Geographic Information Systems (GIS)

at

Peabody Western Coal Company (Reclamation\Engineering)

The Nature of Information at Peabody Western

Here on Black Mesa...

Every Shift, Every Week, Every Month...

THINGS MOVE

Boundaries, Machines, People, Facilities…

Information Management at Peabody Western

AZBU Is A Dynamic Operation...

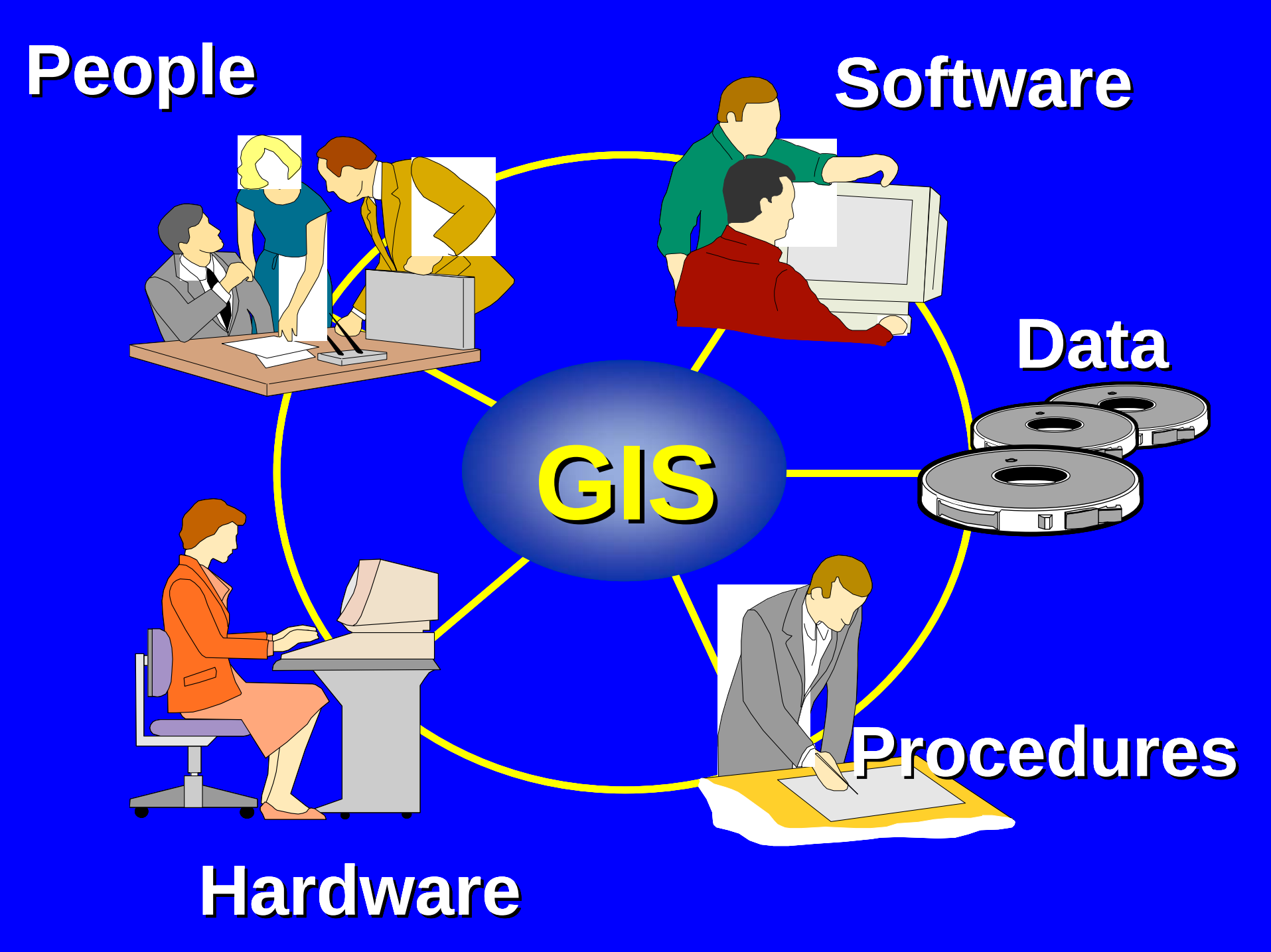
Managing It Requires a Dynamic Technology...

GIS

A Dynamic Answer to Dynamic Needs

What is a GIS?

- Hardware & Software
- Data
- People
- Applications


People
Software
Data
GIS
Procedures
Hardware

Geographic Information System

A GIS Stores and Manages Geographic Features, Either as:

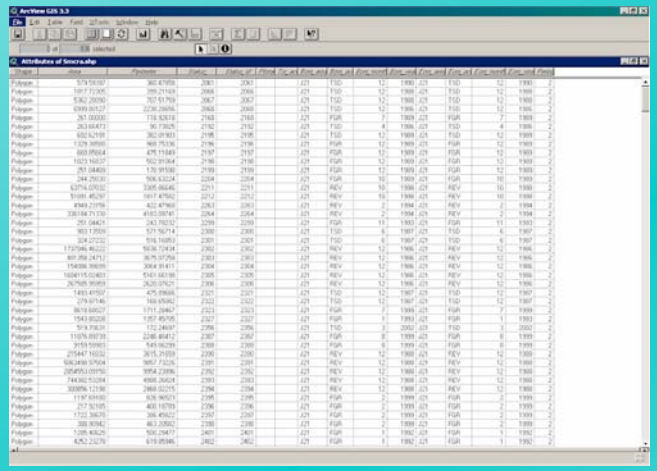
- Points
- Lines
- Polygons (Areas)

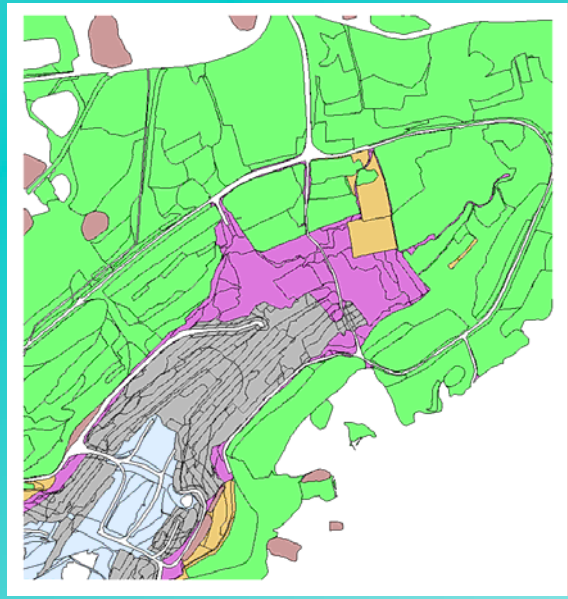
These Features are Linked to Databases Containing Descriptive Information

Geographic Information System

Organizes:

- Views
- Tables
- Graphs
- Layouts

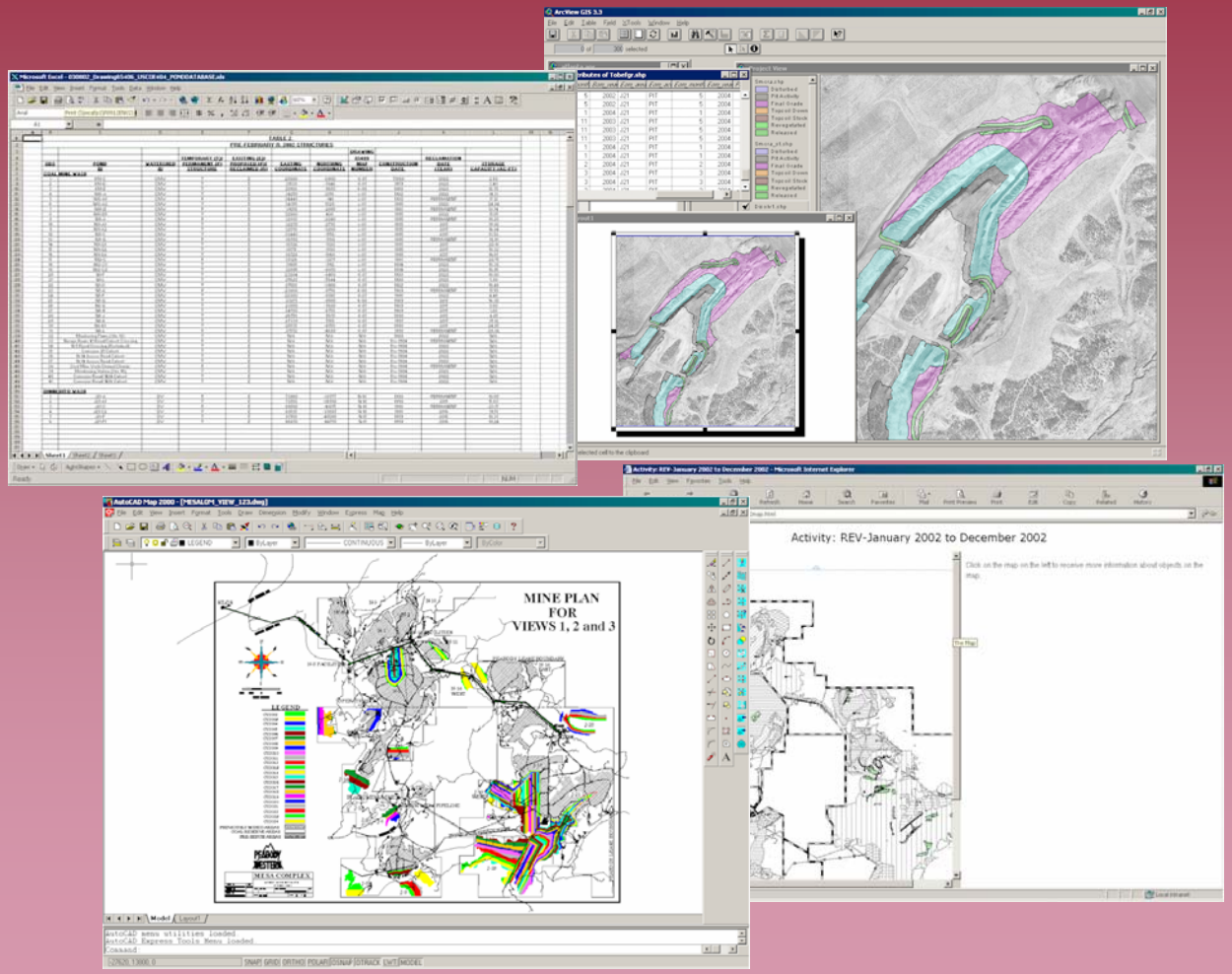




Geographic Information System

Integrates:

- Tabular
- CAD
- Arcview
- and Image Data



Geographic Information System

- **Hardware**
  - HP3500 and HP755 Plotter
  - IBM Compatible PCs
  - Hewlett-Packard Image Scanner
  - GPS Units
  - Color and B/W Printers

- **Software**
  - Windows2000 NT Arc/Info GIS Software
  - ArcView - PC-Based GIS Software
  - AutoCAD
  - Microsoft Office
    - Access (Database)
    - Excel (Spreadsheet)
    - Word (Reporting)
    - Project (Scheduling)

Data

Peabody's GIS Database

- **Operations - Dragstrip, Mine Plans, Coal Resource Areas**
- **Base Layers - Soils, Vegetation, Streams, Topography**
- **Legal Layers - Lease Area, Permit Boundary, Navajo-Hopi Partition Line**
- **Facility Layers - Buildings, Roads, Beltline, Waterline, Powerline, Disturbance Boundaries**
- **Environmental Layers - Monitoring Sites (Soils, Vegetation, Grazing Land Use/Management, Air, Water, Weather), Ponds, Wildlife**
- **Reclamation Layers - Reclamation Activities (Grading, Top Soil, Reseeding, Planting, Fence)**
- **Digital Ortho and Geo-reference Photo**

The People

- Permanent Employees
- GIS Technical Staffing Provided Through Outsourcing Using:
  - Temporary Employment Agency
  - Consulting Firms
  - Co-op Students

Projects

- Supported Peabody's Permit Renewal Application with 18 Regulatory Agencies
- Responded to Legal Challenges and Appeals
- Produced Exhibits for Shareholders' Meeting
- Displayed Sampling Sites for the Spoil Sampling Monitoring Program
- Stored, Displayed and Manipulated Environmental Baseline and Monitoring Data for Permit and Annual Reports
- Identified and Quantified Reclamation Areas and Activities
- Reclamation Planning and Implementation
- ADHOC Reports
- Grazing Management Plans
- Updated Database Using GPS, Digital Orthophotography or Georeferencing Images

Who Uses Peabody's GIS

- Senior Management
- Middle Management
- Technical Staff
- Public Relations
- Federal, State and Tribal Regulatory Agencies
- Outside Consulting Firms

Moving From Today to Tomorrow

Peabody's GIS Today:		Peabody's GIS Tomorrow:
– Data	→	– Information
– Reactive	→	– Proactive
– Display	→	– Analysis
– Complex	→	– User-Friendly
– Reporting	→	– Planning

Cost Control

Managers Now Realize that the Key to Controlling Costs is Timely, Dependable ***Information***.

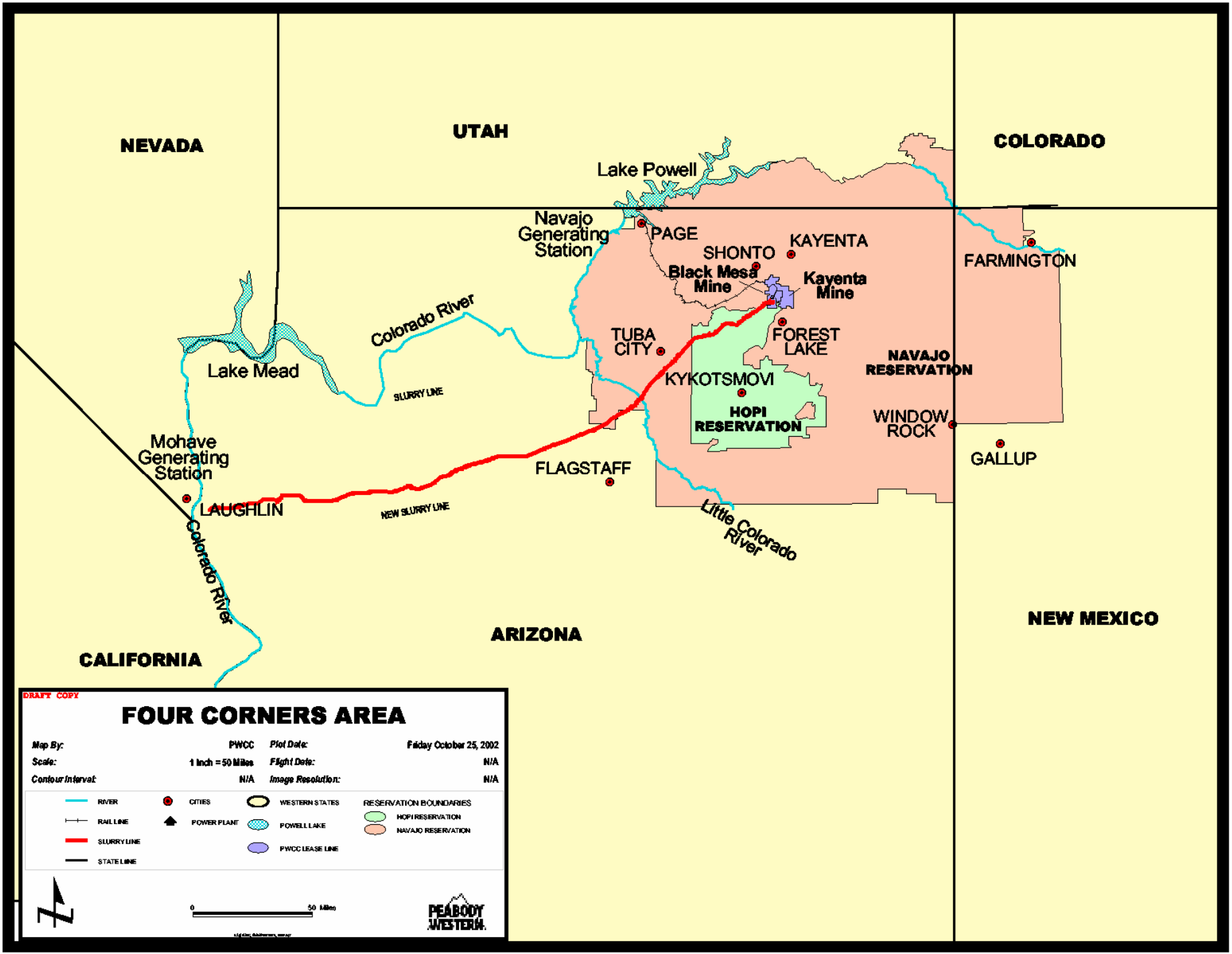
This Information is Essential for Managers to Make Intelligent and Informed Decisions.

"The ability to gather, absorb and disseminate information very rapidly is going to be more critical than it has ever been before."

"…Our managers will have to increase innovation and their acceptance of change. It will require major improvements in technology, productivity and safety. In short,

WE WILL NEED TO CHANGE THE WAY WE WORK.

Irl Engelhardt


NEVADA
UTAH
COLORADO
NEW MEXICO
ARIZONA
CALIFORNIA
Lake Powell
Navajo Generating Station
PAGE
SHONTO
KAYENTA
Black Mesa Mine
Kayenta Mine
FARMINGTON
Colorado River
TUBA CITY
FOREST LAKE
NAVAJO RESERVATION
Lake Mead
SLURRY LINE
KYKOTSMOVI
HOPI RESERVATION
WINDOW ROCK
GALLUP
Mohave Generating Station
FLAGSTAFF
LAUGHLIN
NEW SLURRY LINE
Little Colorado River
Colorado River
DRAFT COPY
FOUR CORNERS AREA
Map By: PWCC
Plot Date: Friday October 25, 2002
Scale: 1 Inch = 50 Miles
Flight Date: N/A
Contour Interval: N/A
Image Resolution: N/A
RIVER
RAIL LINE
SLURRY LINE
STATE LINE
CITIES
POWER PLANT
WESTERN STATES
POWELL LAKE
PWCC LEASE LINE
RESERVATION BOUNDARIES
HOPI RESERVATION
NAVAJO RESERVATION
0
50 Miles
PEABODY WESTERN

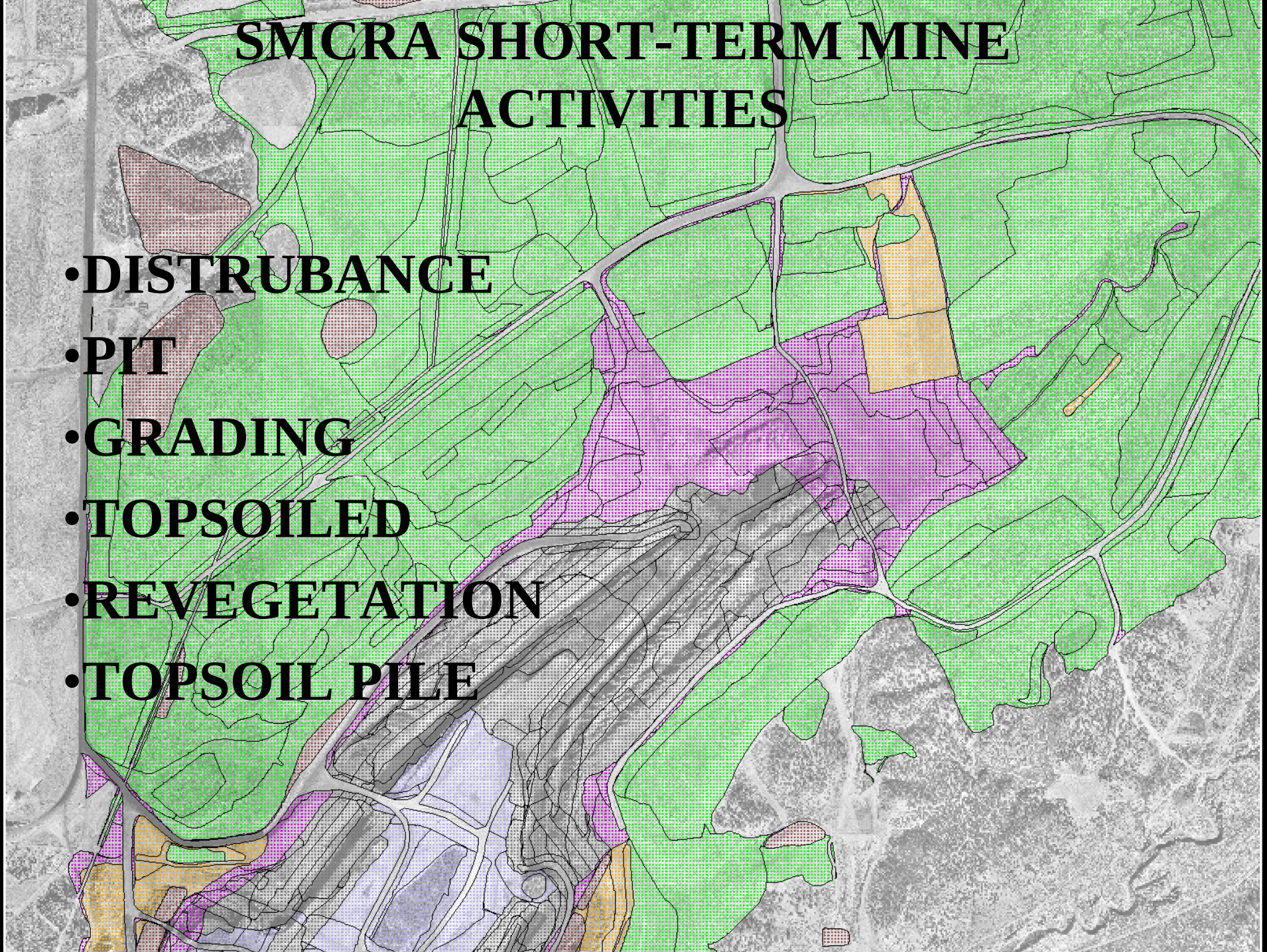
Digital Orthophoto or Geo-Rec. Photo of the Mesa

Reclamation Activities

Cover Crop (COV)
Disking (DIC)
Disturbed (DIS)
Fencing (FEN)
Final Grading (FGR)
Hold for Release (HFR)
Inter-planting (INP)
Inter-seeding (INS)
Mulched (MUL)
Pit (PIT)
Planting (PLT)

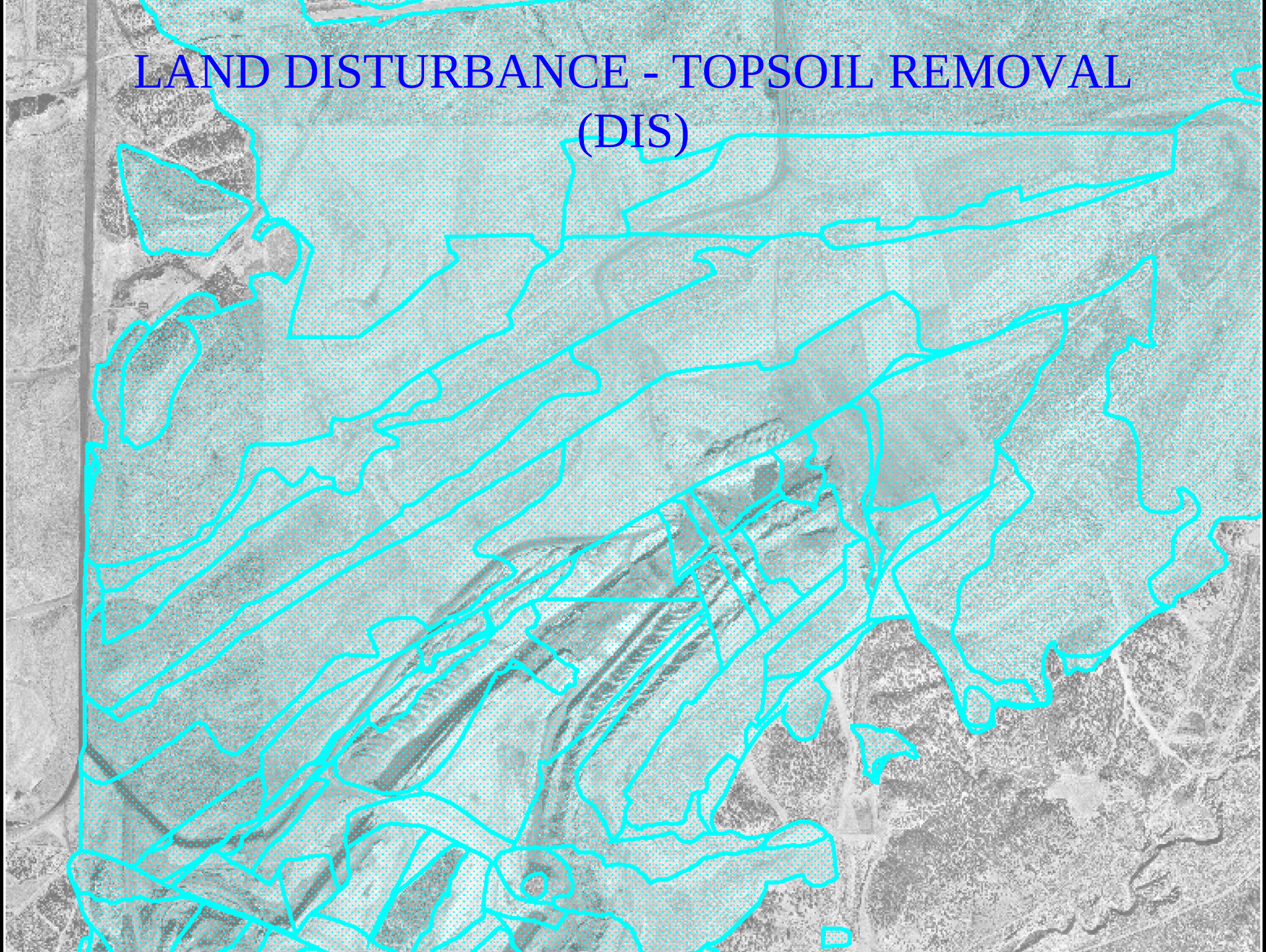
New Seed (REV)
Re-seeding (RES)
Ripped (RIP)
Ramp Activity (RMP)
Spoil Activity (SPL)
Temp. Cover Crop (TMC)
Temp. Disking (TMD)
Temp. Mulching (TMM)
Temp. Ripping (TMR)
Temp. Seeding (TMS)
Topsoil Down (TSD)
Topsoil Removed (TSR)

SMCRA SHORT-TERM MINE ACTIVITIES

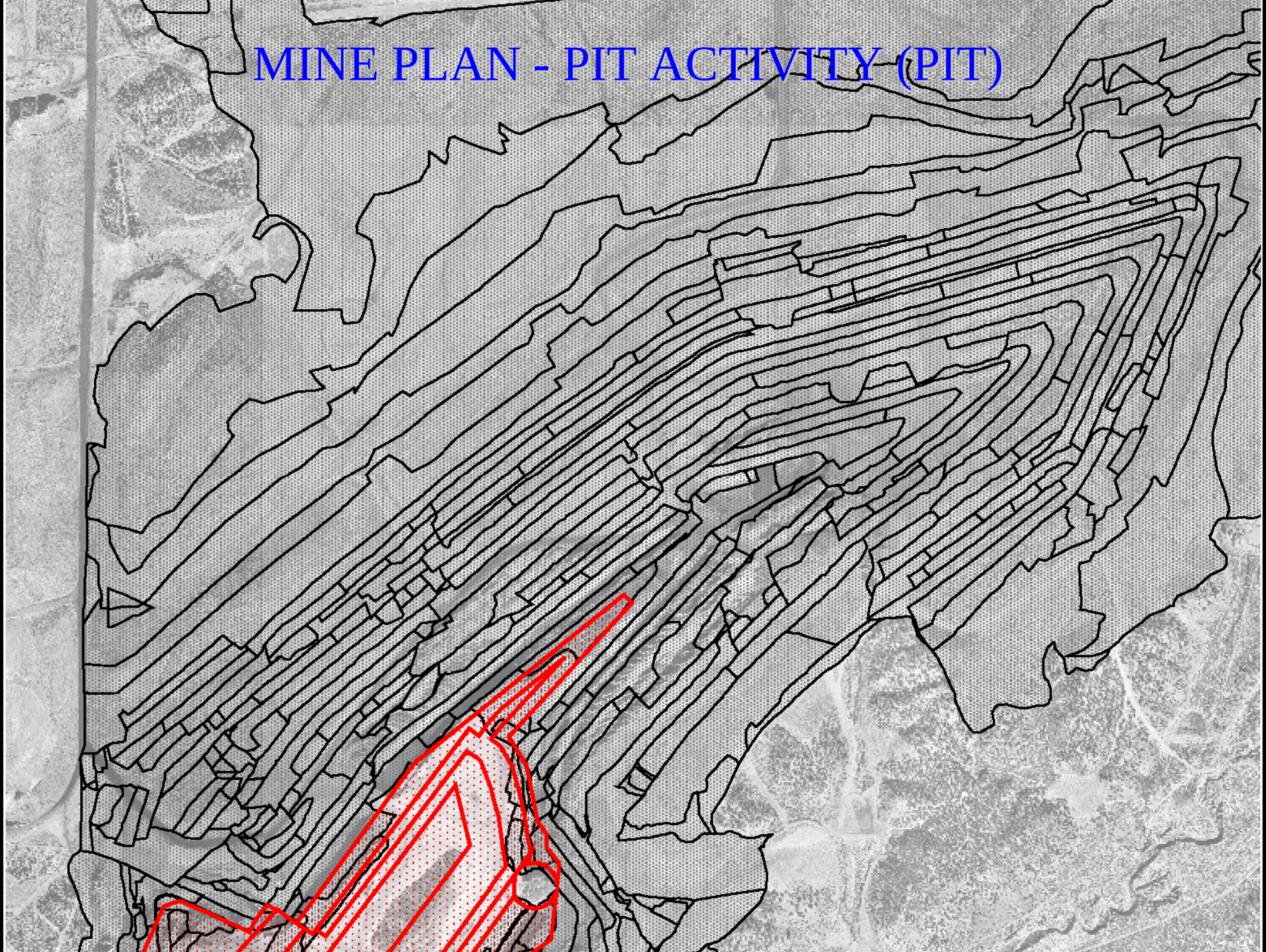


- DISTRUBANCE
- PIT
- GRADING
- TOPSOILED
- REVEGETATION
- TOPSOIL PILE

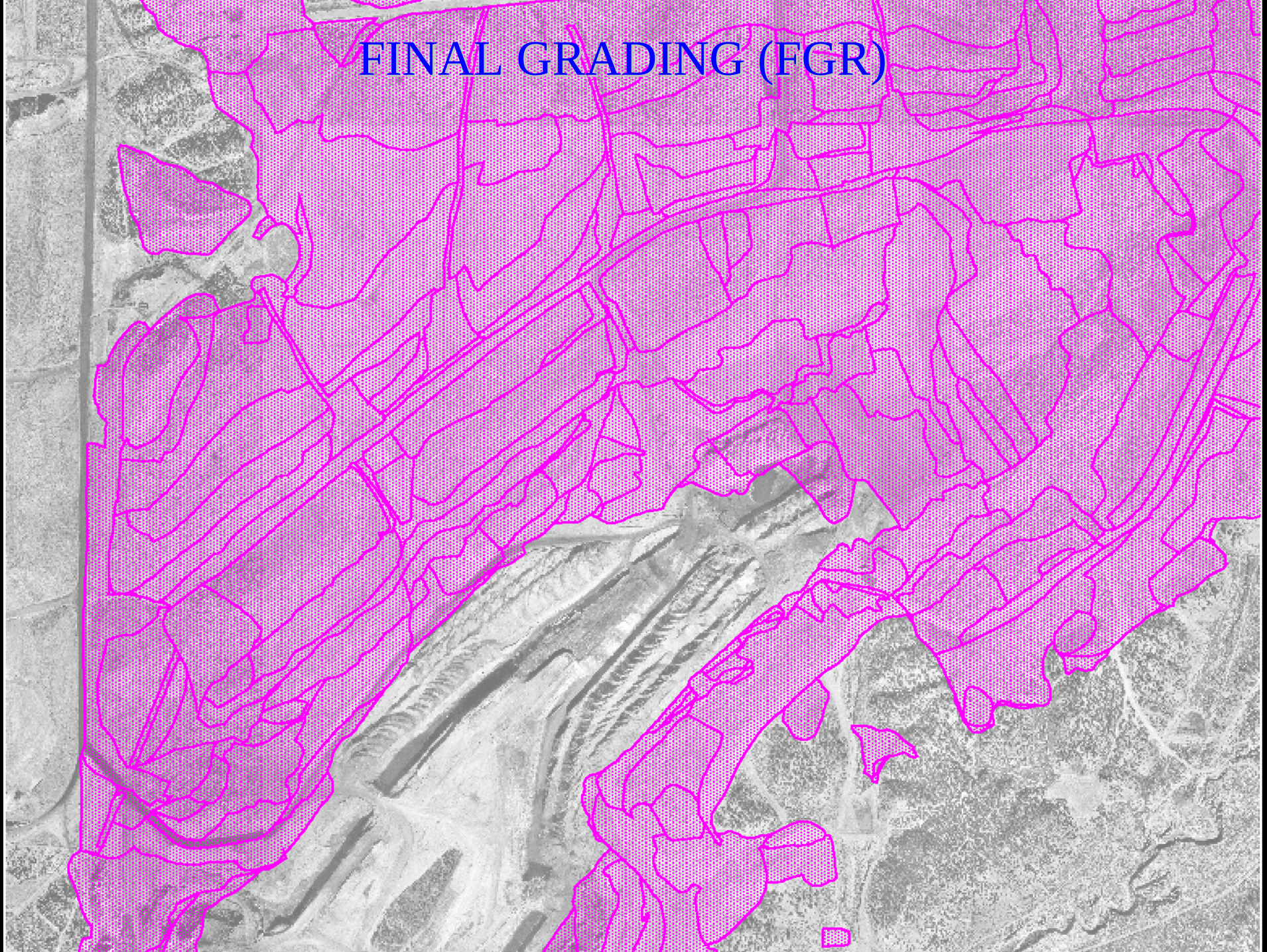
LAND DISTURBANCE - TOPSOIL REMOVAL (DIS)



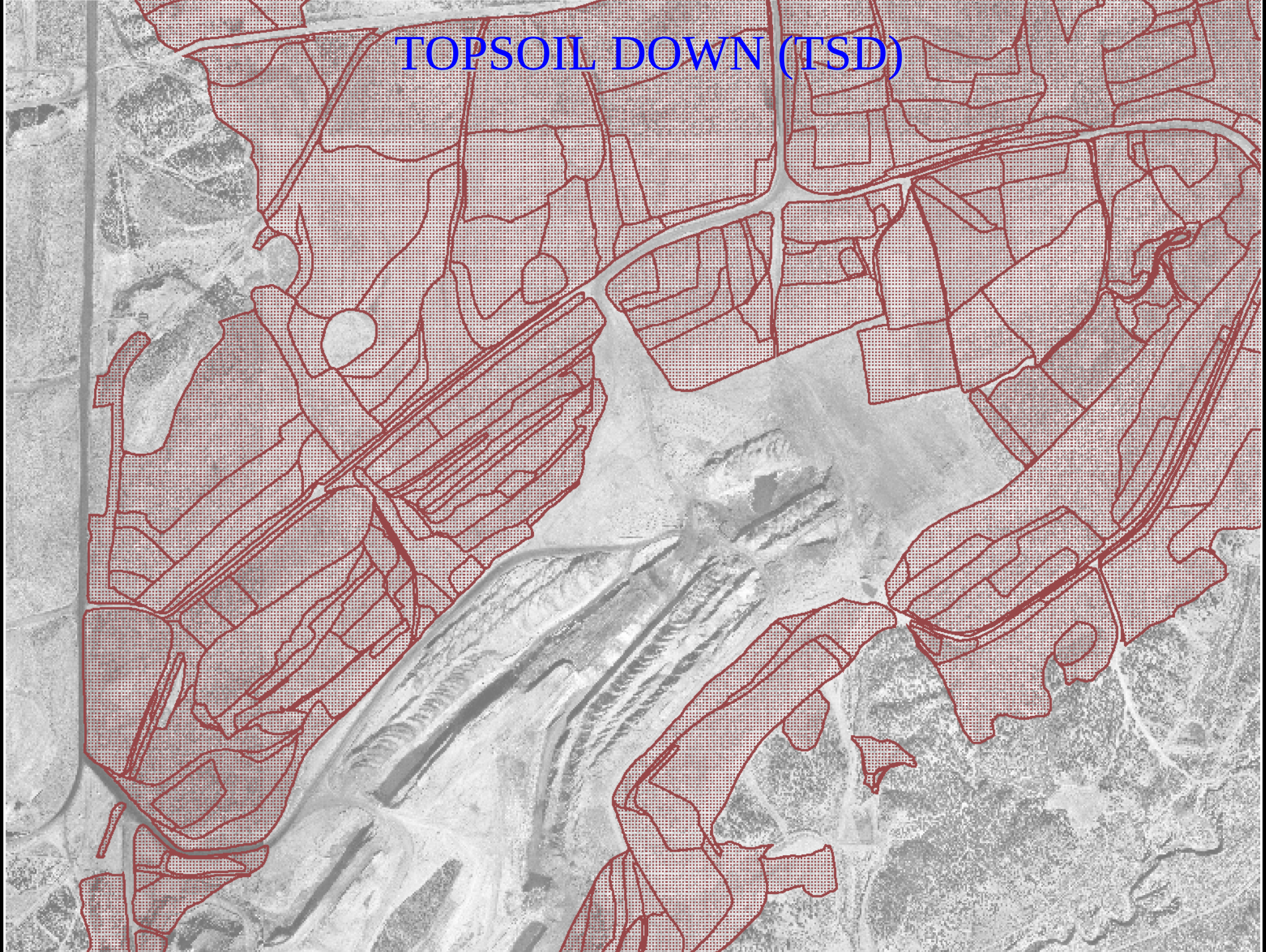
MINE PLAN - PIT ACTIVITY (PIT)

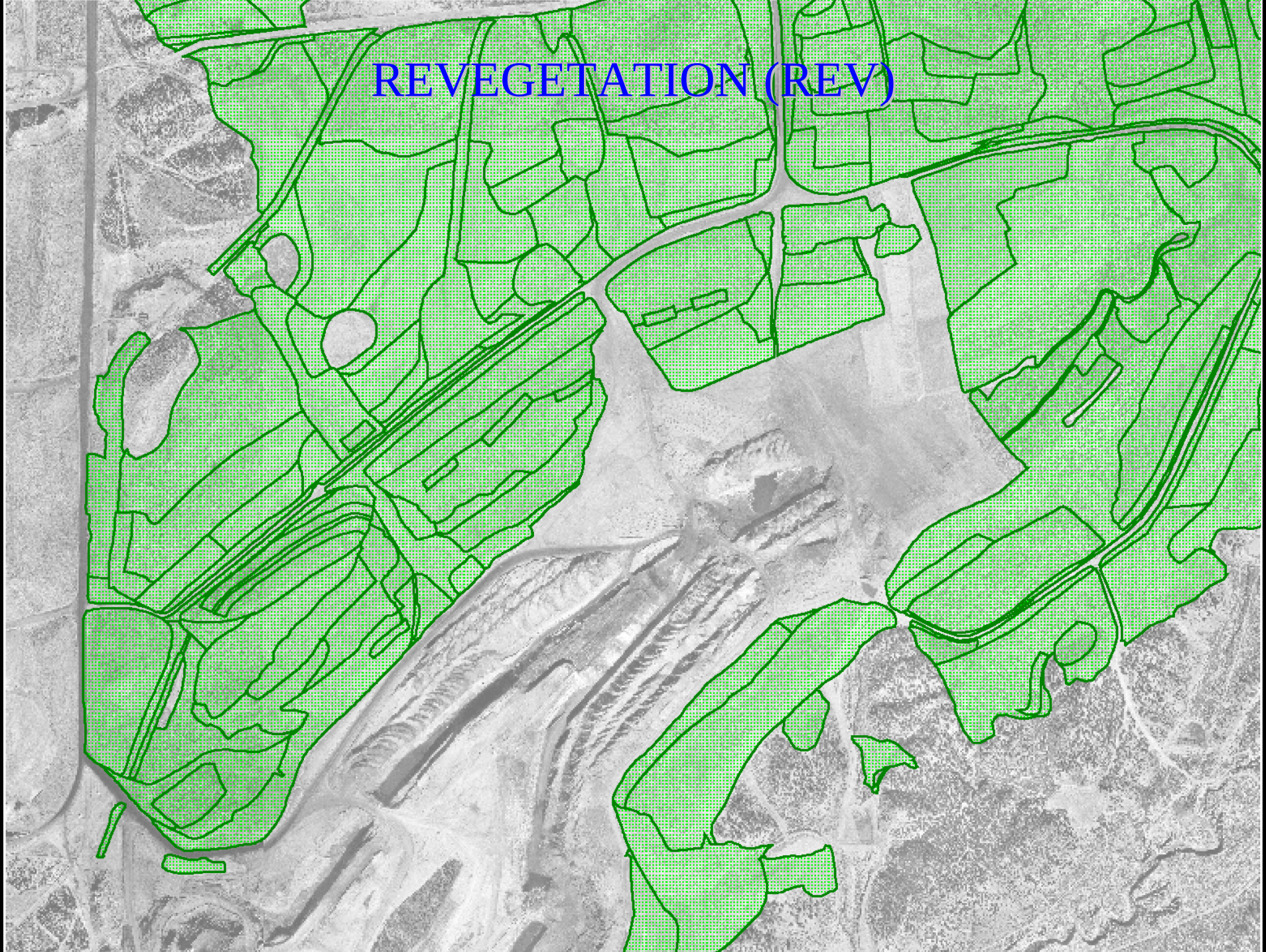


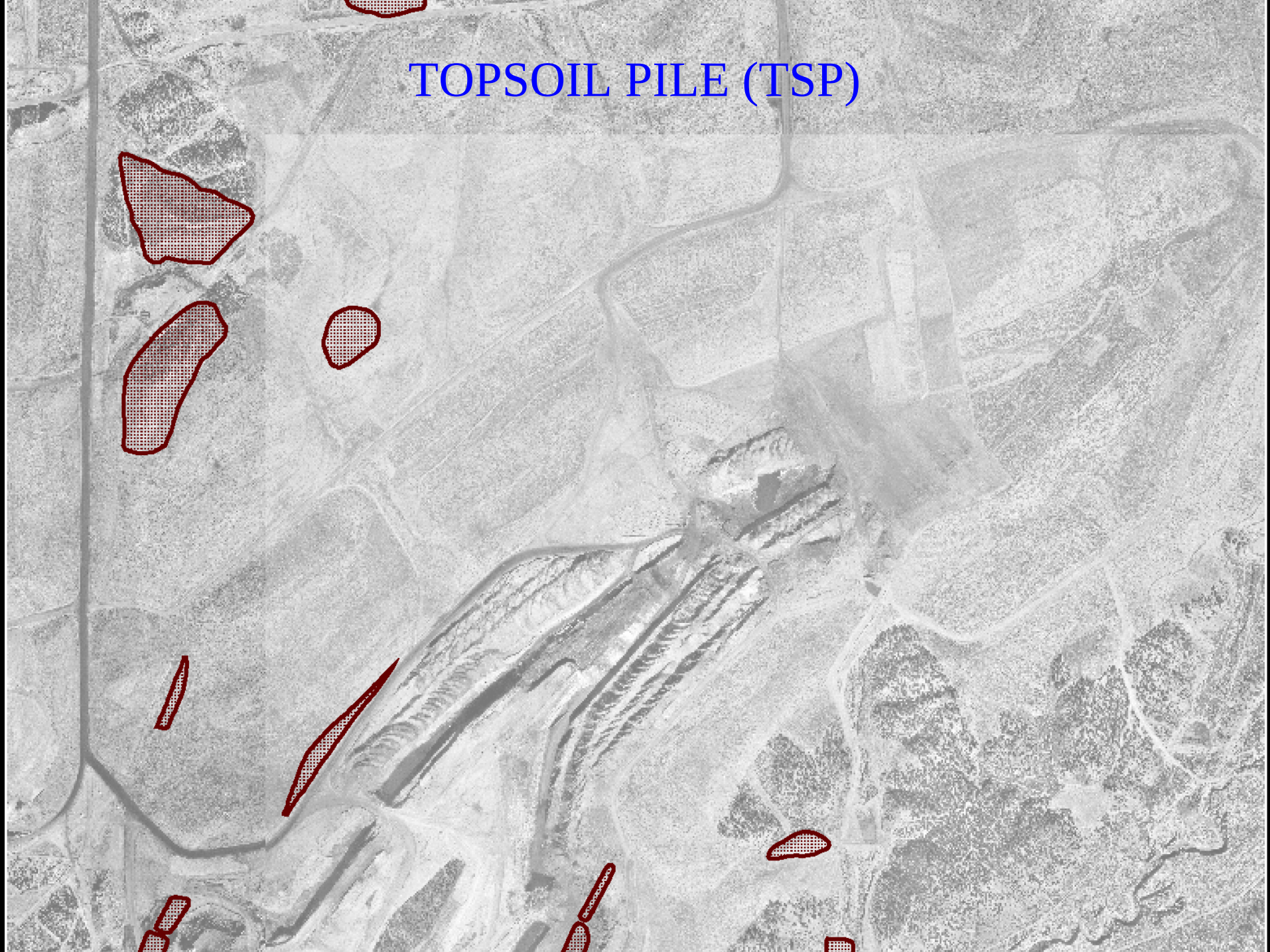
FINAL GRADING (FGR)



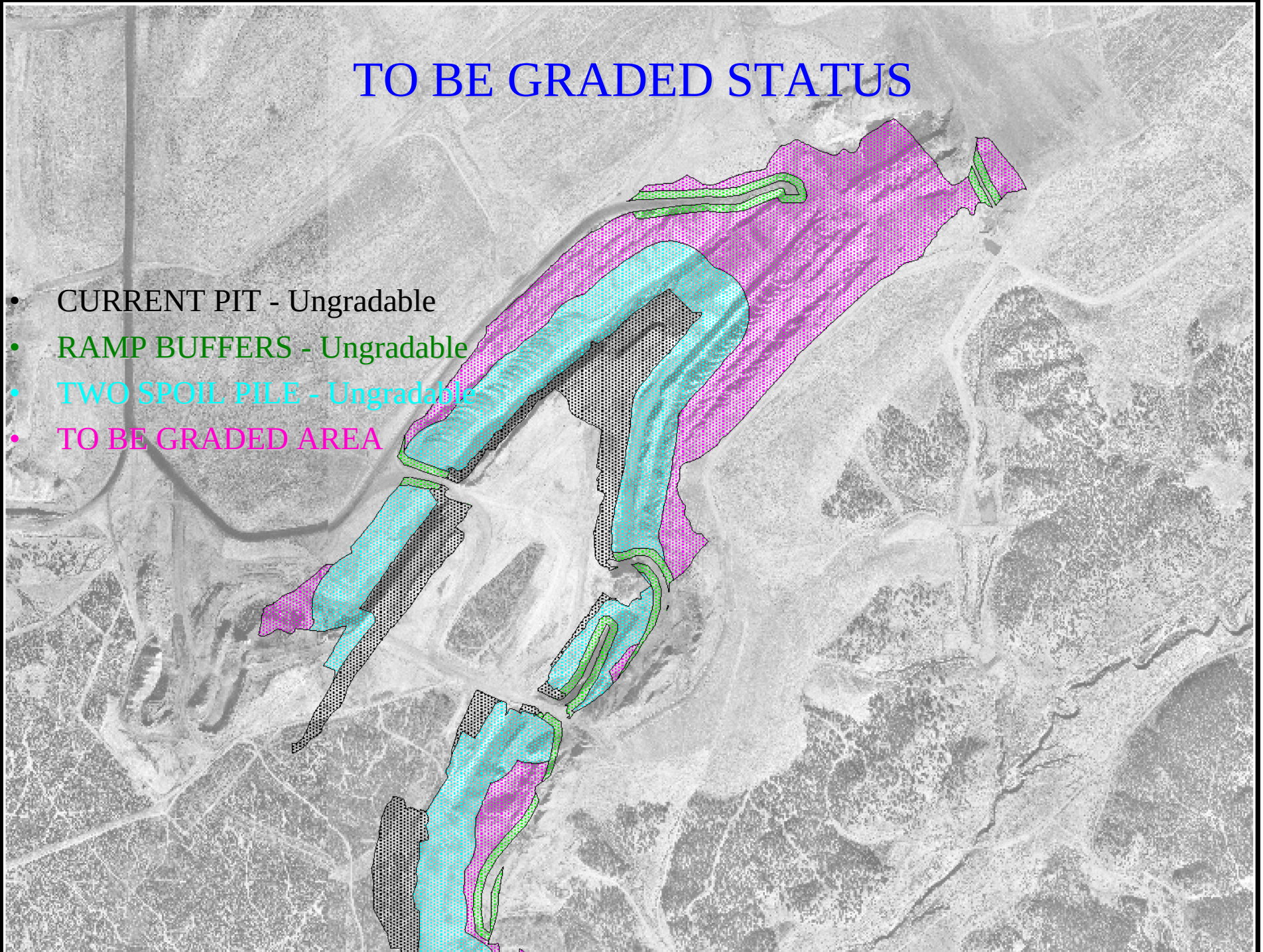
TOPSOIL DOWN (TSD)

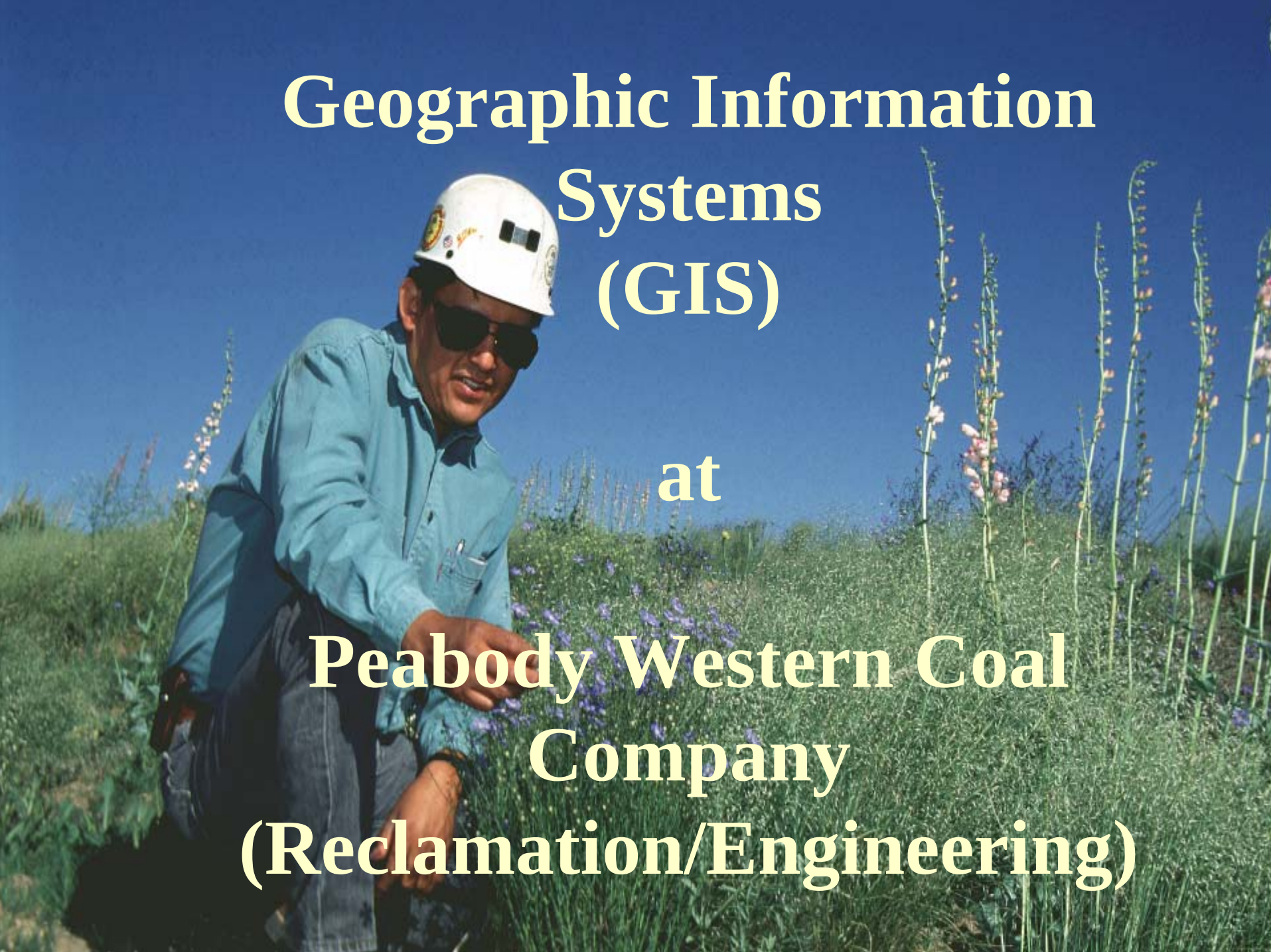



REVEGETATION (REV)


TOPSOIL PILE (TSP)

TO BE GRADED STATUS





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