PART 1. ORDERING HEAVY EQUIPMENT RESOURCES

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Use of heavy equipment in wildfire operations starts with the Incident Commander’s tactical plan, followed by the first equipment resource order to dispatch. Our initial resource order is critically important to successful execution of the incident tactical plan, and is usually based on the intended timeline for meeting a series of objectives, e.g. securing access to and from the incident, and when to turn the incident over to the host agency.

Incident Management Team (IMT), Operations Section: Our first order of mechanized resources is based on our skill to correctly estimate the time and space needed to achieve control of the incident, i.e. calculating the control forces needed. Ordering the right machine for the planned task can avoid devastating results during an active fire season. Ordering the correct number of machines by type and kind, and the necessary overhead for managing the machinery improves the efficiency of implementing the tactical plan.

Incident overhead need to provide dispatchers with the correct information from the beginning of the resource ordering process. A complete mechanized resource order includes realistic time frames allowing for contractor logistics, administrative requirements, and contractual obligations to be met. Incomplete, unrealistic, or poorly-sequenced resource orders can prevent and delay operations on the ground.

Properly executed heavy equipment resource ordering means the Incident Management Team receives the right equipment with the proper attachments for the planned task, in the correct order of arrival, and delivered to the right location.

Table 1. Mechanized equipment ordering components and essential considerations.

<table>
<thead>
<tr>
<th>EQUIPMENT PARAMETER</th>
<th>EXAMPLES AND RELEVANCE</th>
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</thead>
<tbody>
<tr>
<td>Kind of machine</td>
<td>Feller buncher, harvester, skidgine, excavator, dozer, transport.</td>
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<tr>
<td>Machine type</td>
<td>Type 1, Type 2</td>
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<tr>
<td>Machine attachments/special needs</td>
<td>Excavator bucket with thumb, excavator with dozer blade, dozer with rippers, logging truck for long logs or short logs, lowboy suitable for woods roads¹</td>
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<tr>
<td>Where to report</td>
<td>For incident check-in and staging</td>
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<tr>
<td>When to report</td>
<td>Include realistic time needed for machine mobilization, transport and check-in.</td>
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<tr>
<td>Machine arrival sequence</td>
<td>Heavy Equipment Task Force (HETF) with multiple machines and machine types</td>
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</table>

¹ Forest collector roads (terminal roads that feed into an arterial road system) should have turning radiuses for short lowboys. Arterial roads should accommodate all heavy equipment. Both road types may include bridges, which require assessment and approval for heavy equipment crossings.
Order Equipment For Arrival And Deployment Sequence

When ordering a Heavy Equipment Task Force (HETF) specify the prioritized sequence of arrival for each machine, its destination and the incident contact(s). For example, the first machine needed on-scene for roadway hazard tree removal might be a feller buncher to work with a skidgine or engine, or a mulcher for brushing the roadway for safety. Additional task force equipment (e.g. skidder, dozer, road grader) can arrive later as transports are available. If machines arrive out-of-sequence equipment might need to wait for the primary machine, i.e. felling before skidding.2

Designating which equipment to arrive in a specific order also helps transport drivers. Transports, e.g. lowboys and trailers, are often a limiting factor for moving heavy equipment to the incident during fire season. Most heavy equipment contractors own more machines than transports. Contractors may need to hire or rent transports to move multiple machines. Most agency equipment comes matched with its own transport and driver (e.g. USFS Region 8 initial attack dozers with plows).

The tactic dictates what equipment should show up first. This principle also guides what machines are included, and their position in the equipment task force operation.

Example tactic: Open an old, brushed-in woods road as a contingency or backup fireline during initial attack by hand crews and aviation. In this example felling equipment or mulchers will be the lead equipment with skidgines in-tow. Following the skidgines will come skidders, dozers or excavators depending on job requirements (e.g. access, escape, fire containment).

If we need to establish a direct control and containment line against the fire perimeter, the primary task is to construct fireline. Depending on vegetation and terrain suitable equipment could be one or more dozers, excavators, mulchers or graders. Each dozer can go directly to the site and begin constructing fireline. Additional task force machines would follow in sequence: feller buncher or harvester (for hazard tree or canopy clearing), tracked shovel loader (for bunching felled trees, stacking brush slash), grapple skidders (wheeled or tracked, for skidding bunched trees). Include mobile water (e.g. skidgines, off-road engines) wherever machinery is running through vegetation or over rocky ground, and machines to move slash and brush, as well as to reshape disturbed road surfaces (e.g. dozer, grader).

✓ Order equipment that addresses tactical objectives.
✓ Select the appropriate tool for the task, matching the terrain, vegetation and timing.
✓ Order equipment for the phase of the fire, when and where it will be needed.
✓ Pay close attention to ordering details, equipment specifications, and incident logistical support.
✓ Anticipate servicing machines, identifying access drop points and locating staging areas.

How many machines to order?

Consider ordering enough equipment to accommodate possible fire changes and contingencies in the mechanized operation. Ordering for contingencies, i.e. machinery breakdowns3, equipment fails inspection, or changes in priority of tasks, best assures that production of control forces can be maintained.

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2 A mobile water source should accompany the felling machine (e.g. skidgine, engine) to suppress any fire starts that might occur due to sparks originating from the felling operation or any steel machine components (e.g. tracks, chained wheels, felling head attachment) striking rock.

3 Machinery breakdowns can occur due to hydraulic leaks, clogged filters, flat tires, track breakages, engine compartment fires, metal fatigue cracks, lack or loss of fluids (fuel or oil).
Remember the adage, “Order two to get through.”, especially if the machine is essential to meeting critical incident objectives, in short supply, or if machine support (e.g. fuel, parts, services) is not locally available.

Include transports, support vehicles and double-shifting resources (e.g. spare support drivers, machine operators) in the order. Compare operational needs for specialized vs. general equipment. Feller bunchers, mulchers, chippers are specialized machines designed for a specific task. Dozers, excavators and log loaders can perform a wide range of tasks, and fall into the general equipment category with various additional attachments (e.g. bucket thumb attachment on excavators, brush rakes, grapple or winches on dozers).

Example scenario:
1) Complete a contingency control line on-schedule to meet the contingency need described in the Tactical Plan.
2) Importance of the indirect control line changes.

Ensure completion of the job by ordering an extra feller buncher. Factor in essential machine support and logistics. If you order only one feller buncher, and it breaks down, the operation stalls until it is either fixed, a different machine is moved into place, or a less safe alternative is used (e.g. multiple hand fallers).
If you order the extra lead equipment (feller buncher), and nothing breaks down, you complete the felling phase quickly and skidding becomes the primary operation. If one of the two feller bunchers breaks down, the task force continues felling with one machine. Progress in achieving the planned wildfire control does not stop. A second operator included in the equipment order allows for 24-hour machine operation, day or night.

Advise the IMT: Stopping forward progress creates lost time, complicating the calculated time and space requirements. Concept of Operations, strategic and operational intent statements should offer guidance for equipment ordering decisions. Anticipating potential changes and ordering extra equipment, operators and support services can allow a fire manager’s freedom of movement (i.e. options). Anticipate and plan for contingencies; quickly adapt to change.

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**Prevent Ordering Errors**

*Lessons learned can be costly. Order the right tool for the task.*

**Fireline Construction:** Ground slopes > 55% with heavy, downed fuels and large timber (>25” diameter).
- **Ordering Error:** Mid-sized dozers ordered for uphill fireline construction.
  - **Issue:** Inadequate machine size. Operating direction inefficiencies.
  - **Correction:** Type-1 dozers creating a go-back trail to allow working downhill. Multiple dozers (2 or 3) working in-tandem can in a single-pass pioneer, clear and dress a control line.

**Water Supply:** Incomplete, or no water supply plan for water carrying equipment.
- **Ordering Error:** Type-4 skidgines ordered
  - **Issue:** No plan for how and where skidgines will refill, or for minimizing turnaround times to the work site.
  - **Correction:** Order two skidgines and water tenders. Use tenders to service skidgines at a transfer site.

**Worksite Conditions:** Forest fuels include average stump diameters >25 inches on steep slopes (>35%).
- **Ordering Error:** Type 1 feller buncher ordered without specifying maximum felling head cutting dimensions.
  - **Issue:** Type 1 feller buncher with too small a cutting head, or a shear cannot handle large diameter trees.
  - **Correction:** Specify large, steep-slope (leveling) feller buncher with maximum cutting capacity (e.g. 30-32” diameter). For backup order a dozer, a professional faller module, or a blasting crew.

**Downed Fuel Management:** Moving woody debris and cut trees.
- **Ordering Error:** Type-1 excavator ordered with bucket. Thumb and bucket combo not specified.
  - **Issue:** Equipment-Task mismatch. Bucket and thumb combo required to grab and hold objects.
  - **Correction:** Specify Type-1 or Type-2 excavator with the proper attachment, e.g. bucket with thumb, clamshell bucket, or a tracked shovel log loader (if mostly moving cut trees vs. brush).

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The first heavy equipment order for a wildfire incident commits resources to execute the tactical plan, addresses realistic report times and selects known reporting locations with correct on-site contractor information. Taking advantage of balanced mechanized task forces with experienced operators, mechanization can increase capabilities for building control line, improve forest infrastructure (e.g. escape routes, medivac and safety zones), assist ground and aviation crews, and remain for site rehabilitation. When functioning within the machine’s safety parameters and designed performance capabilities (e.g. slope, flotation, traction, lifting/cutting capacity) heavy equipment is highly productive, versatile and a safer incident tool than using manual methods. Proper planning, guidance and staffing creates a very effective fire management resource.