

Communication from Public

Name: RC Petroleum Consulting

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Comments for Public Posting: This letter addresses Tim Saunders's so-called case study, "Backyard Mega-Bombs," about the Rancho LPG Facility at 2110 North Gaffey Street, San Pedro, CA. The supposed case study was posted on the LA City Clerk Connect for CF 11-1813-S8 on May 24, 2023. Background of the Author Tim Saunders, a former USC student and current medical research associate in Greenwich, Connecticut, authored a 2022 study (11-1813-S8_PC_PM_05-24-2023.pdf) that alleged an 8–10-mile blast radius at the Rancho Facility and made other claims about Rancho LPG. However, there is no evidence that Mr. Saunders has qualifications in petroleum engineering, chemical engineering, or process safety. (27) Tim Saunders | LinkedIn) On February 16, 2023, the Saving San Pedro Facebook page, managed by the San Pedro Homeowners United (SPPHU), featured a post titled "The Backyard Mega-Bomb." The final slide of the deck quotes Saunders, who identifies the source of his information regarding the Rancho Facility: "EH MATTERS is a National Institute of Environmental Health Sciences-funded training grant that offers USC undergraduates additional environmental health training. Ed Avol served as my faculty advisor, and Janet Gunter introduced me to the Rancho LPG issue." Funding for this work was provided through grants NIH: P50MD015705; P50ES026086; UH3OD02328, EPA: 83615801. Tim Saunders is listed as the author. My previous correspondence revealed that SPPHU has historically provided information about the Rancho Facility to elected officials and the public that is unsupported by regulatory or legal sources. The commenter cited data from SPPHU's Janet Gunter, which resulted in many inaccuracies in his study on topics such as blast radius, seismic activity, site security, and related issues. Based on an analysis of regulation and legal documentation, I will point out the numerous illogical and inaccurate conclusions in the study produced by Mr. Saunders. Note: Attachments could not be uploaded due to 5MB restrictions by City Clerk. Available upon request.

Clerk.CIS@lacity.org

Dear City of Los Angeles Clerk,

This letter addresses Tim Saunders's so-called case study, "Backyard Mega-Bombs," about the Rancho LPG Facility at 2110 North Gaffey Street, San Pedro, CA. The supposed case study was posted on the LA City Clerk Connect for CF 11-1813-S8 on May 24, 2023.

Background of the Author

Tim Saunders, a former USC student and current medical research associate in Greenwich, Connecticut, authored a 2022 study ([11-1813-S8 PC PM 05-24-2023.pdf](#)) that alleged an 8–10-mile blast radius at the Rancho Facility and made other claims about Rancho LPG. However, there is no evidence that Mr. Saunders has qualifications in petroleum engineering, chemical engineering, or process safety. [\(27\) Tim Saunders | LinkedIn](#)

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The Explosion

Mr. Saunders repeatedly compares LPG release from Rancho to a nuclear explosion, claiming the energy could rival that of a nuclear bomb and affect a radius of 3 to 10.5 miles, potentially impacting hundreds of thousands to millions of people. This comparison was also made by SPPHU attorney Anthony Patchett in correspondence with the Los Angeles City Attorney, but both the City and State Attorney General rejected it in their 2011 responses to Patchett. **(Exhibits 1 & 2)** Given these claims, it's important to assess the reasoning behind this theory.

Comparing the energy content of materials to that of an atomic bomb without context is a way to purposely mislead readers, as it doesn't explain how such events are possible. The following examples illustrate this point.

- The Hiroshima atomic bomb released 12.5 kt (kiloton of TNT) of energy.
- $1 \text{ kt} = 3.97(10)^9 \text{ BTUs of energy.}$
- Thus, one Hiroshima atomic bomb released $4.96(10)^{10} \text{ BTUs of energy}$

The commenter implies to estimate the potential energy stored in the two 12.5-million-gallon butane storage tanks by determining the total mass of butane and multiplying it by its heat of combustion. The resulting energy value is then compared to the energy released by the Hiroshima atomic bomb by dividing the total potential energy of the butane by the bomb's energy yield. This calculation is based on a specific sequence of assumed events being true.

1. The entire contents from both 12.5-million-gallon tanks must be released instantaneously. It is physically impossible for both tanks to vanish.
2. All of the 25 million gallons of butane must instantly vaporize upon release. This is physically impossible.
3. All of the 25 million gallons of butane must instantly mix with the exact amount of air such that the butane/air is a perfect stoichiometric mixture (to ensure 100% combustion). The amount of air required for this is approximately two billion pounds. This amount of air would be equal to a sphere with a diameter of 1,850 feet. This is physically impossible.
4. At this point, the commenter must imagine that the cloud now finds an ignition source and explodes. This is physically impossible (see note about vapor cloud explosions below).

Table 1 lists common materials with their heats of combustion and typical container sizes. The commenter suggests comparing each material's total energy to that released by the Hiroshima atomic bomb to demonstrate that any combustible material can represent a fraction or multiple of an atomic bomb's energy.

Table 1
Equivalent Number of Hiroshima Atomic Bombs for Common Materials

Material	Heat of Combustion (BTU/lb)	Storage Device	Material Density (lb/ft ³)	Total Mass (density x volume) (lb)	Total Energy (heat of combustion x total mass) (BTU)	Number of Hiroshima Bombs
Wood	6,000	1/2 cord (4 ft x 8 ft x 2 ft) or 64 ft ³ or the amount of wood loaded in on pickup bed	45 (Red Oak)	2,880	17.3 x 10 ⁶	0.00035
Gasoline	20,000	30 gallons (automobile gas tank) equal to 4 ft ³	45.4 (regular gasoline)	181	3.62 x 10 ⁶	0.00007
Coal	14,000	Railcar (1 hopper car) holds 110 long tons (110 x 2,000 lbs)	55 (Anthracite)	220,000	3.08 x 10 ⁹	0.06
Butane	21,200	Railcar (30,000 gallons or 4,000 ft ³)	37.4 (Butane)	149,600	3.17 x 10 ⁹	0.064
Crude Oil	18,100	Railcar (30,000 gallons or 4,000 ft ³)	57 (California crude oil)	228,000	4.13 x 10 ⁹	0.083
Gasoline	20,000	1 storage tank (60,000 barrels or 337,000 ft ³)	45.4 (regular gasoline)	15,300,000	3.06 x 10 ¹¹	6.17

Coal	14,000	100 railcar coal train (100 x 110 x 2,000 lbs.)	55 (Anthracite)	22,000,000	3.08×10^{11}	6.21
Butane	21,200	Two Rancho Storage tanks (25 million gallons or 3.34 million ft ³)	37.4 (Butane)	125,000,000	2.65×10^{12}	53.4
Crude Oil	18,100	1 VLCC (very large crude carrier, 1,000 feet long) with a capacity of 300,000 DWT (dead weight tons). The carrier holds 300,000 long tons x 2,240 lb/long ton	57 (California crude oil)	672,000,000	1.22×10^{13}	245

Table 1 shows that a material's total energy content depends on its heat of combustion and mass. For instance, using firewood highlights the problems with Mr. Saunders' statements.

1. The heat of combustion of red oak firewood is 6,000 BTU/lb.
2. One-half cord of firewood would fill the bed of a regular-size pickup truck (about 64 ft³).
3. The density of red oak firewood is 45 lb/ft³.
4. The mass of red oak firewood (density x volume) is 2,880 lbs.
5. The energy content of a pickup truck bed of red oak firewood (mass x heat of combustion) is 17.3 million BTUs.
6. Using Saunders' rationale that a pickup bed full of red oak firewood can instantly vaporize, mix with sufficient air, and explode, the total amount of energy, 17.3 million BTUs, can be released.
7. If this were even remotely possible, a pickup truck of red oak firewood would be equivalent to 0.00035 Hiroshima atomic bombs.

Similar cases can be made for other materials and quantities as shown in Table 1. Does any reasonable person believe the following?

1. A railcar of coal is equal to 0.06 atomic bombs?
2. A train of coal railcars (100 railcars) is equal to 6 atomic bombs?
3. A gasoline storage tank (60,000 barrels, a common size) is equal to 6 atomic bombs?
4. A 30,000-gallon railcar of crude oil (0.083 atomic bombs) is more dangerous than a 30,000-gallon railcar of butane (0.064 atomic bombs)?
5. A crude oil carrier (300,000 DWT) carrying California crude is equal to 245 atomic bombs?

Mr. Saunders' claim that the two 12.5-million-gallon butane tanks could explode with the force of the Hiroshima bomb is both physically impossible and misleading.

Difference Between a Butane vs. Nuclear Explosion

A butane explosion occurs when butane gas combines with oxygen and is ignited, resulting in rapid combustion. The energy released is derived from changes in chemical bonds and is significantly lower than the energy produced by nuclear reactions.

A nuclear explosion is powered by nuclear reactions—fission or fusion—that release energy millions of times greater than chemical blasts. For instance, the Fat Man bomb yielded 22 kilotons of TNT, vastly surpassing any chemical explosion, which rarely exceeds a few kilotons. The biggest nuclear detonation, Tsar Bomba, reached 50 megatons. Even beginners should recognize that butane and nuclear explosions differ fundamentally in their energy source, magnitude, and effects.

A butane explosion can damage structures, while a nuclear explosion destroys cities, causes radiation, and has lasting environmental effects. Though both produce shockwaves and heat, their scale differs significantly. The EPA regulates flammable substances (40CFR68); the NRC oversees nuclear plants (Title 10 CFR). The commenter seems unaware of these key differences.

Mr. Saunders' Nuclear Bomb Calculations

To see how the commenter got blast radii of 3 to 10.5 miles, let's review the formula behind Rancho's 3-mile figure.

$$D_{mi} = 0.0081 \times \left(.1^* \times W_{lb} \times \frac{HC_f}{HC_{TNT}} \right)^{\frac{1}{3}}$$

Where D = Distance to 1.0 psi over pressure (mi)

W_{lb} = Weight of flammable substance (lbs)

HC_f = Heat of combustion of flammable substance (Kj per Kg)

HC_{TNT} = Heat of explosion of trinitrotoluene (TNT) (4680 Kj per Kg)

Distance, miles = 0.0081 x (57,000,000 lbs x 45719)

kilojoules/kilogram/4680 kilojoules/kilogram for TNT) ^{1/3} = **3 miles.**

This is 6 times greater than Rancho estimated and covers an area of 28 sq. miles.

The commenter misstated the TNT-equivalent explosion overpressure from EPA documents and used the wrong formula for calculating the 1 psi overpressure distance. The correct formula is in the cited EPA reference: Chapter 4 of "General Guidance on Risk Management Programs for Chemical Accident Prevention (40 CFR Part 68)," March 2009, which details worst-case consequence evaluation for refrigerated liquid spills generating flammable vapor.

A vapor cloud explosion is specified as the worst-case scenario for flammable substances.

For the worst-case analysis for flammable substances, you need to estimate the distance to an overpressure endpoint of 1 pound per square inch (psi) resulting from a vapor cloud explosion of a cloud containing the largest quantity of the regulated flammable substance from a vessel or process pipeline failure. <https://www.epa.gov/sites/default/files/2013-11/documents/oca-chps.pdf>

“For the worst-case scenario involving a release of a regulated flammable substance (a flammable gas or volatile flammable liquid), you must assume that the quantity of the flammable substance is released into a vapor cloud and that a vapor cloud explosion results. You must estimate the distance to an endpoint of an overpressure level of 1 pound per square inch (psi) from the explosion of the vapor cloud.

- *If the flammable substance is normally a gas at ambient temperature and handled as gas or liquid under pressure or if the flammable substance is a gas handled as a refrigerated liquid and is not contained when released or the contained pool is one centimeter or less deep, you must assume the total quantity is released as a gas and is involved in a vapor cloud explosion.*

- *If the flammable substance is a liquid or a refrigerated gas released into a containment area with a depth greater than one centimeter, you may assume that the quantity that volatilizes in 10 minutes is involved in a vapor cloud explosion”.*

“As in the case of the worst-case release analysis for toxic substances, the worst-case distance to the endpoint for flammable substances is based on a number of very conservative assumptions. Release of the total quantity of a flammable substance in a vessel or pipe into a vapor cloud is generally would be highly unlikely. Vapor cloud explosions are also unlikely events; in an actual release, the flammable gas or vapor released to air might disperse without ignition, or it might burn instead of exploding, with more limited consequences. The endpoint of 1 psi is intended to be conservative and protective; it does not define a level at which severe injuries or death would be commonly expected. An overpressure of 1 psi is unlikely to have serious direct effects on people; this overpressure may cause property damage such as partial demolition of houses, which can result in injuries to people, and shattering of glass windows, which may cause skin laceration from flying glass”. <https://19january2021snapshot.epa.gov/sites/static/files/2013-11/documents/chap-04-final.pdf>

According to the guideline, *“if a flammable liquid or refrigerated gas is released into an area deeper than one centimeter, the amount that evaporates in 10 minutes should be considered for a vapor cloud explosion”.* The Rancho facility has accurately calculated the vaporized butane mass using EPA methodologies.

In the same Chapter 4 of the EPA guidance document referenced above, the following description of several explosion models is presented.

- *“To carry out the worst-case consequence analysis for flammable substances, you may use a TNT-equivalent model (i.e., a model that estimates the explosive effects of a flammable substance by comparison with the effects of an equivalent quantity of the high explosive trinitrotoluene (TNT), based on the available combustion energy in the vapor cloud - see Guidelines for Evaluating the Characteristics of Vapor Cloud Explosions, Flash Fires, and BLEVEs (1994) for additional information). Such models allow you to estimate the distance to a specific overpressure level, based on empirical data from TNT explosions. If you use a TNT-equivalent model, you must assume that 10 percent of the flammable vapor in the cloud participates in the explosion (i.e., you assume a 10 percent yield factor for the explosion). You do not have to use a TNT-equivalent model; other models are available that take into account more site-specific factors (e.g., degree of confinement of the vapor cloud). Generally, however, a TNT-equivalent model is the simplest to use”.*

C.1 Equation for Estimation of Distance to 1 psi Overpressure for Vapor Cloud Explosion

Risk Management Program Guidance for Offsite Consequence Analysis - Appendices (April 1999)

- *“For a worst-case release of flammable gases and volatile flammable liquids, the release rate is not considered. The total quantity of the flammable substance is assumed to form a vapor cloud. The entire contents of the cloud is assumed to be within the flammability limits, and the cloud is assumed to explode. For the worst-case analysis, 10 percent of the flammable vapor in the cloud is assumed to participate in the explosion (i.e., the yield factor is 0.10). Consequence distances to an overpressure level of 1 pound per square inch (psi) may be determined using the following equation, which is based on the TNT-equivalency method:*

$$D = 17 \times \left(0.1 \times W_f \times \frac{HC_f}{HC_{TNT}} \right)^{1/3} \quad (C-1)$$

where: D = Distance to overpressure of 1 psi (meters)
 W_f = Weight of flammable substance (kilograms or pounds/2.2)
 HC_f = Heat of combustion of flammable substance (kilojoules per kilogram) (listed in Exhibit C-1)
 HC_{TNT} = Heat of explosion of trinitrotoluene (TNT) (4,680 kilojoules per kilogram)

The factor 17 is a constant for damages associated with 1.0 psi overpressures. The factor 0.1 represents an explosion efficiency of 10 percent. To convert distances from meters to miles, multiply by 0.00062.

Alternatively, use the following equation for quantity in pounds and distance in miles:

$$D_{mi} = 0.0081 \times \left(0.1 \times W_{lb} \times \frac{HC_f}{HC_{TNT}} \right)^{1/3} \quad (C-2)$$

where: D_{mi} = Distance to overpressure of 1 psi (miles)
 W_{lb} = Weight of flammable substance (pounds)

These equations were used to derive Reference Table 13 for worst-case distances to the overpressure endpoint (1 psi) for vapor cloud explosions.

The correct use of equation C-2 would have the following parameters.

W_{lb} = Weight of flammable substance (pounds) = 132,000 lbs.
 This is the mass of butane that vaporized from the impoundment basin during the first 10 minutes of the release. This value is calculated internally by RMP-Comp and is not the entire mass of butane contained in one refrigerated tank.
 HC_f = Heat of combustion of butane = 45,719 kilojoules/kilogram
 HC_{TNT} = Heat of combustion of TNT = 4,680 kilojoules/kilogram

The use of the EPA RMP-Comp program for calculating the worst-case events that can occur at the Rancho facility provides the following information.

Table 1
Worst Case Distances Calculated Using RMP-Comp

Vessel	Mass or Volume of Material in Vessel	Passive Mitigation System	RMP-Comp Distance to 1 psi overpressure
12,500,000 gallons of a refrigerated tank of butane	27,034,000 kg (vessel 95 % full, 11,875,000 gallons)	Impoundment basin (vaporization rate reduction)	0.5 miles

C.3 Data for Flammable Substances

This section of Appendix C provides essential data for calculating regulated flammable substances as outlined in the guide. Exhibit C-1 lists heat of combustion values for all regulated flammable substances, while Exhibits C-2 and C-3 offer additional data for flammable gases and

liquids, respectively. Most information is sourced from the Design Institute for Physical Property Data and related compilations. Appendix D explains how the factors in Exhibits C-2 and C-3 were derived. <https://www.epa.gov/sites/default/files/2013-11/documents/chap-04-final.pdf>

The commenter incorrectly calculated the 1 psi distance using EPA explosion data, misrepresenting worst-case scenarios. Comparing an LPG vapor cloud explosion to a nuclear bomb is not supported by EPA regulation 40CFR68. The correct calculation method is available at the referenced EPA link:

<https://19january2017snapshot.epa.gov/sites/production/files/2013-11/documents/chap-04-final.pdf>

Other EPA-approved Methods for Off-site Consequence Modeling

- **RMP*Comp™** is a free program you can use to complete the Off-site Consequence Analyses (both worst case scenarios and alternative scenarios) required under the [Risk Management Program rule](#). When you use RMP*Comp, you don't need to make any calculations by hand, and the program guides you through the process of making an analysis. <https://www.epa.gov/rmp/rmpcomp>
- **ALOHA®** (Areal Locations of Hazardous Atmospheres) is the hazard modeling program for the [CAMEO® software suite](#) (Computer-Aided Management of Emergency Operations), which is used widely to plan for and respond to chemical emergencies. <https://www.epa.gov/cameo/aloha-software>.

EPA RMP Comp Input for RMP*Comp for Rancho Worst-Case Scenario

Following the prompts from RMP* Comp Software Program, the following information was input into RMP* Comp™ to determine Rancho's Worst-Case Scenario for a vapor cloud explosion (VCE).

Chemical	Butane
CAS Number	106-97-8
Threat Type	Flammable Gas
Scenario Type	Worst-Case
Liquid State	Liquified by Refrigeration
Quantity Released	57,222,500
Release Type	Vapor Cloud Explosion
Mitigation Measures	Impoundment Basin
Diked Area	121,379
Dike Height	20 Feet
Release Rate to Outside Air	23,800 Pounds Per Minute
Quantity Evaporated in 10 minutes	238,000 Pounds
Wind Speed	3.4 Miles Per Hour
Stability Class	F
Air Temperature	77* F
The data inputs into RMP* Comp provided the worst-case scenario below.	
Estimated distance to 1 psi overpressure:	0.5 Miles (0.8 Kilometers)

The RMP Comp worst-case scenario result is the same for using equation C-1 and Reference Table 13 for 1.0 psi overpressure to the endpoint prescribed by the EPA RMP.

Types of Chemical Release Scenarios: Explosions/Fires

The Center for Chemical Process Safety (CCPS) identifies five types of chemical explosion and fire hazards:

- **Boiling-Liquid-Expanding-Vapor Explosion (BLEVE)** - A type of rapid phase transition in which a liquid contained above its atmospheric boiling point is rapidly depressurized, causing a nearly instantaneous transition from liquid to vapor with a corresponding energy release. A BLEVE of flammable material is often accompanied by a large aerosol fireball, since an external fire impinging on the vapor space of a pressure vessel is a common cause. However, it is not necessary for the liquid to be flammable to have a BLEVE occur.
- **Flash Fire** - A fire that spreads by means of a flame front rapidly through a diffuse fuel, such as dust, gas, or the vapors of an ignitable liquid, without the production of damaging pressure.
- **Pool Fire** - The combustion of material evaporating from a layer of liquid at the base of the fire.
- **Torch Fire** - Refers to a high-temperature flame produced by the combustion of a fuel that is released under pressure. This type of fire is often associated with industrial processes, welding, or specialized applications where a controlled, intense flame is required. It can involve flammable gases, liquids, or a combination of both, creating a concentrated and powerful heat source.
- **Vapor Cloud Explosion (VCE)** -The explosion resulting from the ignition of a cloud of flammable vapor, gas, or mist in which flame speeds accelerate to sufficiently high velocities to produce significant overpressure.

I'll address Mr. Saunders' blast radius estimates by focusing on the vapor cloud explosion hazard, since it poses the highest off-site risk at the Rancho Facility.

Vapor Cloud Explosions

When a flammable vapor cloud forms due to the release of liquid or vapor from containment, several scenarios are possible:

1. The flammable vapor may not ignite and could disperse into the atmosphere until it is no longer flammable. In this situation, property damage and personal injury are unlikely.
2. If the vapor cloud ignites immediately after release, this can result in a jet fire and/or pool fire, with potential for personnel injury and equipment damage. A transition to vapor cloud deflagration or detonation is uncommon since the unignited cloud does not usually move into a congested or confined area before ignition. Studies indicate that vapor cloud explosions require congestion or confinement to occur.
3. If the vapor cloud is not ignited right away and there is minimal or no wind, it may spread over a wide area before finding an ignition source. Without entering obstructed or confined areas, ignition would likely result in a flash fire, which may cause personnel injury but limited equipment damage. The likelihood of deflagration or detonation occurring in this context is low.
4. In cases where the vapor cloud is not immediately ignited and there is little or no wind, a heavier-than-air cloud might spread extensively before ignition. If such a cloud encounters an obstructed or confined area, ignition may lead to deflagration within that

area. Depending on the physical layout and the properties of the gas, a transition from deflagration to detonation (DDT) may occur—this involves the flame front transitioning from subsonic to sonic velocity. Such an event may result in a vapor cloud explosion, potentially causing significant damage to the facility and serious harm to personnel.

Vapor Cloud Explosion Research

Vapor cloud explosion research includes:

- Numerical simulations of vapor cloud ignition, both in obstructed/unobstructed settings and with reactive chemicals.
- Multi-scale testing to verify simulations and analyze VCE physical evidence.
- Incident reviews that identify causes of detonation and align real-world data with modeling and experiments.

What Has Been Learned About Vapor Cloud Explosions?

Vapor Cloud Explosions (VCEs) are possible under certain conditions. A reactive fluid must be released to form a flammable vapor or aerosol cloud and mix with air within specific explosive limits. Low-reactivity hydrocarbons like propane or butane do not explode as liquids; they need to vaporize and create an appropriate air mixture. Only when these criteria and further conditions are met can a vapor cloud detonation take place.

1. Atmospheric conditions that support VCE typically include calm or low wind speeds, enabling the formation of a flat, pancake-shaped flammable vapor cloud over time.
2. The flammable portion of the vapor cloud needs to move into a confined or obstructed area. Obstructions may include process piping and vessels, stands of trees, or bushes and shrubs. Larger equipment, such as storage tanks, generally does not provide significant confinement or congestion.
3. The flammable vapor cloud must come into contact with an ignition source and ignite.
4. Burning vapor within the congested region must result in a deflagration.
5. The deflagration must become turbulent and energetic, leading to flame acceleration before a potential Deflagration-to-Detonation Transition (DDT) event.
6. A DDT event must occur for detonation; otherwise, only a deflagration will happen.

Concluding Remarks About VCE's

Vapor cloud explosions (VCEs) occur only when flammable vapors mix with air and are ignited. Though both explosion types produce damaging overpressures, VCEs need specific conditions to cause detonation and rarely use up all available fuel.

References

1. CCPS: Centre for Chemical Process Safety, Guidelines for Consequence Analysis of Chemical Releases, The American Institute of Chemical Engineering, New York, 1999.
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Modeling for Vapor Cloud Explosions

The Baker-Strehlow-Tang (BST) Model is the most widely used approach for predicting the consequences of vapor cloud explosions (VCEs). It estimates blast loads based on flame propagation characteristics, considering factors like confinement, congestion, and fuel reactivity. Key Aspects of the BST Model are:

1. **Flame Speed Classifications** – The model categorizes flame speeds based on environmental conditions, such as whether the explosion occurs in an open space or a confined area.
2. **Blast Load Prediction** – It uses blast curves to estimate overpressure and impulse at various distances from the explosion center.
3. **Damage Zone Estimation** – The model helps assess structural damage by predicting the intensity of the blast wave.
4. **Ground Effect Corrections** – Adjustments are made when explosions occur near the ground, as reflected in the updated methodologies model for the VCE.

The Kingery-Bulmash Equations, used by the commenter for TNT air blasts, do not suit fuel-air explosions (VCEs) due to different variables like fuel dispersion and ignition. Therefore, Mr. Saunders' VCE data and Rancho off-site calculations are invalid. This will be detailed later.

Results of an Explosion at the Rancho LPG Facility.

According to the commenter, an explosion at the Rancho Facility could result in fatalities exceeding 170,000 individuals within a three-mile radius and more than 1.315 million within ten miles. The resulting blast would likely cause widespread destruction of buildings and significant damage to port infrastructure, thereby adversely affecting the national economy.

Obviously, these claims are absurd and not supported by the Environmental Protection Agency (EPA) regulation 40CFR68. [eCFR :: 40 CFR Part 68 -- Chemical Accident Prevention Provisions](#)

The EPA's 40CFR68, part of the Clean Air Act, requires facilities that manage certain chemicals to establish and report a Risk Management Program. Referred to as the Chemical Accident

Prevention Provisions, this regulation applies to approximately 12,800 businesses and has been revised to include updated safety requirements.

According to this regulation, affected facilities must evaluate both "worst case" and "alternative" release scenarios regarding potential off-site impacts. For Rancho LPG, the Risk Management Program's "worst-case" scenario considers the release of an entire tank of refrigerated butane into a passive mitigation system, which could lead to a vapor cloud explosion producing a 1.0 psi overpressure endpoint, as defined by EPA 40CFR68 guidelines.

Chapter 4 of the USEPA RMP guidance describes the 1.0 psi overpressure endpoint used for bounding the explosion hazard as follows: *"An overpressure of 1.0 psi is unlikely to have serious direct effects on people; this overpressure may cause property damage such as partial demolition of houses, which can result in injuries to people, and shattering of glass windows, which may cause skin laceration from flying glass."* The RMP Guidance further states, *"Vapor cloud explosions are also unlikely events; in an actual release, the flammable gas or vapor released to air might disperse without ignition, or it might burn instead of exploding, with more limited consequences"*. [General Guidance on Risk Management Programs for Chemical Accident Prevention \(40 CFR Part 68\) - CHAPTER 4: OFFSITE CONSEQUENCE ANALYSIS \(April 2004\)](#). **It should be noted that Mr. Saunders used the outdated 1999 version of Chapter 4.**

Page 4-9 WORST-CASE RELEASES OF FLAMMABLE SUBSTANCES – 2004 Edition

- For the worst-case scenario involving a release of a regulated flammable substance (a flammable gas or volatile flammable liquid), you must assume that the quantity of the flammable substance is released into a vapor cloud and that a vapor cloud explosion results. You must estimate the distance to an endpoint of an overpressure level of 1 pound per square inch (psi) from the explosion of the vapor cloud.
- If the flammable substance is normally a gas at ambient temperature and handled as gas or liquid under pressure or if the flammable substance is a gas handled as a refrigerated liquid and is not contained when released or the contained pool is one centimeter or less deep, you must assume the total quantity is released as a gas and is involved in a vapor cloud explosion.
- **If the flammable substance is a liquid or a refrigerated gas released into a containment area with a depth greater than one centimeter, you may assume that the quantity that volatilizes in 10 minutes is involved in a vapor cloud explosion.** Since the butane in the large tanks at Rancho is refrigerated, this is the scenario used to calculate the "worst case."

To meet 40CFR68 requirements, Rancho used EPA RMP*Comp™, a web tool for Off-site Consequence Analyses under the Risk Management Program rule. RMP*Comp simplifies worst-case and alternative scenario analyses by eliminating manual calculations and works with Internet Explorer, Firefox, Chrome, and Safari.

Following EPA regulation 40CFR68, Rancho's "worst case" release scenario involves a 0.5-mile impact at 1.0 psi overpressure. Details are available in our RMP on file at the LAFD/CUPA office at 200 North Main Street in Los Angeles for public review.

The EPA has twice vetted our “worst case” scenario as being “to the letter of the law”.

- **(Exhibit 4)** is an email from EPA Region 9 Attorney Andrew Helmlinger and Rancho’s third-party legal counsel, Cliff McFarland, dated December 10, 2013. Attorney Helmlinger states that **“the EPA calculated Rancho’s RMP to be 0.5 miles, not 3.0 miles as asserted by Ms. Gunter, based on the EPA regulatory formula”**. This correspondence confirms Rancho’s “worst case” scenario in 73 documents released to Ms. Gunter under FOIA request EPA-R9-2014-002842. Despite the EPA validating Rancho’s RMP, Ms. Gunter continues to misrepresent the “worst-case scenario.”
- Page 6, **(Exhibit 4)** of the California State Lands Commission Report dated August 17, 2017, the Environmental Protection Agency (EPA) stated the following, *“As part of a risk management program, Rancho LPG is required to submit an Offsite Consequence Area determination or “OCA” which must be calculated based on federal regulations to show the area around the facility that would be impacted in the event of an accidental chemical release, before the chemical dissipated. This calculation is used to determine which schools should be notified and which emergency response agencies Rancho LPG should coordinate with in responding to incidents.*

“In May 2016, the U.S. Environmental Protection Agency received a petition from (SPPHU) community members requesting a re-examination of the risks associated with the Rancho LPG facility, requiring Rancho LPG’s parent company to resubmit Rancho LPG’s OCA, colloquially referred to as its ‘blast radius’. EPA staff have confirmed that it has completed the review of this petition and has confirmed that Rancho LPG’s OCA or blast radius was accurately calculated at approximately .5 miles, according to governing federal regulations. EPA staff noted that the Rancho LPG facility’s OCA is reduced due to the presence of a passive mitigation system, in the form of a large pit, that would collect most of the butane in the event one of the larger tanks failed. EPA staff also noted that the facility is safer than many other butane storage facilities because the butane is refrigerated and is not stored under pressure”.

EPA regulation 40CFR68 shows that Rancho LPG’s worst-case scenario has a verified blast radius of just 0.5 miles at 1.0 overpressure, not the 3–10 miles or the threat to 1.5 million people claimed by Mr. Saunders. These inaccurate claims are not per EPA 40CFR68.

Seismic Activity and Unstable Geology

Earthquake Fault Information

SPPHU members have repeatedly made unsupported claims about faults at the Rancho site, including alleging three faults under the tanks and calling it the only earthquake rupture zone in the Harbor Area.

Fault Mapping and Designation

Since 1860, the California Geological Survey has mapped the state's earthquake faults and seismic risks. Following the 1971 San Fernando earthquake, the Alquist-Priolo Act restricted most new buildings on active fault lines to mitigate damage from future ruptures.

Surface fault rupture is when a fault breaks through the Earth's surface, as seen in the 1992 Landers Earthquake, which caused about fifty miles of visible ruptures. Not all earthquakes cause this; for example, the 1989 Loma Prieta Earthquake's effects remained underground.

Surface rupture typically occurs along existing faults, either suddenly during earthquakes or gradually as fault creep. The Hayward Fault in Contra Costa and Alameda Counties shows both types, with a sudden rupture in 1868 and ongoing slow movement affecting infrastructure.

CGS Special Publication 42 outlines 64 Alquist-Priolo fault rupture zones in California, excluding the Palos Verdes fault. It lists 104 affected cities, not including San Pedro. Fault classification authority lies with CGS, not USGS. See link: [Special Publication 42: Earthquake Fault Zones - A Guide for Government Agencies, Property Owners / Developers, and Geoscience Practitioners for Assessing Fault Rupture Hazards in California \(2018\)](#)

CGS CalARP Guidelines: Definition and Description of a "Surface Fault Rupture"

2.2 Fault Rupture – Identify fault rupture zones near or under the site. A fault is a crack in the Earth's crust where sections have moved horizontally or vertically. Even minor ground ruptures can severely damage structures and pipelines on or crossing the fault. The best way to prevent damage is to avoid building near active faults.

Under the 1972 Alquist-Priolo Act, the State Geologist must identify "Earthquake Fault Zones" along California's active faults. Interactive maps are available on the California Geological Survey website at <https://maps.conservation.ca.gov/cgs/EQZApp/>. This document now provides guidelines for assessing fault rupture hazards in California and links to online resources for fault maps.

Rancho's 2019 CalARP Report Findings

2.2 Seismic Hazard

"The seismic hazard at the site is influenced by the proximity to the Palos Verdes and Newport-Englewood faults. The shortest horizontal distance between the facility and the governing faults is less than one mile to the Palos Verdes Fault and seven miles to the Newport Inglewood Fault".

2.3 Secondary Seismic Hazards

An evaluation for secondary seismic hazards such as ground surface rupture, slope failure, and liquefaction was performed. Our findings along with findings presented in the geotechnical report dated July 19, 2010 (Reference 11) are as follows (see Appendix A and C):

- "The site is less than one mile from the Palos Verdes Fault as shown on page 3 of Appendix C, but is not within an Alquist Priolo Special Studies Zone. There is no identified surface fault trace that underlies or is in close proximity to the site (Reference 6 and 7)".

Environmental Protection Agency (EPA) – Third-Party Geotechnical Study and Report

In 2012, the EPA commissioned Geotechnologies, Inc. to study the Rancho facility. Key fault information is detailed on pages 7 and 8 of their report dated December 20, 2012. ([Exhibit 3](#))

- "The site is not underlain by the surface trace of any known faults".

- *“The Palos Verdes Fault has not been designated by the California Geological Survey (CGS) with an Earthquake Fault Rupture Zone”.*
- On page 8 the Report declares, *“The nearest CGS-designated Earthquake Fault Zone (Alquist-Priolo) is for the Newport-Inglewood fault, located 6.6 miles to the northeast”* of the facility.
- **To clarify, Geotechnologies serves as an expert consultant for the EPA, not for Rancho.** For the record, SPPHU member Janet Gunter obtained this report through FOIA request, EPA-R9-2013-001262.

Los Angeles Department of Building and Safety (LADBS)

ZIMAS is an online tool provided by City Planning that displays zoning, land use, and property details for Los Angeles.

The ZIMAS application supplies zoning information for individual properties. Users can search within ZIMAS using criteria such as property address, street intersection, assessor parcel number, case number, community plan area, council district, certified neighborhood council, PIN, legal description, and map sheet.

Using the LADBS Zimas application to search Rancho’s address at 2110 North Gaffey Street, San Pedro, CA, revealed the following seismic hazard information.

- Nearest fault (Distance in km) – Within Fault Zone
- Nearest Fault (Name) – Palos Verdes Fault Zone
- Region - Transverse Ranges and Los Angeles Basin
- Fault Type – B
- Alquist-Priolo Fault Zone – No
- Landslide – Yes (see Rancho’s 2019 CalARP Report)
- Liquefaction – Yes (see Rancho’s 2019 CalARP Report)
- Preliminary Fault Rupture Study Area – Palos Verdes
- Tsunami Hazard Area - No

On July 17, 2015, LADBS designated the Santa Monica, Hollywood-Raymond, and Palos Verdes faults as preliminary fault rupture study areas. Developers must survey these sites before construction. Due to CGS delays and funding shortages, LADBS manages the studies, which are then reviewed by CGS for final Alquist-Priolo Fault Rupture Zone designation.

[Earthquake: Los Angeles' preliminary earthquake fault study zone - Documents - Los Angeles Times](#)

According to the LADBS Zimas Parcel Profile, the Rancho LPG Facility is located within the LA Preliminary Fault Area but is not in a CGS-designated Alquist-Priolo Fault Zone. Although the facility is near a seismically active fault area, it has not been classified as an “Earthquake Rupture Zone,” as referenced by the commenter.

California Governor’s Office of Emergency Services (CalOES)

Cal OES manages disaster response in California by coordinating state and federal resources, including FEMA support, and assists local communities with planning, preparedness, response, and recovery.

CalOES MyHazards website

Hazard data for Rancho LPG at 2110 North Gaffey Street, San Pedro 90731, was identified using the MyHazards tool.

Earthquake Risk

- *“The facility is within a Liquefaction Zone Area requiring investigation”*. In 2010, Rancho hired a third-party Geotechnical Firm (GMU) to conduct boring at the site.
- *“The facility is not within an Earthquake Fault Zone of Required Investigation”*.

Flood Risk

- *“The facility is clearly not within a FEMA/DWR Awareness/Regional Studies/USACE Comprehensive Study”*.

Fire Risk

- *“You are outside a Fire Hazard Zone. The State Responsibility Area (SRA) is the area of the state where the State of California is financially responsible for the prevention and suppression of wildfires. SRA does not include lands within city boundaries or in federal ownership”*.

Tsunami Risk

- *“You are outside a Tsunami Hazard Zone”*.
- *“This location is not within a tsunami hazard zone. However, when near the coast, still be aware of tsunami warning signs as these events can be unpredictable”*.

Rancho has always acknowledged its proximity to a seismic-sensitive area and has addressed related concerns. The Palos Verdes fault is not classified as an Alquist-Priolo "fault rupture zone" by the California Geologic Survey (CGS). Since 2015, it has been in a "preliminary fault rupture study area" set by LADBS; only CGS can officially designate Alquist-Priolo zones.

CGS findings and agency reports do not support the commenter's claims that the Rancho Facility is in a fault rupture zone or that three faults run beneath the butane tanks.

Seismic Information

Initial Seismic Assessment of the 25mm Gallon Butane Tanks and the Facility

In 1977, Governor Jerry Brown ordered the CPUC to assess safety risks at the Petrolane (Rancho) Facility, focusing on updated seismic criteria for the Palos Verdes fault to determine if the tank could withstand a major earthquake.

1977 Seismic Re-evaluation Assessment Report by EDAC

Due to concerns from the 1977 CPUC Report, LADBS required a seismic re-evaluation of Petrolane's two low-pressure refrigerated tanks before permitting. In December 1977, EDAC used criteria from Converse Davis Dixon Associates and data from Chicago Bridge & Iron Company to verify that the 300,000 bbl tanks could withstand a magnitude 6.5–7.2 earthquake on the Palos Verdes Fault without rupturing or leaking.

The EDAC Report (pages 2-1) summarizes: *"This section outlines criteria for key seismic tank response modes and lists parameters like tank and fluid periods used in the evaluation." Compliance with the criteria given here will demonstrate that the Petrolane LPG storage tanks have an adequate factor of safety against rupture and the spillage of contents when subjected to maximum credible earthquake ground motions associated with the nearby Palos Verdes fault”*.

On September 29, 1978, the Los Angeles Department of Building & Safety issued Permits #59625 and #59626 to Petrolane for two low-pressure tanks, following EDAC's seismic reevaluation report.

State of California - Seismic Regulation CalARP

Since 1998, CCR Title 19 Division 2 Chapter 4.5 has mandated seismic assessments for hazardous facilities under the CalARP Program. CalARP aims to reduce the potential release of regulated substances that could affect the public or the environment.

The California Geological Survey (CGS) designates zones at risk of ground failure due to liquefaction, landslides, or surface fault rupture, which may increase earthquake-related impacts. The California Building Code separately addresses the risk associated with strong earthquake shaking. Seismic assessments are required by the CalARP Program, and this code includes updated criteria reflecting guideline revisions from March 2014. It applies to covered processes, stationary sources, and structural systems that have the potential to cause offsite releases of regulated substances.

The 5-Year Seismic Revalidation Standards and Requirements

Seismic revalidation is mandated every five years. In 2019, Rancho's CalARP assessment was conducted per the 2016 California Building Code (CBC) and ASCE 7-10 standards, which require that equipment seismic capacity be assessed using the Risk-Targeted Maximum Considered Earthquake (MCER) criteria. <https://earthquake.usgs.gov/designmaps>

Responsible Engineer

Per the 2019 CalArp Guidelines (Page 6, Item 1.4), seismic evaluations must be conducted or supervised by a California-registered Civil, Structural, or Mechanical Engineer with seismic expertise. In 2019, Rancho hired a qualified third-party engineer to perform the required seismic assessment, as confirmed by their signature on Page 39, Item 5 of Rancho's 2019 CalARP Report.

Item 1.2 Approach of the Seismic Assessment – Rancho's 2019 CalARP Report

Following the Title California Accidental Release Prevention (CalARP) Program, the following five tasks were performed:

- Develop the seismic ground motion for the site.
- Screen seismic-induced secondary hazards for the site.
- Perform a detailed seismic walkdown review of the covered tanks & equipment.
- Conduct seismic analyses of the equipment noted in section 1.1.
- Prepare a seismic report to document the findings.

Key Findings in Rancho's 2019 CalARP Report

Section 2.2 Site Seismic Hazard (Request Report from Rancho)

"The seismic hazard at the site is influenced by the proximity to the Palos Verdes and Newport-Inglewood faults. The shortest horizontal distance between the facility and the governing faults is less than one mile to the Palos Verdes Fault and seven miles to the Newport-Inglewood Fault.

According to the CalARP guideline (Reference 3), the seismic hazard at the site should be determined using the 2016 California Building Code (Reference 5). The current CBC is founded on the 2015 International Building Code, which is itself derived from the 2010 edition of ASCE 7.”

The 2016 CBC adopts a Risk Targeted MCER with a 1% probability of structural collapse in 50 years, whereas the 2007 CBC implemented an MCE with a 10% chance of exceedance over the same period. As a result, the design acceleration values are decreased by 19% for short-period rigid equipment and by 23% for longer-period equipment.

This report utilizes MCER Spectral Contour Maps from the 2016 CBC and 2010 ASCE 7-10. The evaluation uses a DBE ground motion spectrum set at two-thirds of the adjusted MCER values, accounting for soil effects. Appendix C summarizes seismic hazard parameters for the Rancho LPG facility per the 2016 CBC method.

- $S_s = 1.668$ (mapped MCER spectral response acceleration parameter at short periods)
- $S_1 = 0.644$ (mapped MCER spectral response acceleration parameter at a period of 1 sec.)
- $SDS = 1.112$ (design spectral response acceleration parameter at short periods)
- $SD1 = 0.644$ (design spectral response acceleration parameter at a period of 1 sec.)
- $PGA = 0.68$ (peak ground acceleration)

Section 2.3 Secondary Seismic Hazards – Landslides and Liquefaction

Secondary seismic hazards such as surface rupture, slope failure, and liquefaction were assessed. Key findings, along with those from the July 19, 2010 geotechnical report (Reference 11), are summarized below (see Appendix A and C):

- **Surface Fault** – *“The site is less than one mile from the Palos Verdes Fault as shown on page 3 of Appendix C, but is not within an Alquist Priolo Special Studies Zone. There is no identified surface fault trace that underlies or is in close proximity to the site (Reference 6 and 7)”.*
- **Landslide** – *“The area has a moderate risk for landslide or slope failure based on the State of California Seismic Hazard Zone map produced by the California Geological Survey (Reference 10 and Appendix A). However, the site-specific geotechnical report by GMU Geotechnical, Inc. indicates there is a low potential for landsliding or slope failure behind the 13-million-gallon butane tanks”. **Therefore, no damage is expected to the tanks. Limited damage to the piping on the hillside may occur, but the piping contains only gas (no liquid) and this would be automatically shut off”.***
- *“The area is prone to a potential for liquefaction of supporting soils based on the State of California Seismic Hazard Zone map produced by the California Geological Survey (Reference 10 and Appendix A). However, the site-specific geotechnical report by GMU Geotechnical, Inc. reports that the groundwater at the site is at 13 feet above mean sea level. The site’s flat area is about 50 feet above sea level so this places the ground water 37 feet below the surface of the two 13-million-gallon butane tanks and the five horizontal 60,000-gallon tanks. **This same report states that the San Pedro Formation that underlies each of the tanks reviewed in this report is dense to very dense (Class SD soil) and that liquefaction potential is low to very low. We would therefore not expect any loss of inventory on the site due to liquefaction-induced failure modes. “Based on the***

evaluation for secondary seismic hazards, it is concluded that ground shaking is the most significant seismic hazard at this site”.

Section 3.2.2 Refrigerated 13 Million Gallon Tanks

“The two 13 million gallon (noted as 300,000 barrel on I.D. plate) refrigerated storage tanks are 171 feet in diameter and about 80 feet in height to the low roof line (Figures 3-13 and 3-14). The storage tanks have double walls with the inner tank containing butane. The inner tank is anchored to a concrete foundation by 264 straps that have a ½-inch by 4-inch cross section. The straps are primarily for hold down due to internal pressure but also act to hold the tank down during an earthquake. Failure of this type of tank is usually due to elephant foot buckling at the bottom of the vertical shell due to compressive forces resulting from earthquake-induced overturning moment. The critical stress for elephant foot buckling was computed to be 1,563 psi in the 0.993-inch-thick lower ring. The calculated stress (using the 2007 CBC and an importance factor of 1.5) was 1,025 psi for the spectral acceleration derived from the seismic hazard ground motion response spectrum on page 6 of the calculations (Appendix C). Since the current 2016 CBC has a lower seismic hazard ground motion than the original CalARP evaluation, the previous calculation is adequate”.

“Tank sliding was checked. The base shear from the original CalARP evaluation performed in 2009 is 15,271 kips. The resistance to sliding was calculated to be 15,666 kips based on an assumed coefficient of friction of 0.25. The geotechnical report dated July 19, 2010 states that a reasonable coefficient of friction is 0.32, which results in a resistance to sliding of 20,052 kips and a greater margin of safety. In addition, the tank bottom is conical with a 1-inch rise per ten feet of radius and the bottom plate is fabricated by overlapping steel plates. This increases the effective coefficient of friction. The slosh height was computed to be about 13.5 feet in the CalARP evaluation performed in 2014. The freeboard above a full tank is about 6.75 feet; however, roof damage is not likely to occur from sloshing, as the roof appears to have been designed for sloshing. The roof plates are 1 ¼ inches thick at the edges and the wall plates are 0.993 inches thick at the top. These tanks have domed roofs which have a much higher capacity for sloshing than conical roofs found on smaller tanks or non-refrigerated tanks, which may have interior columns to support the roof. In addition to the leak detection equipment (Figure 3-27), the tanks also have cathodic protection using a cathodic rectifier (Figure 3-24) and a containment pit”.

“The inlet and outlet piping of these tanks were reviewed during the walkdown. Flexible connections are provided at the interface between the tank and piping, allowing some differential movement between the tank and soil (Figures 3-15 and 3-16). Automatic shutoff valves at the inlet and outlet locations on the 13-million-gallon tanks will prevent the release of significant amounts of product if the pipe supports fail during an earthquake, causing damage to the pipes (Figure 3-17)”.

Rancho’s 2019 CalARP Report: Conclusion on Refrigerated 13 Million Gallon Tanks 3.2.2:

“The tanks did not fail under CalARP seismic hazards.”

The LAFD/CUPA audited Rancho's CalARP in August 2019 with no violations. Required seismic reports were submitted in 2009 and 2014, and SPPHU holds Rancho's 2009 CalARP from an EPA FOIA request.

Environmental Protection Agency (EPA) Third-Party Seismic Report

The Federal RMP in EPA regulation 40CFR68 does not include a seismic component. In 2012, the EPA commissioned Strong Motions, Inc. to conduct a seismic hazard analysis for Rancho's low-pressure refrigerated butane tanks. The results are provided on page 15 of the final report dated May 16, 2012.

- With regards to sloshing, *"Tanks with 67' of liquid are expected to remain operational following the 475-year MRP ground shaking"*.
- With regards to uplift and/or sliding, *"Tanks with 67' of liquid are expected to safely hold their contents following the 2475-year MRP ground shaking"*.

SPPHU received this report through (Gunter) FOIA EPA-R9-2013-001262. Strong Motions, Inc. consults for the EPA, not Rancho.

Seismic evaluations—including those from the 1997 CPUC, 1977 EDAC, 2019 CalARP, and 2012 Strong Motions Assessment—confirm that Rancho LPG tanks met seismic standards at construction and remain compliant. Therefore, concerns about the butane tanks' ability to withstand major seismic events are inconsistent with current regulatory assessments for the facility.

Terrorism Threat and Rancho is a Tier 1-Rated Facility

The Chemical Facility Anti-Terrorism Standards (CFATS), issued by the U.S. Department of Homeland Security, are risk-based regulations intended to secure high-risk chemical facilities from threats like theft or sabotage. Established under Section 550 of the 2007 Homeland Security Appropriations Act, CFATS requires these facilities to assess vulnerabilities and implement site security plans.

The regulation outlines 18 Risk-Based Performance Standards (RBPSs) for facilities, such as perimeter security, access control, personnel security, and cybersecurity. Facilities have the flexibility to select their security measures provided they satisfy DHS requirements, which are assessed through security plans and inspections. The guidance supports facility compliance with CFATS and will be periodically revised based on feedback from DHS.

Under the Chemical Facility Anti-Terrorism Standards (CFATS) program, the Cybersecurity and Infrastructure Security Agency (CISA) assigns chemical facilities to four risk-based tiers based on their vulnerability, potential consequences, and threat level in the event of a terrorist attack.

Tiering ... - CISA] (<https://www.cisa.gov/resources-tools/programs/chemical-facility-anti-terrorism-standards-cfats/cfats-tiering-methodology>).

The tier ratings are:

- Tier 1 – Highest risk, about 5% of facilities.
- Tier 2 – High risk, about 17% of facilities.
- Tier 3– Moderate risk, about 44% of facilities.
- Tier 4 – Lowest risk, approximately 34% of facilities.

Under the Chemical Facility Anti-Terrorism Standards (CFATS) program, facilities were required to implement security measures according to their risk-based tier assignments. The Risk-Based Performance Standards (RBPS) outlined security requirements that differed by tier level.

Security measures included:

- Tier 1 (Highest Risk): Requires stringent measures such as perimeter restrictions, access control, intrusion detection, and response planning.
- Tier 2 (High Risk): Implemented strong security measures similar to Tier 1, with some adjustments in stringency.
- Tier 3 (Moderate Risk): Focused on screening and controlling access, securing site assets, and establishing cybersecurity protections.
- Tier 4 (Lowest Risk): Emphasized basic measures like employee training, inventory controls, and incident response planning.

On July 28, 2023, Congress allowed the CFATS program to expire due to funding issues, and the Cybersecurity and Infrastructure Security Agency (CISA) is no longer able to enforce CFATS regulations. Facilities are now encouraged to voluntarily maintain security practices.

At a public meeting on September 10, 2014, EPA and DHS/CFATS officials told about 200 San Pedro residents that the Rancho LPG facility on North Gaffey Street meets federal regulations. Director Wulf stated that while the security plan can't remove all risks, it reduces them. He added that around **3,200 facilities** are classified as **high-risk** and must follow security measures. [Critics not satisfied by assurances that Rancho LPG storage tanks in San Pedro meets all federal standards – Daily Breeze](#)

The Chemical Facility Anti-Terrorism Standards (CFATS) program designates facility tier ratings as Chemical-Terrorism Vulnerability Information (CVI), which is protected by law from public disclosure per 6 CFR Part 27, § 27.400. Only individuals who have completed CVI training and hold the appropriate clearance are permitted to access this information; unauthorized disclosure may result in a \$25,000 penalty.

DHS/CFATS Director Dave Wulf indicated that Rancho is one of 3,200 high-risk facilities, but did not specify its tier rating. As an authorized CVI attendee, I can confirm that this information was not shared, because sharing it would have been considered a CFATS security violation. Furthermore, I would have reported this violation to DHS.

The terrorism case from 1999 involving two militia members referenced by the commenter is unrelated to Rancho. Statements regarding potential attacks on Rancho are not supported by available information, and DHS officials have verified that Rancho meets current security standards.

Other False Statements about The Rancho Facility by Mr. Saunders

1. Page 2 – “The Facility was built to last only 25 years”.

Mr. Saunders and SPPHU have not provided any regulatory or legal documentation for this claim, which is also referenced regarding the refrigerated butane tanks on page 8.

The Rancho tanks, constructed in 1973 according to API Standard 620R, meet the requirements for aboveground welded storage tanks as outlined in API 650, 653, and 620. API 620 pertains to large, low-pressure carbon steel tanks intended for refrigerated products (+40°F to -60°F) as specified in Appendix R and does not establish a 25-year design life limit.

https://www.apiwebstore.org/standards/620?utm_source=navigation&utm_medium=web&utm_campaign=apitowebstore

API RP 575 outlines inspection guidelines for atmospheric and low-pressure storage tanks, which are intended to complement API 653 standards related to post-commissioning integrity. The document states that tank design life is determined by corrosion rates and required minimum thickness, instead of relying on pre-construction lifespan estimates.

<https://inspectioneering.com/tag/api+rp+575>

2. Page 3 – “Rancho has the highest possible risk ranking while not requiring any protection”

At a public meeting on September 10, 2014, officials assured about 200 San Pedro residents that Rancho LPG meets federal regulations and has a security plan to mitigate, but not eliminate, risks. DHS/CFATS Director Wulf mentioned that around 3,200 high-risk sites must take similar measures. **See the Terrorism Threat section above for more details.**

3. Page 3 –“Rancho revokable (rail) permit can be revoked at any time by the City Council”

May 31, 2012, letter to BOHC – *“The City Attorney's Office finds that the Harbor Department has contractual authority to terminate RP No. 10-05 pursuant to paragraph 3 of RP No. 10-05. Termination of RP No. 10-05 would result in a loss of insurance, indemnification, and rents to the Harbor Department that are provided under RP No. 10-05. Moreover, termination of RP No. 10-05 would not terminate rail service to Rancho as such service would continue to be provided by PHL under the San Pedro Bay Harbor Rail Operating Permit (Permit, 1989). The City Attorney's Office has reviewed and analyzed the relevant legal authorities and has found that the Harbor Department is not authorized to abandon or discontinue the railroad spur track that is the subject of RP No. 10-05. Abandonment or discontinuance of the railroad spur track that serves Rancho requires the approval of the STB, which has exclusive jurisdiction over such matters”.*

On March 6, 2017, the Surface Transportation Board (STB) issued a decision on a petition (Docket No. FD 36065), filed September 12, 2016, by San Pedro Peninsula Homeowners United and John Tommy Rosas. The decision addressed a declaratory order concerning the "temporary rail permit" for rail movements involving the Port of Los Angeles Harbor Department and Rancho LPG Holdings, LLC. **STB rejected in full the SPPHU petition.**

The STB confirmed its exclusive jurisdiction over the track in question, which is used by Rancho LPG for transporting hazardous materials, and stated that state entities cannot impose requirements that restrict these rail operations. *“Rail carriers, including Pacific Harbor Line, Inc. (PHL), have a statutory common carrier obligation to transport hazardous materials upon reasonable request, and any permit terms attempting to restrict this are preempted”.*

4. Page 5 – “These tanks have the same energy output as a nuclear bomb”.

This ridiculous claim was covered in detail on pages 1-3 of this letter.

5. Page 6 – “This facility should not be considered 'safe’.”

Governor Jerry Brown assigned the California Public Utilities Commission (CPUC) to coordinate a multi-agency safety analysis of the Petrolane (Rancho) Facility following concerns raised by local community members. The objective was to evaluate potential hazards to the surrounding area and compile a detailed safety report. The task force comprised the City of Los Angeles Department of Building and Safety (LADBS), City of Los Angeles Fire Department (LAFD), City of Los Angeles Harbor Department (LAHD), United States Coast Guard (USCG), California Department of Industrial Safety (CDIS), Coastal Commission (CC), and California Public Utilities Commission (CPUC). Petrolane representatives facilitated facility tours and provided requested operational and technical data.

A CPUC-led task force’s 135-page report to Governor Brown in September 1977 found no evidence that the Petrolane facility was unsafe or should be closed. Regulatory agencies have since audited and inspected the site regularly, with Rancho maintaining a strong safety record. No regulatory or legal authority supports allegations that the facility is unsafe, contrary to the commenter’s claim.

6. Page 7 – “Not built to the standards of its time’.”

The commentator offered no evidence for this claim. The 1977 CPUC Report to Governor Jerry Brown (Appendix 1) lists 42 construction permits obtained by Petrolane from Los Angeles agencies, including seven from LAFD, and outlines 21 codes enforced during construction—most of which are regularly updated, requiring the Rancho facility to comply with current standards. I request that the commenter or their SPPHU advisor provide regulatory or legal proof that the Petrolane (Rancho) Facility failed to meet applicable construction standards.

7. Page 7 – “Butane is still transported from the facility via pipeline and tanker truck’.”

While the mistake is minor, it reveals the commenter’s unfamiliarity with the Rancho Facility, as anyone well-informed knows, butane is moved by pipeline, trucks, and rail.

8. Page 8 – “Butane leaking from the tank would cause the liquid to absorb heat from the surrounding air and immediately undergo a phase change from liquid to gas’.”

EPA expert consultant Daniel Crowl addressed this allegation in an April 11, 2011, letter to EPA Region 9 Mary Wesling, explaining the effects of a liquid butane release from a refrigerated tank. *“The second approach (refrigeration case) is to refrigerate the butane to keep the temperature below its normal boiling point. Since the refrigeration, not the pressure, maintains the butane as a liquid, the butane liquid can be stored in a low-pressure vessel. The pressure in this vessel must be maintained at a pressure equal to or above the vapor pressure of the liquid butane at 28°F, which is 0.94 atm absolute. A small amount of nitrogen is probably added to the vapor space of the vessel to maintain the pressure slightly above the outside pressure - for this specific butane case, the storage vessel pressure is slightly less than 1 psig. If a hole develops in the tank below the liquid level, the discharge rate of the liquid through the hole will be smaller than the discharge rate for the pressure case due to the lower pressure in the vessel.*

Furthermore, none of the butane liquid will flash into vapor until its temperature is increased to its boiling point of 31.1°F. The liquid will drop to the ground and form a pool of boiling butane, with the boiling rate determined by the heat transfer from the ground. The boiling rate

*for this pool will initially be high since the ground is warm, **but the boiling rate will diminish as the ground is cooled by the colder butane.** The rate at which butane vapor is formed in this case will be much less than for the pressure case. Thus, the geometric extent of the vapor cloud will be less. If the vapor were ignited, the explosion would be smaller. A flash fire and subsequent pool fire are more likely.*

*The advantages to the refrigeration case over the pressure case are: 1) The storage vessel pressure is much lower, resulting in a lower discharge of liquid, and 2) **very little of the cold butane liquid will flash into vapor until it reaches the warmer ground and more will remain as liquid in the boiling pool.***

The consequences for the refrigeration case are less than the pressure case because the rate at which butane vapor is produced will be less, resulting in a smaller vapor cloud than in the pressure case.

Since the consequences of the refrigeration case are less, so is the risk, assuming the probability stays the same. The North Gaffey Street facility uses the refrigeration case.

The remote impoundment area also decreases the consequences of an accident and decreases the risk. Any liquid butane that leaks out of the storage vessels or associated piping is drained away from the storage vessels to the impoundment area. This decreases the accident consequences in the following two ways. First, the impoundment area is remote from the storage vessels. Thus, if the impoundment area fills with butane and catches on fire, the storage vessels will not be directly exposed to this fire. This is important since a storage vessel exposed to fire might eventually fail. Second, the impoundment area reduces the surface area of the potential pool, decreasing the evaporation rate of the butane”.

Professor Crowl’s analysis of butane releases from refrigerated tanks directly refutes the commentators' claim that leaking butane would instantly vaporize, expanding over 230 times in volume and creating a non-flammable vapor cloud explosion. Also, the statement “*creating a non-flammable explosion*” is not the definition of a vapor cloud explosion. The Center for Chemical Process Safety (CCPS) defines a vapor cloud explosion (VCE) as: “*The explosion resulting from the ignition of a cloud of flammable vapor, gas, or mist in which flame speeds accelerate to sufficiently high velocities to produce significant overpressure.*”

It is obvious that the commenter misunderstands refrigerated butane behavior, vapor cloud definitions, explosions, and their effects.

9. Pages 8/9 – “Sources of ignition on-site include three compressors, a heater, and a flare”.

Only the three refrigerated compressors at the Rancho Facility present potential ignition risks. The heater was decommissioned in 1980 and removed by 2011, so it is no longer a hazard. The flare, positioned 155 ft. above ground, cannot ignite butane clouds at ground level according to a 2010 EPA-confirmed study. Claims about other ignition sources or the flare's effectiveness reflect his misunderstanding of the facility and its equipment.

10. Page 9 – “The facility also houses five pressurized 60,000-gallon tanks filled with propane, maintained at -44°F”.

The U1A Certificate is a manufacturer's data report for a pressure vessel, confirming it meets ASME Code requirements. The vessel is rated for a maximum working pressure of 250 psi at 125°F and is suitable for temperatures as low as -20°F.

The vessel is made from SA-515-70, a carbon steel specified by ASME for pressure vessels and boilers operating at intermediate and high temperatures. "SA" shows it's an ASME standard, "515" is the standard number, and "70" indicates a minimum tensile strength of 70,000 psi. While strong and durable at elevated temperatures, SA-515-70 is not ideal for low-temperature use as carbon steel can become brittle below -20°F, especially at -44°F. For such conditions, materials like SA-516 or SA-537, which are designed for cryogenic service, are preferred.

Storing propane at -44°F in 5-60,000-gallon pressure vessels constructed from SA-515-70 will eventually cause metal embrittlement and cracking, potentially compromising vessel integrity and leading to the release of contents. The design standards cited by the commenter do not match their intended operational purpose.

11. Page 10 – “However, this (Impoundment Basin) system is *completely useless*, since any leaking butane would immediately turn into a gas upon tank release”.

The impoundment basin was built to comply with Los Angeles Municipal Code requirements, specifically LAFD Section 57.31.36 on diked areas. The permit from the L.A. Department of Building Safety was issued on 09/15/72, as noted in the CPUC 1977 Report.

The Impoundment Basin at the Rancho LPG Facility:

- Meets capacity containment requirements for a "worst-case" scenario release of the largest quantity of a regulated substance from a vessel or process line failure that results in the greatest distance to endpoint, as outlined in EPA regulation 40CFR68.22(a).
- Fulfills capacity specifications per NFPA 58, 2020 edition (13.5.4), which states that impoundment for refrigerated LP-gas containers must have a volumetric holding capacity, including allowances for displacement due to snow accumulation, other containers, or equipment, equal to the total liquid volume of the largest container served, assuming it is filled to the high-liquid level flow cutoff device. Therefore, the impoundment basin is required to accommodate only the liquid volume up to the high-level alarm cut-off, not the full 300,000-barrel tank capacity.
- Aligns with the definition of mitigation or mitigation system in EPA 40CFR68.3, referring to activities, technologies, or equipment intended to capture or control substances upon loss of containment, minimizing exposure to the public or environment. Passive mitigation refers to systems functioning without human, mechanical, or energy input, while active mitigation requires such input. The Rancho impoundment basin functions as a passive mitigation system.
- Satisfies requirements for worst-case scenario analysis under EPA 40CFR68.25(2) concerning flammable gases handled as refrigerated liquids at ambient pressure. The referenced materials note the distinction between having and not having passive mitigation systems in place for the containment of such releases.

- 40CFR68.25(2)(i) *If the released substance is not contained by passive mitigation systems or if the contained pool would have a depth of one centimeter or less, the owner or operator shall assume that the total quantity of the substance is released as a gas in 10 minutes, and the total quantity will be involved in the vapor cloud explosion.*
- 40CFR68.25(2)(ii) *"If the released substance is contained by passive mitigation systems in a pool with a depth greater than 1 centimeter, the owner or operator may assume that the quantity in the vessel or pipe, as determined under paragraph (b) of this section, is spilled instantaneously to form a liquid pool. The volatilization rate (evaporation release rate) shall be calculated at the boiling point of the substance (31.1°F for butane) and at the conditions specified in paragraph (d) of this section. The owner or operator shall assume that the quantity which becomes vapor in the first 10 minutes is involved in the vapor cloud explosion. This is the Rancho case.*

These examples refute the assertion that released refrigerated butane would immediately vaporize and render the impoundment basin ineffective. For vapor cloud explosion analysis, only the portion that vaporizes in the first 10 minutes at 31.1°F is considered, rather than the entire tank contents. The evaporation rate is determined by factors such as the liquid pool size, properties of the material, and storage temperature.

Regulated flammable substances that are normally gases at ambient temperature and handled as a gas or as a liquid under pressure are listed in 40CFR68.25(e)(1). The code states, *"The owner or operator shall assume that the quantity in the vessel or pipe, as determined under paragraph (b) of this section, is released as a gas over 10 minutes. The total quantity shall be assumed to be involved in the vapor cloud explosion."* This is the scenario associated with instantaneous vaporization for a release from pressurized storage for the scenarios below. In this case, an impoundment basin would serve little or no purpose for containing this type of release.

- **Flash Vaporization:** When non-refrigerated LP-Gas is released into the atmosphere, it rapidly vaporizes due to its high vapor pressure. This process is called flashing.
- **No Pool Formation:** Unlike heavier liquids, LP-Gas doesn't form a stable liquid pool that can be contained by dikes or impoundment basins. Instead, it turns into gas almost instantly.
- **Vapor Dispersion Risk:** The real hazard is the flammable vapor cloud that can travel and ignite, not a liquid spill that can be physically contained.

In these cases, involving pressurized storage of LPG, an impoundment basin would serve little or no purpose in containing this type of release.

The commenter overlooks differences in propane and butane storage, failing to note that impound basins are mandated for refrigerated butane by NFPA 58 and 40CFR68, which contradicts the claim that they provide "no safety."

Propane and butane, both heavier than air, settle near the ground. The assertion that a large leak into an impoundment basin will always cause an explosion is unfounded, as this requires vapor within flammable limits and an ignition source.

12. Page 9 – “Administrative features allow reduction of the weight by an undefined amount”

According to EPA regulation 40CFR68, administrative controls are written procedures that manage hazards by directing human actions, planning, and oversight, rather than using physical or engineering methods. These controls support chemical safety and regulatory compliance in programs like the RMP.

Examples of Administrative Controls

- Standard operating procedures (SOPs)
- Safety manuals and job instructions
- Scheduling of tasks to reduce exposure
- Permit-to-work systems (e.g., hot work permits)
- Training programs and certifications
- Management of shift rotations to minimize fatigue
- Documentation of equipment checks and inspections

In hazardous material modeling and emergency planning, administrative controls are considered passive risk management strategies and tend to be less responsive than active measures like alarms or mitigation systems.

According to EPA 40CFR68, active measures are engineering controls that use energy input to detect and address process deviations. Examples include alarms, safety instrumented systems, and detection hardware such as hydrocarbon sensors.

Distinguishing passive from active control measures is essential. As noted in the 1977 CPUC Report (p. 4-1, Item 2), an overflow indicator pipe warns if electronic alarms or shutdowns fail; it is positioned at the tank's maximum design liquid level. An additional 4'3" to the deck prevents product contact with the insulation deck during earthquakes that create waves in a full tank.

The weight reduction from 60,000,000 lbs to 57,000,000 lbs results from the maximum allowed liquid butane in the tanks. The overflow pipe maintains containment by directing excess butane into the impoundment basin, serving as an active control.

13. Page 9 – “Rancho incorrectly represented the severity of an explosion by incorrectly representing butane as a “Toxic Substance” rather than a “Flammable Gas”.

EPA regulation 40CFR68.130 lists threshold quantities for 77 toxic and 63 flammable substances regulated by section 112(r) of the Clean Air Act; butane is included as a regulated flammable substance in Tables 2 and 4.

A December 10, 2013, email from EPA attorney Andrew Helmlinger and Rancho's third-party counsel Cliff McFarland confirms that Rancho calculated its RMP impact radius as 0.5 miles using the EPA regulatory formula, contrary to Ms. Gunter's assertion of 3.0 miles, and applied this approach to flammable substances.

This information shows that Rancho did not represent its worst-case scenario as limited to toxic substances. The RMP is available for public review at the LAFD/CUPA office in Los Angeles. The commenter is obviously unaware of the applicable regulations.

- 2) For substances in pipes, the greatest amount in a pipe, taking into account administrative controls that limit the maximum quantity.

(2) For flammable gases handled as refrigerated liquids at ambient pressure:

- (i) If the released substance is not contained by passive mitigation systems or if the contained pool would have a depth of one centimeter or less, the owner or operator shall assume that the total quantity of the substance is released as a gas in 10 minutes, and the total quantity will be involved in the vapor cloud explosion.
- (ii) (ii) If the released substance is contained by passive mitigation systems in a pool with a depth greater than 1 centimeter, the owner or operator may assume that the quantity in the vessel or pipe, as determined under [paragraph \(b\)](#) of this section, is spilled instantaneously to form a liquid pool. The volatilization rate (release rate) shall be calculated at the boiling point of the substance and at the conditions specified in [paragraph \(d\)](#) of this section. The owner or operator shall assume that the quantity which becomes vapor in the first 10 minutes is involved in the vapor cloud explosion.

(g) Parameters to be applied. The owner or operator shall use the parameters defined in [§ 68.22](#) to determine distance to the endpoints. The owner or operator may use the methodology provided in the RMP Offsite Consequence Analysis Guidance or any commercially or publicly available air dispersion modeling techniques, provided the techniques account for the modeling conditions and are recognized by industry as applicable as part of current practices. Proprietary models that account for the modeling conditions may be used provided the owner or operator allows the implementing agency access to the model and describes model features and differences from publicly available models to local emergency planners upon request

(h) Consideration of passive mitigation. Passive mitigation systems may be considered for the analysis of worst case provided that the mitigation system is capable of withstanding the release event triggering the scenario and would still function as intended.

(i) Factors in selecting a worst-case scenario. Notwithstanding the provisions of [paragraph \(b\)](#) of this section, the owner or operator shall select as the worst case for flammable regulated substances or the worst case for regulated toxic substances, a scenario based on the following factors if such a scenario would result in a greater distance to an endpoint defined in [§ 68.22\(a\)](#) beyond the stationary source boundary than the scenario provided under [paragraph \(b\)](#) of this section:

68.30 Defining off-site impacts—population.

- (a) The owner or operator shall estimate in the RMP the population within a circle with its center at the point of the release and a radius determined by the distance to the endpoint defined in [§ 68.22\(a\)](#).
- (b) **Population to be defined.** Population shall include residential population. The presence of institutions (schools, hospitals, prisons), parks and recreational areas, and major commercial, office, and industrial buildings shall be noted in the RMP.
- (c) **Data sources acceptable.** The owner or operator may use the most recent Census data, or other updated information, to estimate the population potentially affected.

(d) **Level of accuracy.** Population shall be estimated to two significant digits.

Per EPA regulations, Rancho's worst-case flammable event is based on its single largest refrigerated butane tank (57 million pounds). Claims that combining tanks could result in a 10.5-mile blast radius—equal to 36 atomic bombs—are pure fantasy, technically invalid, and not supported by EPA 40CFR68. Councilman McOsker should consult EPA Region 9 for accurate guidance, as Mr. Saunders' scenario misrepresents the applicable regulation for Rancho.

15. “Use of the Kingery-Bulmash equation for peak overpressures for surface-burst explosions”.

The Kingery-Bulmash Equations predict air blast effects, such as peak overpressure and impulse, from TNT explosions. However, they are not suitable for fuel-air explosions like VCEs due to differences in fuel dispersion, ignition, confinement, and turbulence. These equations use empirical formulas to estimate blast impacts, aiding engineers and defense professionals in assessing explosive effects on structures and environments.

Why It Matters

The Kingery-Bulmash equations calculate parameters for a hemispherical surface burst of TNT, including:

- Peak incident and reflected overpressure
- Impulse (incident and reflected)
- Positive phase duration
- Shock wave arrival time
- Shock front velocity

These parameters are essential for designing structures to withstand explosions and for assessing blast effects in safety studies.

Limitations of the Kingery-Bulmash Equation

- Only valid for TNT surface bursts, not spherical air bursts like a VCE.
- Assumes ideal conditions; real-world factors like terrain and weather can affect accuracy
- Some coefficients may have uncertainties due to limitations in historical measurement tools.

What Makes a VCE Different Than a Spherical Air Burst - TNT

Origin: VCEs occur when a large amount of flammable vapor (e.g., propane or natural gas) mixes with air and ignites, often after the cloud spreads widely.

Geometry: The explosion is typically irregular or elongated, especially in complex industrial environments.

Blast Shape: VCEs create **asymmetric blast waves** due to obstacles and terrain, contrasting with the symmetry of open-air spherical bursts.

Modeling: Most models (like TNO Multi-Energy and Baker-Strehlow-Tang) use hemispherical or elongated ground-level clouds, not mid-air spherical bursts.

https://www.academia.edu/9642214/Vapor_Cloud_Explosion_Prediction_Methods_Comparison_of_TNO_Multi_energy_ME_and_Baker_Strehlow_Tang_BST_Models_in_Terms_of_Vulnerability_of_Structural_Damage_Caused_by_an_Explosion

The Kingery-Bulmash equation is primarily for calculating TNT spherical air bursts, not vapor cloud explosions, contrary to the novice commenter's claim.

16. Page – 19 Comparison of the Beirut Explosion to Rancho

Summary of Beirut, Lebanon

On August 4, 2020, 2,750 tonnes of ammonium nitrate exploded at the Port of Beirut, causing \$15 billion in damage. The blast, linked to material seized from the MV Rhosus in 2014, was among the largest non-nuclear explosions ever recorded. It generated a 3.3 magnitude seismic event felt as far as 240 km away and briefly disrupted Earth's ionosphere. The explosion resulted in at least 218 deaths, 7,000 injuries, and displaced about 300,000 people.

Regulation of Explosives in the United States <https://www.atf.gov/explosives>

Ammonium nitrate is classified as an explosive under the authority of the Bureau of Alcohol, Tobacco, Firearms, and Explosives (ATF), which is responsible for enforcing federal explosives and arson legislation.

- The ATF safeguards public safety by regulating the storage, importation, manufacture, and distribution of explosives. Handling explosives requires the appropriate licenses, and permits are necessary for shipping or receiving these materials. The ATF performs routine inspections to ensure adherence to federal regulations. For information on exemptions, refer to 18 U.S.C. § 845.
- The explosives industry comprises approximately 10,000 federally licensed and permitted entities involved in commercial explosives and fireworks. The ATF oversees the importation, manufacture, and distribution of explosive materials through a comprehensive licensing system and regular compliance inspections.

In addition to the ATF, several other federal agencies regulate explosives under specific circumstances:

- The U.S. Department of Transportation (DOT) governs the transportation of hazardous materials, including explosives, by rail, water, motor carrier, air, or alternative conventional methods.
- The U.S. Coast Guard (USCG) supervises the transit of explosives along U.S. navigable waterways and territorial seas.
- The Mine Safety and Health Administration (MSHA) regulates activities involving explosives at mining sites, encompassing both surface and subsurface operations in coal and non-coal sectors.
- The Occupational Safety and Health Administration (OSHA), part of the U.S. Department of Labor, administers workplace safety standards, including the handling and use of explosives during manufacturing and on job sites.
- The U.S. Department of Defense (DoD) exercises jurisdiction over explosives used by military personnel or in connection with military contracts involving explosives suppliers.
- The Consumer Product Safety Commission (CPSC) regulates consumer fireworks not subject to ATF oversight under 27 C.F.R., Part 555, and manages the distribution, possession, and use of illegal fireworks.

- The U.S. Department of Homeland Security (DHS) is tasked with identifying and regulating high-risk chemical facilities, ensuring that adequate security protocols are implemented.

Characteristics of Explosives

Explosives are chemical substances or mixtures that can be initiated through heat, shock, impact, or friction. Upon detonation, these materials decompose rapidly, generating significant heat and high-pressure gases that expand with sufficient force to breach containment. Detonation results in four principal effects: rock fragmentation, displacement, ground vibration, and air blast. The initial shock wave fractures the adjacent rock, which is subsequently further broken down by expanding gases until the pressure equalises or escapes.

Ammonium nitrate provides the highest volume of gas upon detonation per unit weight, compared to other explosives.

Pure ammonium nitrate is mostly inert and consists primarily of oxygen, nitrogen, and hydrogen. Its main risks are dissolving in water without a protective coating and "cycling," or crystal structure changes with temperature, which can impact storage and explosive effectiveness.

Most dynamites, whether nitroglycerin-based or permissible, use ammonium nitrate, which is also the main component of blasting agents. Ammonium nitrate reduces cycling problems compared to ANFO, though cycling can still occur between 0°F and 90°F, especially in poorly ventilated storage. Without humidity, cycling breaks prills into finer particles or causes swelling, both lowering effectiveness. At over 90°F, prills become denser and detonation velocity increases.

The **detonation velocity of ammonium nitrate** is around 10,000 feet per second at a density of 0.8 g/cm³ and can rise to 15,000 feet per second at 1.2 g/cm³. Humidity can penetrate poorly sealed blasting agents; once the waterproof coating deteriorates, moisture accumulates, causing the material to dissolve and recrystallize into larger crystals. As a result, cycled ANFO may have variable densities, leading to unpredictable performance—ranging from effective detonation to burning or failing to initiate.

The ATF classifies ammonium nitrate as an explosive, while the EPA lists butane and propane (LPG) as flammable under 40CFR68.130. Facilities handling these substances must submit a Risk Management Program to the EPA according to the Clean Air Act.

Note: More details and references on VCEs are in the letter. Therefore, I will not address the Page 22 comparison between the 09/11/2001 event and Rancho.

17. Page 30 – “Safety systems (sprinklers and leak detection) at Rancho are insufficient”

The commenter shows a lack of understanding about the Rancho Facility and its operations. The following clarifies his statements. Chapters 8-10 of the 1977 CPUC multi-agency report to Governor Brown detail the LAFD-approved safety systems.

Chapter 8 CPUC Report Overview: The document outlines safety measures and firefighting systems for propane loading and storage facilities in Los Angeles.

LPG Loading Stations

- Four truck loading stations and two rail stations for propane delivery.
- Sprinklers direct 0.3 gal/sq. ft./minute to the vapor space of tanks.
- Automatic activation of sprinklers by ultraviolet sensors during fire.
- Water monitors and hydrants provide additional fire protection.
- Initial water flow of 5000 GPM to cool tanks, reducing to 1200 GPM after five minutes.

Low Temperature Pipeline

- 16-inch seamless steel pipeline connects wharf to storage, buried 4 feet deep.
- Design pressure of 275 psig, tested to 1.5 times that pressure.
- Safety control valves automatically close under specific conditions.
- Operators continuously monitor transfer operations.

Dock Facility

- Unloading arm transfers refrigerated propane from ship to pipeline.
- Pre-cooling process reduces pipeline temperature to -40°F to prevent thermal shock.
- Cargo discharge can take 36 hours or more, using multiple pumps.
- Nitrogen purges the line post-discharge to minimize atmospheric release.

Firefighting Equipment

- Two 2-inch hose lines and portable water monitors are positioned for fire response.
- Constant communication maintained among key personnel during cargo transfer.
- Operators can stop line flow instantly in emergencies.

Fire Department Comments

- Clarification needed on the purpose of enlarging impoundment basin capacity.
- Diked areas must comply with Los Angeles Fire Code for accidental discharge control.
- Specific requirements for diked area construction and drainage to prevent overflow and hazards.

Chapter 9 CPUC Report

The document provides detailed information about fire-fighting equipment and water supply systems at a terminal. Below is a summary of pages 32-36:

Fire Monitors and Hose Stations:

Four manually operated fire monitors, a hose station, and two hydrants protect the truck and rail car loading/unloading racks. Another monitor safeguards three LP-gas pressure storage tanks. Two hose stations cover the refrigeration and process areas.

Overhead Water Spray Systems:

Automatically activated by ultraviolet sensors or remotely controlled via push-button stations. These systems cool and protect equipment in truck racks, rail car racks, and the cold transfer pump area.

Water Supply System:

A 16" water service, 800 ft. north of Westmont Drive, delivers 13,000 gpm at 100 psig. The main plant system features a 20" feeder line and two loops (14" and 4"). Laterals supply hose reels, sprinklers, hydrants, monitors, and circular weirs for fire control.

Dry Chemical Extinguishers:

Two-wheeled dry chemical extinguishers (125 lbs of Purple-K) and 26 smaller dispensers (20 lbs each) are distributed throughout the plant.

Hose Reels:

Controlled by manually operated Globe valves, delivering 95 gpm with adjustable fog patterns and shut-off options.

Sprinkler Systems:

Operate automatically via ultraviolet sensors but can be manually controlled. Fail-safe mechanisms ensure operation during power outages.

Hydrants:

Three wet barrel hydrants with individual valve controls for 2½" and 4" outlets.

Monitors:

Five manually operated monitors in the loading area and pressure storage area. Two remote-controlled monitors between refrigerated tanks use hydraulic power for adjustments.

Tank Cooling:

Water flow to tanks is manually controlled, with push-button stations for activation. Valves allow high flow rates (6,200 gpm) initially, followed by reduced flow (1,250 gpm) for continuous cooling. Water forms a curtain around the tank for insulation.

Water Supply:

Dual supply from a 20" cast iron line and a 36" steel line in Gaffey Street. The steel line is more resilient to fault displacement.

This section outlines the comprehensive fire-fighting infrastructure and operational procedures to ensure safety and effective response in case of fire emergencies.

Chapter 10 CPUC Report

The document outlines the alarms and shutdown provisions for a plant, detailing various safety measures and systems in place:

1. **Plant Shutdown Switches:** Four total plant shutdown switches are located in the control room, the loader's building, and near the two main gates.
2. **Loading Area Shutdown:** Six loading arm shutdown locations can stop motors and close valves in the loading area.
3. **UV Detectors:** UV detectors are installed to detect flashes, trigger alarms, shut down the plant, and activate the fire water system, especially in loading/unloading areas.

Fire Sensors: Fire sensors are distributed across the plant:

- Process Skid: Two sensors shut down condenser fans, loading pumps, feed pumps, and regeneration pumps.
- Compressor Building: Four sensors shut down compressors.
- Transfer Pump Pad: One sensor activates sprinklers and shuts down cool-down and transfer pumps.
- Loading Pump Area: Two sensors shut down unloading compressors, transfer pumps, loading pumps, feed pumps, and regeneration pumps, and close emergency valves.
- Truck Loading Racks: Sensors activate sprinklers and shut down unloading compressors and loading pumps.

- Tank Car Loading Rack: Sensors activate sprinklers and shut down unloading compressors and loading pumps.

Gas Monitoring: Combustible gas monitors are installed near pumps, compressors, and tanks, alarming at 35% LEL and shutting down the plant at 65% LEL.

Earthquake Switch: An earthquake switch in the control room automatically shuts down the entire plant if a tremor displaces a steel ball from its pedestal, at a magnitude of 5.3.

Combined, these systems are designed to ensure safety by detecting hazards, stopping operations, and isolating affected areas or the entire plant.

The Rancho Facility was built according to NFPA 58, Chapter 3.10, which covers fire protection and water systems but does not address foam systems for LPG facilities. Foam systems fall under API 2510, which applies to bulk LPG storage and explicitly states, "Fire-fighting foam shall not be used to extinguish LPG fires." This directly contradicts Mr. Saunders' statement and indicates a misunderstanding of both refinery standards and the Rancho Facility.

Summary

Mr. Saunders' assertion that an explosion at the Rancho LPG Facility could be comparable to a nuclear detonation lacks any supporting evidence and is therefore based on unfounded assumptions. Scientific modeling and EPA guidelines set the maximum impact radius for a worst-case butane explosion at 0.5 miles, significantly less than Mr. Saunders claims. The EPA reviewed Rancho's analysis and ruled out nuclear-scale effects. Mr. Saunders' comparison of chemical and nuclear explosions, as well as his blast calculations, is imaginary and erroneous.

The facility adheres to all seismic codes, undergoes required five-year revalidations, and has recently passed audits without violations. While the location is proximate to significant faults, it does not reside within an active fault zone, and its storage tanks meet or exceed all regional seismic standards.

Rancho falls under the Department of Homeland Security's Chemical Facility Anti-Terrorism Standards (CFATS) as a high-risk site; however, its specific tier classification is confidential. The facility complies fully with all security protocols, and there are no known ties to terrorism or credible threats.

Conclusion

Since 2009, several studies have been conducted about the Rancho facility, most recently by Mr. Saunders and previously by Cornerstone Technologies, Carl Southwell, Anthony Patchett, and Brian Parrelli, have received sponsorship from SPPHU. Despite this common sponsorship, these studies share similar methodological limitations, including misinterpretations of butane release behavior, vapor cloud explosion dynamics, reliance on techniques not widely accepted within the scientific community, application of flawed formulas, and technically unsound scenarios. As a result of these issues, the Environmental Protection Agency (EPA), which oversees risk analysis for hazardous chemical facilities, has formally rejected the findings of all these studies.

The comprehensive review of Mr. Saunders' study shows that, besides using false information from SPPHU, Mr. Saunders did minimal, if any, independent research on the facility, its operations, seismic/fault issues, and site security requirements. It is obvious that he lacks the qualifications required to conduct a risk assessment on Rancho or any hazardous chemical facility. His reliance on misinformation from SPPHU, coupled with his inexperience, has resulted in a seriously flawed and untrustworthy study.

In contrast, my rebuttal is supported by five decades of diverse petroleum industry experience and process safety certifications, combined with reliable documentation from regulatory agencies and legal authorities responsible for oversight of the Rancho Facility. My final comment and conclusion concerning Mr. Saunders's presumed study reminds me of the old computer acronym GIGO: Garbage In, Garbage Out.

Sincerely,
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American Institute of Chemical Engineers (AIChE)
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Note: Since retiring as Western District Manager for Plains, I am no longer an official spokesperson for the Rancho facility. However, as a licensed independent petroleum consultant, I continue to possess comprehensive knowledge of the Rancho LPG facility operations and compliance matters. My interest in the facility is both personal and professional, due to years of involvement with it. I have a profound respect for the facility, its outstanding safety record, and its dedicated workforce. Therefore, I remain committed to continuing to support their interests against unsubstantiated allegations.