

Hash oil extraction and the Oregon Fire Code

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Items to be covered during presentation

- ▶ Overview of the MAQ's for CO₂, Butane, and Propane
- ▶ Ideas on how to maximize the amount of hazardous materials through the code for storage and use
- ▶ Cover what a Hazardous Materials Inventory Statement (HMIS) should look like and what it needs to include
- ▶ Go over what the Hazardous Materials Management Plan (HMMP) needs to include
- ▶ Touch on the engineering report for the Extraction equipment used, including the process flow and overall product development/refinement
- ▶ Specific requirements for CO₂, Compressed gas, and flammable gasses
- ▶ Some things we have learned along the way

The reason we are all here is to avoid instances like this

https://www.youtube.com/watch?v=agZBqKBDq_4

Maximum Allowable Quantities

N- Butane is a flammable gas measured in pounds

Propane is a flammable gas measured in pounds

CO2 is a simple asphyxiant (inert gas) measured in pounds and does not have a MAQ

300

**TABLE 5003.1.1(1)
MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA OF HAZARDOUS MATERIALS POSING A PHYSICAL HAZARD^{a, i, m, n, o}**

MATERIAL	CLASS	GROUP WHEN THE MAXIMUM ALLOWABLE QUANTITY IS EXCEEDED	STORAGE ^a			USE-CLOSED SYSTEMS ^b			USE-OPEN SYSTEMS ^b			
			Solid pounds (cubic feet)	Liquid gallons (pounds)	Gas cubic feet at NTP	Solid pounds (cubic feet)	Liquid gallons (pounds)	Gas cubic feet at NTP	Solid pounds (cubic feet)	Liquid gallons (pounds)		
Combustible dust	Not Applicable	H-2	See Note q	Not Applicable	Not Applicable	See Note q	Not Applicable	Not Applicable	See Note q	Not Applicable		
Combustible fiber	Loose Baled ⁿ	H-3	(100) (1,000)	Not Applicable	Not Applicable	(100) (1,000)	Not Applicable	Not Applicable	(20) (200)	Not Applicable		
Combustible liquid ^{d, i}	II III A III B	H-2 or H-3 H-2 or H-3 Not Applicable	Not Applicable	120 ^{d, o} 330 ^{d, e} 13,200 ^{d, f}	Not Applicable	Not Applicable	120 ^d 330 ^d 13,200 ^d	Not Applicable	Not Applicable	30 ^d 80 ^d 3,300 ^d		
Cryogenic Flammable	Not Applicable	H-2	Not Applicable	45 ^d	Not Applicable	Not Applicable	45 ^d	Not Applicable	Not Applicable	10 ^d		
Consumer fireworks	1.4G	H-3	125 ^{d, n, i}	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable		
Cryogenic Oxidizing	Not Applicable	H-3	Not Applicable	45 ^d	Not Applicable	Not Applicable	45 ^d	Not Applicable	Not Applicable	10 ^d		
Explosives	Division 1.1	H-1	1 ^{e, s}	(1) ^{e, s}	Not Applicable	0.25 ^s	(0.25) ^s	Not Applicable	0.25 ^s	(0.25) ^s		
	Division 1.2	H-1	1 ^{e, s}	(1) ^{e, s}		0.25 ^s	(0.25) ^s		0.25 ^s	(0.25) ^s		
	Division 1.3	H-1 or H-2	5 ^{e, s}	(5) ^{e, s}		1 ^f	(1) ^f		1 ^f	(1) ^f		
	Division 1.4		H-3	50 ^{e, s}		(50) ^{e, s}	50 ^f		(50) ^f	50 ^f	(50) ^f	
	Division 1.4G	H-3	125 ^{d, n, i}	Not Applicable		Not Applicable	Not Applicable		Not Applicable	Not Applicable	Not Applicable	Not Applicable
	Division 1.5	H-1	1 ^{e, s}	(1) ^{e, s}		0.25 ^s	(0.25) ^s		0.25 ^s	(0.25) ^s		
Division 1.6	H-1	1 ^{e, s}	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable			
Flammable gas	Gaseous Liquefied	H-2	Not Applicable	Not Applicable (150) ^{d, e}	Not Applicable	Not Applicable	Not Applicable (150) ^{d, e}	Not Applicable	Not Applicable	Not Applicable		
Flammable liquid ^d	IA	H-2 or H-3	Not Applicable	30 ^{d, h}	Not Applicable	Not Applicable	30 ^d	Not Applicable	Not Applicable	10 ^d		
	IB and IC	H-2 or H-3	Not Applicable	120 ^{d, e}	Not Applicable	Not Applicable	120 ^d	Not Applicable	Not Applicable	30 ^d		
Flammable liquid, combination (IA, IB, IC)	Not Applicable	H-2 or H-3	Not Applicable	120 ^{d, e, h}	Not Applicable	Not Applicable	120 ^{d, h}	Not Applicable	Not Applicable	30 ^{d, h}		
Flammable solid	Not Applicable	H-3	125 ^{d, e}	Not Applicable	Not Applicable	125 ^d	Not Applicable	Not Applicable	25 ^d	Not Applicable		

(continued)

HAZARDOUS MATERIALS—GENERAL PROVISIONS

2014 OREGON

Maximum allowable quantities

	Division 1.5 Division 1.6	H-1 H-1	1 ^{a,g} 1 ^{a,g}	(1) ^{a,g} Not Applicable		0.25 ^b Not Applicable	(0.25) ^b Not Applicable		0.25 ^b Not Applicable	(0.25) ^b Not Applicable
Flammable gas	Gaseous Liquefied	H-2	Not Applicable	Not Applicable (150) ^{d,e}	1,000 ^{d,e} Not Applicable	Not Applicable	Not Applicable (150) ^{d,e}	1,000 ^{d,e} Not Applicable	Not Applicable	Not Applicable
Flammable liquid ^f	IA	H-2	Not Applicable	30 ^{d,e}	Not Applicable	Not Applicable	30 ^d	Not Applicable	Not Applicable	10 ^d
	IB and IC	or H-3		120 ^{d,e}			120 ^d			30 ^d
Flammable liquid, combination (IA, IB, IC)	Not Applicable	H-2 or H-3	Not Applicable	120 ^{d,e,h}	Not Applicable	Not Applicable	120 ^{d,h}	Not Applicable	Not Applicable	30 ^{d,h}
Flammable	Not			Not	Not		Not	Not		Not

What does a MAQ for butane or LPG look like

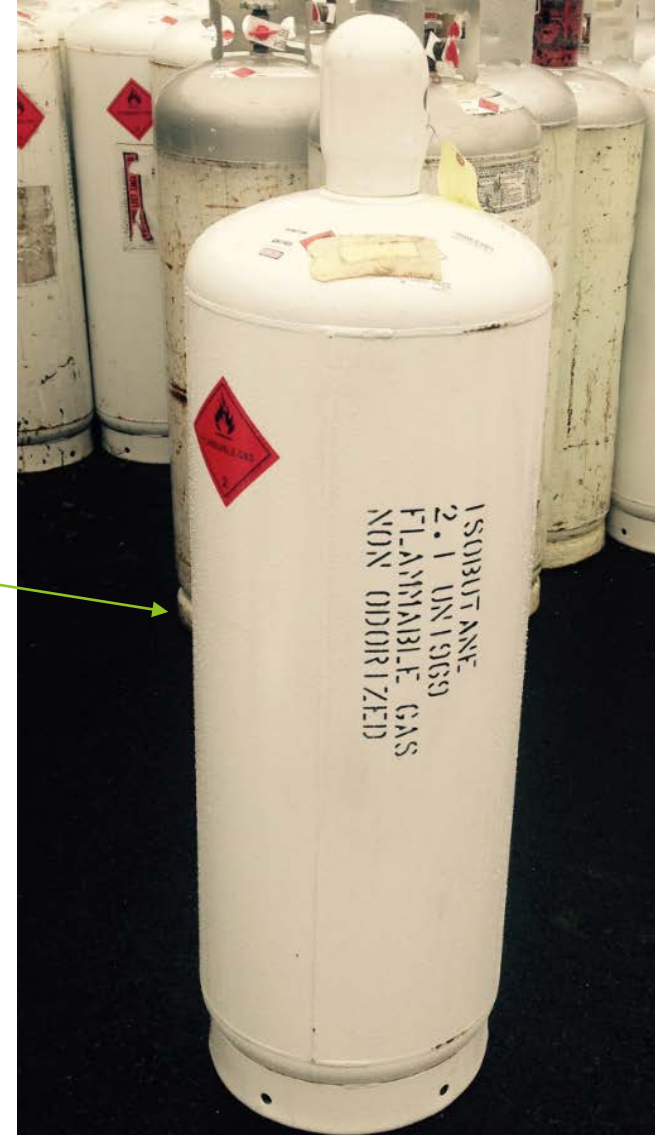
like



A BBQ tank is rated at 23 pounds for Butane and 19 pounds for Propane

5 foot tank is 116 pounds on butane and 95 pounds for propane

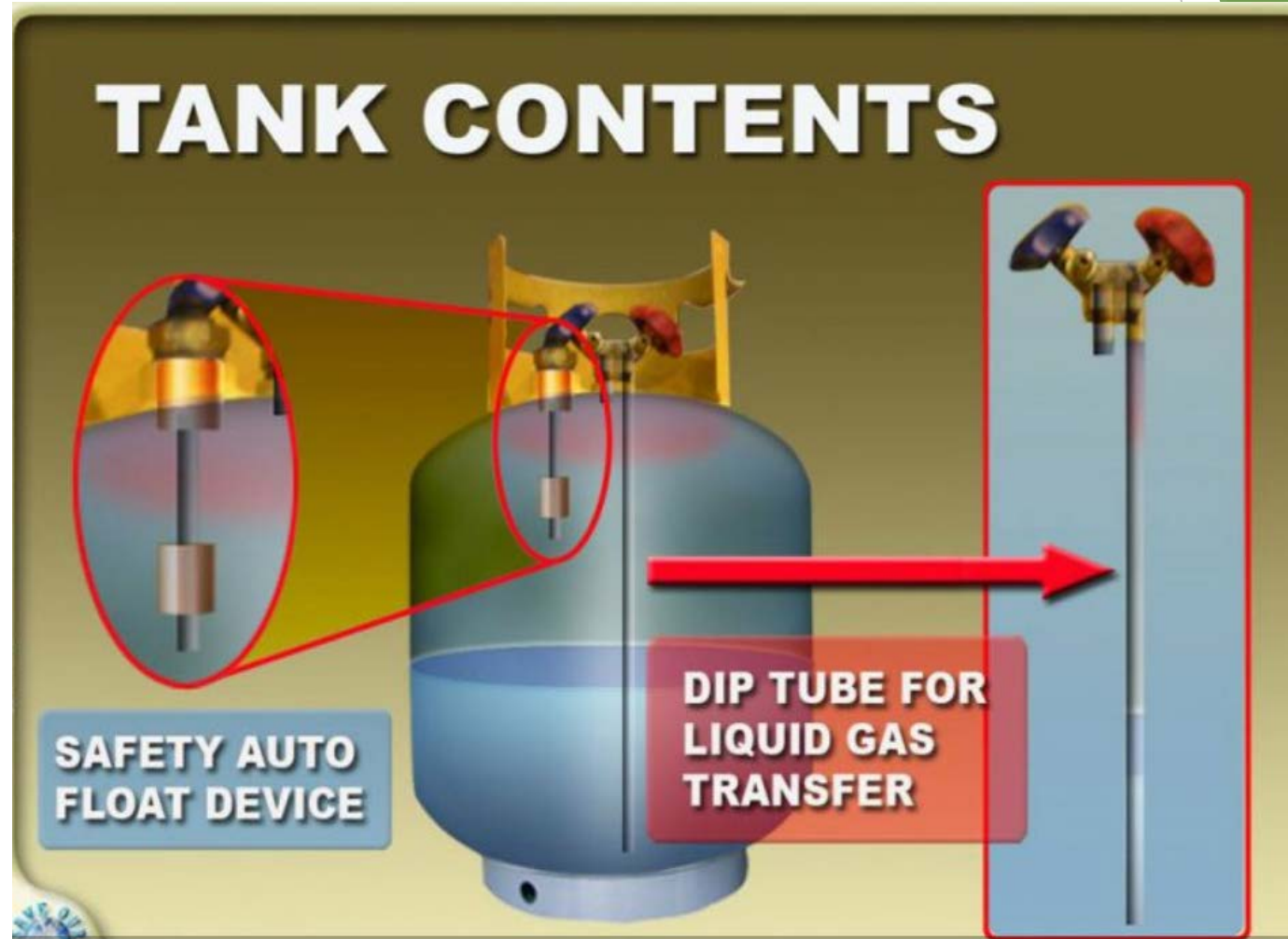
Per the gas suppliers these are the most common distributed sizes



The Working tank



The working tank is the one that is actually hooked up to the extraction equipment notice the 2 way valve.



CO2 tanks

- ▶ Although there is no limit to the amount of CO2 allowed in or around a facility, a permit is required to be obtained in accordance with Section 105.7 Required Constructions Permits, specifically Section 105.7.3 Compressed gases:
 - ▶ When the amount of compressed gases in use or storage exceed the amounts listed in table 105.6.8 a construction permit is required to install, repair damage to, abandon, remove, place temporarily out of service, or close or substantially modify a compressed

**TABLE 105.6.8
PERMIT AMOUNTS FOR COMPRESSED GASES**

TYPE OF GAS	AMOUNT (cubic feet at NTP)
Corrosive	200
Flammable (except cryogenic fluids and liquefied petroleum gases)	200
Highly toxic	Any Amount
Inert and simple asphyxiant	6,000
Oxidizing (including oxygen)	504
Pyrophoric	Any Amount
Toxic	Any Amount

For SI: 1 cubic foot = 0.02832 m³.

CO2 tank sizes



This tank is 1000 liters (according to this distributor these tanks are measured in liters. The CO2 conversion to get to pounds is 2.238 liters per pound or 8.79 cubic feet per pound

So you could have up to 682 pounds of CO2 before having to get a permit for the compressed gas. You could have approximately two of the 1000 liter tanks and one 700 liter tank before hitting the permit amount.

Control area requirements

- ▶ Control areas are spaces within a building where quantities of hazardous materials not exceeding the Maximum allowable quantities per control area are stored, dispensed, used, or handled

5003.8.3 details control area requirements

- ▶ **503.8.3.1 Construction requirements.** Control areas shall be separated from each other by fire barriers constructed in accordance with Section 707 of the International Building Code or horizontal assemblies constructed in accordance with Section 711 of the International building code
- ▶ **5003.8.3.2 Percentage of maximum allowable quantities.** The Maximum allowable quantities of hazardous materials per control area allowed at each floor level shall be in accordance with 5003.8.3.2
- ▶ **5003.8.3.3 Number.** The maximum number of control areas per floor within an building shall be in accordance with table500.3.8.3.2

Number and design of control areas per building, this is for the whole building not just a single space

**TABLE 5003.8.3.2
DESIGN AND NUMBER OF CONTROL AREAS**

FLOOR LEVEL		PERCENTAGE OF THE MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA ^a	NUMBER OF CONTROL AREAS PER FLOOR	FIRE-RESISTANCE RATING FOR FIRE BARRIERS IN HOURS ^b
Above grade plane	Higher than 9	5	1	2
	7-9	5	2	2
	6	12.5	2	2
	5	12.5	2	2
	4	12.5	2	2
	3	50	2	1
	2	75	3	1
	1	100	4	1
Below grade plane	1	75	3	1
	2	50	2	1
	Lower than 2	Not Allowed	Not Allowed	Not Allowed

a. Percentages shall be of the maximum allowable quantity per control area shown in Tables 5003.1.1(1) and 5003.1.1(2), with all increases allowed in the footnotes to those tables.

b. Separation shall include fire barriers and horizontal assemblies as necessary to provide separation from other portions of the building.

How can maximum allowable quantities per control area be increased?

Fire sprinkler increase

- ▶ Footnote D-
 - ▶ Maximum allowable quantities shall be increased 100 percent in buildings equipped throughout with an approved automatic sprinkler system in accordance with Section 903.3.1.1 Where note E also applies, the increase for both notes shall be applied accumulatively.

Enclosure increase

- ▶ Footnote E-
 - ▶ Maximum allowable quantities shall be increased 100 percent when stored in approved storage cabinets, day boxes, gas cabinets, exhaust enclosures, or listed safety cans. Listed safety cans shall be in accordance with Section 5003.9.10. Where note D applies the increase for both shall be applied accumulatively.

Back to the MAQ table to increase quantities

Material

Storage

Used in closed system

Used open

	DIVISION 1.0	H-1	1 st s	Not Applicable		Not Applicable	Not Applicable		Not Applicable	Not Applicable
Flammable gas	Gaseous Liquefied	H-2	Not Applicable	Not Applicable (150) ^{d,e}	1,000 ^{d,e} Not Applicable	Not Applicable	Not Applicable (150) ^{d,e}	1,000 ^{d,e} Not Applicable	Not Applicable	Not Applicable
Flammable liquid ^c	IA	H-2 or H-3	Not Applicable	30 ^{d,e}	Not Applicable	Not Applicable	30 ^d	Not Applicable	Not Applicable	10 ^d
	IB and IC			120 ^{d,e}			120 ^d			30 ^d
Flammable liquid, combination (IA, IB, IC)	Not Applicable	H-2 or H-3	Not Applicable	120 ^{d,e,h}	Not Applicable	Not Applicable	120 ^{d,h}	Not Applicable	Not Applicable	30 ^{d,h}

Sprinkler design and enclosure increases

- ▶ Sprinkler design in the space would be required to be Ordinary or Extra Hazard per NPFA 13
- ▶ OFC 5003.8.5 details exhaust enclosure construction
- ▶ OFC 5003.8.6 details gas cabinet construction
- ▶ OFC 5003.8.7 details hazardous material storage cabinets (cabinets can either be listed to UL1275 or constructed in accordance with this section)
- ▶ OFC 5003.9.10 details safety can requirements, UL 30 cans can be used to increase MAQ; UL1313 cannot be used to increase MAQ

Outdoor control areas

TABLE 5003.1.1(3)
MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA OF HAZARDOUS MATERIALS POSING A PHYSICAL HAZARD IN AN OUTDOOR CONTROL AREA^{a, b, c, d}

MATERIAL	CLASS	STORAGE ^a			USE-CLOSED SYSTEMS ^b			USE-OPEN SYSTEMS ^b	
		Solid pounds (cubic feet)	Liquid gallons (pounds) ^c	Gas cubic feet at NTP	Solid pounds (cubic feet)	Liquid gallons (pounds) ^c	Gas cubic feet at NTP	Solid pounds (cubic feet)	Liquid gallons (pounds) ^d
Flammable gas	Gaseous Liquefied	Not Applicable	Not Applicable (300)	3,000 Not Applicable	Not Applicable	Not Applicable (150)	1,500 Not Applicable	Not Applicable	Not Applicable
Flammable solid	Not Applicable	500	Not Applicable	Not Applicable	250	Not Applicable	Not Applicable	50	Not Applicable
Inert Gas	Gaseous	Not Applicable	Not Applicable	Not Limited	Not Applicable	Not Applicable	Not Limited	Not Applicable	Not Applicable
Cryogenic inert	Liquefied Not Applicable	Not Applicable	Not Applicable	Not Limited	Not Applicable	Not Applicable	Not Limited	Not Applicable	Not Applicable
Organic peroxide	Unclassified Detonable	1	(1)	Not Applicable	0.25	(0.25)	Not Applicable	0.25	(0.25)
Organic peroxide	I	20	(20)	Not Applicable	10	(10)	Not Applicable	2	(2)
	II	200	(200)		100	(100)		20	(20)
	III	500	(500)		250	(250)		50	(50)
	IV	1,000	(1,000)		500	(500)		100	(100)
	V	Not Limited	Not Limited		Not Limited	Not Limited		Not Limited	Not Limited
Oxidizer	4	2	(2)	Not Applicable	1	(1)	Not Applicable	0.25	(0.25)
	3	40	(40)		20	(20)		4	(4)
	2	1,000	(1,000)		500	(500)		100	(100)
	1	Not Limited	Not Limited		Not Limited	Not Limited		Not Limited	Not Limited
Oxidizing gas	Gaseous Liquefied	Not Applicable	Not Applicable (600)	6,000 Not Applicable	Not Applicable	Not Applicable (300)	1,500 Not Applicable	Not Applicable	Not Applicable
Pyrophoric materials	Not Applicable	8	(8)	100	4	(4)	10	0	0
Unstable (reactive)	4	2	(2)	20	1	(1)	2	0.25	(0.25)
	3	20	(20)	200	10	(10)	10	1	1
	2	200	(200)	1,000	100	(100)	250	10	10
	1	Not Limited	Not Limited	1,500	Not Limited	Not Limited	Not Limited	Not Limited	Not Limited
Water reactive	3	20	(20)	Not Applicable	10	(10)	Not Applicable	1	(1)
	2	200	(200)		100	(100)		10	(10)
	1	Not Limited	Not Limited		Not Limited	Not Limited		Not Limited	Not Limited

For SI: 1 pound = 0.454 kg, 1 gallon = 3.785 L, 1 cubic foot = 0.02832 m³.

a. For gallons of liquids, divide the amount in pounds by 10 in accordance with Section 5003.1.2.

b. The aggregate quantities in storage and use shall not exceed the quantity listed for storage.

c. The aggregate quantity of nonflammable solid and nonflammable or noncombustible liquid hazardous materials allowed in outdoor storage per single property under the same ownership or control used for retail or wholesale sales is allowed to exceed the maximum allowable quantity per control area when such storage is in accordance with Section 5003.11.

d. Quantities in parentheses indicate quantity units in parentheses at the head of each column.

OFC 5003.12 Outdoor control areas

- ▶ Outdoor control areas are areas that contain hazardous materials in amounts not exceeding that maximum allowable quantities on table 5003.1.1(3) or table 5003.1.1(4)
- ▶ Outdoor control areas shall be kept free from weeds, debris, and common combustible materials not necessary to the storage. The area surrounding an outdoor control area shall be kept clear of such materials for a minimum of 15ft.
- ▶ Outdoor control areas shall be located not closer than 20ft from a lot line that can be built upon, public alley, or street
 - ▶ The distances can be reduced with rated construction see exceptions 1-4.

Some final notes on MAQs

- ▶ Maximum Allowable Quantities are for the whole building, not just one space in the building. An example would be an extraction facility and a weld shop in the same building but different spaces. You would need to combine the quantities of hazardous materials and be able to stay under the allowable quantities or come up with one of the methods described previously.
- ▶ Different types of hazardous materials keep their own quantities, they do not need to be combined.
- ▶ Exceeding the quantities allowed per chapter 50 in the Oregon Fire Code will result in the occupancy being classified as an H occupancy, which requires a whole different set of requirements that are not detailed in this presentation.

Items to be included in the HMIS

- ▶ Product name
- ▶ Components (for chemicals that are a combination)
- ▶ Chemical Abstract Number (CAS number)
- ▶ Location where stored or used
- ▶ Container size
- ▶ Hazard classification
- ▶ Amount in storage
- ▶ Amount in closed use
- ▶ Amount in open use

HMIS example

Hazardous Material Inventory Statement for "Willamette High School Science Wing"										
Hazard Classes	Trade Name	Chemical Name and %	CAS #	State (S, L, G)	USE - Open or Closed	Quantity	Unit - lbs or gal	Storage Code	NFPA 704	Location
Irritant	Saturated Ammonium Sulfate Solution	Ammonium Sulfate	7783-20-2	L	Closed	200g	0.44lbs	N-1-4	2-1--0	Chem Store RM, Kit Shelf
TOX, Irritant	Sodium Nitroferrocyanide	Sodium Nitroferrocyanide(III) Dihydrate	13755-38-9	S	Closed	2g	0.004lbs	M-1-4	2-0-0	Chem Store RM, Kit Shelf
COR, TOX, OHH	Alpha Naphthol Solution/Schaeffers Salt	2-Naphthol-6-sulfonic acid, sodium salt	135-76-2	S	Closed	50mL	0.013gal	M-1-4	2-1--0 COR	Chem Store RM, Kit Shelf
Mild Irritant, OHH	Latex	Latex, natural (97%) Thiram (<1%) Ammonia (<1%) Zinc oxide (<1%)	9006-04-6 137-26-8 1336-21-6 1314-13-2	S/L (aqueous suspension)	Closed	100mL	0.026gal	N-1-4	None/0-0-0	Chem Store RM, Kit Shelf
Irritant	Sodium Bromide	Sodium Bromide (NaBr)	7647-15-6	S	Closed	5g	0.011lbs	N-1-4	2-0-0	Chem Store RM, Kit Shelf
Irritant, OHH	Barfoed's Reagent	Copper(II) acetate, monohydrate (6%) Acetic Acid (1%) Water (93%)	6046-93-1 64-19-7 7732-18-5	L	Closed	250mL	0.066gal	M-1-4	1-0-0	Chem Store RM, Kit Shelf
Irritant	Seliwanoff Reagent	Resorcinol (<1%) Hydrochloric Acid (11%) Water (89%)	108-46-3 7647-01-0 7732-18-5	L	Closed	125mL	0.033gal	M-1-4	2-0-2	Chem Store RM, Kit Shelf
FLM, Mild Irritant	Cholesterol	Cholesterol	57-88-5	S	Closed	5g	0.011lbs	N-1-4	1-1--0	Chem Store RM, Kit Shelf
CL-IIIB	Coconut Oil	Coconut Oil	8001-31-8	L	Open	50mL	0.013gal	M-1-4	1-1--0	Chem Store RM, Kit Shelf
Irritant, COR	Alconox Cleaner	Proprietary Mixture (anionic detergent) by Alconox Inc.	68081-81-2	S	Open	1814g	4lbs	N-1-4	1-0-0 COR	Chem Store RM, Kit Shelf
Mild Irritant	Prepared Agar, plain non-nutrient	Agar-agar gum	9002-18-0	S	Closed	500g	1.1lbs	R-1-4	1-1--0	Chem Store RM, Bio

Items to be included in the Hazardous Materials Management Plan (HMMP)

- ▶ Access to each storage area
- ▶ Location of emergency equipment
- ▶ Location where a liaison can meet emergency responders
- ▶ Facility evacuation meeting locations
- ▶ The general purpose of other areas in the building
- ▶ Location of above and underground tanks
- ▶ The hazard class in each area
- ▶ Location of all control areas and H occupancies
- ▶ Location of emergency exits

Engineering Report for extraction Equipment

- ▶ OFC 5003.2.3 Equipment, machinery and alarms
 - ▶ Equipment, machinery and required detection and alarm systems associated with the use, storage, or handling of hazardous materials shall be listed or approved.



What should be included in an Engineering report

Methodology

An Engineering Peer Review (EPR) otherwise known as an independent design verification, is a focused, in-depth technical review by a Professional Engineer. The purpose of an EPR is to add value and reduce risk through expert knowledge infusion, confirmation of approach, and specific recommendations. An EPR provides a penetrating examination of design, analysis, manufacturing, test and operational details, drawings, processes and data. PSI will review all relevant design documents, including all:

- Design inputs
 - Performance criteria
 - Service conditions
 - Working fluids
 - Boundaries for Pressures, Temperatures, and Flows
- Process Flow Diagram (PFD), and/or Piping and Instrumentation Diagram (P&ID)
 - Diagrams showing all system pressure and control components
 - Illustrates the control ties between components
 - Provides summary of major mechanical items (e.g., vessels, pumps, heaters, chillers, etc.)
- Material Take-Offs (MTO)/Bills of Material (BOM)
 - Identification of components and subassemblies
- Vendor Cutsheets
 - Vendor information for purchased components
- Detail design drawings
 - Materials of Construction (MOC)
 - Sizes and thicknesses
- Calculations
 - Electrical loads
 - Pressure components
- Specifications
 - Performance-based requirements for purchased components (e.g., "vessels shall be suitable for 100 psig operation at 250°F with LPG")
 - Compliance-based requirements for purchased or fabricated components (e.g., "vessels shall be type 304L stainless steel, 3 inch outside diameter with 0.188 inch wall thickness, fabricated in accordance with ASME Boiler and Pressure Vessel Code Section VIII Division 1")
- Procedures
 - Quality Assurance (governing QA Plan, if any)

- Fabrication procedures (welding, examination, testing)
- Material traceability (control of items before, during, after fab)
- Configuration control (verification item conforms to design)
- Codes and standards
 - Governing Codes or Standards, if any
- Factory Acceptance Tests (FAT)
 - Test plan
 - Test documentation
 - 3rd Party testing or certification (ETL/UL)
- Other relevant design documents used during the design process

The appropriate governing codes are selected based upon the service conditions provided by the equipment manufacturer. Each code is then analyzed for specific requirements. The equipment is then compared to the code requirements as an assembled unit and on an individual component level. Once the equipment has been analyzed in accordance with the governing codes, any deficiencies are reported as either Findings or Observations.

A Finding is defined as anything that could adversely affect safety as related to products, persons or property; or impact the usability of the product. An Observation is defined as a recommendation for process or design improvements, but does not adversely affect safety of the system. Any unresolved Findings described in this report will need to be resolved either through testing (by others) or replacement of affected components (by others) for the equipment to be considered safe for use.

General Hazmat Requirements

- ▶ OFC 5003.2.2 Piping, tubes, valves, and fittings conveying hazardous materials shall be designed and installed in accordance with ASME B31 or other approved standards and sections 5003.2.2.1 and 5003.2.2.2
- ▶ OFC 5003.4 Material safety data sheets shall be readily available on the premises for hazardous materials regulated
- ▶ OFC 5003.5 Hazard identification signs shall be visible and in accordance with NFPA 704. Signs shall be placed on stationary containers, above ground tanks, and entrances to location where hazardous materials are stored
- ▶ OFC 5003.7 Sources of ignition
 - ▶ No smoking signs shall be posted, open flame and high temp devices shall not create a hazard, industrial trucks used in designated hazardous (classified) locations in accordance with NFPA 70 shall be listed and labeled.

NFPA 704 placard

Fire Hazard

Health Hazard

Reactivity



The numbers and the specific hazard class are found in the MSDS sheets

Specific hazard

General Hazmat Continued

- ▶ OFC 5003.9.3 Guard posts or other approved means shall be provided to protect storage tanks in areas subject to vehicular damage
- ▶ OFC 5003.9.4 Electrical wiring and equipment shall be installed and maintained in accordance with NFPA 70

Class I - Contains flammable gases or vapors in quantities large enough to produce an explosion.

Class II - Is hazardous due to the presence of combustible dust in the air.

Class III - Contains easily ignitable fibers or flyings in the air. However, the quantities of fibers and flyings suspended in the air are not likely to be large enough to cause an explosion.

Division 1 - There is a high probability of an explosive atmosphere in normal operation. This can be for part of the time, up to all the time.

Division 2 - There is a low probability of an explosive atmosphere being present during normal operation.

*Group designations further define the types of gases, and dusts (A, B, C, D) (E, F, G)

*Example of an American certification would be:

- **Class I, Div 1, Groups A, B and C; Class II, Div 2, Groups F and G**

OFC 5301 Compressed gas requirements

storage use and handling of compressed gas in containers, cylinders, and tanks shall comply with this chapter

- ▶ OFC 5305.4 Stationary and portable compressed gas containers, cylinders, tanks and systems shall be marked.
- ▶ OFC 5303.5 Security- compressed gas containers cylinders, tanks, and systems shall be secured against accidental dislodgement and against access by unauthorized personnel
- ▶ OFC 5303.5.3 Tank security
 - ▶ Secure to a fixed object with one or more restraints
 - ▶ Secure to a cart or other mobile device designed for cylinder movement
 - ▶ Nesting of tanks is allowed (this is more for tank filling facilities)
 - ▶ Secure within a rack, framework, cabinet, or similar assembly designed for the use



Compressed gas continued

- ▶ OFC 5303.6 Valve protection - cylinder and tank valves shall be protected from damage by means of protective caps, collars, or similar devices in accordance with sections 5303.6.1 and 5303.6.2
- ▶ OFC 5303.7 Separation from hazardous conditions
 - ▶ Incompatible materials
 - ▶ Combustible waste, vegetation, etc
 - ▶ Ledges, platforms, and elevators
 - ▶ Falling objects
 - ▶ Sources of ignition
 - ▶ Exposure to chemicals



5803.1 Flammable gas

the storage and use of flammable gases not exceeding the MAQ shall be in accordance with sections 5001, 5003, 5801, and 5803

- ▶ OFC 5803.1.2 Cylinders and pressure vessels for flammable gases shall be designed, constructed, installed and maintained in accordance with chapter 53 (compressed gas chapter)
- ▶ OFC 5803.1.3 Compressed gas conveying flammable gases shall be provided with approved manual or automatic emergency shut off valves that can be activated at each point of use and at each source
- ▶ OFC 5803.1.4 Ignition sources in areas containing flammable gases in storage or use shall be controlled in accordance with section 5003.7 (discussed in general hazmat storage)
- ▶ OFC 5803.1.5 Electrical wiring and equipment shall be maintained in accordance with section 605 and NFPA 70

Chapter 61 LP-gas

Also regulated and installed in accordance with NFPA 58

- ▶ OFC 6103.2 Use of LP-gas in buildings
- ▶ OFC 6103.2.1.3 In group F occupancies, portable gas containers are allowed to be used to supply quantities necessary for processing, research or experimentation. Where manifolded, the aggregate water capacity of such containers shall not exceed 735 pounds per manifold. Where multiple manifolds of such containers are present in the same room, each manifold shall be separated from other manifolds by a distance of not less than 20ft.
 - ▶ Although this section allows 735 to be manifolded the MAQ table still applies since LP-gas is a flammable gas. There is no exception in the scope of chapter 50 of the Oregon Fire Code

Secondary process of extraction

- ▶ We have spent a lot of time on the initial extraction process but another process that need to be detailed is what is called The Clear or distilled Cannabis oil
- ▶ This is a secondary process to further purify the product that generally will include the addition of a flammable liquid or other substance and will most likely be an open process so quantities of hazardous materials will need to stay low due to the open process
- ▶ Make sure this process is part of the report that gets provided to the Fire/Building department so that proper ventilation , construction, etc can be addressed for the room.



This process would be an open process



A few items we have learned along the way

- ▶ Make sure the building where the extraction is to be done is approved for that use. Some jurisdictions have specific land use or other regulations outside of the International Building and Fire Codes that could be show stoppers outside of building construction.
- ▶ Be upfront with the information; what you will be doing, how you will be doing it, overall processes for the operation (including further refinement of the product), etc. Getting all the info upfront will help limit questions during the permit process and will assist jurisdictions in providing correct answers to customers in the beginning.
- ▶ Build a relationship with your jurisdictions during the process. Most likely there will be compliance inspections that will be completed for years to come, long after you operation is up and running, building the trust and relationships early will go along way.

OLCC rules vs. International Building and Fire codes

- ▶ The building permit process currently does not recognize the OLCC rules in determining whether or not you will be given a certificate of occupancy. It is up to the company and designers to make sure that all the requirements are being met. It is possible to have a compliant building but not be able to be licensed through OLCC.
- ▶ Work with the local Fire Department to determine what will be required for their signature on the OLCC licensing paperwork. Not all departments have fire staff in the building department so extra reports or documentation may be required before a signature will be provided.

Example of our required documentation for signature.

“OAR 845-025-3260(2)(D) Have equipment and facilities used in processing approved for use by the local fire code official.”

Applicants must provide sufficient documentation that satisfies the requirements within each City's respective fire codes. The minimum acceptable information needed by the fire code official to obtain approval of the extraction process and facility is the following:

1. A technical report prepared by a professional engineer registered with the Oregon State Board of Examiners for Engineering and Land Surveying that complies with Oregon Fire Code Section 104.7.2. In addition to the requirements in 104.7.2 The technical report shall contain the following additional information:
 - a. An HMMP in compliance with Oregon Fire Code Section 5001.5.1
 - b. An HMIS in compliance with Oregon Fire Code Section 5001.5.2
 - c. A general flow schematic or general process flow diagram (PFD) of the process. All primary components of the process equipment shall be identified. Operating temperatures, pressures, and solvent state of matter shall be identified in each primary step or component. A piping and instrumentation diagram may be provided for clarification but is not required.
 - d. A description of process equipment utilized and listings pertaining to the equipment.
 - e. Locations where classified electrical requirements of NFPA 70 apply.
 - f. A comprehensive building code study including the following - this is best accomplished by providing a scaled drawing of the site with the following information:
 - i. Group and division designation of the occupancy classifications and uses within the building(s).
 - ii. Construction type of the building(s).
 - iii. Number of stories, square footage and occupancy type for each floor, and the height of the building(s).
 - iv. Indicate if automatic sprinklers, standpipes, and/or fire alarm systems are provided.
 - v. Different fire protection, detection, suppression systems that will be incorporated into the building should be listed.
 - vi. Location of nearest fire hydrant and available fire flow (this information may be obtained from the local water utility)
 - vii. Location and specifications of fire apparatus access roads.