

Oilfield Awareness For Emergency Responders

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OIL & GAS CONSERVATION COMMISSION

Overview

- ❖ Brief History of O&G in Colorado
- ❖ Colorado Oil and Gas Conservation Commission
- ❖ How a wellbore is constructed
- ❖ Overview of production equipment
- ❖ Identify possible hazards
- ❖ Tools and SOP's (Now What?)
- ❖ Short case study of equipment fire



Oil and Gas in the State

- ❖ First commercial oil well -1862 Canon City
- ❖ Florence Field 1880's
- ❖ Boulder Field 1900
- ❖ Nearly every County has been explored since
- ❖ 46,000 + current active wells (as of 10/2011)
- ❖ 40,000 + plugged and abandoned wells

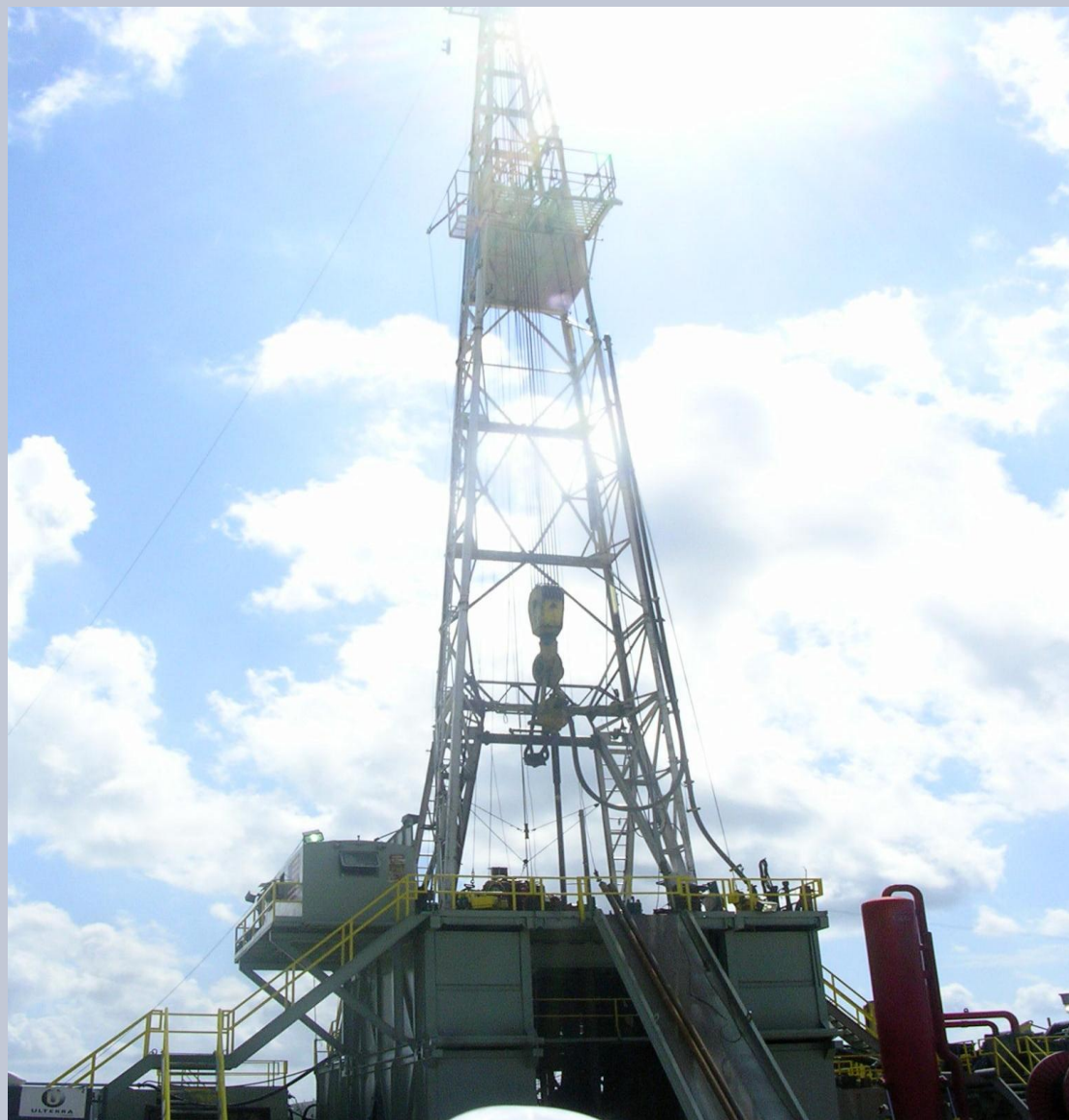


Early Oil



OIL & GAS CONSERVATION COMMISSION

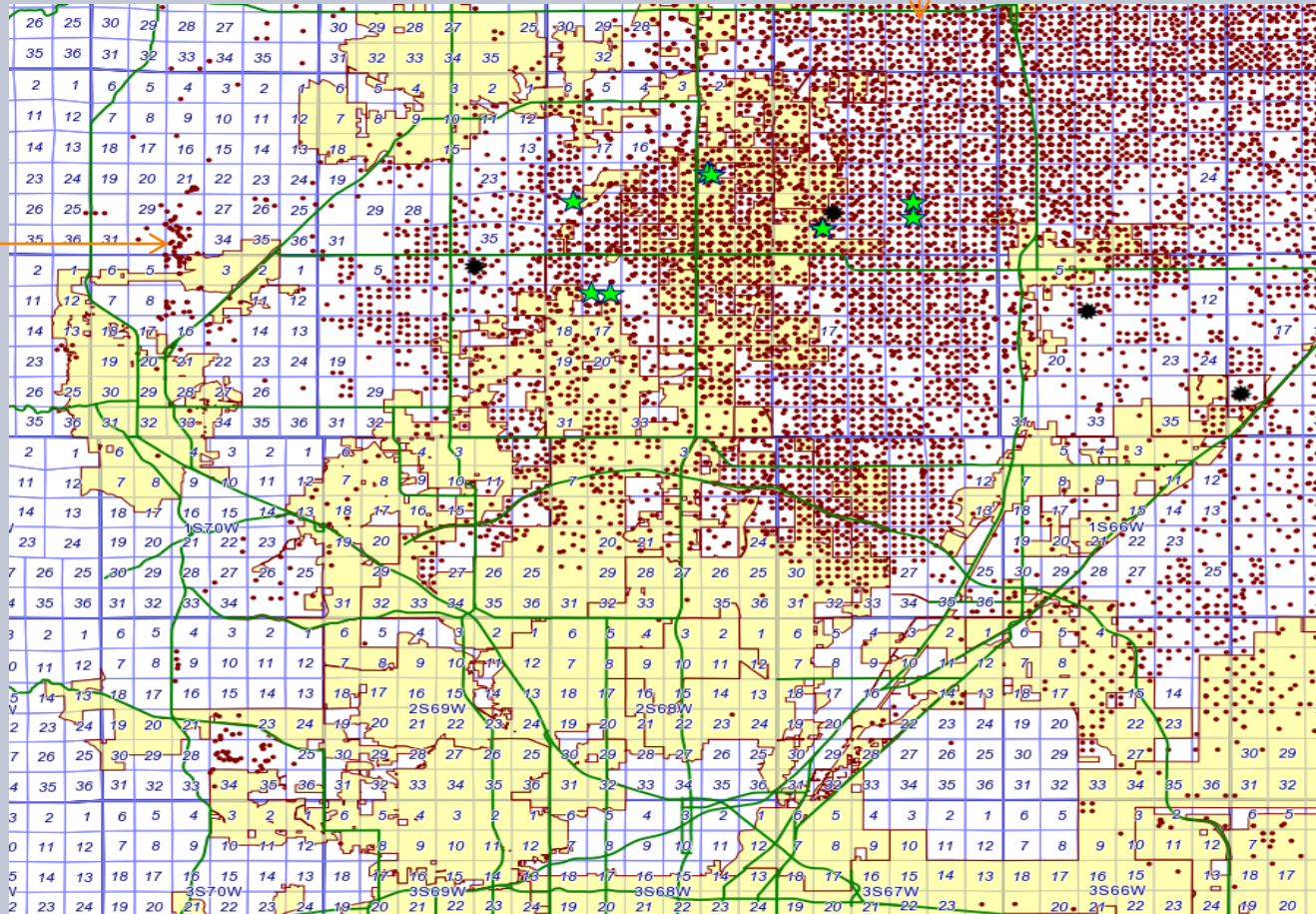
Today



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Current Activity

Historic
Boulder
Field



COGCC

- ❖ Formed 1951 by the Oil and Gas Act
- ❖ Currently has approx 75 employees, Office in Denver (main) and Satellite Office in Rifle
- ❖ 18 are positioned throughout the State as Field Inspectors (11), Reclamation Specialists (2) or Environmental Protection Specialists (6)
- ❖ Web page www.cogcc.state.co.us



OIL & GAS CONSERVATION COMMISSION

Mission Statement

- ❖ Under the Oil and Gas Conservation Act, the Commission's mission is to: Foster the responsible, balanced development, production, and utilization of oil and gas in a manner consistent with protection of public health, safety, and welfare, including protection of the environment and wildlife resources.
- C.R.S. 34-60-102(1)(a)(I).



Rules and Policies

- ❖ Achieve Mission Statement by implementing Rules and Policies
- ❖
- ❖ Rules are approved by Legislature and can only be changed by approval of Legislature

- ❖ Both can be found on web site along with contact info for Area Field Personnel
@www.cogcc.state.co.us

- ❖ Regulate facilities from before drilling until well after plugging



Rules and Policies (cont.)

- ❖ Most Safety Rules (600 Series) are basically general in nature and designed for public safety (Rule 601)
- ❖ Not intended to supersede or replace OSHA rules and regulations (Rule 601 & 212)
- ❖ Do refer to NFPA, UL and API for different situations
- ❖ Setbacks from buildings, public roads, above ground utilities and railroads are defined and reviewed for each new well
- ❖ Setbacks can vary based on area definition (high vs. non-high density)



Rules and Policies (cont.)

- ❖ Other rules address drilling and well servicing operations that deal with well control equipment
- ❖ Storage and handling facilities are covered to include specifications upon construction, adequate secondary containment and control of releases
- ❖ Fire prevention and protection is covered in 606A
- ❖ Hydrogen Sulfide Gas is covered in Rule 607 and is currently being studied for a policy change



Rules and Policies (cont.)

❖ Rule 210 d was specifically adopted in 2009 rule making with First Responders in mind

d. Tanks and Containers.

(1) All tanks with a capacity of ten (10) barrels or greater shall by September 1, 2009 be labeled or posted with the following information:

A. Name of operator;

B. Operator's emergency contact telephone number;

C. Tank capacity;

D. Tank contents; and

E. National Fire Protection Association (NFPA) Label.

(2) Containers that are used to store, treat, or otherwise handle a hazardous material and which are required to be marked, placarded, or labeled in accordance with the U.S. Department of Transportation's Hazardous Materials Regulations, shall retain the markings, placards, and labels on the container. Such markings, placards, and labels must be retained on the container until it is sufficiently cleaned of residue and purged of vapors to remove any potential hazards.



PAR 1

WILLIAMS

PRODUCTION RMT CO.

970-285-9377

NATURAL GAS CONDENSATE
TANK CAPACITY 200 BBLS

HEALTH HAZARDS:

- H200
- H201
- H202
- H226
- H228
- H302
- H312
- H314
- H315
- H317
- H318
- H319
- H330
- H332
- H334
- H335
- H336
- H337
- H338
- H339
- H373
- H410
- H411
- H412
- H413

SPECIFIC HAZARD:

- ACD - Acid
- ALK - Alkali
- CM - Corrosive
- OX - Oxidizer
- P - Polymerizable
- T - Toxic
- XN - Explosive



FIRE HAZARDS:

- F+ (Extremely Flammable)
- F (Flammable)
- FX (Flammable - Extended Exposure)
- OX (Oxidizer)
- OX+ (Oxidizer - Extended Exposure)
- OX- (Oxidizer - Limited Exposure)
- NOX (Non-Oxidizing)
- NO (Non-Flammable)
- LO (Lowly Flammable)
- LN (Non-Flammable - Limited Exposure)
- LN+ (Non-Flammable - Extended Exposure)
- LN- (Non-Flammable - Limited Exposure)
- LN+ (Non-Flammable - Extended Exposure)
- LN- (Non-Flammable - Limited Exposure)

REACTIVITY:

- R+ (Highly Reactive)
- R (Reactive)
- RX (Reactive - Extended Exposure)
- OX (Oxidizer)
- OX+ (Oxidizer - Extended Exposure)
- OX- (Oxidizer - Limited Exposure)
- NOX (Non-Oxidizing)
- NO (Non-Flammable)
- LO (Lowly Flammable)
- LN (Non-Flammable - Limited Exposure)
- LN+ (Non-Flammable - Extended Exposure)
- LN- (Non-Flammable - Limited Exposure)
- LN+ (Non-Flammable - Extended Exposure)
- LN- (Non-Flammable - Limited Exposure)



Rules and Policies (cont.)

- ❖ In Addition 210 a addresses Drilling and recompletion Operations
- ❖ 210 b is for Permanent Designations



210 a

210. SIGNS AND MARKERS

The operator shall mark each and every well in a conspicuous place, from the time of initial drilling until final abandonment, as follows:

a. **Drilling and Recompletion Operations.** Directional signs, no less than three (3) and no more than six (6) square feet in size, shall be provided during any drilling or recompletion operation, by the operator or drilling contractor. Such signs shall be at locations sufficient to advise emergency crews where drilling is taking place; at a minimum, such locations shall include (i) the first point of intersection of a public road and the rig access road and (ii) thereafter at each intersection of the rig access route, except where the route to the rig is clearly obvious to uninformed third parties. Signs not necessary to meet other obligations under these rules shall be removed as soon as practicable after the operation is complete.



210 b

b. Permanent Designations.

- (1) **Wells.** Within sixty (60) days after the completion of a well, a permanent sign shall be located at the wellhead which shall identify the well and provide its legal location, including the quarter quarter section. When no associated battery is present, the additional information required under Rule 210.b.(2) shall be required on the sign.

- (2) **Batteries.** Within sixty (60) days after the installation of a battery, a permanent sign shall be located at the battery. **At the option of the operator, or at the request of local emergency response authorities**, the sign may be placed at the intersection of the lease access road with a public, farm or ranch road if the referenced battery is readily apparent from such location. Such sign, which shall be no less than three (3) square feet and no more than six (6) square feet, shall provide: the name of the operator; a phone number at which the operator can be reached at all times; a phone number for local emergency services (911 where available); the lease name or well name(s) associated with the battery; the public road used to access the site; and the legal location, including the quarter quarter section. In lieu of providing the legal location on the permanent sign, it may be stenciled on a tank in characters visible from one-hundred (100) feet.





Red Willow Production Co.

SO UTE 33-10 #23-1 Mv

Lease # 14-20-151-20

CA # 7960043230

API # 05-067-06179

NWNW Sec. 23, T-33-N, R-10-W, NMPM

Lat: N 37° 05' 38.61"N Long: -107° 54' 30.60"W

La Plata County, CO.

Emerg. Day: 970-563-5100 Night: 713-470-1126

MULL DRILLING CO. INC.
(719) 767-8805



5422
9027810

CRUDE OIL



MULL DRILLING CO., INC.
(719) 767-8805

UPRC HORNBOSTEL TOWER
NWNW SEC.33-135-14W
CHEYENNE, COUNTY
1/8 E-SH 385-1/2 N-CR
IN CASE OF EMERGENCY CALL



DANGER

NO SMOKING
OPEN FLAMES
ARCS OR SPARKS

NOTICE

RESTRICTED AREA
AUTHORIZED
PERSONNEL
ONLY

NOTICE

HARD HAT
SAFETY GLASSES
STEEL TOE SHOES
AREA

5468
9027810

CRUDE OIL



MULL DRILLING CO. INC.
(719) 767-8805

300 BBL
CRUDE
OIL



210 c

c. Centralized E&P Waste Management Facilities. The main point of access to a centralized E&P waste management facility shall be marked by a sign captioned “(operator name) E&P Waste Management Facility.” Such sign, which shall be no less than three (3) square feet and no more than six (6) square feet shall provide: a phone number at which the operator can be reached at all times; a phone number for local emergency services (911 where available); the public road used to access the facility; and the legal location, including quarter quarter section, of the facility.



Wellbore Construction

Christmas Tree (not to scale)

Pipeline to Flow Process and Storage

Surface Casing

Ground Water Protected

Cement

Depth: ~580'

Intermediate Casing

Cement

Production Casing

Tubing

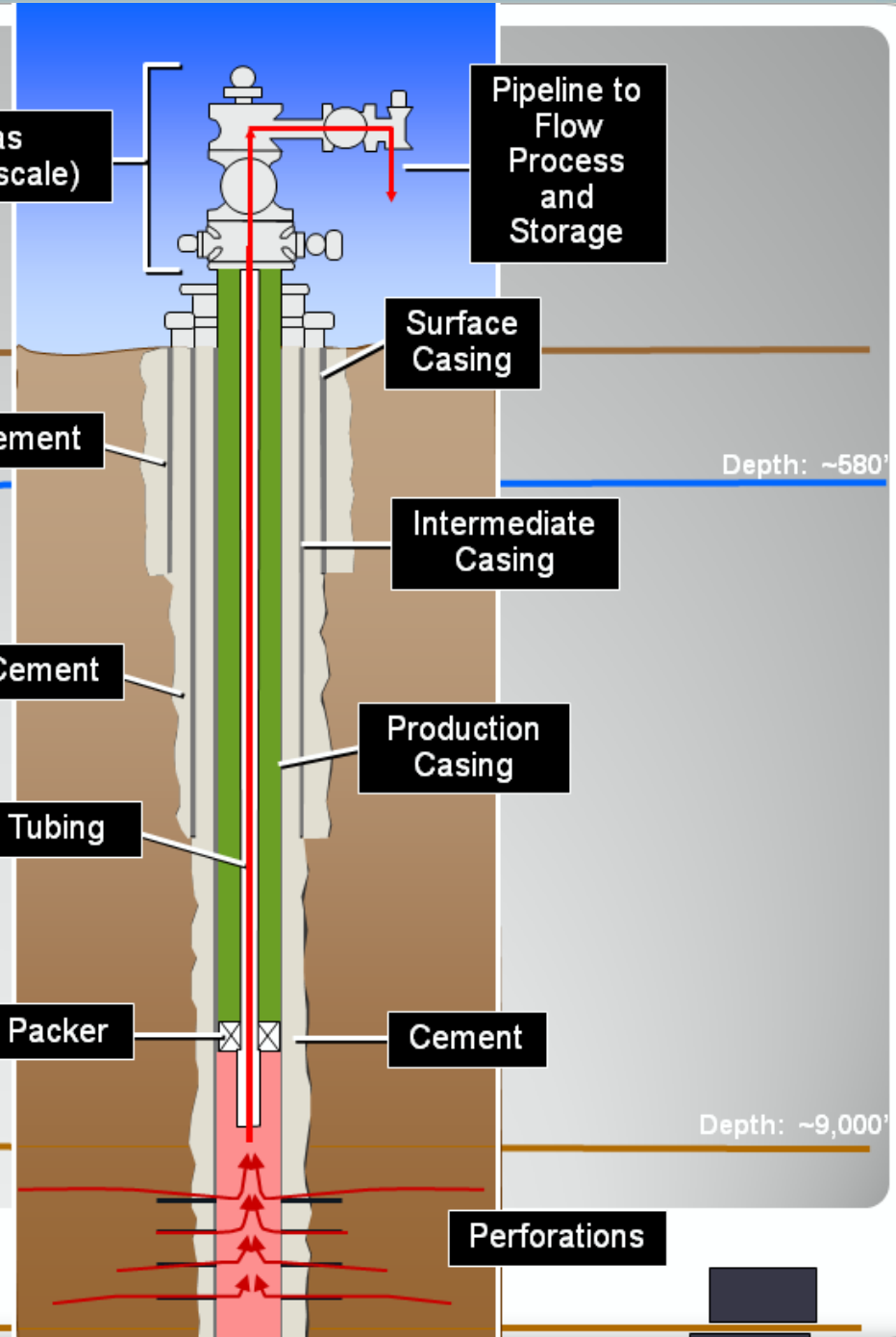
Packer

Cement

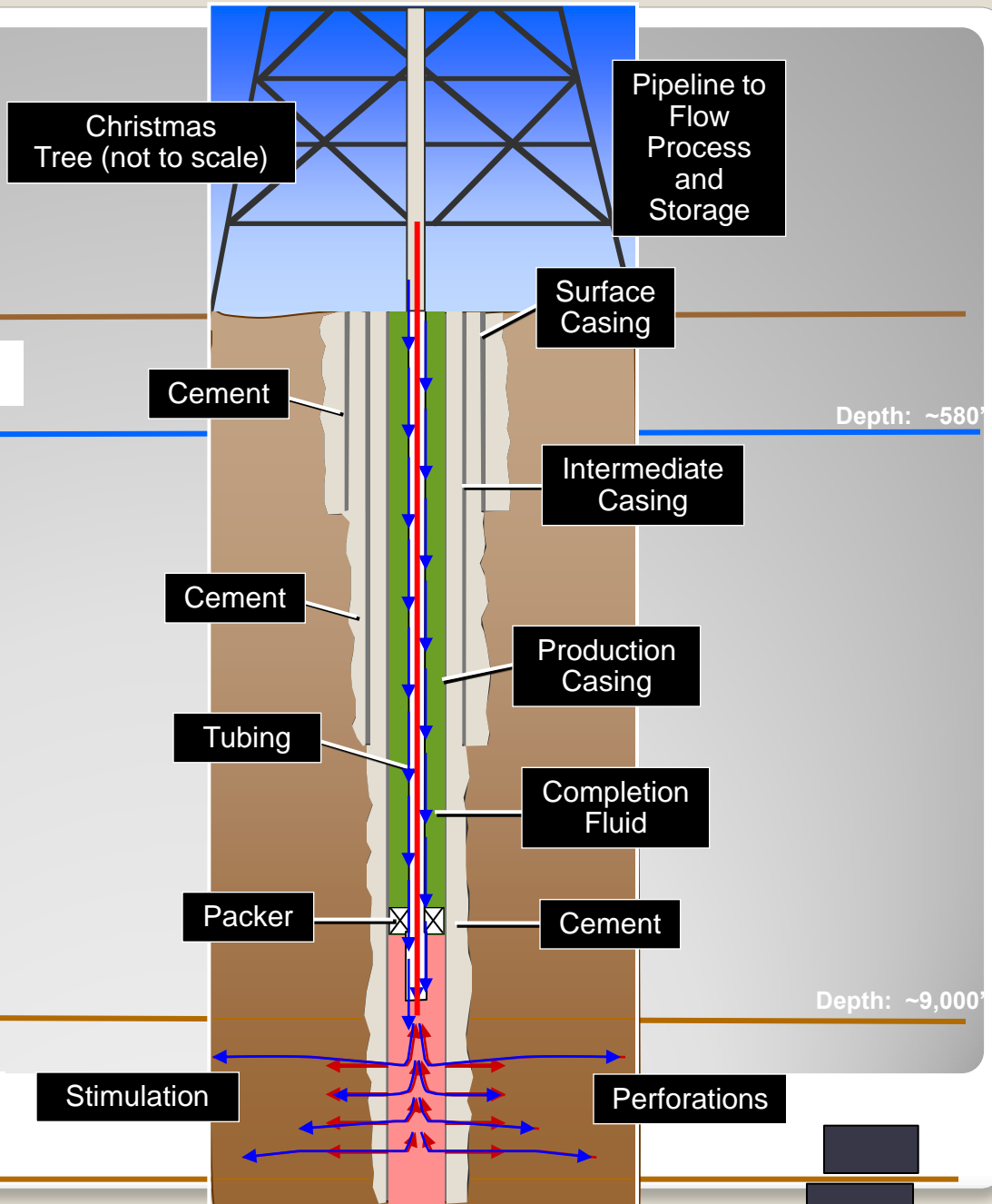
Depth: ~9,000'

Producing Formation

Perforations



Wellbore Construction





AFTER LOCATION IS BUILT,
THE DRILLING RIG IS
BROUGHT IN AND SET UP



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AFTER SURFACE
CASING IS SET AND
CEMENTED THE
BLOWOUT PREVENT
IS INSTALLED



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AFTER DRILLING
RIG RUNS AND
CEMENTS CASING
IT MOVES OFF
AND THE WELL
SERVICE RIG IS
BROUGHT IN TO
FINISH THE WELL.
THESE RIGS ALSO
PERFORM
MAINTENANCE
OPERATIONS ON
WELLS



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WELLBORE CONSTRUCTION

It is very essential to understand that in the majority of wells there is no “downhole” valve that can be shut off if an issue arises at the surface



PRODUCTION EQUIPMENT

- ❖ Oil and gas drilling and production facilities are complex sites, even in their simplest form
- ❖ Can be a combination of various construction and production processes at any one time



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PRODUCTION EQUIPMENT (cont.)

- ❖ Not all oil and gas flows to the surface under its own pressure for an extended period of time
- ❖ Many wells eventually will require “mechanical lift” to assist in removing fluids.
- ❖ This is normally accomplished through the use of “pump jacks” or “plunger lift” systems



Free Flow Systems

- ❖ Free Flow Wells can usually be identified through the obvious lack of wellhead equipment
- ❖ They typically flow at a steady rate with very little change
- ❖ Visually can be confused with disposal/injection wells



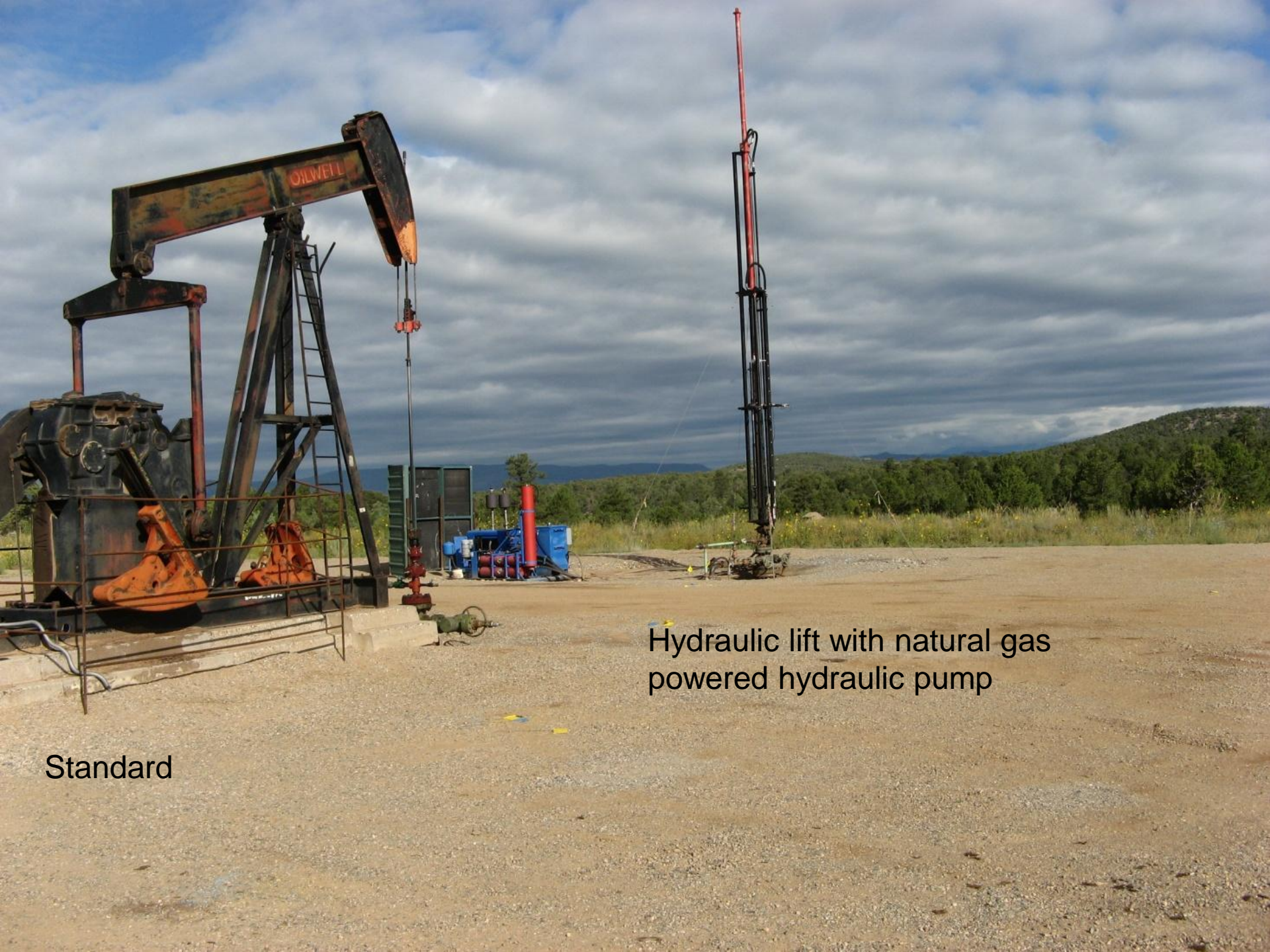


ALL THE FOLLOWING
TOWNSHIP DEPT. AND
SOME SEC. 20-4-14
TOWNSHIP & SEC.
TOWN COUNTY, CO.
AND ORANGE COUNTY
TOWNSHIP, CO.

PUMP JACKS

- ❖ Come in a variety of sizes and configurations, which is determined by depth of well and amount and weight of fluid being lifted
- ❖ Can be driven by internal combustion engines, electric motors or hydraulic drives
- ❖ All can start automatically without notice





Standard

Hydraulic lift with natural gas
powered hydraulic pump

Progressive cavity



Low profile with cellar

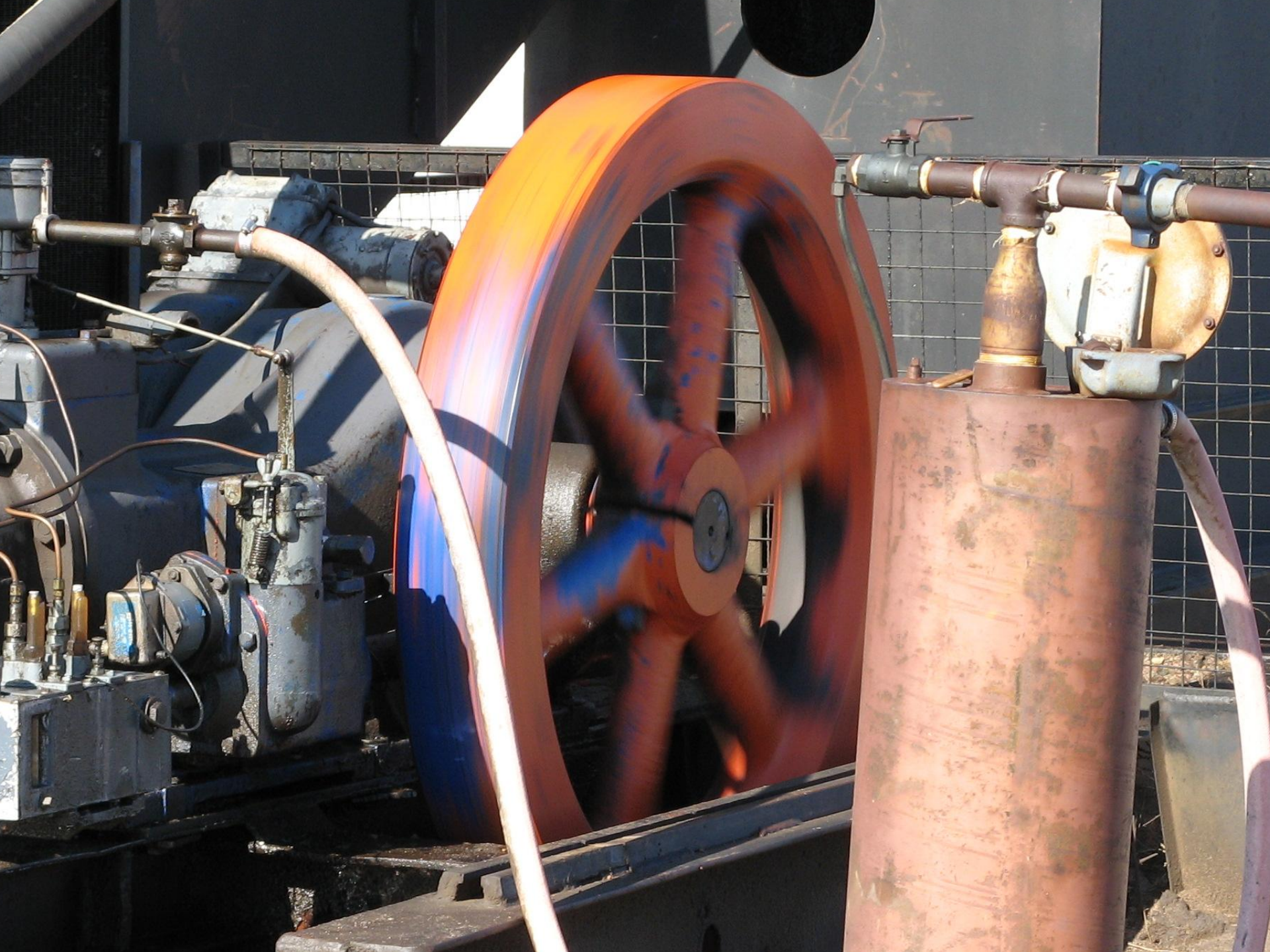






DANGER
HIGH
VOLTAGE

DANGER
HIGH
VOLTAGE



PUMP JACK HAZARDS

- ❖ High Voltage
- ❖ Auto Start
- ❖ Flammable gas or Flammable Liquid Driven
- ❖ Pinch and Crush Points
- ❖ Rotating Equipment
- ❖ Falls from Height
- ❖ Confined Spaces



Plunger Lift Systems

- ❖ Have more wellhead equipment
- ❖ Cycle between Lift, Free Flow
- ❖ Operated on a differential system
- ❖ May seem inactive at times





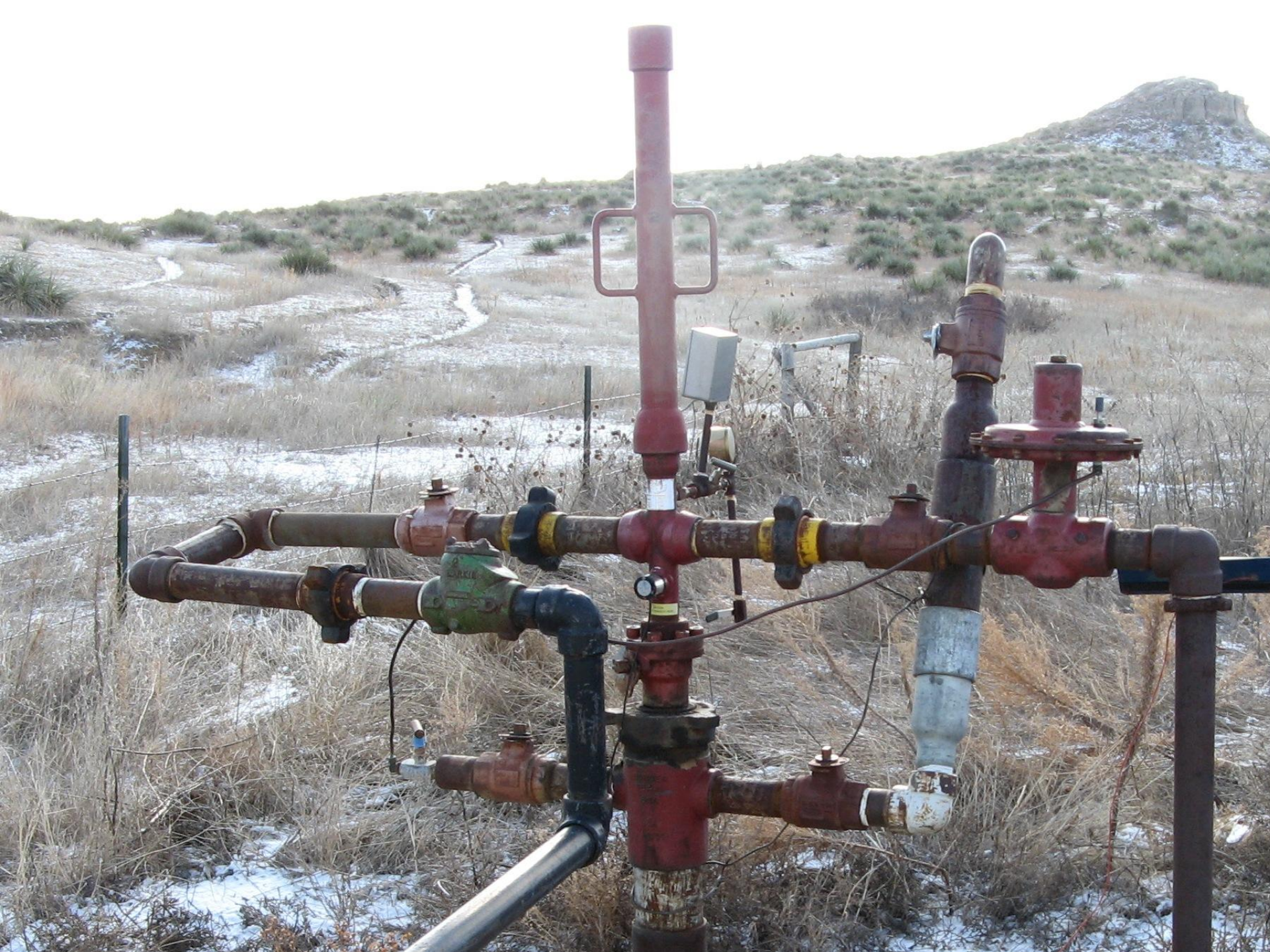
A. B. C. D. E. F. G. H.

THREE FORKS RESOURCES, LLC CO. INC
303-318-0717
Running Creek #15-5r
SWNW Sec 15 T6S-R64
API #05-039-06476
Elbert County, Colorado



THREE FORKS
RESOURCES, LLC
API #05-039-06476





Free Flow and Plunger Hazards

- ❖ May continue to flow or cycle unless well valves are securely shut
- ❖ May cycle without notice
- ❖ If wellhead is damaged cycling plunger can become missile (rare)
- ❖ Improper opening or closing of valves may cause failure (pressure build up)



SEPARATION EQUIPMENT

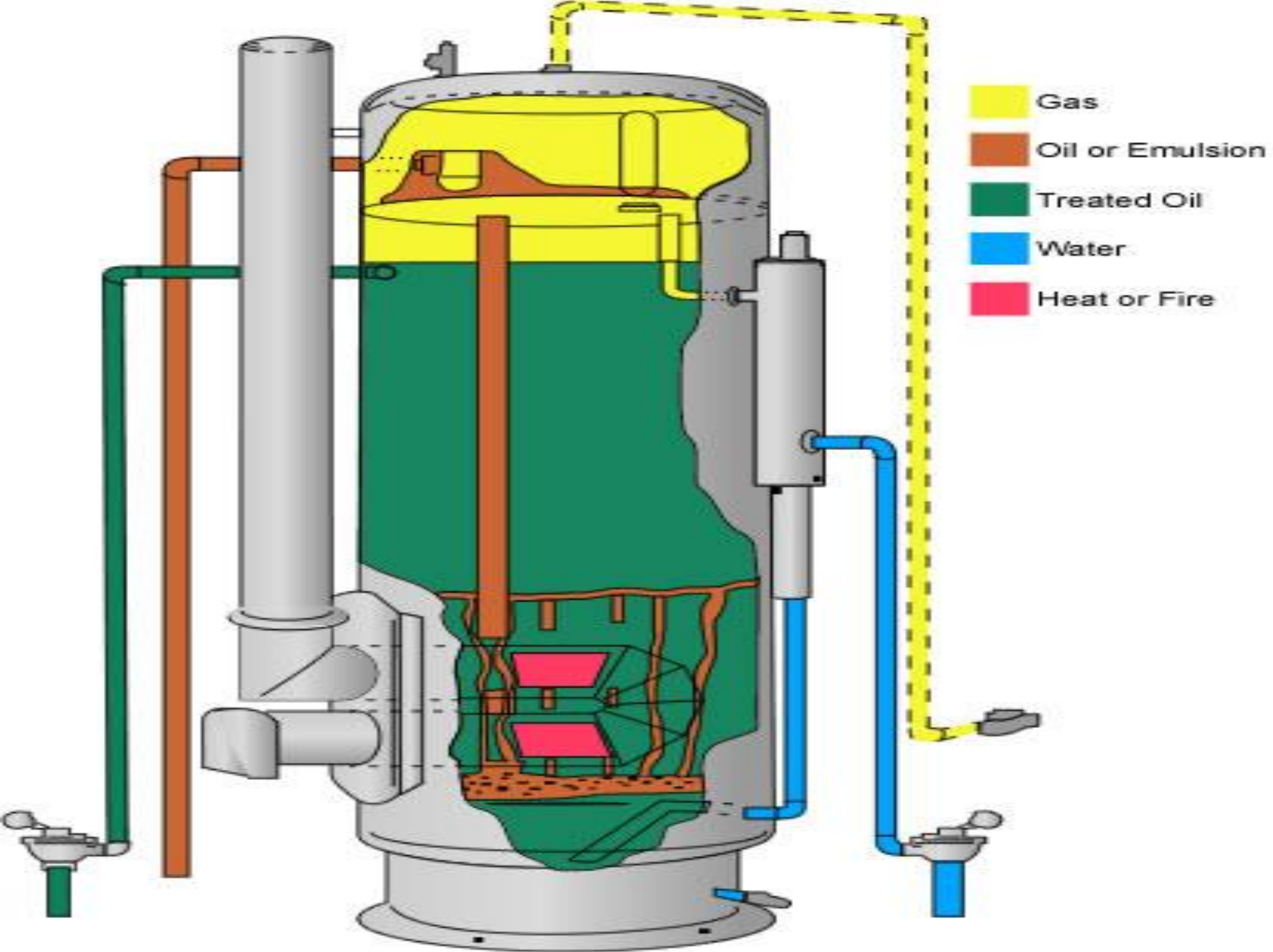
- ❖ Object is to “separate” oil/water/gas
- ❖ Heated/ Non-Heated
- ❖ Can operate with High Pressure/Low Pressure/Atmospheric Pressure
- ❖ As with pump jacks can come in various sizes and configurations
- ❖ Are to be labeled

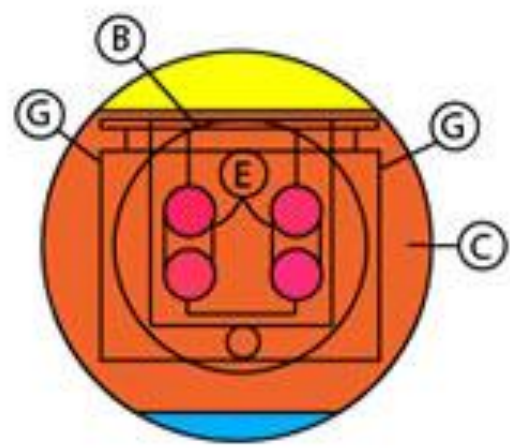
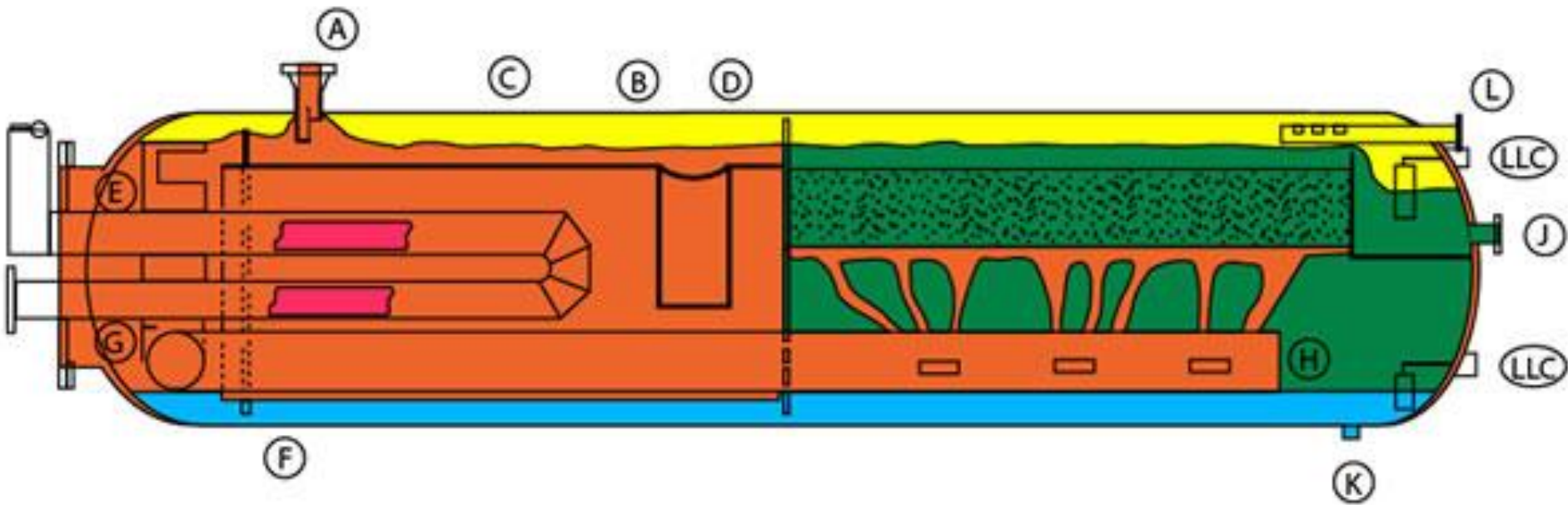


SEPARATION EQUIPMENT

- ❖ Heated equipment have obvious smoke stacks and burner assemblies
- ❖ Both Oil “Heater Treaters” and Heated “Gas Separators work in the same basic fashion
- ❖ Can be Vertical or Horizontal
- ❖ Unheated units work based on gravity and pressure change







- (A) INLET - OIL, GAS, WATER
- (B) SHROUD
- (C) FREE WATER KNOCKOUT SECTION CONTAINS OIL & WATER
- (D) DOWNCOMER FROM F.W.K.O. SECTION INTO SHROUD
- (E) FIRETUBE
- (F) BAFFLE
- (G) (2) VERTICAL COLLECTOR PIPES FOR TREATED OIL
- (H) CONDUCTOR PIPES & OUTLET DISTRIBUTOR
- (I) MAY SECTION
- (J) TREATED OIL OUTLET
- (K) TREATED WATER OUTLET
- (L) GAS OUTLET

- HEAT OR FIRE
- GAS
- EMULSION

- TREATED WATER
- TREATED OIL



Gas Meter Run



Heated Separators 2
in 1 unit



Heated
Separator



Emissions
Burner



Gas Meter Run





Heated Gun Barrel



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Hazards

- ❖ Can be under high pressure (400 psi +)
- ❖ Leaks can result in flammable releases
- ❖ Vessels, fluids and gases may be hot
- ❖ Improper opening or closing valves can result in failures both at vessel or elsewhere
- ❖ BLEVE Potential



STORAGE TANKS

- ❖ Various sizes (10- 1000 Barrels)
- ❖ May be Steel, Fiberglass, Concrete or Plastic (Chemicals)
- ❖ May be unheated or heated (heated have same fire tube/ burner/ stack configuration)
- ❖ May contain Oil, Condensate, Water with Gas in the head space
- ❖ Are required to be labeled



STORAGE TANKS

- ❖ Any tank or treater containing hydrocarbons is required to have secondary containment (berms)
- ❖ Berms can be made of a variety of materials, usually steel or earth
- ❖ In addition may be hooked up to an emission burner unit or vented to atmosphere
- ❖ May have a few ounces to several psi backpressure held on them





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4
1 1

CONDENSATE
16772
916772
CONDENSATE
330 BBLs
ENCANA
303-659-7744

ENCANA OF A DIV OF U.S. G. INC.
WARNING: DO NOT
DRINK
FLAMMABLE LIQUID
VAPOR
DO NOT INHALE VAPOR
DO NOT GET IN EYES
DO NOT GET ON SKIN
DO NOT GET ON CLOTHING
DO NOT GET ON SHOES

PREFERRED WATER
150 BBLs
ENCANA

Tank Hazards

- ❖ Contain Flammable Liquids and vapors
- ❖ Stairs and walkways pose possible slip and falls
- ❖ High angle and confined space issues
- ❖ Can be subject to lightening
- ❖ Secondary Containment can cause access issues
- ❖ Improper opening or closing of valves may cause failure at tank or elsewhere



OTHER EQUIPMENT/ FACILITIES

- ❖ Compressor Stations
- ❖ Compression Equipment
- ❖ Oil Transport Facilities
- ❖ Gas Transport Facilities



Portable Test Compressor



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Single Compressor Station



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Large Transportation Facility



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Now What?

- ❖ Pre plan - contact O & G companies in area
- ❖ Set up contact lists - local pumpers/supervisors
- ❖ Utilize COGCC maps to plot wells in area
- ❖ Understand your Department capabilities





“Competent Person”

At an incident the person you want from the **Oil Company or Contractor** is someone who knows how everything works. Make sure everyone is clear about what is happening.

Only in life rescue situations should you enter prior to an on scene consultation with the operator representative or competent person.



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Now What?

- ❖ As in any industrial facility construction and operation the incidents can vary greatly
- ❖ Injuries can include burns, blunt force trauma, crush injuries, partial and complete amputations
- ❖ In addition working around high pressure fluids and hydraulic systems increase the risk of associated injuries



Now What?



❖ Handle any medical or rescue as you would for any other INDUSTRIAL/HEAVY CONSTRUCTION INCIDENT

❖ Utilize onsite personnel for details of incident and potential hazards.
COMPETENT PERSON!!!!



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RESPONSES

❖ Some hazards may stand out



❖ Others may not as much





KEITH M. GEORGE
DIRECTOR OF OPERATIONS
HSR RUSSELL SEC 2 - 25A
SWSE SEC 2 - T2N - R68
E.D. COLP. D
& 19, 1/2, N. 4 INTO
IN A
EMERG
911 CALL
EXTN
80-0154

Keith M. George
DIRECTOR OF OPERATIONS
CENTE 10-25
SE SE 22-12 -R68W

Keith M. George
DIRECTOR OF OPERATIONS
CENTE 10-25
SE SE 22-12 -R68W

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DIRECTOR OF OPERATIONS
CENTE 10-25
SE SE 22-12 -R68W

Keith M. George
DIRECTOR OF OPERATIONS
CENTE 10-25
SE SE 22-12 -R68W

AN YOU PICK OUT HAZARDS?

HOW ABOUT HERE?



ANY RESPONSE HAZARDS HERE?





FIRES and/or RELEASES

- ❖ FIRST AND MOST IMPORTANT IS TO DETERMINE EXACTLY WHAT IS ON FIRE OR LEAKING
- ❖ DETERMINE POTENTIAL HAZARDS, EVACUATE AS NECESSARY
- ❖ DO NOT OPEN OR CLOSE ANY VALVES UNLESS INSTRUCTED TO DO SO BY RESPONSIBLE PARTY
- ❖ DO YOU HAVE THE RESOURCES ON HAND TO EXTINGUISH AND CONTAIN RELEASE?



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FIRES and/or RELEASES

❖ DETERMINE WHAT EXACTLY IS ON FIRE



SAME FIRE OPPOSITE VIEWS



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FIRES and/or RELEASES

- ❖ Determine potential hazards/mitigate if possible



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FIRES and/or RELEASES

❖ Determine if evacuation needed



Same well different views



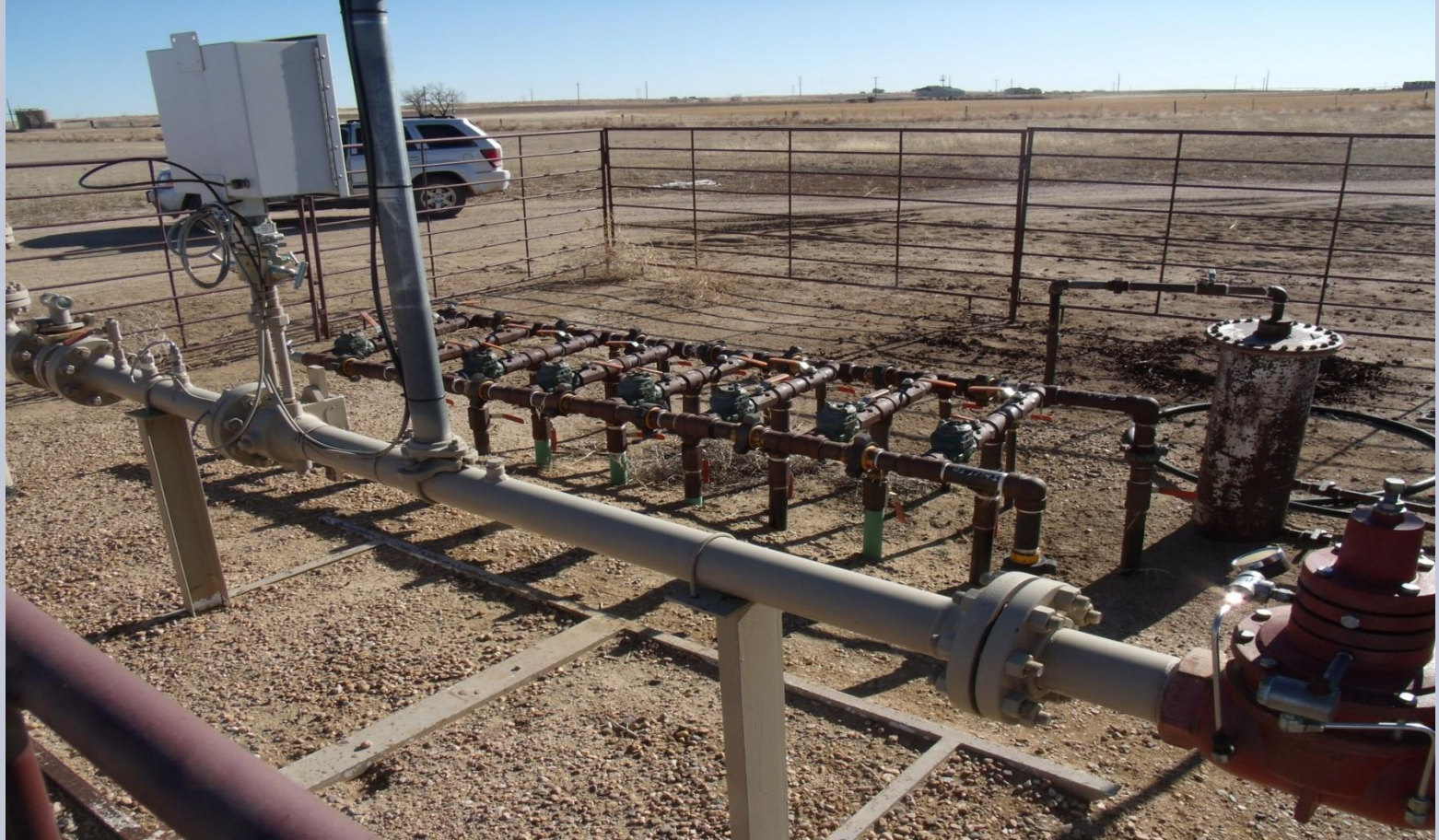
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FIRES and/or RELEASES

- ❖ **DO NOT OPEN OR CLOSE ANY VALVES UNLESS DIRECTED TO DO SO BY A RESPONSIBLE PARTY (COMPETENT PERSON)**
- ❖ **SEVERAL WELLS MAY BE SERVICED BY ONE FACILITY THAT MAY BE SEVERAL THOUSAND FEET AWAY. IT IS ESSENTIAL THE OPERATOR BE CONTACTED PRIOR TO FIRE ATTACK OR ATTEMPTS TO STOP A RELEASE AT EITHER A WELL OR FACILITY**
- ❖ **DOING SO MAY CAUSE UNDESIRABLE PRESSURE BUILD UP OR UNDESIRABLE CHANGE IN DIRECTION OF FLOW**
- ❖ **EITHER OF THESE SITUATIONS CAN RESULT IN OTHER RELEASES OR EQUIPMENT FAILURES THAT CAN COMPLICATE THE SITUATION**



FIRES and/or RELEASES



EIGHT WELL HEADER INTO ONE BATTERY

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FIRES and/or RELEASES

EIGHT WELLS IN ONE SECTION (1 SQ MILE) TO ONE BATTERY



BATTERY SITE



FIRES and/or RELEASES

- ❖ Most Departments can handle equipment and storage tank fires (unless multiple tanks are involved)
- ❖ Once the source(s) is/are shut off adequate application of foam is necessary
- ❖ Prior to attack ensure adequate amounts of foam and water are on hand (are other resources available?)
- ❖ Ensure foam equipment is compatible



FIRES and/or RELEASES

- ❖ Most Departments are not equipped to deal with an actual well on fire. This may also include when adjacent equipment is on fire and the fire has or could impinge on the well
- ❖ They may be asked to assist in conjunction with professional well control companies



FIRES and/or RELEASES



To state it simply;
If you extinguish this,
are you prepared for
that?



Actual Incident

- ❖ Heater Treater and Tank Fire January 24 2006
- ❖ Kit Carson VFD response
- ❖ Photos Courtesy Mike Smith (former Cheyenne Wells VFD Chief and pumper for company)





JAN 24 20





JAN 24 2007





DANGER
ALL PERSONS
ENTERING THIS AREA
MUST WEAR
PROTECTIVE GEAR
AND FOLLOW ALL
SAFETY PROCEDURES.
NOTICE

WARNING
HOT SURFACES
BEHIND THIS WALL
DO NOT TOUCH
OR APPROACH
THIS AREA

JAN 24





MT CARSON
VOL.
FIRE DEPT.

KCVFD

JAN 24 2007



DANGER
NO SMOKING
OPEN FLAMES
ARCS OR SPARKS
NOTICE
RESTRICTED AREA
AUTHORIZED
PERSONNEL
ONLY
NOTICE
WEAR HAT
SAFETY GLASSES
STEEL TOE SHOES
AREA

MULLI DRILLING CO. INC.
JULY 1970
SECID-700-0400
CHEYENNE COUNTY
WV-102-5077 & 5140
PHONE IS EMERGENCY CALL 911





QUESTIONS?



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