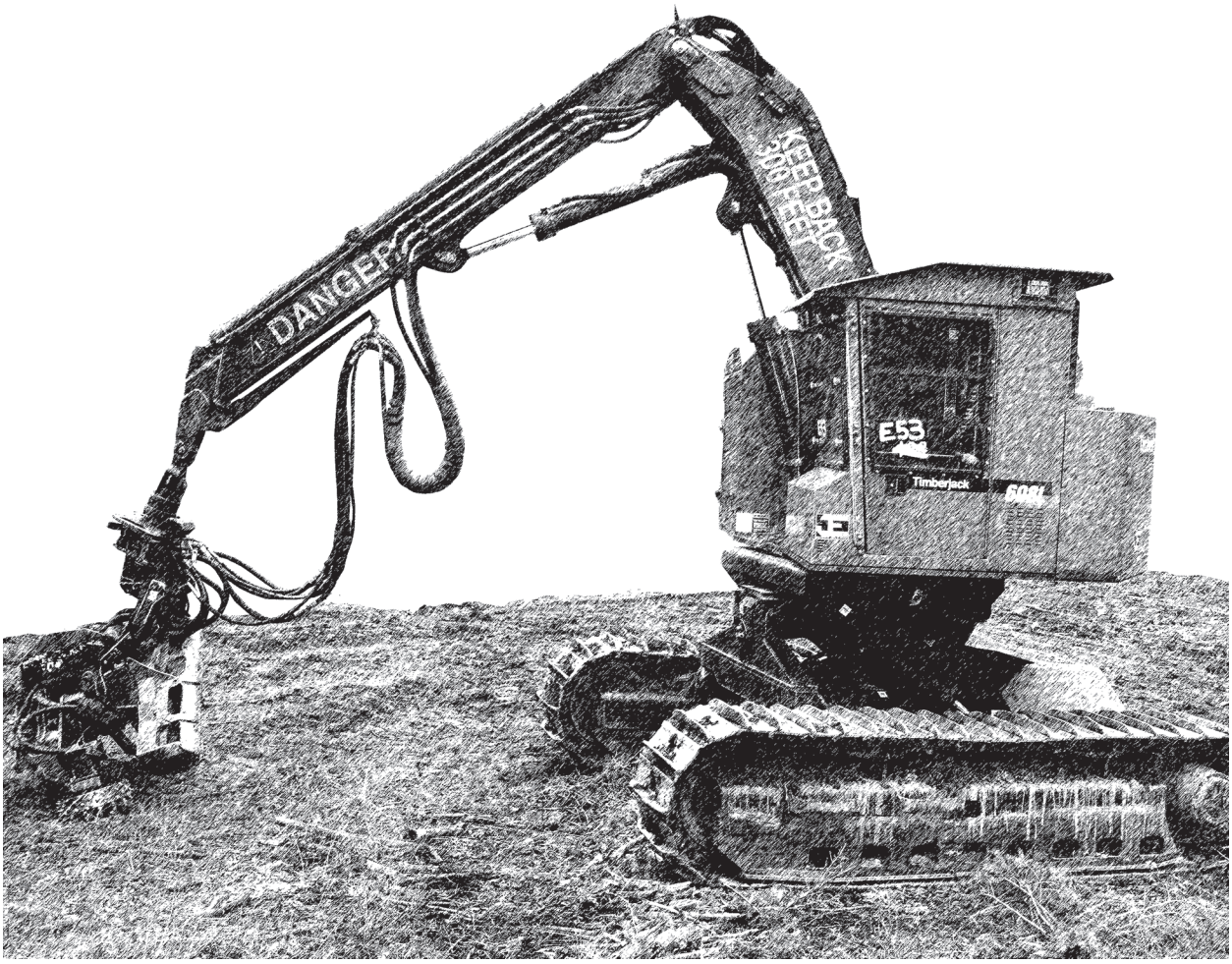
Heavy Equipment Boss
S-236



NATIONAL WILDFIRE COORDINATING GROUP™

NFES 002690

Student Workbook

June 2013

CERTIFICATION STATEMENT

on behalf of the

NATIONAL WILDFIRE COORDINATING GROUP

The following training material attains the standards prescribed for courses developed under the interagency curriculum established and coordinated by the National Wildfire Coordinating Group. The instruction is certified for interagency use and is known as:

Heavy Equipment Boss, S-236
Certified at Level I

This product is part of an established NWCG curriculum. It meets the requirements of the NWCG Curriculum Management Plan and has received a technical review and a professional edit.

NWCG Executive Board Chair

Date June 19, 2013

NWCG Training Branch Manager

Date June 18, 2013

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Sponsored for National Wildfire Coordinating Group (NWCG) publication by the NWCG Operations and Workforce Development Committee. Comments regarding the content of this publication should be directed to National Interagency Fire Center, NWCG Training Branch at BLM_FA_NWCG_Training@blm.gov.

To order additional copies of this publication, please refer to the annual *NFES Catalog Part 2: Publications* posted on the NWCG Web site at http://www.nwcg.gov.

Previous editions: this product replaces S-232, Dozer Boss (March 2006) and S-233, Tractor Plow Boss (August 2005)

PREFACE

Heavy Equipment Boss, S-236 is a *recommend* training course in the National Interagency Incident Management System: Wildland Fire Qualification System Guide (PMS 310-1).

This course was developed by an interagency group of subject matter experts with direction and guidance from the National Wildfire Coordinating Group (NWCG) Training Branch. The primary participants in this development effort were:

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NWCG TRAINING BRANCH

The NWCG appreciates the efforts of these personnel and all those who have contributed to the development of this training product.

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Heavy Equipment Boss, S-236

Unit 0 – Introduction

OBJECTIVES:

Upon completion of this unit, students will be able to:

1. Introduce the course coordinator, instructors, and students.
2. Discuss course logistics.
3. Provide a course overview.
4. Discuss course expectations.
5. Identify course reference materials.
6. Discuss position responsibilities.

I. WELCOME AND INTRODUCTIONS

- Name and job title
- Agency and home unit
- ICS qualifications
- Experience relative to the position as either a trainee or a trainer/coach, both positive and negative.

II. COURSE LOGISTICS

- Course agenda
- Sign-in sheet
- Breaks
- Facility locations (restrooms, vending machines, drinking fountains, smoking areas, evacuation policy, etc.)
- Message location
- Cell phone policy
- Local information (restaurants, local map, transportation)

III. COURSE OVERVIEW

This course is designed to meet the training needs of a Heavy Equipment Boss (HEQB) as outlined in the Wildland Fire Qualifications System Guide (PMS 310-1) and the position task book developed for the position.

A. Course Objectives

At the successful completion of this course, students will be able to:

1. Identify the administrative duties and procedures required of a HEQB.

2. Identify and demonstrate the heavy equipment inspection process and related duties of the HEQB.

3. Demonstrate the actions required of a heavy equipment boss to safely and effectively complete an assignment.

4. Discuss relevant information and methods for communication and tactics related to heavy equipment.

5. Identify the process of preparing for an all hazard assignment.

B. Instructional Methods

1. Facilitation and short lectures with PowerPoint presentations.

2. Discussion

3. Exercises

4. Field-day exercises

C. Evaluating Student Performance

To successfully complete the course, students must:

- Participate in all classroom discussions, exercises, and scenarios.
- Students must obtain a score of 70% or higher on the final exam to receive a certificate of completion for the course.

D. Student Training Course Evaluation Form

Students are given the opportunity to comment on the course, the units, and the quality of instruction at the end of the course.

E. Course Reference Materials

Below is a list of materials that are referenced throughout the course:

- Incident Response Pocket Guide (PMS 461)
- Wildland Fire Qualification System Guide (PMS 310-1)
- Interagency Standards for Fire and Fire Aviation Operations (Red Book)

IV. COURSE EXPECTATIONS

A. Student Expectations

EXERCISE: Student Expectations for the Course

Purpose: Develop a list of expectations for the course.

Format: Work in small groups of three to five students.

Materials Needed: Flip charts and markers

Instructions:

1. Write your responses to the following question on a flip chart:

   - What do you expect to learn from this course?

2. Present your expectations to the class.

End of Exercise.

B. Instructor Expectations

Students will:

- Have an interest in becoming a Heavy Equipment Boss (HEQB).
- Have completed their pre-course work.
- Exhibit mutual cooperation with the group.
- Participate actively in all of the training exercises presented in the course.
- Return to class at stated times.
- Have all questions answered.

V. POSITION DESCRIPTIONS

A. The Heavy Equipment Boss (HEQB) will be covered in detail throughout the course.

- The Heavy Equipment Boss is the direct supervisor of one or more pieces of heavy equipment assigned to an incident. This can be for agency or contracted equipment.
- The Heavy Equipment Boss is supervised by the IC, DIVS, TFLD, or STEQ, depending on the nature and complexity of the incident.

B. Position Task Book (PTB) Description

The PTB contains common tasks for all unit leaders and additional specific tasks for the (HEQB).

The PTB is the primary tool for observing and evaluating performance.

In the current performance based system, trainees must complete the tasking in the PTB to become qualified as a HEQB.

The PTB can only be initiated by the home unit, not at this course.

Heavy Equipment Boss, S-236

Unit 1 – Administration

OBJECTIVES:

Upon completion of this unit, students will be able to:

1. Describe the contracting and use responsibilities of the Heavy Equipment Boss, the Logistics Section, the Finance/Administration Section, and the Operations Section.

2. Identify the inspection, sign-up, and demobilization responsibilities of the Heavy Equipment Boss.

3. Identify specific information the Heavy Equipment Boss should obtain from the operator before beginning work.

4. Describe pre-use inspection of heavy equipment, identify any deficiencies, and describe any corrective actions required.

I. CHECK-IN

The check-in procedures for initial attack are to contact dispatch and receive your orders. Prior to leaving for the incident you should make sure you have your kit together. This kit contains items you may need on the incident and as a HEQB should carry with you at all times.

TIP
The HEQB's vehicle will become a mini-supply cache; the HEQB needs to be prepared for any situation.

The kit items should include but are not limited to the following items:

- Clinometer/compass
- Fence pliers
- Flagging
- Light sticks
- Camera with batteries (preferably water resistant)
- Road, topographic and slope map (if available)
- Covers for resource photos
- Global Positioning System (GPS), color is best
- 2 two-way radios
- Strobe light/bicycle light
- Incident Response Pocket Guide (IRPG)
- Wildland Fire Incident Management Field Guide

- Yellowbook for heavy equipment (fire and fuels reduction)
- Binoculars
- Magnetic car mounted antennae
- Longer radio antennae for your handheld radio
- Bladder bags
- MREs
- Fusees
- Drip torches and fuel
- Water
- Cooler
- Sleeping bag
- Extra PPE
- Fire extinguisher
- Chainsaw
- All-terrain vehicle (ATV) can be a valuable asset if available.

Many of these items will need to be checked out at the supply unit when arriving at the incident.

Upon dispatch you may be assigned a piece of equipment at an agency facility, roadside en route to the incident, or at the incident.

In these cases equipment has usually been contracted through the local agency, and has received a pre-season inspection. Prior to accepting the piece of equipment, you should perform a roadside inspection (equipment, personnel, and paperwork).

On a Type 3 incident you will usually check-in at the incident. Depending on the team organization you may receive your assignment, and equipment from the Incident Commander (IC). Check with IC to see if the roadside inspection has been completed. You should still perform a walk around inspection of the equipment before proceeding to your assignment, and document (preferably using photographs) any issues.

On Type 1 and Type 2 incidents you will follow the normal check-in procedures you learned in the S-230 Crew Boss course. On these types of incidents you will usually be assigned a piece of equipment on your first shift.

When you are assigned a piece of equipment you should complete a walk around inspection.

II. DEMOBILIZATION

Heavy Equipment Boss (HEQB) responsibilities during demobilization include ensuring all equipment time, fuel, and repair services have been properly documented, and turned in. The final inspection of the equipment has been completed, documented, and any checked out equipment has been accounted for.

Ensure the Standard Contractor Performance Report (found exhibit E of Incident Blanket Purchase Agreement [IBPA]) is completed, turned in, and a copy is given to the operator.

Work with the Ground Support Unit to ensure required state regulations for permits are in place before equipment is released. Agency and contracted equipment arrives on incident with a permit waiver. Upon demobilization equipment will need to obtain permits which may include weekend restrictions and the necessity of pilot vehicle(s).

TIPS

- **Photographs of the equipment should be taken during the final inspection.**
- **Objectively document your actions, conversations, and decisions on your Unit Log**
- **If you do not have a vehicle, get General Message forms from your supervisor requesting a four-wheel-drive vehicle with good clearance as soon as possible.**

III. TIME KEEPING

HEQB responsibilities are more complex than for a Crew Boss or an Engine Boss. The HEQB is responsible for specific forms related to contracting, and must work closely with Finance (Time Unit), and Ground Support.

Time Unit will have personnel time recorders, and equipment time recorders to track hours. Agency owned equipment usually will not have to turn in an Emergency Equipment Shift Ticket (OF-297) but they will have to turn in a Crew Time Report (SF-261) to the personnel time recorder.

Non-agency owned equipment will have to fill-in a Shift Ticket and turn it in to the Equipment Time Recorder on a daily basis. The HEQB is responsible to validate or complete the Shift Ticket. The Shift Ticket must be signed by the HEQB or the direct supervisor of the equipment (Task Force Leader or Division Group Supervisor) of the division that the equipment is assigned to for that operational period.

Actual hours must be recorded on the Shift Ticket, including meal breaks. This is important to ensure personnel are working within the work/rest ratio guidelines.

Equipment will often come with a transport (tractor trailer) and transport driver, which may or may not require its own Shift Ticket. Verify with the Ground Support Unit Leader, who is responsible for signing the transport Shift Ticket. In addition, there may be different rates assigned to the transport for staging.

A. Forms

- Emergency Equipment Shift Ticket (OF-297)

  Complete the Emergency Equipment Shift Ticket daily and submit to Equipment Time Recorder.

  1. Agreement No. Enter number from Block 2 of the EERA or Block 2 of the IBPA.

  2. Contractor. Enter the contractor's name as shown in Block 4 of the EERA or Block 17a of the IBPA. Enter the contractor's resource order number.

  3. Incident or Project Name. Enter incident name.

  4. Incident Number. Enter the incident number.

  5. Operator. Enter the names of all operators in Block 14, Remarks; note the operational periods that each operator was on duty.

  6. Equipment Make. Enter the make of equipment from Block 9 of the EERA or the Schedule of Items or the Resource Category form of the IBPA. (Note: Blocks 6 through 8 should reflect what is shown on the EERA or IBPA and provided by the contractor.)

  7. Equipment Model. Enter the model of equipment from Block 9 of the EERA or the Schedule of Items or Resource Category form of the IBPA.

  8. Operator. Check one, in accordance with Block 6 of the EERA or Clause D.1 of the IBPA.

  9. Serial Number. Enter serial number of equipment from Block 9 of the EERA or the Schedule of Items or the Resource Category form of the IBPA.

10. License Number. If equipment is licensed, enter license number of equipment (off-road, heavy equipment normally is not licensed).

11. Operating Supplies. Check one, in accordance with Block 7 of the EERA or Clause D.21.4 of the IBPA.

12. Date. Enter date of use.

13. Equipment Use. Circle hours, days, or miles as per Block 11 of the EERA or the Schedule of Items or Resource Category form of the IBPA. Record the actual hours worked. Enter the start and stop times or beginning and ending mileage in the columns designated as Start/Stop. Calculate the hours worked or miles driven and enter in the Work column. If the rate of pay is by the day, enter "1".

    (See Clause 7A of the EERA or the Schedule of Items or the Resource Category form of the IBPA.)

    Enter any information in the "Special" column required in Block 12 of the EERA or the Schedule of Items in the IBPA.

14. Remarks. Enter any information necessary to administer the terms of the EERA or IBPA.

15. Equipment Status. Mark the appropriate blocks.

16. Invoice Posted By. Enter time recorder initials.

17. Contractor's or Authorized Agent's Signature. To be completed and signed by the appropriate contractor representative, normally at the end of each work shift or break in operational periods.

18. Government's Officer's Signature. To be signed by the incident official responsible for the immediate supervision of the equipment.

19. Date Signed. Enter the date shift ticket is signed.

B. Crew Time Report (CTR, SF-261)

Complete CTR daily and submit to Personnel Time Recorder.

C. Emergency Equipment Rental Agreement (EERA) (OF-294)

IV. HEAVY EQUIPMENT CONTRACTS AND AGREEMENTS

A. Incident Blanket Purchase Agreements (IBPA)

- Most common contract used

  Generally, these contracts are the most commonly used by agencies during high activity to provide heavy equipment support as needed for the duration of the incident.

- The contracted equipment should be carrying two copies of their IBPA; one copy for the HEQB and one for themselves.

- Used for unspecified timeframe.

  Provides the agencies with a contract to obtain service from a heavy equipment vendor on a call-when-needed basis.

- Awarded every 3 years (typically)

  The call-when-needed contracts are solicited and awarded typically every 3 years. Contractors that have been awarded the agreement may only replace equipment when approved by the contracting officer.

- Used nationally

B. Emergency Equipment Rental Agreement (EERA) (incident only)

- Typically used:
  - Initial attack
  - After IBPA resources have been exhausted
  - Specialized equipment not signed up during the IBPA competitive process
- Only awarded for the duration of the incident
- Used nationally
- Standard for some state agencies

C. Cooperative Agreements

- State, local, or rural fire departments
- Check with the local agency for specific guidelines.

V. CONTRACT INFORMATION

Copies of the IBPA, EERA, and State Cooperative Agreements can be obtained from the Finance Section or the vendor (initial attack).

IBPA, EERA, and State Cooperative Agreements contain all pertinent information regarding equipment requirements, vendor information, and pricing.

VI. CONTRACT AUTHORITY

A. Contracting Officer (CO)

The CO is the appointed government official with the authority to enter into, administer, and terminate the agreement.

B. Contracting Officer's Representative (COR)

Authorized to take actions necessary to assure compliance with the technical provisions of the contract.

Most CORs are designated at geographical areas.

Project Inspectors (PI) perform duties onsite on behalf of a remotely located COR.

HEQBs are responsible for the onsite contract administration of the resource assigned to them, but have no delegated authority.

C. HEQB Role

"these heavy equipment contractors are businessmen, be clear with them up-front and it will make everything go more smoothly,…..they expect to operate professionally"

1. HEQB role with IBPAs, EERAs, and Cooperative Agreements

    - Ensures compliance with the terms and conditions of the agreement.
    - Provides oversight and onsite direction of the resource.
    - Ensures pre-use and release inspections have been performed.

- Validates Emergency Equipment Shift Ticket, OF-297
  - Actual hours worked, including meal breaks
  - Down time due to equipment breakdown
  - Operator unavailability
- Monitors work and rest guidelines.
- Ensures assignment is understood and completed in a safe and efficient manner.
- Provides an honest performance evaluation on the Standard Contactor Performance Report form, and ensures a copy is provided to the vendor and Finance Section.

2. Solicitation/Contract/Order For Commercial Items, SF-1449

This form is commonly referred to as the SF-1449 and is used as contractor agreement coversheet. This form is the source of information a HEQB needs to complete an Emergency Equipment Shift Ticket, OF-297 and Vehicle/Heavy Equipment Inspection Checklist, OF-296.

- Block 2 – Contract Number
- Block 3 – Award/Effective Date
- Block 17a – Contractor/ Offeror
- Page 2 – Schedule of Items
  - HEQB will verify that the vehicle identification number (VIN) numbers of the equipment onsite matches the contract.

- Section D

  - D.1 – Scope of Agreement, provides an overview of the agreement.

  - D.2 – Equipment Requirements, provides the technical specifications for the equipment.

  - D.3 – Personnel Requirements, provides training standards for equipment operators.

  - D.7 – Property, provides what may and may not be provided to vendor.

  - D.17 – Incident Pre-Use Inspection, provides overview of the incident inspection process.

  - D.19 – Workmanship, provides information regarding performance standards.

  - D.20 – Performance Evaluations, provides information used when evaluating the contractor's performance.

  - D.21 – Payments, provides an overview of the business practices including payment, repairs, and operating supplies

- Exhibit E – Incident Blanket Purchase Agreement (IBPA) Performance Evaluation

  The administrative information on Exhibit E is obtained from page 1 of the SF-1449 and the resource order.

  Thoroughly document any unsatisfactory, marginal, exceptional ratings, including any unusual events that may have occurred. For example, the operator does not attend operational briefing and arrives on the line late several times during the assignment.

Any unsatisfactory performance that cannot be mitigated through verbal communication, should be documented, and elevated through the chain-of-command to the Contracting Officer.

Tips

- **Gifts from contractors should not be accepted.**
- **Do not encourage or comment on potential contractor's claims.**
- **Maintain a professional working relationship with contractors.**
- **When filling out Emergency Equipment Shift Ticket, OF-297, write legibly, complete all blocks, obtain all proper signatures, and turn-in daily to the Finance Section.**
- **The contracting world can be complicated, if you have questions, ask. The Finance Section is there to help.**
- **On a daily basis complete a Unit Log, ICS-214.**
- **Document any unusual occurrence on a General Message Form, ICS-213. Use only facts and avoid using opinions.**
- **Ensure General Message Form is submitted to your supervisor and document on your ICS-214.**
- **Be sure to answer questions from the Finance Section related to equipment damage or breakdowns in detail.**

IBPA Exercise, see SR 1-1 for instructions.

3. Transports for equipment

Transportation for equipment varies. Check with the hosting agency for proper procedures.

Verify if the equipment and transport was ordered as one unit or ordered separately. Verification should be handled by reviewing the resource order the operator will have.

Relay this information to your supervisor. They will make the determination if they want to keep the transport on the line or release it back to Ground Support. Document the decision on a General Message form, ICS-213 for the Ground Support Unit and document on your Unit Log, ICS-214.

In the remarks section of the Emergency Equipment Shift Ticket, OF-297, note the transport operator's name and whether the transport was retained with the heavy equipment.

D. Conflicts or Disagreements

Conflicts or disagreements when working with heavy equipment can happen at any time and in any environment.

Objective communication is always the best starting point in any type of disagreement. The HEQB must strive to be objective and maintain a professional attitude when working through conflicts or problems.

Documentation is the key to ensuring that the conflict solution is clearly defined as understood by all parties.

The HEQB should follow the appropriate chain-of-command in the beginning of the documentation process to ensure that they are not outside their scope of authority or committing the government to unobtainable solutions.

Below is a general contact guideline for requesting assistance:

- If the problem is contractual and operational related, contact your supervisor.

- If your supervisor, or his supervisor cannot solve the problem, they may have you contact the Finance Section Chief.

Tips for HEQB with Conflicts or Disagreements

- **It is important that the HEQB objectively document all events, conversations, and actions taken concerning a conflict or disagreement. Only use facts.**
- **Always keep the immediate supervisor apprised of any conflicts, discussions, or problems that may come up during operations.**
- **Protect your good working relationship with the contractor by not spending unproductive time arguing with them. Contact the appropriate level of supervision early in the discussions for help and advice.**

VII. INTERACTION WITH GROUND SUPPORT

Interaction with the Ground Support Unit is important to ensure that the piece of equipment you are assigned has been properly inspected, and is ready for an assignment. You will still need to do you daily walk around inspection of the equipment.

The Ground Support Unit is responsible to ensure transportation to and from the incident has been arranged, and service and fuel needs are in place. Ground support needs to arrange a secure area for staging of the heavy equipment.

Copies of damage reports, maintenance repairs, and inspections should be turned in to the Ground Support Unit.

In case that Ground Support Unit is not in place you will need to contact the Logistics Section Chief to find out what the interim process is.

Report any unused or abandoned equipment to the Ground Support Unit.

VIII. OPERATOR CAPABILITIES

HEQB should speak to the operator before starting a shift to identify their experience and knowledge with the particular piece of equipment, and familiarity with firefighting tasks.

Find out what arrangements have been made for service and fueling, and how many hours they have been working before this assignment. Asses the suitability of the operator and the equipment to meet needs of the assigned tasks.

TIP
It is a good practice to document the discussion with the operator.

EXERCISE: Incident Blanket Purchase Agreement (IBPA)

Purpose: To become familiar with parts of the IBPA, SF-1449 and Section D.

Format: Students will work individually.

Materials Needed:

Day 1 Scenario

- Complete IBPA
- Resource order
- OF-296, partially completed (pre-use sections)
- Emergency Equipment Shift Ticket, OF-297 (blank)

Day 2 Scenario

- Complete IBPA
- Resource order
- OF-296, partially completed (pre-use sections) Emergency Equipment Shift Ticket, OF-297 (blank)
- General Message Form, ICS-213 (blank)
- Unit Log, ICS-214 (blank)

Day 3 Scenario

- Complete IBPA
- Standard Contractor Performance Report (found in exhibit E of IBPA)
- OF-296, partially completed
- Emergency Equipment Shift Ticket, OF-297
- Unit Log, ICS-214

Instructions:

Complete each scenario.

Day 1 Scenario

Materials Needed:

- Complete IBPA
- Resource order
- OF-296, partially completed (Pre-use sections) Emergency Equipment Shift Ticket, OF-297 (blank)

Scenario:

You are assigned as a HEQB on the West fire in the Plumas National Forest. You have been assigned a Type II excavator, equipped with a six-way dozer blade, and a bucket and thumb.

The first day of your assignment you meet up with the operator. You receive a copy of the contract from the contractor. Using the provided contract and resource order, complete the pertinent sections of the OF-296. Using the resource order, contract, and information provided below, complete an Emergency Equipment Shift Ticket, OF-297.

Day 1

0800 – 0900	Travel to Fire
0900 – 1100	Check-In
1100 – 1800	Operational period

Day 2 Scenario

Materials Needed:
- Complete IBPA
- Resource order
- OF-296, partially completed (pre-sections)
- Emergency Equipment Shift Ticket, OF-297 (blank)
- General Message Form, ICS-213 (blank)
- Unit Log, ICS-214 (blank)

Scenario:
It is now day 2 of the assignment. You have attended the briefing and completed your daily inspection. At 1000 of the operational period the equipment has a bearing failure. The operator contacts their support vehicle which breaks an axle on the way to the repair site. At this time the contractor requests the incident mechanic respond and repair the heavy equipment.

At 1400 the repairs are completed and the heavy equipment is able to complete the rest of the operational period.

Referencing the IBPA, identify the clauses, and complete the required documentation. Complete the Emergency Equipment Shift Ticket, OF-297.

Day 2	
0600 – 1000	Operational period
1000 – 1400	Equipment breakdown – Bearing on roller failed.
	Support vehicle breaks an axle on the way to the repair site.
	Incident Mechanic used to repair.
1400 – 1800	Operational period

Instructor information:
D.21.3 Mechanic Repairs
D.21.8.3 Equipment down time
(Payment Clause)
(Damage Documentation)

Day 3 Scenario

Materials Needed:
- Complete IBPA
- Standard Contractor Performance Report (found in exhibit E of IBPA)
- OF-296, partially completed
- Emergency Equipment Shift Ticket, OF-297
- Unit Log, ICS-214

Scenario:
It is now day 3 of the assignment. The incident is in the demobilization stage. The operator performs well while in the field but the Supply Unit Leader complained about the vendor continually trying to checkout PPE.

Complete the Emergency Equipment Shift Ticket, OF-297, Release Inspection section of the OF-296, Standard Contractor Performance Report, and Unit Log, ICS-214.

Day 3	
0600 – 1200	Operational period
1230 – 1430	Demobilization – Release Inspection, Performance Report
1430 – 1530	Travel

Heavy Equipment Boss, S-236

Unit 2 – Equipment Identification

OBJECTIVES:

Upon completion of this unit, students will be able to:

1. Identify the various pieces of heavy equipment utilized during a wildfire, or all hazard incident, including rehabilitation and repair.

2. Identify differences in equipment capabilities, limitations, and attachments.

3. Discuss transportation requirements and considerations for heavy equipment.

I. EQUIPMENT OVERVIEW

A. Identification

Heavy equipment identification, knowledge of attachments, and the equipment's capabilities and limitations are a must for all Heavy Equipment Bosses (HEQB). This knowledge will allow them to utilize a piece or a package of heavy equipment safely and efficiently.

Some geographic locations may use specific heavy equipment and attachments best suited for their area. The HEQB should consult with local experience when available to best choose the right equipment for the soils and fuel model in order to accomplish the mission safely and efficiently.

TIP

Talk to the local Foresters if you are having a hard time finding the particular piece of equipment that you require for your mission. They know what is available locally and may be able to recommend contacts and possibly some tactics.

B. Typing

Heavy Equipment is classified by Type which dictates its size, generally utilizing flywheel horsepower ratings as well as less common parameters of weight, water tank size and bucket depth.

Heavy equipment work capacity depends upon its typing. Type 1 is much larger and has more horsepower than a Type 3.

C. Capabilities and Limitations

The capabilities and limitations of heavy equipment change significantly with the change in Type. Differences are measured by the following characteristics:

- Horsepower
- Weight
- Pushing capacity for dozers
- Production rate
- Transportation and support needs to, from, and on incident
- Maneuverability
- Ground pressure
- Width
- Staging

TIP

Heavy equipment that will be used together as a package, without significant geographical separation, will often be managed by one HEQB; if you feel you are being asked to supervise too much equipment, or if it is often separated, consider asking your supervisor for a strike team or task force leader (STEQ, TFLD).

II. HEAVY EQUIPMENT

A. Dozer

Types	Horse Power	Examples
1 Heavy	200-320	D7, D8, TD20
2 Medium	100-199	D6, D5H, JD750
3 Light	50-99	D3, D4, JD550

1. Features and Capabilities

- Pushing soil or clearing vegetation
  - For fireline construction
  - Road building or improvement
  - Turnouts
  - Safety zones

- Retrieving stuck or disabled equipment
- Fireline pioneering
- Push over hazard trees
- Can access steeper ground than wheeled machines
- Low ground pressure

2. Limitations
    - Maximum slope:
        - 75% downhill
        - 55% uphill
        - 45% sidehill

3. Attachments and Options

- Blades

  – Straight

    Often times a straight blade isn't able to be angled, requiring the dozer to turn and cast more often.

    Uses for straight blades are: pioneering, fireline and safety zone construction, and road construction and maintenance.

  – Angle (4-way, 6-way)

    Can push soil to either side of the dozer.

    Very versatile for fireline construction and an excellent choice for water barring, and other rehabilitation needs.

    Angle blades are either manually or hydraulically adjusted.

  – Universal Blade (U blade)

    Is tall and curved, and has large side wings to carry or push more material.

    Semi U

    Both U and semi U blades are best used for pioneering, and building fireline when followed up by an angle blade dozer. They are also a good choice for sump digging, general earth moving needs, and road building.

– Brush rake

A short dozer blade with added vertical bars below and/or above the blade.

The best uses for brush blades are pioneering in brush, clearing and piling slash, mop up work, and certain rehabilitation work.

There are also brush racks, which can be added or removed to the top of dozer blades.

– Shear

Shearing blades are designed to sever tree trunks at ground level. They are fixed at an angle and have saw-like teeth along the base of the modified dozer blade for cutting.

Used for rapid clearing of non-sprouting trees. They leave the area relatively smooth with stumps usually left intact in the ground. They are not effective in rocky ground.

– V blade

Best used in swampy ground as dirt is thrown to both sides in front of dozer for tracks to ride up on.

Also good for punching through dense stands of small diameter fuels (pioneering).

Are utilized in some geographical areas to “strip” undergrowth from between treed plantation rows.

Not good in rocky ground or steep slopes.

- Wide track

  These have low ground pressure (LGP), and can be up to 36” wide.

- Ice grousers (square stock welded to grousers) for added traction

- Cable winch with and without arch. Cable designed for skidding timber.

- Winch (retrieving equipment)

- Lights

- Grapple

4. Application

   - Pioneering

   - A cleared line down to mineral soil.

   - Fuel break

     – Shaded and un-shaded

     – Has no mineral soil break within it.

     – Walk down, where trees aren’t removed.

   - Rehabilitation

   - Hazard tree and snag mitigation

   - Building staging areas, roads, road improvement, and turnouts.

- Safety zone construction
- Vehicle retrieval with winch

5. Unique Inspection Characteristics
   - Blade system

     Blade anchor pins and trunion ball (manual angle blades)
   - Track drive system
   - Attachments

DOZER TIPS

- **Winches are a valuable attachment when ordering dozers. Guideline is half of assigned dozers should have winches.**
- **Consider what type of blade is best for accomplishing the mission efficiently.**
- **In some geographical areas, you will need to consider specifying options such as wide tracks or ice grousers.**
- **While larger dozers can increase production, they also pose logistical limitations of maneuverability and transportation.**

B. Dozer – Pumper Cat

Types	Horse Power	Tank Size
1	200-320+	500+ gallons
2	100-199	325-499 gallons
3	50-99	200-324 gallons

All pumps: 30 gpm at 70 psi

1. Features and capabilities

   - Water tank, pump, and live hose reel
   - Fully functioning blade
   - Stable, powerful, moderately fast, versatile

2. Limitations

- Maximum slope:
  - 75% downhill
  - 55% uphill
  - 40% sidehill

3. Attachments and options

- 200 gallon to 1500 gallon tank
- Foam unit
- Removable tank (not always)
- Straight or angle blade

4. Application

- Ability to direct water placement in difficult terrain.
- Support harvester and feller buncher operations.
- Pioneering
- Fireline construction

5. Unique Inspection Characteristics

- Modification system (water tank and pump)
- Blade system

  Blade anchor pins and trunion ball (manual angle blades)
- Track drive system
- Attachments

DOZER – PUMPER CAT TIPS

- **This is a good choice of equipment for supporting fuel break construction in difficult terrain.**
- **Good piece of equipment for Initial Attack as you have a dozer for line construction and if you are lucky (good) enough to catch the fire, and a tool to help with mop up without ordering more.**

C. Dozer/Track Skidder

1. Features and capabilities

   - Pushing soil or clearing vegetation
   - Skidding logs and trees
   - Fireline pioneering
   - Push over snags
   - Can access steeper ground than wheeled machines
   - Low ground pressure

2. Limitations

   - Maximum slope:
     - 40-50% uphill and downhill
     - 40% sidehill

3. Attachments and Options

- Blades
  - Straight
  - Angle, 4 and 6 way
  - Brush
- Swing and fixed boom grapples
- Cable winch with and without arch
- Lights
- Wide track for lower ground pressure (LGP).

4. Application

- Drag (skid) logs off line.
- Can perform dozer functions.
- Sweeping away ground fuels, when skidding whole tree bundles
- Rehabilitation and repair

5. Unique Inspection Characteristics

- Grapple system
- Blade system

  Blade anchor pins and trunion ball (manual angle blades)

- Track drive system
- Attachments

DOZER/TRACK SKIDDER TIPS:

- **Excellent for rehabilitation due to its ability to place timber and vegetation back on the line, while building water bar.**
- **Skidders use cable winches with arch, grapples or both.**
- **There are three styles of grapple skidder booms:**
  - **Single function with two hydraulic cylinders, allowing the boom to only lower in one position.**
  - **Dual function booms have four cylinders, allowing for adjusting the boom two ways.**
  - **Swing- boom can be swung from side to side allowing spread out trees to be grabbed at once.**
- **Know your attachments.**

D. Excavator

Types	Horse Power	Rating
1	156 +	>50k lbs.
2	111-155	>32k lbs.
3	81-110	> 25k lbs.
4	60-80	> 15k lbs.

1. Features and capabilities

   - 360° swing
   - Usually tracked or rubber tire mounted

     Rarely is a rubber tired machine used in fire.
   - 25 foot to 50 foot boom

2. Limitations

- Maximum slope:
  - 70% uphill and downhill
  - 35-50% sidehill
- Slow track speed
- Shorter grousers can reduce traction.

3. Attachments and Options

- Log grapple
- Various width buckets
- Thumb
- Lights
- Masticator (mulcher)
- Ice grousers for added traction
- Wide tracks
- Clamshell bucket
- Brush rake
- Blades (varying from light to heavy duty)

  New breed of machines coming from the manufacture with 6-way heavy duty blades.

4. Application

   - Depending on attachments and options
     - Fuel breaks
     - Rehabilitation
     - Repair of culvert and ditch drainage.
     - Precise placement of materials
     - Fireline construction

5. Unique Inspection Characteristics

   - Boom assembly
   - Turntable

EXCAVATOR TIPS

- **When ordering realize that 360 degree swing machines are not required by OSHA to have ROPs. OSHA states that the boom qualifies it as the ROP system.**
- **If excavator does not have a blade it can use a log or steel beam for dragging and grooming.**
- **Can build a corduroy system out of available logs in boggy areas, and carry it with them.**
- **In some geographical areas wide tracks can be specified when ordering, which will reduce ground pressure.**
- **Excellent for rehabilitation due to its precise ability to place timber and vegetation back on the line.**
- **Some excavators have dozer undercarriages and larger blades and can work in very steep country (<75%) utilizing their boom and blade for positioning.**
- **Type I excavators can be 55,000 to 100,000 pounds with tracks 12' wide; be sure to discuss your typing needs with your supervisor.**
  - **Useful when rehabbing large lines when a long reach is needed. Saves padding time.**
- **Thumbs are extremely useful and should be specified when ordering excavators.**
- **Excavator can go places that a dozer can't. Less soil disturbance than a dozer.**

E. Feller Buncher

Types	HP
1	226+
2	160-225

1. Features and capabilities

- 360 degree swing
- Most have leveling cabs
- Cut and fell 1-3 trees per minute.
- Tracked
- Rubber tired (drive to tree)-Has no swing or reach.
- Cut up to 28” diameter
- Double cut up to 40” diameter

- Fells one tree-stem at a time while accumulating the others.
- Up to 28 foot reach
- Rotational heads can cut horizontally or vertically.

2. Limitations

   - Maximum slope: Tracked feller buncher
     - 40-55% uphill and downhill
     - 30% sidehill
   - Slow track speed
   - Often large and heavy
   - 300 foot minimum safety circle (360 degrees).
   - Generally this equipment is logistically complex to transport (to, from, and within incident).

3. Attachments and Options

   - “Hot saw” disc heads
   - Lights

4. Application

   - Snagging and hazard tree falling
   - Thinning along roads
   - Fuel breaks

5. Unique Inspection Characteristics

- Leveling cabs
- Boom and head attachments
- Turntable
- Complicated high pressure hydraulics

FELLER BUNCHER TIPS

- **Due to the high speed of the cutting disc, consider having a skidgine or other piece of water handling equipment available due to rock strikes and fire starting potential.**
- **Most bunchers are not able to cut effectively in a horizontal position, while most harvester type heads can.**
- **High stumping will significantly reduce the chance of rock strikes.**
- **Disc head can be back dragged to create a narrow fireline.**

F. Skidder, Rubber Tired

Types	Horse Power
1	176+
2	100-175
3	60-99

1. Features and capabilities

   - Low ground pressure
   - Light duty blade
   - Articulated, for tight stands or narrow trails
   - Quicker travel speed than tracked machine.

2. Limitations

   - Maximum slope:
     - 30-45% uphill and downhill, depending on soils
     - 22% sidehill

3. Attachments and Options

   - Cable winch, with arch and chokers
   - Grapple, fixed or swing boom
   - Both cable and grapple
   - Lights
   - Chains

4. Application

   - Drag (skid) logs off line
   - Sweeping away ground fuels, when skidding whole tree bundles
   - Clear dead and down from line
   - Build fireline in a pinch
   - Break up jackpots of fuel during mop up

5. Unique Inspection Characteristics

   - Grapple system
   - Winch, if equipped
   - Articulation points

SKIDDER, RUBBER TIRED TIPS

- **Cable winch for log retrieval.**
- **Cable requires operator to leave cab, or have a second person as setter.**
- **Depending on terrain consider chains when ordering.**
- **Consider a grapple skidder paired with a mechanized feller to get bundled stems off the line.**
- **Consider the distance required to skid bundles; you may need to order an additional skidder to keep pace with felling operations.**
- **Rubber tired skidders can be more stable on rock than track machines.**
- **The high ground speed of rubber tired skidders allows them to cover large distances on an incident without the need for a transport.**
- **Chains can significantly improve off-road capabilities.**

G. Skidgine, Rubber Tired

Skidgines are converted skidders with either fixed or removable tank and pump systems.

Types	Horse Power	Pump	Tank Size in gallons
1	176+	30 gpm @ 70 psi	1200+
2	75-175	30 gpm @ 70 psi	800-1199
3	100+	30 gpm @ 70 psi	400-799
4	69-99	30 gpm @ 70 psi	200-399

1. Features and capabilities

- Low ground pressure
- Light duty blade
- Articulated, for tight stands or narrow trails
- Quicker travel speed than tracked machine.
- Water tank and pump system

2. Limitations

- Maximum slope:
  - 30-45% uphill and downhill, depending on soils
  - 22% sidehill
  - Water pump is relatively small
- Water tank

3. Attachments and options

- Some skidgines can drop the water system and be used as a skidder.
- Water cannon
- Foam
- Modified blade
- Lights
- Chains

4. Application

- Support for mechanized felling operations.
- Support for off-road suppression or mop up.

5. Unique inspection characteristics

   - Water and pump system
   - Articulation points

SKIDGINE, RUBBER TIRED TIPS

- **Chains can significantly improve off-road capabilities.**
- **Ordering a removable water system will give you duel capabilities of an off-road engine platform or a skidder.**
- **This equipment is highly customized by individuals and there are a variety of options and capabilities within each type.**

H. Skidgine Soft Track

Type	Horse Power	Pump	Tank Size
1	170+	30 gpm @ 70 psi	600+ gl.

1. Features and capabilities

   - Can work in steeper ground than rubber tired equipment.
   - Performs better in some soils when compared to rubber tired.
   - Higher track speeds than hard tracked equipment.
   - Light duty blade

2. Limitations

   - 60% uphill and downhill
   - 35-40% sidehill

3. Attachments and options

   - Foam
   - Water cannon
   - Modified blade

4. Application

   - Support for mechanized felling operations.
   - Support for off-road suppression or mop up.

5. Unique inspection characteristics

   - Soft track system
   - Tank and pump system

SKIDGINE SOFT TRACK TIP

This equipment is highly customized by individuals and there are a variety of options and capabilities within each type

I. Tractor Plow (Types 2-3)

Types	Horse Power
2	100-199
3	50-99

1. Features and capabilities

- Plow is pulled to create fireline.
- Pushing soil or clearing vegetation with blade is secondary.
- Creates a fireline down to mineral soil faster than blading alone, in some soil types.
- Retrieving stuck or disabled equipment.
- Fireline pioneering.

- Pushing over snags.
- Low ground pressure.

2. Limitations
    - Not used in steep terrain.
    - Rocky soil
    - Maneuvering can be a factor in pull behind plows.
3. Attachments and Options
    - Stinger plow
    - Pull behind plow
    - Blades
        - Straight
        - Angle (4-way, 6-way)
        - V-blade
        - Brush
    - Winch (pull behind plow only)
4. Application
    - Fireline construction
    - Walk down
    - Hazard tree and snag mitigation
    - Pioneering

5. Unique Inspection Characteristics

- Plow (stinger or pull behind)
- Blade system

TRACTOR PLOW TIPS

- **Excellent for fireline construction in many geographical areas.**
- **Winches are a valuable attachment when ordering tractor plows.**

J. Grader

Types	Horse Power
1	201+
2	126-200
3	<125

1. Features and capabilities

- Road maintenance
- Fireline construction in flashy fuels
- Road shoulder vegetation treatment
- Recontour road surface

2. Limitations

- Maximum slope:
  - 45% uphill and downhill
  - 15% sidehill
- Approach and departure angles can be a factor due to long wheel base and attachments.

3. Attachments and options

- Articulating chassis
- 14 feet moldboards
- Slopeboard
- Rippers
- Scarifier
- Chains
- Lights

4. Application

- Grass vegetation
- Existing roads

5. Unique inspection characteristics

   - Bull wheel, or circle assembly
   - Trunion ball

GRADER TIPS

- **Higher operating speeds than tracked-blade equipment.**
- **Useful for rehabilitation.**
- **Grader operator's experience may be in road and not in wildfire.**

III. MORE HEAVY EQUIPMENT

A. Forwarder

Types	Horse Power	Pump	Tank (minimum)
1	176+	50 gpm @ 100 psi	1200 gallons
2	75-175	50 gpm @ 100 psi	800 gallons

1. Features and capabilities

- Log moving
- Self-load and un-load timber
- 4/6/8 wheel configurations
- 8–20 ton hauling capacity
- 12 mph–15 mph unloaded

- Rubber tires
- Forward or backward without turning around
- Can haul slash, brush, or chips

2. Limitations
   - Maximum slope:
     – 50% uphill and downhill (with track band option)
     – 12% sidehill
   - 6-8 wheels need 12+ feet trail width.

3. Attachments and options
   - Boom and log grapple
   - Log bunks
   - Blade, light duty
   - Boom mounted water cannon
   - Harvester saw head
   - Water tank and pump combination (1000–4000 gal)
   - Foam
   - Hoppers for aerial bucket refill
   - Chains or tire bands
   - Lights

4. Application and options

   - Multiple capabilities depending upon attachments.
   - Can be configured as a Type I skidgine.
   - Can load and transport timber and slash.

5. Unique inspection characteristics

   - Boom assembly
   - Drive wheel assembly
   - Log bunk and tank securement

FORWARDER TIPS

- **Can be a very versatile piece of equipment, depending upon attachments.**
- **This is a wide piece of equipment. Best used after a fireline or fuel break has been established.**

B. Harvester

Harvesters are generally negotiated under a separate agreement, and aren't nationally typed.

1. Features and capabilities

- 360 degree swing
- Track machines often have leveling cab.
- Boom mounted bar saw cutting heads (dangle head)
- Fell, delimb, and buck trees
- Cut one stem at a time.
- Bar chain moves only when activated.
- Harvester heads lighter than feller buncher.
- Vertical and horizontal positions for cutting.

- Useful for downed or jack-strawed timber
- Some booms can reach as far as 32 feet.

2. Limitations

   - Maximum slope:

     35-55% uphill and downhill (depending on track configuration)

   - Newest machines can operate up and downslope of 80%
   - Rubber tire mounted – <40% up and downhill slope
   - Slow track speeds

3. Attachments and options

   - Track or rubber tire mounted
   - Fixed or dangle head
   - Harvester head (different diameter)
   - Bar-saw
   - Chains or track bands
   - Lights

4. Application

   - Directional felling of trees.
   - Lifting and bucking of downed timber.

- Can be used as a processor after line construction and leave green material in the fuel break as a slash mat.

- Useful for wet areas to place logs as a corduroy.

5. Unique inspection characteristics

   - Head attachment area

   - Leveling cab

   - Complicated high pressure hydraulic system

HARVESTER TIPS

- **Rotate 360°, consider safety circle**
- **Generally this equipment is logistically complex to transport (to, from, and within incident)**

C. Skidgine, Hard Track

A smaller piece of equipment converted from snow cat style cab/chassis. Used in marshy areas.

D. Chipper

Chippers can be used behind a thinning crew and can be assigned to a nearby HEQB.

Types	Horse Power	Minimum Capacity
1	180+	18+ inches
2	110-179	13-17 inches
3	48-109	9-12 inches

E. Mulchers (Masticators)

Mulchers (masticators) can be utilized in a thinning project for fuel breaks. They are best used in conjunction with a felling operation.

Types	Horse Power	Hydraulic Flow	Carrier Weight
1	156+	60+ gpm	50,000+
2	111-155	38-59 gpm	32,000-49,999
3	80-110	24-37 gpm	24,000-31,999

1. Features and capabilities:

   - Mulchers can cut, grind, or chop vegetation/fuels into small pieces.

   - Assist in creating filter-barriers to help in preventing soil erosion.

   - Can lower fuel heights in an area changing the dynamic of the fuels from heavy to 1 and 10 hour class sizes.

- Can be tracked or wheeled
- Can be boomed or non-boomed
- Separated into two classes: Vertical shaft head and Horizontal shaft head.

  Vertical shaft head:

  – Vertical shaft head mulchers resemble a spinning disc.

  – Mulching teeth are attached at the bottom of the disc.

  – Typically mounted on a boomed machine in order to grind trees from the top down.

  – Can be put on a non-boomed machine.

  – Can mulch large trees very slowly.

  Horizontal shaft head:

  – Resembles a barrel drum with mulching teeth attached.

  – Teeth rotate around a horizontal shaft.

  – Typically mounted on the front-end of a tracked or wheeled machine.

  – Often has a push bar to keep severed trees away from the machine.

2. Limitations

   - Slow track speeds
   - Can grind big trees, but very slowly

3. Attachments and options

   - Track or rubber tire mounted
   - Wheeled and non-boomed
   - Tracked and boomed

4. Application

   - Heavy Equipment drives over trees in order for the mulching head to grind them up.
   - Can also drive up to a tree and grind from the top down.

5. Unique inspection characteristics

   - Mulching teeth
   - Pivot cutting knives
   - Hydraulics

IV. TRANSPORTATION AND TRANSPORTS

Types	Rating
I	70k + lbs.
II	35k-70k lbs.
III	<35k lbs.

Larger pieces of Heavy Equipment may be more difficult to move around the fire logistically.

Transportation needs must be calculated along with the Heavy Equipment's work capacity in order to make a final decision.

A transport can be a tractor with fifth wheel trailer, which comes in a number of configurations (semi), or a truck with mounted flatbed which tilts to the ground. Dump trucks also utilize pull behind trailers which generally tilt.

A lowboy is a semi-trailer with a drop in deck height between gooseneck and rear axles. This allows the deck to be extremely low compared with other trailers. It offers the ability to carry legal loads up to 12 feet (3.66 m) tall, which other trailers cannot.

A. Limitations

- Roads with loose sandy soils require higher operating speeds or may be inaccessible.
- Steep slopes and tight turns may require a shorter coupled transport or may not be usable by transports.
- Transports take up a significant amount of space when staged.

B. Attachments and Options

- Additional axles as needed for weight.
- Fixed goosenecks, loads over rear tires.
- Mechanical folding gooseneck – lowers flat and acts as a ramp.
- Hydraulic detachable goosenecks – most common for large equipment, loads flat from front, has auxiliary (Pony) motor.

C. Application

For mobilization to, from, and on an incident.

D. Unique Inspection Characteristics

- Air, hydraulic, and electrical systems to lowboy.
- Auxiliary (Pony) engines for lowboy separation.

E. Special Logistical Concerns

- Low wires
- Bridges
- Bridge rating

- Dead ends
- Cul-de-sacs
- Narrow secondary roads; tight radius turns and switchbacks
- Some transport systems require more time and space for loading and unloading, often times temporarily plugging a narrow road during the process.
- Consider staging areas before they are needed.
- Depending on local law, some transports will need pilot car(s) and permitting before they can demobilize from an incident.
- Overhanging limbs could potentially damage hoses, mirrors and other glass.

TIPS

- **Some transport drivers will be uncomfortable in the back woods and or the fire environment.**
- **Proof out new routes with drivers in a pickup before committing.**
- **Discuss with transport driver their experience in off road heavy haul.**
- **If a transport is left in a staging area on an active fire, remember that they may be relying on you as their eyes and ears to keep them safe.**

Heavy Equipment Boss, S-236

Unit 3A – Equipment Inspection

OBJECTIVES:

Upon completion of this unit, students will be able to:

1. Discuss the field inspection process the heavy equipment boss is responsible for performing.

2. Identify specific information the heavy equipment boss should obtain from the operator before beginning work.

I. INSPECTIONS AND FORMS

This section discusses pre-use and daily inspections. A pre-use inspection is usually performed by the Ground Support Unit when the equipment is checked into the incident. The daily inspection is performed by the Heavy Equipment Boss (HEQB) each day before the equipment begins its assignment.

On Type I and II incidents, check with the Ground Support Unit to ensure the pre-use inspection was completed on the assigned equipment. If it was not completed, work with Ground Support to complete this inspection prior to beginning your assignment.

For initial attack and some Type III incidents the HEQB may have to perform the pre-use inspection.

A. Forms

The standard heavy equipment inspection form is the Vehicle/Heavy Equipment Inspection Checklist (OF-296). Different regions or states may have their own form that they require for inspection. It is advised to check with the local agency to ensure that you are using the correct form.

The S-236, HEQB Daily Inspection Checklist or equivalent is used for the start of shift safety inspection on an incident.

B. OF-296, Vehicle/Heavy Equipment Inspection Checklist

The OF-296 is used for pre-use inspection and release inspection.

This form is divided into 3 sections.

- Section I – Tractor, Motor-Grader
- Section II –Remarks
- Section III – Power Saw and Pump

1. Blocks 1-9

Inspector may not be able to complete all blocks if the equipment assigned is being used for initial attack, and it is not under an agreement. Complete block numbers 1-9 as much as possible, and contact the Contracting Officer as soon as possible.

a. Inspector completes block numbers 1 – 9 on OF-296 form.

General Equipment Information:

(1) Incident name/number

(2) Resource order # (equipment)

(3) Owner/vendor

(4) Agreement, PO, Contract number

(5) Expiration date

(6) Make

(7) Model, type

(8) Serial number and vin

(9) License number

b. Inspector completes vehicle/equipment inspection checking all items as indicated in the "Pre-use" column of the applicable Section and "Remarks" if needed

c. If accepted, the Vendor and Inspector must sign, print name, and provide a telephone number. Additionally, the "ACCEPTED" (block #10) must be checked. If not accepted check “REJECTED” and keep a copy for future reference.

d. "Finance Copy - Pre-Use", is sent as soon as possible to the Finance Section.

e. "Vendor Copy – Pre-Use/Release", is given to Vendor with instruction to bring the copy back for the release inspection.

f. "Finance Copy - Release", and "Inspector - Pre-Use/Release", are kept with the inspector and the contractor.

2. Release Inspection

If vendor chooses to check No Damage/No Claim box, then a release inspection is not required.

a. Retrieve "Vendor Copy" and place between the "Finance Copy - Release" and "Inspector - Pre-use/Release" copies that were held by the Inspector.

b. Inspector completes vehicle/equipment inspection checking all items as indicated in the "Release" column of the applicable Section and Remarks if needed, If applicable

c. Release Inspection must be completed by both Vendor and Inspector. Inspectors need to print and Vendors need to sign their names.

d. Inspector returns "Vendor Copy" to Vendor and as soon as possible sends "Finance Copy - Release" to the Finance Section.

e. At conclusion of a Type I or II incident the Finance Section will include copies of the inspection documentation with their close-out package to the hosting unit. For an initial attack or Type III incident check with the hosting agency for collection of Inspection documentation.

C. S-236, HEQB Daily Inspection Checklist (or equivalent)

1. Complete upper section each day with applicable information and note any changes in operator or equipment in general observation section.

2. If equipment is in serviceable condition it should be checked as acceptable.

3. If equipment is damaged or unserviceable the not acceptable block should be checked, and proper procedures should be followed as specified in the contract. Equipment should be placed in out-of-service status until corrective action has been taken.

4. Operator Safety

- Annual Fireline Safety Refresher (RT-130)
- New generation fire shelter
- PPE: Nomex clothing, leather gloves, leather boots, approved hard hat, eye and hearing protection, flashlight, etc.
- Seat belts (serviceable)

5. Engine

   - Oil levels
   - Belts and hoses
   - Fuel leaks
   - Cooling system (no leaks and clean)
   - Spark arrester (if equipped)

6. Hydraulics

   - No leaks
   - All cylinders extend and retract fully
   - Hoses (serviceable)

7. Electrical

   - Forward lights
   - Work lights
   - Reverse lights
   - Backup or travel alarm
   - Battery secured and not corroded

8. Overall condition of equipment

   - Windows (no cracks or breaks, good visibility)
   - Undercarriage (no broken pads, rollers in serviceable condition)

- No cracks, broken welds, missing hardware or guards, etc.
- Tires (no cracks or cuts to cord)
- Tracks
- Cutting edges (serviceable)
- Engine compartment (e.g., belly pan), free of flammable materials
- Fire extinguisher (secure)

II. DAY IN THE LIFE OF A HEQB

A. Arrival at the Incident

After checking in, if possible meet with the Operations Section Chief or line supervisor.

Information and opportunities gained at this meeting should include:

- Leader's intent
- Coordination of assignments
- Sharing information
- Priorities
- Local hazards
- Environmental concerns

Types of questions to ask:

- Who is your supervisor?
- How do you get there (maps)?
- Where is the equipment?
- Communication plan
- Copy of the incident action plan (IAP) if available.

B. Operational Topics

Your supervisor may be the Incident Commander, Operations Section Chief, Division Supervisor, or Strike Team/Task Force Leader.

- Attend the operational briefing.
- When the heavy equipment operator is available, ensure they attend the operational and division breakout briefing.
- Ask your supervisor if the transport is to remain on the line or return to staging.

  If transport is to remain on the line, discuss with your supervisor who is to assume supervision, and responsibility of the transport.
- Conduct operator interview and daily inspection of equipment (verify if there is a transport driver).
- Brief equipment operator on mission specifics, hazards, local concerns, and give a view of the big picture.
- Ensure communication is clear and understood, e.g., radio, hand, flagging, and other signals.

- Ensure operator is ready for the assignment, PPE, adequate drinking water, lunch, and any other logistical needs.
- Verify transport is capable of delivering equipment to the assignment, e.g., load restrictions, bridges, road access, etc.
- After you arrive at your assignment consider logistics of loading, unloading, and staging.
- After unloading equipment, ensure equipment operator understands the assignment.
- Work closely with adjoining forces to ensure safe distances and operations are maintained from the equipment.
- Periodically, evaluate production rates and relay information to your supervisor.
- Towards the end of the operational period check with your supervisor to see if the equipment is to remain on the line or be transported back to staging.
- Conduct a daily After Action Review (AAR) with operator.
- Meet with your supervisor to review your accomplishments; include maps and GPS coordinates.
- At the end of the operational period validate the Emergency Equipment Shift Ticket, OF-297 along with your personal Crew Time Report (CTR), SF-261, and submit to Finance.
- At the end of the operational period complete the Unit Log, ICS-214, attach your Daily Inspection Checklists, and submit to the Resource Unit.
- Meet with Situation Unit to download GPS coordinates and map locations if applicable.

TIPS:

- **You are the experienced fire personnel and it is your responsibility to ensure the safety of the equipment operator.**
- **Try not to take on more (collateral duties) than is required for your current HEQB role.**
- **If assigned another piece of equipment request an additional HEQB or HEQB trainee.**
- **Use the back of the Incident Action Plan (IAP) for note taking (it will have the current date).**
- **Ensure the equipment you are assigned can meet the requirements of the assignment.**
- **Keep looking at the big picture and communicate with adjoining forces.**

C. Night Operations

If your Incident Management Team (IMT) conducts night operations, your operational period will be similar to the previous section in this unit.

Additional safety measures will need to be taken for the following hazards:

- Line not seen in daylight
- Unseen hazards such as snags
- Rolling debris
- Decreased visibility
- Diminished view of crew locations
- Others

Additional equipment needed for night operations can include:

- Hard hat strobe light/flashing bicycle light
- Glow sticks
- Glow-in-the-dark flagging

Night Operation Advantages:

- Less road traffic from fireline personnel.
- Often lowered fire behavior and moderate fire weather.
- Fewer personnel on the line.

D. Type 3 Organization

Meet with supervisor (in briefing).

Ask questions such as:

- What are your expectations of me as a HEQB?
- What is Leader's intent?
- What is the operational assignment for the equipment?

Gather intelligence, map (Google Earth and Orthographic) and talk with the Division Supervisor, and Resource Advisor if applicable.

Local ranchers, agency personnel, and citizens are a good source of terrain, hazards, and unmapped road information.

TIP: It is critical that you get a good overview of the terrain and fire behavior as early as possible.

Communication and documentation is essential, and a Type 3 organization should operate similar to a Type 2 organization.

Ensure a communication method has been established with the heavy equipment operator, and secure an extra cloned radio if necessary.

Attend morning briefing, and take notes to be used for the equipment operator briefing.

Heavy Equipment Boss, S-236

Unit 3B – Optional Field Exercise

OBJECTIVES:

Given a set of guidelines, students will correctly perform the following tasks in a field exercise:

1. Observe loading and unloading.

2. Pre-use inspection.

3. Daily walk-around check.

Heavy Equipment Boss, S-236
Field Exercise

Instructions for conducting the field exercise:

1. The field exercise will take approximately four hours to complete.

2. Equipment and materials needed:

    - Suggest one piece of heavy equipment with operator per ten students
    - Mechanic on hand if possible
    - HEQB Daily inspection checklist form (page 3B.9)
    - Clipboards and pens
    - Coveralls/gloves

Field Inspection Guidelines

The instructors will arrange for several pieces of heavy equipment to be available for you to inspect.

You will be divided into groups, one group per available heavy equipment station. The groups will rotate from station to station to inspect the equipment.

- At each inspection station, the heavy equipment operator or mechanic will conduct an inspection using the OF-296, Vehicle/Heavy Equipment Checklist (or equivalent), and then perform a walk-around inspection with each group. During this procedure, you are encouraged to closely examine the heavy equipment and ask questions pertinent to its condition. The principal purpose of the first station is to orient you on how to conduct an adequate visual equipment inspection with the assistance of the operator or mechanic.

- After the first station, and at each subsequent station, you will each conduct your own individual checklist inspection of the equipment (as time permits) using a different OF-296 form for each piece of equipment. You should be able to recognize and describe any equipment defects and necessary corrective action. The heavy equipment operator or mechanic will critique your individual inspection performance.

- After you have rotated through all the stations, then return to your original station for the second phase of the exercise. At this point the operators or mechanics at each station will explain that in order to perform an adequate inspection the equipment must be started. Thus, the objective of the second phase of the field exercise is to emphasize the importance of the operational check as an integral component of a thorough and adequate inspection.

- After the above explanation is given, the heavy equipment at each station will be started, if possible, and operated briefly through the following steps: (1) blade raised, lowered and tilted; (2) equipment moved forward and backward; (3) equipment turned right and left; (4) equipment shutdown. The operator or mechanic will then explain any mechanical problems the equipment exhibited, as well as what should be done for correction. This demonstration by the operator or mechanic shall serve as the orientation for the second phase of the field exercise.

- Upon completion of the second phase orientation, as time and equipment are available, each group shall rotate to all other equipment stations, individually performing inspections of the equipment during mechanical operation. As in the first phase of the exercise, the operator or mechanic should critique your performance, as well as answer any questions you might have.

Student Name _____

FIELD EVALUATION

1. _____ Student observed loading and unloading and was able to describe the guidelines.

   Instructor Comments:

2. _____ Student completed Pre-use Inspection. (Equipment operator or mechanic may critique individual performance.)

   Instructor Comments:

3. _____ Student completed daily Walk-around Check.

   Instructor Comments:

LOADING AND UNLOADING

Loading and unloading will be demonstrated, students will observe only.

Loading/unloading guidelines:

1. Park on level ground.
2. Do not use congested area.
3. Ensure brakes are set on low bed (chock block).
4. Ensure heavy equipment is properly released (unchained).
5. Perform a walk around to ensure everything is clear.
6. Act as spotter for operator.
7. Before leaving, ensure transport is in a safe area.
8. Avoid damage to improved roads.

DAILY WALK-AROUND CHECK EXERCISE

Discuss the difference between the daily walk-around check and the pre-use inspection to students.

Explain that for maintenance and operator personnel safety, and maximum service life of the equipment, they should make a thorough walk-around inspection when doing lubrication and maintenance work. A good place to start the check is at the front of the heavy equipment. Always check under and around for such items as loose bolts, trash buildup, oil or coolant leaks.

Students are to complete the daily walk-around check form and the blank walk-around check drawing. Instruct students to put a check mark next to each item on the list if in satisfactory condition. The drawing can be used for taking notes on equipment parts to be inspected.

Observe and evaluate their performance during the inspection. Hand out the completed walk-around check drawing after the exercise.

S-236, HEQB DAILY INSPECTION CHECKLIST

Date:	HEQB Name: Phone:	Vendor Name: Phone:

Operator/Driver Information:

Operator Name: Phone:	Driver Name: Phone:
Last Day(s) Off:	Last Day(s) Off:

Equipment and Transport Information:

E#:	Make/Model:		
Transport Make/Model:			Transport Trailer License #:
E#:	License#:	State:	Trailer Load Rating:

Equipment Inspection:

INSPECTION ITEMS	Acceptable	Not Acceptable
Operator Safety • RT-130		
• New generation fire shelter		
• PPE: Nomex clothing, leather gloves, leather boots, approved hard hat, eye and hearing protection, flashlight, etc.		
• Seat belts (serviceable)		
Engine • Oil levels		
• Belts and hoses		
• Fuel leaks		
• Cooling system (no leaks and clean)		
• Spark arrester (if equipped)		
Hydraulics • No leaks		
• All cylinders extend and retract fully		
• Hoses (serviceable)		
Electrical • Forward lights		
• Reverse lights		
• Work lights		
• Backup or travel alarm		
• Battery secured and not corroded		
Overall condition of equipment • Windows (no cracks or breaks, good visibility)		
• Undercarriage (no broken pads, rollers in serviceable condition)		
• No cracks, broken welds, missing hardware or guards, etc.		
• Tires (no cracks or cuts to cord)		
• Cutting edges (serviceable)		
• Engine compartment (e.g., belly pan), free of flammable materials		
• Fire extinguisher (secure)		

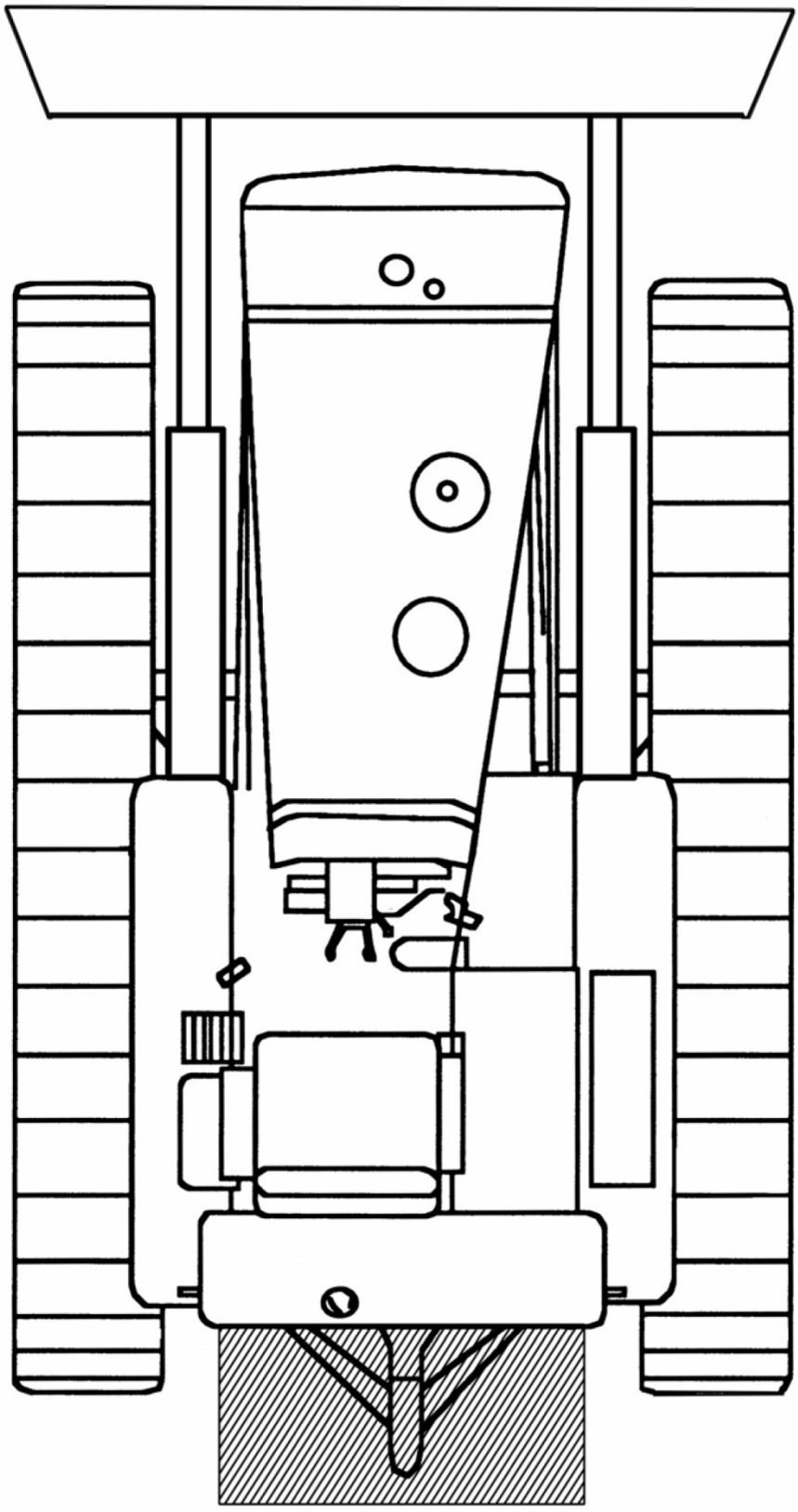
Transport Inspection:

INSPECTION ITEMS	Acceptable	Not Acceptable
Has commercial vehicle operator performed the daily inspection? • Tires		
• Fuel system		
• Cooling system		
• Electrical system		
• Air		
• Brakes		
• PPE		

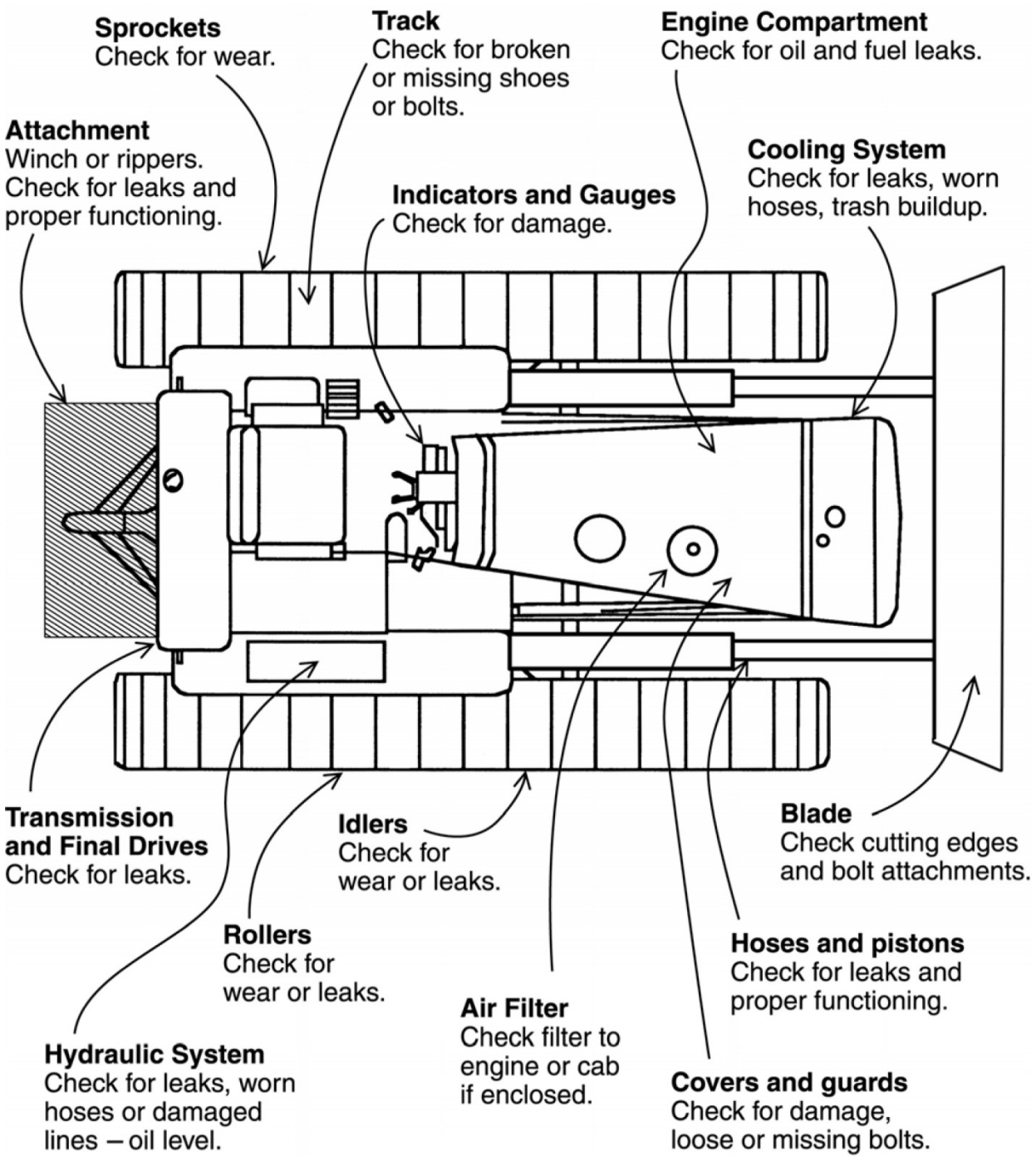
General Observations and Comments (use back of sheet if needed):

HEQB Signature:_____

Walk-Around Check



Walk-Around Check



Class discussion

What actions should you take if the equipment is inoperable?

What should the HEQB do if cut off from operator by fire?

Optional Exercises

Suggestions for optional exercises are:

- Line construction
- Water barring
- Winching
- Flagging
- Hand communications
- Have alternative industrial machinery on display

Cut out and laminate for a pocket card.

Daily Walk-around Check Form

_____Check the blade for broken or bent push arms, adjusting arms, and condition of cutting edge and end bits.

_____Check hydraulic system for leaks, worn hoses, or damaged lines and oil level.

_____Check inside the radiator for oil. This could be an indication of a bad head gasket or broken head.

_____Check rollers for wear and oil leaks.

_____Check for leaks, water, oil, or grease under or around the dozer.

_____Check grouser height, tracks for broken or missing pads or bolts, cracked rails, loose pins, and tightness.

_____Check sprockets for wear or damage.

_____Check idlers for wear, oil leaks and cracks.

_____Check engine compartment for water in the oil, for oil and fuel leaks, for trash build-up.

_____Check air filter.

_____Check rollover protection for proper condition and record on time keeping forms.

_____Check indicators and gauges for damage.

_____Check for fire extinguisher and shovel.

_____Check lights.

Cut out and laminate for a pocket card.

Dozer Entrapment Emergency Procedure
Briefing to Operator

1. Recognize rapidly changing conditions (environment).
2. Communicate situation and plan of action with work group.
3. Don't panic. Stay with dozer if possible.
4. Retreat (use escape route) to safety or deployment zone.
5. Request (call for) air drop.
6. Clear out a deployment site.
7. Burn out around deployment site-if time allows.
8. Doze trench, pushing out berm facing approaching front.
9. Position (straddle) dozer over trench, blade on berm.
10. Engage brakes, set throttle to 1/3.
11. Deploy shelter under dozer.

Heavy Equipment Boss, S-236

Unit 4 – Briefings and Tactics

OBJECTIVES:

Upon completion of this unit, students will be able to:

1. Discuss how relevant information is exchanged during briefings and debriefings.

2. Define other communication methods used by a HEQB.

3. Identify specific tactics used by heavy equipment on a wildfire.

4. Discuss procedures used by heavy equipment to rehabilitate a fireline.

I. EFFECTIVE BRIEFINGS

An operational briefing is held at the beginning of each operational period (day and/or night) to review the IAP with operations personnel. Each member of the command and general staff who has a part in the IAP makes a short presentation.

Effective briefings are essential. Heavy Equipment Bosses (HEQBs) need to have the ability to communicate:

- Risk management expectations
- Tactical objectives
- Hazards including fire behavior, fuel types, terrain features
- Environmental and cultural concerns
- Contingencies (trigger points)
- Communication
- Logistics for the operators (equipment and support vehicle)

Tailor the briefing by importance to the audience.

Elements of an effective briefing:

- Leader's intent and clearly stated goals.
- Briefing should be short and concise.
- Communicate known and potential hazards and associated risks, and reference Risk Management Process.
- Emphasize the importance of trigger points, the need for analyzing associated risks, and the need for additional briefings before tactically engaging.
- Ask audience if there are questions or comments on the briefing.

General Briefing Tips:

- **Always consider your listening audience, and tailor the message to them.**
- **Avoid jargon or slang.**
- **Be concise and to the point.**
- **Speak clearly, and make eye contact.**
- **Try to give a briefing in an area that is quiet.**
- **Create an environment conducive to interaction and feedback.**
- **Follow-up on suggested feedback.**
- **Prepare ahead of time.**
- **Listen to others, and use the briefing styles you admire.**
- **Recognize nervousness.**
- **Be well prepared.**
- **Practice makes perfect.**
- **Teaching classes is a good way to gain confidence and refine your speaking style.**

II. HEAVY EQUIPMENT BRIEFING TOPICS

Briefing heavy equipment operators will be a little different from giving a normal fire briefing. These briefings will include specific topics related to contractor, operator, and equipment needs. Use the Briefing Checklist in the Incident Response Pocket Guide (IRPG) to lead you through your briefing but include some of the specific information listed below.

A. Logistics

- Fueling (wet or dry, fueling station)
- Wash and maintenance cycle
- Transportation (to, from, recon, and breakdown)
- Lunches and adequate water for the operational period.
- Verify personnel have personal protective equipment (PPE).

B. Operations

- Locations (drop point, staging area, and safety zones)
- Access issues
- Line or safety zone parameters
- Operator feedback and scouting
- Safe working distances
- Equipment approach procedures
- Equipment engine noise and shutdown procedures for communicating
- Emergency procedures (e.g., hazardous materials [fuel, hydraulic fluid, etc.] spill)
- Machine capabilities

C. Communications

- Maps, GPS
- Incident communication plan (IAP)
- Radio (frequencies, clone, batteries)
- Phone systems
- Contact numbers
- Flagging methods, glow sticks
- Strobe lights
- Hand signals

- Signal mirrors
- Emergency communication protocol (Medical Plan)

D. General

Remind operators to have adequate supply of medications and personal needs for two operational periods.

TIP
Ensure you take notes and document events on your Unit Log to be used for the after action review (AAR).

HEAVY EQUIPMENT BRIEFING TIPS:

- **Recognize some heavy equipment operators may have hearing loss due to working with equipment for many years.**
- **Verify operators can hear your briefing. You may need to speak louder.**
- **Provide copies of written information to all operators (incident action plan, maps).**
- **Make sure all operators and drivers are present.**
- **Sometimes one HEQB will give the briefing for several pieces of equipment.**
- **Respect that most operators are experienced and are looking to you for the fire behavior, safety, and logistical aspects of the job.**
- **Refer to your initial interview to gauge experience levels of operators.**
- **Be adaptive with visual aids (white board, flip chart paper, cardboard, side of vehicle, etc.).**

III. COMMUNICATION

A. Awareness

- Resources within division
- With adjacent divisions
- Aviation resources
- Other HEQBs
- Other heavy equipment on incident
- Technical Specialist (Regional Fire Equipment Specialists, Equipment Manager, Resource Advisor)

B. With Operator

- Agreed upon flagging methods
- Hand signals
- Strobe light signals
- Flashing mirror signals
- Agreed upon meeting times
- Agreed upon signals (engine revs, powering down, horns, lights)
- Radio systems
- Cellular phones
- Equipment breakdown, estimated time of repair

C. With Supervisor (Chain-of-Command)

- Advise supervisor on equipment configurations (if you have a Feller Buncher [hot saw] you may need a skidder, skidgine or engine to support it)
- When recommending additional resources, recognize the difference in typing capabilities (Type I, II, III).
- Make suggestions about the correct piece of equipment for the task.
- Give feedback on actual and projected production rates.

TIPS
There are tradeoffs with ordering larger equipment.
- **Larger equipment (Type I) may be less mobile and requires more complex logistical needs.**

- Equipment breakdown, estimated time of repair
- Transportation (logistics, lowboys)
- Fueling
- Maintenance cycles
- Time related issues
- Operator performance issues
- Claims/hazards

- Logistical needs – use the chain-of-command
  - Specialized maps (archaeological sites, sensitive resource areas, threatened and endangered species, wilderness study areas)
  - Hazard maps (mining area, military ordinance)
  - Slope maps
  - GIS
  - Road systems maps (are they current)
  - Pre-incident map (structure protection, water sources, identified hazards, etc.)
  - Specialized equipment – strobe lights, clinometers, fencing pliers, GPS, digital camera, stereoscope (aerial photographs)
  - Use of transport (for other equipment on incident, release, or stage).

D. Radio Frequencies and Use

Many contractors have their own company radios. Some can be cloned and some cannot. If clonable radios are not required by the contractor's contract, check with cache to see if they have enough radios to issue to each piece of equipment and each HEQB (ear buds or shoulder microphones).

- Magnetic mount antenna
- Portable repeater
- Extra batteries

E. Backup System if Radio Fails

- Contractor radio network
- Cellular phones
- Routine exchange of contacts and numbers (business cards)

F. Hand Signals

Hand signals may vary with each incident. Agree on hand signals. Ensure they are clearly understood before beginning assignment.

G. Flagging

Proper interpretation and use of flagging during line location. Ensure flagging usage is clearly understood before beginning assignment.

For example:

- Which side of line is flagged?
- Directional change or stop gates?
- Combination of flagging colors to designate specific issues, etc.

H. Language Barriers

Equipment operator may not speak English (check with local agency for contract clarification).

Exercise: Briefing Role Play
Refer to SR 4-1 for instructions.

IV. COMMUNICATION TIMELINE

Questions to ask (examples):

- Does the equipment come wet or dry?
- Has it been inspected?
- Is it coming with its own transport?
- Who is supervising the transport?
- Does the equipment have a radio?
- Is it single or double shifted?
- Is it under an agreement?
- Are the operators fireline qualified?
- Do the operators have PPE?
- Other questions?

V. HEQB RESPONSIBILITIES DURING TACTICAL OPERATIONS

A. Situational Awareness

- The operators are going to be focused on their machines and the task at hand.
- HEQBs need to be focused on the operator, the equipment, and the surrounding environment including adjoining forces.
- Many operators rely on the HEQB to be their eyes and ears for fire behavior, weather, and any other unseen hazards.

B. Special Considerations

In addition to the normal risk management considerations the HEQB will have special considerations related to heavy equipment.

Ensure the tasks assigned do not exceed the capabilities and limitations of the assigned equipment, operator, and time table for the task at hand.

Use operator experience as a resource. HEQB needs to listen to operator. Operator may have a different way to mitigate a hazard.

Special considerations must be given for heavy equipment during night operations. There are both benefits and risk management considerations.

Approved heavy equipment is designed with operator protection systems as required by OSHA and specifications outlined in the ISO/FDIS 11850.

Operator protection systems are made up of the rollover protection systems (ROPS), and falling object protection systems (FOPS), and cab operator protection systems (OPS). Not all three protection systems are required on all equipment.

Operator protection systems (ROPS, FOPS, OPS) should be considered as a mitigation measure when working in an area that would present overhead or site hazards to faller and hand crews. Use the right equipment for the job.

C. Safety Benefits

The safety benefits of heavy equipment design include:

- Equipment works efficiently with minimal crew support.
- Reduces the use of aircraft (ground base water supply and skidgines versus helimopping).
- Equipment operator protection systems (ROPS, FOPS, OPS) reduce risk to operator when working in the forest environment.
- Risk to fireline personnel is reduced when equipment is used within its operational range to remove hazard trees.
- Equipment light packages allow for safe and effective use during night operations. Machines also run cooler at night.

D. Tactics and Equipment Limitations

- HEQB should try to ensure the correct equipment is being used for the assigned tactics.
- Assure dozer berm is pushed to the greenside of the fire.
- The flexible design and modifications to equipment combined with optional attachments may allow for a piece of equipment to perform multiple tasks.
- Combinations or modules including task force and/or strike teams of equipment can be an option to enable the equipment to meet the tactical needs. The HEQB may be a direct supervisor of equipment within this module; the module could be part of a group that goes through Division to accomplish its objectives.

E. Equipment Advances and Improvements

Advances in equipment, weight distribution, and tread and track design allow for modern equipment to be able to go into sensitive areas with reduced damage (e.g., low ground pressure equipment).

Contractors often modify their equipment. The intent of modification is to improve performance but may result in an unsafe design. Ensure the modifications have been inspected, approved, and noted in the contract.

F. Regulations

Heavy equipment operations fall under OSHA regulations.

Specific states may have more restrictive state OSHA regulations that supersede Federal OSHA (e.g., California, Oregon, Washington, and Alaska).

VI. TACTICAL USES OF HEAVY EQUIPMENT

Tactical decision should be detailed, decisive, well planned, and achievable.

A. Fireline Suppression Techniques

A fireline is the part of a containment or control line that is scraped or dug to mineral soil. The various techniques used with heavy equipment include:

- Direct – Line constructed at fire perimeter. Refer to the Incident Response Pocket Guide (IRPG) for specific guidelines.

- Indirect – Line constructed at a considerable distance from the fire. Used on fast moving, high intensity fires where heat does not allow direct attack. Also used where topography or fuel loading is restrictive to direct or parallel attack.

- Parallel – Constructing a fireline parallel to the flank of a running fire at a safe distance to minimize radiant heat while burning out against constructed line.

- Pincer – Direct attack from an established anchor on both flanks simultaneously where the head is pinched off.

- Flanking – Attacking a fire by working along a flank from an established anchor point.

- Leapfrogging – Form of direct attack where equipment (usually dozers) take turns in lead position.

- Potato patching – Crisscrossing of tractor plow lines to break surface fuel continuity. Common in the southeast.

- Stripping – Removing all surface and understory vegetation between rows of timber plantation.

B. Line Construction

- Specific tasks for different pieces of equipment.

  – Earth moving
  – Felling
  – Mulching
  – Material transport
  – Water delivery

- Design parameters

  – Width and location of dirt line.

  – Width and location of vegetation clearing.

  – Acceptable quantity and distribution of residual vegetation, e.g., fuel break versus fireline.

- The line can be made of fireline, a fuel break, or a combination of the two. General guidelines for line width:
  - Either 1½ times fuel height or 1½ times flame height.
  - Operational safety following agency safety guidelines of 2 times the height of the tallest hazard trees
  - Reinforce sections of line
  - Consider additional factors of fire behavior.
- Fuelbreak – A natural or manmade change in fuel characteristics which affects fire behavior so that fires burning into them can be more readily controlled.
- Shaded Fuelbreak – Fuelbreaks built in timbered areas where the trees on the break are thinned and pruned to reduce the fire potential yet retain enough crown canopy to make a less favorable microclimate for surface fires.
- Fuelbreak Reinforcement – Widening a pre-constructed fuelbreak line or removing additional fuel from a fuelbreak or a shaded fuelbreak.
- Mitigation of vegetation:
  - Using heavy equipment to compress vertical fuel to a horizontal configuration (commonly referred to as walk down or walking down).
  - Place vegetation to the green side of the fireline.
  - Skid/forward vegetation to brush bays or log decks adjacent to or off of the fireline.

- Roadside or fireline clearing

  Felling, removing, mulching, or walking down of vegetation along the fireside of an existing road or fireline.

  An advantage of using this technique is reducing the width of the fireline.

  One example would be to walk down the fireside of the fireline in brush or shrub vegetation in preparation for a firing operation, in order to reduce flame length and ember cast.

  Another example would be to walk down the green side of the fireline in timber, to open up the canopy in preparation for a firing operation.

C. Heavy Equipment Application and Techniques

Heavy equipment can be used to construct safety zones, fill sites, staging areas, vehicle turnaround, turnout, brush bays, and log decks. Identify location, size, and distribution.

Some techniques require a combination of different types of equipment to accomplish the assigned mission and objectives.

Examples:

- Dozers/tractor plow in tandem – Two or three working same line.

  The first dozer/tractor plow on the line fells or walks down the vegetation on the line (pioneering), the second clears the vegetation to the mineral soil, and the third dresses the line (vehicle travel, line enhancements).

- Feller/buncher, harvester, or mulcher for vegetation removal, dozer or excavator for dirt movement, skidder(s) for moving vegetation off the line, and skidgine/super skidgine for ground based water delivery (may be necessary for fire watch for the feller buncher, depending on conditions).

Additional benefits of using a skidder in equipment combinations include sweeping away ground fuels, when skidding whole tree bundles, and removing fuel from the fireline.

D. Line Scouting and Location

- Terrain and rock considerations
- Soil – sandy, wet (bogs, marshes, swamplands), permafrost, etc.
- Resource constraints (riparian zones, archeological sites, etc.)
- Alternative routes
- Access considerations
- Consistent flagging methods

  For example, pink flagging will be to the left of the line, head high, "X" means stop and wait, horizontal gates point to change in direction, etc.

- Safety zones (location and size)

  Consult your supervisor. Factors affecting size of safety zones are current and expected fire behavior and weather. Refer to Safety Zone Guidelines (SR 4-2).

  Who does line scouting and location?

  It should be a person with HEQB experience or someone who has experience with equipment capabilities and limitations, and competent with topographic maps, compass, and GPS.

Alaska Fire Exercise, see SR 4-3

VII. REHABILITATION

The objective is to restore disturbed areas to prevent erosion, and to leave the area as close to natural conditions as possible.

Check with local agency or Resource Advisor for rehabilitation guidelines.

Heavy equipment can be a valuable resource if used properly. Consideration should be used during line location and construction to minimize rehabilitation efforts.

Areas that may need special rehabilitation consideration are:

- Riparian zones
  - Bogs
  - Marshes
  - Swamplands
  - Waterways
  - Springs
- Permafrost
- Archaeological sites
- Steep slope
- Sandy or clay based soil
- Residual vegetation (root wads, stumps, slash piles/dozer berm)

Rehabilitation techniques:

- Water bars (How deep? How frequent? Outlet? Angle? Soils?)
- Log placement drainage is when logs are placed at a 30° angle to direct water drainage from the fireline.

  May be better than water bars due to less soil disturbance.

- Slash filter is a tactic when the leafy top of trees are placed on the fireline and used as a filter to protect the soil and reduce erosion.

- Filter barrier is used to prevent soil sedimentation in low lying areas.

- Pull dozer berms and cat piles (feather debris).

- Hydrophobic soil is soil that will not absorb water and may need to have a dozer with rippers or a tracked machine to break the surface.

TIPS

- **Tractor plow furrow – replace materials back to fireline using front dozer blade.**
- **Excavator can be used for breaking ground surface.**
- **Mulcher and chipper can be used for distributing ground cover.**
- **Make contact with private landowners who may deploy their own equipment to protect their land. Make sure you are trying to achieve the same goal.**

Idaho Fire Exercise, see SR 4-4.

EXERCISE: BRIEFING ROLE PLAY

Purpose:
Learn the importance of how to receive and impart heavy equipment specific information during a mock briefing.

Format:
Group members to participate in the exercise as the Incident Commander, Division Supervisor, Heavy Equipment Boss or the Operator.

Materials Needed:
- Wildland Fire Incident Management Field Guide (suggested reference)
- Pen and Paper to take notes on the briefing.
- IRPG briefing checklist (inside of back cover)

Exercise Instructions:
- Students should be ready to listen to the briefing, ask pertinent questions to the IC/Division Supervisor and be ready to ask/answer pertinent questions from the operator when he is re-introduced to the briefing.

- Students will be evaluated on participation.

Exercise Ends. Any Questions?

SAFETY ZONE GUIDELINES
(Same for Heavy Equipment as Crews)

- Avoid locations that are downwind from the fire.
- Avoid locations that are in chimneys, saddles, or narrow canyons.
- Avoid locations that require a steep uphill escape route.
- Take advantage of heat barriers such as lee side of ridges, large rocks, or solid structures.
- Burn out safety zones prior to flame front approach.
- For radiant heat only, the distance separation between the firefighter and the flames must be at least four times the maximum flame height. This distance must be maintained on all sides, if the fire has ability to burn completely around the safety zone.
- Convective heat from wind and/or terrain influences will increase this distance requirement.

CALCULATIONS ASSUME NO SLOPE AND NO WIND

Flame Height | Distance Separation (firefighters to flame) | Area in Acres
10 ft. | 40 ft. | 1/10 acre
20 ft. | 80 ft. | 1/2 acre
50 ft. | 200 ft. | 3 acres
75 ft. | 300 ft. | 7 acres
100 ft. | 400 ft. | 12 acres
200 ft. | 800 ft. | 50 acres

Distance Separation is the radius from the center of the safety zone to the nearest fuels. When fuels are present that will allow the fire to burn on all sides of the safety zone this distance must be doubled in order maintain effective separation in front, to the sides, and behind the firefighters.

Area in Acres is calculated to allow for distance separation on all sides for a three person engine crew. One acre is approximately the size of a football field or exactly 208 feet x 208 feet.

EXERCISE: Alaska Exercise –Tactical Decision Making

Purpose:
Learning to make tactical decisions while on an incident, best method of attack, placement of resources, advantages/disadvantages of equipment, safety/risk management concerns.

Format: Break out groups

Materials Needed:

- Map(s)
- Flip Chart with markers
- IRPG
- Wildland Fire Incident Management Field Guide (suggested reference)

Instructions:

1. Read the scenario; utilize the Power Point and Maps provided.

2. After 15 minutes, answer the scenario questions within your groups and provide input pertaining to the scenario.

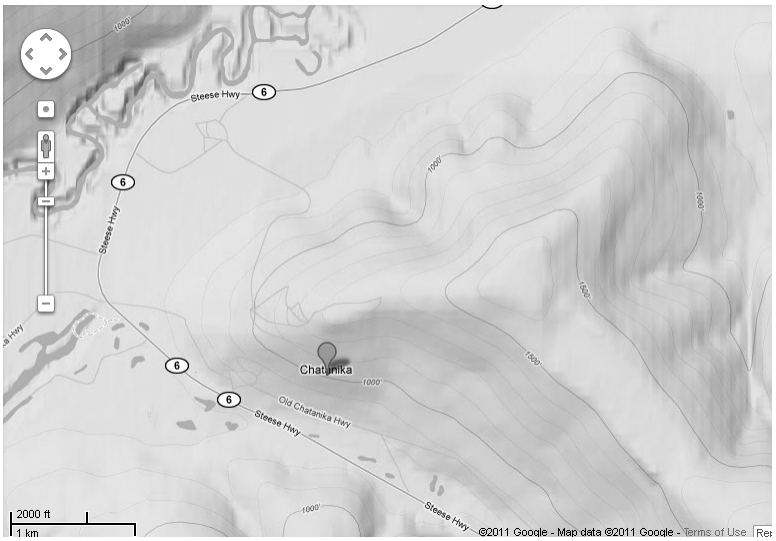
3. Utilizing a student lead present your information to the class.

4. Discuss your findings with the instructor and the class.

5. Exercises will be evaluated by each individual group cadre member based upon: group cohesion, group comprehension of exercise, and observations discussed by the group.

You Are a Heavy Equipment Boss in Fairbanks, Alaska
On the Chatanika Fire

It is June 23rd; you have been reassigned as a HEQB on a transitional fire 12 miles NW of Fairbanks, Alaska. You arrive at staging at 1130 and tie-in with the Operations Section Chief (Ops) of the rapidly assembled ICT3 team. Much of the overhead is detailing from outside of the Area; some IA forces are being reassigned to new starts.



Ops informs you that the fire started last night and is now about 60 acres, predominately burning in Black Spruce. He's assigning you to Division A, the left flank. Your DIVS is en route with an ETA of 1300, and the division is currently unstaffed. Ops assigns you 2 Type 2 dozers, which have just arrived.

Some line has been put in by hand crews and engines, and is holding along the heel. The fire has hung-up on a seismic trail along the lower part of Div A, which he wants you to improve; he plans to have crews hold this line. The fire continues to move up-slope towards a large infrastructure of communications equipment 1 mile to the NE of the seismic trail. He informs you that the National Park boundary is 2 miles NE of the fire, and there are various gold mining camps in the area. Division D, the right flank, is being staffed by 3 type 6 engines and 1 type 2IA hand crew.

Ops plans on placing a resources order soon, but wants your input on what Heavy Equipment will be needed to accomplish the strategies of seismic trail improvement, direct fire line construction along Div A and protection of the communications equipment. He is also concerned that the fire will spot onto the north side of the ridge, where afternoon winds could push it towards cabins along the river. He wants to know if you can go indirect on the backside of the ridge if necessary, or if he'd be better off ordering more hand crews.
You get into your rental pickup for a recon of division A.

1100 Observed Weather: 77 degrees, 35% RH, winds SW 5.
Predicted afternoon weather: 86 degrees, 28% RH, winds S 12-15.

1. What are the tasks you, as a Heavy Equipment Boss, need to accomplish, to be sure your assigned equipment and personnel are able to accomplish your objectives safely and efficiently?

2. When will you updating Ops? List any questions or clarifications needed, issues you anticipate, additional resources needed, production rates, possible line location, etc.

NOTES:

River
Spot Fires
Commo. Equipment
Goldmining Tents
Seismic Trail
N
Div. A
You are here
Div. D
Fire Perimeter at 13:00=110 Acres on 6/23
Wind 8-12 from the SW
Spot fires on back side ridge
© 2012 Google
Image © 2012 DigitalGlobe
Google earth

EXERCISE: Idaho Exercise (5-part scenario)

Purpose: HEQBs will learn tactical decision making components: placement of resources, best method of attack, advantages/disadvantages of equipment, safety/risk management concerns.

Format: Break out groups

Materials Needed:

- Map(s)
- Flip chart with markers
- IRPG
- Wildland Fire Incident Management Field Guide (suggested reference)

Instructions:

1. Read the scenario/each part is meant to be read individually then worked as a group before moving onto the next scenario.

2. After 10 minutes, one group will be chosen to present the groups observations at the end of each level.

3. Exercises will be evaluated by each individual group cadre member based upon: group cohesion, group comprehension of exercise, and observations discussed by the group.

Idaho Exercise
Planning Ops assigns you to Division Bravo

Part 1

September 9th, 1130: You have arrived at the ICP of the Red River fire, which has been burning on the Nez Pierce National Forest for 18 days. Weather has significantly increased the fire's activity and it is now 43,000 acres. The fire increased in size by 3,200 acres yesterday, moving predominantly in a southeast direction; the small town of Dixie and two ranches are threatened. Many unassigned resources have recently arrived, including other HEQB's, but after some confusion you have been assigned to Division B by Planning Ops and received a briefing from the Operations Section Chief (Ops).

In the briefing you are shown that your division is located approximately 11 miles northeast of the ICP and runs north to south, in a forest fuel type of sub alpine fir and lodge pole. The inversion has been breaking by 1100, winds have been picking up by 1300. RH is predicted to be 9% by early afternoon with wind speed and direction of 10-15NW. Resources on your division has gone into safety zones the last two shifts. The IMT2 team's objectives are to hold the fire west of the 1194 rd. and north of the Jack Mtn. rd. Your division is building a contingency line up a spur ridge from the Dixie road southeast to the NF rd. 1194, constructing direct line south from the Dixie rd., and securing two spot fires that crossed the division's fireline yesterday. Your DIVS has recently received additional Heavy Equipment resources but is short on overhead to supervise them; he is anxious for you and your fellow HEQB's to arrive on the line.

At Ground Support you discover there are no available vehicles. The best solution is to ride with a fellow HEQB who has an agency vehicle and is also newly assigned to Division B. Another HEQB just assigned to Division B will also be riding with you. You are handed an IAP and maps and told to report to the DIVS by 1330, giving you time to get your camp set up and obtain supplies.

Would you have any questions for the Operations Section Chief during his briefing?

What are your thoughts concerning this assignment?

What supplies will you obtain?

Do you see any potential issues?

Part 2

September 9th, 1315: You were able to contact DIV Echo on your division's tactical channel and received instructions to meet him for a face to face at the intersection of NF rd. 1194 and Jack Mountain Rd. On the ride up the mountain you observe a smoke column well below and to the northwest of you; the DIVS is looking at a map on his truck's hood when you arrive at the intersection at 1330.

The inversion has dissipated and visibility is good. You notice the winds are 3-5 from the north. The forest on both sides of the intersection seems to have a high percentage of sick and dead lodgepole. The DIVS gives you a briefing and describes the tasks the division is involved with. These include direct attack below and approximately 3 miles to the northwest of you, where you saw the smoke column, mop-up of spot fires below and about 2 miles your south, and a fuel break being constructed below you that will come up to the road you are on (Jack Mountain Rd.). The DIVS is surprised to see 3 of you in one pickup, but divides you up in what he feels is a logical manner. You are to be dropped off at the location of the feller-buncher constructing the fuel break; a hot shot crew member has been supervising this piece of equipment for the last 2 shifts. Dan, one of your fellow HEQB's is to be dropped off at one of the spot fires to supervise 2 dozers that are lining it, he wants one of these dozers, a Type III, to be re-tasked and begin constructing a one blade fuel break up the contingency line you will be on; this equipment is also being supervised by a member of a shot crew. Bill, the last HEQB, has the pickup and will supervise a masticator that is thinning the Jack Mountain Rd., heading towards the upper end of the fuel break under construction.

Would you have any questions for the Division Supervisor?

What are your thoughts concerning your assignment?

Do you see any potential issues?

Part 3

September 9th, 1400: You tie in with the feller buncher and the shot crew member who has been supervising it. You can no longer see the smoke column activity which you believe is to your west at about your elevation or slightly below you. You observe that the fuel break is nearly 50 feet wide and that the tree bundles are being key-holed on the "green" side of the break. The slope is roughly 40% and heavily treed with numerous DBH's of 14-18 inches. You ask the crew member where and when they started this shift; he responds that they began cutting at 1000 and are now going to have a lunch break, and that he flagged their days start point. The feller buncher started working on this contingency line yesterday, cutting .5 miles on that shift. During their break you pace off the distance cut today at about .25 miles. You consult your map and estimate that you have an additional 1.5 miles to cut before reaching Jack Mountain Rd. The DIVS has the expectation that the fuel break will be done by end of shift tomorrow.

Would you have any questions for the hotshot crew member?

What are your thoughts concerning your assignment?

Do you see any potential issues?

What other actions will you take?

Part 4

September 9th, 1430: You observe the operator and crewmember ending their lunch. You thank the crew member for the briefing, double check the operator's name (Fred), and move about 400 feet below and to the "black" side of the fuel break and observe the operation. The operator appears to be competent with the machine with no wasted motion and logical placement of trees and bundles.

You have been monitoring your tactical channel and you have noted an increase in the communication tempo concerning fire behavior, and once again are able to see the smoke column which has sheared towards you from west winds aloft. You realize the wind has been picking up and you now note numerous gusts to 10-12mph from the west northwest. You mentally review your escape route and realize you haven't actually seen your safety zone which is below the road you came in on.

Your DIVS contacts you on your division tactical channel for an update; he is scratchy and weak, but readable.

What will you report to your DIVS?

Do you see any potential issues?

What actions will you be taking?

Part 5

September 9th, 1510: Due to an increase in winds and fire behavior, and after advising your DIVS, you are withdrawing with your feller-buncher to the safety zone, which is about .3 miles to your northwest; your equipment's track speed is about 1 mph. You will cross the 1194a rd. in .2 miles and it has a wide turnout where the contingency line leaves it. One of yesterday's spot fires abuts your contingency line above the 1194a rd. and is about .15 miles from your position. Earlier on your way up the contingency line you noted this 15 acre spot fire had hard black up against your line. This is the spot that Dan is securing with his 2 dozers. You are disappointed because you estimate you only progressed about 5 chains since lunch.

You hear radio traffic on your tac channel stating there is a new spot fire below the 1194a rd.

What are your thoughts concerning your escape route and safety zone?

Do you see any potential issues?

What actions will you take?

Dixie Rd.
and NF
Rd. 1194
Fire
Yesterday's
Spot Fire
1194
& Jack Mtn. Rd.
Intersection
Proposed
Contingency
Fuel Break
N
Google ear
mage USDA Farm Service Agency

Heavy Equipment Boss, S-236

Unit 5 – Safety

OBJECTIVES:

Upon completion of this unit, students will be able to:

1. Describe how to apply the risk management process as it relates to heavy equipment.

2. Describe safety procedures and guidelines when working on or around heavy equipment.

3. Discuss the process to correct safety issues with contract equipment.

4. Discuss manmade and environmental factors that can affect safety when working with Heavy Equipment.

I. USE THE RISK MANAGEMENT (RM) PROCESS

As you might surmise for this class, most personnel at this level already are applying risk management in an intuitive manner.

This unit is designed to reinforce and clarify the application of Risk Management for the single resource boss level as it applies to the HEQB.

Although RM is not a safety program in and of itself, it is a key component of an overall safety program.

Safety is a natural outcome or byproduct of effective risk management. RM minimizes the effects of hazards that cause injury, loss of lives, and damage or destruction of equipment and should ultimately result in operational success.

RM is the principal risk-reduction process to protect personnel and the goal is to make it a routine part of both the planning and execution of operations.

RM is a systematic process designed to:

- Reduce the risks associated with operational hazards.
- Bring personnel to a common understanding of how to identify and manage risk.
- Give management the ability to identify and manage risks associated with all operations.

The foundational concept of RM – Convert the hazard to a *risk*.

The terms *hazard* and *risk* are often used interchangeably; however, they have two distinct meanings as described below:

Hazard – A condition or situation that exists within the working environment capable of causing physical harm, injury, or damage.

In addition, hazards may result in mission degradation.

Risk – An expression of possible loss in terms of severity and probability (associated with human interaction).

As this unit is instructed think of how to apply RM to the information presented.

II. HEAVY EQUIPMENT SAFETY

The HEQB should be trained how to work safely around equipment. Unsafe practices by either the operator or those around the equipment can create very dangerous situations. Injury accidents involving heavy equipment have a higher probability of resulting in a fatality or serious injury than many other types of accidents. It is critical to follow all agency and OSHA safety rules and procedures when working around heavy equipment.

- Ensure equipment operators adhere to safe work practices (OSHA and agency).
- Monitor condition of assigned resources and ensure work/rest guidelines are met.
  - If the operator is also the transport driver consider limitations of hours driven per day.
  - Follow agency driving policies.
- Look out for other nearby personnel.

- Safety circle is generally 200-300 feet depending upon piece of equipment and site conditions. Some equipment will have safe working distance placards.

- Good communication is essential.

- High visibility vests will help the operator to quickly locate personnel, as well as increasing personnel safety on roadways.

- Wear hearing protection when required. If it has been determined that noise levels around the equipment could potentially cause hearing loss, always use protective plugs or muffs when working on or around the equipment.

- Never jump onto or off the equipment. Operators should always use the three-point contact rule when climbing onto or off heavy equipment. The three-point rule means having both feet and one hand, or one foot and both hands in contact with the equipment and/or ladder access at all times.

TIP
The nature of heavy equipment provides a safer work environment for the operator. Risk to fireline personnel is reduced when heavy equipment performs line construction and all non-machines essential personnel are not assigned near the equipment's work area.

III. ESCAPE ROUTES AND SAFETY ZONES

Heavy equipment can be a valuable tool when constructing escape routes and safety zones. A HEQB should work closely with their supervisor and/or the Safety Officer to ensure they are receiving specific directions regarding the placement of escape routes, size and location of safety zones.

Your supervisor may request information from the HEQB for the time and equipment needed to construct escape routes and safety zones.

Considerations:

- Ensure operator and other assigned personnel are aware of escape route and safety zone locations.
- Flag routes to ensure awareness when necessary.
- Determine if escape routes and safety zones are adequate for equipment and other resources.

TIP

Due to the variability of equipment operators, terrain, and fuel types, it is often best to observe equipment working for a period of time to determine actual production rates.

Examples of Heavy Equipment Production Rates and Costs are listed in SR 5-1

TIP
Use available resources for calculating safety zones and equipment production rates, etc., many are available online.

Examples:
- **Wildland Fire Incident Management Field Guide**
- **Incident Response Pocket Guide (IRPG)**

IV. ROAD SYSTEM FOR ACCESS

Risks associated with road systems can be tied to various factors, such as the type of equipment being transported, condition of the road, and the maintenance level of the road.

Examples of hazards include:

- Surface materials
  - Cobble (wash board, base rock)
  - Pavement
  - Unimproved road (two track and native surface)
  - Oil, bound (water, salts, magnesium chloride)
  - Gravel, sand, and pumice
- Slopes (expressed in percent)
  - Uphill and downhill
  - Out sloped
- Bridges
  - Permanent or temporary
  - Gross vehicle weight (GVW) posted
  - Designed for vehicle or equipment use
  - Height and width limitations
  - Condition and age
  - Ownership (variations in seasonal load limit)

- Culverts
  - Load ratings
  - Condition
  - Design (material: metal, concrete, wood)
  - Depth of surface material to the top of the culvert (check with local engineers for adequate depth of surface material).
- Other water crossings
  - Low water crossing (sometimes called a ford or swale, can be natural or constructed)
  - Corduroy (also used in wetlands)
- Turnouts
  - Availability
  - Distance
  - Size
  - How many
- Traffic
  - One-way or two-way
  - Timing (Is road congested at certain times?)
  - Load (how often is it used)
  - Controlled access (opened, closed, gated)

- Access and egress
  - Narrow mountain roads
  - Switchbacks (hairpin turns)
  - Soft shoulders
  - Traffic congestion
  - Overhanging branches (mirrors, glass, hydraulic lines)
  - Debris and blowdown
  - Speed bump (Kelly humped)
- Visibility
  - Time of day
  - Smoke
  - Condition of windshield
  - Line of sight
- Additional Hazards
  - Frost heaves
  - Muddy surfaces
  - Deep powdered dirt surfaces (e.g., moon dust, volcanic ash, talcum powder, sugar sand)

V. ENVIRONMENTAL

- Terrain
  - Slope considerations
  - Surface rocks
    - Equipment traction
    - Stability of rock (e.g., rolling rock, rollout)
    - Composition of rock
  - Soil makeup
    - Equipment traction
    - Resource concerns
    - Compaction
    - Moisture content
  - Tank traps (deep, narrow trench)
- Environmental considerations
  - Riparian zone (wet area)
  - Bog
  - Permafrost
  - Heavy fuel loading
  - High stump

- Weather
  - High temperatures can cause overheating and breakdown of equipment. Optimal performance of equipment is in cooler weather and high humidity.
  - High winds
  - Visibility
  - Thunderstorms (Incident Response Pocket Guide [IRPG])

TIP
While the operator has operator protection systems when in the cab, the HEQB and other personnel will be exposed to various hazards on the line.

- Type and size of fuel cover
  - Trees
    - Root systems (wind firm, shallow rooted live trees)
    - Hazard (snags, spring pole/tension, widow makers)
    - Standing (horizontal sawing, overhead hazard)
    - Downfall (vertical sawing, age of wood, jackstraw or log jam)
    - Age and condition of fuel cover (dead, dying, decadent, diseased)
    - Fuel loading (stems per acre, continuity)

TIP
When presented with a mission where trees are the hazard (decadent, dead, etc.) choose equipment with the proper operator protection.

- Brush/shrub
    - Size (height and stem diameter)
    - Fuel loading (tons per acre, continuity, compaction)
    - Poisonous (poison oak and poison ivy)
- Slash
    - Volume
    - Type (woody, logs, trees, shrubs or combination)
    - Removal/consolidate debris (skid, brush bay/keyhole, pile, mulch)

TIP
Consider how fuel type and continuity affect escape routes, distance, and safety zone size.

VI. OPERATIONAL PERIODS

Equipment and incident personnel interactions during different operation periods can be more complex for the HEQB.

- Shift change (overlapping of equipment and incident personnel)
- Night operations (visibility of personnel and hazards)
- Logistics (servicing, fueling, and transporting)
- Ensure scheduling needs are met within the operational period.

TIP
Night or swing shift operations can provide advantages to the equipment and its production rates due to cooler temperatures, reduced fire behavior, and less incident personnel on the line.

Oregon Fire Exercise, see SR 5-2 for instructions.

EXAMPLES OF HEAVY EQUIPMENT PRODUCTION RATES

The following is an excerpt from the Mechanized Equipment for Fire and Fuels Operations, 2009 (page 34):

FELLER BUNCHER AND HARVESTER TASKS

Felling machines are best suited for quick line clearing and opening up wide sky space in accordance with the long-standing fireline width rule:

1½ times as wide as the height of the dominant fuel.

Thus, in 100 ft. tall timber the fireline width to successfully reduce fire spread from convection and radiation heat would be 150 ft. As a rule, at 100-150 stems felled/hour, or approximately 4 acres cleared a day, for a 150 ft. wide fireline one feller buncher can clear about 1200 ft. of line in 10 hrs. (2400 ft. if double shifted, or by adding another machine). At a modest 50 ft. wide fireline canopy opening, one machine could clear the recommended open space for approximately 3500 ft. in 10 hours (or 7000 ft./double shift day).

EXAMPLES OF HEAVY EQUIPMENT PRODUCTION COSTS

Comparison of line construction methods 1 mile of line, 50 feet cleared of timber (6 acres) 2 feet to mineral soil

Equipment	Cost for 1 Mile of Line	Line Quality	Safety
Dozers	$1,800/shift x 4 shifts = **$7,200**	Trees pushed over by roots. Creates a big long windrow of green trees, slash and dirt ready to catch a spot which is difficult to mop up. Significant soil disturbance with significant rehab needed	No manual falling, difficult to drop individual hazard trees in green
Crews	$10,000/shift x 10 shifts = **$100,000**	Trees cut, bucked, carried by hand and piled on outside of the line creating a large jackpot of fuel. 2 feet to mineral soil, minimal rehab	Significant exposure from falling timber and hazard trees
Feller-Buncher, Tracked Skidder	$5,200/Shift x x 7 shifts = **$3,640**	Trees cut and removed or some retained for rehab. Minimal soil disturbance, 2 feet to mineral soil minimal rehab	No manual falling, hazard trees cut mechanically, creates safe work area for crews

Daily rates for:

- Feller-Buncher Type 1- **$3,410**
- Rubber Tired Skidgine Type 3- **$1,900**
- Excavator Type 2- **$1,820**
- 20 person Crew- **$ 10,000**
- Engine Type 6 - **$ 1,436**

Source for Daily rates: Northern Rockies and Rocky Mountain-Great Basin Incident Business Management Handbook Supplements

EXERCISE: Oregon Fire

Purpose: HEQBs will learn to recognize safety issues associated with heavy equipment operation and management. This scenario will also reinforce tactics and tactical decision making.

Format: Break out into groups.

Materials Needed:

- Map(s)
- Flip chart with markers
- IRPG
- Wildland Fire Incident Management Field Guide (suggested reference)

Instructions:

1. Read the scenario/each part is meant to be read individually then worked as a group before moving onto the next scenario.

2. After 10 minutes, one group will be chosen to present the groups observations at the end of each level.

3. Exercises will be evaluated based upon: group cohesion, group comprehension of exercise, and observations discussed by the group.

Oregon Fire Scenario

As a HEQB, you are assigned a Type II dozer, a Type I Feller-Buncher, and a Type I skidder.

Part 1

It is August 21st and your first shift on the Dog Mountain fire, which has burned across the California line. You have been assigned to Division D on the south west section of the fire, in Modoc County, CA; you note that this part of the fire had substantial growth yesterday. The fire weather predictions given at the morning briefing included a red flag warning for low RH and winds in the afternoon of 10-15 mph from the north-west. At the division break-out, your DIVS assigns you 3 pieces of equipment, a type II dozer with transport, a type I feller-buncher and a type I rubber-tired skidder. He wants you to tie in with your equipment at the division staging area at DP 131, and then thin 2 miles of road 73, from DP 131 to the division break to the east. This road is approximately 3 miles south of the fire, and runs east-west. He envisions the dozer remaining in staging for now. The terrain is gentle, 0 to 5% grade, and rocky in spots; the area is forested with Ponderosa, Sub-Alpine Fir, and Juniper, with openings which have grass. He wants the fire side of the road to be thinned 60 feet deep, leaving as much Ponderosa as possible, with spacing greater than 30 feet.

What are your thoughts concerning the assignment?

10:00: After delays at the ICP and a long confusing drive on forest service roads you arrive at the staging area for Division D, DP 131 at the intersection of road 07 (Kellogg Road) and road 73 (County Highway. 73). You feel there is some confusion, because you don't see any of your assigned resources in the staging area, which is little more than a wide turn-out, and is already full with equipment which you discover is assigned to the neighboring division. You can hear your DIVS talking to the Operations Chief on the command frequency and understand his location is at the extreme north of the division, approximately 9 miles from your location; you doubt if you can hit him on the division tactical channel. He also sounds busy with structure protection problems.

What actions do you take?

Part 2

August 21st, 11:30: After driving to other staging areas, you have found your assigned equipment at DP105, north of your division, on the west side of the fire. You have been watching fire activity increase and you are anxious to get to work on your assignment. You are leading the loaded feller-buncher, and the skidders down road 07 and are 5 miles north of drop point 131. Your loaded dozer has arrived at DP 131 and is waiting to tie in with you.

A TFLD stops you at a driveway intersection. This is the structure protection area your DIVS has been occupied with and you see a dense dark smoke column approximately 1 mile to your east. The TFLD wants to use your equipment to thin the driveway from road 07 east to the ranch structures, about ½ mile distance, both to improve firefighter egress and to potentially be used as a road to fire off of. He believes thinning the fire aside of the road 30 feet in will be adequate with 30 feet minimum spacing of remaining trees. Two hand crews and several engines are already down this driveway. You ask him to check with your DIVS, who immediately approves the plan. The DIVS also states that he knows of an available feller-buncher in Division B (he calls them timbcos, the TFLD calls them hot-saws); he received the okay to borrow it and wants to send your feller-buncher transport to retrieve it while your equipment starts working. You will then be managing it, using it with your feller-buncher and skidder on the ranch driveway which extends east from your location over gentle, slightly rocky terrain, and is treed with Ponderosa and Juniper.

What are your thoughts concerning this new assignment?

What actions do you take?

Do you see any potential issues?

Do you have any feed-back for your DIVS?

Part 3

August 21st, 12:30: After unloading and a briefing, you have made approximately 1/4 mile of progress thinning 30' deep along the driveway, on the side of the approaching fire (future black). You have chosen to drag the bundles out the driveway and across the 07 road, where there is a flat, rocky area of approximately 30 acres, with minimal vegetation. The skidder has fallen behind the feller-buncher as the distance lengthens. The second feller-buncher hasn't arrived, but is due momentarily. You have heard your staged dozer calling you on the division tactical frequency, but he can't hear you answer back.

Fire activity is continuing to increase, so is communication on your tactical frequency. You hear your DIVS order 3 SEATS for structure protection. You see 2 medium bucket ships working to your east.

You think you hear one of the hand crews up the driveway having trouble with multiple spots across the driveway. You estimate he is ¼ mile from you.

What are your thoughts?

What actions do you take?

Part 4

August 21st, 12:45: Your 2nd feller-buncher has arrived and is still on the transport, you're holding him on the 07 road just north of the driveway intersection; he is blocking the road to the north, but you don't remember any turn-outs nearby. Some resources are coming out the ranch driveway, heading south on the 07 road. You have pulled your working feller-buncher back to the driveway intersection and you are deepening the thinning there while the skidder cleans up the bundles remaining along the ranch driveway. You haven't heard an order to fall back but you are preparing to do so because the mission of thinning the driveway seems unobtainable. You worry that you only have one transport for 2 feller-bunchers.

What are your thoughts?

What actions do you take?

Part 5

August 21st, 13:00: You hear the DIVS order all resources off the line and into the safety zone, which is on the 07 road, 5 miles south of your location. As resources continue out the driveway, you acknowledge the order and advise him that you don't have a transport for one of the feller-bunchers. After a long pause he says he will come out and meet you for a face-to-face. While you are waiting, you prepare alternate plans that will allow for all your resources safety.

What are your thoughts?

What actions do you take?

Will you have any feed-back for your DIVS?

DP 105
Fire is .5 mi. N. of
Ranch with head at S. part of fire
Div D
Road 7
Driveway
Intersection
Kellogg Rd
Road 73
N
Google earth

Heavy Equipment Boss, S-236

Unit 6 – All Hazard Assignments

OBJECTIVES:

Upon completion of this unit, students will be able to:

1. Discuss the impact of assignment diversion on the mission.

2. Discuss roles and responsibilities involving working with all hazard teams.

3. Identify indicators of behavioral changes related to critical stress on all hazard assignments.

4. Discuss the Stafford Act and National Response Framework.

5. Discuss preparations timeframes related to all hazard assignments.

6. Identify eight (8) categories of hazards relating to situational awareness for all hazard assignments.

I. INTRODUCTION TO ALL HAZARD ASSIGNMENTS

Your role as Heavy Equipment Boss on an all hazard assignment is to provide supervisory and administrative support for heavy equipment resources assigned to the incident.

The responsibilities, processes, and procedures are similar to a wildland fire assignment, but the hazards, risks, and mitigations are usually different and may require assistance from technical specialists.

A. Length of Assignments

Length of assignments for all hazard assignments may last up to 30 days. Fatigue and stress may be outside the normal experiences you are accustomed to.

Work/rest ratio (2-1) guidelines are the same as on a wildland fire incident. However 14 days on, and one day off, or 21 days on and two off may not be applicable on an all hazard assignment.

When assigned to an all hazard incident discuss with your supervisor or Liaison Officer the need for a set 2-1 work/rest ratio.

B. Assignment Diversion (Mission Creep)

Assignment diversion, commonly known as mission creep is common in all hazard assignments. As a Heavy Equipment Boss you need to be aware of possible mission creep outside the scope of the mission assignment.

Mission creep can have an unforeseen or hazardous effect on the overall mission by taking on duties that are not assigned on your mission statement.

Example of mission creep:

Your team is assigned to support the local fire department with their normal duties at a hurricane. All infrastructures ceased, including sanitation services.

Mission creep: team personnel start assisting the sanitation department with trash disposal.

Your assignment was to support the local fire department not dispose of trash. The safety related issues in this mission creep are that trash could contain toxic or hazardous material, and your team is not trained or equipped to do this job.

II. WORKING WITH ALL HAZARD TEAMS (FEMA, AREA COMMAND, ETC.)

All hazard assignments usually include working in an expanded interagency team atmosphere with various all hazard response agencies and technical specialists you do not normally work with.

Stress levels may be elevated and interpretation of the incident command system may be different from what you are accustomed to.

An example is that all hazard teams may have specialized search and rescue, or hazmat clean up units that use equipment and terminology you may not be familiar with.

A. Communication

1. Radio use

You may be communicating with various outside agencies that are unfamiliar with wildfire radio protocol. They may use their own agency, regional, or cultural terminology. It is vital to use clear text. Do not use acronyms.

Follow the Communication plan and ensure that equipment operators assigned to you are familiar with frequency management and emergency communication procedures.

2. Roles and responsibilities

Responding agencies may have different roles, responsibilities, policies, and procedures. It is important to start a dialog to blend responsibilities so there is a common understanding.

The ability to understand cultural differences, language, and terminology is an essential part of communication. You must be aware of cultural differences to accomplish the mission.

B. Information Requests

As a Heavy Equipment Boss you may be requested by your supervisor to provide specific information for statistical purposes.

Be sure to have a clear understanding of the type of information being requested and who needs to receive it. Check the Assignment List, ICS 204 for specific requirements.

For example, Federal Emergency Management Agency (FEMA) may require specific statistics on non-industrial hazardous materials discovered as a result of a search and rescue mission.

III. ALL HAZARD – CRITICAL INCIDENT STRESS MANAGEMENT (CISM)

Critical stress can have serious short-term and long-term effects. The ability to identify situations that may cause critical stress is paramount to manage and minimizing its effects.

A. Stress

All responders to the incident may be exposed to stressful situations that include isolation, death, disease, devastation, etc. that will affect each individual in a different way.

Patience and sensitivity of the situation is extremely important.

Stress levels may also be very high with local agencies that have been affected by the disaster.

Being aware of what incident support is available and how to access it is important.

B. Taking Care of Yourself

Being put into a disaster situation that includes property destruction, and suffering on a mass scale is outside the scope of normal stress management. Often you are the last one to see a change in your behavior.

You are not immune to human suffering and stress, it is important to step back, take time to assess your physical and mental condition. You need to be able to identify trigger points in your behavior and seek help as needed.

C. Take Care of the Team

Some all hazard incident management teams (IMTs) will have assigned to the command staff a Crisis Incident Stress Manager (CISM).

- Look at team interactions, process, and procedures; note any unusual behaviors due to high stress situations.
  - Behavior is out of character.
  - Dysfunctional team interaction.
  - Not following process.
  - Group think can be a result of behavioral changes.

  Notify your supervisor if you observe out of the ordinary behavior, monitor the situation, and follow-up accordingly.

IV. STAFFORD ACT

Federal support to States and local jurisdictions takes many forms. The most widely known authority under which assistance is provided for major incidents is the Stafford Act.

When an incident occurs that exceeds or is anticipated to exceed local, tribal, or State resources, the Governor can request Federal assistance under the Stafford Act.

The Stafford Act authorizes the President to provide financial and other assistance.

V. NATIONAL FRAMEWORKS SYSTEM (NFS)

The NFS presents the guiding principles that enable all response partners to prepare for and provide a unified national response.

The National Response Framework overview document was developed for emergency management practitioners as an overview of the process, roles, and responsibilities for requesting and providing all forms of Federal assistance.

- Mission Assignment

  FEMA may issue mission assignments to other Federal agencies.

  A mission assignment is very similar to a Resource Order. The difference being, a mission assignment gives you specific tasks to do, whereas a resource order assigns you to an overall incident in a qualified position.

  It is important to follow the mission assignment and avoid mission creep.

VI. ASSIGNMENT PREPARATION

A. Preplanning

All hazard response presents some of the most difficult and complex management challenges that our agencies face.

In some cases training may be provided at the incident and may include HazMat Awareness and Operations. Work with your agency to ensure you have the required trainings for the assignment. If possible try to take IS-800.B online through the FEMA website.

Potential incidents include:

- Hurricanes
- Floods
- Animal disease outbreaks
- Terrorist attacks
- Search and rescue operations
- Large hazardous material releases

Examples of assigned tasks in mission assignments for agency personnel may include management of:

- Logistical distribution centers
- Staging areas
- Base camps for emergency responders
- Clearing roadways and debris
- Support for wildfire or structural fire suppression

TIP
More information can be gathered at the following website: www.fs.fed.us/r8/allhazardresponse

Preplanning for an all hazard assignment is essential. If you are willing to accept all hazard assignments long range preparations may include passports, vaccinations, and research.

- Prepare for all hazard assignments at least six months in advance.
- Obtaining Government passports requires approximately three months.

TIP
If you have a personal passport it will shorten the wait period for a Government passport.

- Vaccinations vary depending upon the area of the world you are going to and may require booster shots.

TIPS
More information on vaccinations can be found at the following website: www.cdc.gov/

Vaccination records from the military or any other foreign travel may help reduce the number of required vaccinations.

B. Understanding the Geographic Area and Mission Assignment

Where am I going? What am I going to? How am I going to operate in that environment?

Internet and technical specialists are very good resources to help prepare for some of the cultural differences you may encounter on an all hazard assignment, in or out of the country.

VII. SITUATIONAL AWARENESS FOR ALL HAZARD ASSIGNMENTS

A. Culture

- Local customs
- Language
- Religious beliefs
  - Religious practices may affect work schedules.
- Perceptions
  - Can go both ways
  - Bias can influence decision making

B. Hazards

- Environmental
  - Disaster aftermath
  - Downed vegetation
  - Water
  - Topography
  - Urban interface (septic tanks, power lines, animals, etc.)

- Weather
  - Wet/cold – extremes
  - Disaster reoccurrence
  - Heat index
  - Mud – Slides/avalanche
  - Floods
  - Wind events
- Animal/reptile

TIPS

Hantavirus pulmonary syndrome (HPS) is a rare but deadly viral infection. It is spread by mice and rats. They shed the virus in their urine, droppings and saliva. Tiny droplets with the virus can enter the air. People can get the disease if they breathe infected air or come into contact with rodents or their urine or droppings. You cannot catch it from people.

Remember to use the PPE required by the incident for protection from hazards.

- Insects

- Infrastructure

TIP
Be prepared to work in an environment where you do not have access to technology.

  - Gas leaks
  - Lack of sanitation
  - Raw sewage
  - Water system (lack of or contamination)
  - Transportation (e.g., road/bridge) systems
  - Power lines
  - Lack of telephone/data
  - Structural fire protection
  - Structural damage (toxic gases or weakened structural integrity)
  - Dam integrity
  - Medical facilities (biohazard and radiation)

- Biological
  - Mold and mildew
  - Pathogens/pandemic
  - Viral/bacterial
  - Manmade/natural
  - Hazmat
  - Toxic plants
- Chemical
  - Spills
  - Aerosols
  - Contact
    - Asbestos
    - Poly carbons
- Radiological
  - Nuclear waste
  - Military
  - Medical facilities

- Explosive
  - Unexploded ordinance
    - Personal defense stockpiles (personal reloading equipment)
    - Military
  - Time sequential explosives/secondary devices
  - Suicide bombers/terrorism
  - Gas/oil wells
  - Pipe bombs
  - Flammable compressed gas (e.g., propane, acetylene, oxygen, etc.)
  - Other (chemicals)
- Human
  - Drug trafficking
  - Unstable individuals (altered stated due to effects of disaster)
  - Human trafficking
  - Unauthorized personnel
  - Criminal activity
  - Fatalities

C. Transportation

- Other agencies involved (requirements and policies may vary)
- Navigation (egress, congestion, unidentifiable area, etc.)
- Communication system and coverage

D. Personal Safety and Security

- Anti-government
- Gang activity
- Criminal activity
- Looting
- Evacuation plan
- Base camp security
- Staging area security
- Site safety plan
- Incident emergency plan

VIII. ALL HAZARD EQUIPMENT

Uses may vary from wildfire.

Is the equipment designed for the assigned task? For example, is the dozer able to work with hazardous material, etc.

Some examples of heavy equipment:

- Warehouse equipment: forklifts
- Vacuum trucks
- Dump trucks
- Skimmers – used to skim oil off water
- Pumping trucks
- Positive pressure fan trailer
- Decontamination trucks
- Fueling trucks: propane, liquid gas, etc.
- Small rubber tired skidders with various attachments (bobcat)
- Rubber tracked excavator

Some examples of unique hazardous material equipment:

- Refrigeration truck (anhydrous ammonia)
- Cryogenic hazmat trucks