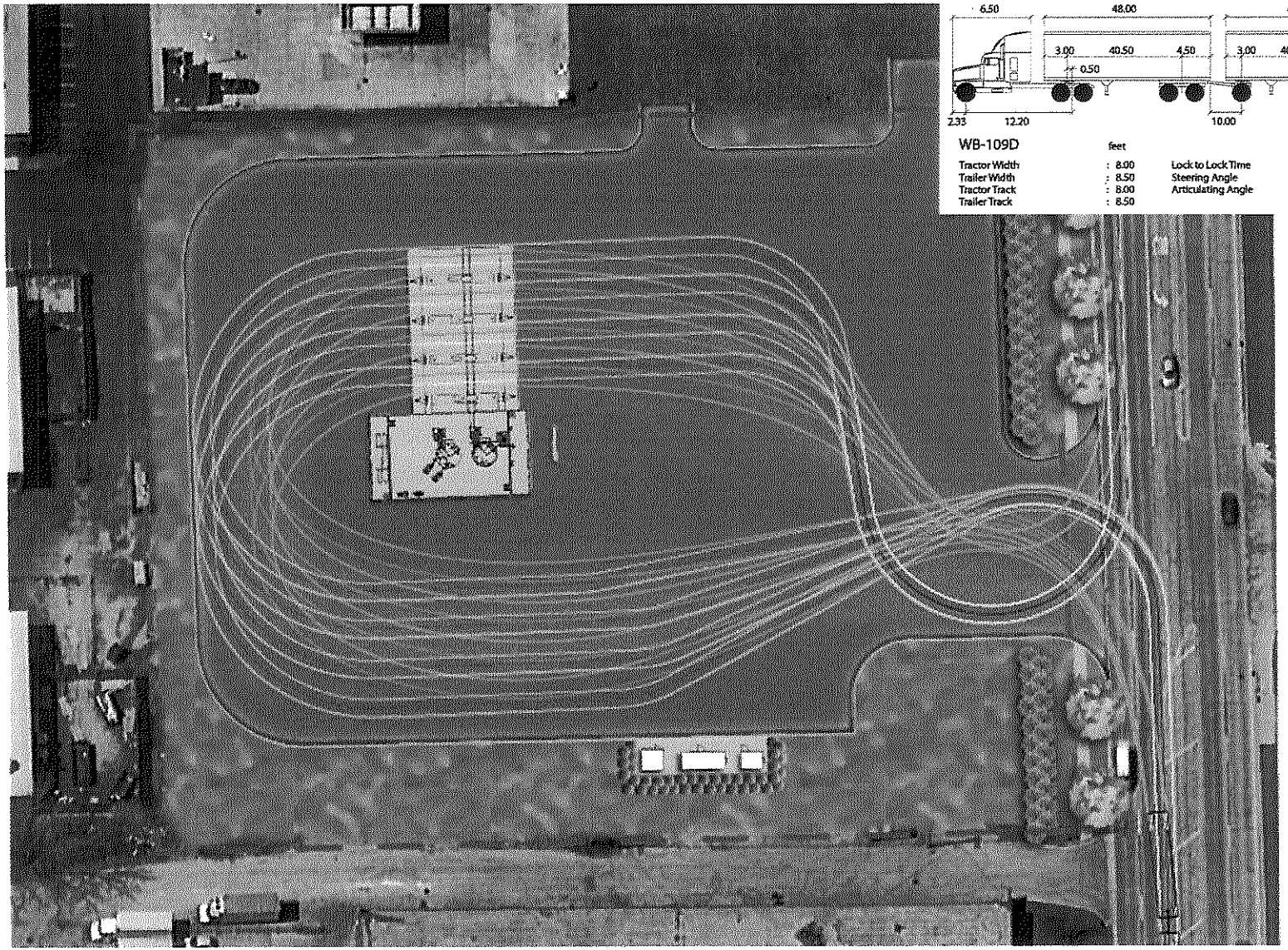
Truck Auto-turn: Single Trailer



WB-65 feet

Tractor Width	: 8.00	Lock to Lock Time	: 6.00
Trailer Width	: 8.50	Steering Angle	: 28.4
Tractor Track	: 8.00	Articulating Angle	: 70.0
Trailer Track	: 8.50		

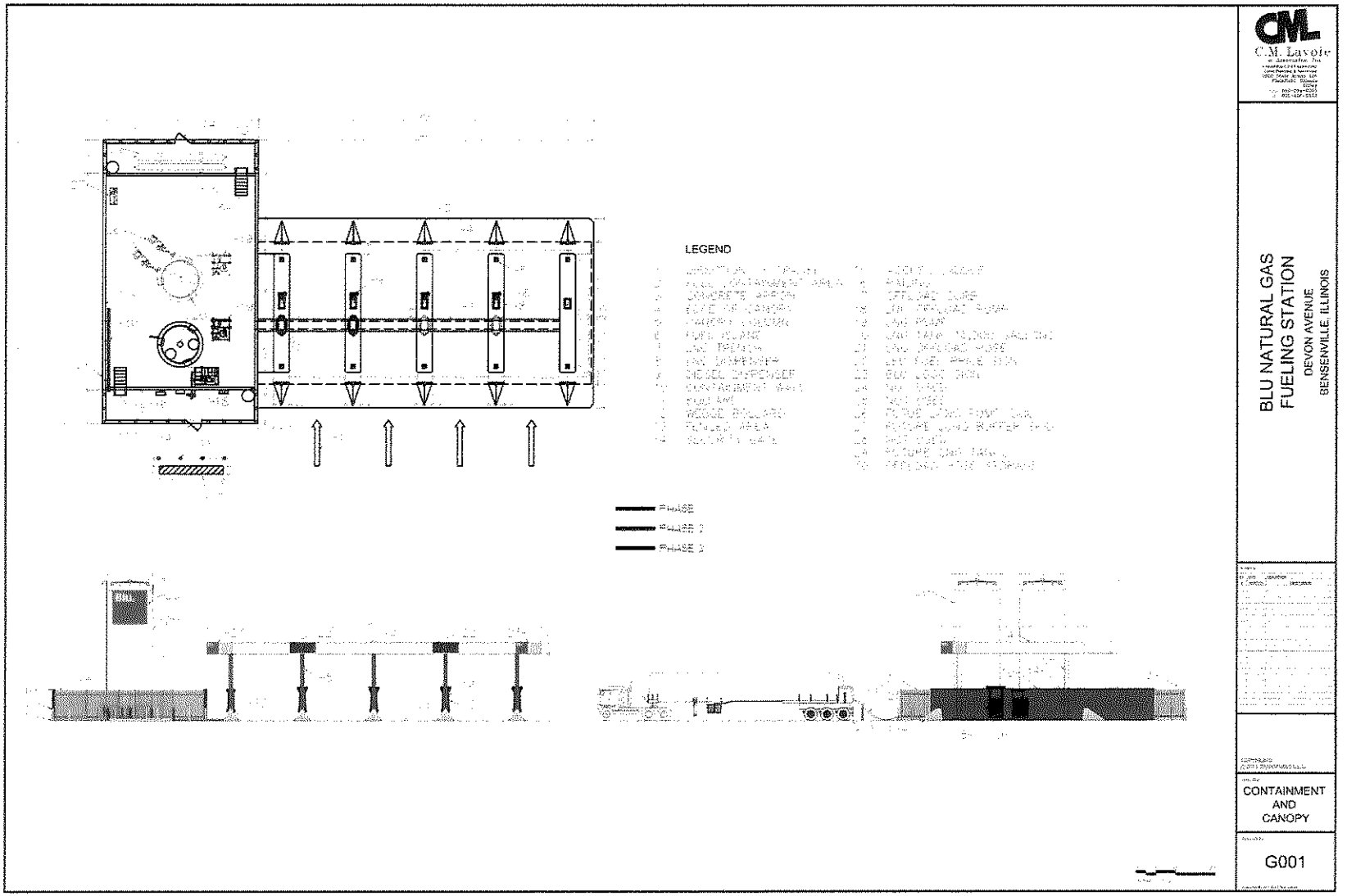
Truck Auto-turn: Double Trailer



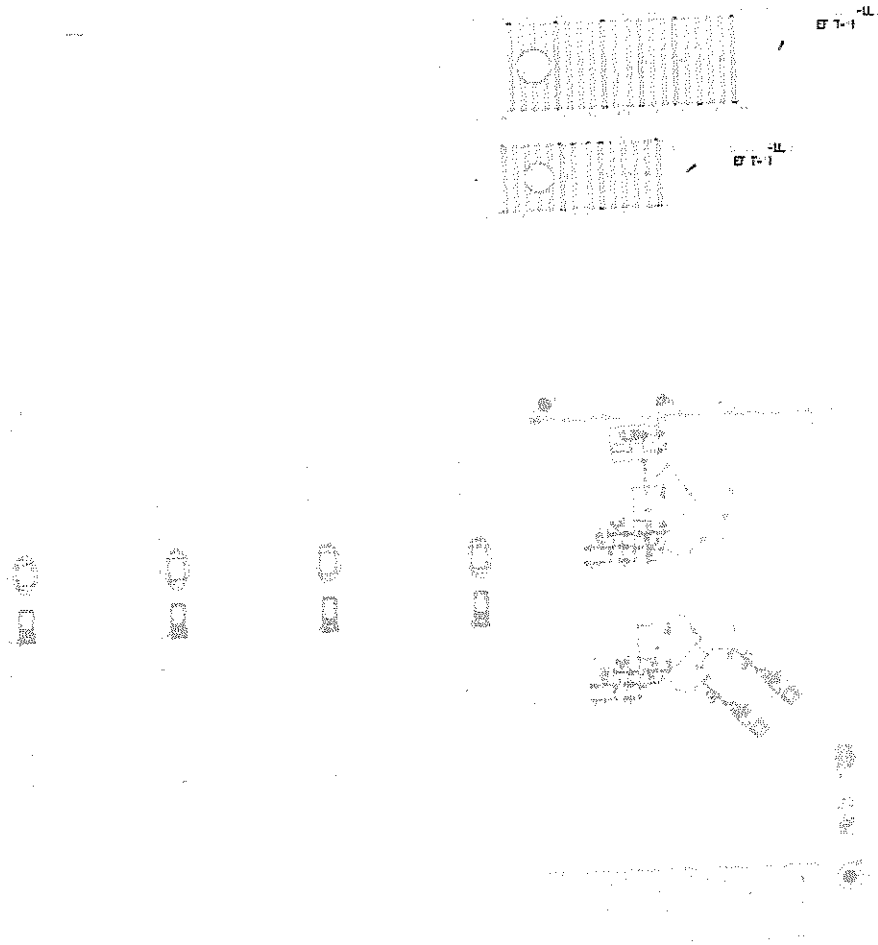
WB-109D feet

Tractor Width	: 8.00	Lock to Lock Time	: 6.00
Trailer Width	: 8.50	Steering Angle	: 12.6
Tractor Track	: 8.00	Articulating Angle	: 70.0
Trailer Track	: 8.50		

Containment & Canopy Schematic

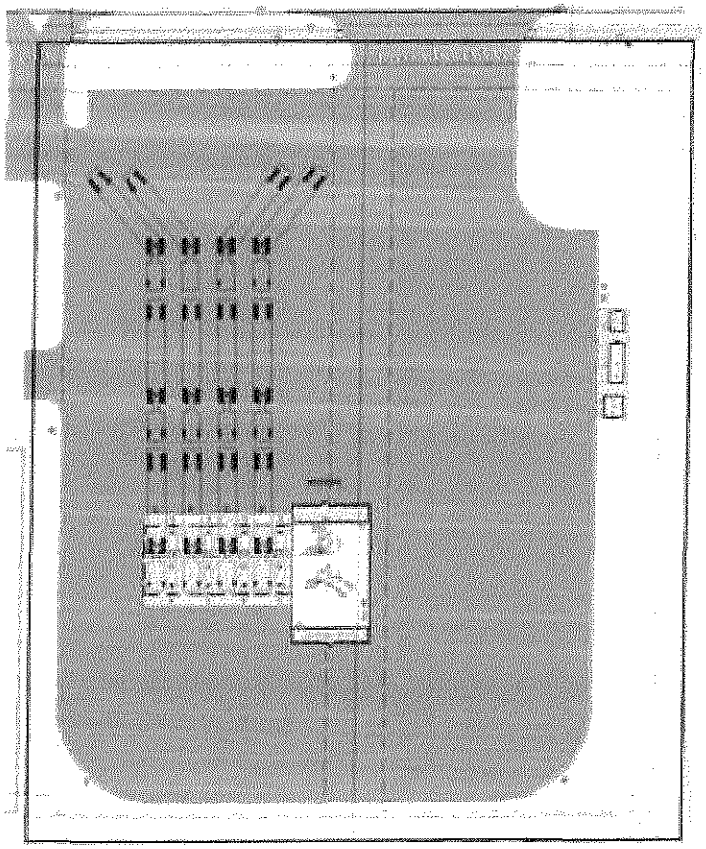


Ancillary Fuel Location



Stacking Distance Study- No Off-site Traffic Conflicts

Truck Fueling Generation



Daily Truck Traffic Generation Hourly Distribution Scenario

	Year 1	Year 2	Year 3	Distribution %
5:00 AM	4	10	18	6%
6:00 AM	4	12	21	7%
7:00 AM	4	12	21	7%
8:00 AM	4	12	21	7%
9:00 AM	4	10	18	6%
10:00 AM	3	9	15	5%
11:00 AM	2	7	12	4%
Noon	2	7	12	4%
1:00 PM	3	9	15	5%
2:00 PM	3	9	15	5%
3:00 PM	4	10	18	6%
4:00 PM	4	12	21	7%
5:00 PM	5	14	24	8%
Overnight	14	40	68	23%
	60	173	297	100%

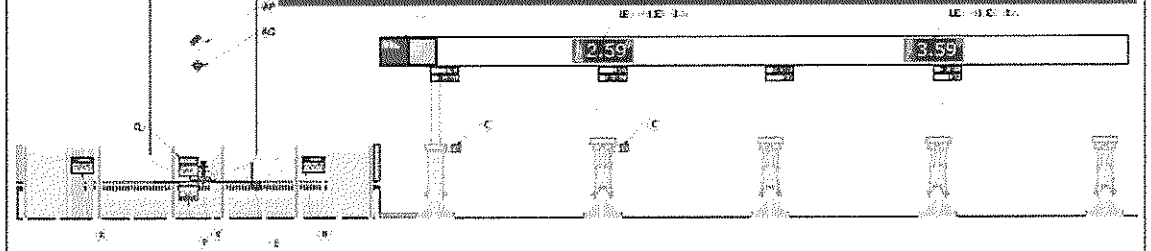
Model Assumes: 20 Fueling Days per Month

Operating Fuel Facility

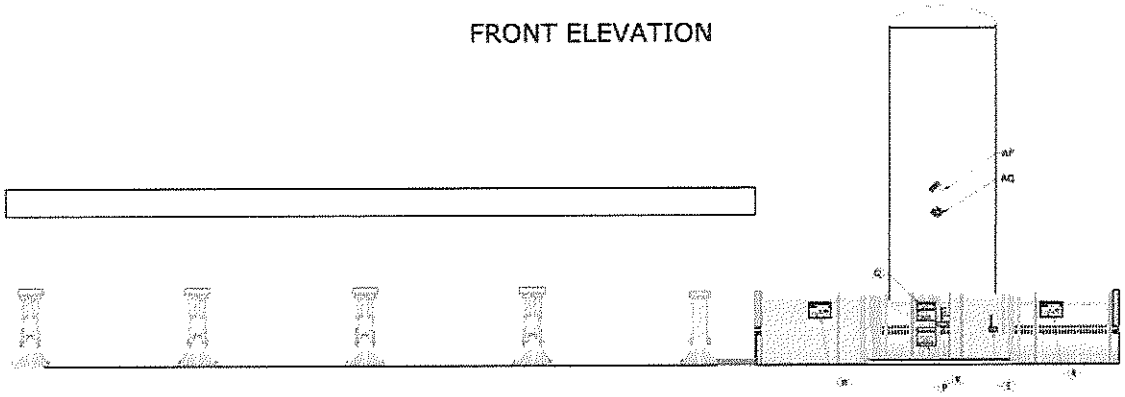
Fueling Station Elevations
Signage Package

Blu Sign:

- Provides identification
- Allows customer sufficient time to make safe traffic movement
- Utilizes existing structure, no separate monument sign
- Only significant identification signage for the facility
- Reflects Company's "Brand"



FRONT ELEVATION



REAR ELEVATION

SIGN LEGEND

LAYOUT	LETTER	DESCRIPTION	NOTES
	C	10" X 10" DIEBOND	EMERGENCY PHONE COLUMNS
	E	7" X 10" DIEBOND	EMERGENCY SHUTDOWN
	F	8" X 12" DIEBOND	24 HOUR SUPPORT SIGN
	H	10" X 14" DIEBOND	
	I	12" X 16" DIEBOND	SURVEILLANCE SIGN
	J	6" X 15" DIEBOND	NO CASH SIGN CONTAINMENT AND BUILDINGS
	K	6" X 15" DIEBOND	PERSONNEL SIGN CONTAINMENT AND BUILDINGS
	N	18" X 12" DIEBOND	EMERGENCY PHONE CONTROL BUILDING
	O	16" X 4" DIEBOND	FIRE EXTINGUISHER CANOPY COLUMN
	P	24" X 24" DIEBOND	NO PARKING SIGN
	Q	24" X 24" DIEBOND	SAFETY SIGN CONTAINMENT AND FENCE
	R	20" X 28" DIEBOND	DANGER SIGN FENCE AROUND CONTAINMENT
	U	34" X 34" DIEBOND SET	BLU. SIGN CANOPY
	V	8' X 8' VINYL	LARGE VINYL TANK WRAP SIGN
DIESEL	AL	6" X 30" DIEBOND	LANE INDICATOR CANOPY COLUMN
DEF	AM	6" X 30" DIEBOND	LANE INDICATOR CANOPY COLUMN
LNG	AN	6" X 30" DIEBOND	LANE INDICATOR CANOPY COLUMN
OFF ROAD DIESEL	AO	15" X 30" DIEBOND	LANE INDICATOR CANOPY COLUMN
	AP	15" X 15" VINYL	TANK SIGN
	AQ	11" X 11" VINYL	TANK SIGN
	AR	12" X 16" DIEBOND	DANGER SIGN CANOPY COLUMNS
	AS	12" X 24" DIEBOND	BLU. SIGN COMPRESSOR BUILDING
	AT	18" X 112" DIEBOND	SAFETY SIGN ON CONTAINMENT
	AU	18" X 112" DIEBOND	SAFETY SIGN ON CONTAINMENT
	AV	18" X 4" DIEBOND	FIRE EXTINGUISHER CONTROL BUILDING

SIGN PACKAGE
BENSENVILLE, IL

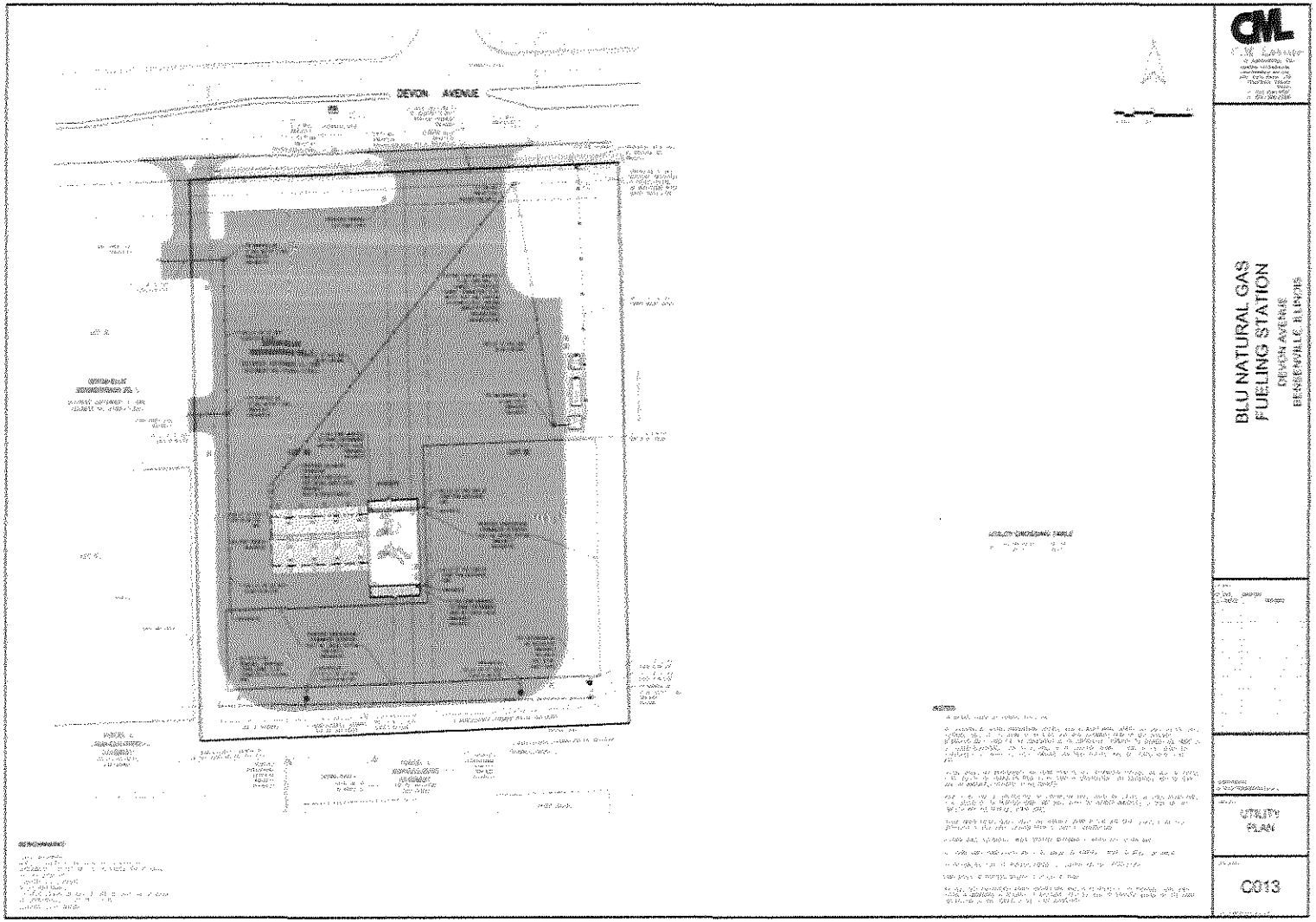
TRANSFUELS, LLC
3760 COMMONS LN
SLC, UT 84104
801-886-7200

NATURAL GAS FUELING STATION

ELEVATION 2

SP 02

Utility Plan



Land Use & Zoning

N

Requested Variance Relief

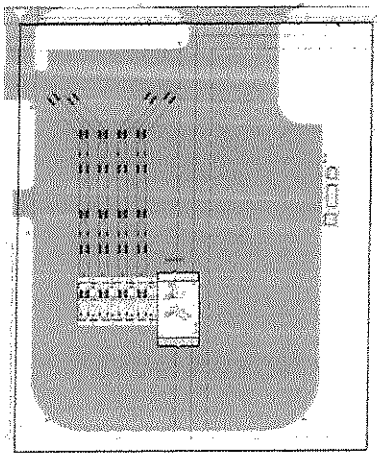
Section 10-14-13A Allow a detached structure 39 feet 6 inches in height

Section 10-18-12 A 2C Allow 64 square foot wall sign

Section 10-18-12 A D(2) Allow wall sign 20 feet above finished grade

Section 10-18-12 2B 3 Allow three (3) canopy signs

Section 10-11-8-2E(1) Increase allowed curb cut/turning radii to 80 feet.



Section 10-11-11 Allow 1 car parking space;

Promote Public Welfare

The Proposed Use Promotes the Public Welfare:

- **Subject Property in TIF # 13:** Currently, the subject property produces negligible property taxes. Development of the Subject Property will result in increase in the property tax increment inuring to the public benefit, without burdening the school system.

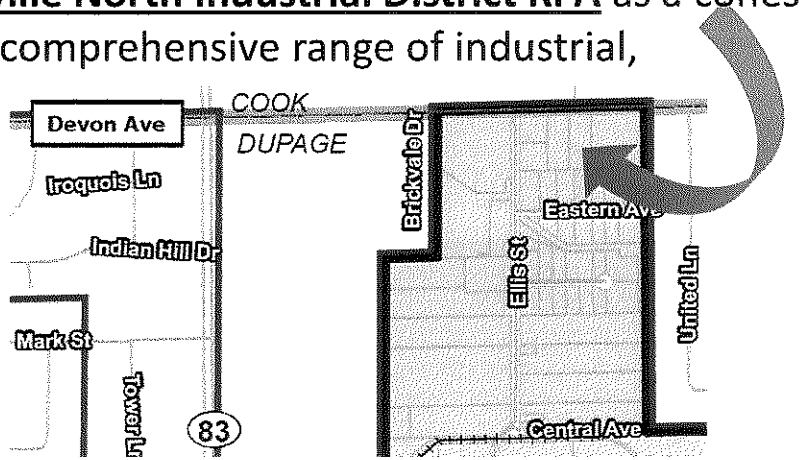
- **Sales Tax Revenue Generator:** The use will generate significant sales tax revenue to the Village; whereas, another industrial use permitted as a matter of right would will not generate sales tax for the Village. The fueling facility will generate sales to customers who would otherwise spend their trade dollars outside the Village.

- **Use in Harmony with Surroundings:** The proposed use complements the industrial use established in the immediate area, along an established truck route.

- **Use is an "In Demand" Amenity:** Local truck fleets are strongly in favor of an LNG opportunity in the immediate area and have been in contact with our sales & marketing team, as well as the local truck leasing companies, asking that a facility be opened.

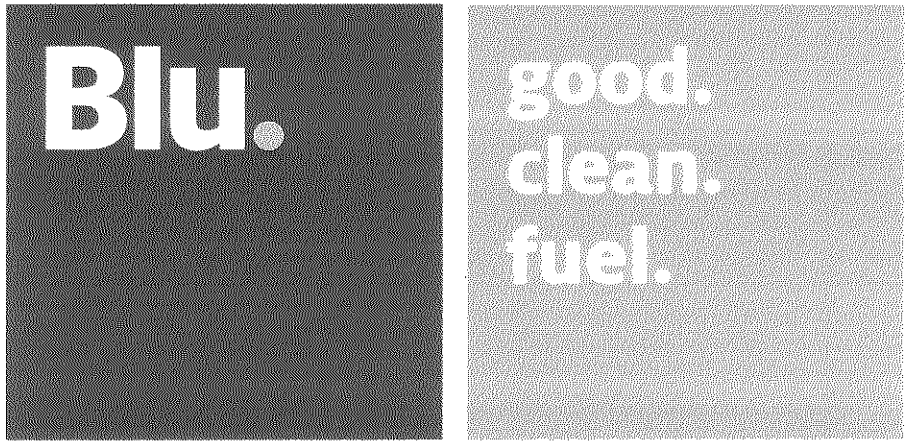
Furthers Bensenville Redevelopment Plan Goals

The **primary goal** of the Redevelopment Plan is to provide the necessary mechanisms to **re-establish the Bensenville North Industrial District RPA** as a cohesive and vibrant mixed-use area that provides a comprehensive range of industrial, commercial and retail uses. (p. 76)



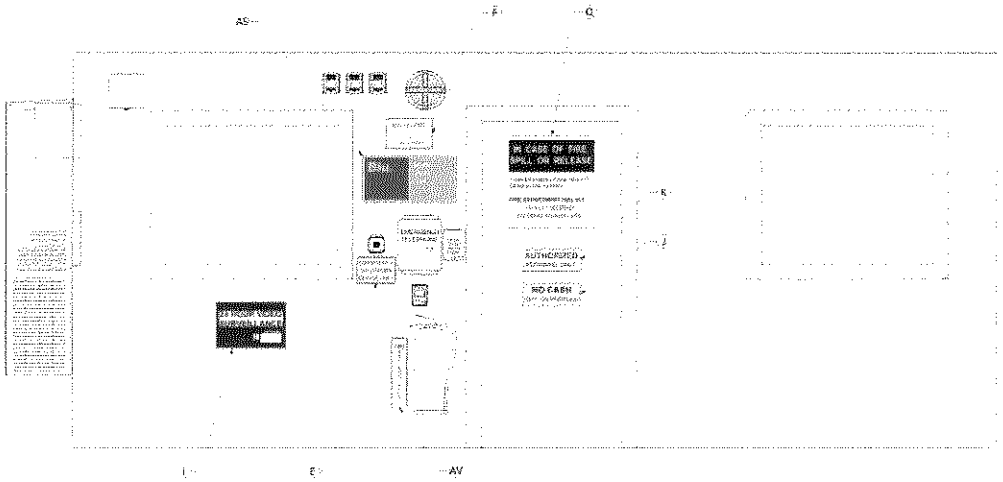
Bensenville will be one of the first communities in the Midwest with an LNG fueling facility, thus:

- Enhancing its reputation as both a leading industrial center in the Chicago Metropolitan Area; and
- Putting the community in the forefront in promoting and being a home to green solutions

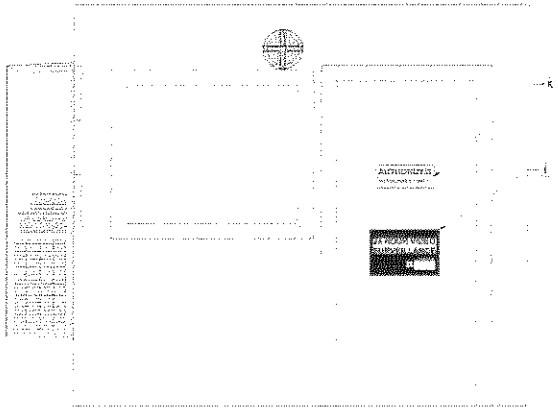

Blu.
good.
clean.
fuel.

ADDITIONAL INFORMATION

Building Signage



CONTROL BUILDING



COMPRESSOR BUILDING

SIGN LEGEND			
LAYOUT	LETTER	DESCRIPTION	NOTES
	C	10" X 10" DIEBOND	EMERGENCY PHONE COLUMNS
	E	7" X 10" DIEBOND	EMERGENCY SHUTDOWN
	F	8" X 12" DIEBOND	24 HOUR SUPPORT SIGN
	K	10" X 14" DIEBOND	
	I	12" X 18" DIEBOND	SURVEILLANCE SIGN
NO CASH	J	6" X 15" DIEBOND	NO CASH SIGN CONTAINMENT AND BUILDINGS
AUTHORIZED	K	6" X 15" DIEBOND	PERSONNEL SIGN CONTAINMENT AND BUILDINGS
	N	18" X 12" DIEBOND	EMERGENCY PHONE CONTROL BUILDING
	O	18" X 4" DIEBOND	FIRE EXTINGUISHER CANOPY COLUMN
	P	24" X 24" DIEBOND	NO PARKING SIGN
	Q	24" X 24" DIEBOND	SAFETY SIGN CONTAINMENT AND FENCE
	R	20" X 28" DIEBOND	DANGER SIGN FENCE AROUND CONTAINMENT
	U	34" X 34" DIEBOND SET	BLU. SIGN CANOPY
	V	8' X 6' VINYL	LARGE VINYL TANK WRAP SIGN
DIESEL	AL	8" X 30" DIEBOND	LANE INDICATOR CANOPY COLUMN
DEF	AM	8" X 30" DIEBOND	LANE INDICATOR CANOPY COLUMN
LNG	AN	8" X 30" DIEBOND	LANE INDICATOR CANOPY COLUMN
OFF ROAD DIESEL	AO	15" X 30" DIEBOND	LANE INDICATOR CANOPY COLUMN
	AP	15" X 15" VINYL	TANK SIGN
	AQ	11" X 11" VINYL	TANK SIGN
	AR	12" X 16" DIEBOND	DANGER SIGN CANOPY COLUMNS
	AS	12" X 24" DIEBOND	BLU. SIGN COMPRESSOR BUILDING
	AT	18" X 112" DIEBOND	SAFETY SIGN ON CONTAINMENT
	AU	18" X 112" DIEBOND	SAFETY SIGN ON CONTAINMENT
	AV	18" X 4" DIEBOND	FIRE EXTINGUISHER CONTROL BUILDING
2.59	–	34 3/8" X 85"	LED PRICING CANOPY SIGNS (1 LNG, 1 DSL)

SIGN PACKAGE
BENSENVILLE, IL

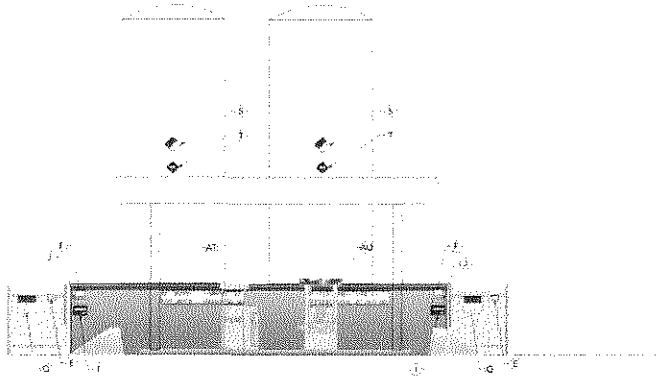
TRANSFUELS, LLC
3760 COMMONS LN
SLC, UT 84104
801-895-7200

NATURAL GAS FUELING STATION

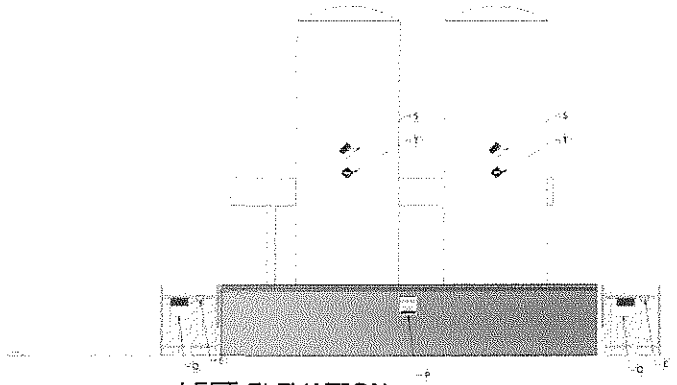
BUILDING SIGNAGE

SP 03

Containment & Tank Signage



RIGHT ELEVATION



LEFT ELEVATION

SIGN LEGEND

LAYOUT	LETTER	PHASE 1 QTY.	PHASE 2 QTY.	DESCRIPTION	NOTES
	C	2		10" X 10" DIEBOND	EMERGENCY PHONE COLUMNS
	E	7		7" X 10" DIEBOND	EMERGENCY SHUTDOWN
	F	3		6" X 12" DIEBOND	24 HOUR SUPPORT SIGN
	H	0		10" X 14" DIEBOND	
	I	4		12" X 18" DIEBOND	SURVEILLANCE SIGN
NO CASH	J	3		6" X 15" DIEBOND	NO CASH SIGN CONTAINMENT AND BUILDINGS
AUTHORIZED PERSONNEL ONLY	K	4		6" X 15" DIEBOND	PERSONNEL SIGN CONTAINMENT AND BUILDINGS
	N	1		18" X 12" DIEBOND	EMERGENCY PHONE CONTROL BUILDING
	O	2		18" X 4" DIEBOND	FIRE EXTINGUISHER CANOPY COLUMN
	P	3		24" X 24" DIEBOND	NO PARKING SIGN
	Q	7		24" X 24" DIEBOND	SAFETY SIGN CONTAINMENT AND FENCE
	R	4		20" X 28" DIEBOND	DANGER SIGN FENCE AROUND CONTAINMENT
	U	1		34" X 34" DIEBOND SET	BLU. SIGN CANOPY
	V	1		8' X 8' VINYL	LARGE VINYL TANK WRAP SIGN
DIESEL	AL	4		6" X 30" DIEBOND	LANE INDICATOR CANOPY COLUMN
DEF	AM	2		6" X 30" DIEBOND	LANE INDICATOR CANOPY COLUMN
LNG	AN	2		6" X 30" DIEBOND	LANE INDICATOR CANOPY COLUMN
OFF ROAD DIESEL	AO	0		15" X 30" DIEBOND	LANE INDICATOR CANOPY COLUMN
	AP	4	4	15" X 15" VINYL	TANK SIGN
	AQ	4	4	11" X 11" VINYL	TANK SIGN
	AR	0		12" X 16" DIEBOND	DANGER SIGN CANOPY COLUMNS
	AS	1		12" X 24" DIEBOND	BLU. SIGN COMPRESSOR BUILDING
	AT	1		18" X 112" DIEBOND	SAFETY SIGN ON CONTAINMENT
	AU	1		18" X 112" DIEBOND	SAFETY SIGN ON CONTAINMENT
	AM	1		18" X 4" DIEBOND	FIRE EXTINGUISHER CONTROL BUILDING
2.59	–	2		34 ½" X 85"	LED PRICING CANOPY SIGNS (1 LNG, 1 DSL)

SIGN PACKAGE
BENSENVILLE, IL

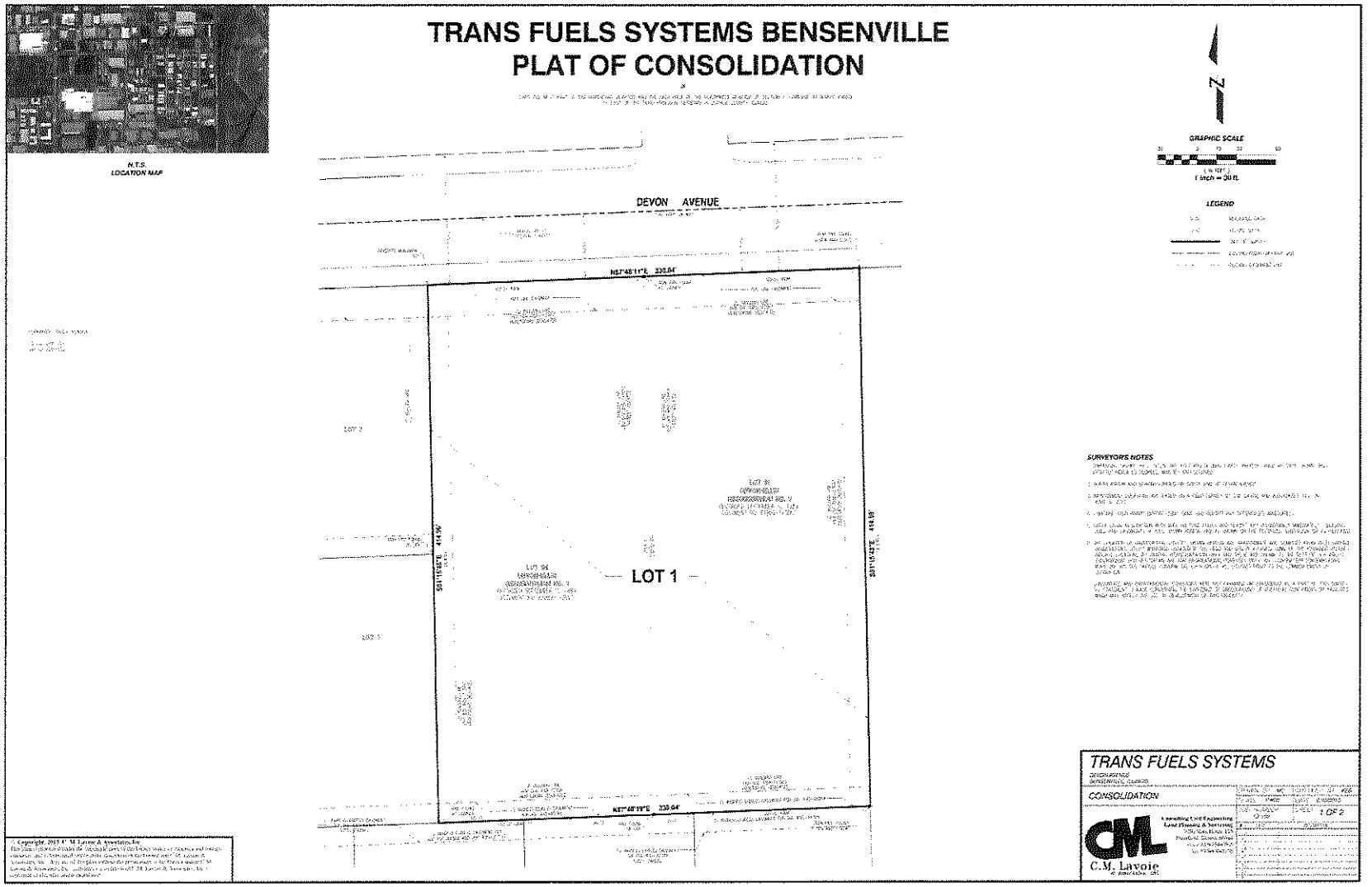
TRANSFUELS, LLC
3760 COMMONS LN
SLC, UT 84104
801-886-7200

NATURAL GAS FUELING STATION

ELEVATION 1

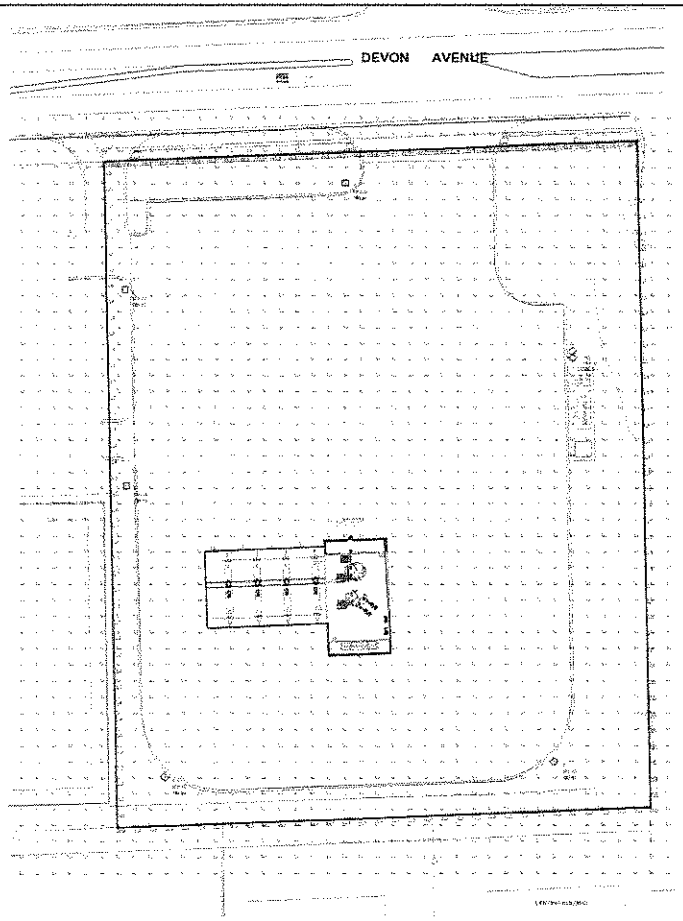
SP 01

Plat of Consolidation



Photometric Plan

N



Calculation Summary								
Label	CalcType	Units	Avg	Max	Min	Avg/Min	Max/Min
CalcPts	Illuminance	Fc	0.60	0.8	0.0	N.A.	N.A.
PROPERTY LINE	Illuminance	Fc	0.13	0.5	0.0	N.A.	N.A.
Paved Area	Illuminance	Fc	0.99	1.9	0.2	4.95	49.50

Luminaire Schedule

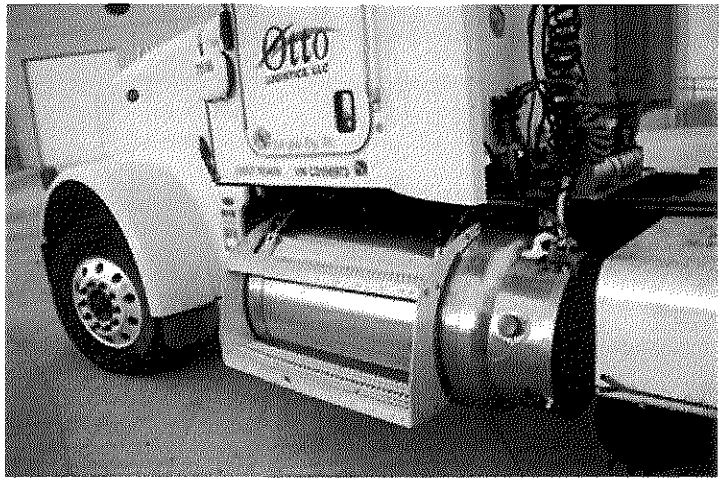
Symbol	Qty	Label	LAMP	Arrangement	Total Lamp Lumens	LLF	Description
□	5	A	400 WATT MH	SINGLE	36000	1.000	AC440
▭	1	AA	400 WATT MH	2 @ 90 DEGREES	36000	1.000	AC440

C.M. Lavoie

BLU NATURAL GAS
FUELING STATION
DEVON AVENUE
BENSENVILLE, ILLINOIS

PHOTOMETRIC PLAN

EX02


Otto

MEMORANDUM

INTRODUCTION

This Memorandum is submitted to the Village of Bensenville to address a number of issues created by Transfuels, Inc.'s proposal to construct an LNG "fleet fueler" at 600 W. Devon Ave.

THE PARTIES

The Subject Property is owned by Devon and Ellis LLC, a Gullo family limited liability company ("Gullo"). The proposed operator is Transfuels, a Utah company which is a minority member of a joint venture with ENN Group Co Ltd., one of China's largest privately held companies.

THE PROPERTY

The Subject Property is a vacant 3.14 acre parcel (Tr. p. 27) of land zoned I-2, (Light Industrial) located on the South side of Devon Ave. approximately 300 feet East of the intersection of Devon Ave. and Ellis Ave. At the present time the only access to the Subject Property is a fifteen foot wide alley located on the south side of the property. Transfuels proposes to construct an 80 foot wide full access driveway with a 131 foot turnaround on Devon Ave. This proposal requires a variance from the requirements of 10-11-8-2E(1) Transfuels also proposes a secondary right in/right driveway and a stub connection to the property to the West (these are addressed under "Traffic and Driveways" below).

THE NEIGHBORHOOD

The Subject Property is located in the heavily developed North Industrial Corridor of the Village. Virtually the entire area (both within Bensenville as well as to the North in Elk Grove Village across Devon) is developed with one story industrial buildings housing numerous small manufacturing and commercial businesses.

THE PROPOSED USE

Transfuels proposes to develop the facility for the sale of compressed liquid natural gas ("LNG") and a "limited amount" of diesel fuel to truck customers. The alleged target customers are "day trippers", not over the road truckers. (Tr. p.10, 14). There would be no sale of either type of fuel to automotive customers.

According to Transfuels' own evidence there are only a limited number of LNG facilities in the United States (Transfuels has "approximately" twelve of these facilities Tr. p. 12) and none in the Midwest. This is their first attempt to establish an LNG facility in Illinois (Tr. p.10), making Bensenville the guinea pig for this type of establishment. Transfuels has no customer base for LNG (Tr. p. 16) and therefore, all of Transfuels' testimony regarding the market for LNG and the impact of the traffic it would draw is speculative. (No traffic study was presented).

According to Mr. Middlebrook, Transfuels' regional representative (he is a lawyer and real estate developer (Tr. p. 25) with no demonstrable expertise regarding LNG) trucks that use LNG must also use diesel fuel due to the scarcity of LNG facilities. (Tr. pp.15-16; 22).

Transfuels contends that LNG will be a cheaper fuel than diesel, (Tr. pp. 18-19) but this contention ignores the substantial costs that must be incurred to obtain, liquefy, transport, store, and dispense LNG, as well as the substantial costs that are necessary to develop a totally new distribution network. Presumably, the funds to carry out these operations will be provided by its Chinese partner ENN.

As will be established later in this Memorandum, LNG is a highly dangerous commodity and for that reason it is anticipated that many informed municipalities will not allow facilities of this type within their corporate limits.

THE PROPOSED FACILITY

According to the drawings (Geometry Plan C012, amongst others) submitted in conjunction with the Application, the proposed facility would consists of two thirty nine foot six inch above-ground pressurized storage tanks, each holding 16,000 gallons of compressed LNG (9,600,000 gallons at ambient temperature) and four fueling stations under a canopy, each of which will dispense both LNG and diesel fuel. In addition, the site would contain a small "control room" building, a pump room and a combined washroom/storage building, characterized by Transfuels' civil engineer as "service buildings for the facility itself" (Tr. p. 30).

ISSUES

THE NUMBER OF ASTs

There is a conflict between Transfuels' application and its drawings and testimony. The application and the bulk of the testimony stated that there would be only one tank. However, Jason Evans (Transfuels' employee) stated that they intended to add a second tank (Tr. pp. 43-44) and all of Transfuels' exhibits (Geometry Plan C012, amongst others) show two tanks. Does that mean that if Transfuels' proposal is approved it need not return to obtain additional approval for its second tank because the approved drawings showed two tanks?

THE PROPOSED AST ARE ILLEGAL UNDER THE VILLAGE'S FIRE PREVENTION CODE.

Each AST will contain 16,000 gallons of natural gas in a compressed state that must be maintained at -260 Fahrenheit until dispensed. The compelling evidence that LNG is highly flammable and combustible will be discussed later in this Memorandum.

Section 7-3-2 F of the Village's Fire Prevention and Protection Code prohibits the above ground storage of flammable and combustible liquids anywhere in the Village:

"F. Aboveground Storage: The aboveground storage of flammable and combustible liquids is prohibited within the corporate limits of the village."

Sec. 10-3-1 A of the Zoning Code prohibits granting a variance for uses not otherwise allowed as a permitted or conditional use in the applicable district.

This issue was summarily dismissed by Jason Evans. He stated that compressed LNG stored in the thirty nine foot six inch pressurized tank was neither flammable nor combustible, except under limited circumstances. (No evidence regarding Evans' qualifications as an expert was presented; he did not even know the maintenance schedule for the proposed AST (Tr. p. 85))

Mr. Rysay supported Evans' opinion by stating that because the Office of the State Fire Marshall ("OSFM") has not yet classified LNG as flammable or combustible Section 7-3-2 F of the Village's Fire Prevention and Protection Code does not apply (Tr. p 109). That contention is ludicrous. To follow Mr. Rysay's reasoning, the present lack of an OSFM classification makes LNG not dangerous and justifies approving the proposed tank in face of Section 7-3-2 F of the Village's Fire Prevention and Protection Code. Does LNG suddenly become dangerous if tomorrow the OSFM says so?

Contrary to Transfuels' self-serving (and non-expert) testimony, LNG is highly dangerous, volatile, flammable, and combustible. The argument that an accident, an act of God, a mechanical malfunction, an operator error, or even an act of sabotage or terrorism is not "likely" to occur begs the question: This is not a proper land use in a densely populated area. Safety concerns should not be measured only by the probability of occurrence, but also by the results that would occur if the unthinkable happened.

THE VARIANCE NEEDED TO PERMIT THE AST

Transfuels seeks a variation from the requirements of Sec. 10-14-13 (12 foot maximum height for detached structures) by mischaracterizing its nearly 40 foot tall AST as a "detached structure". There are a number of problems with this proposition.

The 12 foot height limitation Transfuels seeks to avoid is contained in the portion of the Zoning Code that addresses "accessory structures" (Sec. 10-14-13 A).

An "accessory structure" is defined as "A structure that serves as an accessory use" and an "accessory use" is defined as "A subordinate land use located on the same lot or parcel as a principal use...and serving a purpose customarily incidental and subordinate to that of the principal use and commonly found in connection therewith." (Sec. 10-2-3.)

The proposed AST does not qualify for a variance as an "accessory structure" because there is no "principal use" which it serves—it is the principal use. The small control room, the pump room and the washroom/storeroom are not the principal uses of the property. They are the accessory uses. Without the AST they have no purpose. (Tr. p. 30).

According to Transfuels' "expert" Mr. Evans underground storage of LNG is not possible. (Tr. pp 45-46). That "expert" opinion is patently erroneous. See page 93 of Tab F—LNG storage tanks are normally built underground in Japan. It's just less expensive to build an AST.

Furthermore, granting a variance for the AST is prohibited by Sec. 10-3-3 A of the Zoning Code.

TRAFFIC AND DRIVEWAYS

This is a destination-oriented facility, intended to draw traffic. (Tr. pp. 63-64.) Given the location of the Subject Property, the proposed use (the more successful, the more traffic), it is very difficult to understand why the Village did not require Transfuels to provide a traffic study.

The Subject Property is located on Devon Ave., approximately 300 feet East of Ellis, between Ellis and United. The speed limit on Devon is 40 miles per hour and according to Transfuels' engineer quoting IDOT statistics Devon currently serves 17,500 "cars" per day (Tr. p. 35). There is no signalization between York Road on the East and Busse on the West to slow down this flow. Furthermore, Devon is under Cook County jurisdiction and Cook County has no plans to signalize the intersection of Devon and Ellis.

Transfuels' proposes a curb cut of 80 feet with 131 foot turning radius as its primary entrance, claiming that doing so will avoid conflicts with traffic on Ellis (Tr. p. 27). They also propose a secondary right in/right driveway to be located partially on the West side of the Subject Property and partially on an adjacent, vacant parcel. Furthermore, their plans show a stub connection from the property to the property immediately to the West. Their engineer testified that this secondary access is will provide a cross connection to Ellis, (Tr. pp. 27; 33-34) thereby casting additional traffic burdens on Ellis (and thereby also providing a shortcut to avoid the intersection of Devon and Ellis.)

Gullo owns the property on which the right in/right out and the cross connection are proposed to be constructed, but Transfuels presented no evidence that it has the right to use that property.

Moreover, at the time of the July 8, 2013 public hearing Transfuels did not have Cook County approval for its proposed entrance and failed to provide an estimated timetable for Cook County to act on the proposal. Additionally, Transfuels' plans do not show a Westbound left turn lane at Transfuels' proposed main entrance to prevent stacking on Devon.

Transfuels' estimates of truck traffic to the site are inconsistent. On one hand it would be "minimal" (Tr. p. 35) but on the other hand it would begin at 60 trucks per day and increase to

297 trucks per day by the third year (Tr. p 41) based upon two ASTs (Tr. p. 68). Would Transfuels limit itself to that number? Not likely.

SIGNAGE

Transfuels seeks four signs, a 64 square foot decal sign mounted on the AST and three signs on the 84-foot long canopy, two price signs and a logo. Each of these signs requires a variance.

Transfuels emphasized that its customer base would be fleet users who presumably would know where the facility is located. Yet in the next breath Transfuels pleads that it needs the 64 square foot BLU sign at the top of a 40 foot high AST to allow "people to be able to identify where this facility is so that you can assess it." (Tr. p. 76. See also Tr. p. 83). The forty foot high AST with a 64 square foot sign will function as a billboard. (Tr. p. 77). What happens when they build the second tank—does it also get a sixty four square foot sign?

The justification for the three canopy signs fares no better under scrutiny. According to Transfuels, the three signs are "not out of character with any of the other types of signage that have been approved in these circumstances and provision for pricing and providing identification". Tr. p. 77). However, Transfuels will draw its business from the fleet customers it solicits, not trucks randomly driving down Devon Ave. If that is true, then variances for the identification signs and the pricing signs are not justified.

CRITERIA THAT MUST BE MET IN ORDER FOR THE VILLAGE TO GRANT THE REQUESTED VARIANCES

Sec. 10-3-3B sets out nine criteria that a petitioner must meet in order to be granted a zoning variance. Transfuels itself failed to provide credible evidence that its proposal meets those criteria and instead relied on the Village staff to provide justification for granting the variances. (Tr. p. 76). (The text of each of the criteria is listed in Tab G).

1. Special Circumstances. The variances being sought include a 40 foot tall AST intended to store a highly dangerous liquefied gas in a heavily developed area of the Village and unnecessary signage. ASTs containing combustible or flammable liquids are illegal in Bensenville. Moreover, Transfuels mischaracterizes this AST as an "accessory structure" (tr. p. 76 and elsewhere) when in fact it is the primary structure on the property. Transfuels' witnesses emphasized that the proposed facility is intended to serve fleet truck operators and not a retail operation, but in the next breath they claims that it needs this signage to draw traffic (which in turn will increase congestion on Devon Ave.). The "special circumstances" are the product of the nature of Transfuels' proposal; they are not peculiar to this property.

2. Hardship or Practical Difficulties. The "unnecessary and undue hardship or practical difficulties" are the product of Transfuels' proposed use of the Subject Property. The property is zoned I-2 which even Transfuels admits allows a plethora of other uses. The "hardship and practical difficulties" are traceable solely to Transfuels' desire to construct an illegal 40 foot high AST and to emblazon it and the proposed canopy with advertising signage far in excess of that permitted by Village ordinance.

3. Circumstances Relate To Property: The circumstances prompting Transfuels' application for variances relate solely not to the property itself, but to the business Transfuels' proposed to conduct. Transfuels admits that the property is usable for many permitted uses.

4. Not Resulting From Applicant Action. This is a vacant parcel of land. The need for the requested variances is attributable solely to the extreme nature of Transfuels' proposed use.

5. Preserve Rights Conferred By District: The only property in this district zoned as a conditional use for a "fleet fueler" is the Bell Fuels property. Bell's property contains no ASTs, no billboards, no price signs, and when Bell owned the Subject Property it was denied access to

Devon Ave. Approving Transfuels' proposal would confer the very special privileges the Village denied to Bell Fuels.

6. Necessary For Use Of Property: The only rationale for the requested variances is to increase Transfuels' economic return. As noted above, the Subject Property can be used for a multitude of uses in the I-2 District that would allow the owner of the property who is the applicant (Transfuels is not the owner; it would be a tenant) to enjoy a reasonable economic return.

7. Not Alter Local Character: As addressed above, Transfuels' proposed use at this location will pose a substantial risk to public safety in the vicinity both because of the hazardous nature of the chemical that will be stored in the AST and the increased traffic its proposed use will generate.

8. Consistent With Title And Plan: There are no "changed circumstances" that warrant the variances sought and there are no "changed circumstances" that justify permitting proposed use at this location.

9. Minimum Variance Needed: The variances requested are Transfuels' "wish list". The only " undue hardship" and "practical difficulties" to Transfuels are self-created. The property can be put to any number of uses that do not require the "blessings" that Transfuels seek for its own economic gain

CRITERIA THAT MUST BE MET IN ORDER FOR THE VILLAGE TO GRANT A CONDITIONAL USE FOR THE SUBJECT PROPERTY.

Under Sec. 10-3-4, a Conditional Use is a "Special Use" under Illinois statutes. 65 ILCS 5/11-13-1.1 requires that an applicant cannot be granted a conditional use (a special use under Bensenville's zoning ordinance) unless he meets all of the requirements of Sec. 10-3-4 C Those criteria are as follows:

1. "Traffic: Any adverse impact of types or volumes of traffic flow not otherwise typical of permitted uses in the zoning district has been minimized."

Transfuels' witnesses testified that within three years they expect truck volume at the site to increase to 297 trucks per day. However, there is no guarantee that the truck volume will be substantially more than this number. This is a destination oriented use intended to draw as much traffic as possible. They presented no evidence that the increased traffic Transfuels would attract not beyond that which would otherwise result from development of the property—as for example a manufacturing plant. Instead, Transfuels relied on the Village staff's opinion (Tr. p. 73) which was not based on any traffic study. In short, there was no evidence that the proposed use would not have an adverse impact on the type or volume of traffic.

2. "Environmental Nuisance: Any effects of noise, glare, odor, dust, waste disposal, blockage of light or air or other adverse environmental effects of a type or degree not characteristic of permitted uses in the district have been minimized."

While Mr. Burney and Transfuels' other witnesses opined at length about the environmental benefits of LNG, Transfuels presented no direct evidence on this issue. Quite to the contrary, the second part of this submission relating to the hazards of LNG shows its potential for creating horrific environmental problems. In addition, as noted above, placement of this type of AST is prohibited by Bensenville's Fire Code.

3. "Neighborhood Character: The proposed use will fit harmoniously with the existing character of existing permitted uses in its environs. Any adverse effects on environmental quality, property values or neighborhood character beyond those normally associated with permitted uses in the district have been minimized."

Transfuels has testified that the proposed use is a destination-oriented use. It is the functional equivalent of placing a service station for trucks in the middle of the block in an area that is already burdened with heavy traffic without a protected Westbound turn lane. As far as

Transfuels is concerned the more traffic, the more profitable its business. This hardly meets the requirement to minimize the adverse effect on the neighborhood.

> 4. "Use Of Public Services And Facilities: The proposed use will not require existing community facilities or services to a degree disproportionate to that normally expected of permitted uses in the district, nor generate disproportionate demand for new services or facilities in such a way as to place undue burdens upon existing development in the area."

The area is virtually fully developed but none of the existing uses create the extensive additional traffic volume this proposed use will generate.

> 5. "Public Necessity: The proposed use at the particular location requested is necessary to provide a service or a facility which is in the interest of public convenience, and will contribute to the general welfare of the neighborhood or community."

The proposed facility is not necessary at this location to provide a public service. Transfuels admitted that there is no current demand for this use. Therefore, there is no public convenience to be served. Moreover, Transfuels admits that its proposed use will generate substantially more traffic in the area and that in turn will exacerbate the already existing traffic congestion. It is a circular problem—the more "public convenience" the facility serves, the more public inconvenience it creates.

> 6. "Other Factors: The use is in harmony with any other elements of compatibility pertinent in the judgment of the commission to the conditional use in its proposed location. (Ord. 07-99, 2-23-1999)."

This issue was not addressed.

Both the State statute and Bensenville's Zoning Code require concrete, positive evidence in order to justify the Village granting the requested conditional use. Merely reciting the criteria while ignoring both a lack of evidence and contradictory evidence does not meet that burden.

THE COMMUNITY DEVELOPMENT COMMISSION'S FINDINGS

In the Minutes of its July 8, 2013 meeting the CDC dutifully listed all of the criteria that must be met to justify granting both the requested conditional uses and variances criteria and

addressed each one. However, we submit that based on the issues raised in this Memorandum, the foundation of Transfuels' case is built on sand. Transfuels presented virtually no credible evidence to support either the requested conditional uses or the requested variances. In fact its "evidence" was contradictory on numerous points. The CDC's findings are against the manifest weight of the evidence Transfuels presented. The requested variances and "justifications for a conditional use are "needed" not because of the neighborhood or the property, but because of the character of the proposed use and Transfuels' desire to maximize its economic return. The Village has nothing to gain and much to lose by granting the requested conditional use and variances. Both the public safety and traffic concerns justify denial of Transfuels' proposal.

WHO IS TRANSFUELS?

Transfuels' presentation before the Community Development Commission lacked candor about itself and was replete with misleading information about LNG.

Transfuels portrays itself as a startup energy company, entering the field of LNG because it is good for the environment and because it will help American economy by providing abundant vehicle fuel at a favorable cost. .

The true story is quite different. Transfuels is a joint venture formed in 2012 between CH4 Energy Corp. and ENN Group Co Ltd., one of China's largest privately held companies. The only public information regarding this "alliance" is that ENN owns the "majority" interest in Transfuels, controls the Board of Directors, and is the financial backer of the project. See Tabs A and B.

Transfuels' plans for selling LNG are quite grandiose, but nowhere does Transfuel reveal how it will pay for the rapid, substantial expansion of its business. And there is a good reason

for this silence because it is little more than the "front man" for Chinese interests seeking to gain a foothold in the American energy market.

The substantial capital that will be necessary to construct LNG facilities throughout the country will come from Transfuels' Chinese "partner". Since the whole venture is cloaked in secrecy there is no information available regarding the payback to ENN for advancing the capital, or ENN's share of the profits. However, it is safe to assume that ENN will exact a heavy toll for its financial support.

Yes, Transfuel's ambitious building program will create good paying construction jobs, but that result is transitory. Once the facilities are in operation, they will be manned, if at all, by attendants whose function will be to show truck drivers how to fuel their vehicles with LNG—and the lion's share of the profits from their purchases will belong to Transfuels' partner, ENN.

LNG IS NOT A BENIGN COMMODITY

There was extensive debate at the July 8, 2013 public hearing regarding the dangers inherent in LNG. Transfuels presented Jason Evans, who they characterized as an "expert". Evans testified that LNG was not a dangerous commodity, except when vaporized and then only under limited conditions. A review of the transcript of the hearing (provided in conjunction with this Memorandum) does not contain any evidence that he is qualified as an expert in the field of LNG—he works as a "manager" for Transfuels.

Paul Conarty, Bell Fuels' attorney (and admittedly not an expert regarding LNG) presented the objector's case and gave an opposite opinion, arguing at length that based upon common sense alone, LNG is a highly dangerous commodity.

Consequently, the CDC was presented with the diametrically opposed opinions of two non-experts on the issue. However, given the fact that Transfuels had been working with Village

staff for weeks, they apparently convinced the staff that LNG was not dangerous—a conclusion demonstrated by Mr. Rysay's comments that LNG was not dangerous because the office of the State Fire Marshall had not yet declared it to be so. The following material will dispel that misconception.

OSHA requires that all chemical manufacturers prepare and distribute MSDS (Material Safety Data Sheet). They are the "bible" for all distributors of dangerous chemicals. Under Tab C you will find two MSDS regarding LNG, one produced by Devon and the other by Linde, both respected companies. Neither MSDS minces any words in explaining the highly dangerous nature of LNG. We call your attention especially to the Devon MSDS which is quite explicit. These alone are sufficient to dispel the misinformation put out by Transfuels regarding the nature of LNG. Ask yourselves: Why did not Transfuels voluntarily provide MSDS for LNG? The answer is obvious: The MSDS for LNG contradicts everything Transfuels told the CDC

There have been only two recorded disasters involving LNG, but they have been catastrophic. Begin with the incident in Cleveland in 1944. The photographs and narrative in Tab D describe that disaster in detail. Especially chilling is the description of how LNG leaked into the sewer system, spreading the extent of the incident exponentially throughout the neighborhood. Bear in mind that Transfuels' own engineer, Mr. Hejny, testified that a spill of LNG at the proposed site would be diverted into Bensenville's sanitary sewers. (Tr. p. 40). Even assuming that the technology has advanced materially since 1944, the dangerous nature of LNG has not diminished since that date.

The 2004 disaster in Algeria is also worthy of consideration. See the photographs and description in Tab E.

A detailed discussion of the hazards of LNG can be found in Chapter 8 (Tab F) from the book "Brittle Power, Energy Strategy for National Security" by Lovins & Lovins © 1991 (first prepared as a U.S. Pentagon study).[1] While this chapter discusses several forms of compressed gas, the majority of the Chapter deals specifically with the problems inherent in LNG and the authors' conclusions are frightening.

If you were to follow the logic of Transfuels' contention that LNG is not a dangerous commodity then by the same reasoning, neither is dynamite, C4, or Semtex 10. Each of them poses only a relatively small risk so long as handled properly by persons trained and licensed to do so. However, the risk is present nonetheless and if something "goes wrong" an incident involving dynamite, C4 or Semtex 10, would be catastrophic. And you certainly would not want them stored in bulk quantities in a heavily developed industrial area no matter how carefully they were handled.

LNG is no different. If properly stored, dispensed, and handled by persons qualified to do so, it does not pose an inordinate risk of a catastrophic event. However, if a portion of the system fails, if there is an operator error, if there is n accident, or if there is sabotage, any such event is a recipe for another "Cleveland".

Ask yourselves: Why would you want to allow this commodity in a heavily developed industrial area of Bensenville? What benefit would it confer on the Village to allow this facility to be constructed at the proposed location compared to the calamity that would occur if that unforeseen, "something went wrong" occurred?

Paul F. Conarty

[1] It should be noted that the book was written before the 2004 disaster in Algeria so that event is not mentioned.

Ch4 Energy Corp in Salt Lake City, Utah

Single Location

Save Review Edit

Phone: Unknown
We currently have 27,532,086 phone numbers in our database, but we're missing this one. If you have this company's phone number, add it to the company research hub by clicking the Edit button above.
Address: 4752 W California Ave A Salt Lake City, Utah 84104-4477

User Rating
0 ratings

INFO CORPORATE DATA REVIEWS

General Information

CONTACT INFORMATION

Organization	Ch4 Energy Corp
Office Location	4752 W California Ave A Salt Lake City, Utah 84104-4477 United States
County	Salt Lake

CH4 ENERGY CORP EMPLOYEES

NAME	TITLE	BACKGROUND CHECK
Merritt Norton	Chief Executive Officer	Get Info

COMPANY PROFILE

This listing is for Ch4 Energy Corp's Single Location in Salt Lake City, UT. The company primarily operates in the Automotive Mechanical and Electrical Repair and Maintenance Companies industry.

- Ch4 Energy Corp was founded in 2009, and is Privately held.
- Ch4 Energy Corp had $100,000 in estimated annual revenue (Actual data).
- Ch4 Energy Corp employs 0-10 (Show Value) people (Actual data).
- Of the 0-10 (Show Value) total Ch4 Energy Corp employees, 0-10 (Show Value) (Actual data) are located here at the Single Location

Company Overview of CH4 Energy Corp.

Snapshot People

Company Overview

CH4 Energy Corp. was incorporated in 2008 and is based in Provo, Utah.

4004 North 850 East
Provo, UT 84604

United States

Founded in 2008

- Transfuels Llc had $1.6 Million in estimated annual revenue (Estimated data).
- Transfuels Llc employs 11-50 (Show Value) people (Actual data).
- Of the 11-50 (Show Value) total Transfuels Llc employees, 11-50 (Show Value) (Actual data) are located here at the Single Location.

NAME	TITLE
Merritt Norton	Chief Executive Officer

Corporate Data

INDUSTRIES

- Natural Gas Liquid Extraction
- Petroleum and Petroleum Products Merchant Wholesalers (except Bulk Stations and Terminals)
- Other Gasoline Stations

REVENUE

Sales Volume	$1.6 Million

SIC INDUSTRIES

- Natural Gasoline Production
- Engine Fuels And Oils
- Filling Stations, Gasoline

COMPANY SIZE

Employees At This Location	11-50 (Show Value)
Total Number of Employees	11-50 (Show Value)

OWNERSHIP

Year Founded	2012

COMPANY DETAILS

Location Type: Headquarters

- Financial News N/A
- Growth Clues N/A
- Payment Score Decline N/A
- Purchase Behavior Decline N/A
- Public Records N/A

Ownership: Private

Year Founded: 2012

Last edited Jul 31st 2013 by FindTheCompany

Transfuels Llc in Salt Lake City, Utah Single Location

Address: 4220 W 2100 S Ste F Salt Lake City, Utah 84120-1210

User Rating

0 ratings

General Information

CONTACT INFORMATION Edit

Organization	Transfuels Llc
Office Location	4220 W 2100 S Ste F Salt Lake City, Utah 84120-1210 United States
County	Salt Lake

General Phone Number
(855) 225-8383

TRANSFUELS LLC EMPLOYEES Edit

NAME	TITLE	BACKGROUND CHECK
Merritt Norton	Chief Executive Officer	Get Info

COMPANY PROFILE Edit

This listing is for Transfuels Llc's Single Location in Salt Lake City, UT. The company primarily operates in the Oil and Gas Extraction Companies industry.

- Transfuels Llc was founded in 2012, and is Privately held.

By Nichola Groom
LOS ANGELES | Thu Mar 14, 2013 5:57am EDT

(Reuters) - ENN Group Co Ltd, one of China's largest private companies, is quietly rolling out plans to establish a network of natural gas fueling stations for trucks along U.S. highways.

With plans to build 50 stations this year alone, ENN joins a small but formidable group of players -- including Clean Energy Fuels Corp and Royal Dutch Shell Plc -- in an aggressive push to develop an infrastructure for heavy-duty trucks fueled by cheap and abundant natural gas. Clean Energy is backed by T. Boone Pickens and Chesapeake Energy Corp.

The move is yet another example of China's ambition to grab a piece of the U.S. shale gas boom. Just last month, Sinopec Group said it would pay $1 billion for some of Chesapeake's oil and gas properties in the Mississippi Lime shale.

The natural gas bounty is also expected to help wean the U.S. transport industry off its dependence on diesel fuel made from imported crude oil, and the trucking industry is in a big push to use more of the domestically produced fuel.

The potential savings are huge: shippers can save around $2 a gallon by switching to natural gas from diesel.

Nearly half of the garbage trucks sold in the United States last year run on natural gas. They are able to refuel at dedicated stations at their home bases. To convince the far larger market for long-haul trucking to run on natural gas, truckers need to know they can refuel along their highway routes.

Enter ENN, led by billionaire energy tycoon Wang Yusuo. The company has already built natural gas stations in China, which is farther along in its adoption of natural gas trucks.

A TINY COMPANY IN UTAH

The average liquefied natural gas station costs around $1 million to build, according to industry experts, putting ENN's investment this year at about $50 million. The company's U.S. joint venture would not say how much it plans to spend.

Two years ago ENN began looking to put its expertise in natural gas equipment to work in the United States and first approached the top player in U.S. natural gas fueling, Clean Energy, about forming a partnership, according to people familiar with the matter. Clean Energy would not comment.

But when they rebuffed ENN, the Chinese firm reached out to a small Utah company, CH4 Energy Corp, which had opened a single LNG and CNG fueling station in Salt Lake City with the help of federal stimulus funds.

The deal created Transfuels LLC, which operates as Blu LNG. ENN has a majority stake in the joint venture and controls its board of directors, according to sources familiar with the deal.

Merritt Norton, who founded CH4, is Blu's chief executive, while Jun Yang is chairman and also the vice president of ENN Group.

Blu LNG's plans are bold and moving quickly.

"We have five stations in operation right now, and within I would say two weeks we will have another three stations," Norton said in an interview last week.

Eventually, ENN has said it also plans to build LNG plants.

A source close to the situation said the company "is just testing the market. You can call it an experiment."

As for the secrecy around its plans, the source said, "ENN Group is mindful of potential U.S. reaction to its expansion there because it would bring in more competition."

Blu had no comment on its ownership structure or the makeup of its board of directors. The company said it was not able to comment on behalf of ENN Group. Efforts to reach ENN Group in China were unsuccessful.

A NATIONAL NETWORK

Today there are 28 public LNG refueling stations in the United States, according to the U.S. Department of Energy.

LNG is denser than compressed natural gas, which fuels many buses and garbage trucks. That means trucks require fewer fuel storage tanks to go the same distance. Also, LNG stations are cheaper to build than CNG stations because they do not tap into gas lines. Much like diesel, the liquid fuel is trucked in.

The number of stations Blu will open this year is about equal to the 50 to 60 stations Clean Energy is planning. Clean Energy already has 70 LNG stations, though most will only start operating when there are a sufficient number of trucks that need them. Shell has said it plans to build about 100 LNG fueling stations in the United States, but has not given a timeline.

Blu's eventual plan is to build about 500 LNG stations in the United States, according to another person familiar with their strategy. When asked about that figure, a Blu spokesman said the company was committed to building a network of fueling stations, but that the exact number would depend on a number of factors.

Most of Clean Energy's filling stations are located at truck stops run by Pilot Flying J. Shell said it is in the final stages of negotiations to work with another major U.S. truck stop operator, TravelCenters of America LLC.

Blu has no such deal with a national truck stop owner, but is working with some regional players, Norton said, adding that he did not view other players in natural gas as competition.

All of the company's current stations are in Utah, but it is expanding throughout the country. Blu has between 50 and 100 employees, Norton said, mostly at its headquarters in Salt Lake, but also in the Midwest, Southeast and Northwest.

Blu LNG isn't ENN's first foray into the U.S. market. The company in recent years has announced partnerships with power company Duke Energy Corp to develop green energy projects, though none have yet been built.

It has also been developing a $5 billion solar farm and manufacturing plant in Nevada for years, though the project still does not have a buyer for its power.

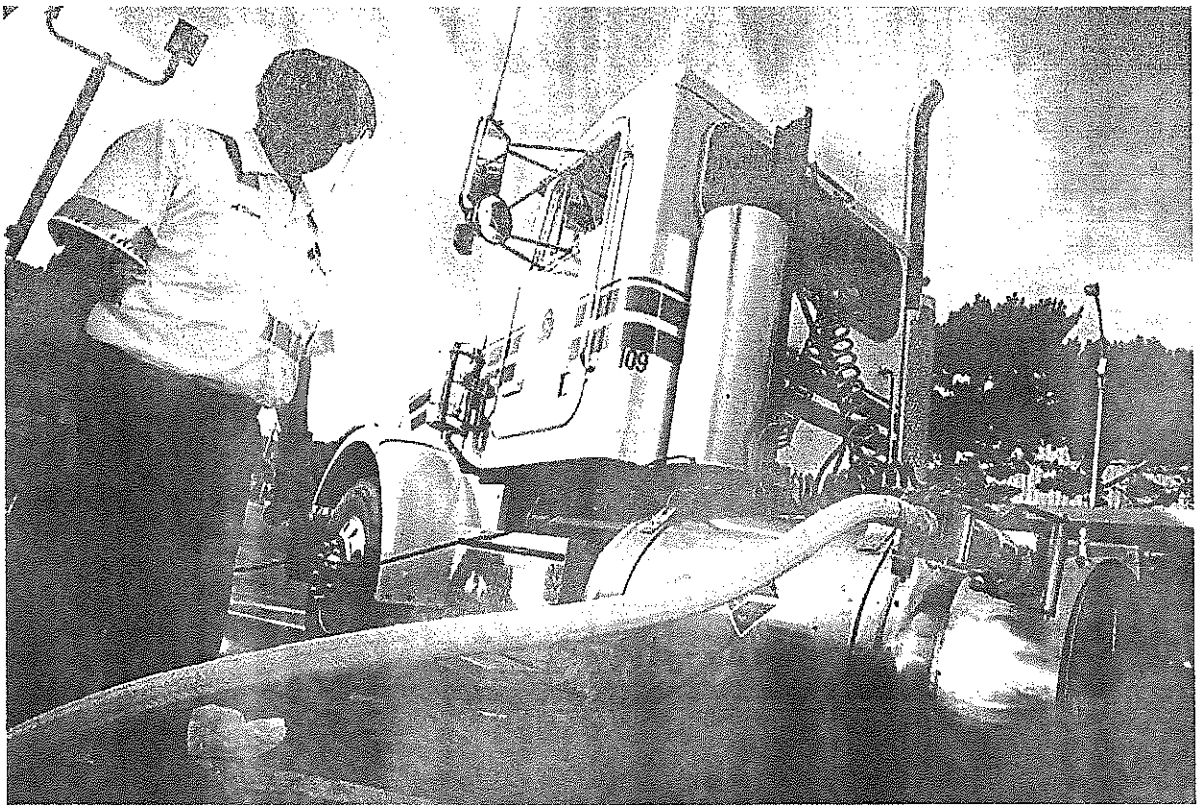
The company hopes to have better luck in natural gas. Last month ENN inked a global deal with natural gas engine maker Westport Innovations to collaborate on efforts to speed the proliferation of natural gas as a transportation fuel.

But Westport is not helping ENN with its U.S. LNG stations.

"They don't need us," said Husayn Anwar, president of Westport's China business. "They know what they are doing and they have the money for it."

(Additional reporting by Charlie Zhu in Hong Kong; Editing by Patricia Kranz and Mary Milliken)

US, China in Major LNG Truck Fuel Joint Venture



A US-China joint venture has unveiled plans to develop a network of at least 500 LNG fueling stations at truck stops across the country. Credit: truckertotrucker.com

China's ENN Group Co. Ltd. and the Utah-based CH4 Energy Corp. have created a joint venture strategy to create a network of natural gas fueling stations for trucks along the major highways criss-crossing the US.

The plan calls for the creation of a joint-venture to collaborate on building 50 stations this year alone "in an aggressive push to develop an infrastructure for heavy-duty trucks fueled by cheap and abundant natural gas," said a joint statement released by the two companies.

The strategy calls for the eventual construction of at least 500 LNG stations at truck stops across the country, according to media reports.

ENN first explored the idea of expanding its reach into the US market two years ago, eventually partnering with CH4.

The Utah company had already tentatively entered the LNG fueling market by opening a single liquid natural gas (LNG) and compressed natural gas (CNG) fueling station in Salt Lake City with the assistance of stimulus funds provided by the US government.

That venture, in turn, led to the creation of Transfuels LLC, which currently operates as Blu LNG, which is majority owned by ENN. The company is on the record saying it cannot comment on its ownership structure or board of directors, which is controlled by ENN, and that it is "unable to comment on behalf of ENN."

Blu LNG now has five LNG fueling stations in operation with another three due to open in the near future. However, a company spokesman did say that, while Blu LNG "does not have a deal with a national truck stop owner at this time," the company is "working with some regional companies," which he declined to identify.

The average liquefied natural gas station costs around $1 million to build, according to industry experts, with estimates of ENN's investment in the US project hovering at around $45 million to $50 million.

The company, however, would not say how much ENN plans to invest in the US joint venture with CH4.

Heavy Competition

The ENN-CH4 joint venture can expect heavy-duty competition from Royal Dutch Shell Plc and US-based Clean Energy Fuels Corp., both of which currently dominate the US LNG fuel sector.

Clean Energy already has 70 LNG stations, though most will only start operating, the company has said, "when there are a sufficient number of trucks that need them." Shell has said it plans to build about 100 LNG fueling stations in the US, but has not given a timeline.

ENN – one of China's largest alternative energy conglomerates – operates more than 238 natural gas stations in 59 cities in China, and has said it also plans to develop several LNG liquefaction plants in North America.

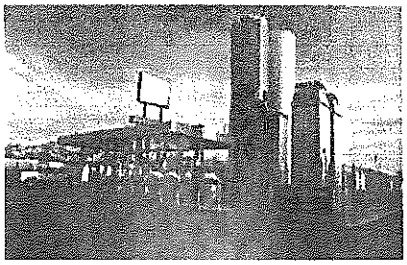
In the US, over the past several years, the company has crafted partnerships with Duke Energy Corp. to cooperate on green energy projects and has also been developing a $5 billion solar farm and manufacturing plant in Nevada.

Last month, ENN partnered with Canada's Westport Innovations Inc., a Vancouver, BC-based manufacturer of natural gas-powered engines, "to cooperate in the marketing and distribution of natural gas and LNG transportation solutions and fuel for on-road, off-road, rail and marine applications," said a statement.

While the ENN-Westport partnership covers the US, Canada, Asia, Europe, Australia and Africa, the company made it clear that Westport "is not involved with the planned Blu network of stations in the US."

Chinese firm puts millions into U.S. natural gas stations

By Nichola Groom, Reuters
Posted: 03/14/2013 10:30:58 AM PDT
Updated: 03/14/2013 10:31:12 AM PDT



A Blu LNG filling station in Salt Lake City, Utah, March 13. ENN Group Co Ltd, one of China's largest private companies, is quietly rolling out plans to establish a network of natural gas fueling stations for trucks along U.S. Highways. (Jim Urquhart)

ENN Group Co Ltd, one of China's largest private companies, is quietly rolling out plans to establish a network of natural gas fueling stations for trucks along U.S. highways.

With plans to build 50 stations this year alone, ENN joins a small but formidable group of players -- including Clean Energy Fuels Corp and Royal Dutch Shell Plc -- in an aggressive push to develop an infrastructure for heavy-duty trucks fueled by cheap and abundant natural gas. Clean Energy is backed by T. Boone Pickens and Chesapeake Energy Corp.

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"They don't need us," said Husayn Anwar, president of Westport's China business. "They know what they are doing and they have the money for it."

Energy Investing

Why This Chinese Company Is Investing in U.S. LNG

- *Jeff Uscher, Contributing Writer - March 15, 2013*

A private energy company based in China is reportedly investing in the construction of a network of liquefied natural gas (LNG) fueling stations in the United States.

According to a ***Reuters*** report, ENN Group Co. Ltd. is teaming with a small U.S.-based company, and the partnership plans to open 50 to 60 LNG fueling stations this year. LNG stations cost an average about $1 million each to build, industry experts say.

ENN has already built a number of natural gas fueling stations in China, which is much further along in use of LNG for heavy trucks than the United States.

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Natural Gas Companies Focusing on LNG

Reuters reports that ENN initially approached Clean Energy Fuels Corporation (Nasdaq: CLNE), the largest natural gas fueling company in the U.S., about forming a partnership to develop LNG fueling stations for large, long-haul trucks.

ENN was rebuffed by CLNE, which has already built 70 LNG stations in the U.S., and turned to a tiny Utah company, CH4 Energy, which operated a single LNG and compressed natural gas (CNG) fueling station in Salt Lake City.

ENN and CH4 Energy formed Transfuels LLC, which operates under the Blu LNG brand. Blu has now opened five LNG fueling stations and will have several more open later this month.

Royal Dutch Shell (NYSE: RDS.A) is also entering the U.S. LNG fueling station business, with plans to open 100 fueling stations although no schedule was given.

Clean Energy uses Pilot Flying J, a closely held, nationwide truck stop operator, to run its LNG fueling stations. Shell says it is in negotiations with TravelCenters of America LLC (NYSE: TA) to operate its planned LNG fueling network.

Blu remains unaffiliated with any truck stop chain. The company says it ultimately plans to build up to 500 LNG stations nationwide.

All of the companies involved are being rather secretive about where they plan to locate their fueling stations.

Because the business is aimed at heavy, long-haul trucks, just about all of the LNG stations will be along major interstate highways.

Why This Chinese Company Is Investing in U.S. LNG

A private energy company based in China is reportedly investing in the construction of a network of liquefied natural gas (LNG) fueling stations in the United States. According to a Reuters report, ENN Group Co. Ltd. is teaming with a small U.S.-based company, and the partnership plans to open 50 to 60 LNG fueling stations this year. LNG stations cost an average about $1 million each to build, industry experts say. ENN has already built a number of natural gas fueling stations in China, which is much further along in use of LNG for heavy trucks than the United States. LNG's been promoted by investors such as T. Boone Pickens and natural gas producers including Chesapeake Energy Corp. (NYSE: CHK) as a cheaper, cleaner fuel for long-haul trucks. Now more natural gas companies are teaming up to provide LNG, which means more investment opportunities for energy investors. To continue reading, please click here...

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Advantages of LNG

Natural gas has many advantages as a transportation fuel.

First, LNG and CNG are much cheaper than gasoline. Truckers can save $2 a gallon or more using natural gas.

Second, natural gas is abundant here in the U.S. so we don't have to send money to unfriendly countries overseas to buy their oil.

Third, natural gas burns much cleaner than most other hydrocarbons. Natural gas is mostly methane and, when burned, methane releases carbon dioxide and water.

Compressed natural gas is more widely available than LNG, which requires low-temperature storage tanks. But LNG is denser than CNG, which means that a truck can hold more energy in a 200-gallon LNG tank than it can hold in a 200-gallon CNG tank.

A truck with an engine built to use natural gas will have the same performance as a diesel or gasoline engine - but with a much lower fuel cost and less pollution.

So why doesn't everyone use natural gas to fuel their vehicles?

The real issue is distribution. The gasoline distribution infrastructure in the United States has been around for 100 years. Gas stations can be found everywhere.

According to the U.S. Department of Energy, there are only 28 public LNG fueling stations in operation in the United States. (Most of the 70 LNG stations that have already been built by CLNE are not yet in operation, as the company is awaiting sufficient demand before opening the stations.)

Long-haul truckers have to know they can get fuel all along their route. Until there are enough LNG fueling stations available around the country, long-haul truckers will be slow to adopt the new fuel, despite its advantages.

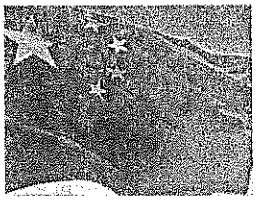
In addition to the natural gas fueling stations mentioned above, investors might want to look at Westport Innovations Inc. (Nasdaq: WPRT), the nation's leading manufacturer of CNG, LNG and bi-fuel (combination CNG and gasoline) engines. As the natural gas fueling network in the United States is expanded, Westport can be expected to see increased demand for its natural gas engines and retrofit kits.

With all of the cheap shale gas coming on stream in the United States, it makes sense for investors to look to the expanded use of natural gas as a transportation fuel for new investment opportunities.

To learn more about natural gas stocks and LNG, check out Money Morning Global Energy Strategist Dr. Kent Moors' report "Betting on the Coming Boom in Natural Gas."

Why China is Buying Into U.S. Natural Gas

MARCH 18, 2013 *By* JEFF USCHER, CONTRIBUTING WRITER, MONEY MORNING



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devon

MATERIAL SAFETY DATA SHEET

1. Product and Company Identification

Material name	Natural Gas Liquids (Y Grade)
Version #	01
Revision date	06-02-2010
Product use	Fuel.
Manufacturer/Supplier	Devon US Operations 20 North Broadway Oklahoma City, OK 73102-8260 Telephone: (405) 235-3611 Devon Canadian Operations Calgary, AB. T2P 4H2 2000, 400 – 3rd Avenue SW. Telephone: (403) 232-7100
Emergency	Emergency Chemtrec: Within the USA (800) 424-9300 Outside the USA (703) 527-3887 Devon Canada Emergency Phone: (403) 232-7100

2. Hazards Identification

Physical state	Gas.
Appearance	Liquefied gas.
Emergency overview	DANGER Extremely flammable gas - may cause flash fire. Contents under pressure. Vapors may cause flash fire or explosion. Will be easily ignited by heat, spark or flames. Containers may explode when heated. Possible reproductive hazard that may cause adverse reproductive effects based on animal data. Gas may be irritating to eyes, skin and the respiratory tract. May cause central nervous system effects.
OSHA regulatory status	This preparation is classified as dangerous according to Directive 1999/45/EC and its amendments. This product is hazardous according to OSHA 29CFR 1910.1200.
Potential health effects	
Routes of exposure	Eye contact. Skin contact. Inhalation.
Eyes	Gas may be irritating to the eyes. Direct contact with liquefied gas may cause eye damage from frostbite.
Skin	Gas may be irritating to the skin. Contact with evaporating liquid may cause frostbite or freezing of skin.
Inhalation	Gas may be irritating to respiratory tract. This product is an asphyxiant gas which can cause unconsciousness/death if OXYGEN levels are sufficiently reduced. In high concentrations, vapors are narcotic and may cause headache, fatigue, dizziness and nausea.
Ingestion	This material is a gas under normal atmospheric conditions and ingestion is unlikely.
Target organs	Skin. Eyes. Respiratory system. Central nervous system. Liver. Kidneys. Reproductive system.
Chronic effects	May cause central nervous system disorder (e.g., narcosis involving a loss of coordination, weakness, fatigue, mental confusion, and blurred vision) and/or damage. Possible reproductive hazard that may cause adverse reproductive effects based on animal data. May cause damage to the liver and kidneys.
Signs and symptoms	Narcosis. Decrease in motor functions.
Potential environmental effects	Not expected to be harmful to aquatic organisms.

3. Composition / Information on Ingredients

Components	CAS #	Percent
Propane	74-98-6	15-18
Isobutane	75-28-5	1-5

n-Butane	106-97-8	2-6
n-Pentane	109-66-0	1-3
Hexanes+	110-54-3	1-3
Methane	74-82-8	0-3

Composition comments All concentrations are in percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

4. First Aid Measures

First aid procedures

Eye contact In case of contact, immediately flush eyes with fresh water for at least 15 minutes while holding the eyelids open. Remove contact lenses if worn. Get medical attention if irritation persists.

Skin contact Not expected to be absorbed through the skin but may cause slight irritation. High pressure injection through the skin requires immediate medical attention. Treat frostbite area of skin by immersing the affected area in warm water (between 100F/38C and 110F/43C, not exceeding 112F/44C). Keep immersed for 20 to 40 minutes. Seek medical assistance.

Inhalation Move injured person into fresh air and keep person calm under observation. If breathing is difficult, give oxygen. Get medical attention if any discomfort occurs.

Ingestion This material is a gas under normal atmospheric conditions and ingestion is unlikely.

Notes to physician Provide general supportive measures and treat symptomatically.

General advice Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

5. Fire Fighting Measures

Flammable properties Extremely flammable gas. Gas forms mixtures with air which can catch fire and burn with explosive violence. Vapors are heavier than air and invisible mixture spreads easily and may accumulate in low or confined areas, travel considerable distance to source of ignition and flash back. Runoff to sewer may create fire or explosion hazard.

Extinguishing media

Suitable extinguishing media Extinguish with carbon dioxide, dry powder or water fog.

Unsuitable extinguishing media Not applicable.

Protection of firefighters

Specific hazards arising from the chemical Fire may produce irritating, corrosive and/or toxic gases.

Protective equipment and precautions for firefighters Do not extinguish fires unless gas flow can be stopped safely; explosive re-ignition may occur. Promptly isolate the scene by removing all persons from the vicinity of the incident. No action shall be taken involving any personal risk or without suitable training. For fires involving this material, do not enter any enclosed or confined fire space without proper protective equipment, including self-contained breathing apparatus. Stop flow of material. Use water to keep fire exposed containers cool and to protect personnel effecting shutoff. If a leak or spill has not ignited, use water spray to disperse the vapors and to protect personnel attempting to stop leak. Prevent runoff from fire control or dilution from entering streams, sewers or drinking water supply.

Special protective equipment for fire-fighters Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with full face-piece operated in positive pressure mode. Use approved gas detectors in confined spaces.

Specific methods In the event of fire and/or explosion do not breathe fumes. Evacuate area. Check oxygen content before entering area. Water spray should be used to cool containers. Remove pressurized gas cylinders from the immediate vicinity. Turn leaking cylinder with the leak up to prevent escape of gas in liquid state. Containers can burst violently when heated, due to excess pressure build-up.

Hazardous combustion products Carbon monoxide and carbon dioxide.

6. Accidental Release Measures

Personal precautions	Eliminate all sources of ignition in vicinity of released vapors. Evacuate all non-essential personnel to an area upwind. Stop leak if possible without any risk. Ventilate enclosed areas to prevent formation of toxic, flammable or oxygen deficient atmospheres. Water spray may be used to reduce vapors. Avoid vapor cloud even with proper respiratory protective equipment. Use suitable protective equipment (section 8). Follow all fire-fighting procedures (section 5).
Environmental precautions	Prevent further leakage or spillage if safe to do so. Prevent material from entering drains, sewers or low lying areas. See section 13 for waste disposal information.
Methods for containment	Stop leak if you can do so without risk. Prevent entry into waterway, sewers or confined areas.
Methods for cleaning up	Stop the flow of gas. Allow to dissipate with adequate ventilation.
Other information	These gases may be used as an auxiliary fuel or disposed of by burning in a properly designed flare or incinerator in accordance with federal or local requirements.

7. Handling and Storage

Handling	Put on appropriate personal protective equipment (see section 8). Special precautions should be taken when entering or handling equipment in this type of gas service because of possible radioactive contamination. All equipment should be checked for radioactivity or opened to the atmosphere and have forced ventilation applied for at least 4 hours prior to entry or handling. Avoid direct skin contact with any surface. Avoid generation of dust, smoke, fumes, etc. in the work area, or if they cannot be avoided, a tested and certified radionuclide dust respirator should be worn. Smoking, eating, or drinking should be prohibited when working with the equipment. Employees should wash thoroughly with soap and water and discard contaminated clothing after entering or handling the equipment. Workers should wash hands and face before eating, drinking and smoking. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter enclosed areas and confined space unless adequately ventilated. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Pumping and transferring operations must be electrically grounded and bonded to dissipate static build up.
Storage	Keep away from heat, spark, and open flame. Store storage containers in cool, well-ventilated areas away from direct sunlight, heat or flame. Thoroughly test gas lines for leakage before use, especially in confined spaces. Store away from strong oxidizing materials.

8. Exposure Controls / Personal Protection

Occupational exposure limits

ACGIH

Components	Type	Value
Hexanes+ (110-54-3)	TWA	50 ppm
Isobutane (75-28-5)	TWA	1000 ppm
Methane (74-82-8)	TWA	1000 ppm
n-Butane (106-97-8)	TWA	1000 ppm
n-Pentane (109-66-0)	TWA	600 ppm
Propane (74-98-6)	TWA	1000 ppm

U.S. - OSHA

Components	Type	Value
Hexanes+ (110-54-3)	PEL	500 ppm 1800 mg/m3
	TWA	180 mg/m3 50 ppm
n-Butane (106-97-8)	TWA	800 ppm 1900 mg/m3
n-Pentane (109-66-0)	PEL	2950 mg/m3 1000 ppm
	STEL	750 ppm 2250 mg/m3
	TWA	600 ppm 1800 mg/m3
Propane (74-98-6)	PEL	1000 ppm 1800 mg/m3
	TWA	1800 mg/m3 1000 ppm

Canada - Alberta

Components	Type	Value
Hexanes+ (110-54-3)	TWA	50 ppm 176 mg/m3
n-Butane (106-97-8)	TWA	1000 ppm
n-Pentane (109-66-0)	TWA	1770 mg/m3 600 ppm
Propane (74-98-6)	TWA	1000 ppm

Canada - British Columbia

Components	Type	Value
Hexanes+ (110-54-3)	TWA	20 ppm
Methane (74-82-8)	TWA	1000 ppm
n-Butane (106-97-8)	STEL	750 ppm
	TWA	600 ppm
n-Pentane (109-66-0)	TWA	600 ppm
Propane (74-98-6)	TWA	1000 ppm

Engineering controls Explosion proof exhaust ventilation should be used. Use process enclosures, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits. Provide adequate ventilation and minimize the risk of inhalation of gas.

Personal protective equipment

Eye / face protection If eye contact is likely, safety glasses with side shields or chemical type goggles should be worn.

Skin protection No special requirements under ordinary conditions of use.

Respiratory protection Wear approved respiratory protection when working with this material unless ventilation is adequate to keep airborne concentrations below recommended exposure standards.

General hygiene considerations Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Observe any medical surveillance requirements.

9. Physical & Chemical Properties

Appearance	Liquefied gas.
Color	Colorless.
Odor	Odorless.
Odor threshold	Not available.
Physical state	Gas.
Form	Liquefied gas.
pH	Not available.
Melting point	Not available.
Freezing point	Not available.
Boiling point	-126.4 °F (-88 °C)
Flash point	-211 °F (-135 °C) Cleveland Closed Cup
Evaporation rate	Not available.
Flammability	Not available.
Flammability limits in air, upper, % by volume	12.5
Flammability limits in air, lower, % by volume	1.1
Vapor pressure	697.96 (38°C /100°F)
Vapor density	Not available.
Specific gravity	Not available.
Solubility (water)	Negligible
Partition coefficient (n-octanol/water)	No data available.
Auto-ignition temperature	500 °F (260 °C)
Decomposition temperature	Not available.
Bulk density	1.1 (Air=1)

10. Chemical Stability & Reactivity Information

Chemical stability	Stable under normal temperature conditions.
Conditions to avoid	Heat, flames and sparks.
Incompatible materials	Strong oxidizing agents.
Hazardous decomposition products	Carbon Dioxide. Carbon monoxide.
Possibility of hazardous reactions	Hazardous polymerization does not occur.

11. Toxicological Information

Toxicological data

Components	Test Results
n-Butane (106-97-8)	Acute Inhalation LC50 Rat: 658 mg/l 4 Hours
n-Pentane (109-66-0)	Acute Inhalation LC50 Rat: 364 mg/l 4 Hours
Propane (74-98-6)	Acute Inhalation LC50 Rat: > 1442.847 mg/l 15 Minutes
Isobutane (75-28-5)	Acute Inhalation LC50 Mouse: 52 mg/l 1 Hours

Toxicological information	This product may contain detectable but varying quantities of the naturally occurring radioactive substance radon 222. The amount in the gas itself is not hazardous, but since radon rapidly decays (t1/2 = 3.82 days) to form other radioactive elements including lead 210, polonium 210, and bismuth 210, equipment may be radioactive. The radon daughters are solids and therefore may attach to dust particles or form films and sludges in equipment. Inhalation, ingestion or skin contact with radon daughters can lead to the deposition of radioactive material in the lungs, bone, blood forming organs, intestinal tract, kidney and colon. Occupational exposure to radon and radon daughters has been associated with an increased risk of lung cancer in underground uranium miners. Follow the special precautions listed in handling and storage section of this document (see section 7).
Acute effects	Gas may be irritating to eyes, skin and the respiratory tract. May cause central nervous system effects. This product is an asphyxiant gas which can cause unconsciousness/death if OXYGEN levels are sufficiently reduced. Contact with liquefied gas can cause damage (frostbite) due to rapid evaporative cooling.
Local effects	May cause central nervous system effects.
Sensitization	Not a skin sensitizer.
Chronic effects	May cause damage to the liver and kidneys.
Carcinogenicity	No data available.
Epidemiology	No data available.
Mutagenicity	No data available.
Neurological effects	Central and/or peripheral nervous system damage.
Reproductive effects	Possible reproductive hazard that may cause adverse reproductive effects based on animal data.
Teratogenicity	No data available.

12. Ecological Information

Ecotoxicological data

Components	Test Results
n-Pentane (109-66-0)	EC50 Daphnia: 2.3 mg/l 48 Hours
	LC50 Fish: 3.1 mg/l 96 Hours
Hexanes+ (110-54-3)	LC50 Fathead minnow (Pimephales promelas): 2.101 - 2.981 mg/l 96 hours

Ecotoxicity	Not expected to be harmful to aquatic organisms. The product contains volatile organic compounds which have a photochemical ozone creation potential.
Environmental effects	Ecological injuries are not known or expected under normal use.
Persistence and degradability	No data available.
Bioaccumulation / Accumulation	No data available.
Partition coefficient (n-octanol/water)	No data available.

Mobility in environmental media	The product is a volatile substance, which may spread in the atmosphere.

13. Disposal Considerations

Waste codes	D001: Waste Flammable material with a flash point <140 °F
Disposal instructions	Dispose of this material and its container at hazardous or special waste collection point. Must be incinerated in a suitable incineration plant holding a permit delivered by the competent authorities. Do not allow this material to drain into sewers/water supplies.

14. Transport Information

DOT

Basic shipping requirements:

UN number	UN1075
Proper shipping name	Petroleum gases, liquefied
Hazard class	2.1
Environmental hazards	
Marine pollutant	No
Labels required	2.1
Additional information:	
Special provisions	T50
Packaging exceptions	306
Packaging non bulk	304
Packaging bulk	314, 315
ERG number	115

DOT BULK

Basic shipping requirements:

UN number	UN1075
Proper shipping name	Petroleum gases, liquefied
Hazard class	2.1
Labels required	2.1
Additional information:	
Special provisions	T50
Packaging exceptions	306
Packaging non bulk	304
Packaging bulk	314, 315
ERG number	115

IATA

Basic shipping requirements:

UN number	1075
Proper shipping name	Petroleum gases, liquefied
Hazard class	2.1

IMDG

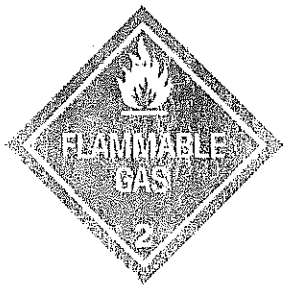
Basic shipping requirements:

UN number	1075
Proper shipping name	PETROLEUM GASES, LIQUEFIED
Hazard class	2.1
Environmental hazards	
Marine pollutant	No
EmS No.	F-D*, S-U

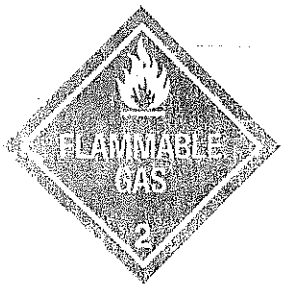
TDG

Basic shipping requirements:

Proper shipping name	PETROLEUM GASES, LIQUEFIED
Hazard class	2.1
UN number	UN1075
Marine pollutant	No



DOT



DOT BULK

IATA

IMDG

TDG

15. Regulatory Information

US federal regulations

This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.
All components are on the U.S. EPA TSCA Inventory List.

US EPCRA (SARA Title III) Section 313 - Toxic Chemical: De minimis concentration

Hexanes+ (CAS 110-54-3)	1.0 %

US EPCRA (SARA Title III) Section 313 - Toxic Chemical: Listed substance

Hexanes+ (CAS 110-54-3)	Listed.

US TSCA Section 12(b) Export Notification: Export Notification requirement/De minimis concentration

n-Pentane (CAS 109-66-0)	1.0 % One-Time Export Notification only.

CERCLA (Superfund) reportable quantity (lbs)

Propane 100
Isobutane 100
n-Butane 100
n-Pentane 100
Hexanes+ 100
Methane 100

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories	Immediate Hazard - Yes Delayed Hazard - Yes Fire Hazard - Yes Pressure Hazard - No Reactivity Hazard - No
Section 302 extremely hazardous substance	No
Section 311 hazardous chemical	No
Drug Enforcement Agency (DEA)	Not controlled
Canadian regulations	This product has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR.
WHMIS status	Controlled
WHMIS classification	A - Compressed Gas B1 - Flammable/Combustible

WHMIS labeling

State regulations

This product does not contain a chemical known to the State of California to cause cancer, birth defects or other reproductive harm.

US - California Hazardous Substances (Director's): Listed substance

Hexanes+ (CAS 110-54-3)	Listed.
n-Butane (CAS 106-97-8)	Listed.
n-Pentane (CAS 109-66-0)	Listed.

US - Massachusetts RTK - Substance: Listed substance

Hexanes+ (CAS 110-54-3)	Listed.
Isobutane (CAS 75-28-5)	Listed.
Methane (CAS 74-82-8)	Listed.
n-Pentane (CAS 109-66-0)	Listed.
Propane (CAS 74-98-6)	Listed.

US - New Jersey Community RTK (EHS Survey): Reportable threshold

Hexanes+ (CAS 110-54-3)	500 LBS
Isobutane (CAS 75-28-5)	500 LBS
Methane (CAS 74-82-8)	500 LBS
n-Butane (CAS 106-97-8)	500 LBS
n-Pentane (CAS 109-66-0)	500 LBS
Propane (CAS 74-98-6)	500 LBS

US - New Jersey RTK - Substances: Listed substance

Isobutane (CAS 75-28-5)	Listed.
Methane (CAS 74-82-8)	Listed.
Propane (CAS 74-98-6)	Listed.

US - Pennsylvania RTK - Hazardous Substances: Listed substance

Hexanes+ (CAS 110-54-3)	Listed.
Isobutane (CAS 75-28-5)	Listed.
Methane (CAS 74-82-8)	Listed.
n-Pentane (CAS 109-66-0)	Listed.
Propane (CAS 74-98-6)	Listed.

16. Other Information

Further information

HMIS® is a registered trade and service mark of the NPCA.

HMIS® ratings

Health: 1*
Flammability: 4
Physical hazard: 0

NFPA ratings

Health: 1
Flammability: 4
Instability: 0

Disclaimer

This information is provided without warranty. The information is believed to be correct. This information should be used to make an independent determination of the methods to safeguard workers and the environment.

Issue date

06-02-2010

Liquefied Natural Gas
Material Safety Data Sheet

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name	Liquefied Natural Gas
UN-Number	UN1972
Recommended Use	Industrial use.
Synonyms	LNG
Supplier Address*	Linde Gas North America LLC - Linde Merchant Production Inc. - Linde LLC 575 Mountain Ave. Murray Hill, NJ 07974 Phone: 908-464-8100 www.lindeus.com Linde Gas Puerto Rico, Inc. Las Palmas Village Road No. 869, Street No. 7 Catano, Puerto Rico 00962 Phone: 787-641-7445 www.pr.lindegas.com Linde Canada Limited 5860 Chedworth Way Mississauga, Ontario L5R 0A2 Phone: 905-501-1700 www.lindecanada.com * May include subsidiaries or affiliate companies/divisions. For additional product information contact your local customer service.
Chemical Emergency Phone Number	Chemtrec: 1-800-424-9300 for US/ 703-527-3887 outside US

2. HAZARDS IDENTIFICATION

DANGER!

Emergency Overview

Extremely flammable
Extremely cold liquid and gas under pressure.
May cause skin, eye, and respiratory tract irritation
Asphyxiant at high concentrations
May cause central nervous system depression
Contents under pressure
Keep at temperatures below 52°C / 125°F

Appearance Colorless. Physical State Cryogenic Liquid. Odor Petroleum like

OSHA Regulatory Status	This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Potential Health Effects

Principle Routes of Exposure	Inhalation.
Acute Toxicity	
Inhalation	May cause central nervous system depression with nausea, headache, dizziness, vomiting, and incoordination. Simple asphyxiant. May cause suffocation by displacing the oxygen in the air. Exposure to oxygen-deficient atmosphere (<19.5%) may cause dizziness, drowsiness, nausea, vomiting, excess salivation, diminished mental alertness, loss of consciousness and death. Exposure to atmospheres containing 8-10% or less oxygen will bring about unconsciousness without warning and so quickly that the individuals cannot help or protect themselves. Lack of sufficient oxygen may cause serious injury or death.
Eyes	Contact with product may cause frostbite.
Skin	May cause frostbite.
Skin Absorption Hazard	No known hazard in contact with skin.
Ingestion	Not an expected route of exposure.
Chronic Effects	None known.
Aggravated Medical Conditions	Respiratory disorders.
Environmental Hazard	See Section 12 for additional Ecological Information.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name	CAS-No	Volume %	Chemical Formula
Methane	74-82-8	62-93	CH_4
Nitrogen	7727-37-9	1-9	N_2
Propane	74-98-6	1-7	C_3H_8
Ethane	74-84-0	3-11	C_2H_6
N-Butane	106-97-8	1-3	C_4H_{10}
Isobutane	75-28-5	1-3	C_4H_{10}
Helium	7440-59-7	<2	He
Isopentane	78-78-4	<1	C_5H_{12}
Pentane	109-66-0	<1	C_5H_{12}
Carbon dioxide	124-38-9	<1	CO_2

4. FIRST AID MEASURES

Eye Contact	In the case of contact with eyes, rinse immediately with plenty of water and seek medical advice. If frostbite is suspected, flush eyes with cool water for 15 minutes and obtain immediate medical attention.
Skin Contact	Wash off immediately with plenty of water. If skin irritation persists, call a physician. For dermal contact or suspected frostbite, remove contaminated clothing and flush affected areas with lukewarm water. DO NOT USE HOT WATER. A physican should see the patient promptly if contact with the product has resulted in blistering of the dermal surface or in deep tissue freezing.

Inhalation	PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF INHALATION OVEREXPOSURE. RESCUE PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS. Conscious inhalation victims should be assisted to an uncontaminated area and inhale fresh air. If breathing is difficult, administer oxygen. Unconscious persons should be moved to an uncontaminated area and, as necessary, given artificial resuscitation and supplemental oxygen. Treatment should be symptomatic and supportive.
Ingestion	None under normal use. Get medical attention if symptoms occur.
Notes to Physician	Treat symptomatically.

5. FIRE-FIGHTING MEASURES

Flammable Properties	Extremely flammable.
Suitable Extinguishing Media	Dry chemical or CO_2. Water spray or fog. DO NOT EXTINGUISH A LEAKING GAS FIRE UNLESS LEAK CAN BE STOPPED.
Hazardous Combustion Products	Carbon monoxide. Carbon dioxide (CO_2).
Explosion Data	
Sensitivity to Mechanical Impact	None
Sensitivity to Static Discharge	Yes.
Specific Hazards Arising from the Chemical	May form explosive mixtures with air. Continue to cool fire exposed cylinders until flames are extinguished. Cylinders may rupture under extreme heat. Damaged cylinders should be handled only by specialists. Vapors from liquefied gas are initially heavier than air and spread along ground. Vapors may travel to source of ignition and flash back.
Protective Equipment and Precautions for Firefighters	If possible, stop the flow of gas. Do not extinguish the fire until supply is shut off as otherwise an explosive-ignition may occur. If the fire is extinguished and the flow of gas continues, use increased ventilation to prevent build-up of explosive atmosphere. Ventilation fans must be explosion proof. Use non-sparking tools to close container valves. Use water spray to cool surrounding containers. Be cautious of a Boiling Liquid Evaporating Vapor Explosion, BLEVE, if flame is impinging on surrounding containers. As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions	ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). All equipment used when handling the product must be grounded. Do not touch or walk through spilled material. Stop leak if you can do it without risk. Wear self-contained breathing apparatus when entering area unless atmosphere is proved to be safe. Monitor oxygen level.
Environmental Precautions	Use water spray to reduce vapors or divert vapor cloud drift. Avoid allowing water runoff to contact spilled material. Prevent spreading of vapors through sewers, ventilation systems and confined areas.
Methods for Containment	Stop the flow of gas or remove cylinder to outdoor location if this can be done without risk. If leak is in container or container valve, contact the appropriate emergency telephone number in Section 1 or call your closest Linde location.
Methods for Cleaning Up	Return cylinder to Linde or an authorized distributor.

7. HANDLING AND STORAGE

Handling

Ground and bond all lines and equipment associated with product system. All equipment should be non-sparking and explosion proof. Remove all sources of ignition. Use only in ventilated areas. "NO SMOKING" signs should be posted in storage and use areas.

Never attempt to lift a cylinder by its valve protection cap. Protect cylinders from physical damage; do not drag, roll, slide or drop. When moving cylinders, even for short distance, use a cart designed to transport cylinders. Use equipment rated for cylinder pressure. Use backflow preventive device in piping.

Use an adjustable strap wrench to remove over-tight or rusted caps. Never insert an object (e.g. wrench, screwdriver, pry bar,etc.) into valve cap openings. Doing so may damage valve, causing leak to occur. If user experiences any difficulty operating cylinder valve discontinue use and contact supplier.

Never put cylinders into trunks of cars or unventilated areas of passenger vehicles. Never attempt to refill a compressed gas cylinder without the owner's written consent. Never strike an arc on a compressed gas cylinder or make a cylinder a part of an electrical circuit.

For additional recommendations, consult Compressed Gas Association Pamphlets P-1, P-14, and Safety Bulletin SB-2.

Storage

Outside or detached storage is preferred. Protect from physical damage. Cylinders should be stored upright with valve protection cap in place and firmly secured to prevent falling. Store in cool, dry, well-ventilated area of non-combustible construction away from heavily trafficked areas and emergency exits. Keep at temperatures below 52°C / 125°F. Full and empty cylinders should be segregrated. Use a "first in-first out" inventory system to prevent full cylinders from being stored for excessive periods of time. Always store and handle compressed gas cylinders in accordance with Compressed Gas Association, pamphlet CGA-P1, Safe Handling of Compressed Gases in Containers.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure Guidelines

Chemical Name	ACGIH TLV	OSHA PEL	NIOSH IDLH
Isopentane 78-78-4	TWA: 600 ppm		
Carbon dioxide 124-38-9	STEL = 30000 ppm TWA: 5000 ppm	TWA: 5000 ppm TWA: 9000 mg/m³ (vacated) TWA: 10000 ppm (vacated) TWA: 18000 mg/m³ (vacated) STEL: 30000 ppm (vacated) STEL: 54000 mg/m³	IDLH: 40000 ppm TWA: 5000 ppm TWA: 9000 mg/m³ STEL: 30000 ppm STEL: 54000 mg/m³
N-Butane 106-97-8	TWA: 1000 ppm	(vacated) TWA: 800 ppm (vacated) TWA: 1900 mg/m³	TWA: 800 ppm TWA: 1900 mg/m³
Pentane 109-66-0	TWA: 600 ppm	TWA: 1000 ppm TWA: 2950 mg/m³ (vacated) TWA: 600 ppm (vacated) TWA: 1800 mg/m³ (vacated) STEL: 750 ppm (vacated) STEL: 2250 mg/m³	IDLH: 1500 ppm Ceiling: 610 ppm 15 min Ceiling: 1800 mg/m³ 15 min TWA: 120 ppm TWA: 350 mg/m³
Methane 74-82-8	TWA: 1000 ppm		
Ethane 74-84-0	TWA: 1000 ppm		
Propane 74-98-6	TWA: 1000 ppm	TWA: 1000 ppm TWA: 1800 mg/m³	IDLH: 2100 ppm TWA: 1000 ppm TWA: 1800 mg/m³
Isobutane 75-28-5	TWA: 1000 ppm	N/A	N/A

Immediately Dangerous to Life or Health.

Other Exposure Guidelines — Vacated limits revoked by the Court of Appeals decision in AFL-CIO v. OSHA, 965 F.2d 962 (11th Cir., 1992).

Engineering Measures — Showers. Eyewash stations. Explosion proof ventilation systems.

Ventilation — Use ventilation adequate to keep exposures below recommended exposure limits.

Personal Protective Equipment

Eye/Face Protection — Wear protective eyewear (safety glasses).

Skin and Body Protection — Work gloves and safety shoes are recommended when handling cylinders. Wear cold insulating gloves when handling liquid. Cotton or Nomex® clothing is recommended to prevent static build-up.

Respiratory Protection

General Use — If exposure limits are exceeded or irritation is experienced, NIOSH/MSHA approved respiratory protection should be worn. Positive-pressure supplied air respirators may be required for high airborne contaminant concentrations. Respiratory protection must be provided in accordance with current local regulations.

Emergency Use — Use positive pressure airline respirator with escape cylinder or self contained breathing apparatus for oxygen-deficient atmospheres (<19.5%).

Hygiene Measures — Wear suitable gloves and eye/face protection.

9. PHYSICAL AND CHEMICAL PROPERTIES

Product Information

Appearance	Colorless.	Odor	Petroleum like.
Odor Threshold	No information available	Physical State	Cryogenic Liquid
Flash Point	-306°F / -188°C	Flashpoint Method	Closed cup
Autoignition Temperature	580°C / 1076°F	Flammability Limits in Air	
		Upper	15%
		Lower	5%

The following information is for the NON-INERT components of this mixture:

Chemical Name	Boiling Point	Melting Point	Molecular Weight	Evaporation Rate	Water Solubility	Vapor Pressure	Vapor Density (Air=1)	Gas Density Kg/m³@20°C
Isopentane	28 °C	-160 °C	72.14	-	No information available		2.5	3.212 @15°
Carbon dioxide	56 °C	-56 °C	44.00	-	0.145 g/ml @ 25°C	838 psig (5778 kPa) @ 21.1°C	1.522	1.839
Pentane	36°C	<-50 °C	72.14		No information available	1100 hPa @ 38 °C	2.5	3.228 @15°
N-Butane	-0.5 °C	-138.3 °C	58.12	-	No information available	2200 hPa @ 20 °C	2.11	2.52 @15°
Methane	-162 °C	-182.5 °C	16.04	-	No information available	46700 hPa @ -82.5 °C	0.56	0.668 @15°
Ethane	-88.7°C	-183 - -20 °C	30.06	-	No information available	600 - 39000 hPa @ 20 °C	1.05	1.282 @15°
Propane	-42.1°C	-183 - -20 °C	44.09	-	No information available	600 - 39000 hPa @ 20 °C	1.55	1.99 @15°
Isobutane	-11.7 °C	-255 °C	58.12	-	No information available	2100 hPa @ 20 °C	2.06	2.51 @15°

The following information is for the INERT components that may be part of this mixture:

Chemical Name	Boiling Point	Melting Point	Molecular Weight	Evaporation Rate	Water Solubility	Vapor Pressure	Vapor Density (Air=1)	Gas Density Kg/m³@20°C
Helium	-268.94 °C	-272.0 °C	4.00	-	0.0089 (vol/vol @ 20°C and 1 atm)	Above critical temperature	0.138	0.166
Nitrogen	-196 °C	-210 °C	28.01	-	0.023 (vol/vol @ 20°C and 1 atm)	Above critical temperature	0.97	1.165

10. STABILITY AND REACTIVITY

Stability	Stable.
Incompatible Products	Oxidizing agents.
Conditions to Avoid	Heat, flames and sparks.
Hazardous Decomposition Products	Carbon monoxide (CO). Carbon dioxide (CO_2).
Hazardous Polymerization	Hazardous polymerization does not occur.

11. TOXICOLOGICAL INFORMATION

Acute Toxicity

Product Information

LD50 Oral: No information available.

LD50 Dermal: No information available.

LC50 Inhalation: No information available.

Repeated Dose Toxicity No information available.

Component Information No information available.

Chemical Name	LD50 Oral	LD50 Dermal	LC50 Inhalation
Propane		-	= 658 mg/L (Rat) 4 h
Ethane			= 658 mg/L (Rat) 4 h
N-Butane			658 mg/L (Rat) 4 h
Isobutane			= 658 mg/L (Rat) 4 h
Isopentane			= 280000 mg/m³ (Rat) 4 h
Pentane	> 2000 mg/kg (Rat)	= 3000 mg/kg (Rabbit)	= 364 g/m³ (Rat) 4 h
Carbon dioxide			470000 ppm (Rat)

Chronic Toxicity

Chronic Toxicity None known.

Carcinogenicity Contains no ingredient listed as a carcinogen.

Irritation No information available.

Sensitization No information available.

Reproductive Toxicity No information available.

Developmental Toxicity Oxygen deficiency during pregnancy has produced developmental abnormalities in humans and experimental animals.

Synergistic Materials None known.

Target Organ Effects None known.

12. ECOLOGICAL INFORMATION

Ecotoxicity

Will not bioconcentrate.

Ozone depletion potential; ODP; (R-11 = 1): Does not contain ozone depleting chemical (40 CFR Part 82).

Chemical Name	Toxicity to Algae	Toxicity to Fish	Toxicity to Microorganisms	Daphnia Magna (Water Flea)
Isopentane				EC50 48 h: = 2.3 mg/L (Daphnia magna)

Chemical Name	Toxicity to Algae	Toxicity to Fish	Toxicity to Microorganisms	Daphnia Magna (Water Flea)
Pentane		LC50 96 h: = 11.59 mg/L (Pimephales promelas) LC50 96 h: = 9.87 mg/L (Oncorhynchus mykiss) LC50 96 h: = 9.99 mg/L (Lepomis macrochirus)		EC50 48 h: = 9.74 mg/L (Daphnia magna)

Chemical Name	Log Pow
Isopentane	3.3
N-Butane	2.89
Pentane	3.39
Ethane	2.8
Propane	2.3
Isobutane	2.88

13. DISPOSAL CONSIDERATIONS

Waste Disposal Methods

Do not attempt to dispose of residual waste or unused quantities. Return in the shipping container PROPERLY LABELED WITH ANY VALVE OUTLET PLUGS OR CAPS SECURED AND VALVE PROTECTION CAP IN PLACE to Linde for proper disposal. This material, as supplied, is a hazardous waste according to federal regulations (40 CFR 261).

14. TRANSPORT INFORMATION

DOT

Proper shipping name	Methane, refrigerated liquid
Hazard Class	2.1
Subsidiary Class	None
UN-Number	UN1972
Description	UN1972,Methane, refrigerated liquid,2.1
Emergency Response Guide Number	115

TDG

Proper Shipping Name	Methane, refrigerated liquid
Hazard Class	2.1
UN-Number	UN1972
Description	UN1972,METHANE, REFRIGERATED LIQUID,2.1

MEX

Proper Shipping Name	Methane, refrigerated liquid
Hazard Class	2.1
UN-Number	UN1972
Description	UN1972 Methane, refrigerated liquid,2.1

IATA

UN-Number	UN1972
Proper Shipping Name	Natural gas, refrigerated liquid
Hazard Class	2.1
ERG Code	10L

Description	UN1972,Natural gas, refrigerated liquid,2.1
Maximum Quantity for Passenger	Forbidden
Maximum Quantity for Cargo Only	Forbidden
Limited Quantity	Forbidden

IMDG/IMO

Proper Shipping Name	Methane, refrigerated liquid
Hazard Class	2.1
UN-Number	UN1972
EmS No.	F-D, S-U
Description	UN1972, Methane, refrigerated liquid,2.1, FP -188C

ADR

Proper Shipping Name	Methane, refrigerated liquid
Hazard Class	2.1
UN-Number	UN1972
Classification Code	3F
Description	UN1972 Methane, refrigerated liquid,2.1,

15. REGULATORY INFORMATION

International Inventories

TSCA	Complies
DSL	Complies
EINECS/ELINCS	Complies

Legend

TSCA - United States Toxic Substances Control Act Section 8(b) Inventory
DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List
EINECS/ELINCS - European Inventory of Existing Commercial Chemical Substances/EU List of Notified Chemical Substances

U.S. Federal Regulations

SARA 313
Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372.

SARA 311/312 Hazard Categories

Acute Health Hazard	Yes
Chronic Health Hazard	No
Fire Hazard	Yes
Sudden Release of Pressure Hazard	Yes
Reactive Hazard	No

Clean Water Act
This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42).

Risk and Process Safety Management Programs
This material, as supplied, contains one or more regulated substances with specified thresholds under 40 CFR Part 68 or regulated as a highly hazardous chemical pursuant to the 29 CFR Part 1910.110 with specified thresholds:

Chemical Name	U.S. - CAA (Clean Air Act) - Accidental Release Prevention - Toxic Substances	U.S. - CAA (Clean Air Act) - Accidental Release Prevention - Flammable Substances	U.S. - OSHA - Process Safety Management - Highly Hazardous Chemicals
Isopentane		10000 lbs	
N-Butane		10000 lbs	
Pentane		10000 lbs	
Methane		10000 lbs	
Ethane		10000 lbs	
Propane		10000 lbs	
Isobutane		10000 lbs	

Clean Air Act, Section 112 Hazardous Air Pollutants (HAPs) (see 40 CFR 61)
This product does not contain any substances regulated as hazardous air pollutants (HAPS) under Section 112 of the Clean Air Act Amendments of 1990.

CERCLA/SARA
This material, as supplied, does not contain any substances regulated as hazardous substances under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302) or the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 355). There may be specific reporting requirements at the local, regional, or state level pertaining to releases of this material.

U.S. State Regulations

California Proposition 65
This product does not contain any Proposition 65 chemicals.

U.S. State Right-to-Know Regulations

Chemical Name	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Helium	X	X	X	-	X
Isopentane	X	X	X		
Carbon dioxide	X	X	X	-	X
N-Butane	X	X	X		X
Pentane	X	X	X		X
Methane	X	X	X		X
Ethane	X	X	X		X
Propane	X	X	X		X
Isobutane	X	X	X		
Nitrogen	X	X	X	-	X

International Regulations

Chemical Name	Carcinogen Status	Exposure Limits
Carbon dioxide	-	Mexico: TWA= 5000 ppm Mexico: TWA= 9000 mg/m³ Mexico: STEL= 15000 ppm Mexico: STEL= 27000 mg/m³
N-Butane		Mexico: TWA 800 ppm Mexico: TWA 1900 mg/m³
Pentane		Mexico: TWA 600 ppm Mexico: TWA 1800 mg/m³ Mexico: STEL 760 ppm Mexico: STEL 2250 mg/m³

Canada

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

WHMIS Hazard Class
A Compressed gases
B1 Flammable gas

16. OTHER INFORMATION

Prepared By	Product Stewardship 23 British American Blvd. Latham, NY 12110 1-800-572-6501
Issuing Date	22-Sep-2011
Revision Date	
Revision Number	0
Revision Note	Initial Release.

NFPA	Health Hazard 3	Flammability 4	Stability 0	Physical and Chemical Hazards -
HMIS	Health Hazard 3	Flammability 4	Physical Hazard 2	Personal Protection -

Note: Ratings were assigned in accordance with Compressed Gas Association (CGA) guidelines as published in CGA Pamphlet P-19-2009, CGA Recommended Hazard Ratings for Compressed Gases, 3rd Edition.

End of Safety Data Sheet

Cleveland East Ohio Gas explosion

From Wikipedia, the free encyclopedia
(Redirected from Cleveland East Ohio Gas Explosion)
Jump to: navigation, search

The **Cleveland East Ohio Gas Explosion** occurred on the afternoon of Friday, October 20, 1944. The resulting gas leak, explosion and fires killed 130 people and destroyed a one square mile area on Cleveland, Ohio's east side.

The disaster[edit source | edit]

At 2:30 p.m. on the afternoon on Friday, October 20, 1944, above ground storage tank number 4, holding liquefied natural gas in the East Ohio Gas Company's tank farm, began to emit a vapor that poured from a seam on the side of the tank. The tank was located near Lake Erie on East 61st Street, and winds from the lake pushed the vapor into a mixed use section of Cleveland, where it dropped into the sewer lines via the catch basins located in the street gutters.

As the gas mixture flowed and mixed with air and sewer gas, the mixture ignited. In the ensuing explosion, manhole covers launched skyward as jets of fire erupted from depths of the sewer lines. One manhole cover was found several miles east in the Cleveland neighborhood of Glenville.

At first it was thought that the disaster was contained, and spectators returned home thinking that the matter was being taken care of by the fire department. At 3:00 p.m., a second above-ground tank exploded, leveling the tank farm.

However, the explosions and fires continued to occur, trapping many who had returned to what they thought was the safety of their own homes. Housewives who were at home suddenly found their homes engulfed in flame as the explosion traveled through the sewers and up through drains. The following day, Associated Press wire stories contained quotes from survivors, many of whom were at home cleaning in preparation for the coming Sabbath. Survivors said that within a split second after the explosion, their homes and clothes were on fire.

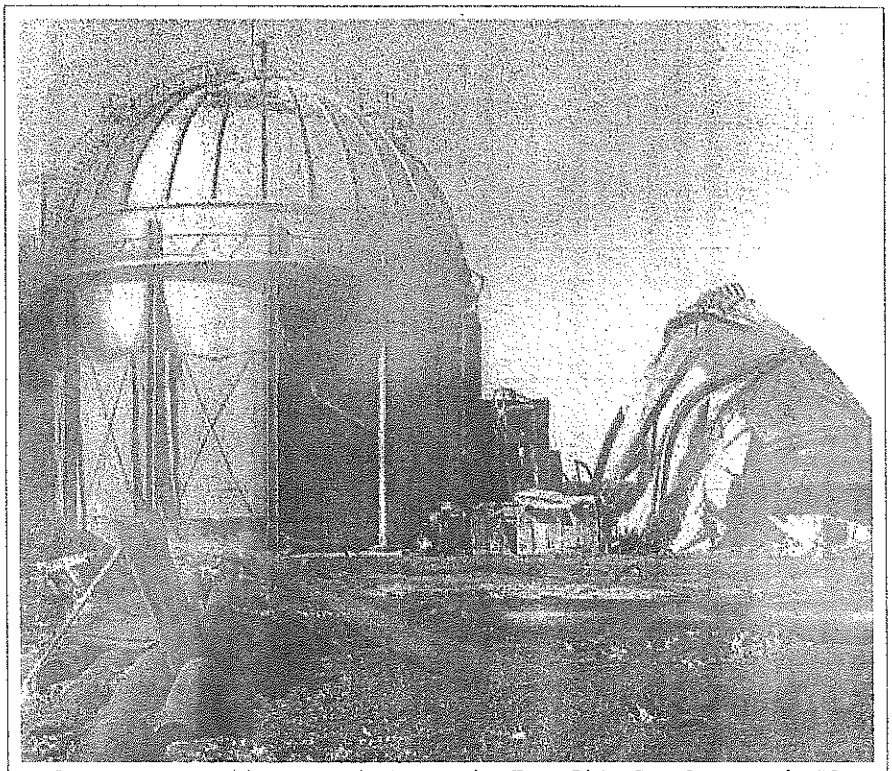
Cuyahoga County Coroner Dr. Samuel Gerber estimated that the initial death toll stood at 200; however, Gerber was quoted in newspaper wire stories stating the magnitude of the fire and the intense temperatures had the power to vaporize human flesh and bone, making an exact count impossible until weeks after the disaster. The final death toll was lower than the coroner's initial estimates.

The toll could have been significantly higher had the event occurred after local schools had let out and working parents returned to their homes for the evening. In all over 600 people were left homeless, and seventy homes, two factories, numerous cars and miles of underground infrastructure destroyed.

Following the explosions and fires, East Ohio Gas worked to assure the public that the destroyed plant held only 24 hours worth of gas for the city. Many families living in the area not only lost their homes, but stocks, bonds and cash, which many kept at home. Estimates for destroyed personal and industrial property ranged between $7,000,000 and $15,000,000.

The explosion also had a long range impact on the natural gas industry. Until the disaster, above ground storage of natural gas, used as fuel for homes, office buildings and factories, was a common sight in cities across America. Following the disaster, utility companies and communities began to rethink their natural gas storage systems, and below ground storage of natural gas grew in popularity.

East Ohio Gas Company Explosion



Damage caused by an explosion at the East Ohio Gas Company's #2 Works, Liquefaction Storage Facility in Cleveland, Ohio on October 20, 1944. The explosion, caused by a gas leak, sparked fires that burned 160 acres of businesses and neighborhoods in Cleveland. Over 100 people were killed.

On October 20, 1944, a natural gas storage tank at the East Ohio Gas Co. plant in Cleveland, Ohio, exploded. The plant was located north of St. Clair Avenue near East 61st and East 62nd Streets. Although investigators never discovered a cause for the explosion, witnesses stated that a leak in one of the tanks occurred. Some spark must have then ignited the gas, although, with World War II currently raging, some residents initially suspected a German saboteur. This was one of the worst disasters in Cleveland's history, with 131 people killed. Twenty-one of the victims were never identified.

The explosion occurred at 2:40 PM on a Friday afternoon. The death toll may have been even higher if schools were not still in session, keeping many children away from the heart of the explosion. Numerous homes and businesses were entirely destroyed over several city blocks. To store more natural gas in the tanks, the East Ohio Gas Co. had liquefied the gas. The liquid gas seeped into the city's sewer system, causing manhole covers to explode into the air and creating a fireball underground that ignited numerous homes and businesses. The fireball supposedly was more than three thousand degrees Fahrenheit in temperature. Soon other storage tanks at the East Ohio Gas Co. exploded. Cleveland residents could see the resulting fireballs from at least seven miles away and the smoke from an even greater distance. As the tanks ignited, windows broke more than one mile away, and the bells of St. Vitus Church began to ring.

Almost one-half of the victims, including the unidentified ones, were buried in Highland Park Cemetery in Cleveland. For the people who survived, most lost everything. The flames destroyed several blocks of homes. Many of these people also had withdrawn their savings from banks during the Great Depression, as numerous banks had failed. The flames destroyed these people's life savings. As a result of the explosions, the East Ohio Gas Co. began to store its natural gas underground. The company also helped rebuild the community by paying more than three million dollars to neighborhood residents and an additional one-half million dollars to the families of the fifty-five company workers who lost their lives.

The East Ohio Gas Co. continues to operate in the neighborhood, but it is now known as Dominion East Ohio. It operates the largest underground storage facility for natural gas in North America, with much of the gas stored near Canton, Ohio.

Report sheds new light on LNG blast in Algeria

Apr 14, 2004 02:00 AM

A newly released document provides important insights into the chain of events that led to the January explosion of a LNG facility in the African nation of Algeria. Several scientists who specialize in LNG research said the document indicates that a similar accident could occur at LNG plants like those proposed for Mobile Bay and elsewhere in the United States.
Initial reports blamed a faulty steam boiler for the massive explosion and fire at the government-owned Skikda, Algeria, plant. Those reports were incorrect, according to the new document presented by Sonatrach, owner of the destroyed LNG plant. A display titled "The Incident at the Skikda Plant: Description and Preliminary Conclusions" indicates, instead, that a large amount of liquid gas escaped from a pipe and formed a cloud of highly flammable and explosive vapour that hovered over the facility. The cloud exploded after coming into contact with a flame source.

The exact nature of the cloud is likely to be sharply debated as industry advocates and even a number of independent scientists have argued that an LNG vapour cloud, if it were to form, would be relatively small and would not explode. Most of the 27 people who died were killed by the force of the blast, according to the report. The report lists a "few casualties by fire," though the fire burned for eight hours.
The Sonatrach report was presented at an international LNG conference held in the Middle Eastern nation of Qatar in late March. Officials with the US Department of Energy (DOE), the Federal Energy Regulatory Commission (FERC) and ExxonMobil declined to discuss the document with the Mobile Register.

In the days after the accident, officials with the DOE, FERC and ExxonMobil, as well as Alabama Port Authority director Jimmy Lyons, stressed that the explosion seemed to be entirely related to a malfunctioning boiler. LNG plants in the United States, they argued, would not have boilers like the ones used at the plant in Algeria, so a similar accident could not occur at an LNG facility in America. But several scientists who examined the new report told the Mobile Register that the type of accident described in it could occur at an LNG facility in this country, regardless of the type or number of boilers present. Almost any source of ignition, from a cigarette lighter to a pilot light, could have ignited a vapour cloud.

ExxonMobil and Cheniere Energy have both proposed building LNG facilities on the shores of Mobile Bay, close to residential neighbourhoods. Both companies said their facilities would not impact nearby residents, even in the event of a catastrophic accident. ExxonMobil would place its plant on land owned by the Port Authority at the former Navy home port; Cheniere would build on Pinto Island.
"I think this tells us that dealing with LNG is a tricky and dangerous business," said James Fay, professor emeritus at the Massachusetts Institute of Technology and one of the nation's leading LNG scientists. "It was apparently a very large gas leak that went on for a while before the explosion. That certainly doesn't give you a lot of faith in their gas detection equipment, with all this gas leaking out. I guess this means sometimes that equipment doesn't work."

Fay said the failure may have important implications for the siting criteria used by FERC when granting permits for new onshore LNG facilities. In particular, Fay said, FERC requires only that companies prove they can contain a vapour cloud and fire resulting from a 10-minute leak of LNG at the plant.
"The fire burned for eight hours, and that fact does seem unusual. I would have thought it would

have burned up more quickly," Fay said. "Maybe there wasn't anyone to shut the equipment down. Maybe all of the workers perished in the blast, and the equipment just kept running, spewing LNG out so it just kept burning and burning. ... FERC's rules just say a company would have a 10-minute leak. That's it. But clearly this one kept leaking for a much longer time period."

Fay and others said the report is missing a critical piece of information: Whether the fuel that leaked from the pipe at the plant was LNG or a LPG, such as propane, or some combination of both. LNG and LPG were present in some quantities at the Skikda plant, the report said, though the damage to the facility was so extensive, it may be impossible to know exactly what kind of gas formed the vapour cloud.
Few would be surprised if LPG proved to be the culprit -- the vapours are known to be highly volatile, and prone to explode when exposed to flame. Pure LNG -- which is almost 100 % methane -- usually is thought to explode only in confined spaces, such as a building or the hull of a ship, according to scientists.

In presentations made in Mobile by the DOE, FERC and ExxonMobil, officials stressed that "LNG does not explode." They also said that if an LNG vapour cloud formed and was somehow ignited, the flame would move through the cloud so slowly that a person simply could walk ahead of it and stay out of danger.
While some scientists agree that may be true of "pure" LNG, which would be entirely methane, the scientific literature suggests that much of the LNG shipped to facilities around the country typically is contaminated with some quantity of more explosive "LPG" gases, such as propane.

A 1980 Coast Guard study titled "LNG Research at China Lake," states that LNG imported into this country is often far from pure, and it reveals that vapour clouds made from "impure" LNG actually explode as readily as the highly volatile LPG. When natural gas is super-cooled and turned into a liquid, as much as 14 % of the total cargo shipped as LNG may actually be LPG or other hydrocarbon fuels, according to the Coast Guard report. Natural gas contains these other fuels when it is pumped from the ground.
LNG containing these so-called "higher hydrocarbons" is known as "hot gas" and has a higher energy content than pure methane. The Coast Guard report reveals that vapour clouds of LNG containing at least 13.6 % of these other fuelscan detonate just like pure propane gas. The agency concluded in its report that this deserves "special consideration, as the commercial LNG being imported into the US East Coast has about 14 % higher hydrocarbons."

Several scientists said they were unaware of the Coast Guard's report. They also were unaware that LNG arriving in the United States sometimes contained significant quantities of other gases, such as propane, butane and ethane. They agreed that in light of the Skikda incident, statements made by the LNG industry and federal officials regarding the explosive potential of LNG vapour clouds may need to be re-examined.
"It's pretty clear that this was not sabotage," Fay said, discounting rumours that terrorists may have tried to damage the facility. "I think there is a strong suspicion that the explosion which occurred could have been an LPG explosion or an LNG explosion. If it were LNG, this would be the first major LNG explosion that occurred anywhere." It is also one of the largest vapour cloud explosions on record, according to scientists.

"The fact that there was a vapour cloud is huge," said Bill Powers, an engineer based in California who has studied LNG terminals, siting issues for both onshore and offshore proposals. "We don't know if it was an LNG vapour cloud or an LPG cloud or a mix of both, but, either way, it means it is the kind of accident that could happen here."
Powers pointed out that several terminals proposed for the United States would deal with both LPG and LNG. At the terminal proposed for Long Beach, California, for instance, Powers said the LPG tanks would be right next to the LNG facility. Powers also felt it was noteworthy that Halliburton had conducted a major renovation of the Skikda plant in 1999, updating all of the key safety equipment and computer systems.

A Halliburton website touts the revamped LNG terminal as a model of modern American workmanship.
"Halliburton is pleased to announce that its recently completed LNG Revamp Project at Skikda, Algeria, has passed all its performance tests," reads the company news release announcing the project's completion. "KBR's work included extensive revamp of the three LNG trains and associated utilities and auxiliaries and a complete revamp of the complex's electrical power and control systems. ... Over 9,000,000 construction man-hours were expended."
The three separate LNG regasification plants or "trains" that were revamped by Halliburton were destroyed in the explosion.

Powers said Halliburton's engineers had missed a weak link in their safety planning for the facility. "That highlights the importance of putting these facilities in places where, no matter what, people will not be at risk. If a company like Halliburton missed a scenario that could cause this, that tells us that we cannot account for all possible accident scenarios at LNG facilities," Powers said.
"Halliburton would have exhaustively checked out every possible accident chain of events and accounted for it, countered it," he said. "They would do that before they give it a clean bill of health. That's how they operate. They must have simply missed this accident possibility."

Source: Washington Times

LNG plant explosion claims 22 lives in Algeria

Jan 21, 2004 01:00 AM

Twenty-two people were killed and 74 were injured when a huge explosion destroyed a LNG plant in the eastern Algerian port of Skikda, in the country's worst industrial accident since independence in 1962, the state energy group Sonatrach said.
The minister for energy and mining, Chakib Khelil, told after visiting the site that it was not yet possible to say what caused the blast. He also said that it not yet known how many people were working in the area at the time of the explosion and rescue workers were still digging through the wreckage in case more bodies were buried there. Officials said President Abdelaziz Bouteflika had interrupted a visit to other parts of eastern Algeria to go to the disaster site.

Pictures screened on Algerian television showed scenes of devastation. Khelil said the explosion destroyed three liquefaction units at the plant, a huge complex lying 500 km (300 miles) east of the capital Algiers which produced 23 % of the country's LNG. Output would have to be stepped up at the Arzew complex, near Oran in western Algeria, which produces the other 77 %, he said.
Khelil said 26 people were still under observation in Skikda hospital but 43 others had been discharged after receiving treatment. Another five people were taken to hospital in Annaba, a port city about 100 km further east. The director of the plant said the blast occurred at 6:40 pm (1740 GMT), in an area where many people were working. Windows were blown out in nearby houses and the resulting fire raged for nearly eight hours. A local official, in charge of health in the Skikda region, told that the fire had been brought under control.

The Skikda complex included six plants for the processing of gas and oil products and employs 12,000 people. It exported 15 mm tons of LNG and oil products to Europe each year. Unlike most other major petroleum exporters, which sell mostly crude oil, Algeria relies to a great extent on exports of gas, a cleaner and lighter energy source, for its foreign currency earnings.
The hydrocarbons sector brought in $ 24 bn last year, or 96 % of the country's export revenues, and natural gas and LNG accounted for more than half of that. The production of LNG was estimated at 26.9 bn cm and its share of the export earnings of the gas sector at 45 %.

Source: The News International, Pakistan

Skikda LNG explosion

On January 19, 2004, an explosion occurred in a natural gas liquefaction plant in Skikda, 500km east of Algiers, Algeria. The plant is operated by Sonatrach, the State-owned oil and gas company. Three out of six gas liquefaction trains were destroyed and two, which were not operating at the time, were damaged ("train" is the term used to describe the liquification and purification facilities in a liquefied natural gas (LNG) plant). The administration building and the maintenance workshop, together with other buildings, were completely destroyed. The explosion also led to the shutdown of a nearby electricity generating plant and an oil refinery. At least twenty-seven people died and at least 74 were injured.

Skikda is a six train natural gas liquefaction plant, consisting of four older liquefaction trains – 10, 20, 30 and 40 – situated on one side of the LNG storage area and two newer ones – 5P and 6P – on the other side. Train 40, where the initial explosion occurred, differed from the two other adjacent trains, using boilers to make high-pressure steam to drive turbines which power plant's refrigerant compressors that are used to liquefy the natural gas. This technology is now considered outdated. Train 40 also lacked the mercury removal sections which are fitted to the other trains.

The sequence of events was as follows :

- At 6.39 p.m. on 19 January steam pressure was observed to rise in the steam boiler adjacent to the 0.85 mta capacity train, GL1-K unit 40. The operator took action to reduce fuel input to the lowest level
- A visible vapor cloud was seen at 6.40 p.m. on train 40
- The steam pressure in the boiler continued to rise, because unknown to the operator, flammable vapor from the external vapor cloud was being drawn into the air intake (aspirator fan), resulting in an explosive mixture in the boiler fire box
- Seconds later, at 6.40 p.m. there was a first explosion (the boiler) followed immediately by a massive explosion and fireball - a vapor cloud explosion
- A large fire covered trains 40, 30 and 20, owing to release of flammable gas and liquids caused by major blast damage. Emergency medical help was sought for injured persons. The site's fire-fighting team from the unaffected part of the plant, the fire services from the Skikda industrial area and the regional fire brigade took action to protect train 10, nearest to the fire, and the LNG storage tanks. Remaining LNG operations were shut down
- After 8 hours, the fire on trains 20, 30 and 40 was extinguished

Sources

- Federal Energy Regulatory Commission, *LNG - Safety Record*. Accessed 29 August 2008.
- Hydrocarbons-technology.com, *Sonatrach Skikda LNG Project, Algeria* Accessed 29 August 2008.
- Poten & Partners, *Explosion at Sonatrach s Skikda LNG Export Plant*, 1/22/04, Accessed 29 August 2008.
- Roe, David, *Report on LNG 14 in Qatar - part 1*, LNG Journal, March/April 2004, Accessed 29 August 2008.

The notes for Chapter 8 appear on page 355 of this pdf.

Chapter Eight

Liquified Natural Gas

Natural gas can be sent by pipeline over long distances. For a price, it can be piped from North Sea platforms to the British mainland, from Algeria to Italy, or from Siberia to Western Europe. But pipelines are not a feasible way to send gas across major oceans–for example, from the Mideast or Indonesia to the United States. A high-technology way to transport natural gas overseas has, however, been developed in the past few decades, using the techniques of cryogenics–the science of extremely low temperatures.

In this method, a sort of giant refrigerator, costing more than a billion dollars, chills a vast amount of gas until it condenses into a colorless, odorless liquid at a temperature of two hundred sixty degrees Fahrenheit below zero. This liquefied natural gas (LNG) has a volume six hundred twenty times smaller than the original gas. The intensely cold LNG is then transported at approximately atmospheric pressure in special, heavily insulated cryogenic tankers–the costliest non-military seagoing vessels in the world–to a marine terminal, where it is stored in insulated tanks. When needed, it can then be piped to an adjacent gasification plant–nearly as complex and costly as the liquefaction plant–where it is boiled back into gas and distributed to customers by pipeline just like wellhead gas.

Approximately sixty smaller plants in North America also liquefy and store domestic natural gas as a convenient way of increasing their storage capacity for winter peak demands which could otherwise exceed the capacity of trunk pipeline supplying the area. This type of local storage to augment peak supplies is called "peak-shaving." Such plants can be sited anywhere gas is available in bulk; they need have nothing to do with marine LNG tankers.

LNG is less than half as dense as water, so a cubic meter of LNG (the usual unit of measure) weighs just over half a ton.[1] LNG contains about thirty per-

cent less energy per cubic meter than oil, but is potentially far more hazardous.[2] Burning oil cannot spread very far on land or water, but a cubic meter of spilled LNG rapidly boils into about six hundred twenty cubic meters of pure natural gas, which in turn mixes with surrounding air. Mixtures of between about five and fourteen percent natural gas in air are flammable. Thus a single cubic meter of spilled LNG can make up to twelve thousand four hundred cubic meters of flammable gas-air mixture. A single modern LNG tanker typically holds one hundred twenty-five thousand cubic meters of LNG, equivalent to twenty-seven hundred million cubic feet of natural gas. That gas can form between about twenty and fifty billion cubic feet of flammable gas-air mixture–several hundred times the volume of the Great Pyramid of Cheops.

About nine percent of such a tankerload of LNG will probably, if spilled onto water, boil to gas in about five minutes.[3] (It does not matter how cold the water is; it will be at least two hundred twenty-eight Fahrenheit degrees hotter than the LNG, which it will therefore cause to boil violently.) The resulting gas, however, will be so cold that it will still be denser than air. It will therefore flow in a cloud or plume along the surface until it reaches an ignition source. Such a plume might extend at least three miles downwind from a large tanker spill within ten to twenty minutes.[4] It might ultimately reach much farther–perhaps six to twelve miles.[5] If not ignited, the gas is asphyxiating. If ignited, it will burn to completion with a turbulent diffusion flame reminiscent of the 1937 *Hindenberg* disaster but about a hundred times as big. Such a fireball would burn everything within it, and by its radiant heat would cause third-degree burns and start fires a mile or two away.[6] An LNG fireball can blow through a city, creating "a very large number of ignitions and explosions across a wide area. No present or foreseeable equipment can put out a very large [LNG]... fire."[7] The energy content of a single standard LNG tanker (one hundred twenty-five thousand cubic meters) is equivalent to seven-tenths of a megaton of TNT, or about fifty-five Hiroshima bombs.

A further hazard of LNG is that its extreme cold causes most metals to become brittle and contract violently. If LNG spills onto ordinary metals (that is, those not specially alloyed for such low temperatures), such as the deck plating of a ship, it often causes instant brittle fractures. Thus failure of the special cryogenic-alloy membranes which contain the LNG in tanks or tankers could bring it into contact with ordinary steel–the hull of a ship or the outer tank of a marine vessel–and cause it to unzip like a banana,[8] a risk most analyses ignore.[9] LNG can also seep into earth or into insulation–the cause of the Staten Island terminal fire that killed forty workers in 1973. Imperfectly insulated underground LNG tanks, like those at Canvey Island in the Thames Estuary below London, can even create an expanding zone of per-

mafrost, requiring the installation of heaters to maintain soil dimensions and loadbearing properties that are essential to the integrity of the tank.

The potential hazards of LNG are illustrated by the only major LNG spill so far experienced in the U.S.–in Cleveland in 1944.[10] A tank holding four thousand two hundred cubic meters of LNG, part of America's first peak-shaving LNG plant, collapsed. Not all the spillage was contained by dikes and drains. Escaping vapors quickly ignited, causing a second tank, half as large, to spill its contents. "The subsequent explosion shot flames more than half a mile into the air. The temperature in some areas reached three thousand degrees Fahrenheit." Secondary fires were started by a rain of LNG-soaked insulation and drops of burning LNG.[11] By the time the eight-alarm fire was extinguished (impeded by high-voltage lines blocking some streets), one hundred thirty people were dead, two hundred twenty-five injured, and over seven million dollars' worth of property destroyed (in 1944 dollars). An area about a half-mile on a side was directly affected, within which thirty acres were gutted, including seventy-nine houses, two factories, and two hundred seventeen cars. A further thirty-five houses and thirteen factories were partly destroyed.[12] The *National Fire Protection Association Newsletter* of November 1944 noted that had the wind been blowing towards the congested part of the area, "an even more devastating conflagration...could have destroyed a very large part of the East Side."

It is noteworthy that the plant's proprietors had taken precautions only against moderate rates of LNG spillage. They did not think a large, rapid spillage was possible. "The same assumption is made today in designing dikes" around LNG facilities.[13] The Cleveland plant, like many today, was sited in a built-up area for convenience; the proximity of other industrial plants, houses, storm sewers, and so forth was not considered. Less than six thousand three hundred cubic meters of LNG spilled, mostly on company property, whereas a modern LNG site may have several tanks, each holding up to ninety-five thousand cubic meters. And the cascading series of failures in two inner and two outer tanks was probably caused by a single minor initiating event.[14]

The future of LNG in the United States is highly uncertain, largely for economic reasons. LNG shipment requires highly capital-intensive facilities at both ends and in between. Their coordination is a logistical feat that exposes companies to major financial risks: "if any of [the system's components is not ready on time]...,the entire integrated system collapses."[15] Like the nuclear fuel cycle, LNG projects require exquisite timing but often do not exhibit it–as when Malaysia was "caught with finished [LNG] carriers before their fields and facilities were ready to begin production."[16] This uninsurable financial exposure by prospective LNG buyers provides a bargaining chip to sellers, who can simply raise the price and dare the buyers to write off their tankers,

terminals, and regasification plants.

This actually happened in 1980–81. Algeria—the major LNG exporter, and the sole source of LNG exports to the U.S. during 1979–80—abruptly demanded that its LNG be priced at the energy equivalent of OPEC oil, more than a trebling of earlier prices. The U.S. government, which had just negotiated a much lower gas price with Canada and Mexico, rejected the Algerian demand. On 1 April 1980, Algeria cut off LNG deliveries to the El Paso Natural Gas Company, idling its costly tankers and its terminals at Cove Point, Maryland and Elba Island, Georgia. A third of the Algerian shipments continued to arrive—via the older (1968–71) Distrigas operation in Everett, Massachusetts, which uses an oil-linked pricing structure and Algerian-owned ships. But by late 1981, the Cove Point and Elba Island facilities were still sitting as hostages to price agreement with Algeria. (So was a nearly completed terminal at Lake Charles, Louisiana.) Algeria has somewhat moderated its initial demands, but it and other LNG exporters still intend to move rapidly to oil parity. Partly for this reason, the proposed Point Conception (California) LNG terminal seems unlikely to be built. Argentina, which has never exported LNG, now proposes to build a liquefaction plant to ship over eight hundred million dollars' worth of LNG per year to the idle Cove Point and Elba Island plants, but market conditions seem most unfavorable for this project. Acknowledging the bleak economic outlook, El Paso in February 1981 "wrote off most of the equity ($365.4 million) in its six tankers which hauled Algerian LNG to the East Coast"[17]—a sizable loss even for such a large company. Of course the tankers might be revived under some new price agreement; but the investors would then have no guarantee that history would not simply repeat itself. Their massive investment would continue to hold them hostage to demands for higher prices.

The economic difficulties of LNG arise not only in the international marketplace but also in the domestic one. New, and probably existing, LNG imports cannot compete with domestic gas (let alone with efficiency improvements and some renewable options). Recent drilling has vastly expanded the reserves of relatively cheap domestic natural gas. Recent geological evidence suggests that enormous reserves can be tapped at prices well below that of imported LNG. LNG has so far been saleable only by "rolling in" its high price with very cheap (regulated) domestic gas, so that customers see only an average of the two. Gas deregulation will probably increase domestic supply and reduce domestic demand so much further as to squeeze LNG out of the market entirely.

Despite these uncertainties, some LNG is now being imported into the U.S., and facilities are available for more. Even though the present imports are only about a thousandth of all U.S. natural gas supplies, they represent a disturbing vulnerability: not so much in interrupted energy supply as in the dam-

age which the LNG facilities–tankers, terminals, storage tanks, and trucks–could do to their neighbors.

LNG tankers

Fourteen LNG terminals are operable worldwide. Some are sited in major urban areas, including Boston Harbor and Tokyo Harbor. (Another, built in Staten Island, New York, has remained mothballed since its fatal 1973 fire, though in February 1980 it was proposed that it be completed and used as a peak-shaving LNG storage facility.) In 1980 the world fleet contained about eighty specially insulated, double-hulled tankers of several designs.[18] Their average LNG capacity was somewhat over fifty thousand cubic meters; the largest held one hundred sixty-five thousand cubic meters–"enough to cover a football field to a depth of one hundred thirty feet."[19] A modern standard LNG tanker of about one hundred twenty-five thousand cubic meters is about a thousand feet long, one hundred fifty feet abeam, and cruises at twenty knots. It is fueled partly by the gas (normally between an eighth and a quarter of one percent per day) that constantly boils off as warmth seeps in through the thermal insulation. LNG tankers carry unique safety equipment and are subject to special rules, usually involving escorts and traffic restrictions, when moving in harbor.

Once moored, a tanker discharges its LNG cargo in ten to fifteen hours. The rate of LNG flow ranges up to one hundred ninety cubic meters per minute–equivalent to about seventy-five thousand megawatts, or the rate at which about seventy giant power stations send out energy. The pipes used in this operation are exposed on the jetty, and lead to at least two tankers' worth of storage tanks, contained (with limitations noted below) by dikes. A typical LNG storage tank, of which most terminals have several, is one hundred forty feet high by one hundred ninety feet in diameter. It holds ninety-five thousand cubic meters of LNG with a heat content equivalent to a quarter of an hour's total energy consumption for the entire United States, or to the energy released by more than forty Hiroshima bombs.

LNG tankers have a fairly good safety record, but projections that it will continue are unpersuasive.[20] Even the limited reports available show some spills.[21] One LNG carrier has gone aground, and three failed certification owing to cracked insulation[22]–a loss of three hundred million dollars for Lloyds of London. Double-hulled LNG tankers–unlike single-hulled, pressurized tankers used for liquefied petroleum gas–are relatively resistant to damage by collision or light attack. They could, however, be pierced by certain weapons available to international terrorists, including limpet mines. Onboard sabotage would be rel-

atively straightforward. Manipulation of onboard valves could in some circumstances rupture the LNG tanks from overpressure.[23] Alternatively, all LNG tanker designs allow internal access below the tanks, and if a tank were deliberately ruptured, ducts open at both ends and running the full length of the cargo area would help to distribute liquid.[24] Any such substantial spillage of LNG onto the steel hull would probably shatter it. The General Accounting Office warned that "Only an expert would recognize some types of explosive material as explosives. One LNG ship crew member, trained in the use of explosives, could cause simultaneous tank and hull damage...[which] might initiate an extremely hazardous series of events." (Ships carrying liquefied propane and butane, described below, are even more easily sabotaged.)[25]

LNG terminals and storage tanks

The enormous amounts of LNG and, if it leaks, of flammable vapors make LNG terminals and storage areas highly vulnerable. The world's largest LNG gasification plant, built at Arzew, Algeria at a cost of over four billion dollars, narrowly escaped destruction one night a few years ago when a gas cloud from a leaking tank drifted through it and dispersed without igniting. The Tokyo Harbor terminal has luckily escaped damage in several marine fires and explosions, including at least one major one from a liquid gas tanker. The Canvey Island LNG terminal downriver from central London recently had its third narrow escape from disaster when a two-hundred-thousand-ton oil tanker collided with a Shell oil jetty that protrudes into the river upstream of it at Coryton.[26] On that occasion, the gush of oil was stopped before it caused a major fire that could have spread downriver to the LNG plant. Years earlier, this very nearly happened when the Italian freighter *Monte Ulia* sheared off that same oil jetty, causing a melange of burning oil and trash barges to drift downriver. A change of wind, fortuitous currents, and desperate firefighters stopped the fire just short of the LNG terminal.[27] One known and one suspected incident of arson aboard a Texaco tanker have also recently endangered the Canvey Island LNG terminal.[28] At a similarly exposed position in Boston Harbor lies the Everett Distrigas LNG terminal. It is near Logan Airport, and its ship channel lies under the flight path for at least one runway. In 1973, a Delta DC-9 on an instrument landing crashed into the seawall short of that runway. Had a gas tanker been in the channel at the time, the errant plane could have missed it by as little as a few feet.[29]

LNG terminals are vulnerable to natural disasters or sabotage. So are the far more numerous peak-shaving LNG plants. (In 1978 the U.S. had forty-five such plants, each storing more than twenty-three thousand cubic meters–three

and a half times the total spill in the 1944 Cleveland disaster.) An audit of five LNG and LPG sites by the General Accounting Office, the independent watchdog agency of the U.S. government, found that at three of the sites, tanks had very small earthquake safety margins; "two of these three sites, including three large tanks, are located next to each other in Boston Harbor."[30]

In Japan, LNG tanks are normally built underground, where they are better protected from mishap and spills are more likely to be contained. In the United States, LNG tanks are normally built aboveground and surrounded by dikes. But General Accounting Office calculations and experiments suggest that most dikes meant to contain minor leaks will in fact fail to contain at least half of any sudden, major spill. Some thin dikes could fail altogether.[31] Abrupt, massive releases are indeed possible, as in Cleveland in 1944, because "if the inner tank alone fails for any reason, it is almost certain that the outer tank will rupture from the pressure and thermal shock."[32] It also appears that relatively small cracks or holes in a large, fully loaded LNG tank could cause it to fail catastrophically by instant propagation of the crack.[33]

This proneness to brittle fracture implies that relatively small disruptions by sabotage, earthquake, objects flung at the tank by high winds, etc. could well cause immediate, massive failure of an above-grade LNG tank. Certainly enough weaponry is available to pierce such a tank with ease. The General Accounting Office confirms that the equipment stolen from National Guard armories includes

> small arms, automatic weapons, recoilless rifles, anti-tank weapons, mortars, rocket launchers, and demolition charges. A large number of commercially available publications provide detailed instructions on the home manufacture of explosives, incendiaries, bombs, shaped charges, and various other destructive devices. All the required material can be bought at hardware stores, drug stores, and agricultural supply outlets.... It is not unusual for international terrorist groups to be armed with the latest military versions of fully automatic firearms, anti-aircraft or anti-tank rockets, and sophisticated explosive devices.[34]

The General Accounting Office also found, however, that such sophistication would not be necessary to cause a major LNG release. Live firing tests "confirmed that the double-wall structure of [LNG]...tanks affords limited protection even against non-military small arms projectiles, and that devices used by terrorists could cause a catastrophic failure of the inner wall."[35] Some tanks allow access to the insulation space through ground-level manholes, or are built in the air on pilings, thus greatly increasing the effectiveness of explosive charges.

In 1978, none of the sixteen LNG facilities visited by the government auditors had an alarm system. Many had poor communications and backup

power sources. Guarding was minimal—often one unarmed watchman. Procedures were so lax that "Access to all of the facilities we visited would be easy, even for untrained personnel."[36]

LNG shipments by truck

More than seventy-five insulated, double-walled trucks deliver LNG from terminals to over one hundred satellite distribution tanks in thirty-one states,[37] chiefly in urban areas.[38] Some LNG may also be imported by truck from Montreal to New England.[39] More than ninety truckloads of LNG can leave Boston's Everett Distrigas terminal in a single day.[40] Though puncture-resistant, the trucks have points of weakness and a very high center of gravity, encouraging rollover accidents.[41] Each truck carries forty cubic meters of LNG, with a heat content equivalent to a quarter of a kiloton of TNT, or about a fiftieth of a Hiroshima yield.

Before LNG trucks are loaded, they are not inspected for bombs, nor are the drivers required to identify themselves properly.[42] Security is only marginally better than for potato trucks.[43] LNG trucks are easily sabotaged. The double walls "are relatively thin,...and can be penetrated by a fairly small improvised shaped charge. Properly placed, such a charge would cause LNG to discharge into the insulation space, causing the outer jacket to fracture and disintegrate."[44] Further, a truck could be hijacked from its fixed route for extortion or for malicious use of its cargo. It is "particularly dangerous, because [it allows]...the easy capture, delivery, and release of a large amount of explosive material any place the terrorist chooses."[45]

At least twelve LNG truck accidents had occurred in the United States by 1978. Two caused spills.[46] One driver blacked out after driving far more than the permitted number of hours and falsifying his logbook.[47] Luckily, both spills were in rural areas and neither ignited. Most LNG trucks leaving the Everett facility travel on the elevated Southeast Expressway, a hazardous road within a few blocks of the crowded Government Center area. In the first four months of 1977 alone, there were four serious accidents on the Southeast Expressway involving tractor-trailer trucks, one of which fell off onto the streets below.[48] An LNG truck would almost certainly break open in such an accident.[49] The entrances to the Sumner and Callahan Tunnels are about a hundred yards downhill from the Southeast Expressway.[50] The area is also laced with basements, sewers, and subway tunnels into which the invisible, odorless vapor would quickly spill.

"The forty cubic meters of LNG in one truck, vaporized and mixed with air into flammable proportions, are enough to fill more than one hundred and

ten miles of six-foot sewer line, or sixteen miles of a sixteen-foot-diameter subway system."[51] That is enough, if the gas actually went that far and did not leak out partway, to fill up virtually the entire Boston subway system. An LNG spill into a sanitary sewer would vaporize with enough pressure to blow back methane through domestic traps into basements.[52] Even if buildings are not involved, sewer explosions can damage large areas. Early on 13 February 1981, for example, an hour before rush-hour traffic, miles of streets in Louisville, Kentucky were instantly torn up by an explosion of hexane vapor, which had apparently leaked into the sewer system from a factory a mile from the point of ignition.[53] Such explosions can do great damage with only a few cubic meters of flammable liquids,[54] and have been used for sabotage.[55]

Analogous hazards of liquefied petroleum gas (LPG)

Liquefied petroleum gas ("LP Gas")–the kind so commonly seen in metal bottles in rural areas and trailer parks–consists almost entirely of either propane or butane. These are by-products separated from natural gas at the wellhead or, on occasion, derived from other parts of the petroleum system. Unlike LNG, LPG is not regasified and piped to customers, but rather delivered directly as a liquid. This is possible because propane and butane liquefy at normal temperatures under modest pressure, or alternatively with moderate cooling at atmospheric pressure.[56] Because LPG is delivered to retail customers as a liquid, it requires many small shipments. Yet because those shipments make up about three percent of all U.S. energy supplies, vehicles carrying LPG are ubiquitous. It is a far older and better-known fuel than LNG, yet is less well studied and regulated–even though in some respects it may be even more hazardous than LNG.

About eighty-five percent of the LPG in bulk storage is kept under pressure in underground salt domes or caverns;[57] the rest is stored aboveground in tanks, often small ones. As these tanks are generally pressurized rather than chilled, they do not require insulation as LNG tanks do. Instead, they have only a single wall and hence are easily penetrated or destroyed. In 1978 the U.S. had twenty aboveground LPG storage facilities with capacities greater than twenty-three thousand cubic meters.

Most LPG is transported through some seventy thousand miles of high-pressure pipelines. The rest travels in sixteen thousand pressurized railcars (as opposed to LNG, which does not move by rail) and in twenty-five thousand pressurized tank trucks, whose squat cylindrical outlines are a daily sight on our highways. A large LPG truck, like its LNG counterpart, holds about forty cubic meters. But unlike an LNG truck, it is under pressure and is single-

walled. It is therefore more vulnerable to breakage through accident or sabotage. LPG trucks are also more likely to explode in fires, both because they are uninsulated and because their cargo creates very high pressures by boiling when exposed to heat.

Many LPG truck accidents have occurred worldwide[58]—often through faulty repairs, delivery procedures, or valve operations.[59] A truck laden with thirty-four cubic meters of LPG, for example, overturned in 1973 on a mountain road above Lynchburg, Virginia, creating a fireball more than four hundred feet in diameter.[60] Four people were burned to death at the site, and three more at a distance by the radiant heat. In a far more destructive accident near Eagle Pass, Texas in 1975, a thirty-eight-cubic-meter LPG tank broke loose from its trailer. Two explosions blew the front of the tank about sixteen hundred feet and the rear (in three pieces) some eight hundred feet. Sixteen people were killed and thirty-five injured.[61] In Berlin, New York, in 1962, a twenty-eight-cubic-meter LPG semi-trailer jack-knifed, hit a tree, and split. The tank was propelled eighty feet back up the road, spewing gas as it went. After some minutes, the gas, having spread over about five acres, ignited and burned in a few seconds, engulfing ten buildings and causing ten deaths and seventeen injuries.[62] And in West St. Paul, Minnesota, a midnight LPG delivery fire in 1974 killed four people and demolished large sections of three apartment buildings.[63]

LPG railcars, each containing about one hundred fifteen cubic meters (equivalent to about an eighteenth of a Hiroshima yield),

> are involved in many of the ten thousand railroad accidents that occur in this country each year. There are often more than ten consecutive LPG cars on a train. Each car can form a ten-second fireball about [four hundred feet]... in radius.[64]

This can cause third- and second-degree burns out to nearly three thousand feet and to one mile respectively.[65] The range can be even larger. In 1973, a slightly oversized railcar of LPG developed a small leak while being unloaded. The ensuing small fire burst the tank after nineteen minutes, causing a fireball nearly a thousand feet in diameter. Thirteen people were killed. Many of the ninety-five people injured were standing along a highway a thousand feet from the track.[66]

The General Accounting Office's safety study of both LPG and LNG notes a further danger of LPG tankers and railcars:

> If vapors from one LPG car ignite, the fire may rupture an unpunctured car in a "Boiling Liquid Expanding Vapor Explosion," or BLEVE [where sudden depressurization rapidly boils and expels the LPG as an aerosol-vapor-air mixture]. Each fire and explosion contributes to the heating and weakening of neighboring cars and makes additional explosions more likely. A BLEVE can rocket a forty-five-thousand-pound steel section of a tank for a quarter of a mile. This is what hap-

> pened in a derailment near Oneonta, New York, in 1974. LPG vapor from a crushed LPG car quickly ignited and formed a fireball. Fire fighters attempting to cool down several other LPG cars were caught in a subsequent explosion; fifty-four were injured.... In a 1974 railyard accident near Decatur, Illinois, an LPG railcar was punctured; the resulting cloud did not ignite immediately, but spread and then exploded over an area one-half by three-quarters of a mile. [The blast was felt forty-five miles away;[67] such unconfined vapor-air explosions are similar to those caused by military fuel-air bombs, some of which use propane.] There were seven deaths, three hundred forty-nine injuries, and twenty-four million dollars in damage [including blast damage out to two and a half miles]. Litter and debris...covered twenty blocks of the city.... LPG railcars travel through densely populated areas of cities, even cities which prohibited LPG storage.[68]

LPG trains could easily be derailed at any desired point: "youth gangs frequently place obstacles on tracks which delay freight trains in New York City just to harass the trainmen,"[69] and similarly in Los Angeles.[70] Sabotage causing serious damage to trains has occurred across the U.S.,[71] including trains carrying LPG (which fortunately did not leak)[72] and chlorine (whose leakage in a Florida derailment killed eight people and injured nearly a hundred).[73]

LPG railcars are only a tenth as numerous as tankers carrying other hazardous cargoes, and are thus likely to occur in the same trains with chlorine, oil, industrial chemicals, and so forth. Such cargoes and LPG can endanger each other. Railcars spend a good deal of time sitting in switchyards where they are subject to tampering and fires. Ammunition trains have blown up in switchyards. A few years ago, a chemical tank car being shunted in Washington State exploded with the force of several World War II blockbusters. A forty-hour fire in a railcar of toxic ethylene oxide recently shut the Port of Newark and curtailed flights at Newark International Airport for fear of an explosion that could hurl shrapnel for a mile.[74] Far less would be enough to breach an LPG railcar. Its steel wall is only five-eighths of an inch thick, and "can be easily cut with pocket size explosive devices [or by] many other weapons commonly used by terrorists...."[75] A small leak can be dangerous because LPG vapor is heavier than air even when it warms up (unlike LNG vapor, which is heavier than air only so long as it remains chilled). LPG vapor can therefore flow for long distances along the ground or in sewers or tunnels. When a mixture of between about two and nine percent LPG vapor in air reaches a small spark, it will ignite or explode.

LPG terminals, as well as shipments by road and rail, penetrate the most vulnerable parts of our industrial system. The General Accounting Office has published an aerial photograph of a major LPG receiving terminal near Los Angeles Harbor.[76] Its propane storage tanks, a stone's throw from the Palos Verdes earthquake fault, are surrounded on one side by a large U.S. Navy fuel

depot and by a tank farm, and on the other side by a dense residential area that runs for miles. All are within the range of an LPG conflagration. Marine LPG tankers add to the hazard and can endanger the terminal itself. In 1974, the LPG tanker *Yuyo Maru* collided and burned in Tokyo Bay with the loss of thirty-three crew. In 1968, the small Swedish LPG tanker *Claude*, having collided with a freighter in Southampton water, was abandoned by her crew and shortly thereafter by her pilot (who supposed the crew must know what was good for them). *Claude* drifted under reverse power, went aground, was towed to a refinery, and started to have a chartered vessel pump off her cargo. But when one hose sprang a leak, *Claude* was again precipitately abandoned by that vessel, rupturing all the hoses and pipelines.[77] It was only luck and the courage of a few remaining crewmen that got the valves shut before the gas cloud ignited, for it could well have destroyed the refinery too.

In 1977, a fifty-thousand-cubic-meter refrigerated propane tank in Qatar, designed by Shell International on a pattern similar to that of tanks in the Los Angeles terminal, suddenly collapsed, sending liquid propane over the dike. The resulting explosion destroyed the LPG facility surrounding the tank. In France, eleven people died and seventy were injured when vapor from a leaking butane tank was ignited by a truck passing more than five hundred feet away, leading to the explosion of eight butane and propane tanks.[78] In a little-noted incident on 30 January 1981, an FB-111 aircraft crashed a quarter-mile from the edge of the tank farm in the second largest LPG/LNG facility in New England (in Newington, New Hampshire). The plant is about two miles from the center of Portsmouth (population about twenty-seven thousand), two and a half miles from a nuclear submarine base, and three-quarters of a mile from Pease Air Force Base with its huge fuel depot. For comparison, the direct fireball radiation alone from the burning of thousands of cubic meters of LPG can start fires and cause third-degree burns at ranges of a mile or more.[79]

The risk from liquefied energy gases (LEG)

In practical effect, the most densely industrialized and populated areas in America have potential bombs in their midst, capable of causing disastrous explosions and firestorms without warning. As the General Accounting Office summarized, describing both LNG and LPG by the generic term "liquefied energy gases" (LEG):

> Successful sabotage of an LEG facility in an urban area could cause a catastrophe. We found that security precautions and physical barriers at LEG facilities are generally not adequate to deter even an untrained saboteur. None of the LEG storage

areas we examined are impervious to sabotage, and most are highly vulnerable.[80]

Moreover,

> In many facilities, by manipulating the equipment, it is possible to spill a large amount of [LEG]... outside the diked area through the draw-off lines. LEG storage facilities in cities are often adjacent to sites that store very large quantities of other hazardous substances, including other volatile liquids. Thus, a single cause might simultaneously destroy many tanks, or a spill at one facility might cause further failures at adjacent facilities.[81]

These might include ports, refineries, tank farms, or power stations. For example, although the Cove Point, Maryland LNG terminal is not near a city, it is five miles upwind–well within plume range–of the Calvert Cliffs nuclear power plant, which probably could not withstand being enveloped in a fireball.

The General Accounting Office report concluded:

> Nuclear power plants are built to higher standards than any other type of energy installation, much higher than those for LEG installations. Nevertheless, they are never located in densely populated areas. We believe that new large LEG facilities also should not be located in densely populated areas.[82]

LNG shipments and facilities likewise perforate America's industrial heartland. Even the most sensitive "chokepoints" are put at risk. In February 1977, for example, LNG was being trucked along the Staten Island Expressway and across the Verrazano Narrows and Goethals Bridges.[83] Seven Mile Bridge, the only land access to the lower Florida Keys, was heavily damaged by a recent propane-truck explosion,[84] which could as well have occurred on any urban bridge in America. It is apparently common for LNG shipments to pass near major oil, gas, and nuclear facilities, few if any of which could withstand envelopment in a burning gas cloud. While many local authorities would like to restrict such shipments before a catastrophe, the regulation of such interstate commerce is federally pre-empted; and so far, despite the devastating criticisms by the General Accounting Office, the dozen or so responsible federal agencies have done little of substance to improve safety.

Perhaps additional LNG imports, brought by eighty-plus large tankers into a half-dozen U.S. terminals, will never happen as enthusiasts once hoped, if only for the economic reasons alluded to earlier. But unless tackled directly, the clear and present dangers from present LNG and–on a far greater scale–LPG operations will persist. Later chapters will show that all the energy now supplied by LNG and LPG can be replaced by much cheaper sources which do not compromise national security.