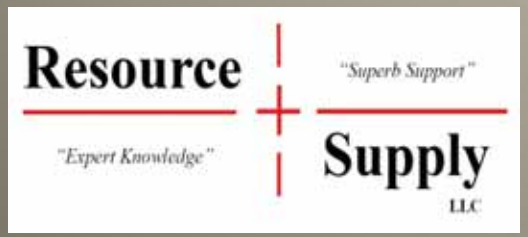
# Measuring Stockpile Volumes... the Easy Way

by:

Jon Aschenbach
Resource Supply, LLC

Timber Measurement Society Meeting

October 28, 2008



# Stockpiles can be…

Wood Chip Piles

Hog Fuel

Chunk Piles

Rock & Gravel

Dirt or Sand

Anything in a pile!

# Common Methods To Measure Volume

1. Outright guesses
2. Flyover with LIDAR on Monthly basis
3. Engineer Measurement with Laser Scanner
4. Walk the pile with GPS unit
5. Laser Rangefinders with MapSmart Software

# Why Do We Measure Stockpiles?

- Inventory control
- Planning
- Cost Accounting

# Chip Piles

Coos Bay, Oregon

Longview, Washington

Roseburg Resources Chip Piles North of Coos Bay, Oregon

# Rock Piles

Gravel

Asphalt dug up from a street project

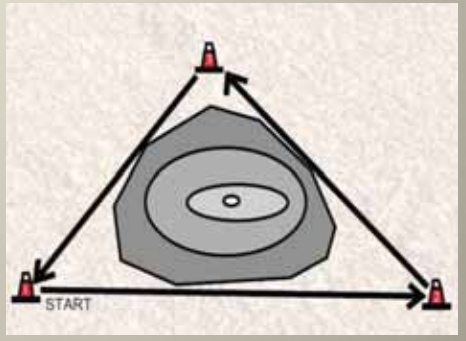
# Equipment

- TruPulse 360B Laser Rangefinder
  - MapSmart Software
  - Pocket PC (ruggedized)
  - Tripod and traffic safety cones

- Impulse 200 Laser Rangefinder
  - MapSmart Software
  - Pocket PC (ruggedized)
  - Angle Encoder
  - Tripod and traffic safety cones

# Procedure

1. Walk the pile laying out cones
2. Choose a starting point
3. Shoot points on the pile
4. Shoot next instrument location
5. Shoot the pile from each new location until the entire surface has been measured.
6. Transfer your field data to your PC.




# Key Points When Shooting Pile

- Shoot the top of the pile carefully (don’t miss)
- Shoot the base (toe) carefully
- Get plenty of shots of the pile while at the instrument point
- Have plenty of cones available (with reflector strip)

# Advantages of This System

- One person operation
- It’s fast; 100,000 yards^3 measured in 2 hours
- Much safer than walking on pile with GPS
- Accuracy usually within 5% of engineer
- Works with small to huge piles
- Works with piles next to walls
- Measure in inclement weather (except fog)
- Export data as DXF file, Text File, Contour Map

# TruPulse 360B

- Built-in compass and laser rangefinder
- Takes shots as fast as you can hit fire button
- Can be affected by large metal such as pulp mills
- Less expensive than Impulse & Angle Encoder
- Minimal Weight

# TruPulse Issues Around Pulp Mills

- Compass problems
  - Start away from pulp mill
  - Calibrate compass often
- Safety issues with mill equipment
- Access to all sides of pile may be limited
- Crowned edges require walking on pile


Pulp Mill near I-5 in Albany, OR

# Impulse 200 & Angle Encoder

- More accurate than TruPulse 360B
- More expensive
- No compass, so local attraction not a problem
- Heavier to pack around

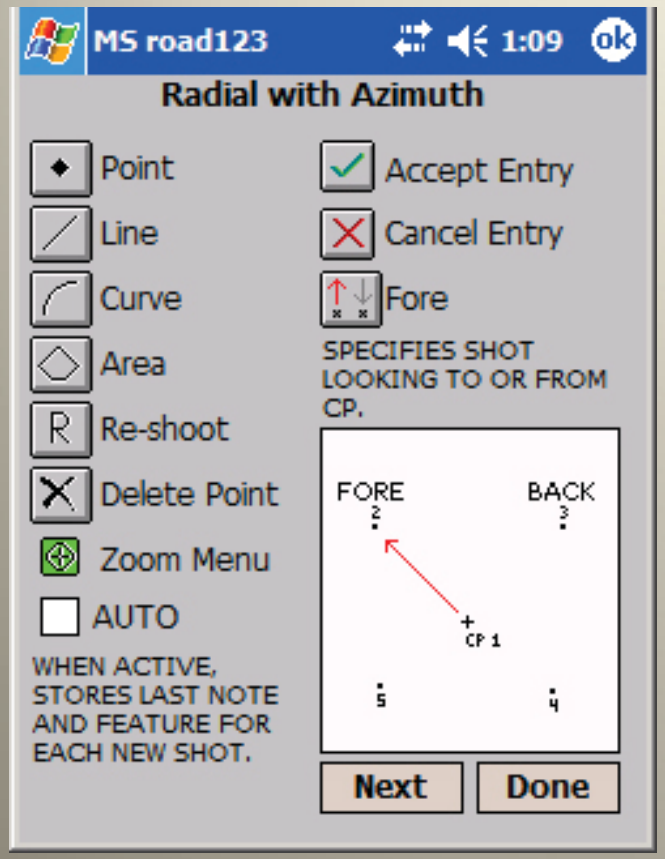
# MapSmart Measurement Methods

## Overview of the Four Methods

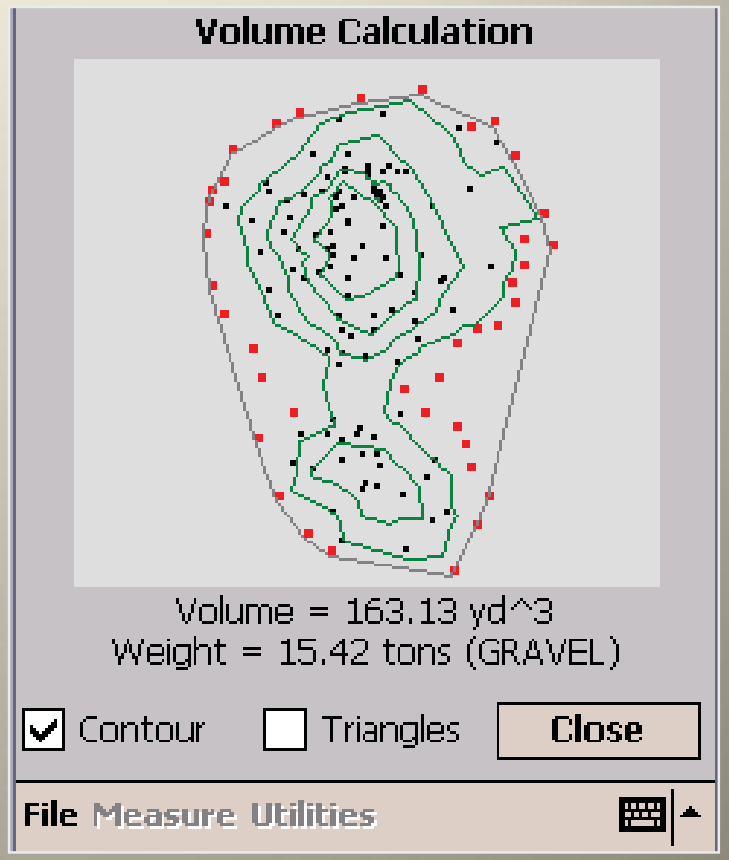
The table below provides an overview of the four measurement methods.

| Method | Requirements | Compatible Hardware |
|---|---|---|
| **Radial with Azimuth** | Proper care and procedure when using a compass in the vicinity of magnetic objects such as cars, utilities, buildings, etc. | MapStar Compass Module<br>Impulse 200<br>TruPulse 200 / 200B<br>TruPulse 360B |
| **Radial with Angle** | Higher accuracy and/or need to work in the vicinity of metal or magnetic objects. | MapStar Angle Encoder<br>Impulse 200<br>TruPulse 200 / 200B |
| **Range Triangulation** | Able to occupy (stand over) every feature to be mapped. Only have access to a laser, no MapStar module. | Impulse 200<br>TruPulse 200 / 200B |
| **Baseline Offset** | Able to walk a straight line from one end of the site to the other. Only have access to a laser, no MapStar module. | Impulse 200<br>TruPulse 200 / 200B |

# MapSmart Screens




Radial With Azimuth Method




Volume Available in Field

# Data Recorded for Each Shot

- File: SW_Hogfuel Pile
- Date: 10/28/2008 11:45 AM
- Method: Radial with Azimuth
- Volume: 29,545 Cubic Yards
- Project note:  TMS
- 

| Point | X | Y | Z | Type | Name | Note |
|---|---|---|---|---|---|---|
| 1 | 0.00 | 0.00 | 0.00 | Point | | Origin |
| 2 | -5.65 | 76.63 | 0.12 | Point | | toe |
| 3 | -3.34 | 74.22 | 0.05 | Point | | toe |
| 4 | 8.15 | 57.74 | 0.21 | Point | | toe |
| 5 | 15.12 | 57.05 | 0.06 | Point | | toe |
| 6 | 20.98 | 53.82 | 0.04 | Point | | toe |
| 7 | 27.62 | 51.30 | 0.00 | Point | | toe |
| 8 | 40.16 | 59.45 | -0.01 | Point | | toe |
| 9 | 40.03 | 62.11 | 1.30 | Point | | pile |
| 10 | 40.73 | 72.88 | 4.13 | Point | | pile |
| 11 | 38.73 | 72.80 | 6.02 | Point | | pile |
| 12 | 44.65 | 91.13 | 7.25 | Point | | pile |

For every shot, a set of data is saved. This is great for anyone wanting an audit trail of the process.

# Conclusion

- Using the MapSmart software with either the Impulse 200 & LTI Angle Encoder or the TruPulse 360B is very cost effective
- Equipment outlay is approximately $4,000.00 for the TruPulse solution and $6,000.00 for the Impulse/Angle Encoder option
- It is a much better alternative than LIDAR Flyovers, guessing, or GPS
- One person operation