Bldg 1 2000 GPM
Bldg 2 1500 GPM
Bldg 3 750 GPM
Bldg 4 1000 GPM
Bldg 5 - 500 GPM

HANDOUT #17

PRE-INCIDENT SURVEY

Building Name: P+G Manufacturing Survey #: 61

Street Address: 2401 W. 5th St.

City, State, Zip: _____

Primary Use: Air Filtration Construction Type: _____

Possible Entry: _____

Possible Occupancy: A.M. 50 P.M. 50 — 8 to 6 - Day

Known Handicapped Personnel: 10 — 6 to 2:30 2nd

NOTIFY IN CASE OF EMERGENCY

Name: Scott Cox - Mgr. Name: Charlie Rasmussen

Phone: 495-1253 Phone: 721-0485

946 9140

BUILDING CONSTRUCTION

Roof Type: _____ Floor Construction: _____

Roof Construction: _____

Basement Construction Type: _____ Height of Basement: _____

Number of Stories: _____ Height of Each Story: _____

Length: _____ Width: _____ Height: _____

Attic Area: _____ Size: L_____ X W_____ X H_____

UTILITY TYPES

Gas: None. Type: _____

Gas Shut Off Valve Location: _____

Electric: Wash. Utilities Phase: 3

Panel Location: _____

Alarm Location: _____

EXPOSURES

North: _____ FT. West: _____ FT. South: 38 FT. East: _____

Type: _____ Type: _____ Type: Metal Type: _____

UN 1977
Airgas Liquid Nitrogen -320°F

SUPPRESSION CRITERIA

Needed Fire Flow: _____ Total Water Supply: _____

Fuel Load: _____ Rate of Flow: _____

HYRANT LOCATIONS

(1) _____ Flow: _____ Unit: _____

(2) _____ Flow: _____ Unit: _____

(3) _____ Flow: _____ Unit: _____

(4) _____ Flow: _____ Unit: _____

OTHER WATER RESOURCES

(1) _____

(2) _____

(3) _____

SPECIAL RESOURCES

(1) _____

(2) _____

(3) _____

MUTUAL AID

(1) _____ Assignment: _____

(2) _____ Assignment: _____

(3) _____ Assignment: _____

STAGING AREA

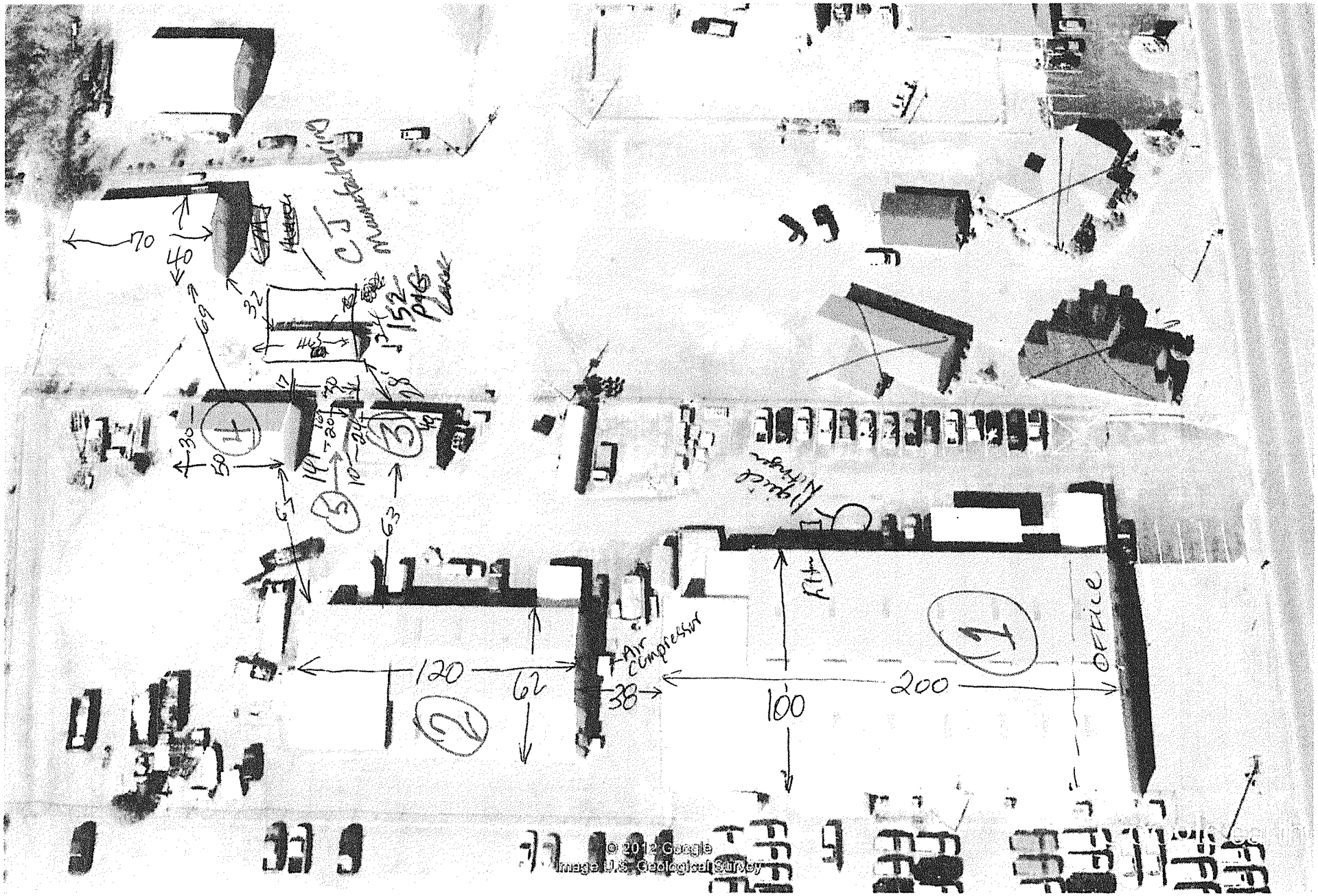
Primary: _____

Secondary: _____

MISCELLANEOUS INFORMATION

Sprinkler Connection: _____

Standpipe Connection: _____



Google earth

feet 300
meters 100

P+G Manufacturing 2401 W 5th St.

Structure Name P & G Manufacturing - Bldg 1 w/ Office

Structure Address 2401 W. 5th St.

Length	Width	Sq Ft	Sq Root	X 18	X construction type	GPM sum 1	X Occupancy	GPM sum 2
200	100	20000	141.42	2545.58	0.8	2036.47	0.85	######

Exposure % add	Exposure add GPM	Exposure per side (75% max) Total Side A	Exposure per side 75% max Side B	Exposure per side 75% max Side C	Exposure per side 75% max Side D	Total GPM with exposures
25%	432.75		0	242	0	1973.00
19%	328.89				0	
14%	242.34					
9%	155.79					
75%	1298.25	Total A,B,C,D				
	MAX	242				

Round off to nearest 250 GPM for flows less than 2500 GPM, the nearest 500 GPM over 2500 GPM

Column J, K, L and M
If up to 10 feet add 25% per side
If 11 to 30 feet add 19% per side
If 31 to 60 feet add 14% per side
If 61 to 100 feet add 9% per side

Column F
Fire Resistive 0.6
Non-combustible 0.8
Ordinary 1
Wood Frame 1.5

Column H
.75 if Mostly non-combustible contents
.85 if Limited combustibles (apartments, churches, schools, hospitals)
1.0 if Mostly combustible (restraunts, sheds, garages)
1.15 if Free burning contents (post offices, horse stables, feed mills, repair garages,ag storage)
1.25 if Rapid burning (aircraft hangers, tires, flammable liquids, wood working)

Total GPM with exposures	Add 50% for each floor above ground floor		# of floors	Total to add for floors above	Sub-total with floors added	If wood shingles on roof add 500 GPM	
	1000		0	0.00			
2000.00					2000.00	0	2000.00

FIRE FLOW NEEDED GPM

2000.00

Structure Name P+G Manu. Bldg 2

Structure Address 2401 W. 54th St.

Length	Width	Sq Ft	Sq Root	X 18	X construction type	GPM sum 1	X Occupancy	GPM sum 2
120	62	7440	86.26	1552.60	0.8	1242.08	1	######

Exposure % add	Exposure add GPM	Exposure per side (75% max) Total Side A	Exposure per side 75% max Side B	Exposure per side 75% max Side C	Exposure per side 75% max Side D	Total GPM with exposures
25%	310.52	174	0	0	112	1640.08
19%	235.99				112	
14%	173.89					
9%	111.79					
75%	931.56	Total A,B,C,D				
	MAX	398				

Round off to nearest 250 GPM for flows less than 2500 GPM, the nearest 500 GPM over 2500 GPM

Column F
Fire Resistive 0.6
Non-combustible 0.8
Ordinary 1
Wood Frame 1.5

Column H
.75 if Mostly non-combustible contents
.85 if Limited combustibles (apartments, churches, schools, hospitals)
1.0 if Mostly combustible (restraunts, sheds, garages)
1.15 if Free burning contents (post offices, horse stables, feed mills, repair garages,ag storage)
1.25 if Rapid burning (aircraft hangers, tires, flammable liquids, wood working)

Column J, K, L and M
If up to 10 feet add 25% per side
If 11 to 30 feet add 19% per side
If 31 to 60 feet add 14% per side
If 61 to 100 feet add 9% per side

Total GPM with exposures	Add 50% for each floor above ground floor		# of floors	Total to add for floors above	Sub-total with floors added	If wood shingles on roof add 500 GPM	
1500.00	750		0	0.00	1500.00	0	1500.00

FIRE FLOW NEEDED GPM

1500.00

Structure Name P & G Mfg. Bldg. 3

Structure Address 2401 W. 5th St

Length	Width	Sq Ft	Sq Root	X 18	X construction type	GPM sum 1	X Occupancy	GPM sum 2
40	24	960	30.98	557.71	0.8	446.17	1	446.17

Exposure % add	Exposure add GPM	Exposure per side (75% max) Total Side A	Exposure per side 75% max Side B	Exposure per side 75% max Side C	Exposure per side 75% max Side D	Total GPM with exposures
25%	111.54	0	40	112	85	683.17
19%	84.77				0	
14%	62.46					
9%	40.16					
75%	334.63	Total A,B,C,D				
	MAX	237				

Round off to nearest 250 GPM for flows less than 2500 GPM, the nearest 500 GPM over 2500 GPM

Column J, K, L and M
If up to 10 feet add 25% per side
If 11 to 30 feet add 19% per side
If 31 to 60 feet add 14% per side
If 61 to 100 feet add 9% per side

Column F
Fire Resistive 0.6
Non-combustible 0.8
Ordinary 1
Wood Frame 1.5

Column H
.75 if Mostly non-combustible contents
.85 if Limited combustibles (apartments, churches, schools, hospitals)
1.0 if Mostly combustible (restraunts, sheds, garages)
1.15 if Free burning contents (post offices, horse stables, feed mills, repair garages,ag storage)
1.25 if Rapid burning (aircraft hangers, tires, flammable liquids, wood working)

Total GPM with exposures	Add 50% for each floor above ground floor		# of floors	Total to add for floors above	Sub-total with floors added	If wood shingles on roof add 500 GPM	
	375		0	0.00			
750.00					750.00	0	750.00

FIRE FLOW NEEDED GPM

750.00

Structure Name P & G Mfg. Bldg. 4

Structure Address 2401 W. 54th St.

Length	Width	Sq Ft	Sq Root	X 18	X construction type	GPM sum 1	X Occupancy	GPM sum 2
50	30	1500	38.73	697.14	0.8	557.71	1	557.71

Exposure % add	Exposure add GPM	Exposure per side (75% max) Total Side A	Exposure per side 75% max Side B	Exposure per side 75% max Side C	Exposure per side 75% max Side D	Total GPM with exposures
25%	139.43	106	78	0	50	897.71
19%	105.96				106	
14%	78.08					
9%	50.19					
75%	418.28	Total A,B,C,D				
	MAX	340				

Round off to nearest 250 GPM for flows less than 2500 GPM, the nearest 500 GPM over 2500 GPM

Column J, K, L and M
If up to 10 feet add 25% per side
If 11 to 30 feet add 19% per side
If 31 to 60 feet add 14% per side
If 61 to 100 feet add 9% per side

Column F
Fire Resistive 0.6
Non-combustible 0.8
Ordinary 1
Wood Frame 1.5

Column H
.75 if Mostly non-combustible contents
.85 if Limited combustibles (apartments, churches, schools, hospitals)
1.0 if Mostly combustible (restraunts, sheds, garages)
1.15 if Free burning contents (post offices, horse stables, feed mills, repair garages,ag storage)
1.25 if Rapid burning (aircraft hangers, tires, flammable liquids, wood working)

Total GPM with exposures	Add 50% for each floor above ground floor		# of floors	Total to add for floors above	Sub-total with floors added	If wood shingles on roof add 500 GPM	
1000.00	500		0	0.00	1000.00	0	1000.00

FIRE FLOW NEEDED GPM

1000.00

Structure Name P & G Mfg. Bldg. 5

Structure Address 2401 W. 5th St.

Length	Width	Sq Ft	Sq Root	X 18	X construction type	GPM sum 1	X Occupancy	GPM sum 2
20	16	320	17.89	321.99	0.8	257.60	1	257.60

Exposure % add	Exposure add GPM	Exposure per side (75% max) Total Side A	Exposure per side 75% max Side B	Exposure per side 75% max Side C	Exposure per side 75% max Side D	Total GPM with exposures
25%	64.40	23	49	49	64	442.60
19%	48.94				0	
14%	36.06					
9%	23.18					
75%	193.20	Total A,B,C,D				
	MAX	185				

Round off to nearest 250 GPM for flows less than 2500 GPM, the nearest 500 GPM over 2500 GPM

Column J, K, L and M
If up to 10 feet add 25% per side
If 11 to 30 feet add 19% per side
If 31 to 60 feet add 14% per side
If 61 to 100 feet add 9% per side

Column F
Fire Resistive 0.6
Non-combustible 0.8
Ordinary 1
Wood Frame 1.5

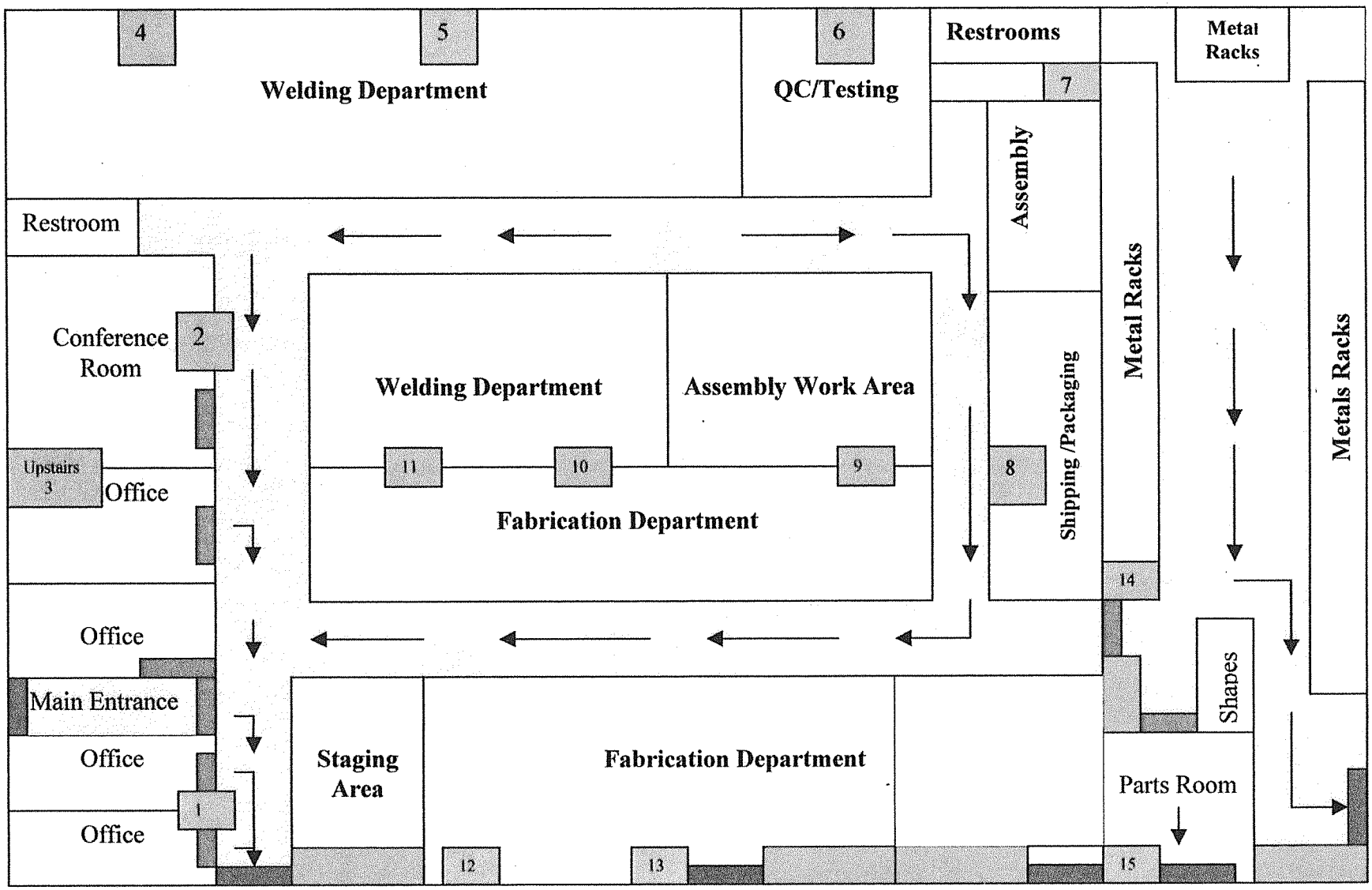
Column H
.75 if Mostly non-combustible contents
.85 if Limited combustibles (apartments, churches, schools, hospitals)
1.0 if Mostly combustible (restraunts, sheds, garages)
1.15 if Free burning contents (post offices, horse stables, feed mills, repair garages,ag storage)
1.25 if Rapid burning (aircraft hangers, tires, flammable liquids, wood working)

Total GPM with exposures	Add 50% for each floor above ground floor		# of floors	Total to add for floors above	Sub-total with floors added	If wood shingles on roof add 500 GPM	
	250		0	0.00			
500.00					500.00	0	500.00

FIRE FLOW NEEDED GPM

500.00

P&G Manufacturing Floor Plan Building 1 Evacuation Route



Parking Lot / Safe Zone

Oxygen sensors are sometimes used as a safety precaution when working with liquid nitrogen to alert workers of gas spills into a confined space.[9]

Vessels containing liquid nitrogen can condense oxygen from air. The liquid in such a vessel becomes increasingly enriched in oxygen (boiling point 90 K; −183 °C; −298 °F) as the nitrogen evaporates, and can cause violent oxidation of organic material.[*citation needed*]

See also

- Computer cooling
- Liquid nitrogen vehicle

References

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6. ^ Brent S. Mattox. "Investigative Report on Chemistry 301A Cylinder Explosion" (reprint). Texas A&M University. http://ucih.ucdavis.edu/docs/chemistry_301a.pdf.
7. ^ British Compressed Gases Association (2000) BCGA Code of Practice CP30. The Safe Use of Liquid nitrogen Dewars up to 50 litres. ISSN 0260-4809.
8. ^ Inquiry after man dies in chemical leak, BBC News, October 25, 1999.
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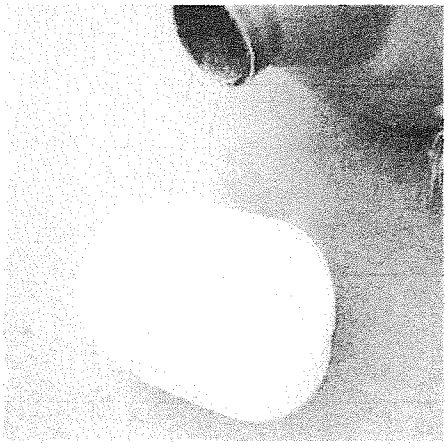
Liquid nitrogen

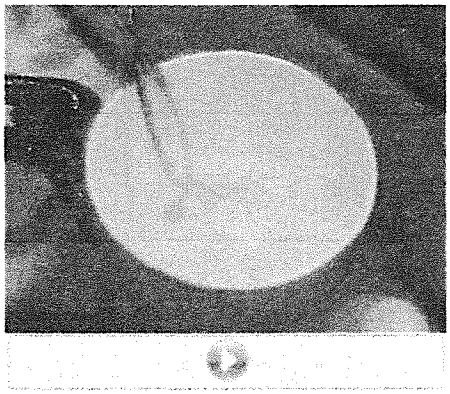
From Wikipedia, the free encyclopedia

Liquid nitrogen is nitrogen in a liquid state at an extremely low temperature. It is produced industrially by fractional distillation of liquid air. Liquid nitrogen is a colourless clear liquid with density of 0.807 g/mL at its boiling point and a dielectric constant of 1.4.[1] Liquid nitrogen is often referred to by the abbreviation, LN_2 or "LIN" or "LN" and has the UN number 1977.



Liquid nitrogen

At atmospheric pressure, liquid nitrogen boils at −196 °C (77 K; −321 °F) and is a cryogenic fluid which can cause rapid freezing on contact with living tissue, which may lead to frostbite. When appropriately insulated from ambient heat, liquid nitrogen can be stored and transported, for example in vacuum flasks. Here, the very low temperature is held constant at 77 K by slow boiling of the liquid, resulting in the evolution of nitrogen gas. Depending on the size and design, the holding time of vacuum flasks ranges from a few hours to a few weeks.



Air balloon submerged into liquid nitrogen

Liquid nitrogen can easily be converted to the solid by placing it in a vacuum chamber pumped by a rotary vacuum pump.[2] Liquid nitrogen freezes at 63 K (−210 °C; −346 °F). Despite its reputation, liquid nitrogen's efficiency as a coolant is limited by the fact that it boils immediately on contact with a warmer object, enveloping the object in insulating nitrogen gas. This effect, known as the Leidenfrost effect, applies to any liquid in contact with an object significantly hotter than its boiling point. More rapid cooling may be obtained by plunging an object into a slush of liquid and solid nitrogen than into liquid nitrogen alone.

Nitrogen was first liquefied at the Jagiellonian University on 15 April 1883 by Polish physicists, Zygmunt Wróblewski and Karol Olszewski.[3]

MIT students preparing homemade ice cream with liquid nitrogen.

Contents

Uses

Liquid nitrogen is a compact and readily transported source of nitrogen gas without pressurization. Further, its ability to maintain temperatures far below the freezing point of water makes it extremely useful in a wide range of applications, primarily as an open-cycle

refrigerant, including:

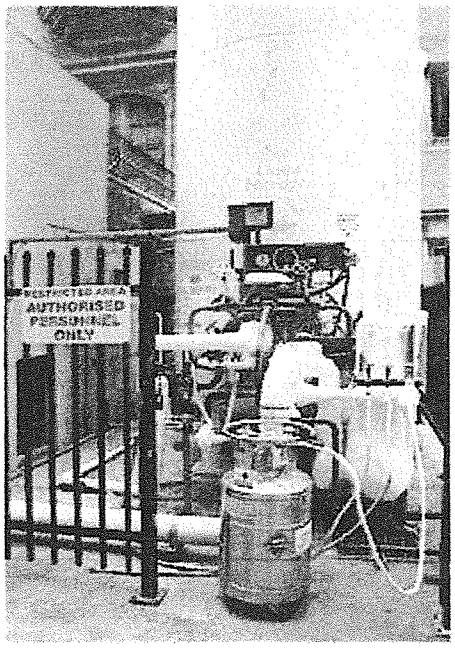
- in cryotherapy for removing unsightly or potentially malignant skin lesions such as warts and actinic keratosis
- as a coolant for CCD cameras in astronomy
- to store cells at low temperature for laboratory work
- in cryogenics
- as a source of very dry nitrogen gas
- for the immersion freezing and transportation of food products
- for the cryopreservation of blood, reproductive cells (sperm and egg), and other biological samples and materials
- as a method of freezing water pipes in order to work on them in situations where a valve is not available to block water flow to the work area
- in the process of promession, a way to dispose of the dead
- for cooling a high-temperature superconductor to a temperature sufficient to achieve superconductivity
- for the cryonic preservation in the hope of future reanimation.
- to preserve tissue samples from surgical excisions for future studies
- to shrink-weld machinery parts together
- as a coolant for vacuum pump traps and in controlled-evaporation processes in chemistry.
- as a coolant to increase the sensitivity of infrared homing seeker heads of missiles such as the Strela 3
- as a coolant to temporarily shrink mechanical components during machine assembly and allow improved interference fits
- as a coolant for computers[4]
- in food preparation, such as for making ultra-smooth ice cream.[5]

Safety

Since the liquid to gas expansion ratio of nitrogen is 1:694 at 20 °C (68 °F), a tremendous amount of force can be generated if liquid nitrogen is rapidly vaporized. In an incident in 2006 at Texas A&M University, the pressure-relief devices of a tank of liquid nitrogen were malfunctioning and later sealed. As a result of the subsequent pressure buildup, the tank failed catastrophically and exploded. The force of the explosion was sufficient to propel the tank through the ceiling immediately above it.[6]

Because of its extremely low temperature, careless handling of liquid nitrogen may result in cold burns.

As liquid nitrogen evaporates it will reduce the oxygen concentration in the air and might act as an asphyxiant, especially in confined spaces. Nitrogen is odorless, colorless and tasteless, and may produce asphyxia without any sensation or prior warning.[7] A laboratory assistant died in Scotland in 1999, apparently from asphyxiation caused by liquid nitrogen spilled in a basement storage room.[8]



Filling a liquid nitrogen Dewar from a storage tank