

**WELL CONTROL EMERGENCY RESPONSE PLAN  
YATES PETROLEUM CORPORATION  
CUSTOMER COPY**



Permit Number-025575	Date issued- 12-01-06	District- 16S
API #- 9	Form W-1 rec-	County-Eddy
Type: Drill	POOL NAME: Wildcat Wolfcamp	

<b>Operator</b> Yates Petroleum Corporation  Artesia, New Mexico	<b>30-015-35262</b>
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**Lease Name:** Terry FU

**Location:** 7 Miles N of Artesia

**Section:** 11/TWN 16S/RNG 25E/UNT M

**Survey:** OCD

**Well Number:** 3H

**Total Depth:** 5200

**Township:** 16S

THIS PERMIT IS GRANTED PURSUANT TO NEW MEXICO STATE OIL  
CONSERVATION DIVISION

**Permit Plat:**

Yates Petroleum Corporation

Terry FU #3H

SECTION 11

Eddy County, New Mexico

Information in this section was provided to American Safety Services Inc by  
Yates Petroleum Corporation



## **Yates Petroleum Corporation Emergency Contact** **List**

<b>Division &amp; Title</b>	<b>Name</b>	<b>Office</b>	<b>Residence</b>	<b>Cellular</b>
<b><i>Drilling Operations</i></b>				
Yates Pet. 1 <sup>st</sup> call	Jim Krogman	505-748-4215	505-746-2674	505-365-8340
Yates Pet. 2 <sup>st</sup> call	Tim Bussell	505-748-4221	505-746-2121	505-365-5695
Yates Foreman				
Drilling Co.				
TP Trailer House				
Tool Pusher				
<b>Public Safety</b>	<b>Facility</b>	<b>Contact</b>	<b>Direct</b>	<b>Emergency</b>
Sheriff	Eddy County	Dispatcher	505-746-9888	911
Fire Dept.	Artesia	Dispatcher	505-746-5050	911
				911
Hospital	Artesia	Emergency Room	505-748-3333	911
Ambulance	Artesia	Dispatcher	505-746-5050	911
Life Flight	Hobbs/ Alamogordo	Dispatcher	800-242-6199	911
State Police	Artesia	Dispatcher	505-748-9718	911
<b>Safety Contractor</b>	<b>Name</b>	<b>Office</b>	<b>Residence</b>	<b>Cellular</b>
American Safety	Shawn McCormick			505-746-7803
	Paul Fodge			505-513-2872
	Nickolas Hughes			505-513-0513
	Cody Richardson			505-513-1620

TABLE OF CONTENTS

LEVEL 1 WELL CONTROL INCIDENTS .....	11
LEVEL 2 WELL CONTROL INCIDENT .....	20
LEVEL 3 WELL CONTROL INCIDENTS .....	34
DUTIES AND RESPONSIBILITIES, RIG SUPERVISOR .....	51
EXAMPLE OF WORK ZONES .....	75
APPENDIX .....	76

Additional H2s information is included at the end of the plan.....

***Prepared by:***  
**American Safety Services Inc**  
**8715 Andrews HWY**  
**Odessa TX 79765**

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## Executive Summary

This plan is intended to document Yates Petroleum Corporation at procedures for dealing with well control emergency situations. American Safety Services Inc encourages taking all preventative measures required to reduce the probability of a well control incident from occurring. If it does occur, however, this pre-developed strategic action plan can be implemented quickly and decisively in response to the emergency. It is intended to supplement the Yates Petroleum Corporation Emergency Procedure and other similar plans.

This Well Control Emergency Response Plan (WCERP) was formulated during low-stress, non-emergency conditions. It is our experience that those response actions hastily grasped during the event suffer from the panic, confusion and indecisiveness of persons not normally involved with high-stress situations.

In any emergency response plan the health and safety of people is the prime concern. Generally, persons not familiar with highly specialized oilwell firefighting, capping and dealing with the high pressures and flowrates associated with blow-outs should not attempt to handle one of these events. Guidelines for early response procedures are included to mitigate risks, losses and damages, however.

There are three incident levels for which an emergency well control response is required. These levels are based on the severity and potential impacts of the incident. They are simply labeled Level 1, Level 2 and Level 3, with Level 1 being the least serious and Level 3 the worst. Level 3 denotes a complete loss of well control with no opportunity for regaining it using equipment and procedures available on-site. These correspond roughly to the Emergency Categories listed in the General Emergency Procedure.

In dealing with a well control emergency response, each person has duties and responsibilities. All critical tasks must be delegated to one person with minimal overlap. Thus, each responsibility is handled effectively without undue duplication.

The on-site organization is supervised and controlled by the Team Leader for the rig involved in the blow-out. The overall situation is controlled by the Manager over the area in which the blowout occurs who will serve as the Incident Commander. For most operations this will be the Manager (Drilling Operations) or the Manager (Exploration). These are individuals with long experience who are familiar with Yates Petroleum Corporation drilling and workover operations, corporate internal structure, corporate culture, personnel, various support services, and the capabilities of all emergency response groups including American Safety Services Inc. Each commander is assisted by several deputies, each of whom deals with responsibilities in their areas of expertise. This provides the most efficient and effective method of dealing with the emergency, protecting human lives and health, mitigating damages, and protecting the environment.

## Response Levels

This plan involves three types of incidents classified as Level 1, Level 2 and Level 3 depending on the seriousness of the incident. A **Level 1** incident involves an uncomplicated kick that requires only normal operating procedures by the Yates Petroleum Corporation Rig Supervisor (Company Man) and the drilling crew with notification to the Team Leader (TL) having supervisory authority over that rig. A **Level 2** incident involves a complication of some type that requires extraordinary measures to be taken by the Company Man, drilling contractor personnel, the TL, Snr. Drilling Engineer and, in some instances, American Safety Services Inc to successfully deal with the situation. A **Level 3** incident involves the complete loss of well control. Response to this type incident requires declaration of a Major Incident, activation of the Well Control Organization within Yates Petroleum Corporation and all the personnel listed below to provide On-Scene Command at the site, Headquarters Control, Support Services and Operations Engineering Support.

## Level 1 Well Control Incidents

### Characteristics

**Definition** A Level 1 incident is defined as a well control problem that occurs during drilling or workover operations for which formal or informal standard operating procedures (SOPs) exist to control the event. There are no injuries or fires associated with this type incident and the situation can be brought under control using only the resources available on-site.

**Action Requirement** These SOPs are executed by the rig crewmembers under the supervision of the toolpusher and Yates Petroleum Corporation Rig Supervisor. The appropriate Team Leader is notified about the incident and the actions taken to control it. Support is rarely required from Drilling Services or from the well control services contractor unless the event escalates to a more serious level.

### Examples

- |  |  |
|--|--|
| <b>Drilling-related incidents</b>                | <ul style="list-style-type: none"><li>• An uncomplicated kick</li><li>• Complete loss of circulation (e.g., &gt;500 bph) with hydrocarbon zone open</li><li>• Leak in casing with a permeable hydrocarbon zone open</li></ul>  |
| <b>Completion- or Workover-related incidents</b> | <ul style="list-style-type: none"><li>• Unable to kill a well to start a workover</li><li>• Tripping with high loss rate (e.g., &gt;250 bph)</li><li>• A kick taken after the well is killed</li><li>• Hole in surface/intermediate/production casing due to corrosion or damage</li><li>• Swabbing the well in during pipe tripping</li></ul>                 |
| <b>Production-related incidents</b>              | <ul style="list-style-type: none"><li>• Pressure on production casing that cannot be bled down</li><li>• Small leak on master valve, swab valve or wing valve on tree</li><li>• Erosion and failure of the vent line to the pit, tank or test unit</li><li>• Master valve frozen or stem broken with valve in closed position</li></ul>                        |
| <b>Simultaneous operations incidents</b>         | <ul style="list-style-type: none"><li>• Moving in rig or workover unit with wellhead damage due to collision</li><li>• Wellhead damage during heavy lift operations while installing BOPs, wireline lubricator, coiled tubing, etc.</li><li>• Close approach/near miss drilling past existing well(s) from same drilling pad while drilling new well</li></ul> |

**Additional incidents**

- Chemical stocks for mixing kill weight mud fall below pre-determined adequate levels
- Kick tolerance falls below pre-determined level (e.g., 2 ppg or 24 bbls)
- Casing wear exceeds acceptable amount
- Failure of critical equipment (e.g., main power system on rig)
- Severe lost circulation and continued mud losses to the loss zone
- Impending severe weather
- Flow after cementing intermediate casing, production casing, or production liner

**Response Actions**

**Responsible party**      Rig Supervisor

**Process overview**      The following table provides an overview of the actions required during a Level 1 well control incident:

Step	Action
1	<ul style="list-style-type: none"><li>• Evaluate the situation</li><li>• Determine that the incident is Level 1</li></ul>
2	Notify all personnel on location
3	Immediately execute initial response action based on standard operating procedures
4	Notify Team Leader
5	Continue using standard operating procedures until situation is resolved

## Level 2 Well Control Incident

### **Characteristics**

**Definition** A Level 2 emergency can be defined as an abnormal well control event involving some sort of complication in which:

- Well control has **not** been lost at the surface
- Resources beyond the normal capabilities of the rig crew or production operations staff may be required such as unfamiliar or complex well control procedures
- Outside well control consultation, materials, special equipment or personnel may be required

There are no injuries or fires associated with this incident level since control has not been lost. The situation is not sufficiently threatening to declare a Major Emergency or to activate an Incident Command System to deal with the situation.

**Action Required** Trained drilling staff should be able to handle a Level 2 emergency in the normal course of drilling or working over a well by:

- Removing the complication, thereby reducing the incident severity to Level 1 status, then using SOPs to circulate out the kick and resolve the problem
- Prepare a specialized procedure to control the incident with the complication remaining throughout the procedure

It is important that action be taken quickly to resolve the situation. Level 2 incidents are more serious than Level 1 incidents and they can escalate quickly to a complete loss of well control (i.e., a Level 3 incident). Even if control is not lost at the surface, an underground blowout or other similar event can occur if measures are not taken quickly.

### **Examples**

- Drilling-related incidents**
- Kick with no pipe in the hole
  - Kick with the bit off the bottom
  - Drill collars or other BHA components across the pipe rams, well shut in on the annular preventer
  - Kick while fishing, pipe off bottom, fish in hole
  - Kick with the bit off bottom, pipe stuck
  - Kick with very high intensity or large volume taken (high shut-in pressure)



	<ul style="list-style-type: none"><li>• Kick with simultaneous losses (above or below the bit)</li><li>• Kick with bit or drill string plugged</li><li>• Kick with critical equipment failure (e.g., pumps, electrical system, etc.)</li><li>• Kick with hole in drill string</li><li>• Kick without sufficient chemicals to weight up mud</li><li>• Kick with wireline in the hole</li><li>• Shallow gas kick with diversion</li><li>• Low volume flow after cementing surface casing</li></ul>
<b>Level 1 incidents escalating to a Level 2 while circulating out a kick</b>	<ul style="list-style-type: none"><li>• Exceeding maximum allowable surface pressure while circulating kick out of the open hole section (before kick reaches the casing shoe)</li><li>• Suspected underground cross-flow requiring further diagnosis</li><li>• Small leak in BOP or wellhead</li><li>• Leak in stab-in safety valve through ball seat and/or operating system seal</li><li>• Gas hydrate (ice) plug in circulation system</li><li>• Choke plugged or cut out</li><li>• Washout in drill string or in surface equipment</li><li>• Dropped drill string</li><li>• Sheared drillpipe</li><li>• Loss of BOP control function</li></ul>
<b>Completion-or workover-related incidents</b>	<ul style="list-style-type: none"><li>• Fishing operation performed under pressure</li><li>• Potential underground crossflow</li><li>• Leak in wireline BOP, lubricator and/or tree valves</li><li>• Fishing or milling operation performed under pressure with coiled tubing or snubbing unit where loss of well control is imminent</li></ul>
<b>Production-related incidents</b>	<ul style="list-style-type: none"><li>• Production casing leak with tubing leak</li><li>• Leak in master valve with failure of ESD valve control</li><li>• Leak in tubing with casing valve leak</li><li>• Tree component eroded to critical limit by sand</li><li>• Surface safety valves do not effectively shut-off flow</li></ul>
<b>Simultaneous operations incidents</b>	<ul style="list-style-type: none"><li>• Drilling into existing well casing from new well</li><li>• Casing leak develops during workover operations</li><li>• Damage to tree, wellhead or casing near surface due to heavy dropped object</li><li>• Motor vehicle collision resulting in severe damage to tree or wellhead</li><li>• Inability to access casing annulus due to inoperative (stuck) side outlet valve on wellhead</li></ul>

## **Response Actions**

**Responsible party**      Rig Supervisor

**Process overview**      The following table provides an overview of the actions required during a Level 2 well control incident:

<b>Step</b>	<b>Action</b>
<b>1</b>	Evaluate the situation; determine that the situation constitutes a Level 2 Incident classification and advise the Team Leader
<b>2</b>	Down man rig; remove all non-essential personnel and equipment from the site
<b>3</b>	Execute initial response actions to protect personnel, the rig, the well and the reservoir
<b>4</b>	Develop a procedure to remove the complication and deal with the situation using SOPs
<b>5</b>	If complication cannot be removed, prepare a non-standard procedure to deal with the incident
<b>6</b>	Consult with the appropriate Team Leader, Drilling Engineer and well control specialists, if needed
<b>7</b>	Obtain approval for execution of either action plan from the Team Leader
<b>8</b>	Execute approved procedure to resolve situation (may require the participation of well control specialists to assist)
<b>9</b>	Review outcome of procedure with the Team Leader

## Level 3 Well Control Incidents

### **Characteristics**

<b>Definition</b>	A Level 3 emergency denotes a <b>total loss of well control</b> with no opportunity to restore it using all the resources available on-site.
<b>Action Required</b>	Level 3 Incidents require the declaration of a Major Emergency and the activation of a fully-functional Incident Command System to effectively deal with the situation.
<b>Discussion</b>	<p>A Level 3 Incident is, quite simply, a blowout. These incidents are equivalent to Category 2 or Category 3 Emergencies, depending on the severity and circumstances involved in the blowout. The Well Control Organization must be activated upon determining that the well is out of control and measures must immediately be taken to protect people, the environment and material assets in that order.</p> <p>These emergencies, although serious at the outset, have the potential to escalate further during control procedures. Such escalation may cause serious structural damage or total loss of the rig, BOP stack and wellhead due to explosion, fire, or cratering. Other nearby wells may also be damaged due to underground crossflow and erosion caused by the blow-out. This could result in multiple, simultaneous well control problems on several wells. Clearly, prompt decisive action is needed to avoid this situation.</p> <p>The response to a Level 3 Incident can be divided into stages for clarity. Different activities, personnel, equipment and safety issues exist at each stage. These are discussed more fully below:</p>
<b>Phase 1: Initial response</b>	Phase 1 is the initial reaction to the well control emergency. It commences at the outset of the Level 3 Incident when it is clear that control is lost and cannot be regained. Actions such as evacuation, exclusion zone establishment and site isolation occur during this stage. Preliminary work to provide water for fire fighting and setting on-scene command facilities at the site are included. It ends when well control intervention operations site begin including fire extinguishment operations.
<b>Phase 2: Well control operations</b>	Phase 2 is the on-site operations phase of the well control emergency. This phase begins when actual well control actions are initiated at the site using surface intervention techniques. It ends when the well has been brought under control by any means. This phase is concluded when the Incident Commander officially declares the emergency resolved, and well salvage and recovery operations begin.

<b>Phase 3: Relief well planning and drilling</b>	Phase 3 is the relief well planning and drilling phase of the well control emergency. It begins when the Incident Commander approves a relief well as part of the well control project. It ends when the blow-out well is intersected and killed by pumping through the relief well or when the well is brought under control using surface intervention techniques and the Incident Commander declares the emergency resolved. Note that Phase 2 and Phase 3 operations can occur simultaneously depending on the circumstances of the blowout event.
<b>Phase 4: Well recovery operations</b>	Phase 4 is the recovery phase of operations on the now dead blow-out well. This phase begins when the well or blow-out is brought under control. It ends when normal drilling, workover or production operations resume or when well is plugged and abandoned.
<b>Phase 5: Post-incident evaluation</b>	Phase 5 involves evaluation of the incident following resolution of the emergency situation. This phase begins at or near the conclusion of well recovery operations. It ends with the submission of the final incident report to Yates Petroleum Corporation management.

## **Examples**

<b>Drilling-related Incidents</b>	<ul style="list-style-type: none"><li>• Underground flow with BOP stack closed and gas, oil or water broaches to the surface</li><li>• Uncontrolled flow to surface through drillpipe with no means of shutting off the flow</li><li>• Gas or oil comes to surface through the drillpipe x casing annulus and the BOP cannot control the flow</li><li>• Uncontrolled flow from BOP stack with drill string out of the hole and unable to close blind rams</li><li>• Drilling rig on fire due to blowout</li><li>• Surface failure of choke line, kill line or choke manifold and well cannot be shut-in</li></ul>
<b>Workover- related Incidents</b>	<ul style="list-style-type: none"><li>• Loss of BOP function</li><li>• Uncontrolled flow to surface through tubing with no means of shutting off flow</li><li>• Gas or oil comes to surface through casing x tubing annulus and stack does not shut off flow</li></ul>

- Uncontrolled flow from BOP stack with no tubing in the hole and unable to close blind rams
- Completion rig on fire due to blowout
- Failure of existing wellhead component with no way to stop the flow
- Collision, irreparable damage to wellhead and leak during rig move in or move out

**Production-related Incidents**

- Collision between vehicle and wellhead resulting in major leak
- Wellhead/tree on fire with no way to shut off flow
- Mechanical failure of master valve, wing valve or flowline with no means to stop the flow

**Simultaneous operations Incidents**

- Falling object from rig damages wellhead or flowline resulting in catastrophic leak
- Gas cloud from major leak prevents access to wellhead or tree to shut-in well

## **Response Actions**

**Responsible party** Rig Supervisor

**Process overview** The following table provides an overview of the actions required by the Rig Supervisor or Snr. Yates Petroleum Corporation employee during a Level 3 well control incident:

Step	Action
1	Evaluate situation and determine that well control is lost with no means to restore control
2	Order all personnel at the site to a designated Safe Area
3	Account for all personnel on the site. If all personnel cannot be accounted for, organize a Search and Rescue Party and attempt to locate all personnel if it is safe for them to do so
4	Determine injuries, if any, and provide first aid. Assess the need for air ambulance evacuation of injured persons. Assign personnel to mark the landing site for helicopter in the Safe Area
5	Notify the Team Leader about the situation and request declaration of a Major Emergency
6	Establish Exclusion Zone around site and mark zone boundary using available supplies and materials
7	Post a watch to secure the rig and prevent unauthorized persons from entering the Exclusion Zone

8	Notify and evacuate nearby rigs, homes, businesses or other facilities if they are affected by the blow-out plume
9	Down man the rig and move non-essential personnel away from the area. <b>Note: Do not release the rig crew until they are interviewed regarding events leading up to the blowout incident.</b>
10	Request that the local Fire Station provide equipment and personnel to contain the fire and protect nearby assets with water spray, if it is safe to do so. <b>Note: Do not attempt to extinguish fire at rig; wait for well control specialists to enter the Exclusion Zone.</b>
11	Complete <i>Initial Status Report</i> and fax to American Safety Services Inc. 432-363-0198
12	Remain on the site and coordinate support services needed for initial well control efforts; await the arrival of the Team Leader (On-Scene Commander)
13	Contain pollution/oil spill, if possible and if safe to do so
14	Monitor well conditions, keep a log recording all observations and report any changes to Team Leader (if not yet on-site) by radio and to CWC via fax or phone
15	Brief American Safety Services Inc First Responder upon arrival at the site; assist First Responder in determining if boundaries of Exclusion Zone should be moved
16	Remain on-site to assist with well control operations

## Duties and Responsibilities, Rig Supervisor

<b>Reports to:</b>	On-Scene Commander
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Team Authority	Job Title
Team Member	Rig Supervisor (Company Man)

### Pre-Spud

Responsibility
Daily duties on location include: <ul style="list-style-type: none"> <li>• Conducts safety meetings</li> <li>• Designates two Safe Areas (Muster Areas) for emergencies</li> <li>• Maintains census of all personnel on site</li> <li>• Reviews his duties and the <i>Initial Response Checklist</i></li> </ul>
Maintains supply of <i>Communications Record</i> at the wellsite
Maintains a current copy of Yates Petroleum Corporation General Emergency Procedure at the site and in toolpusher's quarters
Provides training to rig personnel on required response steps in each type of incident including mustering at designated Safe Areas and evacuation, if required. Periodically runs Search and Rescue exercises to ensure team readiness.

### Level 1

#### Well control incident

Responsibility
Determines that the incident is a Level 1 incident; responds quickly to the situation before it can escalate to a more serious level: <ul style="list-style-type: none"> <li>• Obtains data necessary for response</li> <li>• Prepares a procedure for dealing with the incident</li> <li>• Follows standard operating procedures to deal with the situation</li> <li>• Notifies the Team Leader about the incident and steps taken to resolve it</li> </ul>

### Level 2

#### Well control incident

Responsibility
Determines that the situation is a Level 2 incident and defines the complication involved; responds to the situation to keep it from escalating to a more serious incident level: <ul style="list-style-type: none"> <li>• Determines the best way to remove the complication, thus lowering the incident to Level 1</li> </ul>

- Contacts the Team Leader, Snr. Drilling Engineer and possibly American Safety Services Inc for consultation about the problem
- Prepares a procedure to remove the complication, lower the severity level and deal with the incident using SOPs; alternatively, jointly prepares a procedure to deal with the situation without removing the complication
- Reviews procedure with Team Leader and obtains approval to proceed
- Advises Team Leader of the outcome

**Level 3****Well control incident****Responsibility**

Determines that the situation constitutes a complete loss of well control that cannot be regained using assets on-site

**Level 3****Phase 1: Initial Response****Responsibility**

Executes steps outlined in the *Initial Response Checklist* to deal quickly and decisively with the situation at the wellsite; maintains records of all contacts and communications using the *Communications Record*, if possible

With the assistance of the Toolpusher and medic/radio operator:

- Musters all personnel on the rig to one of the designated Safe Areas
- Accounts for all personnel at each Safe Area by comparing personnel at the muster point to the current on-site personnel census
- Determines the extent of any injuries, provides emergency first aid treatment and assesses the need for air evacuation of injured persons on an emergency basis
- Locates a safe landing zone for emergency aircraft to evacuate injured personnel, if required, and marks it for med-evac helicopter
- Notifies Team Leader about situation and recommends classification of event as Level 3 Incident; provides initial report on event and current activities
- Notifies nearby rigs, facilities, residences, businesses and other persons that could be at risk from the blow-out
- Once site is evacuated, establishes Exclusion Zone around the well/rig, marks with on-hand materials and posts a watch to keep everyone out of the Exclusion Zone

**NOTE: Do not re-enter the Exclusion Zone for any reason until well control specialists arrive to assist.**



- Meets with local security personnel and requests they secure and restrict access to the blow-out site
- Requests assistance to evacuate nearby rigs, facilities, residences and businesses that may be affected by the blow-out
- If site evacuation is not required, contains the fire and protect assets by eliminating possible ignition sources and using a protective water spray by local fire department, if available

**Note: Do not attempt to extinguish the fire.**

- Completes *Initial Status Report* and faxes to:  
American Safety Services Inc - Fax 432-363-0198
- Contains pollution and/or spill, if possible without exposing personnel to danger or contamination
- Monitors well conditions and maintains a log. Reports any significant changes in blow-out behavior to Team Leader
- Briefs the American Safety Services Inc First Responder upon his arrival at the site
- Relinquishes control of the wellsite to the On-Scene Commander (Team Leader) upon his arrival
- Remains at the site and assists in well control efforts, as needed

### Level 3

#### Phase 2: Well control

Responsibility	
	Assists with well control operations and support, as needed
	Prepares a detailed report of incidents immediately preceding the blow-out and provides to the On-Scene Incident Commander; reviews the report's content with the American Safety Services Inc Team Leader

### Level 3

#### Phase 3 Relief well

Responsibility	
	Assists in well control planning, as needed, from his/her knowledge of the local area
	Visually surveys prospective relief well sites and roads for obstructions such as high lines, pipelines, unsatisfactory topography and other problems; provides details on each site to the Relief Well Design Team
	Provides information to the Rig Supervisor on the relief well rig and others supporting relief well drilling operations regarding local drilling conditions and any expected problems while drilling relief well and making intercept

Assists On-Scene Commander to co-ordinate activities during relief well drilling
--

**Level 3****Phase 4:  
Well  
recovery****Responsibility**

Assists in planning well recovery work as directed by the On-Scene Commander
--

Assists in developing recommendation to cease recovery operations, abandon blow-out well and substitute relief well after sidetracking
--

Supervises well recovery work on the blow-out well if feasible, or abandonment if not
---

**Level 3****Phase 5:  
Post-incident  
evaluation****Responsibility**

Assists On-Scene Commander in preparing post-incident report and evaluation from field standpoint; includes his summary of events leading up to the incident and review of initial response efforts
---

**Initial Risk Assessment**

The Rig Supervisor will be the first to assess risks and determine the boundaries of the Exclusion Zone. The Exclusion Zone determines the minimum safe distance away from the blown-out well. It is based primarily on the concentration of combustible gas and/or toxic gas in the atmosphere. In general, the Exclusion Zone should be positioned according to the following:

Hazard	Maximum Limit
Combustible gas	10% of LEL*
Hydrogen Sulfide	10 ppm
Flammable liquid	10 bbls
Noise	85 dB

\*Lower Explosive Limit

Other hazards such as proximity to vehicular traffic, sources of ignition, threats to production facilities and other risks must be evaluated and steps taken to ensure that the Exclusion Zone boundary is set far enough away from the blow-out site to reduce risks to all personnel to an acceptable level.

Once the Exclusion Zone Boundaries are set, no person should enter the area without special training, equipment and companion personnel. Often in such situations, persons not familiar with the potential of sudden catastrophic failures inside the Exclusion Zone venture too close to the blow-out in search of fellow workers, valuables left behind during the evacuation or curiosity. Sometimes, these mistaken few become victims if a failure, such as a spontaneous ignition of the plume, occurs while they are inside the Exclusion Zone.

Boundaries of the Exclusion Zone are not firm, and may need to be moved from time to time depending on several conditions such as:

- Flowrate from the well (increasing or decreasing)
- Zone of flow (increased H<sub>2</sub>S concentration in the plume)
- Changes in atmospheric conditions (reduced air temperature, wind velocity, wind direction, atmospheric inversion, etc.)
- Hydrocarbon runoff with collection offsite
- Ignition of the plume
- Self-extinguishment of a fire
- Changes in boundary threshold limits

Risk management in the early stages of a blowout is accomplished primarily by prohibiting access to the site. Separation of potential victims from potential hazards is a very effective method of mitigating risks. In the case of Exclusion Zone boundary establishment, personnel are simply kept away from all hazards.

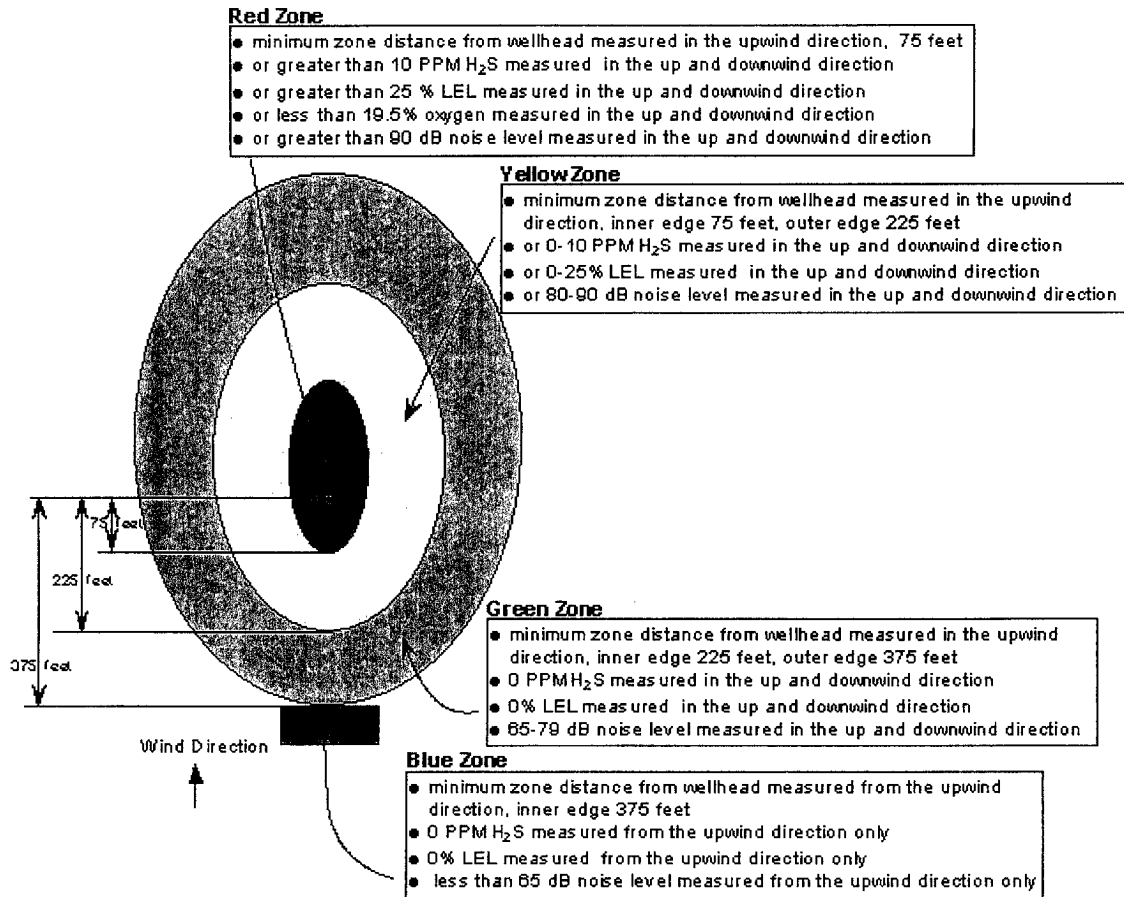
## **Situation Awareness**

This is an area of human factors involving perceptions of people involved in high stress situations. Basically, it is the assessment of the person's concepts and thought processes when multiple data inputs are involved in an emergency. The best example of this area of study involves jet fighter pilots in combat situations.

In high stress situations the human mind can go into sensory overload easily. Alarms are sounding, warning lights are flashing, and there is normally panic, shouting and rapid movements. All of these render many persons incapable of determining what information is valid and should be honored, and what inputs are redundant or meaningless and should be ignored.

Work zones have been established to control access to areas in which well control specialists and certain support personnel can function safely. Others that do not fully understand the risks involved are simply not allowed to enter these areas. This has been successful in limiting exposure and consequential injuries to those people with poorly developed situation awareness during well control operations.

## Example of Work Zones



## Appendix

Appendix A	Initial Response Checklist
Appendix B	Initial Status Report
Appendix C	Communications Record

## Appendix A

### **Initial Response Checklist**

Has pressure containment and flow control been completely lost and cannot be regained?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
--	------------------------------	-----------------------------

**If "yes" this is a Level 3 Well Control Incident**

Date:	Time:	Well Name & No.:
Drilling Contractor:		Rig Number:
Yates Petroleum Corporation Rig Supervisor:		Yates Petroleum Corporation Snr. Supervisor:

#### **ACTIONS** (Check off as performed)

<input type="checkbox"/>	Evacuate all personnel to designated muster area
<input type="checkbox"/>	Check names at muster area against Check-In Sheet; account for all personnel
<input type="checkbox"/>	If all personnel are <b>not</b> at muster area, determine how many personnel are missing, where they were last seen and visually check the area, if possible, to see if they are safe
<input type="checkbox"/>	Activate Search and Rescue Team to recover missing personnel, if required
<input type="checkbox"/>	Provide emergency first aid for any injuries
<input type="checkbox"/>	Determine if emergency medical services and ambulance transport are needed; locate landing site for med-evac helicopter and mark site
<input type="checkbox"/>	Notify nearby rigs or production facilities about potential danger from blow-out
<input type="checkbox"/>	Notify Team Leader about incident; recommend Major Emergency declaration
<input type="checkbox"/>	Establish "Exclusion Zone" around location and mark with available supplies
<input type="checkbox"/>	Secure the area and do not let unauthorized persons inside Exclusion Zone
<input type="checkbox"/>	Contain pollution, if possible
<input type="checkbox"/>	Fill out <i>Initial Status Report</i> and fax to _____
<input type="checkbox"/>	Remain on site pending arrival of Team Leader
<input type="checkbox"/>	Monitor well conditions and report any changes to Team Leader
<input type="checkbox"/>	Brief First Responder upon arrival at location
<input type="checkbox"/>	Assist with well control operations, as needed

\*Do not re-enter the Exclusion Zone unless absolutely necessary until qualified help arrives

\*\*If well is on fire, do not attempt to put the fire out; if well is not on fire, try to keep it from catching on fire

<b>DO</b>	<b>DON'T</b>
Act quickly and decisively	Wait on instructions
Evacuate the rig or wellsite, if necessary	Hang around the rig
Wait in the Muster Area	Leave the well site
Answer questions asked by Yates Petroleum Corporation Team Leader and well control specialist truthfully	Talk to the press or the public without clearance; don't speculate about the cause of the incident; don't exaggerate
	Be a hero

Appendix B  
**Initial Status Report**

**Preliminary information:**

Operator: \_\_\_\_\_ Well Name & Number: \_\_\_\_\_  
Rig: \_\_\_\_\_ Company Man: \_\_\_\_\_  
Rig Phone: \_\_\_\_\_ Cell Phone: \_\_\_\_\_  
Office Phone: \_\_\_\_\_ Office FAX: 505 748 4229  
Directions to site: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Blow-out Information:**

Time of blow-out: \_\_\_\_\_ Well on fire? \_\_\_\_\_  
Operation at time of blow- \_\_\_\_\_  
Point of Escape: \_\_\_\_\_ Est. Flowrate: \_\_\_\_\_  
Type of Fluid: \_\_\_\_\_ H<sub>2</sub>S? Yes ☐ No ☐ CO<sub>2</sub>? Yes ☐ No ☐  
Height of plume before it ignites? \_\_\_\_\_ ft Total Height of flame: \_\_\_\_\_ ft  
Mud Weight: \_\_\_\_\_ ppg MD: \_\_\_\_\_ ft TVD: \_\_\_\_\_ ft Last shoe test: \_\_\_\_\_ EMW @ \_\_\_\_\_ depth  
Rig Condition: \_\_\_\_\_  
BOP Condition: \_\_\_\_\_ Closing Unit OK? \_\_\_\_\_  
Condition of drill string: \_\_\_\_\_ TIW valve installed? Yes ☐ No ☐

**Response:**

Personnel Evacuated?	Yes <input type="checkbox"/> No <input type="checkbox"/>	Number Missing:	_____
Exclusion Zone set up?	Yes <input type="checkbox"/> No <input type="checkbox"/>	Injuries?	_____
Nearby rigs notified?	Yes <input type="checkbox"/> No <input type="checkbox"/>	Air Ambulance needed/called?	Yes <input type="checkbox"/> No <input type="checkbox"/>
Location Secured?	Yes <input type="checkbox"/> No <input type="checkbox"/>	Regulatory Agencies notified?	Yes <input type="checkbox"/> No <input type="checkbox"/>
Residents evacuated?	Yes <input type="checkbox"/> No <input type="checkbox"/>	Pollution contained?	Yes <input type="checkbox"/> No <input type="checkbox"/>

**Drawing of Location:**

## Communications Record

[illegible]



## **Hydrogen Sulfide (H<sub>2</sub>S) Properties and Effects**

H<sub>2</sub>S is an **Extremely Toxic**, Flammable, Explosive and Corrosive Gas. It is heavier than air, paralyses you of smell. Causes breathing to stop and death will result.

At low concentration H<sub>2</sub>S has the odor of rotten eggs. The smell is very offensive. At slightly high concentration H<sub>2</sub>S will cause sense of smell to disappear and you are slowly poisoning yourself. At even slightly higher concentrations DEATH will result.

## **Properties of Hydrogen Sulfide (H<sub>2</sub>S)**

Extremely deadly toxic gas

Colorless

Heavier than air

Burns with a blue flame

Produces Sulphur Dioxide (SO<sub>2</sub>) when burned (another toxic gas)

Highly corrosive

Irritant skin and eyes

Soluble in water and other liquids

Extremely flammable and explosive.

## Hydrogen Sulfide (H<sub>2</sub>S) Toxicity Chart

Concentrations	Effects
Less than 1 PPM	Odor
1-PPM	May cause stress or health symptoms in sensitive people
10-PPM	Permissible Exposure Limit (PEL) Allowed 8 hours exposure without breathing apparatus.
15-PPM	Short Term Exposure Limit (STEL) 15-minute exposure 4 times a day allowed without breathing apparatus.
100-PPM	Immediately Dangerous to Life and Health (IDLH) No exposure allowed without breathing apparatus.
150 – 250 PPM	Loss of smell will result within a few minutes, burning of eyes, throat and coughing.
500-PPM	Destroys sense of reasoning and balance, causes respiratory within minutes and death will result.
600-PPM	Unconscious quickly, followed by loss of lung function, heart failure and death if not rescued and treated.
1000-PPM	Immediately loss of body function including the lungs. Heart will arrest, DEATH within minutes if not rescued immediately and treated.

**10,000 PPM is 1 %**

### **Sulphur Dioxide (SO<sub>2</sub>) Toxicity Chart**

<b><u>Concentration</u></b>	<b><u>Effects</u></b>
1-PPM	Odor
2-PPM	Permissible Exposure Limit (PEL) Safe for 8 hours without breathing apparatus.
5-PPM	Short Term Exposure Limit (STEL) Safe for 15 Minutes – four time a day without breathing apparatus.
12-PPM	Burning of eyes, breathing irritation. Causes damage to the wall lining of the lungs.
100-PPM	Immediately Dangerous to Life and Health (IDLH) Causes serious decaying of skin tissue of respiratory system.
150-PPM	Extreme irritation, tolerated only for a few minutes.
500-PPM	Sense of suffocation with first breath requires medical aid.
1000-PPM	Death will result unless rescued and medical aid is provided.

**SO<sub>2</sub> is known to be a cancer-causing agent.**

### H2S Emergency Levels:

	Level I Low Impact Unconfirmed	Level II Significant Impact Potential	Level III Major Impact Hazard to People
Drilling	Problems During Drilling in a sour gas zone and the well has significant losses or gas-cut mud or kick	Equipment malfunction while circulating a kick or unable to maintain circulating volumes	Uncontrolled flow of sour gas (ignited or unignited) from the wellbore
Testing	Sour gas zone is open and an event occurs that has the potential to lead to a well control problem (leak at surface setup) Limited release.	An equipment malfunction restricts the ability to manage any level I emergency.	Uncontrollable flow of sour gas (ignited or unignited) from the wellbore.

### Rig Crew Emergency Action

Position	Report to	Duties
Rig Manager	Drilling Supervisor	Activate the H2S Alarm. Supervise evacuation to Safe Briefing Area. Return to Drill Floor and Account for Essential personnel. Report to DS for further Instructions.
Driller on Duty	Rig Manager	Prepare to Secure Well. Check Drill Crew personnel for H2S Safety Equipment Readiness. In Case of Emergency Remove Non- Essential Personnel from Rig Floor
Drill Crew	Driller	Check their H2S Breathing Equipment for Readiness and Follow Instruction of the Driller.
H2S Safety Supervisor	Report to Rig Floor	Ensure that all Personnel are Using Required Breathing Apparatus. Report to DS. Monitor all Operations and Monitor all Personnel Under Air.
Service Company Personnel Visitors	Safe Briefing Area	Report to Safe Area and Await Further Instructions.