Ontario

On-site Orientation

Hydraulic Excavator Operator

Ministry of Training, Colleges and Universities

On-Site Orientation

Hydraulic Excavator Operator

Program/Programme #P600102

Development Date: October 2008
Printing Date: April 2009

CONTENTS **PAGE**

PREFACE

The Workplace Training Branch of the Ministry of Training, Colleges and Universities (MTCU) developed this equipment-specific orientation/training document, in consultation with representatives from the logging industry. It is intended to be used by employers for on-site orientation/training of their workers/trainees before registration to the on-the job training or operating the machine related to their duties.

The care and maintenance of this document is the joint responsibility of the worker/trainee and the employer. The document is an official record of a worker's/trainee's orientation/training.

Employers or designates and workers/trainees are required to attest to successful on-site machine specific orientation/training by filling their names in the appropriate lines on page 6.

NOTICE/DECLARATION FOR COLLECTION OF PERSONAL INFORMATION

1. This information is collected under the authority of the Order-In-Council Number 701/85.

2. The information is collected for the purpose of administering this modular training program within the Province of Ontario.

3. Questions regarding collection and use of this information may be directed to:

Director
Ministry of Training, Colleges and Universities
Service Delivery Branch
33 Bloor St. E 2nd Floor
Toronto, Ontario
M7A 2S3
(416) 326-5605

NOTE

This guide and checklist is designed to refer employers and employees to the most obvious and critical component in each skill area. However, since machine model and make vary greatly, the primary reference material for specific machine safety related operating requirements should be the operator's manual supplied by the manufacturer of the particular machine in question

Employer Information:

Company: _____

Address: _____

_____

Telephone: _____

Completed On-site Orientation Checklist: Worker and Employer/Designate Verification:

Inspect workplace for hazardous and/or potential hazardous conditions
Verify zero energy state
Identify hydraulic excavator components and terminology
Conduct circle check
Perform visual and operational checks of attachments and moving components for fluid leaks and damage
Travel with hydraulic excavator
Perform site planning and set up
Observe machine limitations
Observe danger zone
Shut down hydraulic excavator
Refuel hydraulic excavator
Perform minor maintenance and adjustments

Worker Name (Please Print*)*: _____

Worker Signature: _____

Date of Completion: _____

Employer/Designate (Please print): _____

Employer/Designate Signature: _____

INSPECT WORKPLACE FOR HAZARDOUS AND/OR POTENTIAL HAZARDOUS CONDITIONS

Performance Objective

Inspect workplace for hazardous and/or potentially hazardous conditions, including: unauthorized personnel and/or equipment; removing and/or guarding hazards and/or potential hazards; according to legislative requirements, manufacturer specifications and recommendations.

Guidelines for Performance Objective:

1. Ensure that there is no unauthorized personnel in the work area. Access to the entire area must be guarded and controlled.

2. Review potential hazards such as under cut, overburden, angle of repose, and height of face. Height of working face of gravel pit or sand pit presents a risk to workers even if they are not working on top of it. Absolutely no undercutting of the working face is permitted. If the sand or gravel is being removed by powered equipment, the working face must be sloped at its angle of repose and the vertical height of the face must not be more than 1.5 metres above the maximum reach of the equipment. Identify and report hazards such as unstable ground.

Component Checklist:

- ❑ Unauthorized personnel and equipment
- ❑ Undercut
- ❑ Overburden
- ❑ Angle of repose
- ❑ Height of face
- ❑ Unstable ground

VERIFY ZERO ENERGY STATE

Performance Objective

Verify zero energy state, by lowering hydraulic components to the ground or rest position, turn electrical switches and engine off, according to legislative requirements and manufacturer specifications and established lockout procedures, in order to protect self and others during inspection and maintenance.

Guidelines for Performance Objective:

The machine must be immobilized and all moving parts de-energized before an operator can begin to work close to the machine and its components. Most importantly all hydraulic implements must be lowered (or blocked). Follow lockout procedure

NOTE: Check with your manufacturer supplied operator's manual and immediate supervisor regarding correct procedures to apply the step by step lockout and verification procedure for your operation. Machines of different model or manufacturer may have different steps and requirements. The above is essential to ensure the safety of the operator and co-workers, as well as to confirm zero energy state prior to initiating the circle check procedures and other maintenance and trouble shooting functions. Operators must have proper out-of-the-cab PPE *e.g.* -safety boots laced to the top, hard hat, high visibility vest or clothing, as well as hand, hearing, and eye protection where required.

Component Checklist:

- ❑ Lower boom to the rest position to manufacturer specifications.
- ❑ Disengage pilot control.
- ❑ Put engine in idle (cool down).
- ❑ Turn engine off.
- ❑ Turn master key off.

IDENTIFY HYDRAULIC EXCAVATOR COMPONENTS AND TERMINOLOGY

Performance Objective

Identify hydraulic excavator components and terminology, visually and verbally, as described in the manufacturer manual, in order to ensure safe and efficient operation and maintenance. (Employer, supervisor or trainer refer to manufacturer manual to provide specifics regarding each component identified)

Guidelines for Performance Objective:

Having an understanding of the terminology used to describe major components is a vital part of using the manufacturer manual effectively and ensuring that such things as safety information, maintenance schedules, machine capacities and operating directions are understood and correctly applied. Reviewing the major (key) components from the machine manufacturer manual will assist the operator in identifying the key components, knowing their location on the machine and describing their purpose. (see appropriate pages in machine manufacturer manual for specific terminology and diagrams)

Component Checklist:

- ❑ Boom and hydraulic cylinders.
- ❑ Carriage and components (tires and tire chains or tracks).
- ❑ Cab and operator controls and escape hatch.
- ❑ Bucket.
- ❑ Chuck blade.
- ❑ Thumb.
- ❑ Turntable and cab levelers.
- ❑ Engine.
- ❑ Hydraulic pumps.
- ❑ Fire suppression system.

CONDUCT CIRCLE CHECK

Performance Objective

Perform visual and operational checks of attachments; ensuring that all attachments are lowered to the ground or in the rest position and the machine is properly shut down prior to initiating the circle check procedure. All substandard conditions and problems must be reported to the immediate supervisor. The circle check must be conducted at the beginning of each shift.

NOTE: Operators must have proper out-of-the-cab PPE e.g. - safety boots laced to the top, hard hat, high visibility vest or clothing, as well as hand, hearing and eye protection where required.

Guidelines for Performance Objective:

1. Cracks: Explain how to check and identify cracks and point out common locations where cracks may form (stress points). Point out that repairs must be done as soon as possible to prevent costly breakdowns and to prevent even further damage or the potential of injury to the operator and others.

2. Leaks: Show the locations where leaks (hydraulic fluid, brake fluid, fuel) can occur. Explain that leaks can lead to further more serious problems, cause fires or damage the environment. Leaks can also cause slip and fall injuries to operator and others due to fluid on machine. Explain the danger of checking for leaks where fluid is under high pressure (e.g. hydraulic fluid) and the proper method for checking.

3. Grease fittings: Identify the location (including remote connections), condition and purpose of grease fittings as described in the routine maintenance section of the owner's manual. Check to ensure they are in good condition and connected properly. Excessive grease build-up should be cleaned regularly to prevent the potential of slips and falls and fire.

4. Tracks, pads and pad bolts*:* Ensure adequate tension and proper adjustment of the tracks. Check for loose, worn, damaged or missing pads, bolts, grousers, idlers and main pins. Examine the condition of pins and bushings including the locking device on pins and watch for signs of wear or breakage of pins and bushings.

5. Tires, wheels, and tracks chains***:*** Explain the requirements for correct pressure, adequate tread, no punctures or defects, rim in good condition, cap on valve stem. Follow the manufacturer guidelines when inflating/deflating tires. Ensure that chains are properly installed and tightened. If too loose, debris can be caught in chains and thrown out with considerable force. Watch for excessive wear, missing or damaged clevis pieces or loose parts of the chain. Also check for loose or missing wheel lugs.

6. Engine/manifold area*:* Check engine compartment and exhaust manifold/turbo for debris. Check and remove debris from engine compartment to reduce the potential for fire, pay particular attention to the exhaust manifold/turbo area. *NOTE:* When checking and identifying hydraulic hose requirements, the operator must be familiar with the type of hose fittings. (3 types - GIC, OFS and Pipe Thread)

7. Gull wings*:* Engage safety latch for gull wings (where applicable) Check to ensure latch is properly secured to ensure operator safety.

8. Pins and Bushings*:* Examine holding pins and bushings for damage; ensure they're engaged properly and in place.

9. Check fluid levels*:* Identify location of site glass and/or dip stick/cap and filler locations and check for proper levels. Keep areas clean of debris, spilled fluids and grease build-up. Determine and confirm type of fluid at each filling location. Follow manufacturer guidelines for proper checking procedures of pressurized systems and know the hazards of hot fluids. No smoking during these procedures. When checking and identifying hydraulic hose requirements, the operator must be familiar with the types of hose fittings. (3 types - GIC, OFS and Pipe Thread)

10. Boom and lift cylinders*:* Check for cracks, condition of pins (locks), and the condition of cylinders keeping an eye out for leaks, damaged grease fittings, hoses, and bolts on turntable.

11. Bucket: Examine bucket for cracks and defects, ensure all teeth are in place and in good condition, and look for excessive wear of the shanks.

12. Condition of guards, catwalks, handholds and steps*:* Examine all guards to ensure that they are properly installed and in good condition. Do not operate without guards installed. Check the condition of all handholds, steps and walkways to ensure that they are not damaged and free from debris, ice snow, grease and oil.

13. Fire extinguisher and fire suppression system*:* Operators must know how to access equipment and how to use it. Check daily to ensure a proper charge, maintenance tag is updated, the pin is in place and device is properly secured in cab. A full water pack in working condition is required for fire season. For machines equipped with a fire suppression system, know the location(s) of activation plungers and ensure they are in good condition. Check outlets for good condition.

14. Escape hatch*:* The operator must know the location of the escape hatch and procedure to exit. Check to ensure that the hatch opens and, the latches, hinges, handles, and pins are in good condition, and the procedure to exit..

15. Seat belt*:* Examine seat belt to ensure that it is in good working condition (wear, anchors, frayed, buckle works freely).

16. Lights: Turn on all lights to check that they are in good working order. If guarded, make sure the guards are in place, the lenses are cleaned and wiring harnesses are intact.

17. Windows/doors: Examine windows and door to ensure they are clean and in good condition. Broken or missing windows must be reported and repaired. Check to see door opens and closes properly. Make sure wipers and wiper blades are in working order, and that window guards/screens (if equipped) are properly installed.

18. Housekeeping and loose equipment in cab*:* Keep all tools outside the cab or properly secured in the cab. No loose items in the cab. Keep floor clean and air conditioning/heater filters clear of materials. Aerosol containers should be secured and away from heat sources.

19. Radio communications*:* Check the radio to ensure that it is in good working order and equipped for channels used in your area (if applicable).

20. First-Aid Kit: Know the location, condition and required contents of the first aid kit. It should be easily accessible.

21. Spill Kit*:* Know the location, condition, how to use it, required contents of the spill kit. It should be easily accessible.

Component Checklist*:*

- ❑ Check for cracks and leaks.
- ❑ Identify grease fittings.
- ❑ Check tire/track components condition.
- ❑ Check engine compartment and manifold for debris.
- ❑ Check condition of pins and bushings.
- ❑ Check fluid levels.
- ❑ Check condition of bucket and teeth.
- ❑ Check condition of boom and lift cylinders.
- ❑ Check condition of guards, handholds and steps.
- ❑ Check condition of fire extinguisher and fire suppression system.
- ❑ Check condition of escape hatch.
- ❑ Check condition of seat belt.
- ❑ Check lights.
- ❑ Check condition of windows, wipers and guards.
- ❑ Check housekeeping and remove, or properly stow loose equipment in cab.
- ❑ Check radio communication (if applicable).
- ❑ Check first-aid kit.
- ❑ Check spill kit.

PERFORM VISUAL AND OPERATIONAL CHECKS OF ATTACHMENTS AND MOVING

Performance Objective

Check bucket attachments for proper operation, fluid leaks and damage, according to manufacturer specifications, in order to ensure safe and efficient operation of equipment.

Guidelines for Performance Objective:

Activate pilot system and operate controls: Check for bent or damaged arms. Check the danger zone to ensure it is free of co-workers or other equipment prior to activating the system. If the arms bind or are damaged, report immediately to your supervisor.

Component Checklist:

- ❑ Activate pilot system and operate controls to check for bent or damaged arms.
- ❑ Check bucket and teeth for damage.

PERFORM VISUAL AND OPERATIONAL CHECKS OF ATTACHMENTS AND MOVING COMPONENTS FOR FLUID LEAKS AND DAMAGE

Performance Objective

Check attachments for proper operation, fluid leaks and damage, according to manufacturer specifications, in order to ensure safe and efficient operation of equipment

Guidelines for Performance Objective:

1. Activate parking brake and/or hydraulic/transmission interlocks*:* Check the danger zone to ensure it is free of co-workers or other equipment prior to activating the system. Check for proper operation of components. If defects are detected report immediately to your supervisor.

2. Check attachments for damage*:* Make sure the attachments are not damaged and that no leaks are apparent.

3. With the transmission locked or in neutral**,** all controls in the rest position, engine running, lights turned on and emergency braking applied, dismount from cab using 3-point contact, complete one more walk around the machine, checking for fluid leaks or other obvious damage.

Component Checklist:

- Activate parking brake and/or hydraulic/transmission interlocks
- Check attachments for damage and leaks. Identify grader components and terminology, visually and verbally, as described in the manufacturer manual, in order to ensure safe and efficient operation and maintenance. (Employer, supervisor or trainer refer to manufacturer manual to provide specifics regarding each component identified)
- Visual inspection, when walking around machine, with engine running.

TRAVEL WITH HYDRAULIC EXCAVATOR

Performance Objective

Prepare machine for travel by placing attachments in travel position. Adjust appropriate speed according to manufacturer specifications to protect self and others and to prevent damage to equipment.

Guidelines for Performance Objective:

1. Place bucket and boom in the travel position: The bucket and boom should be maintained in a position not to impede visibility by maintaining an appropriate height.

2. Select speed appropriate to ground conditions while maintaining control of the machine. Maintain a speed and engine RPM that allows the operator to maintain full control of the machine at all times taking into consideration ground conditions, weather, etc.

3. Maintain control, travel at a safe speed and keep right on roadways or on route to landing to ensure public safety. Beware of local traffic while traveling and observe traffic and warning signs posted within work area. Keep speed appropriate to road conditions, weather, volume of traffic and seasonal conditions (dust, weather, etc.). Be aware of soft shoulders.

4. Maintain communication with other equipment operators (if applicable). Check to ensure your radio is in good working order and proper channel is used. Monitor the local channel for traffic (if applicable). Check with your immediate supervisor for communication protocol within your work area.

5. Passing Protocol when operating hydraulic excavator on the road, ensure that the bucket is on ground and the throttle is at idle and with pilot system is disengaged when allowing traffic to pass.

Component Checklist:

- ❑ Place boom in travel position.
- ❑ Select a speed appropriate to ground conditions while maintaining control of machine.
- ❑ Maintain control, travel at a safe speed and keep right while traveling on the roadway or on route to and from the work site while maintaining radio communication to ensure public safety.
- ❑ Maintain communication with other operators.

PERFORM SITE PLANNING AND SET UP

Performance Objective

Plan and organize excavating pattern, using maps, photographs, and established road/pit boundaries, in order to facilitate material extraction and minimizing ground disturbances. Evaluate and recognize ground conditions by observing changes in terrain and weather conditions, in order to prevent equipment and environmental damage and to protect self and others. Observe road/pit boundaries, according to pre-established prescriptions and legislative requirements in order to prevent entry into protected and non-allocated areas.

Guidelines for Performance Objective:

1. Identify excavating pattern: Check with your immediate supervisor to determine any environmental or other concerns utilizing maps, photographs and established road/pit boundaries to assist you. Be aware of any potential hazards in the immediate area (*i.e.* chicots, hang-ups, terrain, traffic or other equipment, power lines, etc.).

2. Identify travel route*:* Check with your immediate supervisor and/or cross-shift operator regarding hazardous terrain that must be taken into consideration (*i.e*. Rough terrain, wet areas, etc).

3. Minimize rutting and ground disturbances: Be aware of ground disturbances guidelines for your operation and if unsure check with your immediate supervisor.

4. Maintain a safe operating distance between neighboring equipment*:* Be aware of other equipment working in your work area. Check with your immediate supervisor and co-workers to identify appropriate danger zones for your operation. Follow the danger zone communication rules for your operation.

5. Operate equipment within identified boundaries: Check with your immediate supervisor in relation to boundary identification rules. (*i.e.* colour of ribbon used to identify concerns and boundaries). Observe established rules and if unsure confirm with your immediate supervisor.

6. Excavating on hill*:* Excavating on inclines should be conducted in direction of slope to reduce potential of roll over. Excavatin*g* should be conducted straight up and down on steep hills. Travel on hills should be performed as per manufacturer specifications. The operator must maintain a low centre of gravity with the load in the bucket kept low to ground. Avoid traveling over high stumps and rocks. Discuss ground condition concerns with your immediate supervisor or the previous shift co-worker at beginning of each shift.

7. Maintain boom to high side when excavating on a slope: This practice reduces the potential for machine roll over by maintaining a stable centre of gravity.

8. Seasonal concerns (winter, summer) requires extra caution be exercised due to poor visibility and hidden hazards. Be aware of these hidden hazards due to seasonal conditions (*i.e.* ditches along roadways frozen/covered with snow, culverts hidden by snow, hidden areas of concerns such as recently planted areas, hidden rock outcrops/cliffs, etc.) In summer, heavy underbrush results in poor visibility and hides hazards such as cliffs, mining holes, etc. Summer conditions

pose a hazard of fire being ignited due to machine tracks on rocks. Operators must be on the look out for ignition of underbrush. Caution should be exercised when working in soft ground conditions. There may be many techniques used for road building/ excavating on soft ground. Refer to operator's manual.

Component Checklist:

- Identify excavating pattern.
- Identify travel route (considering hills, swamps, etc).
- Minimize rutting and ground disturbance.
- Maintain a safe operating distance between neighboring equipment (review manufacturer danger zone requirements and identify site specific hazards).
- Excavating on hills should be conducted in direction of slope to reduce potential of roll over.
- Maintain boom to high side when excavating on a slope.
- Seasonal concerns (winter, summer) require extra caution due to poor visibility and hidden hazards.
- Adjust material weight taking into consideration ground conditions.
- Operate equipment within identified road/pit boundaries (if in question immediately contact your supervisor).

OBSERVE MACHINE LIMITATIONS

Performance Objective

Observe machine limitations according to manufacturer specifications by identifying equipment load chart, recognizing conditions that affect machine capabilities such as steep terrain, boom over extension, in order to protect self and others and prevent equipment damage.

Guidelines for Performance Objective:

1. Apply the manufacturer standards for machine capacity and limitations in determining the size of load, keeping in mind ground conditions and slopes.

2. Maintaining the boom position close to the machine and low to the ground to avoid damage to the machine or possible roll over.

3. Minimizing the boom extension in order to maximize available power and efficiency.

Component Checklist:

- Understand the load limitation of the machine according to ground conditions (maintain full ground contact at all times).
- Keep boom as close to the machine and as low to the ground as possible, while observing obstructions, during the process of excavating.
- Minimize boom over extension to maximize machine power and efficiency.

OBSERVE DANGER ZONE

Performance Objective

Observe danger zone by keeping a safe distance between self, others and equipment, recognizing potential hazards from falling trees, limited visibility and blind spots, according to manufacturer specifications, legislative requirements and established procedures, in order to protect self and others and prevent damage to equipment.

Guidelines for Performance Objective:

Review danger zone requirements and identify site-specific hazards. Know the danger zone as it applies to other equipment and operating equipment near other workers. Consult operator's manual for recommended danger zone for this equipment.

Component Checklist:

- ❑ Maintain a safe operating distance between other equipment (review manufactures danger zone requirements and identify site specific hazards).

SHUT DOWN AND IMMOBILIZE HYDRAULIC EXCAVATOR

Performance Objective

Shut down and immobilize hydraulic excavator according to manufacturer specifications and requirements.

Guidelines for Performance Objective:

Lower boom to the ground**:** Park machine on level bare mineral soil and lower boom while positioning cab to facilitate safe and effective dismount. Shut down machine as per manufacturer specifications. Maintain 3-point contact during dismount.

Component Checklist:

- Lower boom to the ground.
- Shut down procedures.
- Safe dismount 3-point contact.

New: Installation of bridges and culverts:

Water crossing are to be performed as per Water Crossing Guidelines/Site Plan.

REFUEL HYDRAULIC EXCAVATOR

Performance Objective

Refuel hydraulic excavator, by monitoring ventilation levels; shutting off engine; maintaining the area free of smoking; and preventing spills or damage to the environment; according to legislative requirements, manufacturer specifications and recommendations.

Guidelines for Performance Objective:

1. Use caution when approaching fuel tank: to prevent damage to the fuel tank.

2. Shutdown hydraulic excavator: Follow previously noted shutdown procedures.

3. Fuelling procedures: Follow local fuelling procedures, no smoking, never leave the nozzle unattended; properly store the hose after use.

4. Always use 3-point contact.

Component Checklist:

- ❑ Use caution when approaching fuel tank
- ❑ Shut down procedures
- ❑ Fuelling procedures
- ❑ Safe dismount 3-point contact

PERFORM MINOR MAINTENANCE AND ADJUSTMENTS

Performance Objective

Perform minor maintenance and adjustment on the hydraulic excavator, after immobilizing (locking out) machine, lubricating equipment and attachment, maintaining fluid levels, ensuring replacement of belts and hoses, and checking and completing maintenance and/or deficiencies report, according to legislative requirements, manufacturer specifications and recommendations,

Guidelines for Performance Objective:

1. Shut down hydraulic excavator: Immobilize machine, lower attachments to the ground, shut down engine, and follow lock out procedures.

2. Lubricate/maintain fluid levels: following manufacturers' specifications for greasing. It is a good opportunity to check for cracks, leaks, wear in p*ins and* bushing**s.**

3. Report deficiencies: Complete report according to local procedures, perform repairs that you are qualified to do and/or report to the supervisor or mechanic or service person.

Component Checklist*:*

- ❑ Shut down hydraulic excavator and lock out
- ❑ Lubricate/maintain fluid levels
- ❑ Report deficiencies

NOTE: The following skill areas will be continuously discussed during the training process:

Perform excavating/trenching operations.
Perform grading operations.
Perform loading operations. (Never swing bucket over the cab of other equipment or co-workers)
Perform shuttling operations.
Perform ramp-building operations.
Perform stockpiling operations.
Perform backfilling operations.
Perform hoisting operations. (Only take direction from a competent person)