Public Safety Impacts of DCP Midstream LPG Tank Proposal

A DCP Midstream L.L.C.[1] spokesperson in a media interview said she "did not want to speculate what would happen" if an accidental BLEVE[2][3] explosion occurred if DCP's 22.7 million gallon Liquified[4][5] Petroleum[6] Gas[7] tank became operational at Mack Point[8], Searsport, Maine.[9] It may be true that we should not speculate what would happen; we should try to ***predict*** what could happen.

LPG

LPG[10], Liquified[11] Petroleum Gas, is a byproduct of petroleum[12] crude oil drilling, consisting of a mixture of Propane[13], Isobutane[14], N-Butane,[15] Propene[16], Butene[17] and other gases. It is synthesized from wet natural gas[18] and refrigerated to change its state from gas to liquid. [19] Its per-gallon energy content is greater than Liquified[20] Natural Gas[21] [LNG[22]]. Like LNG[23], LPG[24] fuel temperature must be kept very cold, below water's freezing point for gas to remain liquified[25].

According to December 1, 2011, Village Soup Journal [26], 22.7 million gallons of LPG[27] contain the explosive power of 549,743 tons of TNT.[28] Dividing 549,743 tons of TNT explosive energy in 22.7 million gallons of LPG[29], by 20,000 Tons of TNT[30] energy released by Hiroshima Atomic Bomb[31], yields 27.[32] Atomic Bombs. When ignited in presence of oxygen, LPG[33] explodes in a fiery conflagration, called a "BLEVE[34][35]", *Boiling Liquid Expanding Vapor Explosion*.

Today, sixteen existing above-ground fuel tanks store over 50 Million gallons of gasoline, Diesel Fuel,

1 http://en.wikipedia.org/wiki/Limited_liability_company
2 http://en.wikipedia.org/wiki/Boiling_liquid_expanding_vapor_explosion
3 BLEVE is a "Boiling Liquid Expanding Vapor Explosion" that occurs with flammable gases in liquid form.
4 http://www.thefreedictionary.com/liquified
5 http://www.thefreedictionary.com/liquified
6 http://en.wikipedia.org/wiki/Petroleum
7 LPG is Liquified Petroleum Gas, mostly propane and butane.
8 http://www.mackpoint.com/images/mackpoint_large.gif
9 http://www.searsportme.net/maps/dt_map.pdf
10 http://en.wikipedia.org/wiki/Liquefied_petroleum_gas
11 http://www.thefreedictionary.com/liquified
12 http://en.wikipedia.org/wiki/Petroleum
13 http://en.wikipedia.org/wiki/Propane
14 http://en.wikipedia.org/wiki/Isobutane
15 http://en.wikipedia.org/wiki/Butane
16 http://en.wikipedia.org/wiki/Propene
17 http://en.wikipedia.org/wiki/Butene
18 http://energy.about.com/od/gloss/g/What-Is-Wet-Natural-Gas.htm
19 http://en.wikipedia.org/wiki/Liquefied_petroleum_gas
20 http://www.thefreedictionary.com/liquified
21 http://en.wikipedia.org/wiki/Gasoline_gallon_equivalent
22 http://en.wikipedia.org/wiki/Liquefied_natural_gas
23 http://en.wikipedia.org/wiki/Liquefied_natural_gas
24 http://en.wikipedia.org/wiki/Liquefied_petroleum_gas
25 At any temperature and pressure matter exists in one of 3 states, solid , liquid, or gas.
26 http://waldo.villagesoup.com/news/story/lpg-and-dcp-a-quick-primer/471087
27 http://en.wikipedia.org/wiki/Liquefied_petroleum_gas
28 "LPG and DCP : A quick Primer," Ethan Andrews, December 1, 2011,22,7 M gallons LPG has 549 Kilotons of TNT
29 http://en.wikipedia.org/wiki/Liquefied_petroleum_gas
30 Tons TNT is an explosive metric. A common explosive, TNT is TriNitroToluene, One Kiloton equals 1000 tons.
31 The energy of Atomic Bomb dropped on Hiroshima = 20 Kilotons: Gen. Omar Bradley, "A General's Life", 1983 .
32 This is 549,743 Tons of TNT in LPG tank divided by 20,000 Tons of TNT per A-Bomb = 27 A-Bombs .
33 http://en.wikipedia.org/wiki/Liquefied_petroleum_gas
34 http://en.wikipedia.org/wiki/Boiling_liquid_expanding_vapor_explosion
35 http://en.wikipedia.org/wiki/Boiling_liquid_expanding_vapor_explosion

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Fuel Oil Number 2, Fuel Oil Number 6, Kerosene, and Jet Fuel on Mack Point[36], Unlike LPG[37] these fuels are normally liquid at atmospheric temperatures and pressures, at which LPG[38] becomes gas.

Class B[39] conflagrations of LPG[40], Gasoline[41], Diesel Fuel, Number 2 and Number 6 Fuel Oil[42], Kerosene[43], or Jet Fuel *cannot be extinguished with water* alone, as Class A[44] wood or paper

fires can.[45] To extinguish Class B [46]fires, oxygen must be separated, by smothering the flames with fire retardants [such as sand, foams[47], gases such as Carbon Dioxide[48], or vaporized aqueous solutions] from burning fuel, temperature must be reduced below ignition temperature of the fuel.

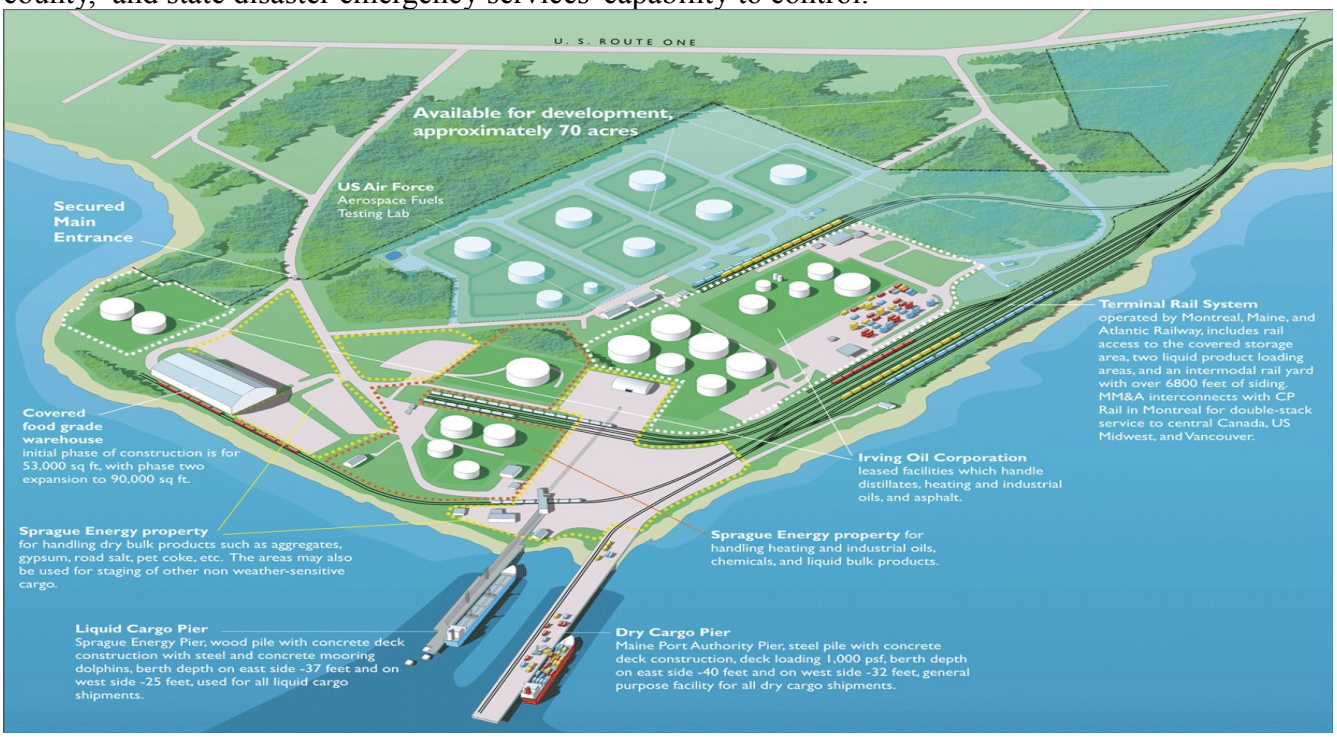
To put Class B[49] fires out, *sufficient amounts of fire suppressants must be available* near flammable fuels. Are 50 million gallons of BromoChlorodiflouromethane[50], Carbon Dioxide[51], Aqueous Film Forming Foam,[52] or other Class B[53] fire suppressants stored at or near Mack Point[54] now? I think the answer is no.

When filled to capacity, sixteen Mack Point[55] tanks of Gasoline, Diesel fuel, Fuel Oil Number 2, Fuel Oil Number 6, Kerosene, and Jet fuel contain an aggregate of 7,726,250 Million BTU[56]s of Energy,

36 http://www.searsportme.net/maps/dt_map.pdf
37 http://en.wikipedia.org/wiki/Liquefied_petroleum_gas
38 http://en.wikipedia.org/wiki/Liquefied_petroleum_gas
39 http://en.wikipedia.org/wiki/Fire_classes
40 http://en.wikipedia.org/wiki/Liquefied_petroleum_gas
41 http://www.wate.com/story/14905575/man-burned-when-gasoline-explodes-in-morristown
42 https://www.youtube.com/watch?v=TjbBIpFpCSg
43 http://news.google.com/newspapers?nid=2457&dat=19760102&id=igE1AAAAIBAJ&sjid=NU8KAAAAIBAJ&pg=4499,525212
44 http://en.wikipedia.org/wiki/Fire_classes
45 http://en.wikipedia.org/wiki/Fire_classes
46 http://en.wikipedia.org/wiki/Fire_classes
47 http://en.wikipedia.org/wiki/Fire_fighting_foam
48 http://en.wikipedia.org/wiki/Carbon_dioxide
49 http://en.wikipedia.org/wiki/Fire_classes
50 BromoChlorodiflouromethane is also known as BCP
51 http://en.wikipedia.org/wiki/Carbon_dioxide
52 http://en.wikipedia.org/wiki/Fire_fighting_foam
53 http://en.wikipedia.org/wiki/Fire_classes
54 http://www.mackpoint.com/images/mackpoint_large.gif
55 http://www.mackpoint.com/images/mackpoint_large.gif
56 http://en.wikipedia.org/wiki/British_thermal_unit

equivalent to 97 Atomic bombs[57]. [Table II] A 22.7 Million Gallon LPG[58] BLEVE[59] explosion releasing 27 Atomic Bombs equivalent energy could burst and ignite flammable fuels in the other sixteen Mack Point[60] fuel tanks, generating up to 1.9 Million Tons of TNT. **A**ggregate potential LPG[61] and other Mack Point[62] fuel energy equate to 124 Atomic Bombs. If ignited, this could launch gasoline, fuel oil, and kerosene high into the sky, from which it could fall, ignited, into Penobscot Bay, Gulf of Maine, and many Maine counties setting fire to combustible matter. The energy of 22.7 Million gallons of LPG[63] and 50 Million gallons of flammable fuels could propel debris many miles before descending to earth.

Wood is composed of a flammable glucose polymer called cellulose[64] which has an average energy value is 15 to 17 Mega[65]-joules per kilogram[66] Cellulose[67] and lignin[68] in forest undergrowth, trees, and wood structures burn exothermically[69], releasing heat and intensifying BLEVE[70]-generated firestorms. To absorb heat emitted by 1 kilogram of burning wood requires seven liters of water. Intense LPG[71] BLEVE[72] heat at Searsport or other towns could ignite a forest firestorm beyond town, county, and state disaster emergency services' capability to control.



57 See Table III
58 http://en.wikipedia.org/wiki/Liquefied_petroleum_gas
59 http://en.wikipedia.org/wiki/Boiling_liquid_expanding_vapor_explosion
60 http://www.mackpoint.com/images/mackpoint_large.gif
61 http://en.wikipedia.org/wiki/Liquefied_petroleum_gas
62 http://www.mackpoint.com/images/mackpoint_large.gif
63 http://en.wikipedia.org/wiki/Liquefied_petroleum_gas
64 http://en.wikipedia.org/wiki/Cellulose
65 http://en.wikipedia.org/wiki/Mega-
66 http://www.remarkable.com/leavestoenergy.html
67 http://en.wikipedia.org/wiki/Cellulose
68 http://en.wikipedia.org/wiki/Lignin
69 http://en.wikipedia.org/wiki/Exothermic_reaction
70 http://en.wikipedia.org/wiki/Boiling_liquid_expanding_vapor_explosion
71 http://en.wikipedia.org/wiki/Liquefied_petroleum_gas
72 http://en.wikipedia.org/wiki/Boiling_liquid_expanding_vapor_explosion

Public Safety Impacts of DCP Midstream LPG Tank Proposal

Since flaming gasoline, kerosene, and fuel oil float on water, roads and other obstructions, explosions of the fuels in these 16 Mack Point[73] tanks could create pathways for flames outward from Mack Point[74] across all obstacles in all directions. If LPG[75] tank exploded, it is unlikely that any physical barrier, waterway, including Penobscot Bay, or highway, could stop the fire.

Easily-ignitable energy fuel vapors could be ignited by sparks when fuel is transferred from one container to another. A Mack Point[76] explosion and firestorm could be triggered when gasoline, heating oil, kerosene, jet fuel, or LPG[77] is routinely offloaded from ship to tank, truck to tank, or tank to truck. It could be set fire by lightning strike, accidental hunting bullet hit, or events, such as:

- Vehicle accident spark igniting propane[78], butane[79], fuel oil, kerosene[80] or gasolene vapor;
- Static electricity spark setting fuel oil, propane[81], butane, kerosene, or gasolene vapor ablaze;
- Mobile Phone inflaming fuel oil, propane[82], butane, kerosene or gasolene vapor;
- Electrical short-circuit spark igniting fuel oil, propane, butane, kerosene[83], or gasolene vapor;
- LPG[84] burn-off flare setting flame to gasolene, fuel oil, propane, butane or kerosene[85] vapor;
- Ship vessel accident setting afire propane, butane, gasolene, fuel oil, or kerosene[86] vapor;
- Cigarette accidentally sparking propane, butane, fuel oil, kerosene[87] or gasoline vapor;
- Deliberate detonation of dangerous fuels by sabotage or terrorism;
- Vehicle exhaust igniting gasolene, propane, butane, fuel oil, or kerosene[88] vapor;
- Accident at another Mack Point[89] tank inflaming gasolene, fuel oil, or kerosene[90] vapor;
- Helicopter Crash setting flame to gasolene, fuel oil, propane, butane or kerosene[91] vapor;
- Shipboard accident setting propane, butane[92], gasolene, fuel oil, or kerosene[93] vapor ablaze;
- Acetylene construction torch sparking propane, butane[94], gasolene, fuel oil, or kerosene[95] vapor;
- Arsonist deliberately igniting propane, butane[96], gasolene, fuel oil, or kerosene[97] explosion;
- Airplane accident inflaming propane, butane[98], gasolene, fuel oil, or kerosene[99] vapor;
- Electric short-circuit igniting propane[100], butane[101], gasolene, fuel oil, or kerosene[102] vapor;

73 http://www.mackpoint.com/images/mackpoint_large.gif
74 http://www.mackpoint.com/images/mackpoint_large.gif
75 http://en.wikipedia.org/wiki/Liquefied_petroleum_gas
76 http://www.mackpoint.com/images/mackpoint_large.gif
77 http://en.wikipedia.org/wiki/Liquefied_petroleum_gas
78 http://en.wikipedia.org/wiki/Propane
79 http://en.wikipedia.org/wiki/Butane
80 http://en.wikipedia.org/wiki/Kerosene
81 http://en.wikipedia.org/wiki/Propane
82 http://en.wikipedia.org/wiki/Propane
83 http://en.wikipedia.org/wiki/Kerosene
84 http://en.wikipedia.org/wiki/Liquefied_petroleum_gas
85 http://en.wikipedia.org/wiki/Kerosene
86 http://en.wikipedia.org/wiki/Kerosene
87 http://en.wikipedia.org/wiki/Kerosene
88 http://en.wikipedia.org/wiki/Kerosene
89 http://www.mackpoint.com/images/mackpoint_large.gif
90 http://en.wikipedia.org/wiki/Kerosene
91 http://en.wikipedia.org/wiki/Kerosene
92 http://en.wikipedia.org/wiki/Butane
93 http://en.wikipedia.org/wiki/Kerosene
94 http://en.wikipedia.org/wiki/Butane
95 http://en.wikipedia.org/wiki/Kerosene
96 http://en.wikipedia.org/wiki/Butane
97 http://en.wikipedia.org/wiki/Kerosene
98 http://en.wikipedia.org/wiki/Butane
99 http://en.wikipedia.org/wiki/Kerosene
100 http://en.wikipedia.org/wiki/Propane
101 http://en.wikipedia.org/wiki/Butane
102 http://en.wikipedia.org/wiki/Kerosene

- Smoking Pipe setting fire to gasoline vapor, propane, butane[103], fuel oil or kerosene[104] vapor;
- Lightning strike conflagrating propane, butane[105], gasolene, fuel oil, or kerosene[106] vapor;
- Accidental hunting bullet strike inflaming gasolene, propane, butane[107], or fuel oil vapor;

Fuel undergoes rapid oxidation, consumes oxygen from air, and emits heat and light. High temperature is required to initiate each reaction. Heat emitted from combustion increases temperature further, increasing speed of combustion. Heat can cause a thermal explosion if it is produced faster than it can be dissipated. If LPG's[108] explosive energy could be added to the Mack Point[109] fuel tank farm's explosive energy, and all tanks were completely full, their simultaneous explosion could be equivalent to 124 Atomic Bombs [27 LPG[110] + 97 {Fuel Oil & Gasoline & Kerosene} Atomic Bombs] When the result is multiplied by the Hiroshima Atomic Bomb destructive radius an extrapolated incineration zone radius for a Mack Point[111] BLEVE[112] [124 Atomic Bombs x 1 miles radius per Atomic Bomb = 124 Miles.]

Since a simultaneous LPG[113] BLEVE[114] with sixteen Mack Point[115] fuel tank explosions are highly unlikely, because each flammable fuel is in a separate container, with different temperature, different pressure, and different composition, aggregating the energy of 17 tanks' *overstates* blast force. A more likely scenario would be 17 *separate explosions* a few minutes apart in random order, the smallest being 1,240 Million BTUs[116] and the largest being 1,139,250 MillionBTU[117]s [Table II].

Since fuel tanks are unlikely to be completely full, except right after a fill-up, these estimates may be overstated. Because deflagration[118] shock waves are smaller than detonation [119], an Atomic Bomb comparison could be somewhat overstated. Detonation[120] explosions[121] shock pressures are four times that of fuel deflagration[122]. If tanks were 50% full, and 25 % deflagration[123] adjustment[124] were applied, aggregate thermal ignition energy would be only Atomic Bombs [124 x 50% = 62 x 25 %= 15] . Revised for these factors, incineration zone radius would be reduced to 15 Miles from Mack Point[125].

Uneven terrain. mountains and hills should absorb explosion impact and shield from direct impact the property behind them. However debris and material, including flammable fuels, can be thrown over

103 http://en.wikipedia.org/wiki/Butane
104 http://en.wikipedia.org/wiki/Kerosene
105 http://en.wikipedia.org/wiki/Butane
106 http://en.wikipedia.org/wiki/Kerosene
107 http://en.wikipedia.org/wiki/Butane
108 http://en.wikipedia.org/wiki/Liquefied_petroleum_gas
109 http://www.mackpoint.com/images/mackpoint_large.gif
110 http://en.wikipedia.org/wiki/Liquefied_petroleum_gas
111 http://www.mackpoint.com/images/mackpoint_large.gif
112 http://en.wikipedia.org/wiki/Boiling_liquid_expanding_vapor_explosion
113 http://en.wikipedia.org/wiki/Liquefied_petroleum_gas
114 http://en.wikipedia.org/wiki/Boiling_liquid_expanding_vapor_explosion
115 http://www.mackpoint.com/images/mackpoint_large.gif
116 http://en.wikipedia.org/wiki/British_thermal_unit
117 http://en.wikipedia.org/wiki/British_thermal_unit
118 http://en.wikipedia.org/wiki/Deflagration
119 http://en.wikipedia.org/wiki/Detonation
120 http://en.wikipedia.org/wiki/Detonation
121 http://en.wikipedia.org/wiki/Explosion
122 http://en.wikipedia.org/wiki/Deflagration
123 http://en.wikipedia.org/wiki/Deflagration
124 Adjusting for detonation shock wave being four times that of deflagration, deflagration is 25% [one fourth] of a detonation..
125 http://www.mackpoint.com/images/mackpoint_large.gif

mountains by explosions of this great magnitude, landing in villages beyond. Since earth is spherical, not flat, explosion shock wave would rise into the atmosphere, tangent to earth's horizon curve, more distant from the center of the blast, lessening direct shock wave impact to distant objects, and victims, on the ground. Gravity would bring solid objects, that had been propelled upward by the blast, down to earth great distances away, including gasoline, kerosene, heating oil, and fuel containers.

Energy

How much energy will a 22,700,000 gallon LPG[126] tank contain?

According to December 1, 2011, Village Soup Journal [127], 22.7 million gallons of LPG contain the explosive power of 549,743 tons of TNT.[128] Dividing 549,743[129] tons of TNT explosive energy in 22.7 million gallons of LPG, by 20,000 Tons of TNT energy released by the Atomic Bomb, yields 27 [130] Atomic Bombs.

The 20 Kiloton[131] Atomic Bomb explosions that destroyed Hiroshima and Nagasaki in World War II were described:

" *In both cities the blast totally destroyed everything within a radius of 1 mile from the center of explosion, except for certain reinforced concrete frames as noted above. The atomic explosion almost completely destroyed Hiroshima's identity as a city. Over a fourth of the population was killed in one stroke and an additional fourth seriously injured, so that even if there had been no damage to structures and installations the normal city life would still have been completely shattered.* ***Nearly everything was heavily damaged up to a radius of 3 miles*** *from the blast, and beyond this distance damage, although comparatively light, extended for several more miles. Glass was broken up to 12 miles."* [132]

This seems like an enormous amount of energy, but what damage can it do?

Explosions are exothermic[133] reactions with high temperatures, heat, light, expanding gases, rapid volume and pressure increases. Explosions may be deflagration[134]s that create subsonic[135] shock waves[136] or detonations[137] that create supersonic[138] shock waves[139]. Explosions that propagate supersonic shock waves[140] are observed in solid, liquid, and reactive gases. Detonation[141] velocity is higher in solid and liquid explosives than in gases. Maximum deflagration[142] shock wave[143] pressures

126 http://en.wikipedia.org/wiki/Liquefied_petroleum_gas
127 http://waldo.villagesoup.com/news/story/lpg-and-dcp-a-quick-primer/471087
128 "LPG and DCP : A quick Primer," Ethan Andrews, December 1, 2011.. This Writer independently confirmed the explosive Tons of TNT which is 549 Kilotons of TNT, a common explosive metric benchmark. TriNitroToluene, One Kiloton equals 1000 tons. 549,743 tons equals 549.743 Kilotons.
129 This writer calculated the same statistic by multiplying LPG energy density by the volume in gallons, converting to Tons TNT.
130 549,743 Tons of TNT in tank divided by 20,000 Tons of TNT per A-Bomb.
131 http://www.infoplease.com/spot/hiroshima1.html
132 http://www.atomicarchive.com/Docs/MED/med_chp3.shtml
133 Exothermic reactions, such as combustion, release heat; while endothermic reactions absorb heat..
134 http://en.wikipedia.org/wiki/Deflagration
135 http://en.wikipedia.org/wiki/Subsonic
136 http://en.wikipedia.org/wiki/Shock_wave
137 http://en.wikipedia.org/wiki/Detonation
138 http://en.wikipedia.org/wiki/Supersonic_speed
139 http://en.wikipedia.org/wiki/Shock_wave
140 http://en.wikipedia.org/wiki/Shock_wave
141 http://en.wikipedia.org/wiki/Detonation
142 http://en.wikipedia.org/wiki/Deflagration
143 http://en.wikipedia.org/wiki/Shock_wave

are generally far less than those generated by detonations[144]. Deflagration[145] combustion propagates thermal conductivity, hot burning fuel igniting adjoining layers of fuel.[146]

Although TNT, Atomic Bomb, and LPG[147] explosive properties are different, scientists compare conventional and nuclear[148] explosives[149] on the same scale, using Tons of TNT to describe nuclear explosions. To compare liquified[150] gas explosions using these metrics is helpful in understanding the meaning of data, even though thermodynamics of BLEVE[151]s are different from Atomic Bombs.
Will the proposed LPG[152] tank normally be full? No, the tank will contain all 22,700,000 gallons only a few times times each year, when the LPG fuel has been just offloaded from ships. After trucks have removed fuel, it will partly empty until the next shipload arrives..

If one person hits a golf ball 27 times as hard as another, shouldn't it go, on average, 27 times as far? If 20 Kilotons of TNT cause a 1 mile destruction radius then, assuming earth is flat and no obstacles block the blast, shouldn't 549.713 Kilotons of TNT destroy everything in a 27 mile destruction radius?

The destruction radius calculation does not include the explosive force of gasoline, heating oil, kerosene, jet fuel, or any other stored chemical in the ring of fire, therefore, it is understated.

Since BLEVE[153]-ignited cellulosic[154] combustion energy in Maine's woodlands, are not included in this energy estimate, LPG[155] impact is understated.

Who would be in the incineration zone?

To identify towns which would be in the "ring of fire," the distance of places less than destruction radius from Searsport in miles on its North, South, East, and West can be calculated. Using these assumptions, the zone would include: Stockton Springs [4 Miles], Swanville [5 miles], Penobscot [6 Miles], Castine [6 Miles], Belfast [6 miles], Waldo [6 Miles], Brooksville [6 Miles], Prospect [7 Miles], Bucksport [7 miles], Blue Hill [7 Miles], Orland [7 miles], Northport [7 Miles], Belmont [7 Miles], Sedgewick [8 Miles], Morrill [8 Miles], Islesboro [11 miles], Lincolnville [12 Miles], Bucksport [13 miles], Frankfort [15 Miles], Searsmont [15 miles], Winterport [18 Miles], Orrington [20 miles], Appleton [20 Miles], North Haven [23 miles], Hampden [25 miles], Brewer [25 Miles], Camden [25 miles], Deer Isle [25 Miles], Brooklin [25 Miles], Surry [25 Miles], Liberty [25 Miles], Monroe [25 Miles], North Haven [25 Miles], Rockland [27 miles], Ellsworth [28 miles], Vinalhaven [28 miles], Bangor [29 Miles][156], Mount Desert Island - Bar Harbor [35 Miles], Seal Harbor [35 Miles,], Saint George [35 Miles], If the tank were completely full and earth were flat, by multiplying 27 Atomic Bombs by 1 miles radius per bomb from the LPG tank site, estimated blast radius would equal 27 miles.

144 http://en.wikipedia.org/wiki/Detonation
145 http://en.wikipedia.org/wiki/Deflagration
146 http://en.wikipedia.org/wiki/Explosion
147 http://en.wikipedia.org/wiki/Liquefied_petroleum_gas
148 http://www.merriam-webster.com/dictionary/nuclear
149 http://en.wikipedia.org/wiki/Explosive_material
150 http://www.thefreedictionary.com/liquified
151 http://en.wikipedia.org/wiki/Boiling_liquid_expanding_vapor_explosion
152 http://en.wikipedia.org/wiki/Liquefied_petroleum_gas
153 http://en.wikipedia.org/wiki/Boiling_liquid_expanding_vapor_explosion
154 http://en.wikipedia.org/wiki/Cellulose
155 http://en.wikipedia.org/wiki/Liquefied_petroleum_gas
156 **http://www.distancebetweencities.net/bangor_me_and_searsport_me/**

Table I Searsport Area Population and Estimated Home Values

Municipality	County	Population	Houses	$ Med Value H U	D x E $
Augusta	Kennebec	19,136	9,480	$132,111	$1,252,412,280
Fairfield	Kennebec	2,474	1,224	$94,577	$115,762,248
Waterville	Kennebec	15,968	6,819	$113,791	$775,940,829
Windsor	Kennebec	2,385	952	$167,355	$159,321,960
Winslow	Kennebec	7,743	3,591	$144,085	$1,115,650,155
Bangor	Penobscot	33,039	15,674	$140,600	$2,203,764,400
Bradley	Penobscot	1,242	707	$134,137	$94,834,859
Brewer	Penobscot	9,482	4,457	$160,000	$713,120,000
Dedham	Penobscot	1,422	1,053	$197,940	$208,430,820
Eddington	Penobscot	2,052	911	$154,076	$140,363,236
Etna	Penobscot	1,012	427	$129,787	$55,419,049
Hampden	Penobscot	7,257	1,714	$188,695	$323,423,230
Holden	Penobscot	2,827	1,320	$179,997	$237,596,040
Levant	Penobscot	2,171	829	$153,895	$127,578,955
Newburgh	Penobscot	1,394	602	$165,677	$99,737,554
Old Town	Penobscot	7,840	3,885	$126,800	$492,618,000
Orono	Penobscot	9,474	2,624	$181,600	$476,518,400
Orrington	Penobscot	3,526	1,495	$170,390	$254,733,050
Veazie	Penobscot	1,919	767	$174,197	$133,609,099
Total	**Pnb+Knb**	**84,657**	**58,531**		**$8,980,834,164**
All	**Hancock**	**54,418**	40,184	$198,800	$7,988,579,200
All	**Waldo**	**38,786**	21,566	$145,300	$3,133,539,800
All	**Knox**	**39,736**	23,744	$206,400	$4,900,761,600
Total		**217,597**			**$25,003,714,764**

The Energy of an LPG explosion can hurl hard objects, such as cars and trucks a long distance, causing damage and injuries, with the effect of shrapnel. The power of LPG deflagration[157] blast can collapse and ignite buildings. Waldo County, Hancock County, Knox County, Lincoln County, and Bangor / Penobscot County could be within the incineration zone of a Mack Point[158] LPG BLEVE[159] plus forest fire. Damage costs could be over $25 Billion, with thousands of fatalities [see Table II.]

Until a 549 Kiloton LPG explosion burnt up, or fell below ignition temperature, an LPG explosion and firestorm, releasing an enormous amount of heat, could be very hard to extinguish. Intense heat of initial explosion could ignite many other flammable materials, gasoline, heating oil, flammable gases, stored at Mack Point, causing a secondary wave of destruction. Gasoline and heating oil trucks traveling the roads during the BLEVE[160] could add to the size of the inferno.

Wood, paper, cardboard and other solid cellulosic materials create Class A[161] fires, which can be extinguished with water, by separating oxygen and fuel from flames, and reducing temperatures.[162]

Maine Department of Environmental Protection permits and license[163] revealed that Searsport's Mack Point[164] now has 3 tank farms that are now storing over 50 million gallons of flammable fuels, including gasoline, kerosene, Number 2 fuel oil, Number 6 fuel oil, and biodiesel[165], in 16 tanks,

157 http://en.wikipedia.org/wiki/Deflagration
158 http://www.mackpoint.com/images/mackpoint_large.gif
159 http://en.wikipedia.org/wiki/Boiling_liquid_expanding_vapor_explosion
160 http://en.wikipedia.org/wiki/Boiling_liquid_expanding_vapor_explosion
161 http://en.wikipedia.org/wiki/Fire_classes
162 http://en.wikipedia.org/wiki/Fire_classes
163 Irving Oil Corporation Departmental Waldo County Findings of Fact and Order Searsport, Maine Air Emission License A-413-71-H-N 2
164 http://www.mackpoint.com/images/mackpoint_large.gif
165 Biodiesel is a mixture of Diesel Fuel, Vegetable oils, and other chemicals used for compression ignition engine fuel and for heating purposes to replace number 2 heating oil with a sustainable, renewable fuel.

identified by numbers 1 through 21. [166] By examining energy density we can assess potential for destruction by accidental ignition of these fuels. Tanks 23 through 26 contain dyes and "Microlene," water filtering material.

Gasoline, kerosene, jet fuel, #2 fuel oil, #6 fuel oil, diesel fuel [167]combustion energy is measured in British Thermal Units[168], BTUs and Tons of TNT.

The explosion, according to reports, of one [1] ton of TNT releases 3,966,000 BTU[169]s of energy.[170]

If each tank is completely full and one gallon of gasoline contains about 115,000 BTU[171]s of energy,[172]

Table II Existing Irving Tank Farms at Mack Point[173] Searsport, Maine

Tank	Million	Contains	Energy-BTU	Million BTUs	BTU[174]s	Atomic Bombs
	Gallons		per Gallon	B times D	E Times 1000000	(F/3966000)/20000
1	7.350	Gasoline	115000	845250	845250000000	11
2	7.350	#2 Fuel Oil	140,000	1,029,000	1,029,000,000,000	13
3	3.360	Kerosene	135,000	453,600	453,600,000,000	6
4	7.350	#6 Fuel Oil*	155,000	1,139,250	1,139,250,000,000	14
5	3.360	Gasoline	115000	386400	386400000000	5
6	5.250	#2 Fuel Oil	140,000	735,000	735,000,000,000	9
7	5.670	Kerosene	135,000	765,450	765,450,000,000	10
8	5.670	#2 Fuel Oil	140,000	793,800	793,800,000,000	10
9	4.620	#2 Fuel Oil	140,000	646,800	646,800,000,000	8
10	2.100	Diesel Fuel*	140,000	294,000	294,000,000,000	4
11	1.680	#2 Fuel Oil*	140,000	235,200	235,200,000,000	3
12	0.756	Kerosene/Jet*	135,000	102,060	102,060,000,000	1
13	2.100	Diesel Fuel*	140,000	294,000	294,000,000,000	4
14	0.020	biodiesel	130,000	2,600	2,600,000,000	0
15	0.020	biodiesel	130,000	2,600	2,600,000,000	0
21	0.008	#6 Fuel Oil*	155,000	1,240	1,240,000,000	0
23	0.004	Microlene*	NA		0	0
24	0.004	Microlene*	NA		0	0
25	0.004	Red Dye*	NA		0	0
26	0.001	Red Dye*	NA		0	0
TOTALS	56.677			7726250	7726250000000	97
				BTUs / Ton TNT=	3,966,000	
				Tons TNT=	1,975,126	
				Atomic Bomb Energy Equiva;ence	97	

175

Tank #1 contains 7.35 Million gallons of gasoline, shown in Table II Column 2 Row 1, from MDEP license. [176] Multiplying 7.35 million gallons, by 115,000 BTU[177]s [column 4] per gallon of gasoline [178]

166 Tank Numbers 16 through 20 are not listed on this License. Tanks 22 through 25 are not believed flammable, containing Red Dye and Microlene.
167 http://wiki.answers.com/Q/What_class_of_fire_suppression_should_be_used_against_oil_or_gas_fires#ixzz1h2NxgBxc
168 http://en.wikipedia.org/wiki/British_thermal_unit
169 http://en.wikipedia.org/wiki/British_thermal_unit
170 http://wiki.answers.com/Q/How_many_btu%27s_in_one_ton_of_TNT
171 http://en.wikipedia.org/wiki/British_thermal_unit
172 http://www.engineeringtoolbox.com/fuel-oil-combustion-values-d_509.html
173 http://www.mackpoint.com/images/mackpoint_large.gif
174 http://en.wikipedia.org/wiki/British_thermal_unit
175 Maine DEP Air Emission License "A-413-71-H-N 3/5/2007; http://www.epa.gov/region1/npdes/permits/finalme0002208permit.pdf; http://www.epa.gov/region1/npdes/permits/2010/finalme0002461permit.pdf
176 Ibid
177 http://en.wikipedia.org/wiki/British_thermal_unit
178 http://www.engineeringtoolbox.com/fossil-fuels-energy-content-d_1298.html

obtains 845,250 million BTU[179]s [Column 5]. Multiplying Column 5 [Million BTU[180]s] by 1 million [1,000,000] obtains 845,250,000,000 BTUs[181] [Column 6] .

Knowing that 3,966,000 BTU[182] are generated by each ton of TNT, we can convert Column 6, BTU[183]s in each tank to Atomic Bombs by dividing the BTUs[184] in Tank 1 [Column 6] by 3,966,000 [BTU[185]s per Ton] to obtain tons and divide the result by 20,000 [Tons of TNT per Atomic Bomb] to obtain Atomic Bomb-equivalent energy.

Column 7 contains the energy of fuel in each tank when it is full, measured in Atomic Bomb equivalent energy. Under these assumptions Tank 1 contains the equivalent energy of 11 Atomic Bombs.

The energy content of other tanks which contain flammable explosive fuels are computed using the same method,. Fuel Oil Number 2 contains 140,000 BTU[186]s of energy per gallon. Kerosene contains 135,000 BTU[187]s of energy per gallon. With 160,000 BTU[188] per gallon[189] Number 6 Fuel Oil has the highest energy content per gallon of all Mack Point[190] fuels.

This analysis indicates that when completely full, existing Irving Oil storage tanks at Mack Point[191], Searsport contain 2.5 Megatons of TNT, equivalent to 97 Atomic Bombs, If tanks were 50% full, and 25 % deflagration[192] adjustment were applied, the aggregate power of a thermal ignition would be [97 x 50% = 65 x 25 % =] 12 Atomic Bombs.

Coping with Disaster

LPG, gasoline, heating oil, and other fuels could create a conflagration with intense heat that water cannot completely extinguish. If all Mack Point[193] LPG, Gasoline, and heating oil exploded, all burnable material within over a mile would turn into ash in a very short time.

Wood ignition temperature is far lower than intense temperatures that would be generated by an LPG-created thermal explosion. Heat from this intense thermal explosion could ignite forest undergrowth and trees. On ignitable, hay, leaf, tree, and brush-covered forest ground LPG, gasoline, fuel oil, kerosene explosion-induced forest fire could spread rapidly to other trees and buildings. Releasing additional heat, exothermic brush, wood, and leaf combustion, could propagate fire many miles from the source.

Evacuations creating lethal traffic jams and accidents causing fatalities in surrounding communities, Searsport, Belfast, and Stockton Springs populations could perish quickly. Waldo, Knox, and

179 http://en.wikipedia.org/wiki/British_thermal_unit
180 http://en.wikipedia.org/wiki/British_thermal_unit
181 http://en.wikipedia.org/wiki/British_thermal_unit
182 http://en.wikipedia.org/wiki/British_thermal_unit
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186 http://en.wikipedia.org/wiki/British_thermal_unit
187 http://en.wikipedia.org/wiki/British_thermal_unit
188 http://en.wikipedia.org/wiki/British_thermal_unit
189 http://www.engineeringtoolbox.com/fossil-fuels-energy-content-d_1298.html
190 http://www.mackpoint.com/images/mackpoint_large.gif
191 http://www.mackpoint.com/images/mackpoint_large.gif
192 http://en.wikipedia.org/wiki/Deflagration
193 http://www.mackpoint.com/images/mackpoint_large.gif

Public Safety Impacts of DCP Midstream LPG Tank Proposal

Hancock County could burn completely before fires were suppressed, making thousands homeless, destroying property costing billions of dollars. Some people sheltered by impregnable environments might be able to survive.

Because for over 50 years Maine has not experienced major forest fires, Maine forest fire-fighting resources are scarce and inexperienced. LPG BLEVE[194] fire suppression would be difficult and ineffective. LPG thermal explosion creates forest fires traveling at speeds which would give many residents insufficient time to evacuate.

Maine State Law [37-B §783. DISASTER EMERGENCY PLAN] requires each municipality and county to have Disaster Emergency Management plans which identify potential disasters:
"*Each municipality, county and regional emergency management agency shall prepare and keep a current disaster emergency plan for the area subject to its jurisdiction. That plan must include, without limitation: [2003, c. 404, §10 (RPR).] 1. **Identification of disasters.** Identification of disasters to which the jurisdiction is or may be vulnerable, specifically indicating the areas most likely to be affected; "*[195]

Not all counties have completed disaster emergency plans yet, and few, if any; municipalities have identified LPG heat explosion-generated fires as potential disasters.

At this writing, Knox County had not yet approved a disaster emergency plan, but many of its municipalities Appleton, Union, St George, and Rockland had. .[196] In Appleton's plan a forest fire is listed as a potential disaster with "moderate" danger level.

How might warnings about approaching BLEVE[197]-induced forest fires reach towns soon enough for citizens to act?

As can be seen in on-line videos[198] truck or railroad tank explosions could put the entire coast of Maine at risk. In this video[199] an exploding Propane BLEVE[200] propelled a railroad tank car over 1000 feet: that weighed over 50 tons [http://www.youtube.com/watch?v=Xf3WKTwHpIU]

Searsport, Stockton Springs, and Belfast populations could be exterminated before LPG-gasoline fires burned out. Burning forest and buildings pose added danger; homes could be in ashes within hours. LPG ignition thermal explosions could very quickly incinerate other nearby towns. [201]

In addition to gasoline, diesel oil, fuel oil, and kerosene trucks, if the LPG tank is built up to 144 additional LPG trucks per day could also be loading LPG[202] every 10 minutes. LPG truck collision accidents could occur anywhere in the area. Although BLEVE[203]S of 10,000 gallon trucks would be smaller than 22,700,000 gallon tanks, truck BLEVE[204]S would be more likely, due to heavy LPG, fuel,

194 http://en.wikipedia.org/wiki/Boiling_liquid_expanding_vapor_explosion
195 37-B §783. DISASTER EMERGENCY PLAN Section 1 and 2
196 http://www.ci.rockland.me.us/vertical/Sites/%7BDE9EDD66-EFF4-4A6B-8A58-AA91254C1584%7D/uploads/CH2.pdf
197 http://en.wikipedia.org/wiki/Boiling_liquid_expanding_vapor_explosion
198 http://www.youtube.com/watch?v=Xf3WKTwHpIU
199 http://www.youtube.com/watch?v=Xf3WKTwHpIU
200 http://en.wikipedia.org/wiki/Boiling_liquid_expanding_vapor_explosion
201 http://en.wikipedia.org/wiki/Boiling_liquid_expanding_vapor_explosion
202 http://www.mackpoint.com/images/mackpoint_large.gif
203 http://en.wikipedia.org/wiki/Boiling_liquid_expanding_vapor_explosion
204 http://en.wikipedia.org/wiki/Boiling_liquid_expanding_vapor_explosion

kerosene, and gasoline trucks traffic in and out of Mack Point[205]. Today, without LPG Mack Point[206] gasoline, kerosene, and heating oil truck traffic is very heavy.

An accidentally-ignited fire in an empty Mack Point[207] heating oil tank, was reported by the Bangor Daily News last June.[208]

Although media has given superficial attention to public safety danger of a proposed Mack Point[209] LPG Tank, it has not deeply reported the story[210]. The Bangor Daily News covered protest assemblies against LPG, unnecessarily reporting the ages of quoted protestors [who were all seniors.] Television has ignored LPG safety issues and radio coverage has been minor. VillageSoup Journal which had better coverage, reported that LPG tank energy content would be 549,000 Tons of TNT but did not put it in context, it did not equate it to 27 Atomic Bombs.

Since DCP Midstream L.L.C[211]. is a Limited Liability Company[212], it may be able to avoid responsibility for its disasters. DCP owners Conoco-Phillips L.L.C[213]. and Duke/Spectra Energy L.L.C[214]. may be shielded by legal liability limits of L.L.C[215]. . L.L.C. " is a hybrid business entity having certain characteristics of both a corporation and a partnership or sole proprietorship. An L.L.C[216]., although a business entity, is a type of unincorporated association and is not a corporation. The primary characteristic an L.L.C. [217]shares with a corporation is limited liability, and the primary characteristic it shares with a partnership is the availability of pass-through income taxation. It is often more flexible than a corporation, and it is well-suited for companies with a single owner. "[218]

Insurance companies must estimate accident probabilities before pricing and issuing insurance to customers. Actuaries are likely to predict increased fire risk after an LPG tank were built, increasing

205 http://www.mackpoint.com/images/mackpoint_large.gif
206 http://www.mackpoint.com/images/mackpoint_large.gif
207 http://www.mackpoint.com/images/mackpoint_large.gif
208 http://bangordailynews.com/2011/06/06/news/crews-fighting-fuel-tank-fire-in-searsport/ref=mostReadBox
209 http://www.mackpoint.com/images/mackpoint_large.gif
210 Search for "LPG Searsport" in Portland Press Herald yields no results.
211 http://en.wikipedia.org/wiki/Limited_liability_company
212 http://en.wikipedia.org/wiki/Limited_liability_company
213 http://en.wikipedia.org/wiki/Limited_liability_company
214 http://en.wikipedia.org/wiki/Limited_liability_company
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217http://en.wikipedia.org/wiki/Limited_liability_company
218 http://en.wikipedia.org/wiki/Limited_liability_company

home insurance costs significantly. This would be a direct uncompensated loss of money for Maine residents.

Since higher insurance costs and living with the danger of being burnt alive at any moment are undesirable to potential home buyers, an LPG tank could reduce property values. This would be a direct uncompensated loss of money for Maine residents.

In contrast to the cost for residents, DCP[219] Midstream L.L.C[220]. will reap enormous profits for selling cheaply-obtained foreign waste gas at high prices to local consumers if LPG tank construction is allowed. A byproduct of crude oil production, LPG is cheap to obtain. Maine's environmental impact, insurance impact, and property value impact could make everyone poorer. As Ellen Brown said: "Wealth is what you have after your money is gone."

Instead of importing dangerous subterranean mined energy, it would be far more sensible for Maine to use local, existing, renewable, sustainable environment-compatible sources. Existing wood waste could provide years of energy needs without explosion danger or pollution. Biofuels[221], tidal energy,[222] biomass[223], cellulosic[224], solar photovoltaic[225], decentralized vertical axis wind[226], geothermal energy, [227] and solar thermal[228] are safe, renewable, sustainable energy alternatives to LPG.

Wood chips[229] or wood pellets[230] can be burned in wood stoves to create heat, generate electricity, propel steam engines, which in prior centuries powered trains and automobiles, and processed to create transportation bio-fuels. Electric vehicles could be recharged with renewable solar, vertical axis wind, wood chip generators, or other renewable energy sources. Unlike LPG, these technologies are local, safe, compatible with "the way life should be", do not explode, and produce livelihoods for local workers.

Renewable resources such as cellulosic [231]fuels, derived from forests are sustainable and not explosive. Biofuels[232] derived from cellulose[233] include cellulosic alcohols[234] which propel spark ignition engines, biodiesels[235], and dimethyl ether[236] which can replace diesel fuels. Renewable alternatives are far less polluting than most Mack Point[237] fuels and do not explode when they burn.

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219 DCP Midstream LLC is reportedly a joint venture of Conoco-Phillips and Spectra Energy - A sip-off of Duke Energy. It has proposed building a 22.7 Million gallon LPG tank in Searsport at Mack Point.
220 http://en.wikipedia.org/wiki/Limited_liability_company
221 http://en.wikipedia.org/wiki/Biofuel
222 http://en.wikipedia.org/wiki/Tidal_power
223 http://en.wikipedia.org/wiki/Biomass
224 http://en.wikipedia.org/wiki/Cellulosic_ethanol
225 http://en.wikipedia.org/wiki/Photovoltaic_system
226 http://en.wikipedia.org/wiki/Vertical_axis_wind_turbine
227 http://en.wikipedia.org/wiki/Geothermal_energy
228 http://en.wikipedia.org/wiki/Solar_thermal_energy
229 http://en.wikipedia.org/wiki/Woodchips
230 http://en.wikipedia.org/wiki/Wood_pellet
231 Cellulosic Fuels are derived from Cellulose which is in trees and grass, include Methyl Alcohol, Ethyl Alcohol, Butyl Alcohol.
232 http://en.wikipedia.org/wiki/Biofuel
233 http://en.wikipedia.org/wiki/Cellulose
234 Methanol, Ethanol, Butanol are nonexplosive locally produceable alcohols created from Cellulose derived from trees, grass..
235 http://en.wikipedia.org/wiki/Biodiesel
236 http://en.wikipedia.org/wiki/Dimethyl_ether
237 http://www.mackpoint.com/images/mackpoint_large.gif

[Photo is Irving Gasoline Tanks @ Mack Point[238], Searsport, ME by R. Parr]

Extinguishing LPG Fire

The most common method for extinguishing Class B LPG fire is smothering foam[239]. Combustion requires higher than ignition temperature and oxygen in contact with fuel. Fires can be extinguished by separating fuel from Oxygen, and lowering temperature below ignition point. Foam[240], Carbon Dioxide[241], BromoChlorodiFloromethane (Halon 1211) powder extinguishers can be used to extinguish gas, fluid, and petrol fires.

Foams [242]are stable masses of air-filled bubbles with lower density than oil, gasoline or water. Foams[243] work by blanketing fuel surface. smothering fire, separating surface of fuel from flames, cooling fuel, and suppressing release of flammable vapors. Carbon dioxide[244] gas liquifies[245] when compressed and it can be kept liquified[246] in pressurized cylinders vaporizing rapidly. Because Carbon Dioxide[247] is denser than air it blankets burning material and smothers flames. BromoChlorodiFloromethane[248], which does not undergo reaction, is easily liquified[249] at room temperature, has excellent properties for smothering fires.

Gas, Gasoline, heating, diesel fuel fires can be fought using sand, sodium bicarbonate,[250] and mono-ammonium phosphate ($NH_4H_2PO_4$). Endothermic[251] Sodium bicarbonate melting and decomposing

238 http://www.mackpoint.com/images/mackpoint_large.gif
239 http://en.wikipedia.org/wiki/Fire_fighting_foam
240 http://en.wikipedia.org/wiki/Fire_fighting_foam
241 http://en.wikipedia.org/wiki/Carbon_dioxide
242 http://en.wikipedia.org/wiki/Fire_fighting_foam
243 http://en.wikipedia.org/wiki/Fire_fighting_foam
244 http://en.wikipedia.org/wiki/Carbon_dioxide
245 http://www.thefreedictionary.com/liquified
246 http://www.thefreedictionary.com/liquified
247 http://en.wikipedia.org/wiki/Carbon_dioxide
248 [Halon 1211] CF2ClBr, carbon, fluorine, chlorine and bromine
249 http://www.thefreedictionary.com/liquified
250 (NaHCO3)
251 http://en.wikipedia.org/wiki/Endothermic

absorbs heat and produces Carbon Dioxide[252] and water which help smother flames.

To sum up, the proposed 22.7 Million Gallon LPG tank at Mack Point could be ignited by accident or sabotage in at least 19 ways.

When completely full a 22.7 Million Gallon LPG tank at Mack Point[253], Searsport, Maine, contains 549 Kilotons of TNT energy, equivalent to 27 Atomic Bombs like the one that destroyed Hiroshima, Japan.

The aggregate energy in sixteen existing Mack Point[254] fuel tanks containing 50 million gallons of flammable fuels when full, are equivalent to 97 Hiroshima-class Atomic Bombs. The aggregate energy at Mack Point if an LPG tank is built would be 2.5 Megatons, equal to 124 Atomic Bombs when full.

Class B fires involving Mack Point flammable fuels generate enormous amounts of heat and cannot be extinguished with water. Class B fires require smothering retardants equivalent to the amount fuels that are stored [50 to 77 million gallons.] If not extinguished Class B fires are likely to create enormous forest fires.

A Mack Point[255] disaster **c**ould destroy Searsport, Stockton Springs and many other Maine towns and cities. Since the impact of a Mack Point[256] disaster extends far beyond Searsport.

LPG Public Safety is far more than merely a Searsport issue. It should be managed by a higher level authority than the town of Searsport because it will impact far more people and property outside Searsport town borders than within them.

There is no evidence that Maine state and local governments could manage a disaster of this magnitude.

State and federal authorities mandated by law with protecting public safety should protect public safety as they are tasked to do.

Midcoast Maine area living costs could increase substantially due to construction of a 22.7 Mil;lion gallon LPG tank increasing insurance rates and increasing costs of public safety hazards, fire suppression and public safety.

Because risks associated with the LPG project are far higher than any benefit that could result, the 22.7 million gallon Mack Point LPG tank project should **not** be approved.

V. 1.4
1/19/2012
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252 http://en.wikipedia.org/wiki/Carbon_dioxide
253 http://www.mackpoint.com/images/mackpoint_large.gif
254 http://www.mackpoint.com/images/mackpoint_large.gif
255 http://www.mackpoint.com/images/mackpoint_large.gif
256 http://www.mackpoint.com/images/mackpoint_large.gif