

# Virginia DMME Field GIS Application

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Meeting of SMCRA Geospatial  
Data Stewards

# Introduction

- ArcGIS Engine Application MMEGIS
  - Field Staff Application
- Replacement of existing Field Mapping Application - MapObjects
- Tie-in with existing non-spatial applications
- Important component in enterprise GIS development



# Disconnected Users with Occasional Connectivity – Typical Field Scenario

- Customizable solutions for Inspectors
- Building geospatial knowledge into normal workflow



# Why Create a Field Application?

- Put the data in the “hands” of the users
- Assist in inspection
- Field Verification
- Electronic Permitting (EP) data
- Complaint Investigations
- Predecessor application – “used to having the data”



# Development Process

- Funding - Governor's Innovation Technology grant award used for development
- Established scope of work and contracted with Timmons Group, Inc to write base application
  - Set guidelines, timeframe and deliverables
  - Coordination between contractor, IT and Mapping groups
  - Standard Program language using ESRI's ArcObjects
- Development of complimentary datasets and tables from non-spatial applications – Enforcement System Application
- Integrating scripts to export, robocopy and establish data work flow for Microsoft Offline folder synchronization



# Functionality

- Built with ArcObjects and is compatible with other ESRI applications and data types
- ESRI's CAD tools can be used to analyze industry submitted maps and drawings
- Includes connected capabilities
  - Web Map Services
  - Geodata Services
  - Access other agencies data, if available
- GPS Interface built into application
  - Standard NMEA output
- Consumes Map Documents (.MXD) authored by mapping personnel but contains ability for Inspectors to create their own



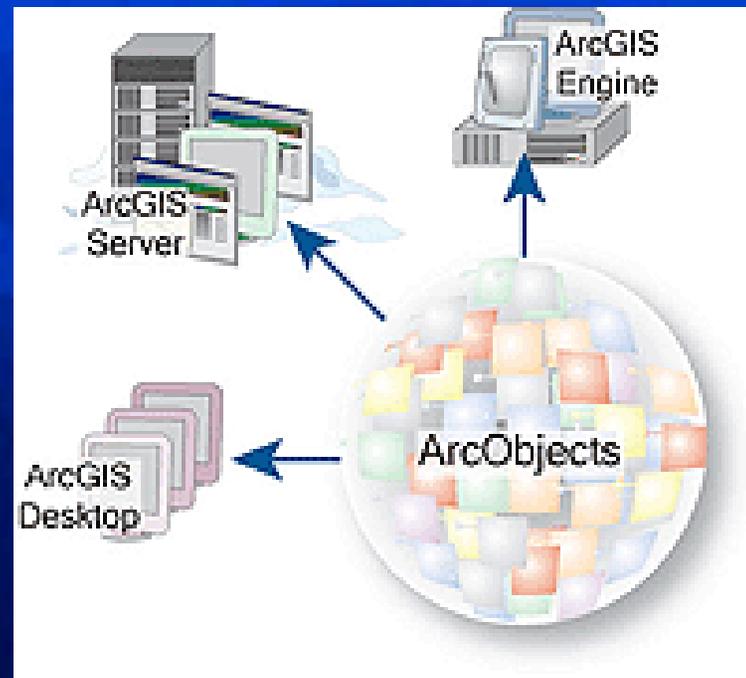
# Customizable

- Scalable and Flexible
  - Additional functionality can be added using standard program language with in-house staff programmers
  - Works offline and online
  - Novice to expert users
  - Ease of use “So easy a caveman can do it”
  - Mapping staff can author user maps
- Transferable
  - DMME owns the code
  - Low cost runtime license
  - Can be used for other field staff in other agencies such as Game Wardens, Forestry, etc.



# Enterprise GIS Development

- ArcGIS Engine application, seamless integration in enterprise development



# Requirements for Running MMEGIS Application

- Laptop with minimum specifications
  - All inspectors already have laptops
- Runtime license, developers license or standard ESRI desktop license (inspectors will use runtime license)
- Some data & that's it!



# Permitting and Inspection

- Electronic Permitting (EP) Application
- Contains submission of digital maps from applicants
- Contains submission of tabular data fields(.mdb)
- Location-Based Information –  
Coordinate Pairs to map features
- Spatial Analysis in the field
- GPS interface for navigation, validation and verification
  - Measuring instrument for compliance
  - Documentation of inspection



# Applicant Data

- Monitoring Points
- Maps –Application, Revision, Renewal, Geology, SWH, etc.,
- Map Features
- Data Formats – flexibility
- Required Layers
- Site Plan
- Other extraction activities



# Applicant Maps – CAD



**DmIr Viewer**

Back Forward Prev Next Up

- II ADMINISTRATIVE INFORMATION
- III SITE INFORMATION
- IV GEOLOGY
- V HYDROLOGY
- VI PHC/HRP
- VII LAND USE
- VIII FISH AND WILDLIFE
- IX SOILS AND REVEGETATION
- X OPERATIONS PLAN
- XI DRAINAGE CONTROL
- XII SEDIMENT CONTROL
- XIII BACKFILLING/GRADING
- XIV EXCESS MATERIALS DISPOSAL
- XV TOXIC MATERIALS AND NOISE
- XVI BLASTING
- XVII TRANSPORTATION PLAN
- XVIII UNDERGROUND CONTROLS
- XIX BONDING
- XX SPECIAL CATEGORIES
- XXI VERIFICATIONS/CERTIFICATIONS
  - 21.1 VERIFICATION(S)/CERTIFICATION
  - 21.2 MAPS/CERTIFICATIONS**
  - 21.3 APPLICATION COMMENTARY
  - 21.4 MAP LEGEND
  - 21.5 POINT DATA

**21.2 MAPS/CERTIFICATIONS** History

Add Delete Details Cancel Save

| Attachments (21)                  |                                     |
|-----------------------------------|-------------------------------------|
| Description                       | File Name/Path                      |
| CORPS ENVIRONMENTAL RESOURCES MAP | C:\unzipped\POWERDEEP3\ENVIRONMENT  |
| STREAM RE-CONSTRUCTION POWERS     | C:\unzipped\POWERDEEP3\POWERSTREA   |
| ▶ APPLICATION MAP                 | C:\unzipped\POWERDEEP3\POWDPAPP.dwg |
| RELINQUISHMENT MAP(1101822)       | C:\unzipped\POWERDEEP3\1822RELMAP.d |
| GEOLOGY AND MONITORING MAP        | C:\unzipped\POWERDEEP3\POWDMGEO     |
| GEOLOGY SECTIONS A_B              | C:\unzipped\POWERDEEP3\GEOSECAB.dwg |
| SURFACE WATER HYDROLOGY MAP       | C:\unzipped\POWERDEEP3\POWDPSWH.d   |
| POND NO. 1                        | C:\unzipped\POWERDEEP3\POWERP1.dwg  |
| POND NO. 2                        | C:\unzipped\POWERDEEP3\POWERP2.dwg  |
| POND NO. 3                        | C:\unzipped\POWERDEEP3\POWERP3.dwg  |
| SITE PLAN AND SECTIONS            | C:\unzipped\POWERDEEP3\POWDMSITE.d  |
| EXISTING FILL NO.3'S DRAWING      | C:\unzipped\POWERDEEP3\POWERF3.dwg  |
| ROAD DRAWING _DETAILS             | C:\unzipped\POWERDEEP3\POWERDMROA   |

Application Guide:  
Attach appropriate maps and certifications in (or immediately following if paper) this section as Attachment(s) 21.2. The original signed maps should be submitted hard copy with an electronic version attached in this section.

**MAP REQUIREMENTS**

Recd: 9/21/2004 Out:10/20/2004 JAC Status: TRS-9/22/2004 TSS() PRB() CJS() DXK() SBM(N) GFB(N)

1001899 - 3

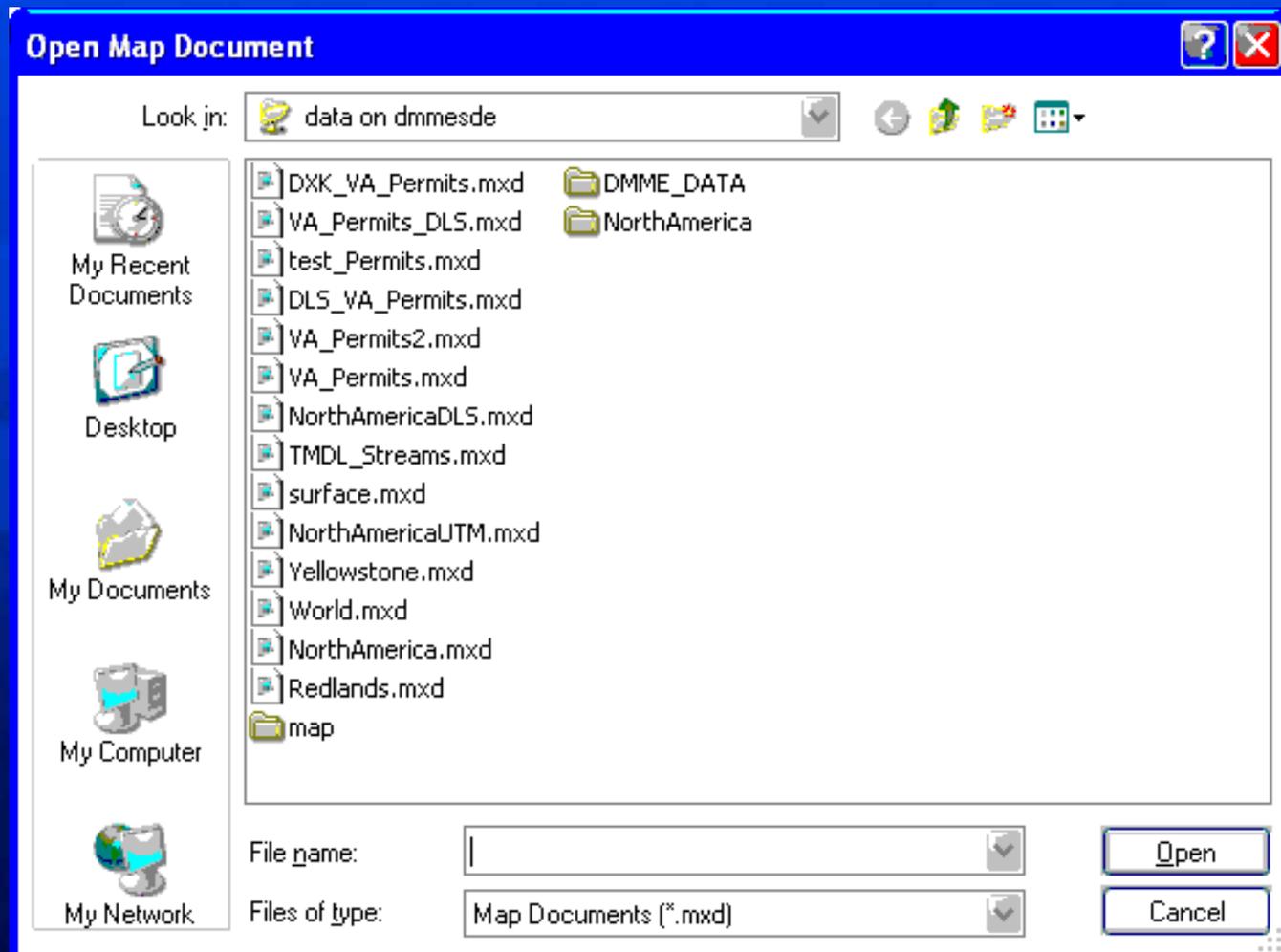
Exit Word Done Map Inspr. Info Example WORD Attachments History

# Types of Analysis

- Direct map feature comparison – applicant map features to agency spatial data
- Imagery verification – areas of disturbance, visual analysis of adjacent features (homes, streams, roads, other permits, timbering operations)
- Acreage calculations – permit boundaries, re-mining, bonding increments, etc.
- Identify potential conflicts – Proximity analysis (other permits, gas wells, pipelines, and past mining activities, inhabited structures, roads)
- Easy query and navigation capabilities - inclusion of other datasets – (Transportation, hydrology, rail, etc.)
- GPS collection

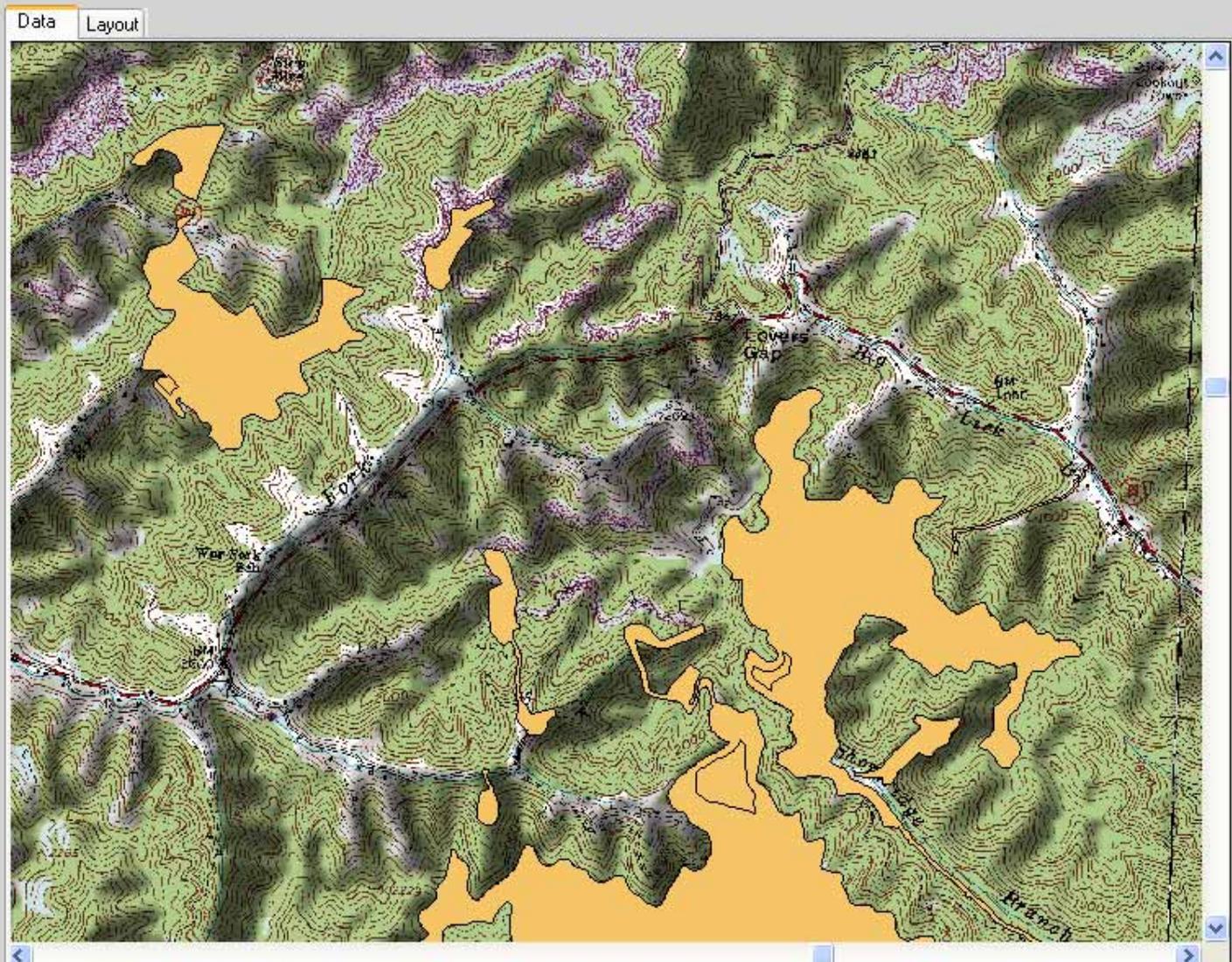


# Open Custom Map Documents (.MXD)



Navigation toolbar with icons for pan, zoom, and other map functions. A scale bar shows 1:24,056. A dropdown menu is set to 'permit polygon'. A 'Customize' checkbox is on the right.

- Layers**
- permit polygon
  - SWVA\_3D\_Topo.tif

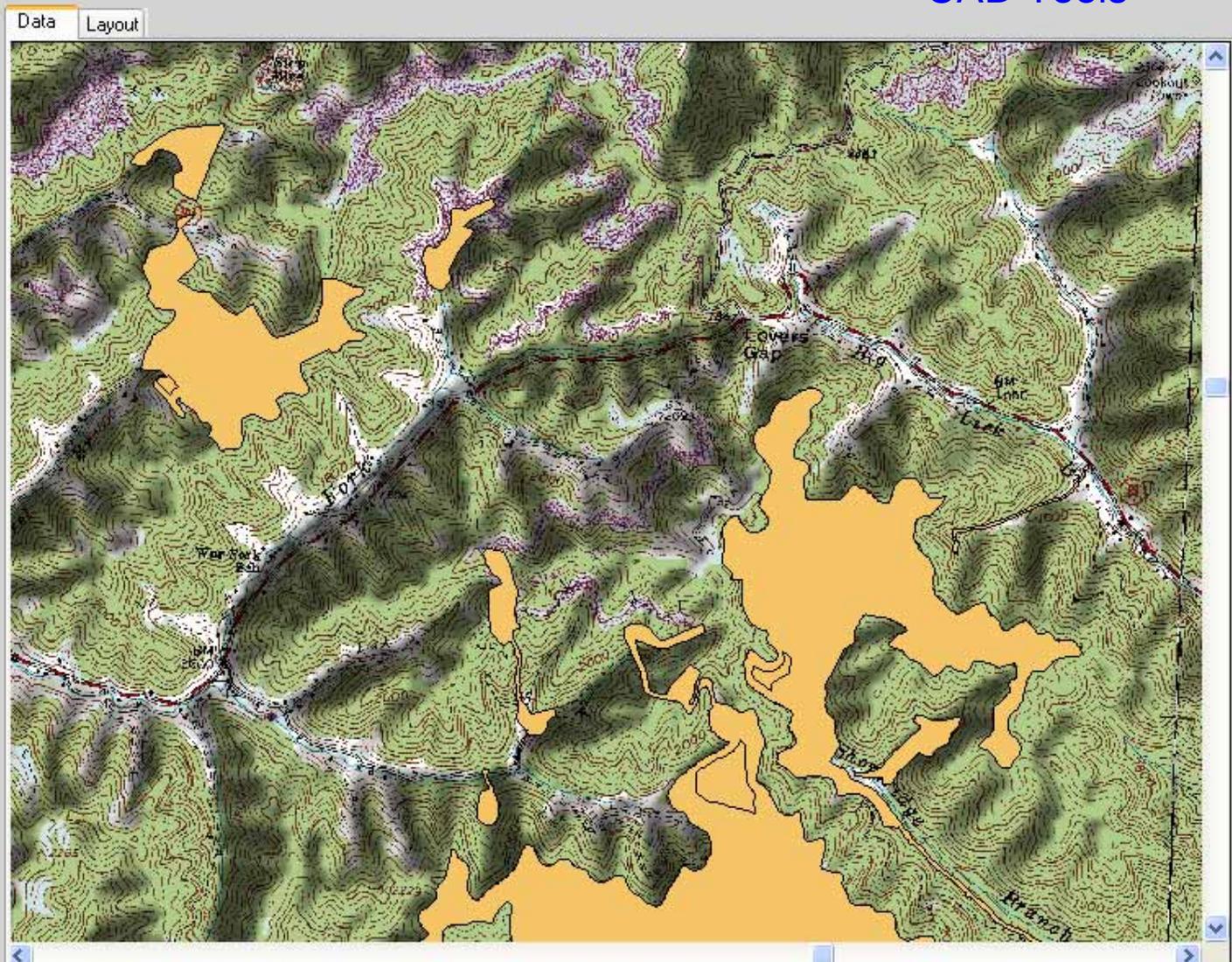


GPS Tools

Navigation toolbar with icons for pan, zoom, and other map functions. A scale bar shows 1:24,056. A **CAD** button is highlighted with a blue box and an arrow pointing to the text 'CAD Tools'.

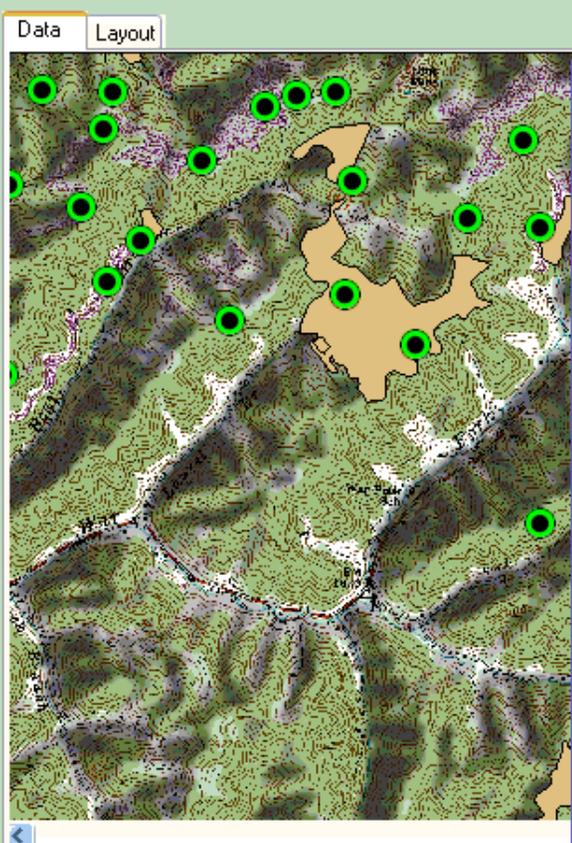
CAD Tools

**Layers**  
[ ] permit polygon  
[ ] SWVA\_3D\_Topo.tif





- Layers**
- Active\_Gas\_Oil\_Wells
  - permit polygon
  - SWVA\_3D\_Topo.tif



**Identify**

Identify from: <Top-most layer>

- Active\_Gas\_Oil\_Wells
  - LOVERS GAP #34 W/PL

Location: 933,852.244 344,966.386 Feet

| Field      | Value                         |
|------------|-------------------------------|
| FID        | 2459                          |
| Shape      | Point                         |
| AREA       | 0                             |
| PERIMETER  | 0                             |
| DGO_ACT_   | 2460                          |
| DGO_ACT_ID | 2460                          |
| FILENUMBER | BU-3062                       |
| OPNAME     | LOVERS GAP #34 W/PL           |
| LASTINSPDT | 20070509                      |
| INPRIORITY | 4                             |
| INSPDUE    | 20080531                      |
| ELEVATION  | 2148.71                       |
| EAST       | 933870                        |
| NORTH      | 345006                        |
| OPERATOR   | Range Resources-Pine Mountain |
| COUNTY     | Buchanan                      |
| USGS_QUAD  | PRATER                        |
| INSPECTOR  | Jerry Hagy                    |
| TBLINCODE  | JHH                           |
| OPTYPE     | Coalbed/Pipeline              |
| OPSTATUS   | Producing                     |

Identified 1 feature

Executing assembly is C:\Program Files\Timmons\_Group\MMEGIS\MMEGIS\_Settings\_Pointer.xml  
 Settings loaded from ::  
 Cannot log errors to Create the directory path  
 Application is licensed as Product: ArcGIS Engine. Initialized  
 Current map mxd is  
 Initial map mxd not found at  
 Current map mxd is  
 Current map mxd is

935859.33, 344436.74 Feet

# Data Types



**Add Data**

Create New Connection: ArcGIS Server IMS WMS

**Shapefiles**

**Geodatabases**

**Rasters**

**Servers**

**Layers**

- arcgis on dmmsede
- dmmsede
  - DLS
    - DLS\_VA\_Permits
    - DMLRPermit
    - DXK\_VA\_Permits
    - North
    - NorthAmericaDLS
  - rtr
    - surface
    - TEST\_NPDES
  - TMDL
  - VA\_Permits
  - VA\_Permits\_D XK
  - VA\_Permits2
  - VaSurface
  - World
  - Yellowstone

Dataset:

Show of type:

# Additional Information

- Application will be launched summer 2008
- Potentially will be able to share base application with other states
- Runtime license cost is around \$300 per user
- Total development cost around \$70,000
- Additional customization will be done in-house
- GPS units being tested with application are Garmin 60Cx handhelds



# Acknowledgements

- Timmons Group  
[www.timmons.com](http://www.timmons.com)



- OSM – Harry Morris, Robert Welsh and Lou Hamm
- Thanks for the GPS units!



# QUESTIONS?

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