Haul Systems & Semitech Review
2.19.03 – T. Rumley and B. Rogers

What is a Haul System?
- Basically it is a way to forcibly pull or haul an object over certain distance.
- Haul system will also generally include mechanical devices to give a mechanical advantage.
- Mechanical advantage of a pulley, lever
- Makes your job easier

How/Why?
- Work = Force x Distance
- Therefore force and distance are inversely proportional
- You increase the distance you decrease the force. Increase distance by using haul systems.

Four different systems

1:1 system (no mechanical advantage)

2:1 system

3:1 system

4:1 system

Z-rig (3:1)
1:1 – Compare to just pulling – reason is that we assume the pulley is ideal and only acts as a change of direction and transmits all force. (sometimes called Brute Force)

2:1 – Ideally you get a 2x advantage. Not always so! Angle of rope makes a big difference.

3:1 – 3x advantage, compare with two fixed pulleys. You’re really pulling all the weight. It is a combination of a 1:1 and a 2:1. (called the Z-Haul or Z-Rig)

4:1 – 4 times advantage (that’s like doing a fourth of your homework and still getting full credit!) combination of 2:1 and 2:1.

Problems
- Since you changed the distance, you have to pull more rope to move the same amount.
- Watch that angle! You can actually multiply the amount of force that the rope feels.
- Huge forces can build up, so the equipment must be able to handle the load
- Anchors must be bombproof!

So why do we use haul systems?
- Slope or terrain makes it impossible to move the stokes under your own power.
- Too steep, vertical!, slippery

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**Litter Captain**

**Before Getting on the Litter:**
- **Explain Objective:** To get patient to safety as safely and as quickly as possible.
- **Explain How:** With team attached to litter and purpose of belay system.
- **Check Equipment of Team Including ASRC Seat Harness, Helmet, Sling of Perlon, and Carrabiner.**
- **Commands Between You (the LC) and the Rope Handlers…Minimize Extra Talking.**
- **Explain Commands Between You (the LC) and Your Team.** (4) Falling, Rock, Vomit, Stop.
- **Keep the Litter as Level as Possible. If an Angle is Necessary, Make Sure Head is Higher Than Feet.**

**Once on the Litter:**
- **Instruct Team to Double-Check Tie-in of Member Across the Litter From Them.**
- **Explain Lifting Procedure:** Keep knee closest to patient’s head down and lift with legs, not back.
- **Don’t Forget to Preload!!!**