Well control emergency response plan

OIL & GAS
U.S. OIL AND GAS LAND OPERATIONS

Provided by Wild Well Control, Inc. and Travelers
This emergency response plan is not intended to replace sound judgment. It is to be used as a guideline only in responding to a well control emergency.

Well control emergencies require common sense and professional judgment on the part of all personnel involved in the intervention. Wild Well Control, Inc. and Travelers cannot and do not guarantee, warrant or represent the accuracy of or accept any responsibility for the use of any information contained herein.

No operation should be undertaken if it involves risk to personnel.

Modification to the emergency response plan and its actions may be necessary depending on the circumstances of the event.

Accurate information is essential to an effective blowout intervention project. Recommendations are included for the required information to be gathered both from the well site and from office records.

EARLY INTERVENTION IS CRITICAL!
Call at the earliest detection of ANY incident regarding well control. The call and phone consultation are free.

Wild Well Control, Inc.
281.784.4700
Phones answered 24/7 by a Wild Well Control employee who understands the importance of your call.
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Introduction

Procedures for handling emergencies are absolutely essential to ensure the protection of life, property and the environment. Wild Well Control, Inc. has developed this Emergency Response Plan (ERP) for the operator/contractor to define the procedures that are to be used in the event of a well control emergency at the well site.

The equipment and procedures specified in this ERP address various well control scenarios ranging from routine well control operations to situations involving a total loss of well control, which necessitate the immediate mobilization of intervention equipment and personnel. This ERP is general in nature and is intended for use within U.S. land operations.

This document is written with drilling operations as the primary focus. However, it also applies to workover and production operations. This plan assumes that adequate oil spill contingency plans are in place and will be implemented in the event of a well control emergency.

The primary objective of the ERP is to establish a process for responding to and safely managing well control emergencies. This process includes:

1. Protecting the personnel at the site in the event of a well control emergency
2. Defining the notification protocols at the onset of a well emergency
3. Preventing further damage or injury while adequate equipment and personnel are being mobilized
4. Defining the critical information that is required in order to determine the appropriate response level and strategies
5. Organizing personnel and providing guidelines for their roles during the emergency response and the subsequent management
6. Pre-selecting sources and developing mobilization plans for personnel, equipment, materials and services typically required for implementation of well control procedures
7. Notification of the appropriate regulatory agencies
Shutting-in the well

It is very important to shut-in the well as soon as possible when flow is suspected. The following procedures are standard industry practices for a “hard” shut-in of the wellbore:

Well shut-in procedures – while drilling/on bottom

1. **Space out the drillstring and sound the alarm**
   - Position the Kelly or top drive so that no tool joints are in the preventers
   - If possible, have uppermost tool joint at connection height above rotary table/rig floor

2. **Shut down the rotary/top drive and the pumps**
   - Stop rotating
   - Stop the mud pumps

3. **Check for well flow. If well is flowing, continue with next step (4.)**

4. **Shut-in the well**
   - Close the designated blowout preventer (BOP)
   - Ensure the choke is closed
   - Open the choke line hydraulic opening valve
   - Verify that the well is shut-in and the flow has stopped
Well shut-in procedures – while tripping

1. Sound the alarm

2. Stab the safety valve on drillstring
   - Make up fully opened safety valve to uppermost tool joint
   - Close safety valve once properly made up

3. Space out the drillstring

4. Check for flow. If the well is flowing, continue with next step (5.)

5. Shut-in the well
   - Close the designated BOP
   - Close the choke and open the choke line hydraulic operated valve (HOV)
   - Verify that the well is shut-in and the flow has stopped
Response levels

This section will aid in determining the requirements needed for personnel and material for different well situations. Wild Well Control, Inc. personnel should be consulted in the initial mobilization, but the operator/contractor personnel and the drilling consulting company involved in the project should be familiar with the different response levels. Many well control emergencies are preceded by a period in which the potential for sudden escalation is high, even though primary well control is maintained. The actions taken in this period often make the difference between a well control problem and a well control emergency.

Well control situations involve an infinite number of variables that make precise classification difficult. Often, seemingly insignificant event characteristics can have a major effect on the resolution and potential for escalation of a minor problem. This section attempts to classify various situations according to the amount of risk involved, the procedures required to deal with the situation and other experience-based aspects. There is no attempt to classify the situations according to the probability and/or frequency of occurrence.

The following sections contain specific situations and “trigger points” that are viewed as adding significant complications and/or hazards. Each response level has certain activities associated with it, including notification and/or mobilization of specialized personnel, information to be obtained, equipment requirements and considerations that should be analyzed.

The “levels” are intended for use solely as guidelines and have been made applicable to onshore environments. It is highly probable that situations could develop that defy definition via one of the response levels. These situations will require the use of judgment and experience in order to determine the appropriate actions to be taken.

Operators/contractors are encouraged to contact well control specialists any time there is a doubt about the nature of any well control situation.
Level 1 | Event defined

Level 1 events involve situations that are either common to routine operations or do not pose significant risk to personnel. In most instances, Level 1 events can be resolved using standard operating/drilling procedures, commonly available equipment, personnel and techniques.

Examples of Level 1 events include, but are not limited to, the following scenarios:

a) Well “kicks” (influxes) of manageable volume and intensity (usually < 1 ppg) that are not complicated by mitigating circumstances

b) Mild to moderate loss of circulation

c) Loss of production tubing integrity resulting in sustained pressure on production casing < 50% of casing burst rating. Loss of tubing integrity includes failure of wellhead seals and downhole equipment

d) Loss of production casing integrity resulting in sustained pressure on intermediate casing < 25% of casing burst rating. Loss of casing integrity includes failure of wellhead seals

e) Minor surface leaks that can be isolated via remote means or accessed and isolated manually without significant risk to personnel

Level 1 | Response

Level 1 events should be corrected through the use of standard industry operating/drilling procedures. Notification of Wild Well Control, Inc. will be made at the discretion of the operator/contractor.

No specialized equipment or personnel should be required unless the Level 1 event escalates.
Level 1 Considerations

- Weighting materials and mud chemicals should be evaluated for kick circulation (consider using driller’s method if materials are low or if suspected swabbed kick).
- Monitor surface equipment during kick circulation in order to quickly identify any leaks.
- Monitor pressure on outer casing string during kick circulation in order to quickly identify pressure communication between the strings of pipe.
- Be prepared to immediately close pipe ram if annular begins to leak.
- If productive zones are exposed, monitor well closely for signs of flow during circulation losses.
- Small surface leaks that can be isolated should be isolated remotely if possible. Adequate safety precautions should be in place before approaching even small surface leaks.
- Closely monitor outer casing strings if sustained casing pressure results from tubing or downhole equipment failures.
Level 2 | Event defined

Level 2 events involve circumstances that are not commonly encountered during routine drilling operations and pose the potential for significant risk to personnel, equipment and/or the environment. A Level 2 event may require specialized well control personnel, equipment and/or techniques in order to be safely resolved.

Examples of Level 2 events include, but are not limited to, the following scenarios:

a) Well kicks complicated by influx size or intensity (under-balance), pipe off bottom, plugged tubing/drillstring, washout, plugged choke, etc.

b) Severe loss of circulation

c) Small surface leaks that cannot be easily or safely isolated

d) Loss of production tubing integrity resulting in sustained pressure on production casing >50% of casing burst rating. Loss of tubing integrity includes failure of wellhead seals and downhole equipment

e) Loss of production casing integrity resulting in sustained pressure on intermediate casing >25% of casing burst rating. Loss of casing integrity includes failure of wellhead seals

f) Loss of protective casing integrity resulting in sustained pressure on surface casing (any pressure)
Level 2 | Response

Certain Level 2 events can be dealt with according to established procedures; others require special consideration be given to personnel safety while implementing these procedures as well as specialized techniques. The ERP should be activated, and the appropriate personnel should mobilize to the company office and well site. The operator/contractor emergency response team should remain in operation until the situation is resolved or downgraded to a Level 1 event.

Operator/contractor should contact and advise Wild Well Control, Inc. at the onset of a Level 2 event. The operator/contractor should consult with the well control specialists/engineers for advice on safe handling of the situation. Completed well control information forms (Page 34-36) should be sent along with any other pertinent and/or related information.

Arrangements for the mobilization of well control specialists/engineers should be made for, at minimum, two well control specialists/engineers. These arrangements should be continually updated to ensure the most expedient mobilization route until the Level 2 event is resolved or downgraded to Level 1.

If mobilization of well control specialists/engineers is not deemed necessary, the operator/contractor’s office should maintain open and frequent communications with Wild Well Control, Inc.’s office in Houston, Texas. Information related to the situation, as well as results of technical analysis, will be conveyed via telephone, fax, email and electronic file transfer, as deemed appropriate.
Level 2 | Considerations

- Weighting materials and mud chemicals should be evaluated for kick circulation (consider using driller's method if material supplies are low or if suspected swab kick)

- Monitor surface equipment during kick circulation in order to quickly identify any leaks

- Monitor pressure on outer casing string during kick circulation in order to quickly identify pressure communication

- Be prepared to immediately close pipe ram if annular begins to leak

- If productive zones are exposed, monitor well closely for signs of flow during circulation losses

- If the thrust created by the current or anticipated surface pressure acting on the cross-sectional area of the pipe approaches or exceeds an amount equal to the buoyed weight of the pipe string, the pipe should be secured at the surface. This may require the use of conventional equipment such as drillpipe clamps, chains and/or cables. The situation may eventually require the use of slip rams and other measures. The well control specialists/engineers should be consulted and mobilized if such a situation develops

- Monitor mud/gas separator equipment for signs of overload while circulating large gas influxes

- Consider mobilizing additional liquid mud and loss circulation material (LCM) if conventional lost circulation techniques are ineffective

- Consider the possibility of stripping/snubbing of slick bottom hole assembly (BHA) versus perforating or severing drill collars to accommodate high concentration LCM placement and/or barite pills, gunk pills, etc.

- Evaluate the possibility of casing failure due to wear as a cause of lost circulation. Note that this could quickly become a Level 3 event if an influx is taken
• Consider using temperature log to determine exact point(s) of losses (ambient temperature fluid pumped from the surface will enhance identification)

• Prepare to deal with gas migration while preparing to strip pipe to bottom (water-based mud systems)

• Annular BOP failure can be expected while stripping if closing pressure is not reduced. Consult with BOP manufacturer for recommended procedures and practices for stripping

• Improper bleed-off during pipe stripping can lead to underground blowouts or additional influxes. Review procedures carefully before attempting to strip pipe to bottom. Allowances must be made for gas migration and influx elongation due to pipe entry in water-based systems

• If no pressure increase or a transient pressure fluctuation is observed while lowering pipe (stripping), an underground flow may be in progress. If this is confirmed, a Level 3 event should be declared

• If surface pressures are too high for safe stripping operations (including situations where the pipe is “light”), an off-bottom kill should be considered using volumetric and circulation techniques (i.e., volumetric control until influx is above bit then constant bottom hole pressure circulation)
Level 3 | Event defined

Level 3 events present serious and immediate risks to personnel, the environment and assets. These situations require the immediate application of specialized techniques and well-developed safety assessment and hazard mitigation programs. Examples of Level 3 events include, but are not limited to, the following scenarios:

a) Surface blowout (drillpipe, BOP, production tree, broach, etc. with or without fire)

b) Underground blowout with insufficient casing set so that the well cannot be brought under control by pumping heavy mud simultaneously down the drillstring and annulus using rig pumps

c) Surface pressure beyond the pressure rating of equipment (including tubulars)

d) Other situations that constitute a clear and present danger to personnel, environment or equipment that cannot be resolved via conventional means

Level 3 | Response

Level 3 events will warrant the immediate activation of the emergency response plan, mobilization of well control specialists/engineers from Wild Well Control, Inc. and other specialist personnel and equipment. Operator/contractor should contact Wild Well Control, Inc. immediately upon the determination of a Level 3 incident. Completed well control information forms (Pages 34-36) should be sent along with any other pertinent and/or related information.

The activities defined in the intervention action plan section of this emergency response plan should be initiated immediately. These include, but are not limited to:

- Personnel should be accounted for and moved to a safe upwind location
- Medical attention should be provided for any injured personnel
- The well site should be secured
Further notifications by the operator/contractor’s incident command structure (ICS) team

Notification to local/state/federal authorities

Information gathering and assessment of the situation should be initiated

Complete or partial rig evacuation is likely under most Level 3 events. Re-manning of the rig should be attempted only under the direction of on-site well control specialists/engineers. If the arrival of the well control specialists/engineers is delayed, such action(s) should be discussed in detail and agreed upon with the well control specialists/engineers before being attempted by operator/contractor personnel.

The first task will be to determine the critical aspects of the situation, perform a hazard analysis and establish safe working principles for the intervention (i.e., hot zones, safe areas, access control and accounting, emergency evacuation plans, etc.).

A minimum number of personnel will enter the location. A well site command center will be designated in a safe area, and all operations will be directed from it. Restrictions will be placed on personnel movement between command post and the rest of the location; personnel accounting procedures will be established to monitor the personnel on location at all times.

Rig evacuation and shutdown will render critical equipment unusable. A plan will need to be developed to identify components that will be required for intervention purposes and to provide sufficient power.

The equipment that may be needed during such an event includes, but is not limited to:

- Drawworks
- Top drive
- Mud pumps
- BOP hoists
- Air/hydraulic winches
- Hydraulic chokes
- BOP accumulator charge pumps
- Iron roughneck
 Immediate response actions – Field

While intervention activities will be dictated by an event’s severity and magnitude, the immediate response will be consistent and uniform for any event. This action plan does not intend to replace sound logic or engineering judgment — it is a guideline only.

Well control emergencies require common sense and professional judgment on the part of all personnel involved in the intervention. Wild Well Control, Inc. cannot and does not guarantee, warrant or represent the accuracy of, or accept any responsibility for, the use of any information contained herein.

Evacuate all rig personnel

- Evacuate rig and move personnel to designated safe area
- Account for all personnel
- DO NOT re-enter area until authorized Secure Location

Secure the perimeter to prevent area population, news media, etc. from accessing the well site area. Seek assistance from the local police/sheriff agency

Shut down fired equipment

All fired (or non-intrinsically safe) equipment should be shut down as per established rig contractor guidelines and procedures.

NOTE! The above actions should only be undertaken if they do not involve risk to the safety of personnel.

Establish safety zone

Based on various criteria, the area immediately around the wellhead is designated the hot zone. Access to the hot zone is strictly limited to well control personnel. Based on wind and other conditions, the hot zone may change throughout the course of the event. The boundaries should be closely
monitored and changes made accordingly. The safe zone is located away from the well and has minimal impact from the blowout. The command center will be located within the safe zone. The safe zone should have two means of ingress and egress. Between the hot zone and the safe zone is the warm zone. Access to the warm zone will be monitored and restricted to essential support personnel only.

**Initiate fire watch**

Identify any engines that may have been left running. Identify any other possible ignition sources.

**Implement operator’s emergency response plan**

Notify operator’s office – give status of the incident.

**Notify Wild Well Control, Inc. (281.784.4700).**

**Identify hazardous materials on-site**

Identify the material and location on the well site of any hazardous material. Present information to the well control specialists upon their arrival at the well site.

**Monitor well conditions**

Appoint a rig crew member to observe the well from a safe location outside the hot zone and record all changes in the flow at the wellhead. Recorded changes should include changes in flow, noise, etc. The collected information will be important to the well control specialists/engineers in completing their investigation and analysis of the situation.

**Implement pollution abatement measures**

Working in the safe zone only, use heavy equipment to establish the safe drainage and storage of well flow away from the wellhead area.

Prevent any well flow runoff from entering any public ditch, drainage, culvert or septic system, streams, waterways, roadways, etc.

A fluid containment plan should be discussed with the well control specialists/engineers and implemented as quickly as possible.
Initial evaluation and information gathering

Certain information is crucial in developing an effective intervention plan and immediate response. This duty will fall upon the operator/contractor’s personnel at the rig. The following information should be gathered and documented so that it can be passed on to well control specialists. Well control forms are shown on pages 34-36 for the collection of this information.

- Operation at the time of the incident
- Last observed pressures
- Present configuration of the well bore – casing, drill pipe, drill collars, packers, depths, geology, fluids, etc. at the time of the incident
- BOP equipment in use at the time of the incident – position of all rams, subsea BOP pod status, and top drive safety valves, etc.
- Last known status of wellhead or BOP components – open, closed, locked, damaged, etc.
- Rig equipment shutdown level initiated, well control actions implemented
- Estimate of flow rates and flow characteristics (gas and water)
- Extent of damage sustained by the rig
- Size and location of any boil at the surface
- Other information as dictated by the situation

The information from the initial evaluation will be conveyed to Wild Well Control, Inc. for planning purposes and should be included in the permanent records.

In the initial stages, the information will be used to determine the feasibility of a quick resolution (i.e., pumping kill fluids, bridging agents, etc.) if it exists.

If possible, this should be done before the situation deteriorates, eliminating this type of intervention.
Immediate response actions – Office

Upon notification from the field, the incident commander (the person designated to manage well control emergencies) shall review the information and, if deemed necessary, enact the ERP which activates the ICS.

A command center should be designated within the operator/contractor’s office, if possible, and the designated command staff and operations staff shall meet to review the current situation and initiate the various assigned tasks and duties.

The operator/contractor’s office should immediately contact Wild Well Control, Inc. to discuss the incident and possible mobilization of well control personnel and equipment.

Notify Wild Well Control, Inc.

(281.784.4700)

Discussion with well control specialists regarding the initial mobilization of equipment and personnel will be done at this time. A list of all equipment and services ordered should be noted. Information regarding the location, route details, trucking or flying time and a full manifest, etc. will need to be gathered and properly documented.
Incident Command Structure (ICS) Organization

A well-developed organizational structure is crucial to effective emergency response. The ICS is generally adhered to in defining and establishing a response organization. The ICS defines an organizational framework with designated positions, staffing of the positions, responsibilities, notification protocols and lines of authority. The ICS is activated with implementation of the operator/contractor’s emergency response plan. A typical ICS organization for a well control emergency would look similar to the following:

**Incident Commander** – Absolute authority and responsible for all emergency response efforts and reports to Management

**Deputy Incident Commander** – Acts as liaison between incident commander and the various operations and source control teams

**Command Staff** – Reports directly to the incident commander

**Risk Management Officer** – Responsible for legal and insurance

**Finance Officer** – Provides accounting analysis of all associated costs to Management

**Communications Officer** – Responsible for all media/public relations

**Regulatory Officer** – Acts as liaison with regulatory and governmental agencies

**Operations Staff** – Reports directly to the deputy incident commander

**Logistics Team** – Provides operational and support resources as requested by the source control team

**Planning Team** – Responsible for developing action plan with the source control team

**Operations Team** – Responsible for executing action plan with the source control team

**Engineering Team** – Provides engineering support for source control team
Safety Team - Responsible for safety of operations and source control team. Responsible for the site safety plan and enforcement of safety regulations

Environmental Team – Responsible for implementing pollution abatement measures as required

Source Control Team – Reports to the operations team leader

Well Control Ops Team – Responsible for well intervention activities at the well site

Well Recovery Team – Responsible for planning and executing well recovery operations

Relief Well Team – Responsible for planning and executing the relief well operations

The ICS Organization is designed to be easily expanded or minimized based on the size and severity of the event. In smaller organizations, a single person may be responsible for more than one role within the organization.

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**Incident Command Structure**

- **Incident commander**
- **Deputy incident commander**
- **Command Staff**
  - Risk Management
  - Finance
  - Communications
  - Regulatory compliance

- **Operations staff**
  - Logistics team
  - Planning team
  - Operations team
  - Engineering team
  - Safety team
  - Environmental team

- **Source control team**

- **Well control ops team**
- **Well recovery team**
- **Relief well team**

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Interim action plans

The following tasks can be assigned and implemented while waiting on the well control specialists to arrive at the well site. If there are any questions or concerns, contact Wild Well Control, Inc. before initiating any task.

Do not attempt any task that will endanger personnel.

Monitor well conditions
- Maintain time log as to the well’s condition

Secure location from public
- Set up a no-fly zone
- Utilize local police and fire to handle security and traffic

Organize well site layout
- Designate the on-site command center
- Identify and designate staging area for well control equipment
- Establish communications

Identify and secure sourcing of water
- Establish storage for water at the well site
- Arrange transportation of water to well site; initiate civil work away from wellhead
- Establish second point of access to the wellhead
- Grade for pollution drainage and containment
- Prep staging area and wellhead site
Initiate safety measures

- Set up gas monitoring system
- Identify safety hazards on location
- Initiate development of site safety plan (Wild Well Control will provide assistance in finalizing)
- Secure emergency medical services/medevac for the well site

Other considerations

- Potential for event to escalate
  - Protect collateral assets
- Evacuation of population
- Voluntary ignition of uncontrolled flow. See page 22 for additional information on Voluntary Ignition

Special considerations for suburban settings

- Air pollution
  - Gas plume concentration/dispersion
  - Smoke
  - Hydrogen sulfide gas ($\text{H}_2\text{S}$)
- Ground pollution
  - Contamination of local water supply
  - Contamination of ditches/public drain systems
- Ignition
  - Explosions
  - Heat radiation
  - Other wells
  - Collateral assets (buildings, homes, etc.)
- Broaching of surface
- Utilities
  - Power lines
  - Pipelines
Evacuation of area population

Collect critical information; make informed decision as to requirements for evacuation of population

- Once the decision is made, react quickly
  - Arrange transportation from the area
  - Identify and secure temporary housing for evacuees
  - Set up accounts for meals, groceries, medicines, etc.
- Designate company spokesperson to assist evacuees
- Communicate directly to evacuees at regularly scheduled times
- Be prepared to assist evacuees with incurred expenses
- Utilize local law enforcement and fire personnel for assistance
Voluntary ignition

Voluntary ignition of a blowout should be considered if:

• Immediate threat to human life (H₂S gas cloud)
• High uncertainty of successful well intervention at surface
• Pollution from well flow (oil) is unrestricted and/or threatens environmentally sensitive areas

If the following conditions exist, it may not be necessary to ignite. It is essential that all facts be carefully evaluated and assessed. It is advisable to solicit assistance from Wild Well Control, Inc. as to what should be the course of action.

These additional considerations include:

• Minimal threats (remote area, minimal population involvement)
• Uncertainty as to whether burning of flow can be sustained
• Ignition creates unacceptable threat to other collateral assets
• High certainty of successful surface intervention
• Other options possible (diverting, isolation, etc.)

The decision to ignite or not to ignite requires quick and thorough assessment of the ongoing facts at the well site.

Due to the many variables and unknowns, assistance from Wild Well Control, Inc. must be sought in making the final decision.
Response methodology of wild well control

Intervention activities will be dictated by the event’s severity and magnitude.

The activities required to regain control of the blowout well will depend on specific circumstances and will vary with each scenario. The course of action(s) will be discussed and mutually agreed upon by the operator/contractor and the well control specialists/engineers. In summary, the major activities of a Level 3 blowout and fire usually include:

**Assessment/evaluation** – An initial assessment or evaluation by the operator/contractor(s) and Wild Well Control, Inc. personnel will determine the course of action, which will result in well control being regained safely in a minimum amount of time. Equipment requirements beyond those given in the initial response will be identified.

**Site preparation** – Will involve various civil works designed to prepare the location for equipment placement, pollution containment and drainage.

**Rig-up firefighting equipment** – To establish necessary firewater cover will involve developing a method of supplying and storing the necessary water volume (frac tanks/trucks, nearby natural water supplies, earth pits, etc.).

**Debris removal** – Will involve clearing of equipment and damaged rig components that impede access to the wellhead. It may require abrasive jet cutting for severing of heavy structural pieces.

**Capping** – Placement of suitable control device(s) on wellhead. It may require removal of existing wellhead and installation of a new wellhead for capping.

**Preparations for kill operations** – Will proceed along with intervention and capping operations.
**Divert** – The well may be diverted following capping operations for additional diagnostics work or until kill operations are initiated.

**Kill operations** – Appropriate kill operations will commence following capping. Kill operations will be based on downhole configuration, casing integrity and on other issues. Options include shut-in/bullhead, dynamic kill pump operations, snubbing, etc.

**Return well to normal operations** – Will involve repair to wellhead components, casing repair, etc.

**Remediate location** – Remove and properly dispose of any pollution on location.
Typical equipment requirements

Heavy equipment

The heavy equipment typically required during the course of a well control operation is usually furnished through local suppliers which are already under contract with the Operator. Typical heavy equipment requirements may include:

- Bulldozers, Caterpillar D-8 with tail winches
- Cranes, 75-125 ton, hydraulic or lattice boom
- Track hoe, Caterpillar 235, 200 HP, 2-yard bucket
- Forklift, Caterpillar 966, 30,000 capacity
- Air compressor, 185 CFM, 125 PSI, with 150-foot 300 PSI hose
- Light towers, self-contained, diesel powered
- 15–20 Frac tanks, 300-500 bbl capacity each for on-site water storage

Specialized firefighting/well control equipment

Specialized firefighting/well control equipment is usually provided by Wild Well Control, Inc. In response to a well control emergency, the following equipment would typically be mobilized from Houston, Texas:

- Athey wagon, with various accessories, conventional or hydraulic
- Fire pumps, 2,500 – 4,500 gpm capacity
- Fire monitors with portable shields
- Hose container with various suction and output hoses
- Fuel tank
- Blowout tool container, with miscellaneous support tools
- Air compressor
Typical support service requirements

These services are typically required during the course of, or during some phase of, a well control operation. Support services are usually furnished through local suppliers who are already under contract with the operator. These services should be put on “standby” notice, but not mobilized until requested by Wild Well Control, Inc. Typical support services may include:

- High-pressure pumping equipment
- Drilling fluids specialist/supplier
- Wellhead specialist/supplier
- Vacuum tank truck services
- Welding crews
- Roustabout crew, supervisor with five-man crew
- Personnel safety services
- Medical/medevac services
- Wireline logging services, full diagnostic capabilities
- Machine shop services

Once the initial assessment and planning is completed, the well control specialists/engineers will be able to provide the operator/contractor with a more detailed list of the support equipment and services that will be required.
EMERGENCY RESPONSE PLAN

Site safety plan

Prior to initiating any well control operation, a comprehensive site safety plan should be developed and implemented through the safety section of the ICS. The site safety plan should cover all safety management aspects of the task at hand. It should be written so that it is flexible enough for modifications and updates to be easily made and incorporated.

The site safety plan should be comprehensive and include, at minimum, the following elements:

- Site description and identification of site’s zones
  - Hot zone
  - Warm zone
  - Safe zone
- Site hazards
  - Physical hazards
  - Chemical hazards
  - Toxic/gas hazards
- Personal protective equipment (PPE) requirements
- Site access
  - Check-in points
- Communications
  - Safety channel designation on radios
  - Alarms
- Emergency medical services
- Environmental monitoring services required
- Safety meeting schedule
- Safety drills
Hazard assessment

Safe, successful well control operations require risk identification, mitigation and management. Thus, the primary function of the well control team (intervention and well control operations unit leaders) will be hazard identification via a thorough assessment of the situation.

There are numerous potential hazards associated with a serious well control situation. The well control team, under the direction of the well control operations unit leader, will assess the situation for the following hazards:

- Combustible gas accumulation/dispersion
- Accumulations of combustible/flammable fluids
- Ignition hazards
- Explosive materials
- Radioactive materials
- Over-pressured surface equipment/potential catastrophic failures
- Flow lines – anchoring, erosion
- Leaking flanges
- Stability/competency of the sediment surrounding the rig
- Potential instability of rig equipment and tubulars
- Hydrocarbon inventories and potential hazards associated with production equipment

The results of the hazard analysis will be incorporated into the site safety plan. Additional personnel, equipment, services and/or safety procedures/measures required to deal with the identified hazards will be specified and submitted to the field operations team leader.
EMERGENCY RESPONSE PLAN

H₂S operations

When drilling in areas of known H₂S, rig crews should:

- Be trained in H₂S safety measures
- Have the appropriate safety equipment
- Use equipment with proper PSL (priority substance listing) rating for H₂S service

Any influx into the wellbore (kick) should be assumed to contain H₂S. The size of the influx, amount of under balance, formation character, weather conditions, etc. should be considered when deciding to circulate out or pump away the influx. If the decision is made to circulate out the H₂S kick, clear the rig floor and restricted area of all unnecessary personnel and take the following additional precautions:

- Rope off the rig substructure – to include BOPs, choke lines, choke manifold and mud return areas – and identify as restricted area. No one shall enter these areas without proper breathing apparatus, H₂S monitor, and specific approval from the Toolpusher
- Continuously monitor the H₂S concentration level in the mud returns
- The drilling supervisor shall alert affected downwind facilities and population
- The drilling supervisor shall implement any other precaution deemed necessary
- When circulating, all personnel involved in the well control operation will mask-up at least 30 minutes prior to bottoms up. The flow from the choke should be diverted through the gas buster, and the gas should be flared. The mud stream will return to the active system where any remaining gas can be removed by the degasser and the use of an H₂S scavenger
Communication/PR plan

Media coverage should be addressed as quickly as possible to prevent incorrect information and minimize any negative impact to the operator/contractor.

The operator/contractor’s communication officer, as designated in the company’s ERP, will be responsible for all communication with the media.

No employee shall make comments, give interviews, answer questions, etc. to people outside the company. Any requests for information will be re-directed to the communications officer as designated in the company’s ERP.

Once the facts and information are known and confirmed, the communications officer should designate a time and place to make a statement on the company’s behalf and answer any questions. It is important to keep the media informed as the information becomes available.

If there are casualties or the event was catastrophic, it is advisable that the communications officer seek legal counsel and the assistance of a professional public relations firm.
Relief well considerations

Relief wells should be considered for the following scenarios:

- Successful surface intervention unlikely – low probability of surface intervention being successful
- Surface intervention operations require undue risks for well control personnel
- Well flow broaching the surface
- Significant pollution or other environmental damage imminent during long-term well intervention operation

Multiple relief wells should be considered for the following scenarios:

- High hydraulic requirements for kill – requires multiple wells
- High probability of drilling problems in single relief well effort
- High degree of uncertainty regarding blowing well’s position

Relief wells are typically engineered, planned and initiated with the assistance of the well control engineers who understand the technical requirements for a successful well kill operation.
<table>
<thead>
<tr>
<th>POSITION</th>
<th>NAME</th>
<th>OFFICE</th>
<th>CELL/FAX</th>
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<tbody>
<tr>
<td>Operator</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Drilling manager</td>
<td>Drilling engineer</td>
<td>Wild Well Control</td>
<td>281.784.4700</td>
</tr>
<tr>
<td>Risk manager</td>
<td>Wild Well Control, Inc.</td>
<td></td>
<td>F 281.784.4750</td>
</tr>
<tr>
<td>Insurance underwriter</td>
<td>Travelers Oil &amp; Gas</td>
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Emergency contact information

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## Well Control Forms

### General Information

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<th>Information</th>
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<td>Time</td>
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### Operator Information

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<td>Address</td>
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### Contractor/Rig Information

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<td>Rig name/#</td>
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## EMERGENCY RESPONSE PLAN

### Well control forms

#### BOP/SURFACE INFORMATION

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