SLICKLINE OPERATIONS

AN INDUSTRY RECOMMENDED PRACTICE (IRP) FOR THE CANADIAN OIL AND GAS INDUSTRY

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DISCLAIMER

This IRP is a set of best practices and guidelines compiled by knowledgeable and experienced industry and government personnel. It is intended to provide the operator with advice regarding the specific topic. It was developed under the auspices of the Drilling and Completions Committee (DACC).

The recommendations set out in this IRP are meant to allow flexibility and must be used in conjunction with competent technical judgment. It remains the responsibility of the user of the IRP to judge its suitability for a particular application.

If there is any inconsistency or conflict between any of the recommended practices contained in the IRP and the applicable legislative requirement, the legislative requirement shall prevail.

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PREFACE

PURPOSE

The purpose of this document is to ensure that guidelines for slickline operations are in place and readily available for all personnel involved in the development, planning, and completion of a slickline program. It may be used to provide reference to the entire audience and act as a guideline for Slickline Service Companies in training employees and developing internal procedures for safe slickline practices.

IRP 13 is intended to supplement existing standards and regulations. It is also intended to establish guidelines in areas where none previously existed.

AUDIENCE

The intended audience of this document includes slickline personnel (both management and service rig personnel), oil and gas company engineers, field representatives, and regulatory bodies.

SCOPE AND LIMITATIONS

IRP 13 is a guideline intended for slickline service companies to develop an appropriate slickline service program that promotes slickline worker safety on the job. This IRP has been written for a broad audience. Oil and gas companies as well as slickline service personnel and third-party workers may find, all or portions, of this IRP of interest. IRP 13 includes pertinent information about slickline safety, including the following:

- Slickline Service Company responsibilities,
- Worker responsibilities,
- Owner responsibilities,
- Well control,
- Operational procedures,
- Equipment maintenance, and
- Training.

IRP 13 supplements existing standards and regulations, and provides guidelines and recommendations where none previously existed. It also refers to other pertinent standards where appropriate, and provides information on how to access them. A full list of the documents referred to in this IRP plus other useful reference material is provided in References at the end of this document.

REVISION PROCESS

Industry Recommended Practices (IRPs) are developed by Enform with the involvement of both the upstream petroleum industry and relevant regulators. IRPs provide a unique resource outside of direct regulatory intervention.

This is the first version of IPR 13. It is based on issues brought to the Drilling and Completions Committee (DACC) by industry and government stakeholders. Technical issues brought forward to the DACC as well as scheduled review dates can trigger a re-evaluation and review of this IRP, in whole or in part. For details on the specific process for the creation and revision of IRPs, visit the Enform website at www.enform.ca.

Revision History

Edition	Sanction Date	Scheduled Review Date	Remarks/Changes
1	November 2007	2012	IRP 13 was initially published in December, 2007
1.1	February 2009	2012	Added references to IRP 15 in sections: 13.1.2, 13.4.7, 13.4.8, 13.5.11

SANCTION

The following organizations have sanctioned this document:

- *Alberta Employment, Immigration and Industry*
- *British Columbia Oil and Gas Commission*
- *British Columbia Workers Compensation Board (WorkSafeBC)*
- *Canadian Association of Oilwell Drilling Contractors*
- *Canadian Association of Petroleum Producers*
- *Energy Resources Conservation Board (Alberta)*
- *International Intervention and Coil Tubing Association (Canada)*
- *National Energy Board*
- *Petroleum Services Association of Canada*
- *Saskatchewan Industry and Resources*
- *Small Explorers and Producers Association of Canada*

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BACKGROUND

Slickline service is a mobile oil and gas service that offers an array of downhole tools to aid in the manipulation of oil and gas wells. Oil and gas owners sub-contract slickline service for a variety of services from routine oil well servicing to emergency well control.

Slickline service uses a single solid-stranded non-electric cable, known as slickline. The slickline is secured to the slickline unit, passes through a stuffing box and pressure control equipment mounted on the wellhead. The slickline is used to run, set and control downhole equipment such as tools, recorders, plugs or flow-control equipment. Appropriate and safe slickline service can maximize the potential of a well and can increase safety for other third-party services.

Today, slickline service is an integral part of oil and gas servicing. The scope of slickline work continues to expand with the development of new technologies and procedures. Slickline applications include, but are not limited to:

- exploring older wells to determine condition,
- setting plugs in conjunction with snubbing units or on drilling/service rigs,
- setting mechanical perforations or timed explosive perforations,

- determining accurate bottom hole pressures on new or existing wells (gradients),
- swabbing tubing back to the Owner's or other services tank, or
- simple gauging tubing or measuring depth.

Slickline service typically runs as a 'go-to' service and many slickline service companies run a 24-hour operation. Given the nature of slickline work, slickline service personnel may be working at any hour of the day or night, and are often working in unpredictable well pressure situations. With such a broad scope of potential work, working hours and potential services requested worker safety is of primary concern.

The reality of oil well service risk was made all too clear in August 2005 with a single fatality involving several third-party services. Associations representing the services on location along with CAODC, PSAC and DACC responded quickly to initiate the development of *IRP 13: Slickline Operations*. Prior to the development of this IRP, slickline service reference material was limited to API or company-specific documentation. A collection of experts were gathered to develop and sanction IRP 13 as a guideline for slickline service companies, slickline service personnel and oil and gas companies.

IRP 13 is intended to offer guidance to develop an appropriate slickline service program and provide guidelines for slickline workers, slickline service companies along with oil and gas companies to promote safe work practices onsite.

13.1. SLICKLINE SERVICE COMPANY RESPONSIBILITIES

13.1.1 INTRODUCTION

This section reviews the responsibilities, including both legislated requirements and industry recommended practice, a Slickline Service Company has to its customer. This IRP references the following terms:

- Owner refers to the authorizing oil company or prime contractor.
- Wellsite Supervisor refers to the owner's onsite representative. Field Representative, Program Engineer, or Company Representative refers to the Prime Contractor's onsite representative and will be referred to as the Wellsite Supervisor throughout this IRP.
- Customer within this IRP refers to the Slickline Service Company's customer and is usually the Owner.
- Slickline service personnel refers to all slickline workers, operators and supervisors.

13.1.2 INFORMATION GATHERING / PRE-ASSESSMENT

The first stage of any slickline job is to gather necessary information to …

- identify equipment and crew requirements and
- assist with hazard assessment.

There are four primary components of information gathering that assist equipment and crew selection and mitigate known hazards:

- customer communication,
- job scope,
- federal and provincial legislation, and
- hazard assessment.

1. Customer Communication

Thorough and complete customer communication is critical for the Slickline Service Company to identify necessary equipment, skilled crew and potential hazards. It is the responsibility of the Slickline Service Company to contact and request information from its customer. Communication among the Slickline Service Company, Owner and Wellsite Supervisor is essential to establish the job scope. A clear understanding of the job scope along with timing, location, pertinent well information and equipment requirements allows the Slickline Service Company to select appropriate equipment and assign properly trained personnel for the job.

2. Job Scope

The Slickline Service Company requires site-specific information from the customer / Owner, usually provided during customer communications. Information is gathered by dispatch and communicated to slickline service personnel on a job order request form (see Appendix A or Sample Job Dispatch Sheet in *Wireline Operations and Procedures*[1]).The items listed below should be clarified prior to job commencement to ensure the Slickline Service Company selects appropriate equipment and assigns an appropriate crew.

Details of Job Request

- Owner contact information and details:
    - Will the Wellsite Supervisor be on location?
    - Will there be any other services present?
    - Is snubbing equipment rigged up?
    - Are the Owner responsibilities clearly identified?
    - Will a safe work permit be required from a well operator or field foreman?
    - Has the Wellsite Supervisor completed a hazard assessment?
- Owner-specific MSDSs,
- Slickline Service Company MSDSs,
- billing information,
- type of slickline unit(s) needed, and
- BHA profiles.

Jobsite Information

- well location (L.S.D. well legal name) and details,
- complete directions to the jobsite,
- detailed description of surface conditions,
- fall protection training
- Personal Protective Equipment (PPE safety harness)
- height of the wellhead (platform present or required?), and
- tire chain requirements.

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[1] American Petroleum Institute Exploration & Production Department. *Wireline Operations and Procedures*. (June, 2000). Third Edition. Washington, DC.

Well Information

- well type (sweet or sour),
- well head connection,
- shut in tubing and casing pressure,
- downhole schematics, and
- downhole conditions.

Recommended Crew and Equipment

- crew size,
- crew experience,
- appropriate equipment, and
- supporting equipment.

3. Federal / Provincial Legislation and Industry Recommended Practice

Federal and provincial legislation is in place to protect the safety of workers, the public and the environment. It is the Slickline Service Company's responsibility to comply with all federal and provincial legislation along with IRPs. Refer to IRP 9: Basic Safety Program for information on federal and provincial legislation. The legislations and practices most pertinent to slickline activities are listed below:

- Federal Commercial Vehicle Standard 9: Drivers' Hours of Service regulations (SOR / 2005 - 313),
- Occupational Health and Safety (OHS),
- Transportation of Dangerous Goods,
- Explosives Act,
- PSAC Code of Practice, and
- Federal Transportation Cargo Securement Standard 10.

4. Hazard Assessment

It is imperative the Slickline Service Company identify potential hazards and control measures. Identified hazards and control measures must be recorded and kept on location during slickline operations. Control measures may include engineering, administrative, or Personal Protective Equipment (PPE). Along with the hazard assessment provided by the Wellsite Supervisor, it is in the best interest of the Slickline Service Company to compile all the information gathered through customer communications, job scope and a review of legislation to develop a hazard assessment specific to slickline operations for each job.

The slickline hazard assessment may include hazards revealed from the following sources:

- owner supplied hazard assessment,
- job scope,
- federal and provincial legislation, and
- IRPs.

Refer to IRP 9: Basic Safety Program for a generic hazard assessment sample.

13.1.3 EQUIPMENT REQUIREMENTS

It is the Slickline Service Company's responsibility to identify the appropriate equipment for the job given the information gathered by the Slickline Service Company and provided by the Owner. Slickline Service Company equipment should be maintained as per:

- manufacturers' specifications,
- *13.6: Equipment Maintenance* of this IRP, and
- *IRP 2: Completing and Servicing Critical Sour Wells:2.7: Slickline Operations.*

Appropriate equipment selections are possible with a thorough and complete review of these three sources.

- Information gathering / pre-assessment from the customer,
- Well control criteria as described in 13.4: Well Control, and
- Operational procedures as described in *13.5: Operational Procedures.*

Additionally, consider the following when selecting equipment:

- The slickline unit must be compatible with road and lease conditions, or suitable for remote access work as required. Lengths and types of slickline on the unit should be verified and appropriate for known well conditions (see 13.5.3: Slickline Unit Selection).
- Select pressure control equipment in accordance with the identified well division (see 13.4.2: Well Divisions).
- Proper equipment certifications and inspections must be completed, documented and available onsite.
- Select downhole equipment, including flow control, in accordance with the job scope. Materials and tool types are determined based on well conditions, depths and job scope.
- A wireline valve, occasionally referred to as a BOP, must be used in all slickline operations.

An assessment of the road conditions should be completed to ensure selected equipment will arrive safely and on time. For example, the condition of the lease

road and location may require the unit be equipped with tire chains or appropriate assistance for muddy or icy conditions.

For jobs in remote locations, it is important to account for additional equipment, but not be limited to, the following as appropriate:

- helicopter,
- appropriate survival gear,
- first-aid kit, and
- bear deterrent.

13.1.4 CREW SELECTION

The slickline crew's skill, qualifications and experience must be considered when planning for the job. Information gathered during pre-assessment will assist in determining the skills and qualifications required by each crew member.

Consider the following to determine crew compatibility with job requirements:

- The crew must have the proper safety tickets as mandated by federal, provincial, IRP or Slickline Service Company standards (refer to 13.7: Training).
- Proof of proper crew certification must be present on site.
- The crew complies with Federal Commercial Vehicle Standard 9: Drivers' Hours of Service regulations (SOR / 2005 - 313).
- The crew must be fit for duty. The Slickline Service Company has the responsibility to assess if workers are fit for duty. Consequently, the Slickline Service Company may terminate the job if workers are assessed as unfit for duty during operations due to fatigue, etc.
- The crew has prior experience with the type of job described in the job scope.

13.1.5 PRE-JOB SAFETY MEETINGS

Prior to entering the job site, the crew should stop at the boundary of the job site, gear-up in PPE, overlook the lease with the Wellsite Supervisor and then enter the site.

Once the crew arrives onsite, and before the slickline work commences, an onsite safety meeting is required. This onsite safety meeting should include all present and cover the following topics:

- review unique aspects of the job;
- review, discuss and append any identified hazards and mitigation plans;
- when using a helicopter at remote locations, review the pilot check-in intervals;
- review pertinent standard operating procedures or Job Safety Analysis as documented on a Pre-Job Meeting / Hazard Assessment form (Note: forms are company-specific, whether owner or Slickline Service Company); and
- establish a 'Chain of Command'.

Each time the job scope changes or any new hazards are introduced to the work site, a new hazard assessment should be completed and communicated in an additional onsite safety meeting.

13.1.6 TRAINING

Slickline Service Companies have the responsibility to provide a training program in accordance with 13.7: Training

13.2. WORKER RESPONSIBILITIES

13.2.1 INTRODUCTION

Workers protect themselves, fellow workers, the public and the environment, by safely and efficiently performing responsibilities assigned to them. Workers and employers at all levels of the organization, must be aware of their individual safety responsibilities. Management must ensure that workers are aware of their responsibilities, continuously reinforce performance requirements, and motivate workers to become involved in the health and safety program.

Occupational Health and Safety (OHS) regulations, Industry Recommended Practices (IRPs) and Safe Work Practices exist to protect workers' personal safety on the jobsite. It is the responsibility of the Slickline Service Company to provide a safe work environment in accordance with these regulations, standards and practices. A Slickline Service Company's established policies and procedures surrounding workplace safety must be in accordance with the law and is intended for worker safety.

For workers to understand and adhere to their responsibilities, company-specific worker safety responsibilities should be clearly defined in writing. This IRP provides recommended worker responsibilities common to slickline activities. It emphasizes slickline service worker responsibilities specifically and the responsibilities of those stakeholders that may impact slickline worker safety. For more information, refer to the following (Note: this is not an exhaustive list.):

- local WCB regulations,
- provincial OHS,
- federal / provincial traffic regulations,
- federal / provincial explosives regulations,
- IRP 9: Basic Safety Program,
- IRP 16: Basic Safety Awareness Training,
- municipal bylaws,
- provincial energy and utilities board, and
- International Standards Committees (API, CSA, NACE).

13.2.2 GENERAL RESPONSIBILITIES

This section reviews slickline service worker responsibilities, including both legislated requirements and IRPs. It references the following terms:

- **Driver** refers to the slickline service worker who is driving a vehicle and does not refer to a specific career level.
- **Supervisor**, also known as operator, refers to the slickline service worker in charge of the job and slickline personnel onsite.
- **Assistant**, also know as helper or trainee, refers to all other slickline personnel on the job reporting to the supervisor.

Slickline Service Companies are required to have established policies and procedures surrounding workplace safety to provide workers' 'right to know'. Workers are responsible to familiarize themselves with their company's safety practice, actively engage in reducing personal risk, and ensure the safety of themselves and their fellow workers.

Right to Know / Obligation to Refuse Unsafe Work

Workers are typically informed during safety meetings. For workers to fulfill their 'right to know' they must be present, attentive, and participative in all required safety meetings. Safety meeting topics (see 13.1.5: Pre-Job Safety Meetings) will inform workers of …

- potential hazards,
- required PPE, or
- required senior worker supervision.

The following reporting procedures also contributes to workers' 'right to know':

- incident reporting,
- hazard assessment / reporting, and
- customer reporting and hazard reporting procedures.

Additionally, it is the responsibility of all workers to refuse unsafe work. When a worker identifies an unsafe situation, they must …

- stop work immediately,
- inform a supervisor, and
- mitigate and control the hazardous situation before proceeding with work.

Personal Safety

Slickline Service Companies must document required policy and procedures and provide an appropriate training program (see 13.1: Slickline Service Company Responsibilities and 13.7: Training). It is the workers' responsibility to apply company procedure and take accountability for personal safety.

Safe workers…

- identify hazards;
- use appropriate PPE;
- use the 'buddy system' to prevent incidents ;
- understand the Workplace Hazardous Materials Information System (WHMIS) and know what controlled products they may be working with;
- ensure they are fit for duty by;
    - reporting fatigue to supervisors,
    - utilizing 'off-work' time to rest,
    - following employers' alcohol and drug policy,
    - reporting over-the-counter/prescription drug-use to supervisor,
- carry current training certification at all times; and
- inform supervisor of certification coming up for renewal.

Unsafe Work Conditions

All workers have the responsibility to refuse unsafe work for themselves as well as their fellow workers. It is imperative workers inform the Slickline Service Company of unsafe working conditions as soon as possible to mitigate risk, ensure the safety of others and allow for alternative planning. If a worker finds himself, or herself, in an unsafe situation, the worker must refuse unsafe work and must report the unsafe working conditions to his, or her, supervisor.

Workers who are unaware, or who ignore, their responsibilities may inadvertently create unsafe work conditions for others possibly resulting in equipment damage, lost time, incidents, danger to the public, or a fatality.

13.2.3 DRIVER RESPONSIBILITIES

Workers that drive as part of their job must …

- maintain a valid driver's license appropriate to the vehicle being operated;
- use seatbelts and request all passengers use seatbelts at all times during transport;
- follow the rules of the road and abide all traffic signs;

- adjust appropriately for driving conditions (e.g. during chain-up remove unit(s) from the road way to avoid creating unsafe conditions for other motorists);
- practice common courtesy on roadways;
- follow convoy distances of 300m between vehicles; and
- use spotters at all times.

All drivers must be familiar with Transport Canada regulations regarding:

- Hours of Service Regulation Standard 9 (provincial regulations may differ from federal),
- Transportation of Dangerous Goods (TDG),
- Explosives regulations, and
- Cargo Securement NSC Standard 10.

Before transport, drivers must perform and document a pre-trip inspection to ensure the vehicle is road-worthy as prescribed by federal and provincial regulations.

Drivers should allow for adequate driving time to the jobsite to include road side inspections, weather, stops, and traffic.

13.2.4 SUPERVISOR RESPONSIBILITIES

Supervisors have more responsibility due to the nature of their job. They need to have a clear understanding of legislation, safety standards, and Owner-specific policy and procedures.

The Owner's policy and procedures are a minimum standard for slickline operations. In the event a task requires deviation from existing slickline or Owner policy and procedure, both Slickline Service Company management and Owner management must be notified.

Supervisors' duties include, but are not limited, to the following responsibilities ...

- communicate with the Wellsite Supervisor,
- communicate the site-specific Emergency Response Plan (ERP),
- preserve the confidentiality of Owner intellectual property (e.g., tight hole, bottom hole pressure, etc.),
- prepare appropriate equipment and tools assigned for the job,
- ensure equipment is used only for its designed intent,
- safety of all workers under their direction
- supervise and train assistants in ongoing daily activities, and

- represent the Slickline Service Company in a professional and courteous manner at all times.

A significant part of the supervisor's role is to prepare safety communications including, but not limited to ...

- pre-job safety meeting,
- incidents reporting,
- request clarification from Owner or Slickline Service Company management when direction is incomplete,
- report defective equipment, and
- complete daily paper work required by the Slickline Service Company.

13.2.5 ASSISTANT RESPONSIBILITIES

Safe working and effective assistants must ...

- report all incidents promptly to the supervisor,
- inform supervisor / customer of unsafe work conditions,
- participate in pre-job meetings,
- ensure equipment and tools are kept clean and organized,
- keep uninvolved people and services clear of work area,
- properly operate valves,
- complete all daily paper work required by the Slickline Service Company, and
- represent the Slickline Service Company in a professional and courteous manner at all times.

13.3. OWNER RESPONSIBILITIES

13.3.1 INTRODUCTION

For the purposes of this document the Owner refers to the oil/gas company that owns the lease, or is a delegated representative of the leasee (see 13.1.1: Introduction). It is expected the Owner will provide a Wellsite Supervisor to liaise with the Slickline Service Company onsite.

Owner responsibilities include, but are not limited to ...

- ensure a qualified site coordinator is appointed for health and safety and ensure that all hazard information is passed on to all affected persons,
- customer communications,
- regulatory compliance,
- disposal of well contaminates,
- expected owner policy and procedures,
- Fire and Explosion Prevention Plans (FEPPs),
- site-specific Emergency Response Plans (ERPs),
- specifics about job scope and well details,
- lease requirements, and
- onsite expectations.

13.3.2 CUSTOMER COMMUNICATIONS

Communication between the Owner and the Slickline Service Company is crucial to the safe and effective completion of a slickline job. The Owner should designate an appropriate Wellsite Supervisor for the job. This representative should be the Slickline Service Company's first point of contact with the Owner.

During the Job Request

At the time of the job request, it is the responsibility of the Owner to provide the Slickline Service Company a complete and accurate job scope along with well details. The intention of these initial communications is to provide the Slickline Service Company information necessary to select appropriately trained personnel and identify the correct equipment for the job (see 13.3.6: Job Scope and Well Details). Providing incomplete and inaccurate information may result in job delay.

Prior to the Job

It is expected the Owner will develop a communication action plan that provides direction to the Slickline Service Company. This action plan must include …

- Owner specific check-in requirements,
- safety meeting communications when the job scope changes, and
- IRP 18: Fire and Hazard Explosion Hazard Management compliant FEPP.

Additionally, the Owner must maintain copies of all pre-job meetings and make them available onsite, upon request, to the Slickline Service Company.

Onsite Communications

Onsite authority lies primarily with the Owner designated Wellsite Supervisor. Communications between the Wellsite Supervisor and the Slickline Service Company allows the Slickline Service Company to arrange any needed hazard mitigation.

There may be instances where the Wellsite Supervisor is not onsite. Slickline service personnel understand the potential hazards when opening the wellbore and risks surrounding surface explosions, therefore, when a Wellsite Supervisor is not onsite, the Owner **must** assign authority to the Slickline Service Company. For the safety of all workers onsite, the Slickline Service Company must be given the authority to stop other onsite crews who may cause potential risk.

13.3.3 REGULATORY COMPLIANCE

Regulations must be adhered to when selecting a Slickline Service Company for specific jobs. There are numerous regulations that impact the availability and actions of Slickline Service Companies. It is recommended Owners consider the following regulations in job requests and job programs:

- provincial OHS (re: general safety requirements such as scaffolding and fall protection),
- Department of Transport,
- ERCB Directives and Bulletins or other provincial oil and gas regulating bodies,
- Natural Resources Canada (re: explosives),
- Canadian Nuclear Commission (re: storage and transport of sources),
- Transportation Canada (re: hours of service and cargo securement), and
- Canadian Provincial and Labour Codes.

If there are no Slickline Service Companies available that can meet minimum regulatory compliance, then the job must be postponed.

13.3.4 OWNER POLICY AND PROCEDURES

The Owner should be prepared to provide company-specific procedures in writing to the Slickline Service Company either at the time of the job request, or onsite. A Slickline Service Company is most likely to request company-specific procedures in the following situations:

- when the Slickline Service Company is requested to operate the Owner's equipment,
- when the procedure for the slickline task varies from the existing Slickline Service Company's defined procedure, or
- when the Slickline Service Company does not have a documented procedure for a specific requested slickline task.

The Owner's documented policies and procedures are essential as they …

- create a safe work environment onsite,
- reduce the potential for damage to equipment, and
- increase the potential for a successful completion of the job in the least amount of time.

To avoid confusion on location, it is strongly recommended that the Owner has a policy documented regarding the use of slip stops above tubing plugs.

13.3.5 FIRE AND EXPLOSIONS PREVENTION PLAN

It is the responsibility of the Owner to ensure an IRP 18: Fire and Hazard Explosion Hazard Management compliant FEPP is performed for each job and presented to the Slickline Service Company prior to the pre-job meeting. It is recommended the Owner include the CAPP Hazard Assessment for Flammable Environments form (from the CAPP Flammable Environments Guideline) in the FEPP.

It is the responsibility of the Wellsite Supervisor to ensure the FEPP is reviewed with all third-party services, including Slickline Service Companies, and followed by all services on location.

The Owner must ensure that applicable provincial OHS codes be addressed to ensure well classifications are completed accurately. Well classifications must be forwarded to the Slickline Service Company at the time of the job request.

13.3.6 JOB SCOPE AND WELL DETAILS

The Slickline Service Company requires specific information to select appropriately trained personnel and identify the correct equipment for the job. It is imperative the Owner provide the following information completely and accurately to ensure the proper personnel and equipment are sent to the jobsite. At the time of the job request, the Owner should be prepared to discuss the following topics:

Details of job request

- Owner contact information and details including:
    - Will the Wellsite Supervisor be on location?
    - Will there be any other services present?
    - Are the Owner responsibilities clearly identified?
    - Will a safe work permit be required from a well operator or field foreman?
    - Has the Wellsite Supervisor completed a hazard assessment?
- Owner-specific MSDSs,
- billing information,
- type of slickline unit(s) needed,
- BHA profiles.

Jobsite Information

- well location (L.S.D. well legal name) and details,
- complete directions to the jobsite,
- detailed description of surface conditions,
- wellhead height (platform present or required)
- tire chain requirements,

Well Information

- well type (sweet or sour),
- well head connection,
- shut in tubing and casing pressure,
- downhole schematics,
- downhole conditions.

13.3.7 LEASE REQUIREMENTS

It is the responsibility of the Owner to identify any lease requirements including:

- ratholes onsite,
- sumps around the wellhead,
- chains required to access the jobsite, or
- machinery provided for towing around, or to, the jobsite.

It is the responsibility of the Owner to identify potential onsite hazards including:

- chemicals,
- hydrates,
- transport concerns,
- logging roads,
- road condition, and
- break-up.

13.3.8 ONSITE EXPECTATIONS

To ensure safe and efficient working conditions and job completion the Owner must:

- ensure that all personnel onsite perform a pre-job meeting,
- encourage all services onsite attend meetings,
- monitor meeting attendance,
- stop work when the job scope unexpectedly changes, and
- perform a revised hazard assessment as a result of change job scope.

Further, the Owner must ensure that all workers onsite have proper certification to comply with the Owner's policies and regulations. Work must not proceed until the proper certification is produced or a certified replacement sent to the jobsite.

13.4. WELL CONTROL

13.4.1 INTRODUCTION

Well control describes well pressure control on the surface and discusses how to safely gain access to the wellbore. This section describes relevant well divisions and stresses the importance of downhole data. It reviews common applications of surface pressure control equipment and offers recommendations on the selection and application of surface pressure control equipment. It concludes with a discussion of the mitigation of surface fire and explosions hazards and offers recommendations for downhole pressure control selection.

13.4.2 WELL DIVISIONS

In preparation for a job, a Slickline Service Company reviews information given by the Owner to identify well divisions. Table 1 below defines slickline well divisions:

Table 1. Suggested Divisions for Slickline Services

Well Type	**Sweet Wells**		
Pressure	Less than 10,000 kPa (1450 PSI)	10,000 to 21,000 kPa (1450 PSI to 3000 PSI)	Greater than 21,000 kPa (3000 PSI)
Division	1A	2A	3A
Well Type	**Sour Wells**		
Pressure	Less than 10,000 kPa (1450 PSI)	10,000 to 21,000 kPa (1450 PSI to 3000 PSI)	Greater than 21,000 kPa (3000 PSI)
Division	1B	2B	3B

ERCB critical sour classifications must comply with IRP 2: Completing and Servicing Critical Sour Wells: 2.7: Slickline Operations and will supersede all sections of this document. All well divisions must meet the standards set in this document with the exception of 3B which must always meet the standards in IRP 2: Completing and Servicing Critical Sour Wells: 2.7: Slickline Operations whether or not the well is deemed Critical Sour.

Divisions 1A, 2A and 3A are typically not corrosive. For non-corrosive environments well control equipment may be made from materials not meeting NACE requirements.

13.4.3 DOWNHOLE DATA AND CONDITIONS

The Slickline Service Company requires downhole data and conditions from the Owner to determine equipment requirements. Downhole data may be communicated verbally or electronically and can vary. Communication between the Slickline Service Company and the Owner is essential to gather information necessary for job preparation. It is important that the Slickline Service Company ask appropriate questions to gather required information (see 13.1: Slickline Service Company Responsibilities.) Information gathered from the Owner is confidential and proprietary to the Owner.

All downhole data and conditions should be recorded. (See 13.1: Slickline Service Company Responsibilities: Appendix A: Job Order Request Form or Sample Job Dispatch Sheet in *Wireline Operations and Procedures*) Downhole data may determine slickline operator expertise requirements and impact crew selection.

Insufficient downhole data and conditions may modify the scope of operations. In situations that require onsite investigation, the Slickline Service Company must inform the Owner of any conditions that place the operator, or equipment, outside the scope of operations. Next, the information gathered from the investigation should be used to re-asses equipment and operator requirements.

13.4.4 SELECTING SURFACE PRESSURE CONTROL EQUIPMENT

The lubricator length, diameter, and working pressure rating must be adequate for slickline services to be provided. On pressure control equipment, working pressure is the maximum pressure that must never be exceeded during field operations.

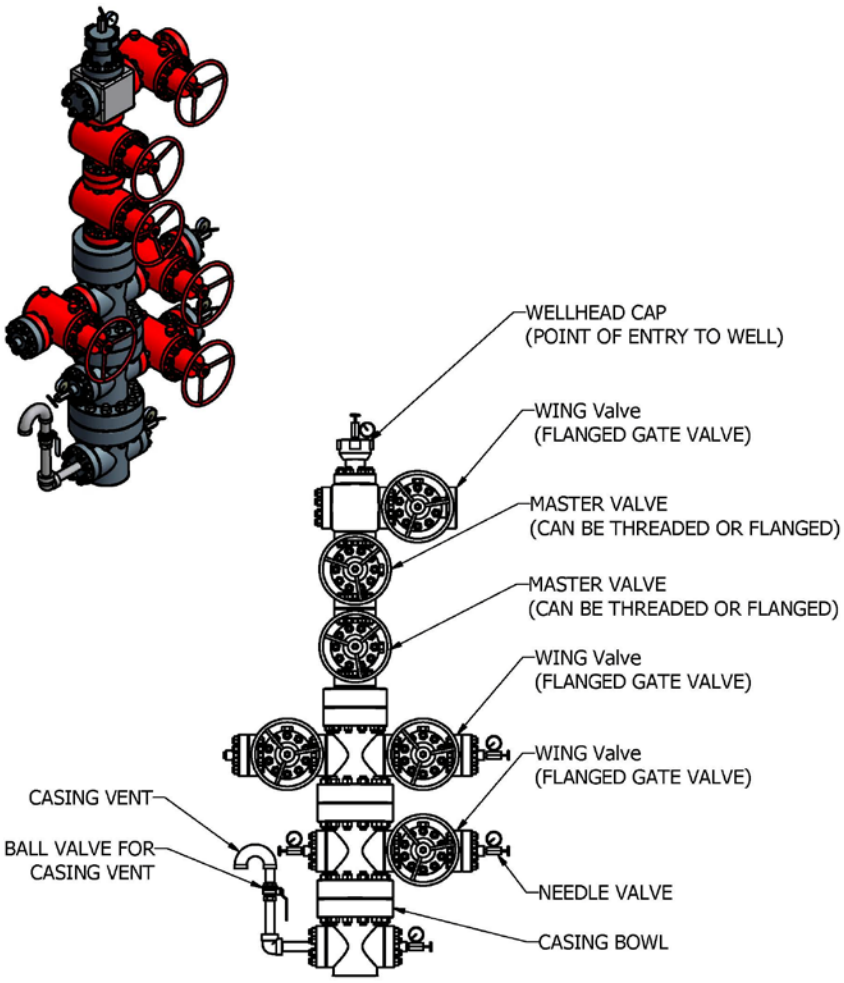
The rating of pressure control equipment must be a minimum 1.3 x the maximum shut in tubing head pressure (SITHP). Equipment must not exceed the maximum working pressure. For example, 27,600 kPa (4000 PSI) surface pressure (BHP) x 1.3 equals 35,900 kPa (5200 PSI), therefore, slickline pressure control equipment must be upgraded to 69,000 kPa (10,000 PSI).

On wells where the maximum potential wellhead pressure is not sufficiently established, it is recommended that slickline pressure control equipment be tested to the maximum working pressure of the wellhead connection or the lowest pressure rating of the equipment.

13.4.5 WELLHEAD

Wellheads are equipped with a master valve(s) to control wellbore pressure. Master valves are the access port for slickline operations. There are a variety of valves that control flow of gas from the tubing and/or casing. Wellhead valve operations vary depending on the type of valve (see Figure 1). Wellhead and valve operation should be discussed, determined, assigned and documented during the pre-job meeting.

Figure 1. Wellhead



Common Master Valves

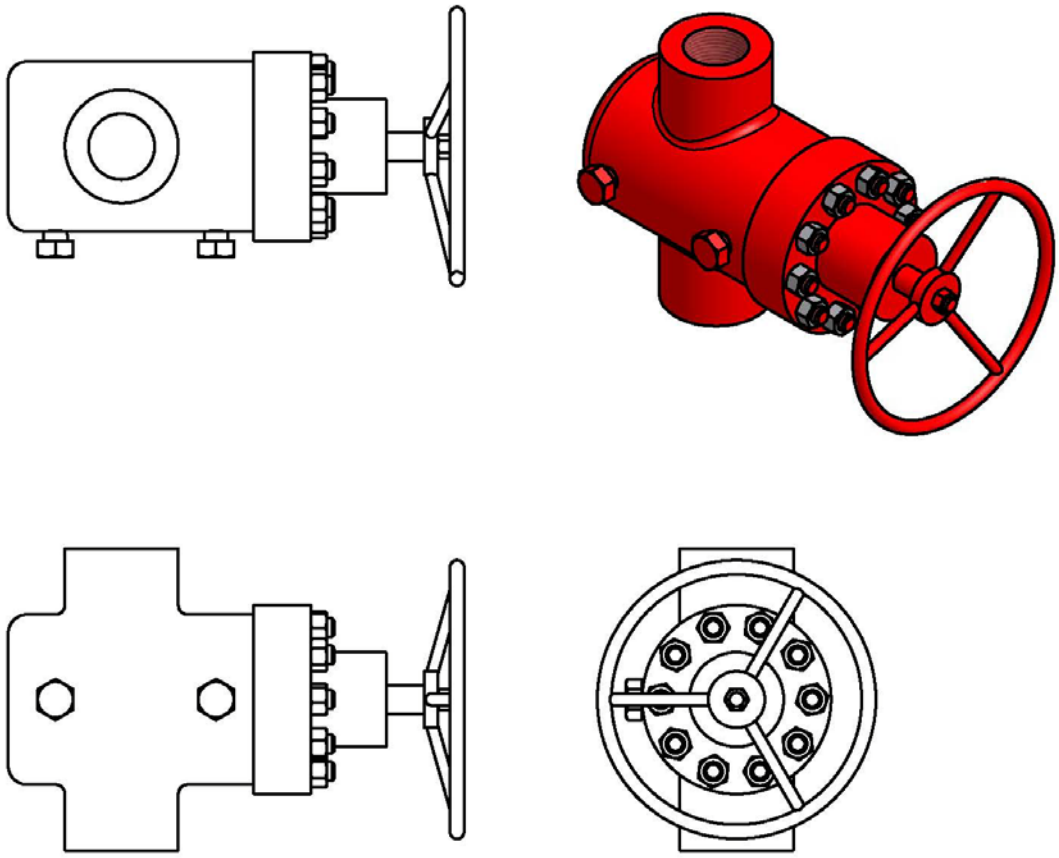
When operating master valves **always** count the number of turns to ensure the valve is fully open or fully closed. A master valve with a defined number of opening turns (e.g. 13) should close with the same number of turns (e.g. 13). If when closing the valve, it feels closed with fewer turns (e.g. 10), then there may be an obstruction in the valve body. Obstructions may include slickline, slickline tools, ice plugs, hydrates, soap sticks, coil tubing, etc. Hand tools, such as snipes or pipe wrenches, must never be used to assist closing the master valve.

Common master valves and supporting illustrations are described below:

13.4.5.1 Gate Valve

A gate valve (see Figure 2) is an opening and closing device (a valve) that employs a gate that is moved in or out of a sealing seat within the valve's body.

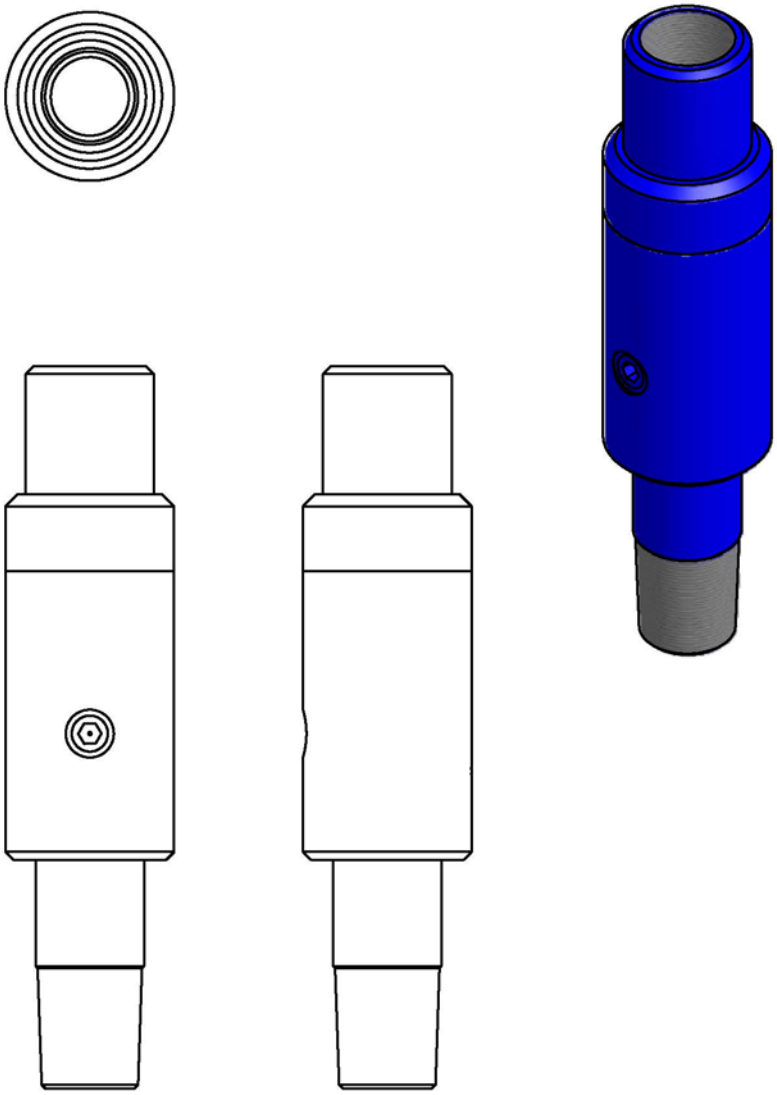
Figure 2. Gate Valve



13.4.5.2 Stabbing Valve (TI)

A stabbing valve (see Figure 3) is a ¼ turn valve with a two-piece body containing a ball style gate that is typically used for emergency pressure control during service rig or snubbing operations. Before attempting to open a stabbing valve, be sure to equalize the surface pressure control equipment above the valve. Snipes and pipe wrenches **must never** be used to open or close a stabbing valve. Although not always possible, it is recommended a gate valve be below a stabbing valve to enhance pressure control.

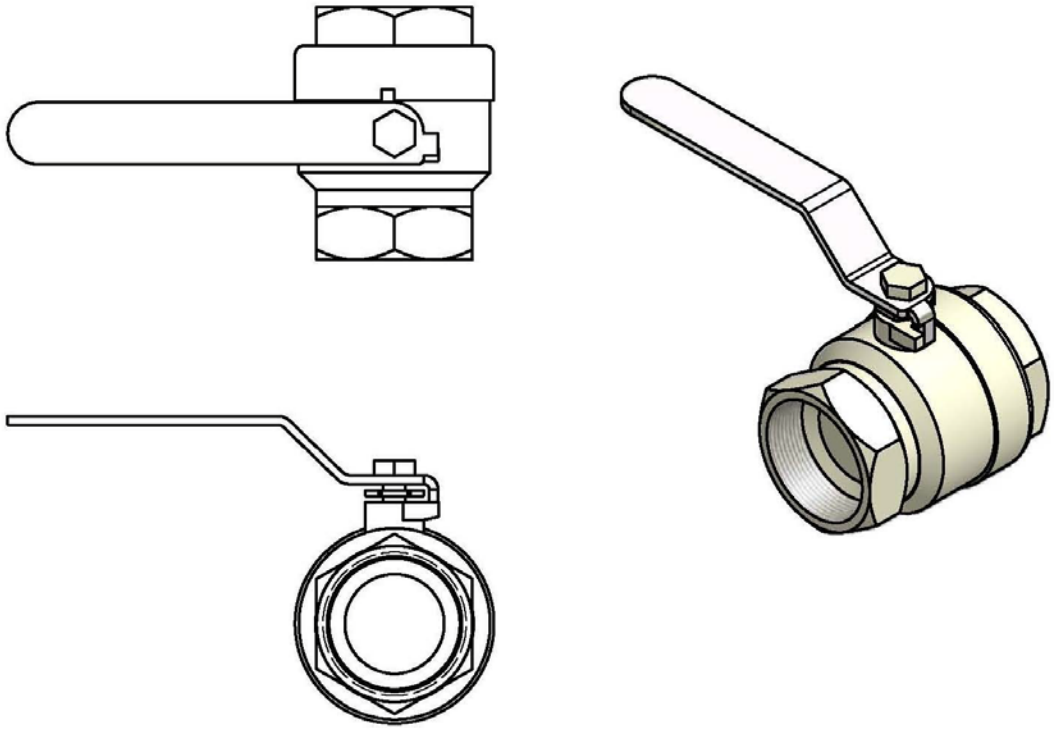
Figure 3. Stabbing Valve



13.4.5.3 ¼ Turn Ball Valve

A ¼ turn ball valve (see Figure 4) is a flow control device with a handle to open or close the flow of gas through the wellhead. They are commonly seen in coiled tubing and small diameter tubing wellheads.

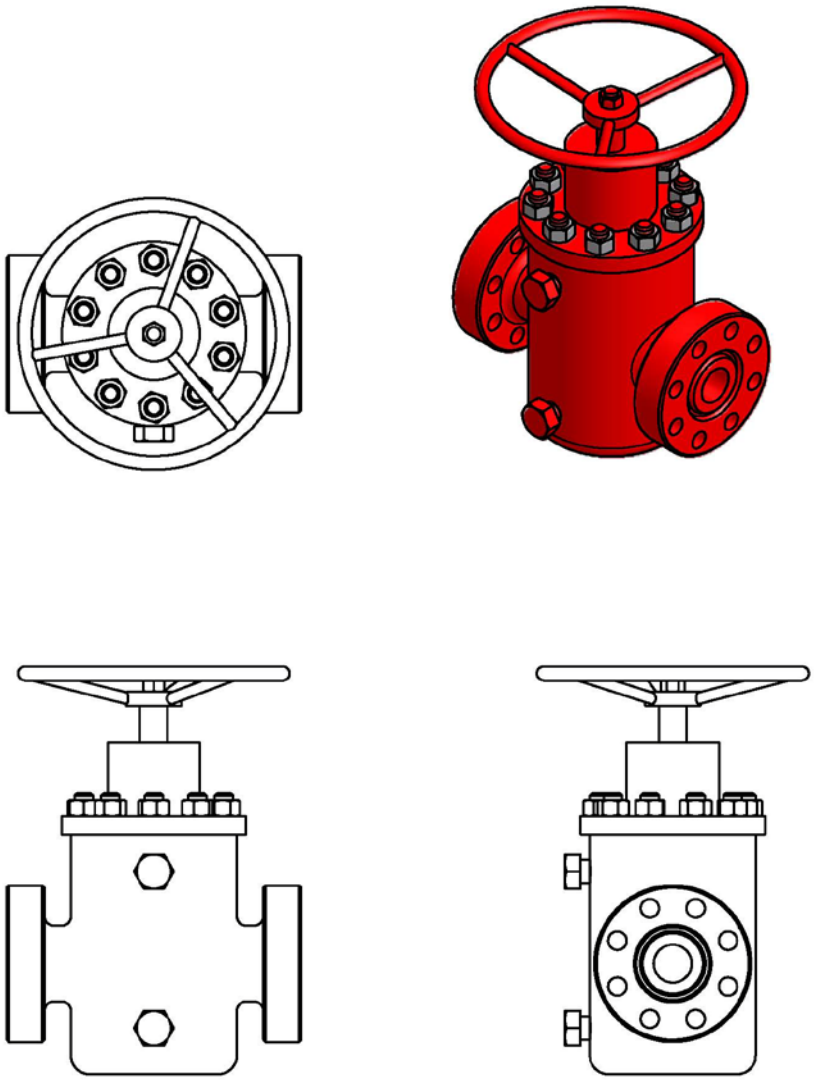
Figure 4. ¼ Turn Ball Valve



13.4.5.4 Demco (Gate Valve)

A Demco (see Figure 5) is a multiple turn gate valve that may only be used in a fully open or fully closed position. Demco valves are typically used on casing completions and/or for access to larger wellbore operations.

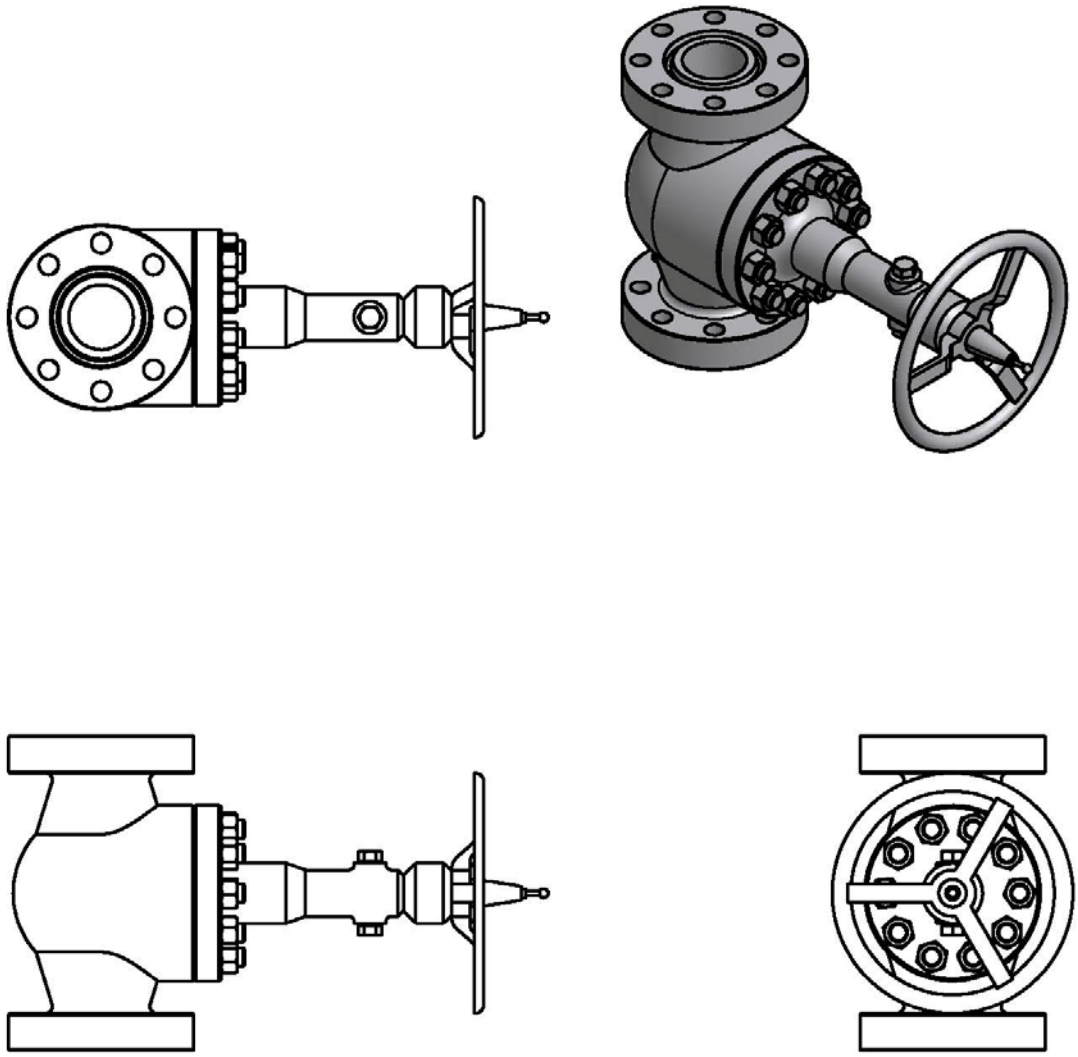
Figure 5. Demco (Gate Valve)



13.4.5.5 Orbit Valve

An orbit valve (see Figure 6) is a large diameter, multiple turn ball valve. Before an orbit valve is opened, surface pressure control equipment must be equalized above the valve.

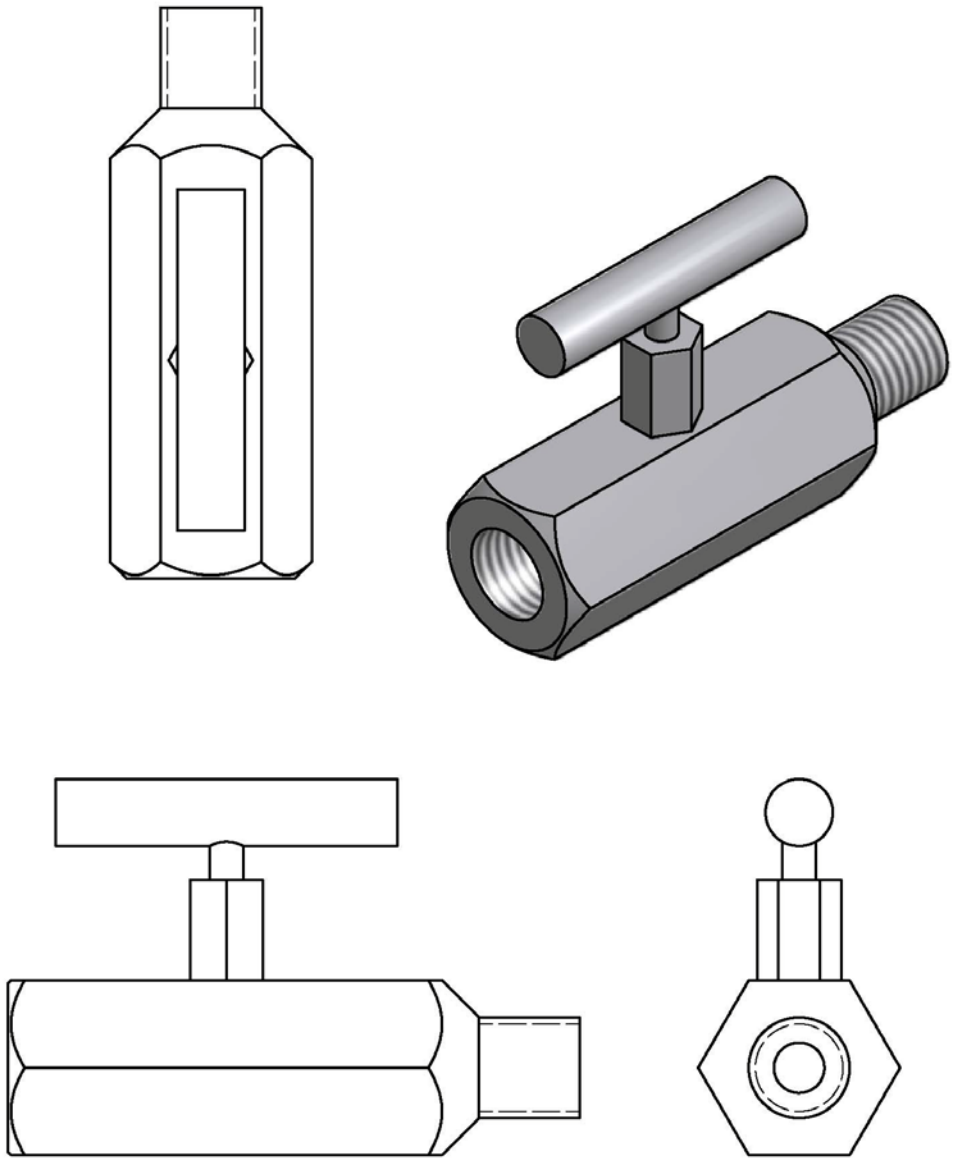
Figure 6. Orbit Valve



13.4.5.6 Needle Valves

Needle valves (see Figure 7) are functionally similar to gate valves, but permit a finer flow adjustment. The end of the stem is pointed like a needle and fits accurately into the needle seat. Needle valves are used for very small, accurate adjustable flows. Needle valves are susceptible to becoming plugged or freezing-off at all temperatures due to the small flow path.

Figure 7. Needle Valves



13.4.5.7 Wing Valve

A wing valve, which could be a ball valve or gate valve, is used on the wellhead as access to the tubing and casing pressures. Slickline operations use wing valves as access to obtain pressure readings, bleed-off surface pressure control equipment, for swabbing activities, or flaring. Wing valves isolate surface pressure from production facilities.

13.4.5.8 Surface Casing Vent

A surface casing vent is piping attached to the wellhead to monitor surface casing pressure. It is not used in slickline operations. NEVER stand on the surface casing vent.

13.4.6 SLICKLINE SURFACE PRESSURE CONTROL EQUIPMENT

Surface pressure is controlled through a series of specifically designed pressure-rated devices that contain, direct, or control the flow of pressure to allow it to be managed in a safe manner. Hand unions are the most common way to connect surface pressure control equipment. They are sized, pressure-rated and have an o-ring seal. Pressure control equipment can vary in pressure ratings. Metallurgy can vary to accommodate sweet, or sweet/sour applications.

For slickline services surface pressure control equipment starts with a wellhead adapter and works up the assembly depending on the service needed downhole. In some instances, the assemblies are small enough to be handled by hand and in other a picker unit is required to lift them due to their large size and pressure rating.

Major components of the slickline surface pressure control equipment are described and illustrated below (see Appendix B: Slickline Control Equipment String):

13.4.6.1 Well Head Adapter

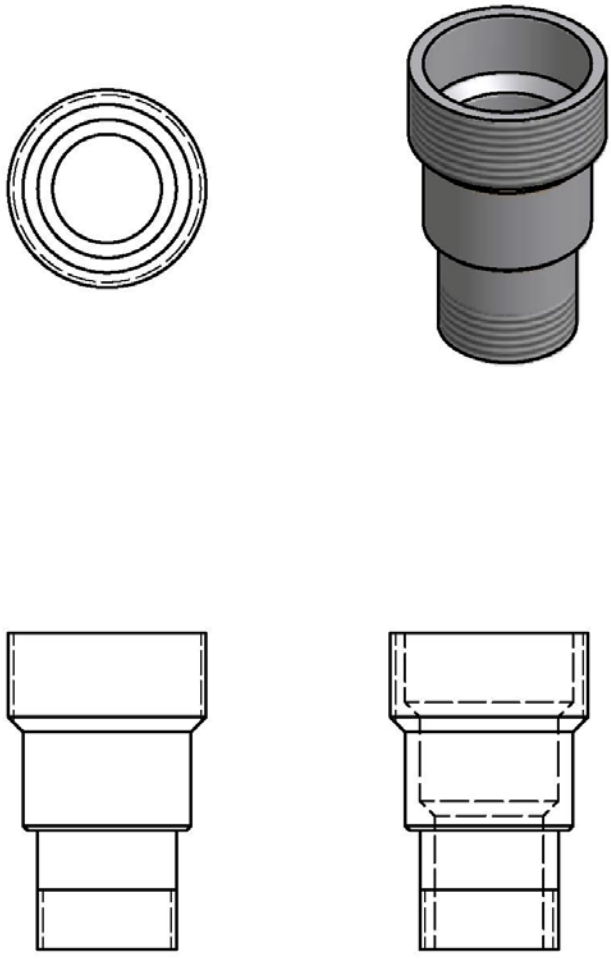
There are two types of wellhead adaptors:

1. Swedge (see Figure 8)

The swedge wellhead adapter includes the following features:

- solid steel construction with Bowen thread,
- line pipe, EUE or 8 round threads,
- varies from 1" – 5 ½" (The most common sizes are 2", 2 3/8", 2 7/8", 3"),
- threaded onto the existing wellhead as a male connection, and
- should be tightened to the wellhead with a properly sized pipe wrench.

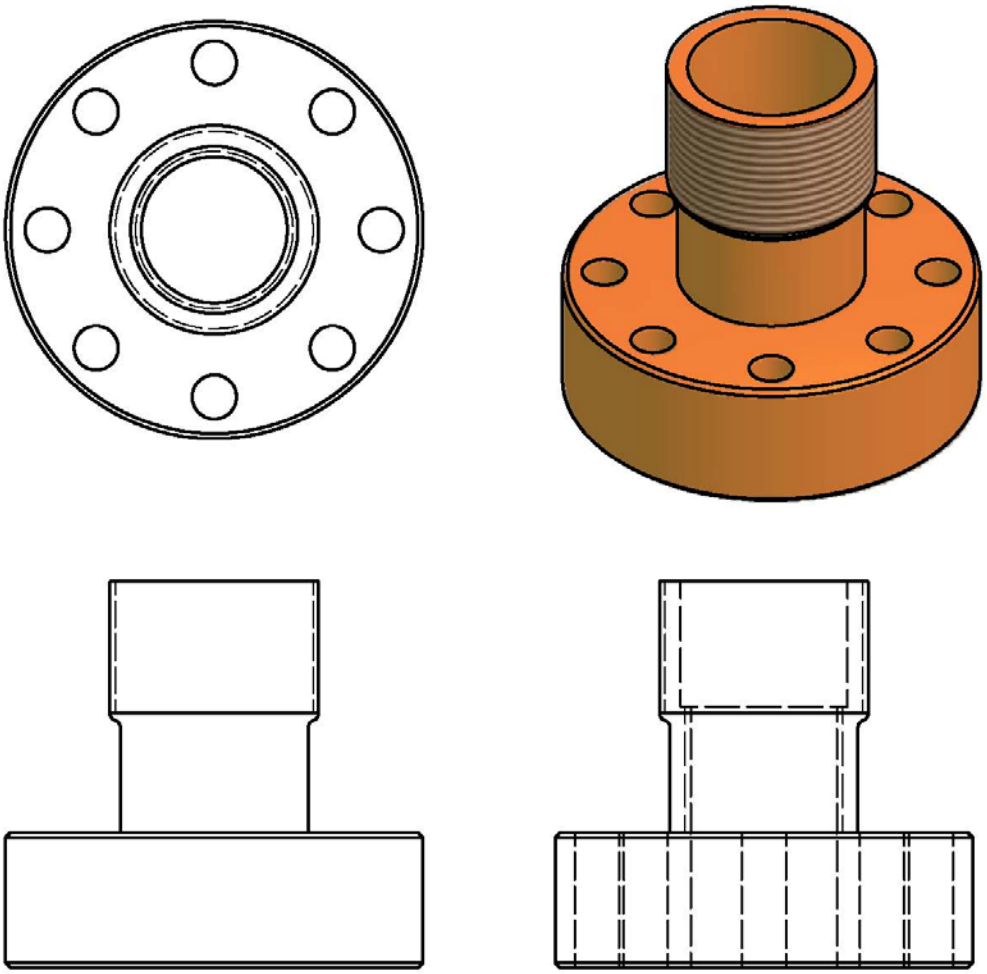
Figure 8. Swedge Wellhead Adapter



2. Adaptor flange

Adaptor flanges (see Figure 9) are used in sour critical applications (refer to IRP 2:Completing and Servicing Critical Sour Wells), higher pressure and larger diameter applications in the absence of a threaded wellhead. They can also be attached to the rig BOP connection, secured to the flange base using bolts and sealed with a metal gasket. Adaptor flanges are heavy and should be moved with mechanical assistance. These are recommended for Well Class 3A and mandatory on 3B wells.

Figure 9. Adaptor Flange



13.4.6.2 Pump-in Sub

A pump-in sub is also commonly known as a flow-tee or kill-sub. Pump-in subs usually include a 2” ball valve attached at 90° angle . The ball valve should match the working pressure of the pump-in sub. The pump-in sub uses hand unions to connect to the rest of the assembly.

The pump-in sub is normally positioned below the wireline valve and above the wellhead. It allows well control by pumping fluid below a closed wireline valve.

13.4.6.3 Wireline Valve

A wireline valve, also know as a slickline BOP, is a manual or hydraulic device containing a valve that closes around the wireline to shut in the well if pressure threatens a blowout. A wireline valve must be used in all slickline operations. Manual rams are most common.

Prior to use, wireline valves should be cycled (opened and closed) to ensure all parts are functioning properly. Each side must be closed or opened with the same number of turns to complete a centered seal. Number of turns should be recorded on the Pressure Control Equipment Inspection. Stump testing, or an onsite leak test, is essential on sour service wells. To stump test …

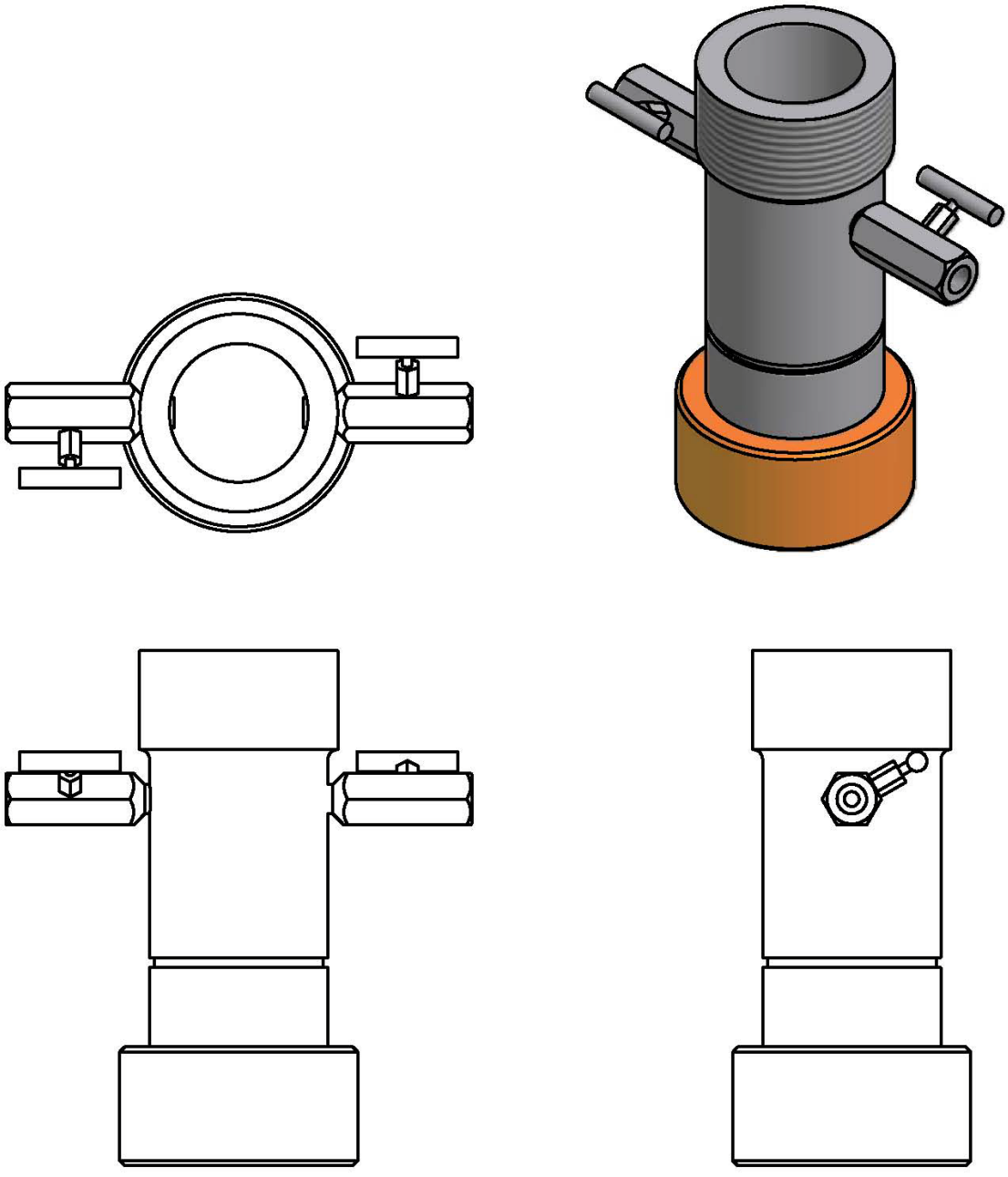
- pressure-up below,
- ensure there is a seal, and
- ensure the equalizing ports are operating properly.

There are several moving and non-metal parts that should be serviced after each use in harsh chemical or sour environments.

13.4.6.4 Bleed Sub

Bleed subs (see Figure 10) can be used for equalizing and flaring gases from the lubricator. A bleed sub is connected to the bottom of the lubricator and typically has two 1/2” NPT (National Pipe Threads) ports for needle valves.

Figure 10. Bleed Sub



13.4.6.5 Lubricator

Lubricators enable the tool string to be introduced or retrieved from a wellbore under pressure. They are normally positioned above the bleed sub. Length, size, and amount of lubricator is all dependent on the servicing to be completed.

There are three common types of lubricators:

Regular Steel Lubricator

- vary from 2" – 4" ID
- vary in length (10' most common)
- connected to assembly with hand unions

Aluminum Lubricator

- vary from 2" – 3" ID,
- vary in length (10' most common)
- connected to assembly with hand unions
- only used as per manufacturers' specifications

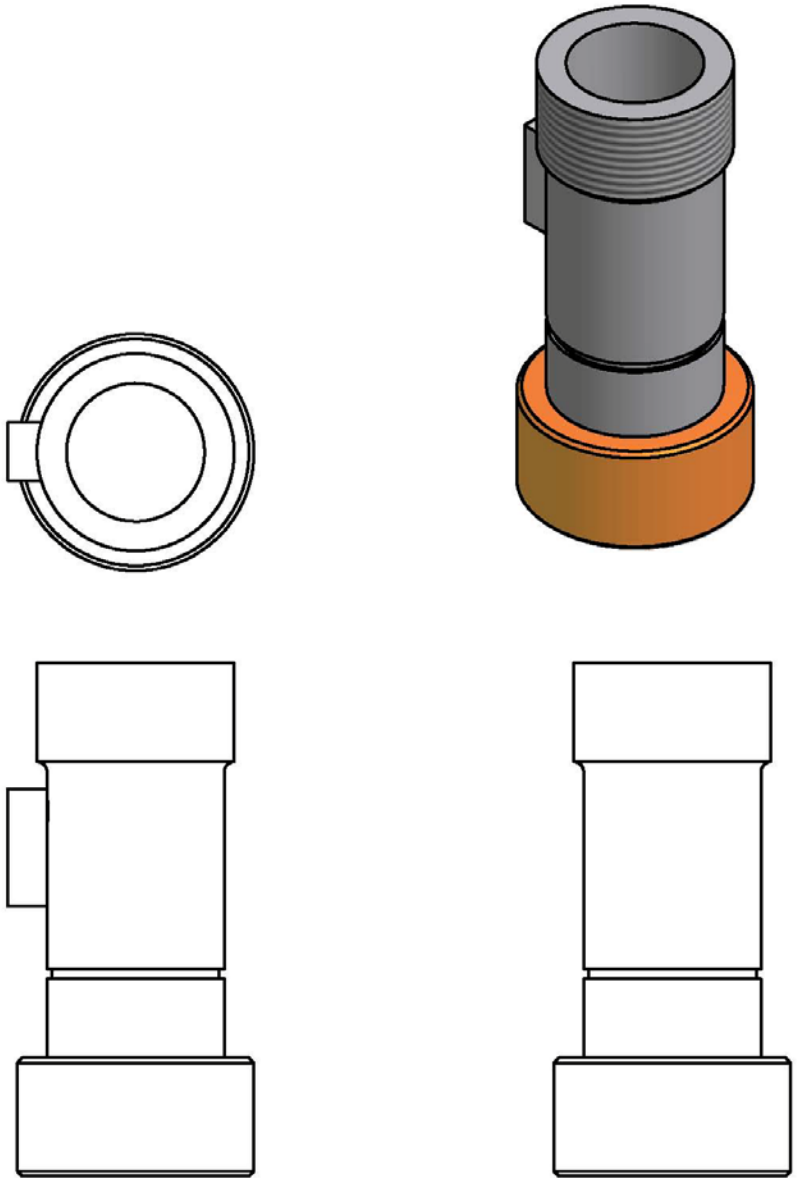
Large Steel Lubricators

- vary from 5" – 9 5/8" ID
- vary in length
- connected to assembly with hand unions
- can be very heavy and should be moved with mechanical assistance

13.4.6.6 Chemical Injection Sub

Chemical injection subs are usually located above the lubricator and are designed to apply a de-icing agent, corrosion inhibitor, or to lubricate larger diameter slickline during well service operations. A check valve on the side of the chemical injection sub has a hose connection. The hose should be connected before lifting the assembly to allow access to the chemical injection sub from the ground. A chemical injection sub can be used to introduce inert gas when purging lubricators under sour conditions.

Figure 11. Chemical Injection Sub



13.4.6.7 Stuffing Box

A stuffing box is used on the top of the wellhead assembly to contain the pressure seal around the slickline as it is run in and out of the hole. An oil injection sub, or grease head, may be used in conjunction with a stuffing box to maintain the seal around the slickline.

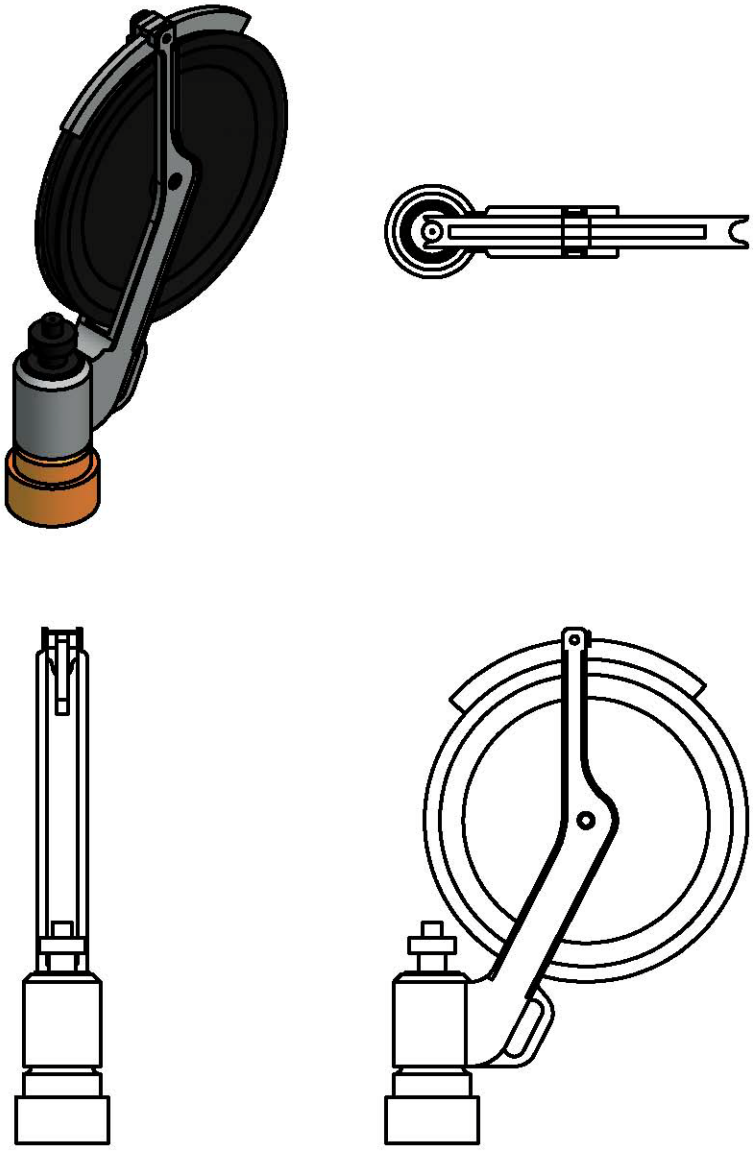
Stuffing boxes should be inspected for packing wear before use. The packing is a series of rubber pieces through which the line runs. To ensure a proper seal, packing should be in good working condition and not too loose on the line.

There are two common types of stuffing boxes:

Stuffing Box with Sheave (see Figure 12)

This stuffing box supports the top sheave which guides the line into the stuffing box. The sheave should be inspected for wear in the wire guide groove and the bearings should be in good working condition.

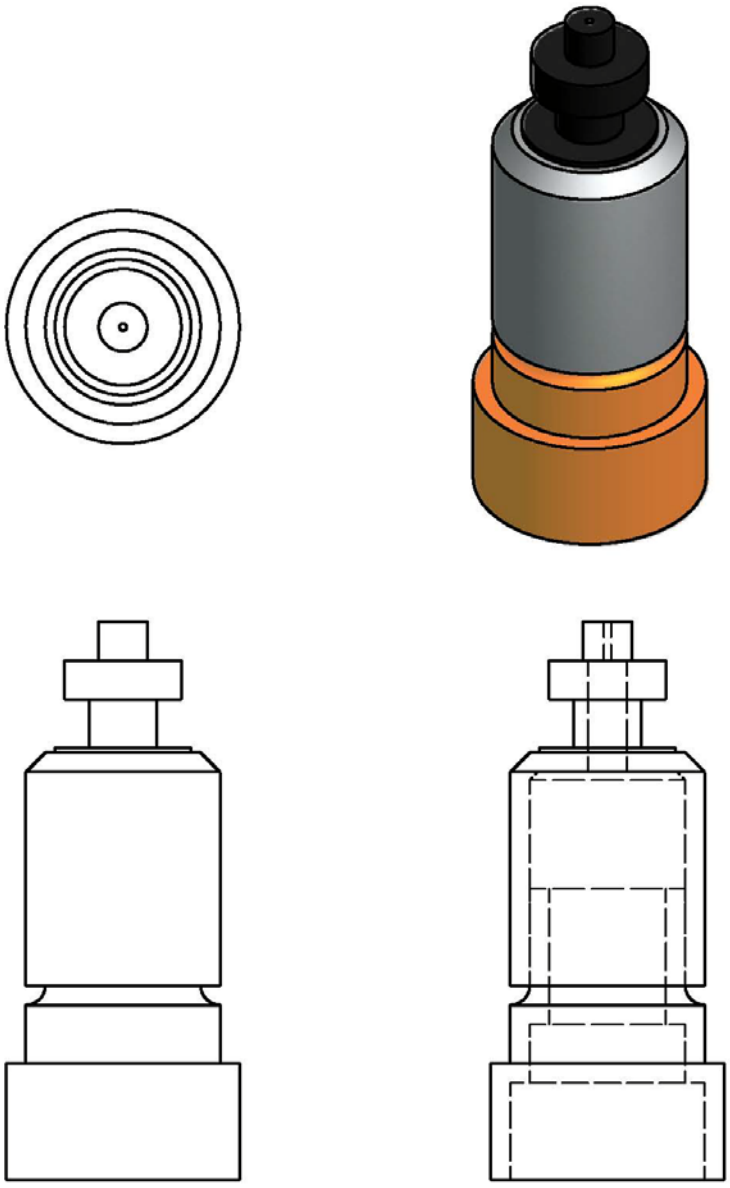
Figure 12. Stuffing Box with Sheave



Stuffing Box without Sheave (see Figure 13)

A stuffing box without a sheave is commonly used for larger gauge slickline. The sheave that guides the slickline into the stuffing box is suspended by a boom, derrick staff, or rig blocks.

Figure 13. Stuffing Box without Sheave

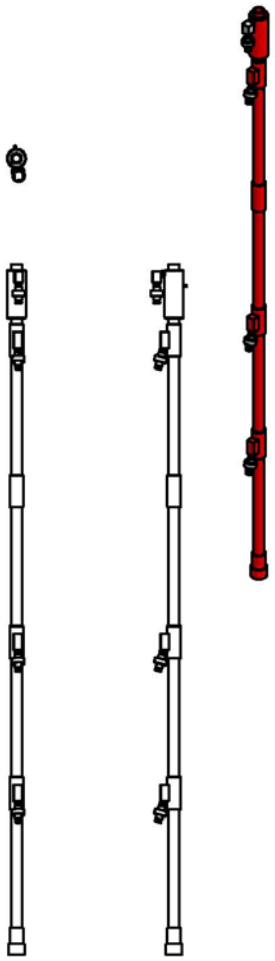


13.4.6.8 Grease Injection System

A grease injection system consists of a grease injection head and a grease pounder. The grease injection head has a fitting at the bottom into which grease (summer, mid-season or winter) is injected from a grease pounder through high pressure lines. The grease pounder injects grease at a slightly higher pressure than the pressure on the well. Grease is forced up through the tubes, filling any open spaces around and in the slickline, thus creating a seal.

A return hose, with a needle valve on the end, is at the top of the grease injection head. The return hose runs back into a bucket to be monitored for gas. The slickline takes down the hole as it descends. When the area between the injection port and return line are full of grease, a seal is created allowing the slickline to run in and out of the hole while maintaining a seal. It is important to slow running speeds to allow for the grease head to remain full of grease and maintain the seal.

Figure 14. Grease Injection System



13.4.6.9 Sheaves (Top and Bottom)

A sheave guides and assists the slickline from the unit to the wellbore to keep the slickline off the ground and away from workers. Sheaves vary in size, type, and make. All slickline jobs require a top and bottom sheave. A bottom sheave is usually connected to the wellhead, or stump, and must be supported to keep it from falling over. A top sheave can be suspended by a boom, derrick staff, rig blocks, or stuffing box. It guides the line into the surface pressure control equipment.

All rigging used to secure top and bottom sheaves must be visually inspected prior to each use and recorded.

13.4.7 MITIGATING SURFACE FIRE AND EXPLOSION HAZARDS

Surface fire and explosion hazard mitigation should be in accordance with the Owner's IRP 18: Fire and Hazard Explosion Hazard Management compliant Fire and Explosion Prevention plan (FEPP). The FEPP should direct the removal of one leg of the fire triangle and should identify one of the following methods:

- Equalize above the master valve.
- Raising Upper Explosive Limit (UEL) / lowering Lower Explosive Limit (LEL) inside pressure control equipment.
- Purging the lubricator assembly.
- Agreed alternative methods

In all cases valves must be opened slowly to prevent an unexpected pressure release.

IRP 15: Snubbing Operations **provides guidance on mitigating surface fire and explosion hazards when conducting snubbing operations.**

13.4.7.1 Equalize Above the Master Valve

To equalize above the master valve introduce compatible hydrocarbons, fluid or nitrogen into the lubricator assembly through the needle valve, pump-in sub or flow lines. Use piping, equalizing hoses, kelly hoses or pressure hoses to equalize.

This method equalizes the gas pressure so that when the master valve is opened it does not allow a rush of high pressure gas to travel at high velocity over the valve's sealing surface. This prevents wash-out and static charge build up over the valve and sealing surface.

13.4.7.2 Raising UEL/LEL Limits

UEL/LEL limits are the upper and lower limits of the explosive ranges of specific gases. The procedure to raise gas concentration, or lower the oxygen content, is similar:

- To raise gas content above the UEL, an equalizing hose must be attached above and below the master valve. Either tubing gas, casing gas, or a fuel gas must be introduced to displace the oxygen.
- To lower oxygen content, displacement gas (e.g. N_2, propane, etc.) or fluid (e.g. water, degasified kill fluid, etc.) may be introduced above the master valve and used to displace oxygen by volume inside the surface assemblies.

13.4.7.3 Purging the Lubricator Assembly

To purge the lubricator assembly a purge substance is introduced at the top of the lubricator through a check valve to exhaust the oxygen through the valve at the lowest point of the assembly.

> Caution: Care must be taken to ensure that workers are not exposed to dangerous / hazardous purge substances at the bottom of the lubricator assembly.

13.4.7.4 Agree Alternative Method

The three methods described above may not apply in all applications. In the case where the three recommended methods do not work, the Owner should complete a hazard assessment for the chosen alternative method. The Owner must discuss the alternative method with the Slickline Service Company and ensure it is thoroughly detailed in the pre-job meeting.

13.4.8 DOWNHOLE PRESSURE CONTROL SELECTION

Select downhole pressure control devices (e.g., tubing plugs) according to the minimum recommended applications noted in the Table 2 below. A checkmark indicates a recommended application.

> Note: When snubbing operations are underway, please refer to the guidelines outlined in IRP 15: Snubbing Operations for downhole pressure control selection.

Table 2. Downhole Pressure Control Selection

	Holds pressure from above	Holds pressure from below	Holds pressure from both directions
Repair surface equipment		✓	✓
Test tubing by bleeding down		✓	✓
Test tubing by pressuring up	✓		
Snubbing tubing in or out of well		✓	✓
Set hydraulic packer	✓		
Circulate above with fluids	✓		✓
Zone separation in selective completions			✓
Fracturing selective completions	✓		✓
Kill well		✓	
Move rig on or off location		✓	✓
Use as standing valve	✓		
Packer test			✓
Acidizing on selective completions	✓		✓
Wellhead plugging on completions		✓	✓
Wellhead plugging on remedial work		✓	✓

Adapted from: Wireline Operations and Procedures. (June, 2000). Third Edition. American Petroleum Institute Exploration & Production Department. Washington, DC.

The American Petroleum Institute Wireline Operations and Procedures (Third Edition) defines three types of tubing plugs which are set in landing nipples. It describes tubing strings to plug the tubing pressure from above, below or both directions.

From above:

> "The circulating plug holds pressure only from above and may be flowed through. Its construction has several variations, such as a ball and seat, valve and seal, or rubber type check valve…

From below:

> …The tool that plugs from below is attached directly to an equalizing sub which is attached to a locking device. This plugging device is designed so it can be pumped through from above …

From both directions:

> …seals in both directions and is used mostly for separating zones in selective type completions. It is provided with a fluid bypass for running and utilizes a retrievable prong-type equalizing feature…"[2]

Beyond simply selecting appropriate tubing plugs, slickline service companies should consider the following:

Seal Integrity

To prevent plug leaking use a gauge ring to ensure nipple depth and tubing is clear of obstruction. When tubing is suspected of containing debris, a nipple brush may need to be run through profiles.

Observation of Seal Integrity

After isolation plug(s) are in place, it is recommended to bleed pressure off and observe the well to ensure downhole seal integrity. Observe the tubing pressure for a minimum of 15 minutes. If there is a leak in the seal, repair appropriately.

Dual Barriers

Downhole well conditions may determine the need for dual barriers as identified in the Owner's hazard assessment. There are risks associated with using dual barriers. In the situation where the dual barrier consists of two plugs, and the tubing containing the plugs has been brought to surface, pressure may be trapped within the tubing. This pressure must be released prior to handling the tubing on surface (e.g. hot tapping) as this trapped pressure creates a potentially fatal hazard.

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2 Wireline Operations and Procedures. Third Edition. American Petroleum Institute Exploration and Production Department, June 2000.

Slip Stops and Bridge Plugs

A slip stop may be used on top of a profile plug as a backup safety measure to prevent the profile plug from moving up the tubing. The slip stop does not provide an additional barrier to trapped pressure but simply prevents the profile plug from being ejected from the wellbore. It is not recommended to use a slip stop on top of a bridge plug as jarring down to set a slip stop may cause the bridge plug to dislodge and, if under enough pressure, come to surface. When setting the bridge plug, it is suggested to follow manufacturer's specifications for backup safety measures.

13.5. OPERATIONAL PROCEDURES

13.5.1 INTRODUCTION

Efficient and safe slickline operations are highly dependent on information provided by the Owner at job request and onsite observation of wellsite surface conditions. Material and tool selection is determined by pre-job information. Hazard assessment and a review of job procedures ensure worker safety during the job. Rigging up and downhole procedures may vary.

13.5.2 PRE-JOB PREPARATIONS

Slickline operators need accurate and complete information prior to the start of the job to perform their jobs safely and efficiently. Slickline dispatchers need to collect specific data from customers at the time of the job request to make appropriate equipment selections and provide operators information pertinent to a safe work environment.

It is recommended, at a minimum the following data be collected: (refer to Appendix A: Job Order Request Form or Sample Job Dispatch Sheet in Wireline Operations and Procedures for a more extensive sample)

- job task request,
- customer contact information,
- well location (L.S.D. well legal name),
- directions to the jobsite,
- well type (sweet or sour),
- well head connection,
- potential pressure,
- downhole schematics,
- downhole conditions,
- billing information,
- type of slickline unit(s) needed, and
- BHA profiles.

13.5.3 SLICKLINE UNIT SELECTION

There are a variety of slickline units available that are uniquely selected by each Slickline Service Company. Some of the units available include:

- tandem/tri-axle trucks = heavy
- single axle trucks = heavy / medium
- pick-up = medium / light
- all-terrain = transported by trailer
- portable = transported by trailer / plane / helicopter

The units described above may be equipped with the following common slickline sizes listed in the table below:

Table 3. Common Slickline Sizes

inches	millimeters
.066	1.676
.072	1.829
.092	2.336
.108	2.743
.125	3.175
.140	3.556
.150	3.810
.160	4.064
.188	4.775

The slickline dispatcher selects an appropriate unit after gathering and documenting information from the job request. When selecting slickline units, it is recommended to consider the following:

- weather conditions;
- road access conditions;
- lease conditions;
- travel distance;
- type of work (i.e. light slickline duties, heavy pulling with slickline, fishing); and
- whether a picker is required.

A support vehicle must be present during remote work to provide emergency response. This vehicle can be part of the slickline equipment as long as it is not tied into the wellhead via slickline, crane, or piping.

If a helicopter is required to complete a job, the helicopter must be available as described in a pre-job safety meeting and ERP. It is recommended the helicopter pilot check-in at regular intervals as documented in the pre-job safety meeting.

13.5.4 EQUIPMENT SELECTION

Appropriate equipment, or tools, are needed to work safely and efficiently. Equipment selection varies depending on the job request and is highly dependent on information gathered from the customer.

Equipment may include:

- pressure control equipment,
- downhole tools, or
- specialized PPE.

To select equipment, consider:

- wellhead height;
- well accessibility;
- wellhead adaptor sizes;
- tubing/casing sizes;
- downhole conditions; (Note: Downhole conditions may include temperature, fluid, chemicals, sweet or sour, number, and type of task to be performed, etc.);
- downhole tool size.

All equipment must be in good working condition, and must be inspected before use. Damaged equipment must be repaired before use.

It is highly recommended to maintain both electronic and hard copies of equipment certification documents. Proof of equipment certification must accompany the equipment. Exceptions may be made under certain circumstances (e.g., remote locations, etc.) and certifications shall be provided in a timely manner. For details on required equipment certification refer to 13.6: Equipment Maintenance.

13.5.5 ONSITE COMMUNICATIONS

Before pre-job meeting work commences, the Slickline Service Company should complete the following onsite communications with the Wellsite Supervisor:

- The slickline supervisor must contact the Wellsite Supervisor.
- Slickline personnel shall review well conditions and tasks and discuss any changes to the job request.
- The Owner must provide MSDS documentation for review.

Pre-Job Meeting

A pre-job meeting is required onsite prior to any work commencing. Pre-job meetings should:

- perform a hazard assessment and
- review job task(s).

The following personnel are required to attend the pre-job meeting:

- slickline personnel,
- alternative third-party services,
- Owner or Wellsite Supervisor,
- other personnel working near the slickline operation, and
- any additional services that arrive during slickline operations.

When a slickline unit arrives at an operation in progress, the Slickline Service Company Supervisor/operator must conduct a pre-job meeting and hazard assessment with all personnel that will work with, or near, the slickline operation. The Wellsite Supervisor must ensure that operations are halted and that there is participation from all other services during the slickline pre-job meeting.

When a third-party service arrives while slickline operations are in progress, it is the responsibility of the Wellsite Supervisor to ensure that the third-party service personnel are oriented with the existing pre-job safety meeting hazard assessment and job task(s).

13.5.6 JOB PROCEDURE OR JOB SAFETY ANALYSIS

Job procedures or Job Safety Analysis (JSA) are unique to each Slickline Company and typically developed to identify known hazards specific to the tasks. All identified hazards and control measures noted must be reviewed with all personnel onsite. The Slickline Service Company Supervisor should explain the roles, tasks, associated hazards and expectations to all personnel who will be directly involved with slickline operations.

If customers provide job procedures, the Slickline Service Company Supervisor must review and discuss them at the pre-job meeting.

13.5.7 SITE SPECIFIC HAZARD ASSESSMENT

Slickline Service Company Supervisors must conduct a hazard assessment before starting work. The assessment should consider (For a sample Hazard Assessment refer to IRP 9: Health and Safety Management System):

- wellsite conditions,
- wellhead conditions,
- equipment,
- job tasks, and
- concerns described by regulatory agencies.

Slickline personnel shall assign control measures to identified hazards (engineering, administrative or PPE), and notify the Wellsite Supervisor if engineering controls are required for the Owner equipment or lease.

Slickline personnel should review all third-party pre-job meeting agendas. Slickline operators should conduct a new hazard assessment after:

- a crew change (slickline or service/drilling rig),
- a job request change,
- an incident on site, or
- returning to the site for a new work day.

13.5.8 WELLHEAD SURFACE CONDITIONS

Before rigging up, slickline personnel must visually inspect wellhead surface conditions for potential hazards including:

- wellhead height;
- corrosion;
- leaking valves or connections;
- leaking dog nut or tubing hanger;
- ice and snow;
- slippery conditions created by oil;
- piping and insulation;
- recent spills;
- rat holes;

- sump holes;
- planking for footing;
- trees and grass growth.

Following the inspection, slickline personnel must record any potential hazards in the hazard assessment report.

13.5.9 RIGGING UP SLICKLINE EQUIPMENT

Only slickline personnel must rig up slickline equipment unless other services assisting in rig up are informed of potential equipment and procedural hazards.

The wellbore may be accessed through the internal threads of the wellhead (in either a snubbing basket with TI valve or on a stinger tool), drill pipe on the drilling rig, adaptor flange, or rig BOPs.

Rig up procedures are company-specific, but should include the following activities:

- spot the slickline truck and picker;
- lay out surface pressure equipment;
- inspect equipment for damage;
- prepare slickline;
- prepare downhole tools;
- take surface pressure readings from the wellhead (casing and tubing);
- assemble slickline downhole tools and surface pressure equipment;
- disassemble the wellhead;
- assemble the slickline wellhead adaptor;
- use mechanical equipment to raise surface pressure equipment over the wellhead adaptor;
- calculate elevations and zero the counter and tool string before entering the wellbore (see *Appendix E: Zeroing and Adjustment Calculations*).

Pressure control equipment may be lifted with the aid of a picker, mechanical winch or drilling/service rig lifting devices. It is not uncommon for slickline service personnel to climb up on lifting devices, but where it is necessary personnel should wear appropriate fall protection when climbing on lifting devices in use (e.g., Ginpoles).

13.5.10 DOWNHOLE PROCEDURES

Downhole procedures depend on company protocol and downhole conditions such as sand, fluid, hydrates, oil, ashpaltines, pressure, and temperature.

Ensure the wellhead and pressure control equipment is secure, equalizing completed, and the master valve is open before downhole work begins.

The Slickline Service Company Supervisor must contact the Wellsite Supervisor and inform the slickline services area manager in the event any problems occur during downhole operations as operational changes may be required.

13.5.11 RIG OUT

To complete a job request:

- put slickline equipment back on the slickline unit;
- reassemble the wellhead;
- clean up and remove spray/spills;
- remove garbage;
- clean off wellheads;
- secure the area (gates, locks, doors);
- inform dispatch the job is complete;
- inform the customer about any site or equipment damage found, or occurred, during operations.

13.5.12 SNUBBING OPERATIONS

When snubbing operations are being conducted, the operational procedures outlined in IRP 15: Snubbing Operations must be followed.

13.6. EQUIPMENT MAINTENANCE

13.6.1 SCOPE

Equipment must be maintained according to OEM specifications and this IRP. This IRP is intended to provide recommendations for slickline service equipment in accordance with OHS. In the absence of OEM specifications, this IRP must be followed.

13.6.2 CERTIFICATION TABLE

The table below describes how often equipment certification renewals are required. Reference *IRP 2: Completing and Servicing Critical Sour Wells: 2.7: Slickline Operations* for critical sour maintenance procedures.

Table 4. Slickline Certification Table

	Level I Visual Inspection	**Level II Servicing Inspection**	**Level III Shop Inspection and Pressure Test**	**Level IV and Certified Pressure Test**
BOPs	Daily	3 months	Annually	3 years
Lubricator	Daily	3 months	Annually	3 years
Stuffing box	Daily	3 months	Annually	3 years
Flow tees	Daily	3 months	Annually	3 years
Wellhead adaptors	Daily	3 months	Annually	3 years
Night caps	Daily	3 months	Annually	3 years
Flow subs / Purge subs	Daily	3 months	Annually	3 years
Sheaves	Daily		Annually (as per OEM)	3 years (includes complete tear-down, rebuild and inspection)
Grease injection heads	Daily	3 months	Annually	3 years

Equipment that may retain pressure (e.g. accumulator bottles) or is used for rigging (e.g., shackles, straps, line clamps), and not mentioned in this document, must be visually inspected prior to use following appropriate OEM specifications.

13.6.3 INSPECTIONS

The first step in equipment maintenance is regular inspection. Visually inspect each instrument as follows:

- Look closely at the instrument from all angles.
- Use a magnifying device to look for potential signs of damage; consult a supervisor for a second opinion.
- Use your hands to feel instruments for unusual changes, such as corrosion, cracking and gouges.
- Any slickline pressure control equipment involved in misuse, abuse, or subjected to pressure beyond its rating must undergo a Level IV Inspection and Pressure Test (see below).

The four levels of equipment inspection described in the certification table above apply as follows:

Level I: Visual Inspection

Qualified personnel visually inspect all slickline equipment before operations or on a daily basis. Inspect for the following:

- condition of o-rings,
- cracks in hand unions,
- condition of rigging, and
- perform a function test at atmospheric pressure.

Level II: Servicing Inspection

Qualified personnel thoroughly inspect all slickline equipment during operations and maintenance, and assess for damage to:

- sheaves;
- pressure control equipment, if damage is found the qualified person must;
    1. change out all seals exposed directly to well fluid/pressure,
    2. pressure test to working pressure,
    3. function test at working pressure,
    4. coat all internal surfaces with anti-corrosion products for equipment not expected to be in immediate service,
- hoses;
- areas under stress while in use;
- all pressure bearing areas;
- welds;
- pickup points;

- seals; and
- hoses.

The inspection must be documented and any completed repairs noted in the unit logbook.

Level III: Shop Pressure Test and Inspection

A shop pressure test and shop inspection must be performed by qualified personnel annually unless required more frequently by OEM specifications.

Pressure testing must include:

- equipment disassembly;
- visual inspection of the threads and sealing areas;
- permanent equipment records including:
    - serial number,
    - accurate description of the item,
    - Maximum Allowable Working Pressure Rating (MAWP), and
    - manufacturer;
- pressure testing to 1400 kPa (200 PSI), held for 10 minutes and recorded in the permanent records using a printed chart or electronic recorder;
- pressure testing up to the MAWP, held for 10 minutes and recorded in the permanent records using either a printed chart or electronic recorder;
- elastomer, seal, and o-ring replacement;
- repair records, as required for the equipment to maintain its MAWP.

To conclude the pressure test complete the following steps:

1. Stamp equipment with working pressure and test date (use low stress stamps or stamp on a separate steel band),
2. Update the pressure control logbook and retain with the tested pressure control equipment,
3. Ensure asset ID number is legible on the tested pressure control equipment, or re-stamp with low stress stamps (see API 6A for allowed stamping methods), and
4. Coat all internal surfaces with anti-corrosion products for equipment not expected to be in immediate service.

Note: Pressure-rated equipment repairs that involve machining or welding must be completed by an OEM, or equivalent facility, and must have a Certification Pressure Test performed.

Level III Shop Inspection of sheaves must include:

- equipment disassembly;
- visual inspection of the load bearing areas;
- permanent equipment records must include:
    - serial number,
    - accurate description of the item,
    - description of any repairs performed, and
    - manufacturer.

Level IV: Certified Pressure Test and Inspection

An OEM, or equivalent, certified facility must perform a Level IV: Certified Pressure Test on slickline service equipment and provide necessary repairs. The inspection should include both non-destructive testing and pressure tests (including API test pressures). Repairs and the accompanying paperwork must meet the guidelines described in 13.6.5: Required Documents.

Pressure control equipment must be inspected three years after it is certified and/or placed in service, or immediately after one of the following:

- an uncontrolled flow;
- pressure in excess of the manufacturer's rating;
- a sour fluid exposure (where the equipment is not NACE certified).

Certification Pressure Tests must include:

- disassembly and cleaning of mechanical and hydraulic components should include:
    - remove paint, preferably by water blast, or bead blast (do not use shot blast);
    - inspect all items for corrosion both internally and externally;
    - check all union threads with go/no go profile gauge;
    - inspect all sealing surfaces - discard any part with pits larger than 1/16";
- required records must include:
    - the condition of the received parts (identify all parts);
    - required repairs (identify all parts);
    - the specifications for "acceptable condition" as described by the OEM;
    - measurements of wearing components with calibrated and traceable instruments;

  - non-destructive testing at a minimum Level II CGSB Non-Destructive Testing Certification;
  - completed repairs (include inspection criteria, sizes, tolerance and part numbers);
  - repair methods including welding procedures, heat treatment and parts standards approved by an OEM, OEM equivalent, or Professional Engineer, along with appropriate API, ASME and AWS standards;
- repairs with traceable parts that are designed for equivalent or superior performance and approved by an OEM, OEM equivalent, or Professional Engineer (Note: The replacement of elastomers is at the discretion of qualified repair personnel.);
- repairs performed, or supervised, by qualified repair personnel, as defined in 13.6.6: Personnel Qualification and Documentation; and
- assembly, function testing and pressure testing of pressure rated equipment before shipment.

Pressure tests must be held for 15 minutes and recorded in the permanent records using a printed chart or electronic recorder and include the following:

- low pressure test at 1,400 kPa (200 PSI),
- high pressure test at 1.5 x equipment rating,
- wireline valve body test and rams function test at MAWP,
- close function hydraulic pressure test to manufacturer's rating,
- open function hydraulic pressure test to manufacturer's rating, and
- any additional testing as required by the OEM.

Pressure Test Documentation must include:

- Certified Pressure Test document noting the full working pressure test results;
- an inspection report, repair report and testing documentation reviewed and signed by the certifying party;
- certification documents must include:
  - name of the certifying facility;
  - facility certification job number;
  - certification date;
  - manufacturer;
  - model;
  - pressure rating and bore size;
  - serial number;

  - date the certified equipment was placed in service;
  - signature of certifying party.

- a copy of the certification document only, not the Pressure Test Charts, should be available on the slickline unit, or upon request in a timely manner, from the slickline service company;
- certification documents with unique identifying numbers as well as pressure test charts must be maintained on file at the OEM and slickline service company for a minimum of 4 years;
- storage of pressure rated equipment according to the OEM or professional engineering standards will grant the slickline service company the ability to place an in-service date on the Certification Pressure Test (Note: in-service date cannot exceed **one** year from certification date).

For a sample document, see Appendix C: Pressure Control Equipment Inspection.

Level IV Inspection of Sheaves must include:

- equipment disassembly;
- visual inspection of the load bearing areas
- record of the results of the test or inspection including:
  - serial number;
  - accurate description of item tested or inspected;
  - manufacturer;
  - non-destructive testing inspection report;
  - illustration of the item, show areas inspected and any damaged areas;
  - repair report.

For a sample overhead equipment service document, see Appendix D: Overhead Equipment Service Certification.

NOTE: In accordance with the National Association of Corrosion Engineers (NACE), nickel hardness and content tests must be performed on unknown materials. Records of the test results must be kept to prove NACE compliance.

13.6.4 REQUIRED DOCUMENTS

For all required documents noted in the inspections above, remember …

- sign-off by a Professional Engineer is required to change inspection criteria and frequency;
- altered documents must be kept in field offices and made available to legislative authorities;
- sign-off by a Professional Engineer is required on certifications that involve welding;
- sign-off by a Professional Engineer is required on certifications that involve machining on pressure containing surfaces (bodies, rams, connections, threads, etc.);
- all documents for pressure rated equipment and overhead equipment must be located in a central filing system.

For a sample pressure control equipment inspection document, see Appendix C: Pressure Control Equipment Inspection.

For a sample overhead equipment service document, see Appendix D: Overhead Equipment Service Certification.

13.6.5 JOB AND EQUIPMENT COMPATIBILITY (ELASTOMERS)

NACE material guidelines apply to equipment and elastomer products in H_2S or CO_2 environments. All materials must be chemical resistant and suitable for their environment.

Elastomers must be compatible to the well bore fluids given by the oil companies. Standard o-rings should be used in all repaired equipment, but specific elastomers may be needed if the Owner (oil company) requirements specify fluids or environments that deteriorate standard elastomers at an accelerated rate.

13.6.6 PERSONNEL QUALIFICATION AND DOCUMENTATION

Certifying Party

A certifying party must be an OEM designated representative, a Professional Engineer, or a designated person with industry experience approved by an OEM or Professional Engineer in writing in the form of a letter or placard stating specific qualifications.

Professional Engineers

Professional Engineers qualified to test pressure control equipment must be able to produce evidence of:

- previous experience or training related to repairing pressure vessel and pressure control equipment;
- practical working knowledge of blowout prevention equipment;
- experience with general quality control standards;
- professional status in Canada.

The Professional Engineer supervises, completes inspections and repairs, and initiates quality control methods as required by API, ASME and AWS Standards. Professional Engineers may require assistance of pressure control equipment mechanics, welders and or non-destructive testing (NDT) personnel. It is recommended these supporting personnel carry the qualifications described below.

Pressure Control Equipment Mechanics

A qualified pressure control equipment mechanic must be able to produce evidence of:

- training from a Pressure Control Equipment OEM or certification as a mechanical tradesperson;
- knowledge of equipment type and model;
- the ability to disassemble, repair and re-assemble equipment;
- ongoing learning and development in certified environments.

Welders

A qualified welder must be able to produce evidence of:

- a valid Journeyman Welding Ticket with a B pressure endorsement, and
- experience in pressure rated equipment repair or sign-off by certifying party.

Non-Destructive Testing Personnel

Qualified non-destructive testing personnel must be able to produce evidence of:

- CSGB Level II, and
- prior experience in the inspection of BOPs.

13.7. TRAINING

13.7.1 INTRODUCTION

Slickline service personnel must be provided training by the employer in accordance with federal, provincial, IRP 16: Basic Safety Awareness Training, and Slickline Service Company standards. Training may include, but not be limited to, the following:

- Slickline Service Company safety orientations,
- Slickline Service Company policy and procedures,
- Equipment maintenance procedures,
- Required certifications,
- Emergency Response Plans (ERPs),
- Industry Recommended Practices (IRPs),
- Industry suggested competencies, and
- Owner-specific orientation.

13.7.2 SLICKLINE SERVICE COMPANY ORIENTATION

Slickline Service Company orientation training should be IRP 16 compliant and emphasize, but not limited to, the following slickline specific topics:

- company mission statement / guiding principles,
- company health safety and environment statement,
- employee benefits and compensation,
- company alcohol and drug policy,
- company expectations of slickline service personnel including competency program,
- shop orientation and introduction to slickline equipment in the shop environment,
- Petroleum Safety Training (PST),
- Construction Safety Training System (CSTS),
- Hours of Service,
- defensive driving, and
- hydrate awareness (as per IRP 4: Well Testing and Fluid Handling).

Slickline Service Company policy and procedures must be reviewed with new employees following the company orientation and before on-the-job training.

13.7.3 SLICKLINE SERVICE COMPANY POLICY AND PROCEDURES

Slickline Service Companies should develop and document slickline-specific policy and procedures including, but not limited to, the following applications:

- Bottom Hole Pressure (BHP),
- snubbing,
- bailing,
- swabbing,
- multi services on location,
- remote operations,
- slickline explosive tools,
- plug work, and
- specifications for tubing plugs (e.g. CW hookwalls, pack-offs and DK plugs).

Slickline Service Company policy and procedures must be reviewed with new employees following the company orientation and before on-the-job training. Policy and procedure training should be offered to all employees and documented in the company-specific competency program. Considerations must be made for critical sour well applications as per IRP 2 Completing and Servicing Critical Sour Wells.

13.7.4 SLICKLINE SERVICE PERSONNEL CERTIFICATION

Slickline Service Company personnel are required to maintain certifications. The following certifications are mandatory and a requirement for all Slickline Service Company personnel:

- valid provincial driver's license for those required to operate company vehicles,
- H2S Alive®,
- WHMIS,
- TDG, and
- IRP 16: Basic Safety Awareness Training compliant orientation.

The following certifications may also be required as per company-specific policy:

- First Aid,
- Air Brake Endorsement,
- Wellhead Boom Truck,

- Oilwell Perforator's Safety Training,
- Oilwell Servicing Blasting,
- defensive driving,
- confined spaces, and
- fall protection.

13.7.5 EQUIPMENT MAINTENANCE PROCEDURES

Slickline Service Company personnel are required to maintain equipment according to IRP guidelines and company-specific policy. All slickline field and shop personnel must receive training, but not limited to, the following topics:

Equipment Maintenance and Preparation

- Wireline valve service (BOP),
- Pressure testing as per 13.6: Equipment Maintenance, and
- NACE requirements as per IRP 2 Completing and Servicing Critical Sour Wells.

Lubricator

- pressure rating,
- banding or company-specific colour coding,
- size requirements, and
- o-ring material considerations.

Stuffing Box

- pressure rating,
- remote operation pack-off,
- grease injection,
- elastomer seals, and
- proper sheave size for wire.

It is recommended that equipment maintenance training be part of the company-specific competency program.

13.7.6 EMERGENCY RESPONSE PLANS

Emergency Response Plans (ERPs) are an integral part of any Slickline Service Company's training program. All workers must be oriented to site-specific ERPs. Topics covered should include, but may not be limited to, the following:

- chain of command (Slickline Company and Owner);
- regulators to contact;
- ERCB,
- OHS,
- RCMP, and
- Explosive Regulatory Division (ERD),
- working alone regulations (as per OHS in Western Provinces);
- working remote access area;
- STARS Air Ambulance requirements; and
- driving ERP as legislated by TDG (refer to TDG Regulations: Emergency Response Assistance Plan) For more information visit: www.tc.gc.ca.

13.7.7 SLICKLINE COMPETENCIES

Slickline Service Companies should prescribe a career ladder that appropriately reflects levels of career competence. Until such time that the Petroleum Human Resource Council of Canada (Petroleum HR Council) develops a slickline worker competency profile, career levels are at the discretion of the Slickline Service Company. Further, descriptions of the competency criteria are to be determined by the Slickline Service Company. Competency criteria are written specifications of knowledge and skills required by a worker to be applied over the range of circumstances demanded by a job.

Suggested levels are recommended as minimum guidelines, but are not limited to, the following:

- Short Service Worker
- Assistant Operator 1
- Assistant Operator 2
- Assistant Operator 3
- Slickline Supervisor 1
- Slickline Supervisor 2
- Slickline Supervisor 3

APPENDIX A: JOB ORDER REQUEST FORM

Job Order Request			
Job Type		Request Date	

Slickline Service Company Requirements			
Supervisor		Assistant(s)	
Unit			
Picker			
Supporting Equipment			

Owner Information		**Wellsite Supervisor Information**	
Name		Name	
Address		Address	
Phone Number		Phone Number	
Billing Information		AFE#	

Job Details		
	Yes	**No**
Will the Wellsite Supervisor be on location?		
Has the Wellsite Supervisor completed a hazard assessment?		
Will a safe work permit be required from a well operator or field foreman?		
Have Owner MSDSs been made available?		
If yes, where are they?		
Fire Explosion and Prevention Plan (provide description)		
List any other services that may be present on the job site.		

Jobsite Information	
Well location (L.S.D. well legal name)	
Directions to the jobsite	
Surface conditions	
Access condition (e.g., chain requirements, road conditions)	

Wellsite Information	
Well type (sweet / sour)	
Wellhead connection (type / size)	
Wellhead height (low / medium / height)	
Shut in tubing and casing pressure	
Bottom Hole Pressure	
Bottom Hole Temperature	
Downhole schematics (attached / on location)	
Downhole conditions	
Safety Trailer on Location (yes / no)	

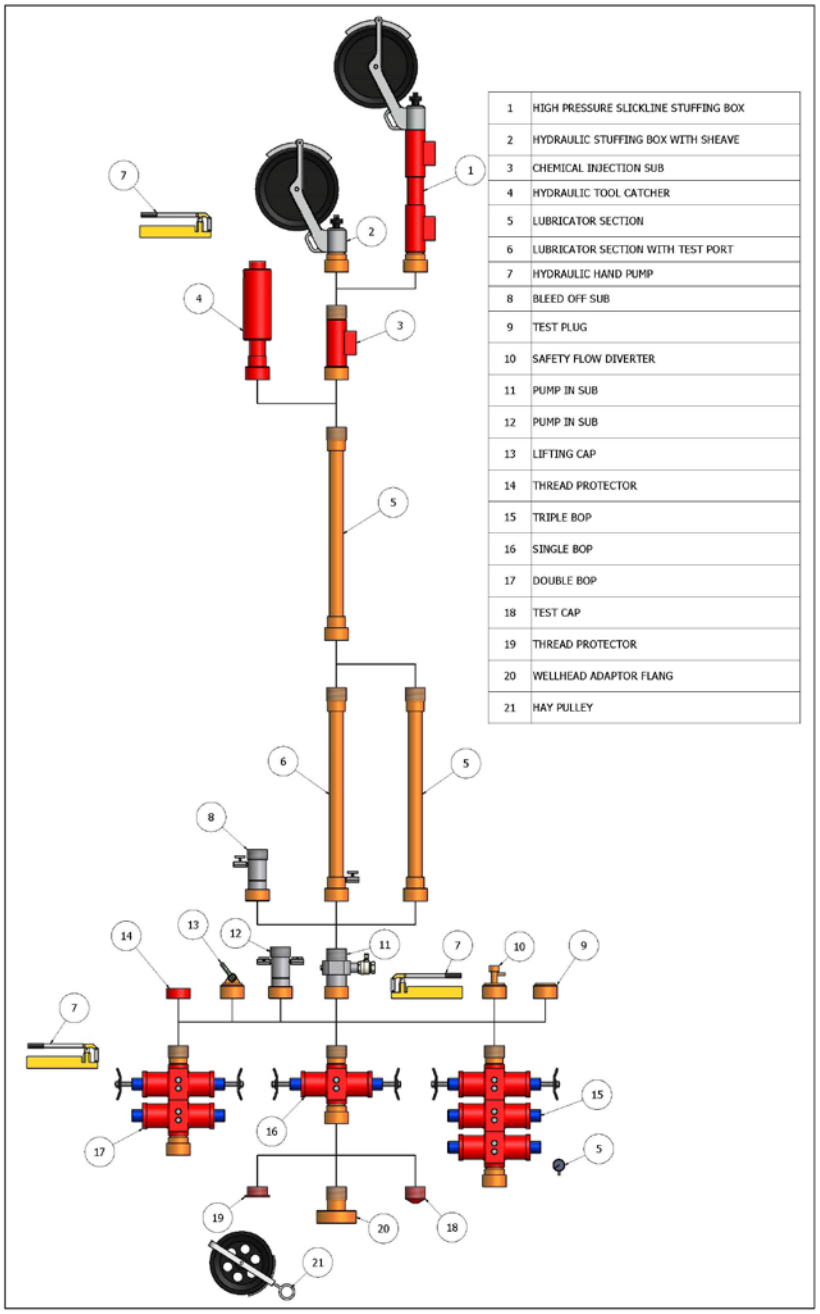
Additional Comments

Job order taken by
(print name) _____

Date _____

APPENDIX B: SLICKLINE CONTROL EQUIPMENT STRING

Figure 15. Slickline Control Equipment String



APPENDIX C: PRESSURE CONTROL EQUIPMENT INSPECTION

Third Party Inspection					
Company Name		Work Order #			
Date					
Internal Inspection					
Inspected by		Location			
Date		Ram Seal Size			
Equipment Information					
Manufacturer		Bore Size			
Description		Pressure Rating			
Serial #		Elastomer Type			
Wireline Valve Ram turn count (Each side must be closed or opened with the same number of turns to complete a centered seal.)		Right Turns		Left Turns	

This is to certify that the above noted equipment meets the requirements of IRP 13 and has been serviced using generally accepted industry practices and engineering judgment. The service is complete and the equipment can be used as specified by the original equipment manufacturer or as noted in the pressure rating on this document. All service repairs and replacement parts exposed to well bore fluids meet the requirements of NACE MR 01-75 latest edition specifications for sour gas service.
This service included a certification pressure test with the following results:

Low at _____ kpa for _____ minutes.
High at _____ kpa for _____ minutes.

Additional Comments

Authorization

Non-Destructive Testing Certificate Number (if applicable)

Non-Destructive Testing Technician Signature (if applicable)

Inspector Signature

Repair Facility Authorized Signature

APPENDIX D: OVERHEAD EQUIPMENT SERVICE CERTIFICATION

Third Party Inspection			
Company Name		Work Order #	
Date			

Internal Inspection			
Inspected by		Location	
Date		Ram Seal Size	

Equipment Information					
Manufacturer		Bore Size			
Description		Pressure Rating			
Serial #		Elastomer Type			
Wireline Valve Ram turn count (Each side must be closed or opened with the same number of turns to complete a centered seal.)		Right Turns		Left Turns	

This is to certify that the above noted equipment meets or exceeds the requirements of IRP 13 Level IV certification and has been serviced using generally accepted industry practices and engineering judgment. The service is complete and the equipment can be used as specified by the original equipment manufacturer or as noted next to Rating in this document.

Certification is valid for three (3) years unless otherwise indicated in OEM or until the unit has been damaged. Note: IRP 13 Level I, II and III inspections must be performed on the equipment according to the criteria in 13.6.2: Certification Table.

This service included the following:

Authorization

Non-Destructive Testing Certificate Number (if applicable)

Non-Destructive Testing Technician Signature (if applicable)

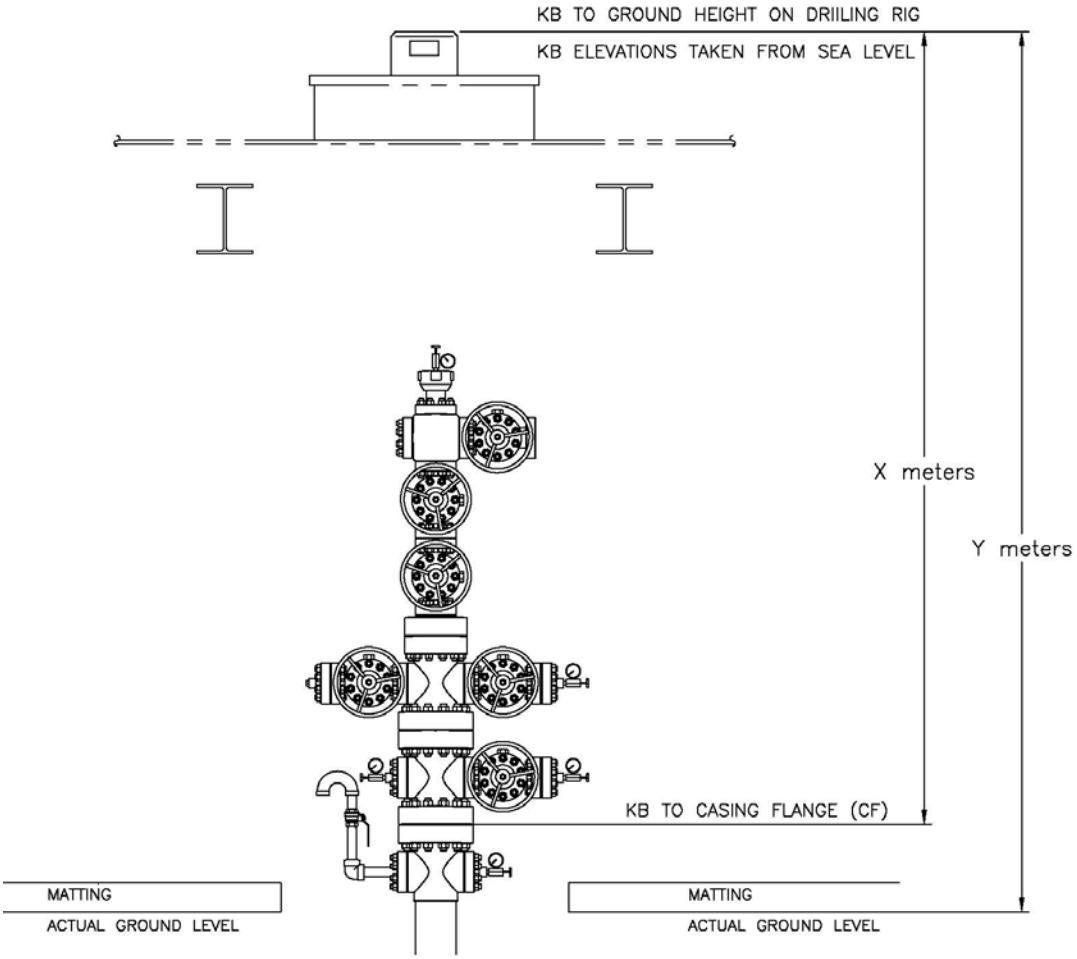
Repair Facility Authorized Signature

APPENDIX E: ZEROING AND ADJUSTMENT CALCULATIONS

Before entering the wellbore, it is important to calculate elevations and zero the counter. Most downhole tubing and equipment elevations are shown on well schematics as metres from Kelly Bushing (mKB) depths as illustrated in the figure below. Slickline measuring system(s) or counter(s) need to be adjusted for accuracy while at surface (commonly referred to as 'zeroed').

To 'zero' the counter, the bottom of the tool string is lowered to the casing flange, or ground, and the measuring device is set to zero metres (m)

Figure 16. Measuring mKB sample diagram



Calculation Examples

The calculations below show two types of calculations: finding the depth given the adjustment at ground level and calculating the adjustment given two elevations. **All final adjustment calculations should be recorded in mGL or mCF for the purpose of slickline service.**

Example 1: Calculation with Ground Level

(Finding depth given the adjustment)

The customer shows an R-nipple at a depth of 512 mKB.

Schematic gives an adjustment of:

KB to GL is 4 m

Once the counter is zeroed at ground level the calculation follows as:

512 mKB - 4 m = 508 mGL

The depth of the R-nipple is tagged as 508 mGL.

Example 2: Calculation with Casing Flange

(Finding the adjustment given two elevations)

Elevation of the end of tubing is supplied by the customer as KB 811 m. Another elevation of the end of tubing is given as CF 807 m. To find the KB to CF adjustment:

KB - CF = adjustment

811 m - 807 m = 4 m (KB to CF)

ACRONYMS AND ABBREVIATIONS

API	American Petroleum Institute
ASME	American Society of Mechanical Engineers
AWS	American Welding Society
BHA	Bottom Hole Assembly
BHP	Bottom Hole Pressure
BHT	Bottom Hole Temperature
BOP	Blowout Preventer
CAPP	Canadian Association of Petroleum Producers
CGSB	Canadian General Standards Board
CO_2	Carbon Dioxide
CSA	Canadian Standards Association
ERD	Explosive Regulatory Division
ERP	Emergency Response Plan
ERCB	Energy Resources Conservation Board (formerly EUB) {Alberta}
EUE	External Upset End
FEPP	Fire and Explosion Prevention Plan
GL	Ground Level
H_2S	Hydrogen sulphide
ID	Inside Diameter
IRP	Industry Recommended Practice
JSA	Job Safety Analysis
KB	Kelly Bushing
LEL	Lower Explosive Limit
LSD	Legal Site Description
MAWP	Maximum Allowable Working Pressure
MSDS	Material Safety Data Sheets
NACE	National Association of Corrosion Engineers
NPT	National Pipe Threads
NSC	National Safety Code
OD	Outside Diameter
OEM	Original Equipment Manufacturer
OHS	Occupational Health and Safety
PPE	Personal Protective Equipment

PSAC	Petroleum Services Association of Canada
PST	Petroleum Safety Training
TDG	Transportation of Dangerous Goods
UEL	Upper Explosive Limit
WCB	Workers' Compensation Board
WHMIS	Workplace Hazardous Material Information System

GLOSSARY

The following glossary terms have been defined from a Slickline context.

¼ Turn Ball Valve: A flow control device with a handle to open or close the flow of gas through the wellhead.

Adaptor Flange: A crossover flange that converts from one size and or pressure rating to another.

Anti-corrosion products: Chemicals introduced to the tubing to clean impurities off the walls of the tubing.

Ashpaltines: Solid impurities formed as by-products from produced reservoir fluid.

Assistant: All slickline personnel on the job reporting to the supervisor (also know as helper or trainee).

Bailing: The operation of removing mud, sand, cuttings and other material from the bottom of the wellbore with a bailer.

Bleed Sub: A short piece of lubricator configured for the installation of needle valves on wireline pressure control equipment to bleed pressure out of the lubricator above the wireline valve.

Blowout preventer: For the purposes of IRP 13 a blowout preventer, or BOP, is a wireline valve designed to seal around slickline to allow the depressurization of equipment above the wireline valve for disassembly.

Bottom Hole Pressure: Well pressure at reservoir face.

Bottom Hole Temperature: Temperature recorded from wellbore at reservoir interface.

Bottomhole assembly (BHA): Completion assembly ran in the wellbore with tubulars.

Bridge plug: Downhole tool located and set to isolate the lower part of the wellbore (not in a profile). It may be permanent or retrievable, enabling the lower wellbore to be permanently sealed from production or temporarily isolated from a treatment conducted on an upper zone.

Casing Flange (CF): Flange located on the bottom of the wellhead.

Casing Pressure: The pressure in a well that exists between the casing and the tubing or the casing and the drill pipe.

Casing: Large diameter steel pipe cemented in place when the well is drilled.

Certification Pressure Test: A non-destructive test performed by a third-party, or authorized party, to manufacturers' specification.

Certification: In the IRP13 slickline context, certification refers to the required three-year third party non-destructive testing or OEM specified inspection criteria.

Chemical Injection Sub: A device usually located above the lubricator and designed to apply a de-icing agent, corrosion inhibitor, or to lubricate larger diameter slickline during well service operations. A check valve on the side of the chemical injection sub has a hose connection.

Critical sour well: A well that generally includes all the elements of a sour well plus the added concerns of residents near the well site and environmental issues. The criteria for a critical sour well may vary according to specific jurisdiction's regulatory agency.

Customer: The Slickline Service Company's customer and is usually the Owner.

Demco: A multiple turn gate valve that may only be used in a fully open or fully closed position.

Downhole tools: Equipment ran on the end of slickline.

Driver: Any slickline service worker who is driving a vehicle. It does not refer to a specific career level.

Dual Barrier: In the context of slickline services, a dual barrier is defined as a secondary safety factor for plugs that are set in tubing to hold pressure from below. Dual barriers may include, but not be limited to, two pump-through plugs (e.g. TKX plug) or a bridge plug and cement.

Elastomer: Rubber material used in moulded flexible parts such as o-rings, seals and adhesives.

Equalize: The activity to balance the pressure above and below the valve, plug or similar pressure fluid isolation barrier.

External Upset End (EUE): An extra thick wall at the threaded end of drill pipe or tubing that does not have a uniform outside diameter throughout its length but is enlarged at each end.

Fire and Explosion Prevention Plan (FEPP): A documented hazard assessment that addresses planned activities which have the potential to ignite an oxygen-air and fuel-hydrocarbon mixture.

Flow Subs: Equipment on the lubricator pressure control equipment to allow flow into, or from, the lubricator stack.

Flow Tee: A short joint of lubricator installed below the wireline valve with customer specified hand unions on the top and bottom, along with any combination of side ports required. Typical side ports requested are; ½" NPT, 2" LP, 2" ARP, or 1502 WECO thread half. Also referred to as 'the pump-in' or 'bleed-off sub'.

Function Hydraulic Pressure Test: A hydraulic method to function test rams.

Function Test: A no-pressure test to ensure pressure control equipment parts are not seized, move freely and are able to work when under pressure (i.e. closing rams).

Gate Valve: An opening and closing device that employs a gate that is moved in or out of a sealing seat within the valve's body.

Grease Injection Heads: A collection of grease tubes (3 or 4) which have a slightly larger ID than the slickline OD. In the slickline context, a grease injection head is used as an alternate form of surface well control.

Grease Injection System: An assembly used to contain wellbore pressure during slickline operation by means of a dynamic grease seal around the slickline. The assembly includes a grease pounder and grease injection head in which grease is pumped at high pressure from the grease pounder into the grease injection head.

Grease Pounder: A system used to pressurize grease and pump it into a grease injection head.

Ground Level (GL): The final grade of the ground surrounding the wellhead after completions operations are finished.

Hazard Assessment: The anticipation, recognition and control of hazards and or hazardous situation to people, environment and or the public.

Hazard: A physical situation with a potential for injury, damage to property or damage to the environment. (Refer to IRP 16: Basic Safety Awareness Training)

Hot Tapping: A procedure to drill a hole through a pressure barrier while ensuring the pressure is contained to allow controlled bleed-off.

Hydrates: Compounds in natural gas molecules trapped within a crystal structure. Hydrates form in cold climates, such as permafrost zones and deep water. They can form in pipelines and in gas-gathering, compression, and transmission facilities at reduced temperatures and under high pressures.

Hydrogen sulphide: A gaseous compound, commonly known by its chemical formula, H2S. It is frequently found in oil and gas reservoirs, and has a distinctive rotten egg odour at low parts per million. It is extremely poisonous and corrosive and quickly deadens the olfactory nerve so that its odour is no longer a warning signal.

Incident: An undesired event that, under slightly different circumstances, could have resulted in personal harm, property damage, or loss. In other loss control disciplines, such as security, an incident could result in a loss. Also referred to as a near miss.

Job/Task Analysis: A systematic analysis of the steps involved with doing a job/task, the loss exposures involved, and the controls necessary to prevent loss. An important step in the analysis is consideration of the elimination or reduction of hazards. A job/task analysis is a prerequisite to the development of work procedures and practices.

Jobsite: The actual location of the well where the work is to be completed (commonly referred to as well site or lease).

Kelly Bushing (KB): A rotary table at the drilling rig floor height.

Lower Explosive Limit (LEL): The lowest vapour or gas concentration limit where a fire or explosion will not occur.

Lubricating: The action of running or pulling slickline tools from a wellbore while controlling associated well pressures.

Lubricator: Sections of tubing material threaded on both ends to accept hand unions. When assembled, lubricators act as pressure control equipment during wireline operations to house the tool string in preparation for running into the well, or for retrieval of the tool string on completion of the operation. A group of lubricators connected are known as lubricator joints, and typically come in 8 or 10 foot lengths.

Master Valve: A large valve located on the Christmas tree and used to control the flow of oil and gas from a well. A Master valve, also called a master gate, is the term used for any type of valve that is the main form of well control at surface.

Needle Valves: A valve that functions similarly to a gate valve, but permits a finer flow adjustment. The end of the valve stem is pointed like a needle and fits accurately into the needle seat. Needle valves are commonly used as bleed-off valves for lubricators. Due to the fine flow through the valve they may freeze off quickly.

Night Caps: A piece of a pressure control equipment with a female union including a port for a needle valve. It is commonly used as a cap for wireline valves or lubricator when pressure testing or to contain pressure overnight when workers are not present on site.

Non-Destructive Testing: A method of determining the integrity of pressurized equipment without incurring damage to the equipment.

Orbit Valve: A large diameter, multiple turn ball valve that is occasionally used as a master valve in casing applications.

Owner: Within the IRP 13 context, the Owner refers to the oil and gas company that owns the lease, or a delegated representative of the leasee. When workers from more than one employer are working at a wellsite one party must have overall responsibility for safety at that wellsite and co-ordination of all employers to carry out the planned work. Within IRP 13, this party is known as the 'Owner', and may be referred to as the prime contractor in other contexts.

Personal Protective Equipment: The equipment or clothing worn by a worker to reduce the consequences of exposure to various hazards associated with working conditions or a work site. Personal protective equipment includes goggles, chemical goggles, chemical suits and aprons, cold weather clothing, dust masks, face shields, fire-retardant clothing, gloves, hard hats, hearing protection, high visibility safety vests, hoods, safety goggles, safety helmets and safety-toed footwear.

Pressure Control Equipment: Equipment used to contain wellbore pressures at surface while slickline operations are being preformed. Pressure control equipment is comprised of a wellhead connector (flange or swedge) a wireline valve, lubricator with bleed-off and a stuffing box or pack-off.

Pressure Test: A procedure to ensure proper operation at working pressure. Pressure bearing equipment is tested at defined timed intervals at a maximum pressure greater than, or equal to, working pressure.

Pressure Vessels: Devices designed to contain gas or vapor under pressure.

Prime Contractor: Within the IRP 13 context the prime contractor is referred to as the Owner. The prime contractor acts as the directing contractor for a multi-employer wellsite. When workers from more than one employer are working at a wellsite then one party must have overall responsibility for safety at that wellsite and co-ordination of all employers to carry out the planned work. In Alberta this party is known as the ‘prime contractor’ and this term will be used throughout this IRP. In other jurisdictions this specific term may not be used, but the legislation has similar requirements and responsibilities for this function.

Pump-in Sub: A device to provide access for pumping in fluids or bleeding pressure from the lubricators usually through a 2" pressure rated ball valve.

Purge Subs: A device located at the top of the pressure control equipment meant to offer a way to introduce a purge gas or fluid. Purge subs must have an external check valve to prevent back pressure.

Purge: The act of removing the contents of a pipe, pipeline, vessel or container, and replacing it with another substance. A purge out-of-service replaces hydrocarbons with safer contents; a purge into service displaces air with another substance to avoid creating an explosive atmosphere when hydrocarbons are introduced.

Purging: A practice where a vessel, container, or piping system is evacuated of its gas and/or fluid contents and replaced with another gas and/or fluid; general purpose is to remove explosive and/or flammable gas/fluid from a closed system before opening the system to the atmosphere or before entry to the system by a worker.

Ram Function Test: A procedure to open and close rams manually or hydraulically to ensure the equalizing ports work properly under pressure.

Ram: The closing and sealing component on a wireline valve. There are three types of nonmetallic rams: blind, line, and shear. Line rams, when closed, have

configuration such that they seal around the line; shear rams cut through the line then form a seal; blind rams seal on each other with no line in the hole.

Rat holes: A hole in the rig floor,some 30 to 40 feet (9 to 12 metres) deep, which is lined with casing that projects above the floor, into which the kelly and the swivel are placed when hoisting operations are in progress.

Safe Work Permit: A written record that authorizes specific work at a specific work location. It identifies the known hazards and safe work practices required for the work.

Shackles: Rigging components used for attaching lifting components.

Sheave: A pulley used to guide the line from the slickline unit into the surface pressure control equipment. A sheave can be suspended above equipment, attached to the stuffing box, and secured below the master valve.

Shut-in Tubing Pressure: A tubing pressure reading that is not flowing and is sometimes referred to as shut-in wellhead pressure.

Slickline Service Company: refers to all slickline organizations.

Slickline Service Equipment or Slickline Equipment: Slickline equipment consists of all surface pressure control equipment, supporting flow control equipment and any equipment assisting the Slickline Service Company to transport or complete a job.

Slickline Service Personnel: refers to all slickline workers, operators, and supervisors.

Slickline: A solid single stranded line that may be described as piano wire, wireline or measuring line and used for selective placement and retrieval of wellbore flow control, such as plugs, gauges and valves.

Slip Stop: A retrievable locking device with a slip mechanism that engages the tubing wall to anchor the tool. Slip stops may be used above profile plugs as a safety measure to prevent a profile plug from moving up the tubing in the case when the profile plug becomes disengaged.

Snubbing: The practice of conducting underbalanced tripping operations when the weight of the drill string or coiled tubing drill string is not sufficient to overcome the upward force exerted on the drill string or coiled tubing drill string by pressure from the well.

Stabbing Valve: A ¼ turn valve with a two-piece body containing a ball style gate that is typically used for emergency pressure control during service rig or snubbing operations.

Stuffing Box: A device on the top of the wellhead assembly to contain the pressure seal around the slickline as it is run in and out of the hole.

Sump hole: A pit dug on a well location for storing fluids and cuttings from the wellbore which may be large or small depending on the requirement and are typically referred to as a 'sump'.

Supervisor: Within the IRP 13 context, supervisor refers to the operator of the slickline unit. This person is in charge of the slickline operations responsible to supervise junior slickline employees.

Surface Casing Vent: Piping attached to the wellhead to monitor surface casing pressure. It is not used in slickline operations.

Surface pressure: The pressure reading taken at surface from the wellhead or slickline surface pressure control equipment. Surface pressure can be read using an analog (needle style), or digital pressure gauge.

Swabbing: The operation conducted to reduce the hydrostatic pressure of the fluid in the wellbore to initiate flow from a formation.

Swedge Wellhead Adaptor: An adapter used to screw into the tubing to allow access to the wellbore. Typically the swedge crosses over between EUE threads and lubricator threads.

Test Pressure: The recorded pressure surface pressure control equipment is subjected to during inspections.

Third-party Service: Sub-contractors hired by the slickline service company and charged back to the Owner.

Tubing plug: Non-retrievable type of plug installed in the end of tubing and expelled into the well cellar. The tubing plug is used by Slickline Service Companies to retain pressure coming up the tubing from the wellbore.

Tubing: A relatively small-diameter pipe that is run into a well to serve as a conduit for the passage of oil and gas to the surface.

Upper explosive limit (UEL): The maximum proportion of vapour or gas in air above which propagation of flame does not occur.

Well Control: Well pressure control at the surface and access to the wellbore.

Well division: Categories assigned to wells. IRP 13 includes Divisions 1, 2, and 3.

Well Type: Within the IRP 13 context, well type describes the gas expected from the well (i.e. sweet gas or sour gas).

Wellbore: The hole drilled into the ground by a drilling rig to a specified depth. The wellbore may have casing in it, or it may be open (uncased), or part of it may be cased, and part of it may be open. When completed the wellbore has tubing in it that will convey the oil or gas from the formation to surface.

Wellhead Adaptor: A device in the surface pressure control equipment that crosses between one size of wellhead to another or from one pressure rating to another (e.g. 7" casing bowl to 5" or 3K to 5K). A wellhead adaptor may be a flanged connection, a swedge adapter, or simply a step adapter ring between two flanges.

Wellhead Connection: The connection between well and slickline pressure control equipment.

Wellhead: All components and related equipment from the top of the outermost casing string (the casing bowl connection) up to but excluding the flowline valve. Within the IRP 13 context the wellhead includes both wellhead components and christmas tree equipment as defined by API Specification 6A (current edition).

Wellsite Supervisor: The individual representing the Owner, or prime contractor, at the wellsite and is generally responsible for directing all employers at the wellsite. The Wellsite Supervisor is therefore the representative of the Owner, or prime contractor, at the wellsite. Within IRP 13, this individual is known as the 'Wellsite Supervisor', and may be referred to as the Consultant, Company Man, or Engineer in other contexts (the use of 'engineer' must be avoided unless the individual is a registered P. Eng.).

Wing Valve: A device used on the wellhead to access the tubing and casing pressures. It could be a ball valve or a gate valve.

Wireline Valve: A manual or hydraulic device, also known as a slickline BOP, containing a valve that closes around the wireline to shut in the well if pressure threatens a blowout.

Working Pressure: Maximum pressure on the pressure control equipment that must never be exceeded during field operations.

Workplace Hazardous Material Information System (WHMIS): An information system that, along with other requirements, includes safe handling precautions of controlled products on labels and material safety data sheets.

REFERENCES

American Petroleum Institute Exploration & Production Department. *Wireline Operations and Procedures*. (June, 2000). Third Edition. Washington, DC.

The University of Texas at Austin. Petroleum Extension Service. *A Dictionary for the Oil and Gas Industry.* (2005) First Edition. Austin, TX.

Danatec Educational Services. *Transportation of Dangerous Goods: Regulations*. (2001) Clear Language Edition, Calgary, AB.