Apprenticeship and Industry Training

Rig Technician

Apprenticeship Course Outline

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Government of Alberta

Apprenticeship and Industry Training

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Rig Technician
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Course Outline

Apprenticeship

Apprenticeship is post-secondary education with a difference. Apprenticeship begins with finding an employer. Employers hire apprentices, pay their wages and provide on-the-job training and work experience. Approximately 80 per cent of an apprentice's time is spent on the job under the supervision of a certified journeyperson or qualified tradesperson. The other 20 per cent involves technical training provided at, or through, a post-secondary institution – usually a college or technical institute.

To become certified journeypersons, apprentices must learn theory and skills, and they must pass examinations. Requirements for certification—including the content and delivery of technical training—are developed and updated by the Alberta Apprenticeship and Industry Training Board on the recommendation of Rig Technician Provincial Apprenticeship Committee.

The graduate of the Rig Technician apprenticeship program is a certified journeyperson who will be able to:

- take responsibility for personal safety and the safety of others
- supervise, coach and train apprentices and floor hands
- perform the duties of a motorhand, derrickhand or driller
- perform assigned tasks in accordance with quality and production standards required by industry

Apprenticeship and Industry Training System

Industry-Driven

Alberta's apprenticeship and industry training system is an industry-driven system that ensures a highly skilled, internationally competitive workforce in more than 50 designated trades and occupations. This workforce supports the economic progress of Alberta and its competitive role in the global market. Industry (employers and employees) establishes training and certification standards and provides direction to the system through an industry committee network and the Alberta Apprenticeship and Industry Training Board. The Alberta government provides the legislative framework and administrative support for the apprenticeship and industry training system.

Alberta Apprenticeship and Industry Training Board

The Alberta Apprenticeship and Industry Training Board provides a leadership role in developing Alberta's highly skilled and trained workforce. The board's primary responsibility is to establish the standards and requirements for training and certification in programs under the Apprenticeship and Industry Training Act. The board also provides advice to the Minister of Advanced Education and Technology on the needs of Alberta's labour market for skilled and trained workers, and the designation of trades and occupations.

The thirteen-member board consists of a chair, eight members representing trades and four members representing other industries. There are equal numbers of employer and employee representatives.

Industry Committee Network

Alberta's apprenticeship and industry training system relies on a network of industry committees, including local and provincial apprenticeship committees in the designated trades, and occupational committees in the designated occupations. The network also includes other committees such as provisional committees that are established before the designation of a new trade or occupation comes into effect. All trade committees are composed of equal numbers of employer and employee representatives. The industry committee network is the foundation of Alberta's apprenticeship and industry training system.

Local Apprenticeship Committees (LAC)

Wherever there is activity in a trade, the board can set up a local apprenticeship committee. The board appoints equal numbers of employee and employer representatives for terms of up to three years. The committee appoints a member as presiding officer. Local apprenticeship committees:

- monitor apprenticeship programs and the progress of apprentices in their trade, at the local level
- make recommendations to their trade's provincial apprenticeship committee (PAC) about apprenticeship and certification in their trade
- promote apprenticeship programs and training and the pursuit of careers in their trade
- make recommendations to the board about the appointment of members to their trade's PAC
- help settle certain kinds of disagreements between apprentices and their employers
- carry out functions assigned by their trade's PAC or the board

Provincial Apprenticeship Committees (PAC)

The board establishes a provincial apprenticeship committee for each trade. It appoints an equal number of employer and employee representatives, and, on the PAC's recommendation, a presiding officer - each for a maximum of two terms of up to three years. Most PACs have nine members but can have as many as twenty-one. Provincial apprenticeship committees:

- make recommendations to the board about:
    - standards and requirements for training and certification in their trade
    - courses and examinations in their trade
    - apprenticeship and certification
    - designation of trades and occupations
    - regulations and orders under the Apprenticeship and Industry Training Act
- monitor the activities of local apprenticeship committees in their trade
- determine whether training of various kinds is equivalent to training provided in an apprenticeship program in their trade
- promote apprenticeship programs and training and the pursuit of careers in their trade
- consult with other committees under the Apprenticeship and Industry Training Act about apprenticeship programs, training and certification and facilitate cooperation between different trades and occupations
- consult with organizations, associations and people who have an interest in their trade and with employers and employees in their trade
- may participate in resolving certain disagreements between employers and employees
- carry out functions assigned by the board

Rig Technician PAC Members at the Time of Publication

Mr. J. Bruce .....Calgary..... Presiding Officer
Mr. L. Block .....Brooks ..... Employer
Mr. J. Brown .....Calgary..... Employer
Mr. T. Dibben.....Beaumont..... Employer
Mr. G. Teeuwsen.....Ponoka ..... Employer
Mr. J. Blahun .....Stony Plalin ..... Employee
Mr. C. Mazuren.....Sherwood Park..... Employee
Mr. D. Moore .....Teulon MB..... Employee

Alberta Government

Alberta Advanced Education and Technology works with industry, employer and employee organizations and technical training providers to:

- facilitate industry's development and maintenance of training and certification standards
- provide registration and counselling services to apprentices and employers
- coordinate technical training in collaboration with training providers
- certify apprentices and others who meet industry standards

Technical Institutes and Colleges

The technical institutes and colleges are key participants in Alberta's apprenticeship and industry training system. They work with the board, industry committees and Alberta Advanced Education and Technology to enhance access and responsiveness to industry needs through the delivery of the technical training component of apprenticeship programs. They develop lesson plans from the course outlines established by industry and provide technical training to apprentices.

Apprenticeship Safety

Safe working procedures and conditions, incident/injury prevention, and the preservation of health are of primary importance in apprenticeship programs in Alberta. These responsibilities are shared and require the joint efforts of government, employers, employees, apprentices and the public. Therefore, it is imperative that all parties are aware of circumstances that may lead to injury or harm.

Safe learning experiences and healthy environments can be created by controlling the variables and behaviours that may contribute to or cause an incident or injury. By practicing a safe and healthy attitude, everyone can enjoy the benefit of an incident and injury free environment.

Alberta Apprenticeship and Industry Training Board Safety Policy

The Alberta Apprenticeship and Industry Training Board (board) fully supports safe learning and working environments and emphasizes the importance of safety awareness and education throughout apprenticeship training- in both on-the- job training and technical training. The board also recognizes that safety awareness and education begins on the first day of on-the-job training and thereby is the initial and ongoing responsibility of the employer and the apprentice as required under workplace health and safety training. However the board encourages that safe workplace behaviour is modeled not only during on-the-job training but also during all aspects of technical training, in particular, shop or lab instruction. Therefore the board recognizes that safety awareness and training in apprenticeship technical training reinforces, but does not replace, employer safety training that is required under workplace health and safety legislation.

The board has established a policy with respect to safety awareness and training:

> **The board promotes and supports safe workplaces, which embody a culture of safety for all apprentices, employers and employees. Employer required safety training is the responsibility of the employer and the apprentice, as required under legislation other than the *Apprenticeship and Industry Training Act.***

The board's complete document on its 'Apprenticeship Safety Training Policy' is available at www.tradesecrets.gov.ab.ca; access the website and conduct a search for 'safety training policy'.

Implementation of the policy includes three common safety learning outcomes and objectives for all trade course outlines. These common learning outcomes ensure that each course outline utilizes common language consistent with workplace health and safety terminology. Under the title of 'Standard Workplace Safety', this first section of each trade course outline enables the delivery of generic safety training; technical training providers will provide trade specific examples related to the content delivery of course outline safety training.

Addendum
As immediate implementation of the board's safety policy includes common safety learning outcomes and objectives for all course outlines, this trade's PAC will be inserting these safety outcomes into the main body of their course outline at a later date. In the meantime the addendum below immediately places the safety outcomes and their objectives into this course outline thereby enabling technical training providers to deliver the content of these safety outcomes.

STANDARD WORKPLACE SAFETY

A. Safety Legislation, Regulations & Industry Policy in the Trades .....

Outcome: ***Describe legislation, regulations and practices intended to ensure a safe work place in this trade.***

1. Demonstrate the ability to apply the Occupational Health and Safety Act, Regulation and Code.
2. Explain the role of the employer and employee in regard to Occupational Health and Safety (OH&S) regulations, Worksite Hazardous Materials Information Systems (WHMIS), fire regulations, Workers Compensation Board regulations, and related advisory bodies and agencies.
3. Explain industry practices for hazard assessment and control procedures.
4. Describe the responsibilities of workers and employers to apply emergency procedures.
5. Describe positive tradesperson attitudes with respect to housekeeping, personal protective equipment and emergency procedures.
6. Describe the roles and responsibilities of employers and employees with respect to the selection and use of personal protective equipment (PPE).
7. Select, use and maintain appropriate PPE for worksite applications.

B. Climbing, Lifting, Rigging and Hoisting .....

Outcome: ***Describe the use of personal protective equipment (PPE) and safe practices for climbing, lifting, rigging and hoisting in this trade.***

1. Select, use and maintain specialized PPE for climbing, lifting and load moving equipment.
2. Describe manual lifting procedures using correct body mechanics.
3. Describe rigging hardware and the safety factor associated with each item.
4. Select the correct equipment for rigging typical loads.
5. Describe hoisting and load moving procedures.

C. Hazardous Materials & Fire Protection.....

Outcome: ***Describe the safety practices for hazardous materials and fire protection in this trade.***

1. Describe the roles, responsibilities features and practices related to the workplace hazardous materials information system (WHMIS) program.
2. Describe the three key elements of WHMIS.
3. Describe handling, storing and transporting procedures when dealing with hazardous material.
4. Describe safe venting procedures when working with hazardous materials.
5. Describe fire hazards, classes, procedures and equipment related to fire protection.

Workplace Health and Safety

A tradesperson is often exposed to more hazards than any other person in the work force and therefore should be familiar with and apply the Occupational Health and Safety Act, Regulations and Code when dealing with personal safety and the special safety rules that apply to all daily tasks.

Workplace Health and Safety (Alberta Employment, Immigration and Industry) conducts periodic inspections of workplaces to ensure that safety regulations for industry are being observed.

Additional information is available at www.worksafely.org

Technical Training

Apprenticeship technical training is delivered by the technical institutes and many colleges in the public post-secondary system throughout Alberta. The colleges and institutes are committed to delivering the technical training component of Alberta apprenticeship programs in a safe, efficient and effective manner. All training providers place great emphasis on safe technical practices that complement safe workplace practices and help to develop a skilled, safe workforce.

The following institutions deliver Rig Technician apprenticeship technical training:

NAIT
Red Deer College
SAIT
Medicine Hat College (Brooks Campus)

Procedures for Recommending Revisions to the Course Outline

Advanced Education and Technology has prepared this course outline in partnership with the Rig Technician Provincial Apprenticeship Committee.

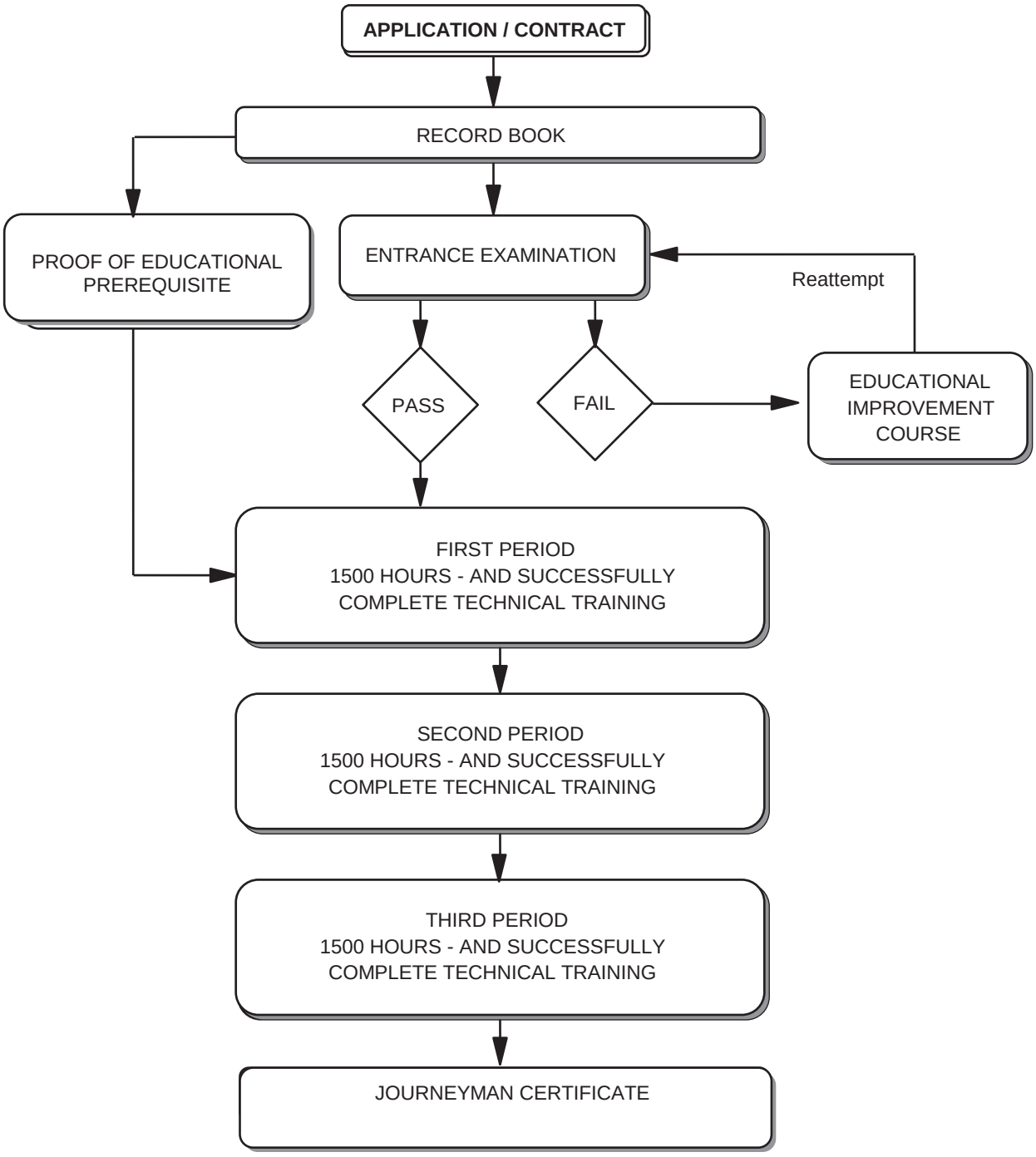
This course outline was approved on January 29, 2010 by the Alberta Apprenticeship and Industry Training Board on a recommendation from the Provincial Apprenticeship Committee. The valuable input provided by representatives of industry and the institutions that provide the technical training is acknowledged.

Any concerned individual or group in the province of Alberta may make recommendations for change by writing to:

Rig Technician Provincial Apprenticeship Committee
c/o Industry Programs and Standards
Apprenticeship and Industry Training
Advanced Education and Technology
10th floor, Commerce Place
10155 102 Street NW
Edmonton AB T5J 4L5

It is requested that recommendations for change refer to specific areas and state references used. Recommendations for change will be placed on the agenda for regular meetings of the Rig Technician Provincial Apprenticeship Committee.

Apprenticeship Route toward Certification



Rig Technician Training Profile
FIRST PERIOD
(4 Weeks 30 Hours per Week – Total of 120 Hours)

SECTION ONE

INDUSTRY, COMMUNICATION AND LEADERSHIP
15 HOURS

A	B	C
Apprenticeship System 1 Hour	Oil and Gas Well Drilling Industry and Associations 2 Hours	Regulations That Affect the Trade 4 Hours
D	**E**	
Communication Skills 6 Hours	Manuals, Forms, Logs and Records 2 Hours	

SECTION TWO

RIG SAFETY AND SAFETY SUPERVISION
49 HOURS

A	B	C
Rig Safety Hazards 3 Hours	Rig Lifting, Slip and Fall Hazards 3 Hours	Blow Out Prevention Equipment 6 Hours
D	**E**	**F**
Fall Protection Equipment 6 Hours	Fall Protection Procedures 6 Hours	Rig Rescue 6 Hours
G	**H**	**I**
Confined Spaces on Drilling Rigs 5 Hours	Detection and Control of Flammable Substances on the Rig 4 Hours	Light Duty Vehicle Driving Improvement 6 Hours
J		
Safe Loader Operation 4 Hours		

SECTION THREE

TOOLS, EQUIPMENT AND RIGGING
21 HOURS

A	B	C
Proper Care and Use of Hand Tools 1 Hour	Proper Care and Use of Power Tools 2 Hours	Rigging and Hoisting Equipment 3 Hours
D	**E**	**F**
Rigging and Hoisting Operation 3 Hours	Slip and Cut 1 Hour	Rig Move Awareness 2 Hours
G	**H**	**I**
Introduction to Drilling Fluids 3 Hours	Storage and Inventory 1 Hour	Tubular Awareness 2 Hours
J	**K**	
Drawworks 2 Hours	Liquefied Petroleum Gas (LPG) Fittings 1 Hour	

SECTION FOUR

POWER SYSTEMS
35 HOURS

A	B	C
Fuel Supply Systems 2 Hours	Engines 4 Hours	Drivelines and Transmissions - Operation 1 Hour
D	**E**	**F**
Drivelines and Transmissions - Maintenance 2 Hours	Cooling Systems 2 Hours	Lubrication Systems 2 Hours

G	H	I
Maintenance and Problem Identification 2 Hours	Rig Electrical Systems – Part A 3 Hours	Rig Electrical Systems – Part B 3 Hours
J	**K**	**L**
Rig Electrical Systems - Batteries 1 Hour	Air Compressors and Air Brake Systems 2 Hours	Introduction to Boilers 4 Hours
M	**N**	
Hydraulic Systems 3 Hours	Pipes, Hoses and Connections 4 Hours	

SECOND PERIOD
(4 Weeks 30 Hours per Week – Total of 120 Hours)

SECTION ONE

COMMUNICATION, LEADERSHIP AND SUPERVISION
31 HOURS

A	B	C
Leadership 6 Hours	Communication 6 Hours	Safe Practice and Safety Supervision 3 Hours
D	**E**	**F**
Response To Musculoskeletal Rig Injuries 5 Hours	Response to Soft Tissue Rig Injuries 6 Hours	Response to Other Rig Injuries 5 Hours

SECTION TWO

DRILLING FLUIDS
47 HOURS

A	B	C
Geology and Lithology 3 Hours	Mud 8 Hours	Mud Operations 8 Hours
D	**E**	**F**
Pumps 10 Hours	High Pressure Mud Lines, Hoses, and Connections Part A 4 Hours	High Pressure Mud Lines, Hoses, and Connections Part B 4 Hours
G	**H**	**I**
Mud Tanks and Low Pressure System 6 Hours	Casing 2 Hours	Waste Management and Spill Response 2 Hours

SECTION THREE

FIRST LINE BLOWOUT PROTECTION
28 HOURS

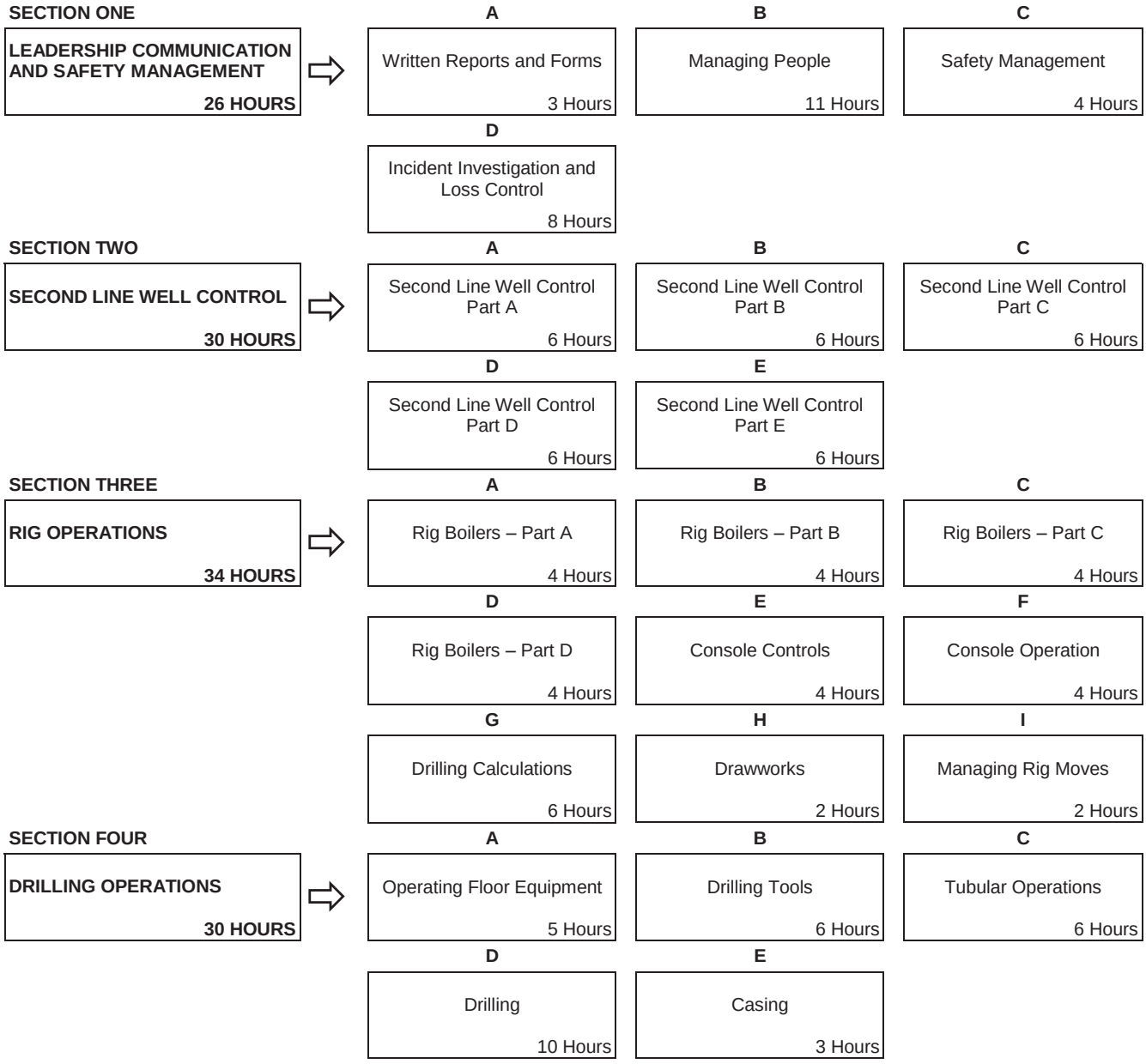
A	B	C
First Line Blowout Prevention Part A 6 Hours	First Line Blowout Prevention Part B 6 Hours	First Line Blowout Prevention Part C 6 Hours
D	**E**	
First Line Blowout Prevention Part D 6 Hours	First Line Blowout Prevention Part E 4 Hours	

SECTION FOUR

DERRICK
14 HOURS

A	B	C
Derrick Equipment 3 Hours	Derrick Safety 4 Hours	Rig Up and Rig Down 4 Hours
D		
Tripping 3 Hours		

THIRD PERIOD
(4 Weeks 30 Hours per Week – Total of 120 Hours)



NOTE: The hours stated are for guidance and should be adhered to as closely as possible. However, adjustments must be made for rate of apprentice learning, statutory holidays, registration and examinations for the training establishment and Apprenticeship and Industry Training.

FIRST PERIOD TECHNICAL TRAINING
RIG TECHNICIAN TRADE
COURSE OUTLINE

UPON SUCCESSFUL COMPLETION OF THIS PROGRAM THE APPRENTICE SHOULD BE ABLE TO PERFORM THE FOLLOWING OUTCOMES AND OBJECTIVES.

SECTION ONE: ..... INDUSTRY, COMMUNICATION AND LEADERSHIP ..... 15 HOURS

A. Apprenticeship System .....1 Hour

Outcome: ***Explain the role and purpose of the advisory network and Provincial Apprenticeship Committee structure for the Rig Technician trade.***

1. State the process involving the contract of apprenticeship and record book.
2. Outline the training profile for the rig technician trade.
3. Describe the structure and purpose of provincial and local apprenticeship committees.

B. Oil and Gas Well Drilling Industry and Associations .....2 Hours

Outcome: ***Explain the role of the industry and identify the associations and whom they represent.***

1. Describe this industry as it applies to Western Canada.
2. Describe the scope of training education opportunities.
3. Briefly describe the industry associations involved with oil and gas well drilling.

C. Regulations That Affect the Trade .....4 Hours

Outcome: ***Identify the regulatory bodies that apply to drilling oil wells.***

1. Explain the role of the provincial regulators of oil and gas well drilling.
2. Briefly explain the role of the employer and the employee in regard to the following regulations: provincial worker safety regulations, WHMIS regulations, fire regulations, provincial workers compensation regulations, highway and transportation regulations pertaining to drilling equipment and rig crews.

D. Communication Skills .....6 Hours

Outcome: ***Communicate effectively when giving or receiving instructions.***

1. Identify and describe the ‘chain of command’ or organizational structure of the drilling rig.
2. Describe the essential differences in communicating with fellow workers, supervisors, customers and subcontractors on a rig.
3. Supervise and train junior workers: organize and plan on the job training and instruction, obtain feedback on training and instruction, evaluate training and instruction.
4. Resolve communication problems.
5. Describe anger management.
6. Describe communication styles.
7. Interpret non verbal communication.
8. Obtain feedback on communication initiated; give feedback on the other person’s communication.

9. Practice positive community relations: show respect for the landowner, show respect for members of the local community.

E. Manuals, Forms, Logs and Records .....2 Hours

Outcome: Complete forms and maintain records. Use manuals to access information.

1. Identify forms used on drilling rigs.
2. Identify the information required to complete a form.
3. Complete all required forms in a legible manner.
4. Maintain forms, logs and inventory in a systematic organized way.
5. Describe the use of standard manuals used on a drilling rig, including the Drillers manual.

SECTION TWO: ..... RIG SAFETY AND SAFETY SUPERVISION .....39 HOURS

A. Rig Safety Hazards ....3 HOURS

Outcome: Identify safety hazards present in the worksite and take actions to protect self and others.

1. Describe the types of personal hazards associated with the work assigned to a rig technician.
1. Describe what a lockout is and when or where lockouts should be used.
2. Identify the safety equipment and procedures used for dealing with hazards associated with rig operations.
3. Practice safe care and control of the hazardous products commonly used by rig technicians.
4. Recognize and describe environmental hazards associated with drilling operations.
5. Describe fire control including types of fires and extinguishers.
6. Describe fire equipment maintenance procedures.
7. Describe rig emergency response procedure.
8. Participate/conduct safety training for new hands.
9. Participate in preparing a written job safety analysis (JSA).

B. Rig Lifting, Slip and Fall Hazards .....3 Hours

Outcome: Identify lifting, slip and fall hazards and describe how to prevent them.

1. Be able to demonstrate proper body position for lifting.
2. Explain the hazards and corrective action for walking and carrying items on slippery deck plates, stairs, etc.
3. Monitor floorhands and other workers for: correct lifting techniques, suitability of non slip footwear, appropriate personal protective equipment for tasks performed.

C. Blow Out Prevention Equipment .....6 Hours

Outcome: Give an overview of blow out prevention and describe the role of the motorhand in blow out prevention.

1. Describe the need for blow out prevention and how Blow Out Preventers (BOP) work.
2. Describe BOP components and their functions.
3. Explain Maximum Allowable Casing Pressure (MACP).

4. Describe the operation of the BOP accumulator.
5. Describe the Nitrogen Back Up system and applicable government regulatory pressure requirements.
6. Describe the remote panel.
7. Describe nippling up procedures.
8. Describe the kick/kill procedure for the motorhand.

D. Fall Protection Equipment .....6 Hours

Outcome: Identify equipment and components used in fall protection (arrest) systems.

1. Calculate the force generated by a fall, given weight and length of drop.
2. Identify situations where fall protection systems are required.
3. Describe selection, application, components and hazards of passive and active fall protection systems.
4. Describe ropes and knots used for fall protection and rescue.
5. Describe shock absorbers, application and hazards of not using them.
6. Identify the components for vertical and horizontal lifelines.
7. Describe permanent and temporary cable ladder systems.

E. Fall Protection Procedures .....6 Hours

Outcome: Follow procedures for fall protection (arrest).

1. Perform equipment inspection before and after use.
2. Demonstrate the procedure for correctly fitting a harness.
3. Demonstrate the use of the double leg lanyard while climbing.
4. Demonstrate the use of lifelines.
5. Demonstrate work position from a ladder.

F. Rig Rescue.....6 Hours

Outcome: Perform fall rescue.

1. Describe recovery team roles.
2. Describe rescue equipment and how it is used: block and tackle stretcher, stretcher board and four point lifting harness.
3. Describe the management of an escape device.
4. Describe rescue – recovery scenarios including; securing victim and a block and tackle lift from monkey board.
5. Perform a ladder rescue lift and lower.

G. Confined Spaces on Drilling Rigs .....5 Hours

Outcome: ***Follow appropriate procedures for working in confined spaces.***

1. Define what is meant by confined space and give examples of confined space areas on a drilling rig.
2. Identify potential fatal hazards in confined space entry.
3. Locate and identify legislation and regulations pertinent to “confined space entry”.
4. Describe the hazards in confined space entry.
5. Describe steps to safely enter confined space.
6. Describe atmospheric testing and monitoring procedures.
7. Prepare safety equipment and clothing.
8. Describe the function of explosion proof lighting.
9. Describe how to perform a safe rescue.
10. List rescue equipment.

H. Detection and Control of Flammable Substances on the Rig .....4 Hours

Outcome: ***Describe how to detect the presence of flammable substances and take appropriate action. Describe the classification and properties of flammable substances.***

1. Describe what is meant by upper and lower explosive limit (UEL, LEL) and target work range.
2. Describe the implications of a vapour density or specific gravity for flammables that is less than or greater than one.
3. Describe gas and vapour detection equipment: active, passive and fixed and personal monitors
4. Describe the hazards of hydrogen sulphide.
5. Describe the seven steps for dealing with a hydrogen sulphide incident.
6. Describe the operation of a flame arrestor.
7. Describe factors that will affect the operation of detection equipment.
8. Describe monitor function testing and the need to calibrate monitors for a specific flammable substance.
9. Describe the obligation to refuse unsafe work.

I. Light Duty Vehicle Driving Improvement.....6 Hours

Outcome: ***Drive more carefully and responsibly and exhibit awareness of the unique hazards of driving to and from drilling rigs.***

1. Describe the worker’s responsibility for ensuring that equipment is operated safely.
2. Describe the importance of using seatbelts.
3. Describe driving in marginal traction.
4. Describe emergency equipment and supplies required for travelling in remote locations.
5. Describe the hazards of driving on rural roads.
6. Describe the causes and effect of impairment on driving.

7. List the factors that can impair the ability to drive or operate equipment.
8. Describe securing loads for light trucks.
9. Describe tire chain installation.
10. Use a map to determine the best route to any road accessible destination in Western Canada.
11. Describe the requirements of the Transportation of Dangerous Goods (TTDG) legislation as it applies to drilling rigs.
12. List the common products used on drilling rigs covered by provincial transportation of dangerous goods legislation.
13. Describe off road driving techniques.

J. Safe Loader Operation .....4 Hours

Outcome: Describe safe loader operation at rig site and in the shop or yard.

1. Describe loaders used by rig crews.
2. Describe forklift, mobile crane, and loader design principles and capacities.
3. Describe securing loads.
4. Describe tire chain installation on loaders.

SECTION THREE: ..... TOOLS, EQUIPMENT AND RIGGING .....21 HOURS

A. Proper Care and Use of Hand Tools .....1 Hour

Outcome: Describe proper hand tool usage on a drilling rig.

1. Recognize the safe and serviceable condition of hand tools.
2. Describe the need for securing or containing hand tools, fasteners and loose parts.
3. Identify and use proper wrench sizing (Metric and SAE).
4. Identify and describe the use of hand tools.
5. Apply and use measuring principles and tools.

B. Proper Care and Use of Power Tools .....2 Hours

Outcome: Identify and use power tools common to the trade.

1. Describe the safe handling of power tools and their use on the rig.
2. Describe the importance of electrical grounding.
3. Describe the relationship between cord size (gage), length of extension cord and voltage.
4. Describe the safe set up and operation of the wash gun.
5. Describe air powered hand tools.
6. Describe operation and safe handling of hydraulic tubular tools, (e.g. pipe spinners, Iron Roughneck Hawkjaw etc.) pinch points and lockouts.
7. Summarize general maintenance requirements for hydraulic tubular tools.

C. Rigging and Hoisting Equipment .....3 Hours

Outcome: Describe rigging and hoisting equipment.

1. Describe the construction of wire rope.
2. Describe the construction and use of steel and fibre slings.
3. Describe hoisting equipment hardware.
4. Describe construction and use of chain and chain slings.
5. Describe the construction of fibre rope.
6. Describe knots and their application.
7. Describe the effect of knot types on rope strength.
8. Describe hand-rigging equipment.

D. Rigging and Hoisting Operation .....3 Hours

Outcome: Describe rigging and hoisting operation and procedures.

1. Describe the inspection of clamps, rope and slings.
2. Determine the weight of various objects from specifications (e.g. rig manual).
3. Select appropriate rigging and slinging for weight and type of object.
4. Use standard hand signals used for rigging and hoisting operations.
5. Describe hoisting and load moving procedures.

E. Slip and Cut .....1 Hour

Outcome: Basic understanding of the purpose of the slip and cut operation.

1. Describe purpose of slip and cut.
2. Identify wear, condition of: drum, drum anchor, anchor bolt, dead man, hanging blocks and crown blocks
3. List the steps for completing a slip and cut.
4. List the hazards and how they are addressed for a slip and cut.

F. Rig Move Awareness .....2 Hours

Outcome: Describe the hazards associated with rig set up and tear down.

1. Describe the role of the motorhand in rig moves.
2. Describe potential hazards that exist when moving a rig.
3. Describe safe prefab installation.
4. Describe storage and winterizing considerations.

G. Introduction to Drilling Fluids.....3 Hours

Outcome: Describe purpose, composition and classes of drilling fluids.

1. Describe the composition of drilling fluids: water based, oil based and air drilling.
2. Describe the purpose of drilling fluids.
3. Describe the safe storage and handling of drilling fluid ingredients.

4. Describe PPE requirements for handling drilling fluids or ingredients.

H. Storage and Inventory .....1 Hour

Outcome: Describe the importance of maintaining inventoried and stocked items.

1. Describe the importance of maintaining adequate supplies in usable condition.
2. Describe loss control methods.
3. Describe classification systems: by product category and by manufacturer
4. Implement procedures to keep track of inventory and usage.
5. Describe the “want list”.
6. Implement strategy for the timely replacement of inventory.
7. Describe the importance of maintaining an appropriate inventory based on item usage and anticipated requirement.
8. Describe techniques for fixing discrepancies in stock levels.
9. Describe appropriate storage procedure for items that are subject to be damage in storage.

I. Tubular Awareness .....2 Hours

Outcome: Describe care of tubular and identify thread types.

1. Describe tubular thread compounds and applications.
2. Identify tubular thread types.
3. Describe drifting casing.
4. Describe the function of the upper and lower Kellycock.
5. Identify the use and correct application for; collars, protectors, pick up subs, slings and nubbins.
6. Describe proper positioning of holdback line.
7. Describe operation of casing tongs.
8. Identify casing tong pinch points.

J. Drawworks .....2 Hours

Outcome: Describe how to perform basic maintenance on the drawworks under the driller’s direction.

1. Describe the function and operation of; blocks, drum, main brakes, auxiliary brakes, brake linkage.
2. Describe drawworks lock outs.
3. Describe daily maintenance procedures.
4. Describe drawworks inspection and lubrication procedure.

K. Liquefied Petroleum Gas (LPG) Fittings.....1 Hour

Outcome: Describe storing and handling LPG containers and hooking up and operating LPG fired equipment.

1. Describe the safe operation of propane fired equipment.
2. Describe liquid petroleum gas (LPG) containers.
3. Describe LPG lines and fittings.

4. Describe the function and purpose of LPG regulators.
5. Describe the purpose of the safety pilot light.
6. Describe how to light a safety pilot light.

SECTION FOUR: ..... POWER SYSTEMS ..... 35 HOURS

A. Fuel Supply Systems ..... 2 Hours

Outcome: Perform basic maintenance and service on a fuel supply system.

1. Identify the fuels used to power motor vehicles and drilling rigs and the precautions for their use and storage.
2. Identify the major fuel supply system components.
3. Describe the operation of a fuel supply system.
4. Describe the importance of using clean diesel fuel for priming fuel filters.
5. Describe the requirements for recovery of fuel during a disassembly process.

B. Engines ..... 4 Hours

Outcome: Describe basic maintenance, service and identifying problems on rig engines.

1. Identify the common types (designs) of engines.
2. Describe inspection and daily maintenance requirements for each type of internal combustion engine.
3. Describe how to lockout the engine.
4. Describe inspection and servicing of air filters and turbo chargers.
5. Describe the preparations required for performing routine maintenance.
6. Describe how trouble codes are obtained and used for troubleshooting.
7. Describe how engines are prepared for cold weather operations.
8. Describe how engines are prepared for a move or an extended shut down.

C. Drivelines and Transmissions - Operation ..... 1 Hour

Outcome: Describe the safe operation and working safely around rotating equipment.

1. Describe safety considerations for working with rotating equipment and guards for rotating equipment.
2. Describe the operation of clutches and torque converters.

D. Drivelines and Transmissions – Maintenance ..... 2 Hours

Outcome: Describe the maintenance of rig mechanical power transmissions.

1. Describe torque tubes.
2. Describe chain and belt drive alignment and adjustment.
3. Describe the maintenance of drive shafts and torque converters.
4. Describe maintenance requirements of transmissions and rotary gearbox.

E. Cooling Systems.....2 Hours

Outcome: Explain the maintenance and servicing on a cooling system.

1. Explain the differences in operating principles between air and liquid cooling systems.
2. Identify the major components of cooling systems.
3. Describe the recovery of the coolant prior to disassembly of a system.
4. Describe the removal and replacement of the components and coolant of a cooling system.
5. Describe routine service methods.

F. Lubrication Systems.....2 Hours

Outcome: Explain the maintenance and routine servicing of lubrication systems.

1. Describe the types and classification of oil and grease.
2. Describe oil filter systems.
3. Analyze oil for; oil condition, presence of moisture, leaks and other foreign substances.
4. Explain the reason for oil coolers and heat exchangers.
5. Describe the effect of extreme cold on lubricants and coolants.

G. Maintenance and Problem Identification.....2 Hours

Outcome: Explain maintenance concepts, and be able to recognize the warning signs of developing problems.

1. Interpret maintenance schedule according to hour meter and drilling conditions.
2. Explain conditions that are apparent due to telltale signs.

H. Rig Electrical Systems – Part A.....3 Hours

Outcome: Explain rig electrical safety and the limits for servicing of rig electrical systems.

1. Describe electrical lockouts.
2. Describe a basic electrical circuit.
3. Describe potential electrical hazards.
4. Describe legal requirements for working with electrical systems on drilling rigs.
5. Define the limits of maintenance, repair or installation for electrical systems for rig technicians.
6. List precautions for avoiding electrical hazards.
7. Describe static electricity as it applies to drilling.
8. Recognize basic electrical terms and symbols.

I. Rig Electrical Systems – Part B.....3 Hours

Outcome: Explain rig electrical safety and the limits for servicing of rig electrical systems.

1. Identify the electrical/electronic systems commonly found on drilling rigs.
2. Describe the procedure an electrician uses for replacing the electrical plug types on a drilling rig, including selecting the correct plug for the voltage and amperage of the circuit.
3. Describe electrical generators (or alternators) and electrical power generation.

4. Describe the types of electric motors found on drilling rigs.
5. Describe how to use a multimeter (VOM) to test electrical circuits and devices for voltage, resistance and continuity.
6. Describe indicators of problems with motors and generators.
7. Describe maintenance of electric motors and generators.

J. Rig Electrical Systems – Batteries.....1 Hour

Outcome: Describe the use and operation of batteries in rig electrical systems.

1. Explain the purpose, operation and ratings of batteries on a drilling rig.
2. Describe testing and routine service for batteries used on drilling rigs.
3. Diagnose problems attributed to batteries.
4. Describe the proper procedure for boosting and charging batteries in the field.

K. Air Compressors and Air Brake Systems .....2 Hours

Outcome: Operate, adjust and service compressed air systems.

1. Identify and describe the purpose of the major air system components.
2. Describe the daily, routine maintenance requirements for air compressors.
3. Describe boiler safety requirements for periodic inspection and certification requirements for air receivers (air tanks).
4. Describe the inspection process to identify damaged or worn components.
5. Describe the typical braking systems used for rotating equipment on a drilling rig.
6. Describe brake components.
7. Inspect brake components.
8. Describe routine maintenance on brake systems.

L. Introduction to Boilers .....4 Hours

Outcome: Monitor rig boiler; identify normal from abnormal operation.
(Under the supervision of a certified special oil-well class holder.)

1. Describe rig boiler system.
2. Describe lockouts for boiler and steam systems.
3. Describe the hazards and precautions required for working with boilers and steam.
4. Describe the precautions needed for handling de-scaling chemicals.
5. Describe daily boiler inspection and daily maintenance including blowdown.
6. Describe boiler instrumentation and controls.
7. Describe blowing down steam lines.

M. Hydraulic Systems.....3 Hours

Outcome: Describe basic hydraulics and routine maintenance for hydraulic systems on a drilling rig.

1. Explain hydraulic principles.
2. Identify pinch points and the use of lockouts for hydraulic components.

3. Identify rig hydraulic system layout.
4. Identify rig hydraulic systems components, their function and how to recognize problems.
5. Identify the hydraulic fluids commonly used on drilling rigs.
6. Analyze the condition of hydraulic fluid.
7. Describe the inspection of hydraulic components, fittings and lines.
8. Describe how to find and identify hydraulic leaks, or any other problems requiring attention.

N. Pipes, Hoses and Connections .....4 Hours

Outcome: Explain pipe and hose pressure schedules as found on drilling rigs.

1. Describe low and high pressure connectors and fitting used for air, hydraulics, steam, coolant, fuel, drilling fluid (high pressure and low pressure sides) as found on drilling rigs.
2. Explain the appropriate application of pipe, hose and connector usage on drilling rigs.

SECOND PERIOD TECHNICAL TRAINING
RIG TECHNICIAN TRADE
COURSE OUTLINE

UPON SUCCESSFUL COMPLETION OF THIS PROGRAM THE APPRENTICE SHOULD BE ABLE TO PERFORM THE FOLLOWING OUTCOMES AND OBJECTIVES.

SECTION ONE:.....COMMUNICATION, LEADERSHIP AND SUPERVISION..... 31 HOURS

A. Leadership.....6 Hours

Outcome: Assist or act for the driller as crew leader.

1. Describe the role of supervisor as team leader.
2. Give examples of positive and negative reinforcement.
3. Describe how positive reinforcement and encouragement can be used to improve productivity.
4. Explain why relying too heavily on negative reinforcement is usually ineffective.
5. Describe strategies for dealing with problem employees.
6. Describe appropriate disciplinary action.
7. Describe the importance of documentation and records related to employee supervision.
8. Describe confidentiality requirements of supervision.
9. Describe the basic leadership styles: authoritarian, participative (democratic) and delegative (laissez faire).
10. Identify the personal leadership styles used by yourself and others.
11. Give examples of how a leadership style can be appropriate or inappropriate depending on the situation.
12. Describe how different leadership styles can conflict with, or complement each other.
13. Describe strategies for dealing with different styles.
14. Describe the stages of team development.
15. Describe the effect of change (new crew members, etc.) on the stages of team development.
16. Model desirable behaviour with crew.

B. Communication.....6 Hours

Outcome: Practice effective communication on and off the drilling rig.

1. In the role of derrickhand or drilling contractor's representative, demonstrate appropriate communication with others.
2. Demonstrate effective listening.
3. Demonstrate how feedback can make communication more effective.
4. Identify barriers to communication.
5. Demonstrate techniques for dealing with difficult situations and/or difficult people.
6. Be able to maintain records.

C. Safe Practice and Safety Supervision ..... 3 Hours

Outcome: Describe the role of the derrickhand in the responsibility for workplace safety.

1. Assist driller in conducting job safety analysis (JSA), safety meetings, ensuring crew works safely at all times
2. Ensure that any crew personal protection equipment is in good condition, if in use and that workers are using it properly.
3. Train workers in safe procedure and the use of personal protective equipment.
4. Describe the use and maintenance of fall protection equipment.
5. Secure self, tools and equipment when working at heights.
6. Model safe practice, including drug and alcohol policies.

D. Response to Musculoskeletal Rig Injuries ..... 5 Hours

Outcome: Describe the musculoskeletal injuries that can occur on a rig and how to provide emergency treatment for each injury type.

1. Describe musculoskeletal injury types.
2. Describe emergency treatment for musculoskeletal injuries that occur on the rig.

E. Response to Soft Tissue Rig Injuries ..... 6 Hours

Outcome: Describe the soft tissue injuries that can occur on a rig and how to provide emergency treatment for each injury type.

1. Describe emergency treatment for soft tissue injuries that occur on the rig.
2. Describe the treatment of pinching injuries, cuts, severed digits, etc.
3. Describe emergency treatment for fall related injuries.
4. Describe emergency treatment for contact burns, chemical burns.

F. Response to Other Rig Injuries ..... 5 Hours

Outcome: Describe other injuries that can occur on a rig and how to provide emergency treatment for each injury type.

1. Describe first response treatment for hazardous gas inhalation.
2. Describe the emergency treatment for vehicular accidents in remote locations.
3. Describe reporting accident procedures or emergency actions for accidents that occur off the rig site.
4. Describe first response treatment for frost bit and hypothermia.

SECTION TWO: .....DRILLING FLUIDS ..... 47 HOURS

A. Geology and Lithology.....3 Hours

Outcome: Describe the Canadian Sedimentary Basin (CSB) as it relates to oil and gas well drilling.

1. Describe the drilling characteristics of the rock types common to the CSB.
2. Describe the distribution of hydrocarbons in the CSB.
3. Describe hydrostatic and formation pressures as found in the CSB.
4. Describe the effect of hydrostatic pressure on drilling.
5. Describe the effect of formation pressures on drilling.
6. Describe how drilling fluid is mixed and adjusted for different rock types and pressures.

B. Mud .....8 Hours

Outcome: Mix drilling fluids and alter properties based on operational need.

1. Explain the various terms applicable to the drilling fluids.
2. Using MSDS and supplier information explain the proper and safe procedure for mixing chemicals such as adding bases or acids to water, etc.
3. Explain the potential consequences of improper mixing procedures, or combination of chemicals.
4. Describe the typical make up of drilling fluids and precautions for handling and mixing.
5. Using MSDS and/or supplier information, describe the typical personal protective equipment used for mixing the ingredients of drilling fluids.
6. Perform the various calculations or measurement for mud – drilling fluids.
7. Monitor mud and chemical inventory.
8. Describe mud characteristics and applications of various mud treatments.

C. Mud Operations …… ..... 8 Hours

Outcome: Analyze mud and take corrective actions.

1. Describe the effect and corrections for various mud contaminants on the drilling process.
2. Describe how pressure variations are controlled by the mud system.
3. Describe corrosion problems and how to correct with additives.
4. Describe air drilling and common additives (re. IRPs for under balanced drilling).
5. Describe the hazards associated with air drilling, working with high pressure air, compressors, etc.
6. Describe drilling problems that can be indicated by the cuttings.
7. Describe the various mud operation problems with their correction.
8. Describe the importance of maintaining proper pit level.

D. Pumps.....10 Hours

Outcome: Describe 1the operation and maintenance of the mud pump system.

1. Describe a mud pump system.
2. Describe how a triplex pump is prepared for use.

3. Describe the need for positive load for triplex vs. other pumps.
4. Identify pump knock and isolate the cause including mechanical knock and fluid knock.
5. Describe the effect of contaminants such as sand, gas, air, C02, high temperatures, etc., on pump operation and component wear.
6. Describe the relationship between pump size, liner size pressure and the circulation rate.
7. Describe the safe operation of pump lockouts.
8. Describe pump maintenance and lubrication schedule.
9. Describe the following fluid end maintenance procedures: packing replacement, changing components, rod lubrication and liner wash.
10. Describe the power end maintenance procedures for checking oil and maintain – replace pony rod seals, suction filters, and oil change.
11. Describe preparing and operating a pump in extreme cold weather.

E. High Pressure Mud Lines, Hoses, and Connections – Part A .....4 Hours

Outcome: ***Describe pressure ratings, handling and hook up of pipes hoses and connections used for the mud system.***

1. Describe the characteristics of high pressure pipe, lines and hoses.
2. Describe the need for maintaining the correct pressure rating for installed fittings.
3. Describe how to identify the pressure rating of fittings, connections and hammer unions.
4. Identify the proper application of fittings by type, including when and where they should be used.
5. Identify pipe types/grades/schedules common to the oilfield.
6. Identify pressure rating and fire retardant rating for hoses and the appropriate application on the rig for different hose types.
7. Cut NPT (National Pipe Thread) pipe threads using manual threading dies and pipe cutting equipment on 1-2” pipe.

F. High Pressure Mud Lines, Hoses and Connections – Part B .....4 Hours

Outcome: ***Describe pressure ratings, handling and hook up of pipes hoses and connections used for the mud system.***

1. Select appropriate thread dope or sealant for pressure rating of fitting.
2. Identify, select and connect correctly rated high pressure fittings and pipes.
3. Identify high pressure flange types including correct rings, gaskets, sealant, and fasteners to make the connection for drilling fluids and for air drilling.
4. Identify pressure ratings and applications for safety valves, (pop valves).
5. Describe valve settings procedure for mud system (e.g. open before closing to prevent excess pressure build-ups).
6. Describe the hazards associated with high pressures.
7. Describe extreme cold weather preparation and operation of the high pressure mud system.

G. Mud Tanks and Low Pressure System ..... 6 Hours

Outcome: ***Describe the operation and maintenance of the mud tanks and low pressure systems.***

1. Describe safety requirements for working with mud tanks and low pressure systems.
2. Describe low pressure mud pumps and their applications.
3. Describe low pressure pump maintenance requirements.
4. Describe safety considerations for working on low pressure pumps, including; working in the cellar and electrical safety.
5. Describe the operation of shale shaker, including; screen types and applications for screen types.
6. Describe shale shaker and screen maintenance requirements.
7. Describe operation and maintenance of degassers.
8. Describe mixing hopper maintenance.
9. Describe solids control equipment.
10. Describe the operation and maintenance requirements for solids control equipment.
11. Describe the inspection and repair procedures for low pressure hoses and connections.
12. Describe the operation and maintenance of centrifuge.
13. Describe extreme cold weather preparation and operation of the low pressure mud system.

H. Casing ..... 2 Hours

Outcome: ***Provide a brief overview of casing a well with emphasis on the role of the derrickhand.***

1. Describe the roles of derrickhand, drilling crew and specialist sub contractors for casing operations.
2. Describe the casing operation.
3. Describe the cementing operation and the role of the derrickhand when cementing casing.

I. Waste Management and Spill Response ..... 2 Hours

Outcome: ***Describe the applicable environmental protection requirements for the disposal and/or recycling of waste materials associated with drilling rigs.***

1. Describe what is meant by hazardous wastes as defined by environmental regulations.
2. Describe the importance of using environmentally sound practices and procedures.
3. Describe provincial regulatory requirements for oilfield waste management.
4. Describe initial spill containment procedures.

SECTION THREE: ..... FIRST LINE BLOWOUT PREVENTION..... 28 HOURS

(NOTE: First line BOP training and certification is required for all drillers, training and certification has been developed by Enform and approved for all provinces, obtaining a first line certificate is not a requirement for completing apprenticeship training, having the knowledge to be able to pass the certification exam is part of the requirements for completing apprenticeship training.)

A. First Line Blowout Prevention – Part A ..... 6 Hours

Outcome: Be able to obtain first line BOP certification.

1. Describe the causes and consequences of a blowout.
2. Explain the blowout prevention drill requirements.
3. Explain the purpose of the drilling programs.
4. Explain the need for crew training in relation to well control.
5. Describe the required BOP stack components.
6. Describe other common BOP components.

B. First Line Blowout Prevention – Part B ..... 6 Hours

Outcome: Be able to obtain first line BOP certification.

1. Explain pressure test procedures, such as testing equipment and pressure tests.
2. Identify special purpose preventers, such as the diverter system for surface holes, rotating heads and the rotating annular preventer.
3. Identify control units, such as accumulators, recharge pumps, fluid reservoir, nitrogen back up and the controls.
4. Explain accumulator requirements, such as volume, volume/pressure graph and nitrogen back up requirements according to regulations.
5. Describe the functions of kick detection equipment, such as pit level monitors, gas detectors, trip tanks and gauges, trip tank volume and trip sheet.

C. First Line Blowout Prevention – Part C ..... 6 Hours

Outcome: Be able to obtain first line BOP certification.

1. Explain hydrostatic pressure.
2. Explain formation pressure including normally pressured formations, abnormally pressured formations and sub-normally pressured formations.
3. Explain crucial pressures including pressure gradients, overburden pressure, differential column pressure, surge pressure, swab pressure, circulating pressures and bottom hole pressures.
4. Describe tripping, dry strands and wet strands
5. Explain Boyle's Law and pressure inversion.
6. Explain leak-off and formation integrity tests to obtain maximum allowable casing pressure (MACP).

D. First Line Blowout Prevention – Part D ..... 6 Hours

Outcome: Be able to obtain first line BOP certification.

1. Describe the causes of kicks.
2. List the kick warning signs.

3. Explain the flow checks and shut-in procedures while drilling.
4. Explain the flow checks and shut-in procedures while tripping.
5. Explain the flow checks and shut in procedures while out of the hole.
6. List the pre-recorded information required.
7. Explain the well control procedure while drilling.
8. Describe the low choke and other well control methods.
9. Explain the well control procedure while tripping, stripping and snubbing.

E. First Line Blowout Prevention – Part E ..... 4 Hours

Outcome: Be able to obtain first line BOP certification.

1. Identify abbreviations and formulas introduced in the rig technician program and be able to use tables supplied in the second period of the program.
2. Identify tables used in well control.
3. Identify pill pumping procedures.

SECTION FOUR: ..... DERRICK ..... 14 HOURS

A. Derrick Equipment ..... 3 Hours

Outcome: Describe rigging up, operation and rigging down of the derrick and related equipment including maintenance requirements.

1. Describe derrick inspection and maintenance.
2. Describe the Canadian Association of Drilling Contractors (CAODC) recommended practices for overhead equipment and maintenance.
3. Describe how certain operations will affect derrick condition, maintenance and need for inspection.

B. Derrick Safety ..... 4 Hours

Outcome: Work safely on the derrick.

1. Describe the considerations for working at heights and securing tools and equipment.
2. Describe the use of personal protection equipment when working at heights.

C. Rig Up and Rig Down ..... 4 Hours

Outcome: Describe a rig move from the perspective of the derrickhand.

1. Describe the role of the derrickhand on rig moves.

1. Describe the process and the roles of crew members for rig move.
2. Describe how equipment is prepared for a move.
3. Describe how buildings and equipment are picked up, transported and spotted.
4. Describe how to use the CAODC rig move manual as a reference during rig moves.

D. Tripping ..... 3 Hours

Outcome: Describe the role of the derrickhand when tripping.

1. Describe preparation for tripping.

2. Describe equipment readiness check and safety inspection.
3. Describe procedure for mixing and pumping a pill.
4. Describe cold weather preparation for tripping.
5. Describe hand signals or other communication method between hands on derrick and driller.
6. List considerations for latching and unlatching elevators on tall pipe stands.
7. Describe the proper procedure for racking, storing, selecting and running drill pipe and collars, watching for snags, lanyard and rope condition, knots.

THIRD PERIOD TECHNICAL TRAINING
RIG TECHNICIAN TRADE
COURSE OUTLINE

UPON SUCCESSFUL COMPLETION OF THIS PROGRAM THE APPRENTICE SHOULD BE ABLE TO PERFORM THE FOLLOWING OUTCOMES AND OBJECTIVES.

SECTION ONE: .....LEADERSHIP, COMMUNICATION & SAFETY MANAGEMENT ..... 26 HOURS

A. Written Reports and Forms .....3 Hours

Outcome: ***Complete and keep track of the correspondence, forms and reports related to operating a drilling rig.***

1. Explain the purpose of the tour sheet.
2. Complete the hole fill sheets.
3. Describe the importance of an accurate pipe tally.
4. Review the motor's log for completeness and accuracy.
5. Describe how a work permit should be written using a standard form, including the appropriate content for a work permit.
6. Write a work permit that clearly defines the limits of the permit.
7. Describe standard forms of business communication applicable to the rig, and the appropriate application for each type.
8. Describe electronic/digital forms of communication commonly used on a rig and general principles of appropriate use for electronic communication.
9. Describe how to handle internal bulletins and memos on the rig (filing, posting, responding, etc.)
10. Describe the importance of timely completion of reports, such as safety or environmental reports.
11. Compose a typical report of approximately 500 words.

B. Managing People .....11 Hours

Outcome: ***Describe the responsibilities, and be able to act as an effective crew leader for the drilling rig.***

1. Describe orientation of new crew members; for a new hand and for an experienced hand, new to crew.
2. Assess worker competency; prescribe and arrange for training if required.
3. Describe how to conduct an effective meeting with crew members (e.g. drilling plan, safety meetings).
4. Describe how to go through the drilling plan with the crew.
5. Describe the use of questions and feedback can assist in assessing worker competency.
6. Communicate expectations clearly.
7. Conduct or lead required drills.
8. Describe 'succession', how to prepare selected crew members for leadership positions.
9. When a driller is acting rig manager, describe the communication issues that they may be faced with.

C. Safety Management ..... 4 Hours

Outcome: ***Describe the roles and responsibilities of the driller for the overall safety of the rig.***

1. Organize scheduled safety meetings.
2. Assess individual crew safety and well control training needs.
3. Observe crew readiness.
4. Perform PPE and clothing checks for crew and other personnel working on the rig.
5. Ensure that crew training is up to date, including certificate expiry dates.
6. Train or delegate training for crew members who need safety or equipment training.
7. Describe the conducting of safety drills for various situations.
8. Model ideal behaviour for the crew.
9. Describe procedures for ensuring that safety standards are met by all crew members.
10. Describe the meaning of ‘due diligence’.
11. Describe the OH&S regulations for the legal responsibilities of the crew leader for crew safety at work.
12. Understand and perform risk management.

D. Incident Investigation and Loss Control. ..... 8 Hours

Outcome: ***Using case studies conduct a systematic incident investigation that will be an effective tool for prevention of similar incidents in the future.***

1. Define loss control.
2. Describe the purpose of loss control (prevention of future incidents, not assigning blame.
3. Using one or more case studies, perform the tasks involved in incident investigation and loss control.
4. Describe how feedback is used for understanding.
5. Record critical information quickly in writing.
6. Use visual aids, including photographs, to describe an incident.
7. Describe basic rules for composing a photograph.
8. Use re-enactment sparingly and carefully.
9. Describe how communication lines are kept open.
10. Analyze and evaluates all significant causes.
11. Use cause and effect to determine how the incident occurred.
12. Document using written reports.
13. Develop remedial actions.
14. Consider alternative controls.
15. Describe how to decrease the likelihood of occurrence.
16. Describe how to reduce the potential severity of loss.
17. Describe immediate temporary actions.
18. Describe permanent actions to take as soon as possible.
19. Describe consultation with superiors as required, describe when to ask.

SECTION TWO: .....SECOND LINE WELL CONTROL ..... 30 HOURS

(Note: Second Line Supervisors Well Control training and certification is available for all drillers, training and certification has been developed by Enform and approved by all provinces, obtaining a SLSWC certificate is not a requirement for completing apprenticeship training, having the basic knowledge is part of the requirements for completing apprenticeship training.)

A. Second Line Well Control Part A .....6 Hours

Outcome: Be able to obtain second line supervisors well control certification.

1. Explain primary pressures associated with drilling operations.
2. Explain secondary pressures associated with drilling operations.
3. Explain how factors affect maximum allowable casing pressure.
4. Explain accumulator design, sizing and the applicable regulatory requirements.

B. Second Line Well Control Part B .....6 Hours

Outcome: Be able to obtain second line supervisors well control certification.

1. Explain primary, secondary and tertiary levels of well control.
2. Describe the secondary methods of well control and complete Well Control Kill Sheets for the four secondary methods.
3. Perform the calculation used to determine the allowable amount of MACP that can be exceeded.
4. Differentiate the advantages and disadvantages associated with each of the secondary methods of well control.
5. Explain trouble shooting methods used when using the Driller's Method of well control.

C. Second Line Well Control Part C .....6 Hours

Outcome: Be able to obtain second line supervisors well control certification.

1. Explain unusual well control operations.
2. Explain under-balanced and lateral drilling.
3. Explain critical sour wells.

D. Second Line Well Control Part D .....6 Hours

Outcome: Be able to obtain second line supervisors well control certification.

1. Explain the dynamics of Case Studies 1 through 8.
2. Explain management's responsibilities.
3. Describe gauges and sending units.
4. Explain leak-off tests
5. Explain pressure integrity tests (Enform).
6. Describe causes of kicks and shut in procedures.

E. Second Line Well Control Part E.....6 Hours

Outcome: Be able to obtain second line supervisors well control certification.

1. Know the general acronyms used in well control.

2. Interpret and use the different well control formulas and tables.

SECTION THREE: .....RIG OPERATIONS ..... 34 HOURS

A. Rig Boilers – Part A .....4 Hours

Outcome: Be able to obtain provincial rig boiler certification.

1. Explain boiler regulations and certification.
2. Explain the basic principles of boilers.
3. Explain the design and types of well-site boilers
4. Explain how a boiler operates and how it is made.

B. Rig Boilers – Part B .....4 Hours

Outcome: Be able to obtain provincial rig boiler certification.

1. Describe combustion control and firing equipment, fuel oils, theory of combustion, combustion system components and draft.
2. Identify the various automatic controls and safety devices used on modern well-site boilers.

C. Rig Boilers – Part C .....4 Hours

Outcome: Be able to obtain provincial rig boiler certification.

1. Describe boiler water treatment, water impurities, water treatment and testing methods.
2. Describe how pumps and injectors work on a boiler.

D. Rig Boilers – Part D. .....4 Hours

Outcome: Be able to obtain provincial rig boiler certification.

1. Set up boiler for operation.
2. Prevent fires and safety hazards around boilers.
3. Use fire prevention hardware.

E. Console Controls.....4 Hours

Outcome: Describe the purpose and function of the controls and instruments of standard drilling console types.

1. Describe the instruments and controls of the drilling console.
2. Describe the instruments, their calibrations and interpret readings.

F. Console Operation.....4 Hours

Outcome: Describe the operation of standard drilling console types.

1. Describe brake operation.
2. Describe typical top drive console.
3. Describe crown saver operation.
4. Explain the relationship between torque, gearing and drilling speed.
5. Describe proper application of the clutch and transmission.

G. Drilling Calculations ..... 6 Hours

Outcome: ***Be able to perform drilling calculations and describe their purpose.***

1. Calculate an accurate pipe tally; give examples of problems caused by errors.
2. Calculate mud circulating system pressures.
3. Calculate mega joules for slip and cut.
4. Calculate maximum weight on bit.
5. Calculate hole volume.
6. Calculate casing cement displacement.

H. Drawworks ..... 2 Hours

Outcome: ***Provide a detailed description of the operation and maintenance of the drawworks.***

1. Be able to evaluate condition of the drawworks.
2. Describe drawworks rating and the relationship of the ratings of all rig components to the overall rating of the rig.
3. Describe drawworks maintenance and troubleshooting.

I. Managing Rig Moves ..... 2 Hours

Outcome: ***Manage a rig move efficiently.***

1. Describe the role of the driller in rig moves.
2. Describe the purpose and content of the Rig Move Manual.
3. Describe the purpose and content of the Rig Move Manual.
   a) who is in charge at each stage
   b) who should be giving orders to whom
4. Describe the hazards associated with rig moves and how to address them (e.g. pre-job meeting).
5. Describe importance of ensuring the crew is ready when needed at each stage of the move.
6. Describe the importance of electrical grounding as it applies to drilling rigs and equipment.
7. Describe checking drilling line.
8. Describe visual inspection of the derrick and other structural components for signs of structural damage or failure (e.g. flaking paint indicates possible weld failure).
9. Describe pick up and placement of components – buildings, weight and handling issues, use of rig diagram.
10. Describe importance of first mat placement or drilling of rat hole.

SECTION FOUR: ..... DRILLING OPERATIONS ..... 30 HOURS

A. Operating Floor Equipment ..... 5 Hours

Outcome: ***Provide a detailed description of the equipment used for drilling the main hole.***

1. Describe the operation, inspection, rating and maintenance of the equipment used for drilling the main hole.

2. Describe testing and certification requirements for overhead equipment; inspection schedules, tracking hours and magnafluxing – non destructive testing.
3. Describe slip and cut procedure.
4. Describe operation of; pneumatic, hydraulic and electric equipment.
5. Describe how control systems work.
6. Describe the purpose of planned preventative maintenance.

B. Drilling Tools.....6 Hours

Outcome: Describe the specialty drilling tools and their application.

1. Describe special drilling tools (including those supplied by others).
2. Describe drilling tool assembly.
3. Describe drill bit types and bit grading.
4. Describe drill bit optimization.

C. Tubular Operations.....6 Hours

Outcome: Provide a detailed description on the deployment and handling of tubulars.

1. Describe pipe inspection and downgrading.
2. List and describe pipe down grading factors.
3. Describe thread types and characteristics of thread types.
4. Describe proper handling and the effect of improper handling on pipe characteristics.
5. Describe how to break in new pipe.
6. Describe visual inspection of pipe for damage.
7. Describe the effects of improper pipe handling.
8. Describe the effects of tool condition, hard banding, galling, etc.
9. Describe using supplier provided inspection manuals.

D. Drilling.....10 Hours

Outcome: Provide a detailed description of the drilling process.

1. Describe the operation of the well survey tools in common use.
2. Describe how the main hole is surveyed for deviation.
3. Describe methods to correct for deviations.
4. Describe fishing operations.
5. Describe washouts and how to deal with them.
6. Describe the equipment and procedures for conducting the Drill Stem Test (DST).
7. Describe tight hole problems.
8. Describe loss of circulation, including the effects of circulation loss and combating circulation loss.

E. Casing ..... 3 Hours

Outcome: ***Provide detailed description of the procedures, materials and equipment used for casing the well.***

1. Describe casing string design.
2. Describe how casing is matched to well control equipment.
3. Describe the differences between casing and tubular.
4. Describe the various characteristics of casing cements.
5. Describe cement slurry design.
6. Describe annular spacers and special cements.
7. Describe tying down casing.

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