Kentucky's Mine Mapping Initiative

Processes and Procedures

Bryan W. Bunch, PLS, PG
Systems Consultant IT
Kentucky EPPC-OIS-GIS
500 Mero Street 14th FL CPT
502-564-5174
Bryan.Bunch@ky.gov

Kentucky
UNBRIDLED SPIRIT™

Kentucky Mine Mapping Status From Feb, 2004 through May, 2005

- 34,395 Total Documents Scanned
- 17,229 Mine Map Documents
- 16,051 Transmittal Documents
- 1,115 Stitch Partials
- 7,387 Geoprocessed and Deployed to Web

MAP / IMAGE FILE NAMING CONVENTIONS

APPLIES TO ALL MAPS
(UPPER CASE)

THESE TAGS MAY
APPEAR IN VARIOUS
COMBINATIONS, OR NOT AT ALL
(lower case)

STATE FILE NUMBER (SFN)

MAP YEAR

MAP DATE YYYYMMDD

SHEET TAG

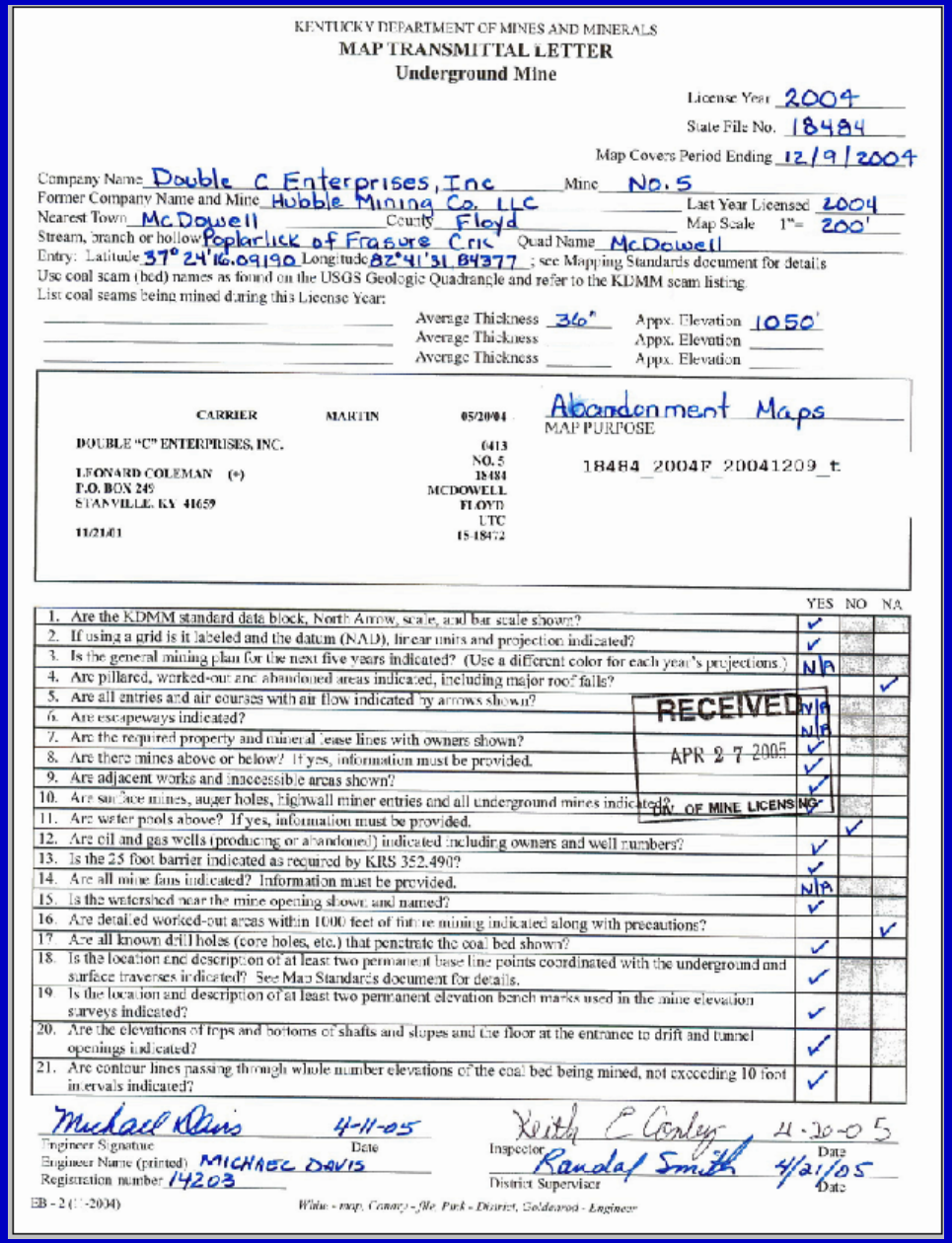
STITCH PARTIAL TAG

MAP PURPOSE TAG
- F = FINAL MAP
- L = LICENSE MAP
- M = MAP YEAR (GENERIC)
- S = SUPPLEMENTAL MAP

SUPPLEMENTAL PURPOSE TAG
- o = OVERLAY
- u = UNDERLAY
- m = MISC. MAP

12345-678_2005L_20050312_t

SCANNED TRANSMITTAL DOCUMENT



KENTUCKY DEPARTMENT OF MINES AND MINERALS

MAP TRANSMITTAL LETTER

Underground Mine

License Year 2004

State File No. 18484

Map Covers Period Ending 12/9/2004

Company Name Double C Enterprises, Inc Mine No. 5

Former Company Name and Mine Hubble Mining Co. LLC Last Year Licensed 2004

Nearest Town McDowell County Floyd Map Scale 1"= 200'

Stream, branch or hollow Poplarlick of Frasure Crk Quad Name McDowell

Entry: Latitude 37° 24' 16.09190 Longitude 82°41'31.84377 ; see Mapping Standards document for details

Use coal seam (bed) names as found on the USGS Geologic Quadrangle and refer to the KDMM seam listing.

List coal seams being mined during this License Year:

Average Thickness 36" Appx. Elevation 1050'

Average Thickness Appx. Elevation

Average Thickness Appx. Elevation

CARRIER	MARTIN	05/20/04
DOUBLE "C" ENTERPRISES, INC.		0413
		NO. 5
LEONARD COLEMAN (*)		18484
P.O. BOX 249		MCDOWELL
STANVILLE, KY 41659		FLOYD
		UTC
11/21/03		15-18472

Abandonment Maps
MAP PURPOSE

18484_2004F_20041209_t

RECEIVED
APR 27 2005
DIV. OF MINE LICENSING

	YES	NO	NA
1. Are the KDMM standard data block, North Arrow, scale, and bar scale shown?	✓		
2. If using a grid is it labeled and the datum (NAD), linear units and projection indicated?	✓		
3. Is the general mining plan for the next five years indicated? (Use a different color for each year's projections.)	N/A		
4. Are pillared, worked-out and abandoned areas indicated, including major roof falls?			✓
5. Are all entries and air courses with air flow indicated by arrows shown?	N/A		
6. Are escapeways indicated?	N/A		
7. Are the required property and mineral lease lines with owners shown?	✓		
8. Are there mines above or below? If yes, information must be provided.	✓		
9. Are adjacent works and inaccessible areas shown?	✓		
10. Are surface mines, auger holes, highwall miner entries and all underground mines indicated?	✓		
11. Are water pools above? If yes, information must be provided.		✓	
12. Are oil and gas wells (producing or abandoned) indicated including owners and well numbers?	✓		
13. Is the 25 foot barrier indicated as required by KRS 352.490?	✓		
14. Are all mine fans indicated? Information must be provided.	N/A		
15. Is the watershed near the mine opening shown and named?	✓		
16. Are detailed worked-out areas within 1000 feet of future mining indicated along with precautions?			✓
17. Are all known drill holes (core holes, etc.) that penetrate the coal bed shown?	✓		
18. Is the location and description of at least two permanent base line points coordinated with the underground and surface traverses indicated? See Map Standards document for details.	✓		
19. Is the location and description of at least two permanent elevation bench marks used in the mine elevation surveys indicated?	✓		
20. Are the elevations of tops and bottoms of shafts and slopes and the floor at the entrance to drift and tunnel openings indicated?	✓		
21. Are contour lines passing through whole number elevations of the coal bed being mined, not exceeding 10 foot intervals indicated?	✓		

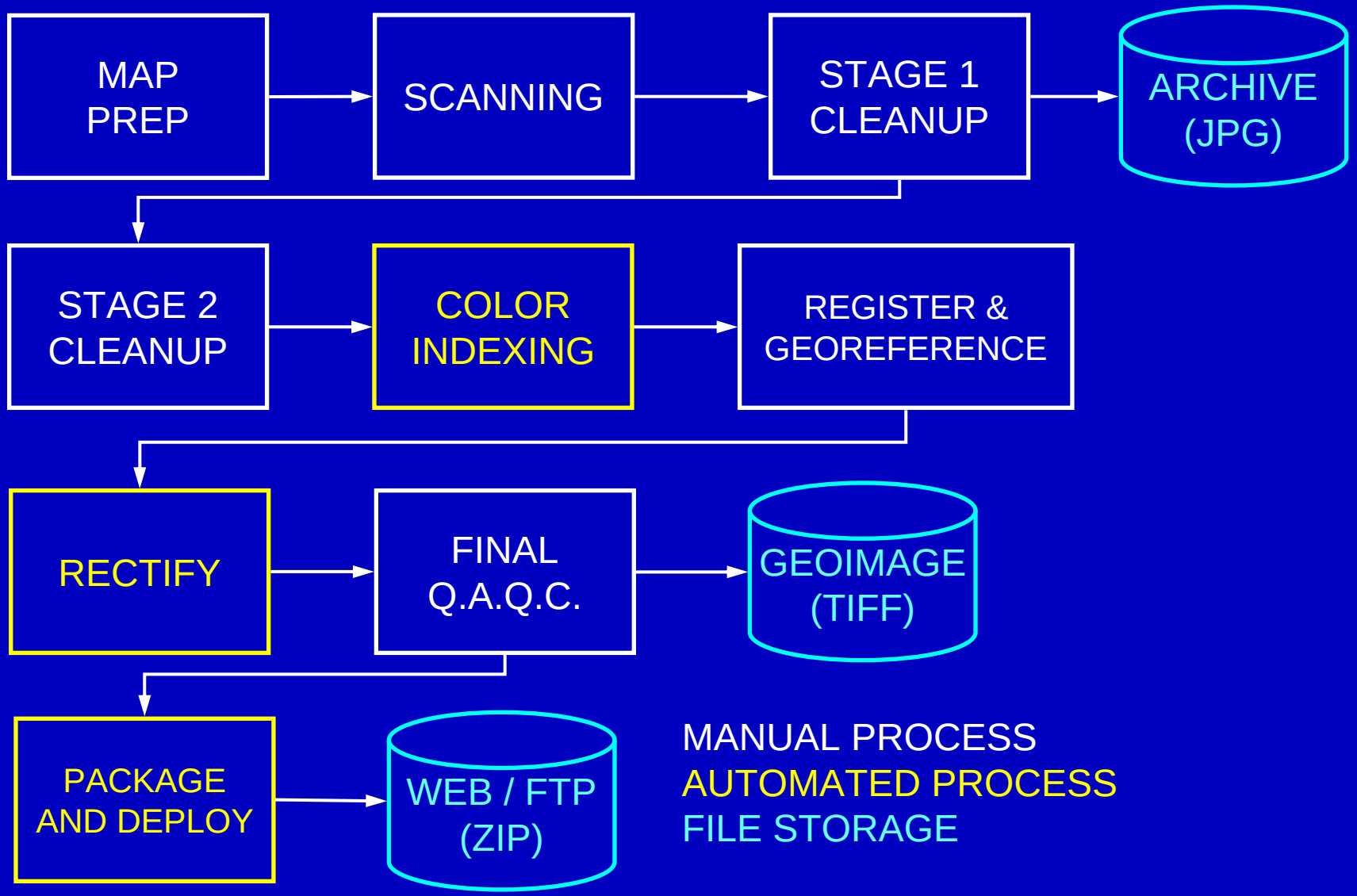
Michael Davis 4-11-05
Engineer Signature Date
Engineer Name (printed) MICHAEL DAVIS
Registration number 14203

Keith C Conley 4-20-05
Inspector Date
Randal Smith 4/21/05
District Supervisor Date

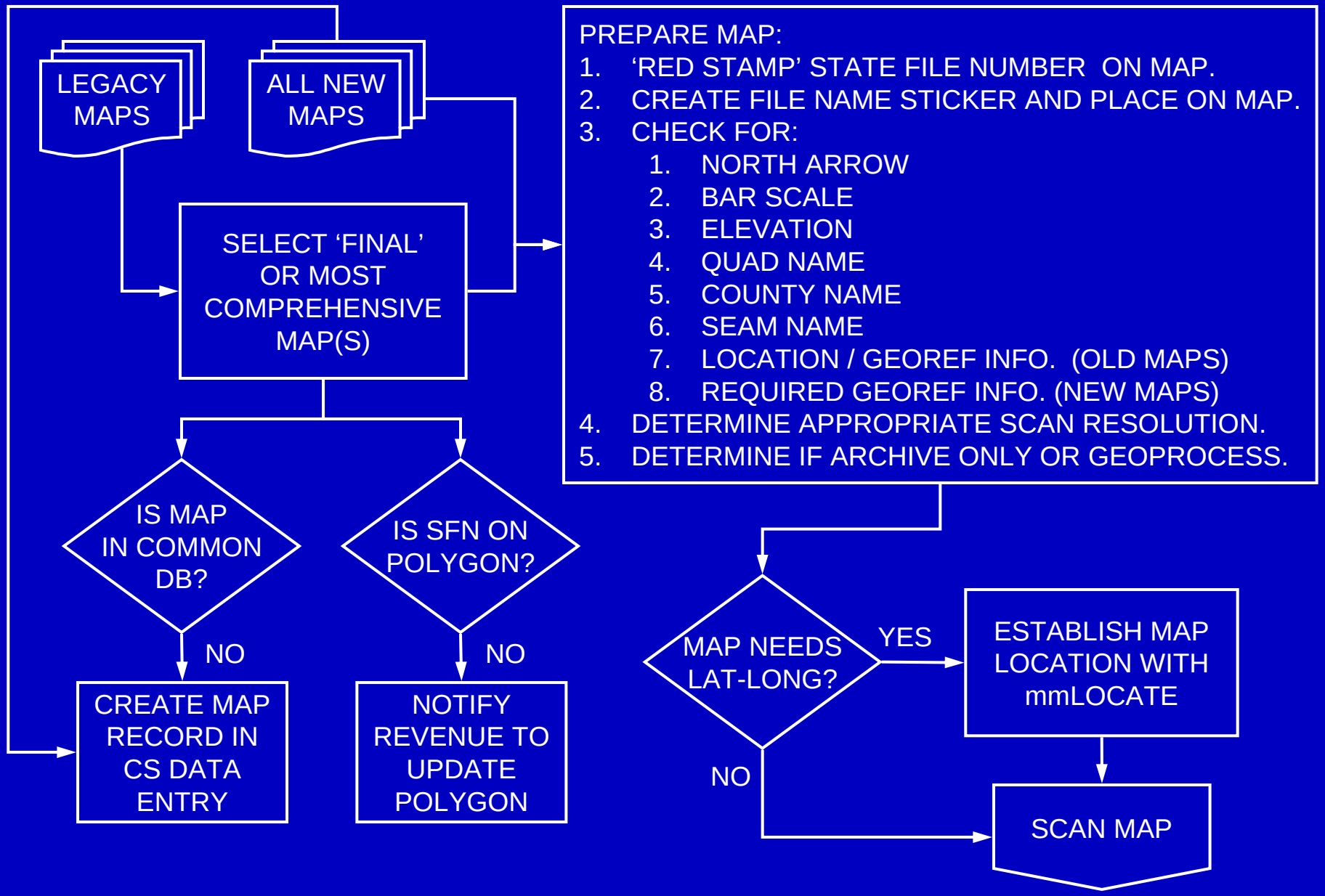
EB - 2 (1-2004) White - map, Canary - file Pink - District, Goldenrod - Engineer

Map Transmittal Document

MINE MAPPING PROCESS



MAP PREPARATION



SCANNING

200 - 300 DPI
24 Bit Color
JPEG 90
FULL WIDTH (42”)
AUTO HEIGHT

RAW SCAN FILE

IS MAP NAME VALID?

NO

LEAVE ON SCANNER AND PLACE “INVALID MAP NAME” ENTRY IN LOG FILE.

YES

FORMAT IMAGE NAME

DUPLICATES DETECTED?

YES

MOVE TO DUPLICATES FOLDER AND PLACE “DUPLICATE MAP” ENTRY IN LOG FILE.

NO

1. COPY TO:
   ARCHIVE FOLDER
   BACKUP FOLDER
   STAGE-1 CLEANUP FOLDER
2. CREATE METADATA.
3. REMOVE IMAGE FROM SCANNER.

ARCHIVE

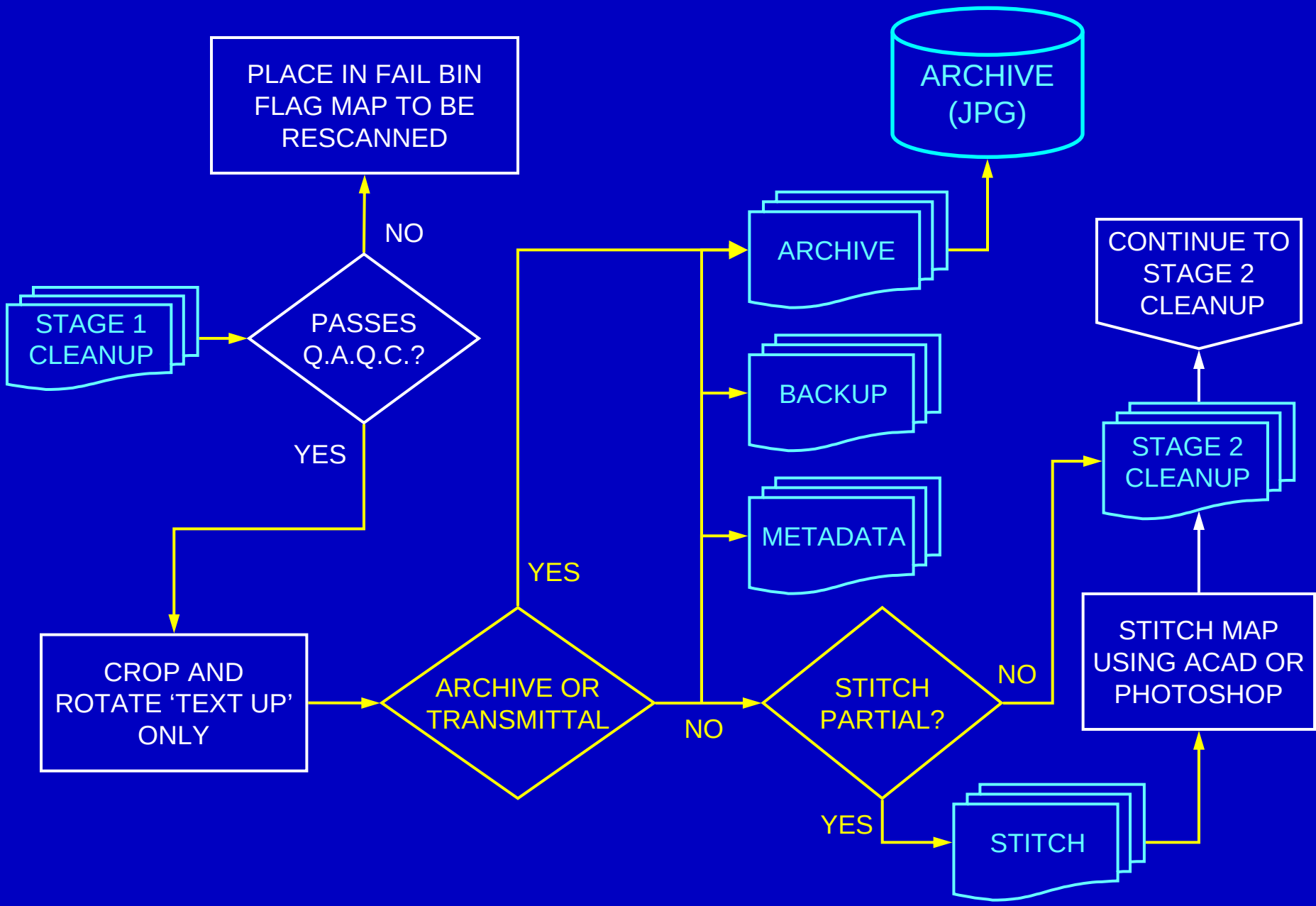
BACKUP

STAGE 1 CLEANUP

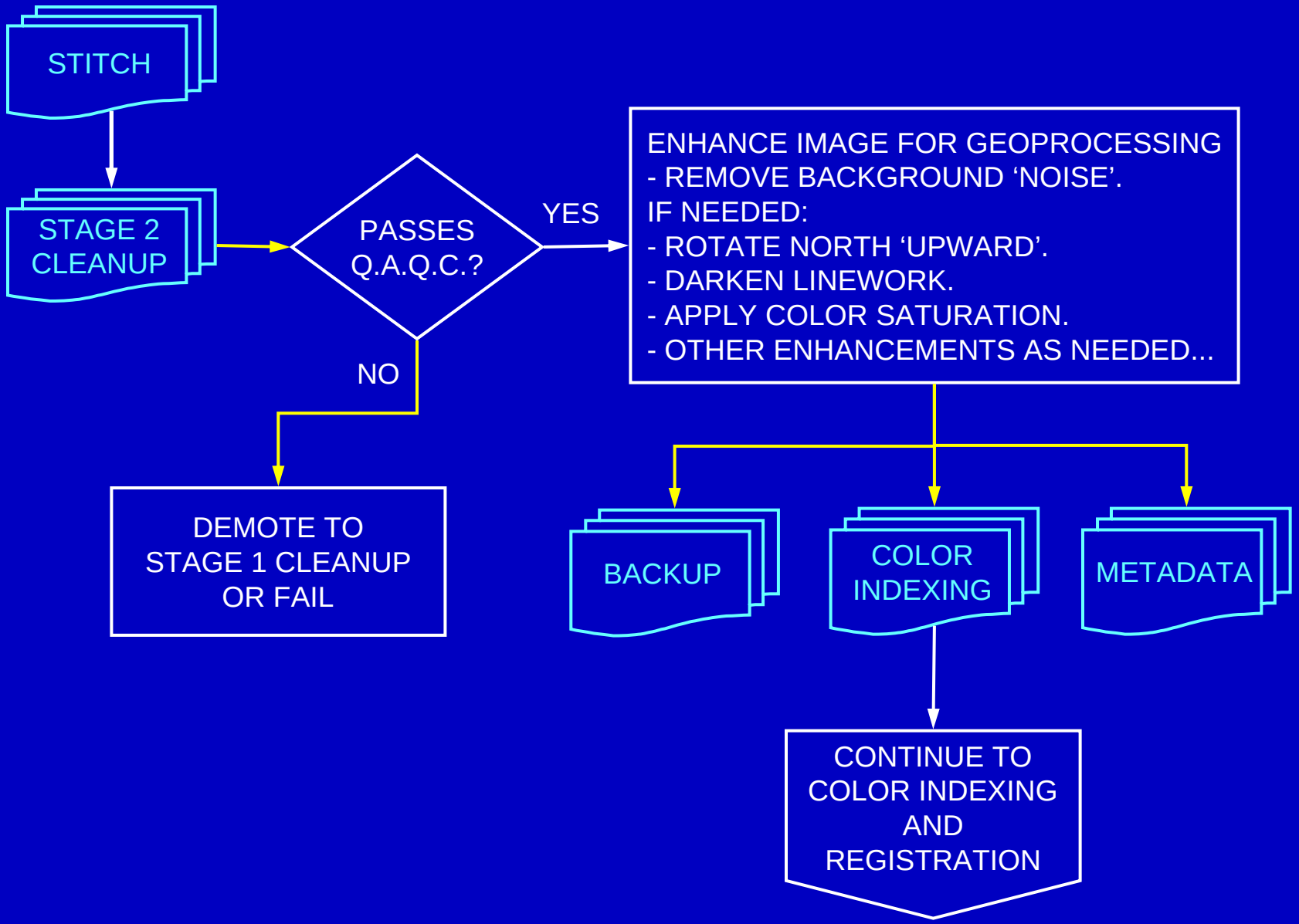
CONTINUE TO STAGE 1 CLEANUP

METADATA

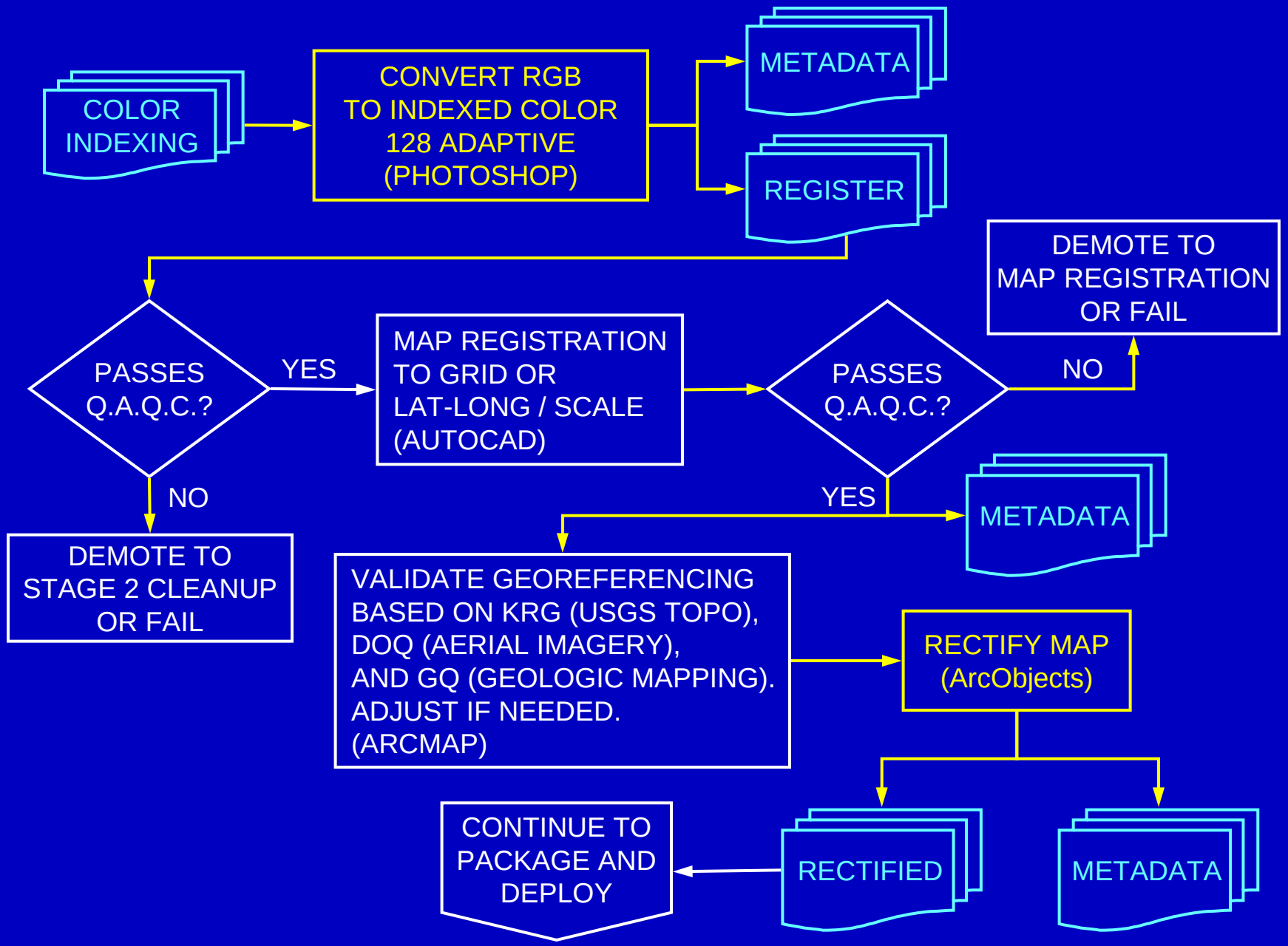
STAGE 1 CLEANUP



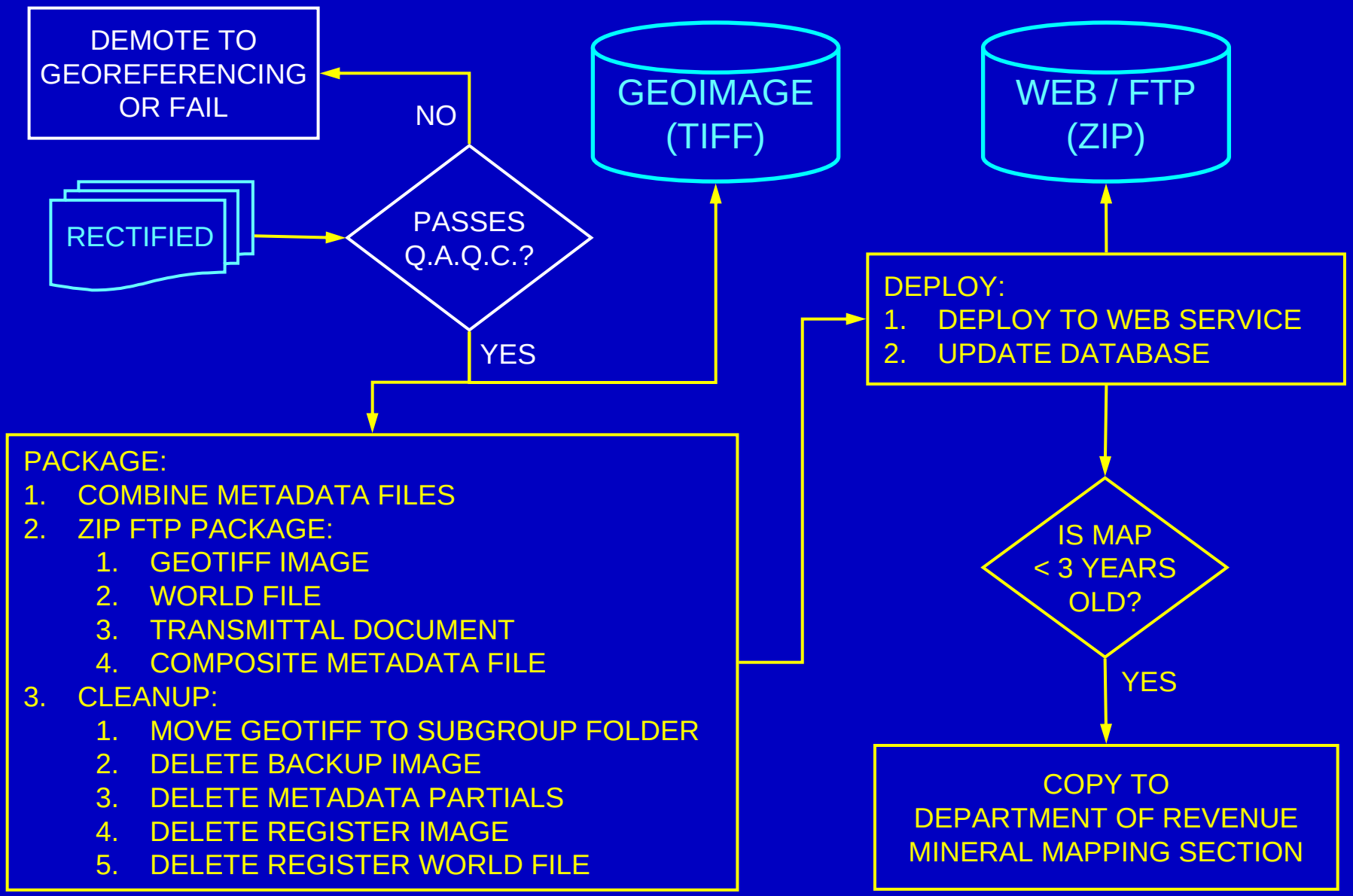
STAGE 2 CLEANUP

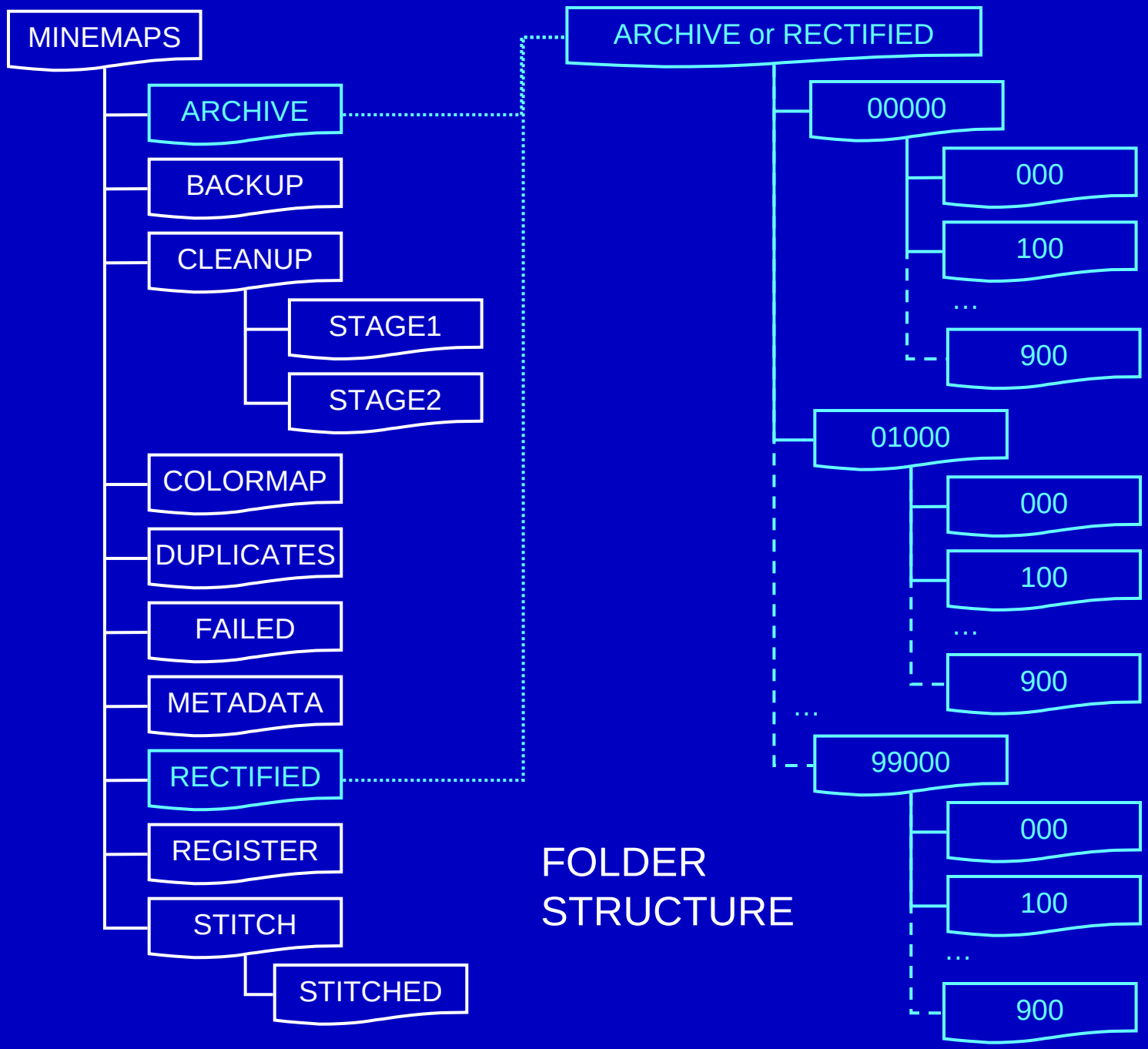


COLOR INDEXING, REGISTRATION, AND RECTIFICATION



PACKAGE AND DEPLOY




MINEMAPS
ARCHIVE
BACKUP
CLEANUP
STAGE1
STAGE2
COLORMAP
DUPLICATES
FAILED
METADATA
RECTIFIED
REGISTER
STITCH
STITCHED
ARCHIVE or RECTIFIED
00000
000
100
...
900
01000
000
100
...
900
...
99000
000
100
...
900
FOLDER
STRUCTURE

Process Automation / ActiveX

- ADODB
- ArcGIS / ArcObjects (VBA)
- AutoCAD Object Model (VBA)
- Photoshop Type Library / Photoshop SDK

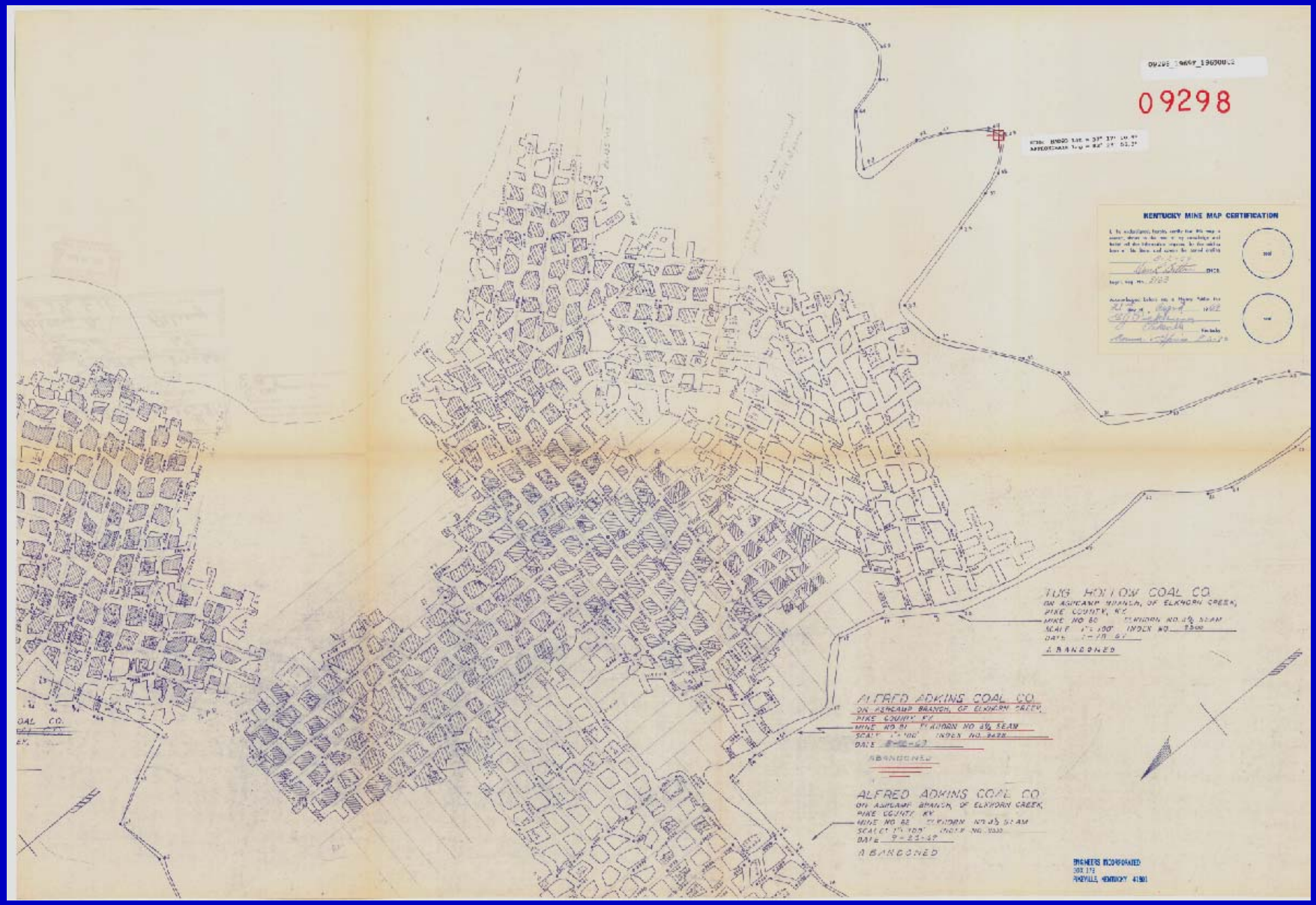
Supporting Cast: Datasets

- KYRASTER (contiguous statewide – ESRI SDE Raster)
  - Kentucky Raster Graphic (KRG) 7.5 Min. Topo
  - Kentucky Digital Ortho Quads (DOQ) 1:12,000 Aerial
  - Kentucky Geologic Quads (GQ) 7.5 min Geology
- KYVECTOR (contiguous statewide ESRI SDE Vector)
  - Kentucky County Boundaries
  - Kentucky 7.5 Minute Quadrangle Boundaries
  - Kentucky Oil and Gas Wells
- KYGNIS – Geographic Name Information System (GDB)
- MMIS5 – Kentucky Mine License Database (MDB)
- Dept. of Revenue: Mined Out Polygons (ESRI SHP)

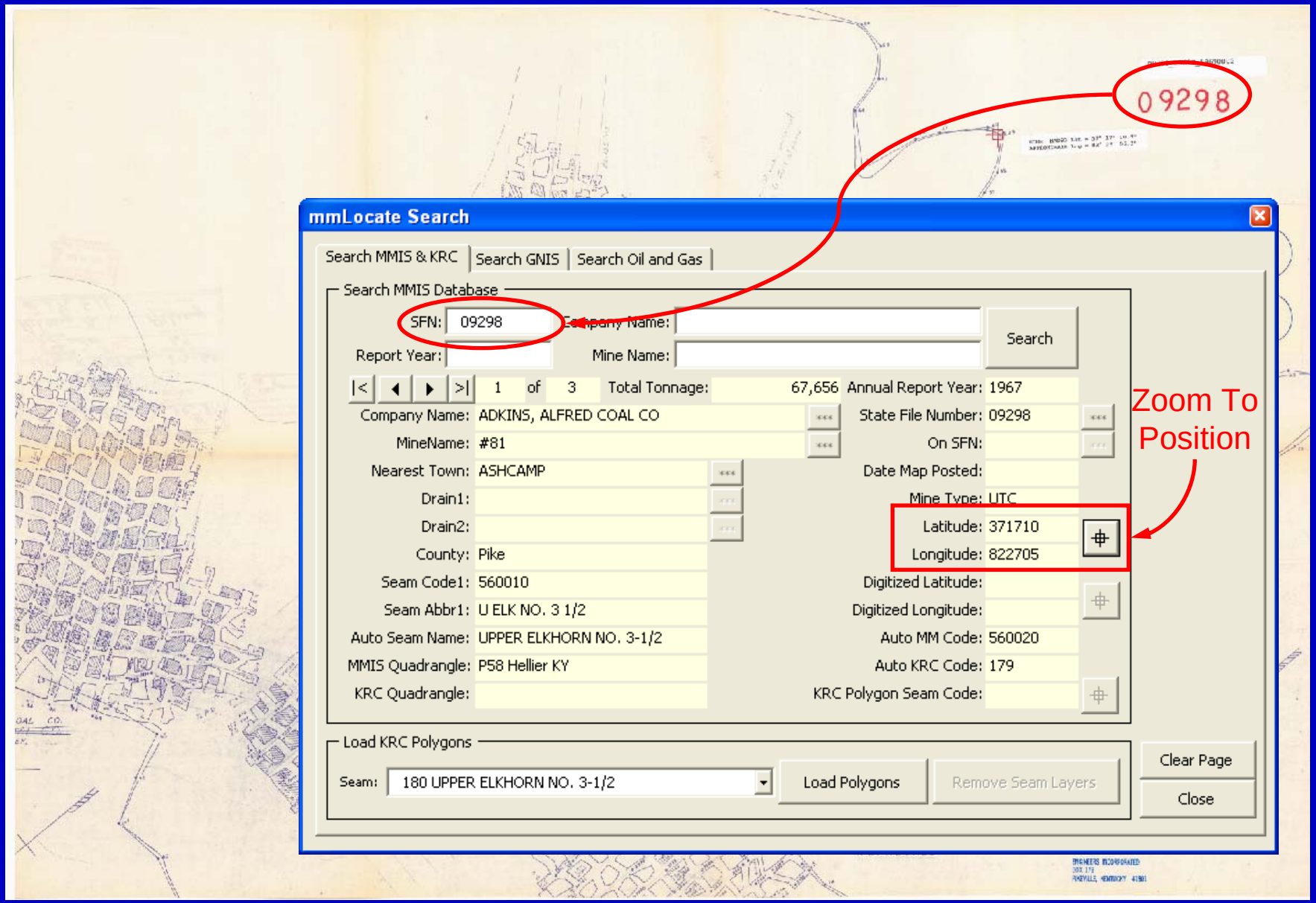
Process Automation

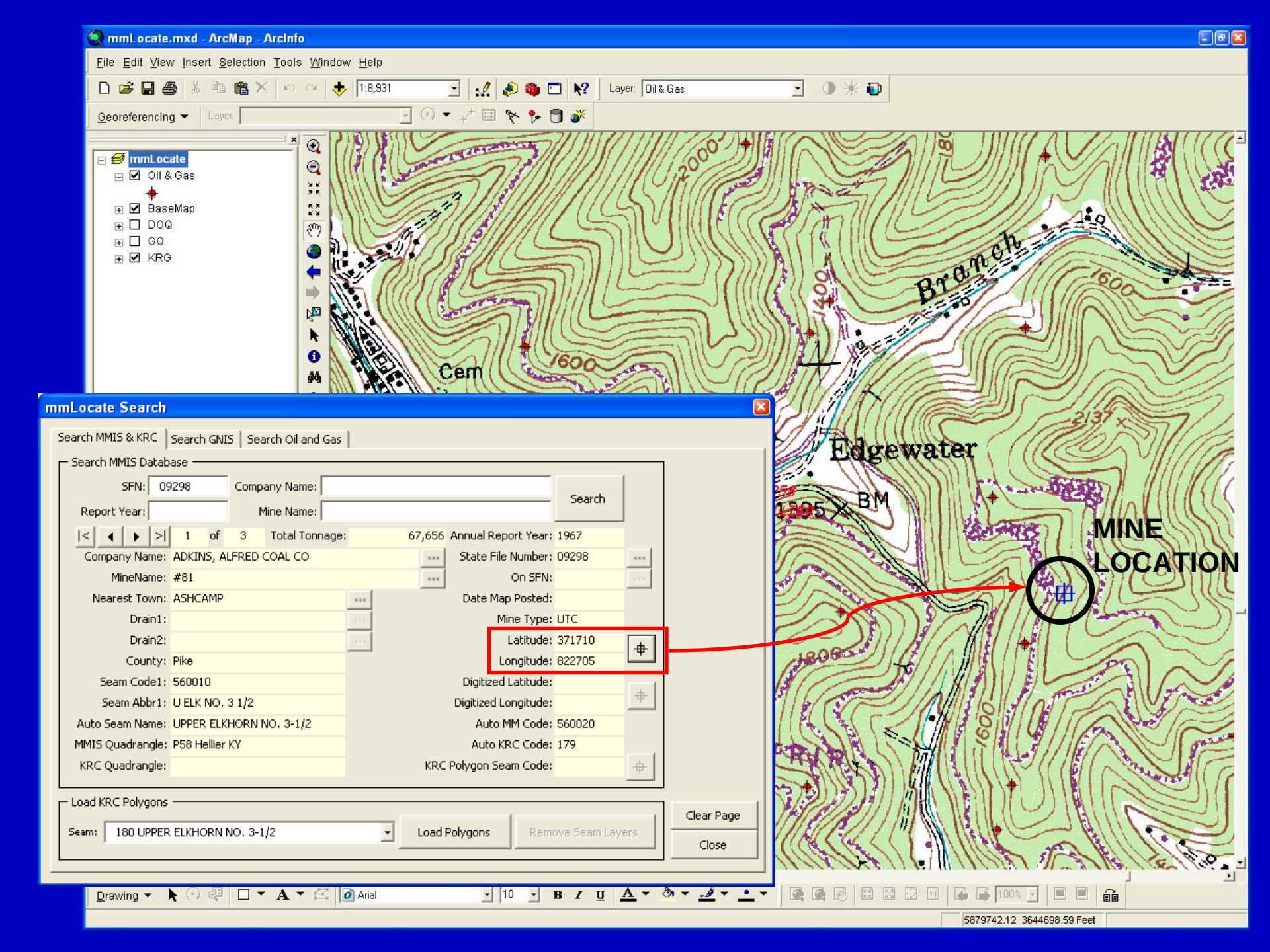
- File migration and management.
- Locational and geographic search (mmLocate).
- Stage 1 and 2 Cleanup (Semi-Automated).
- Color Indexing (color mapping).
- Map Registration (Semi-Automated).
- Map Georeferencing (Semi-Automated).
- Map Rectification.
- Georeferencing Q.A.Q.C. (Semi-Automated).
- Package and Deploy to MMWEB and Revenue.

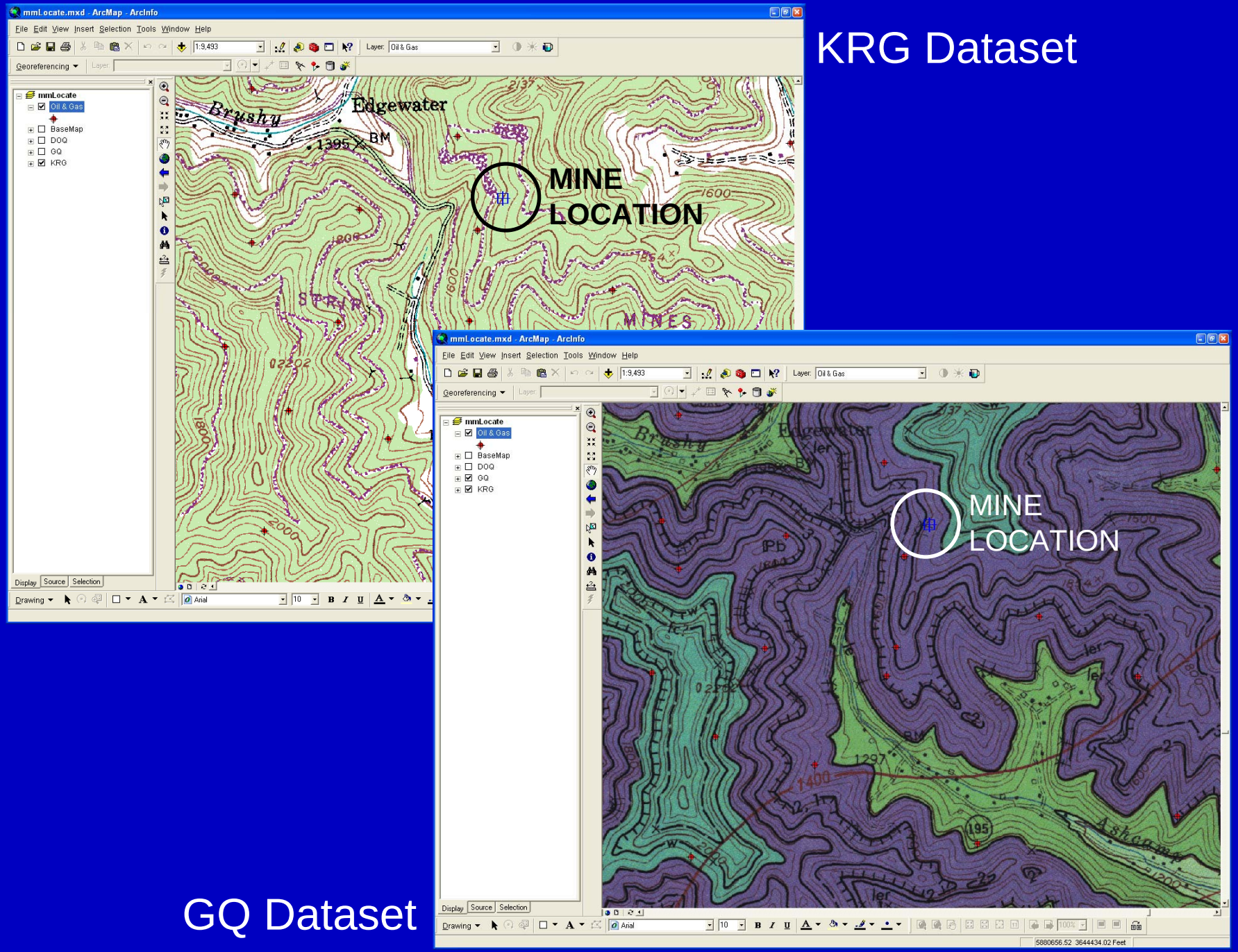
Map Preparation – mmLocate (ArcMap/ArcView)



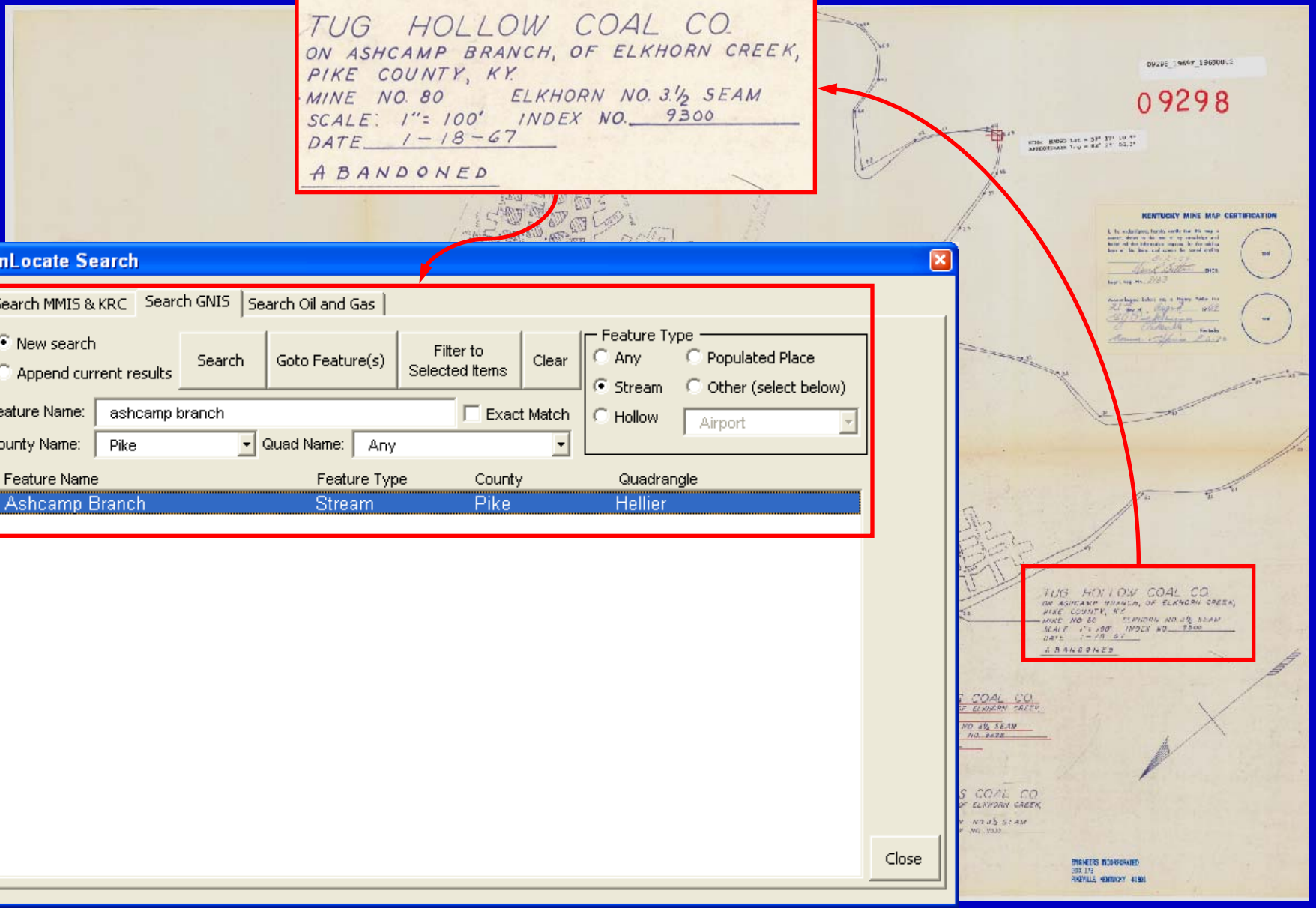
mmLocate: Search by SFN

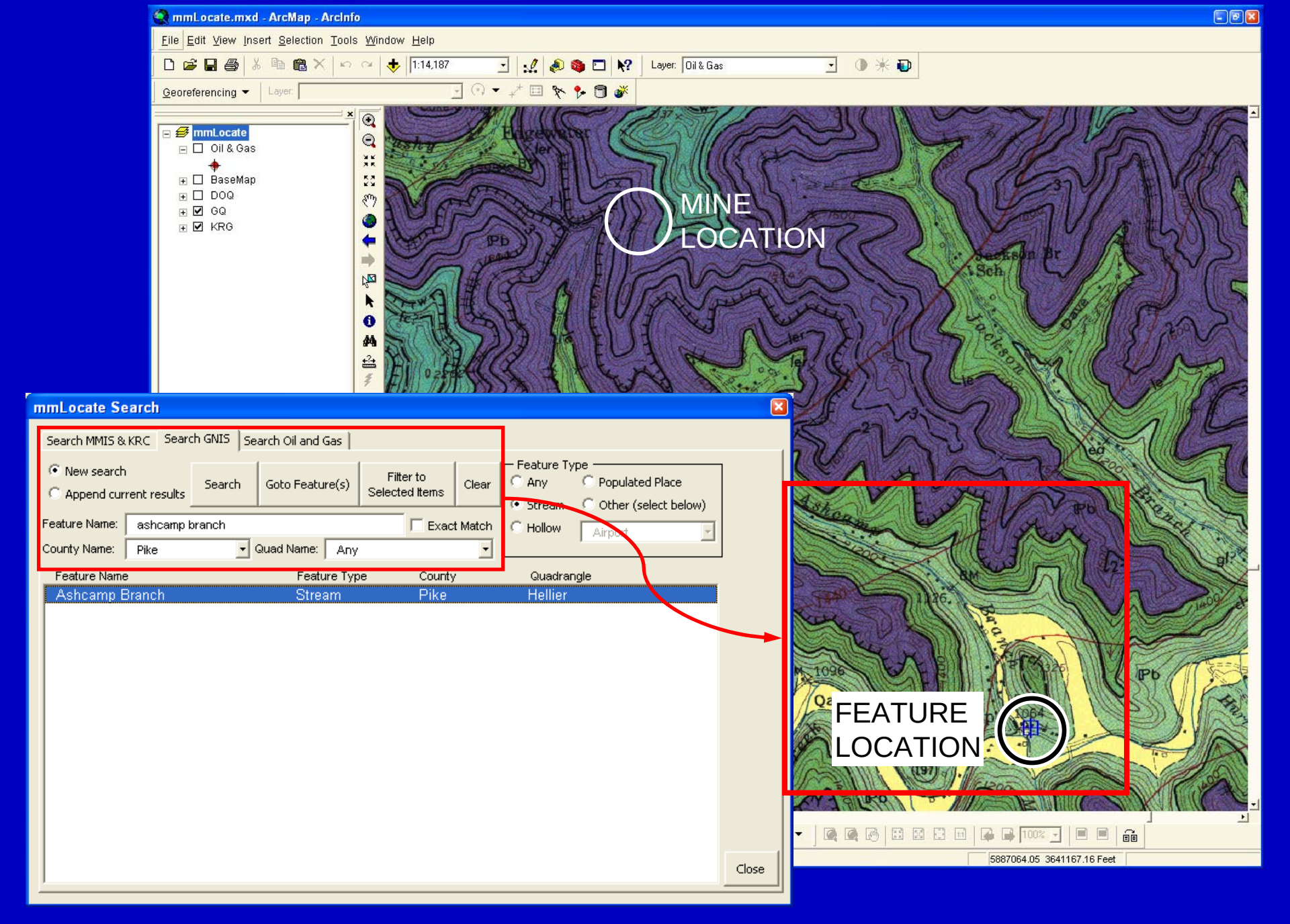


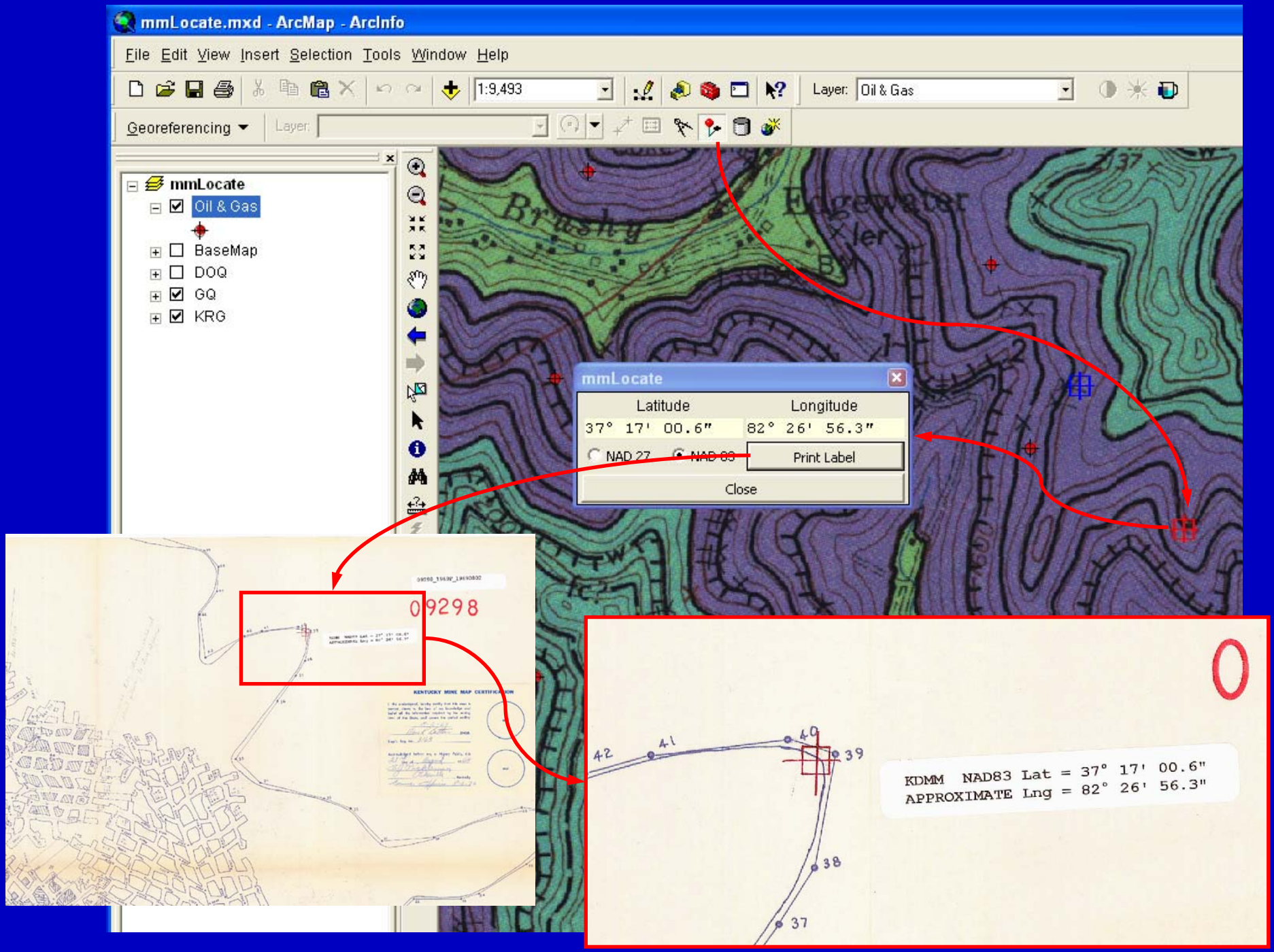

mmLocate.mxd - ArcMap - ArcInfo
File Edit View Insert Selection Tools Window Help
Georeferencing
mmLocate
Oil & Gas
BaseMap
DOQ
QQ
KRG
mmLocate Search
Search MMIS & KRC
Search GNIS
Search Oil and Gas
Search MMIS Database
SFN: 09298
Company Name:
Report Year:
Mine Name:
Search
1 of 3
Total Tonnage: 67,656
Annual Report Year: 1967
Company Name: ADKINS, ALFRED COAL CO
State File Number: 09298
MineName: #81
On SFN:
Nearest Town: ASHCAMP
Date Map Posted:
Drain1:
Mine Type: UTC
Drain2:
Latitude: 371710
Longitude: 822705
County: Pike
Seam Code1: 560010
Digitized Latitude:
Seam Abbr1: U ELK NO. 3 1/2
Digitized Longitude:
Auto Seam Name: UPPER ELKHORN NO. 3-1/2
Auto MM Code: 560020
MMIS Quadrangle: P58 Hellier KY
Auto KRC Code: 179
KRC Quadrangle:
KRC Polygon Seam Code:
Load KRC Polygons
Seam: 180 UPPER ELKHORN NO. 3-1/2
Load Polygons
Remove Seam Layers
Clear Page
Close
Edgewater
Cem
Branch
BM
MINE LOCATION
Drawing
Arial
5879742.12 3644698.59 Feet


mmLocate.mxd - ArcMap - ArcInfo
File Edit View Insert Selection Tools Window Help
Georeferencing
mmLocate
Oil & Gas
BaseMap
DOQ
GQ
KRG
Brushy
Edgewater
1395
BM
MINE
LOCATION
MINES
Display
Source
Selection
Drawing
Arial
KRG Dataset
GQ Dataset

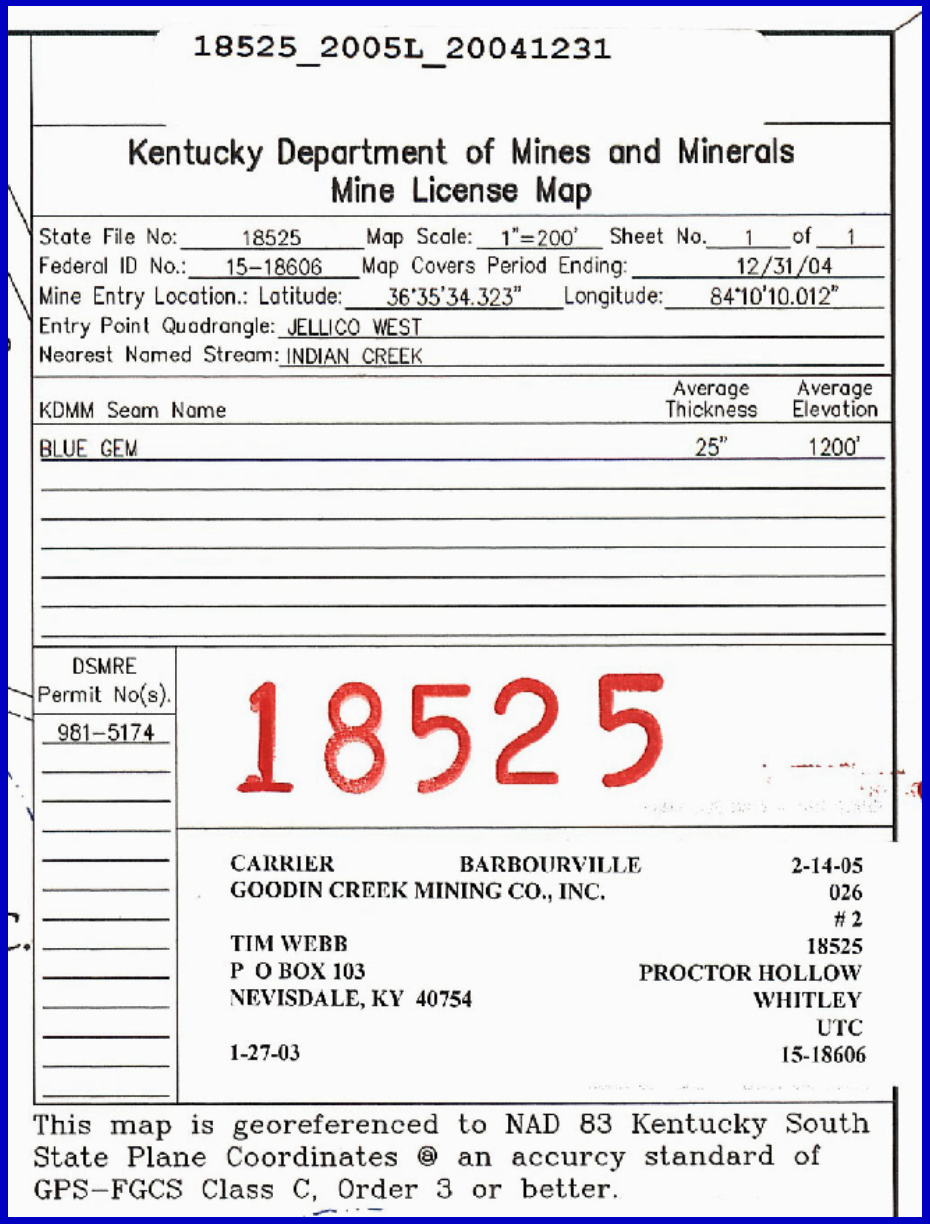
mmLocate: Search by GNS




mmLocate.mxd - ArcMap - ArcInfo
File Edit View Insert Selection Tools Window Help
Georeferencing
mmLocate
Oil & Gas
BaseMap
DOQ
GQ
KRG
MINE LOCATION
mmLocate Search
Search MMIS & KRC
Search GNIS
Search Oil and Gas
New search
Append current results
Search
Goto Feature(s)
Filter to Selected Items
Clear
Feature Type
Any
Populated Place
Stream
Other (select below)
Hollow
Airport
Feature Name: ashcamp branch
Exact Match
County Name: Pike
Quad Name: Any
Feature Name
Feature Type
County
Quadrangle
Ashcamp Branch
Stream
Pike
Hellier
Close
FEATURE LOCATION
5887064.05 3641167.16 Feet


mmLocate.mxd - ArcMap - ArcInfo
File Edit View Insert Selection Tools Window Help
1:9,493
Layer: Oil & Gas
Georeferencing
Layer:
mmLocate
Oil & Gas
BaseMap
DOQ
GQ
KRG
mmLocate
Latitude
Longitude
37° 17' 00.6"
82° 26' 56.3"
NAD 27
NAD 83
Print Label
Close
09298
KENTUCKY MINE MAP CERTIFICATION
42
41
40
39
38
37
KDMM NAD83 Lat = 37° 17' 00.6"
APPROXIMATE Lng = 82° 26' 56.3"

Standardized Map Info Block (Required for All New Maps)



18525_2005L_20041231

Kentucky Department of Mines and Minerals
Mine License Map

State File No: 18525 Map Scale: 1"=200' Sheet No. 1 of 1
Federal ID No.: 15-18606 Map Covers Period Ending: 12/31/04
Mine Entry Location.: Latitude: 36°35'34.323" Longitude: 84°10'10.012"
Entry Point Quadrangle: JELLICO WEST
Nearest Named Stream: INDIAN CREEK

KDMM Seam Name	Average Thickness	Average Elevation
BLUE GEM	25"	1200'

DSMRE Permit No(s).
981-5174

18525

CARRIER BARBOURVILLE 2-14-05
GOODIN CREEK MINING CO., INC. 026
#2
TIM WEBB 18525
P O BOX 103 PROCTOR HOLLOW
NEVISDALE, KY 40754 WHITLEY
UTC
1-27-03 15-18606

This map is georeferenced to NAD 83 Kentucky South State Plane Coordinates @ an accurcy standard of GPS-FGCS Class C, Order 3 or better.

KDMM Map Name Label

Map Geometry and Location:
- Map Scale
- Mine Entry Lat & Long
- USGS Quadrangle
- Nearest Named Stream

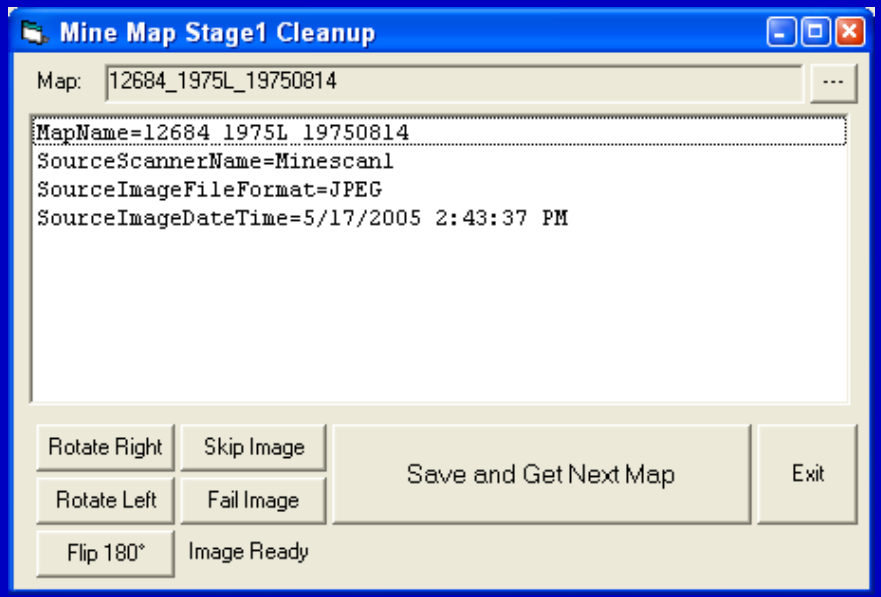
Coal Seam Information

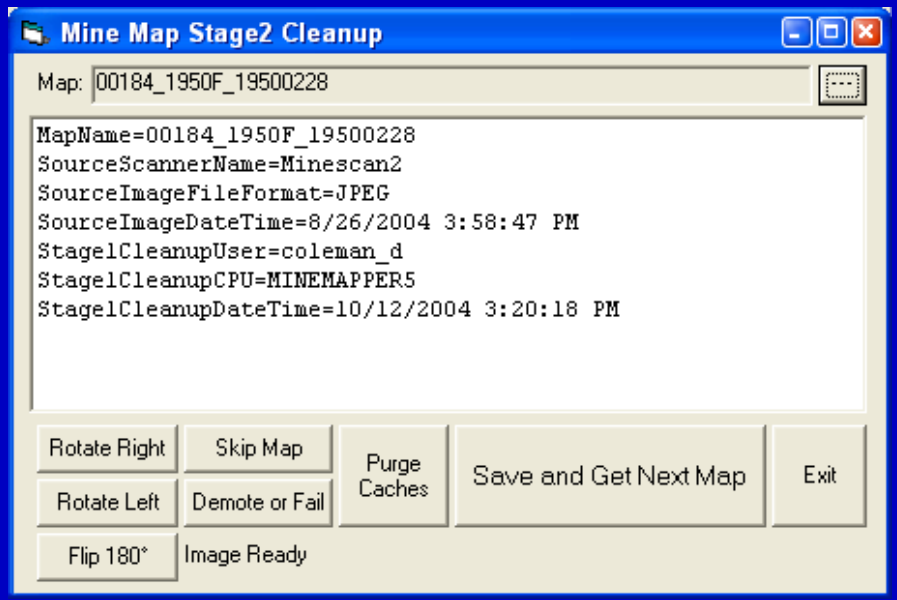
KDMM State File Number Stamp

KDMM Field Office Label

Survey Control and Georeferencing Information

Stage 1 and 2 Cleanup Application Control Panels





Stage 1 Cleanup:

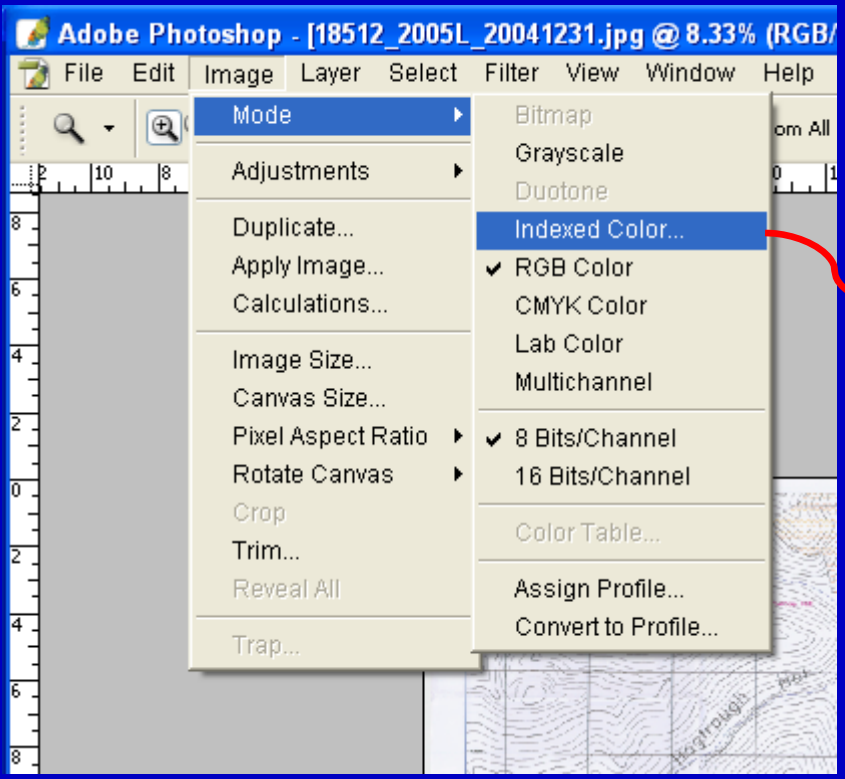
1. Q.A.Q.C. for visual quality.
2. Crop and rotate.
3. Orient map to read upward.

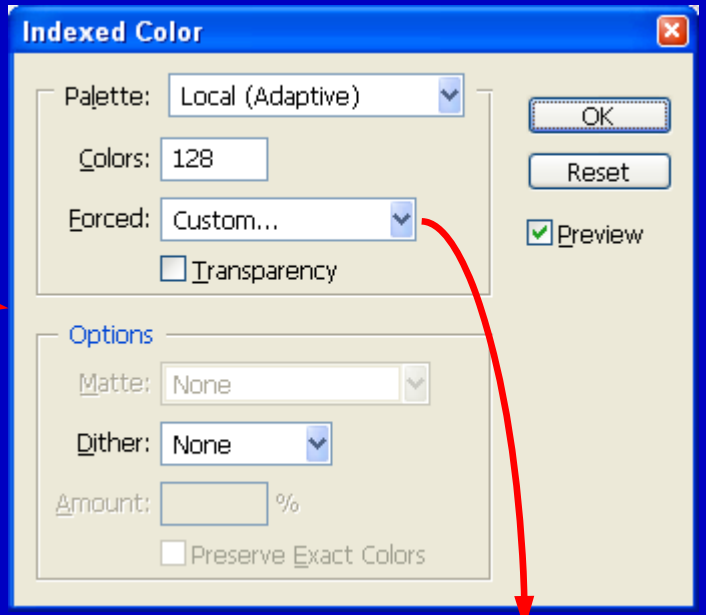
Stage 2 Cleanup:

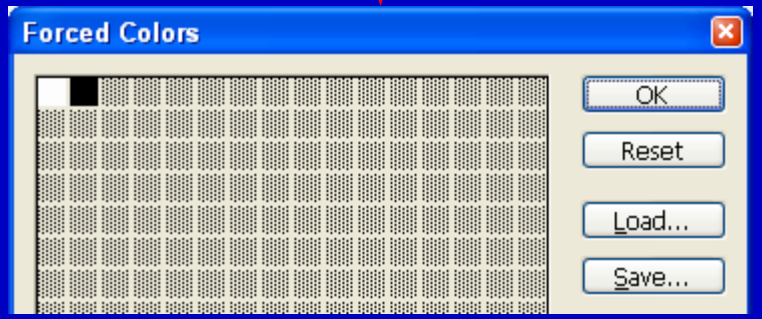
1. Q.A.Q.C. for visual quality.
2. Remove background noise.
3. Image enhancements.
4. Orient north ‘upward’.

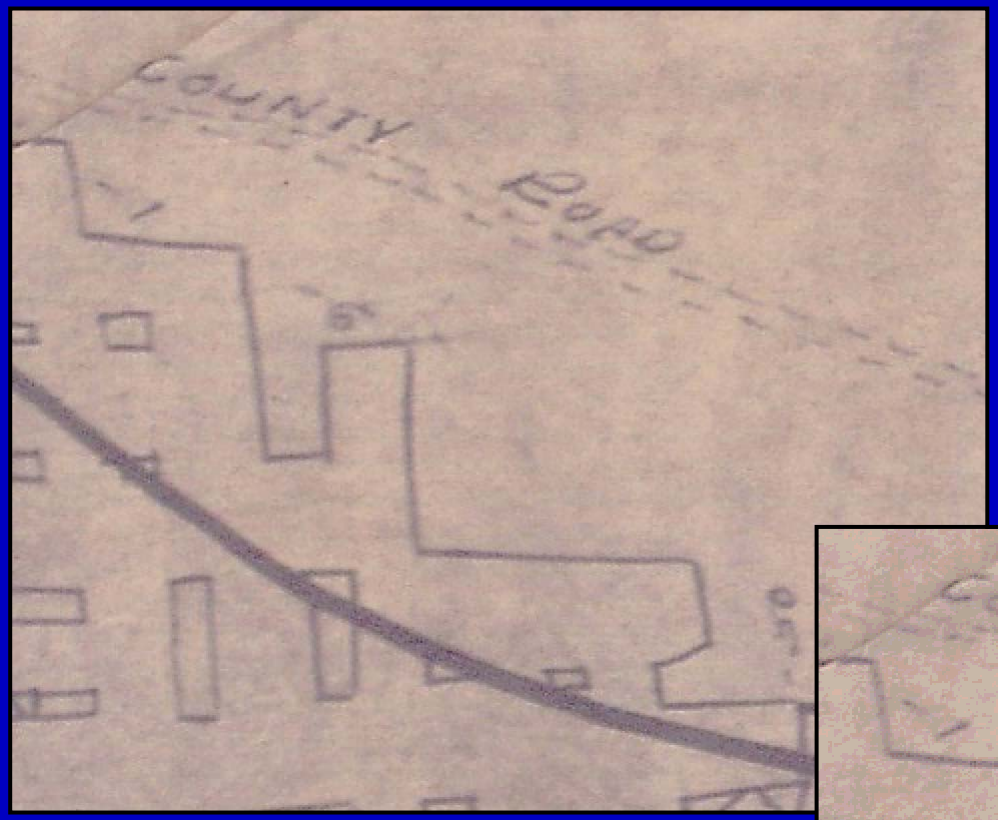
Color Indexing (Photoshop)

- Convert RGB Mode to Indexed Color
- Reduce to Best-Fit (Local Adaptive) 128 Colors
- Force White = 0 and Black = 1 (Monobit Scheme)

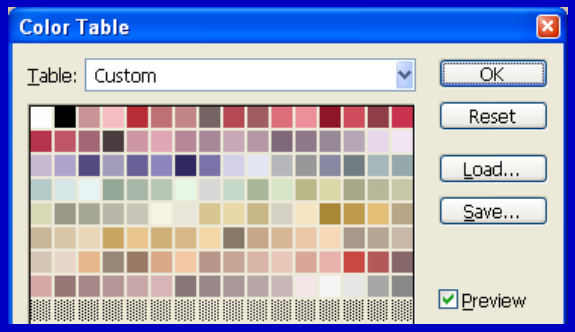




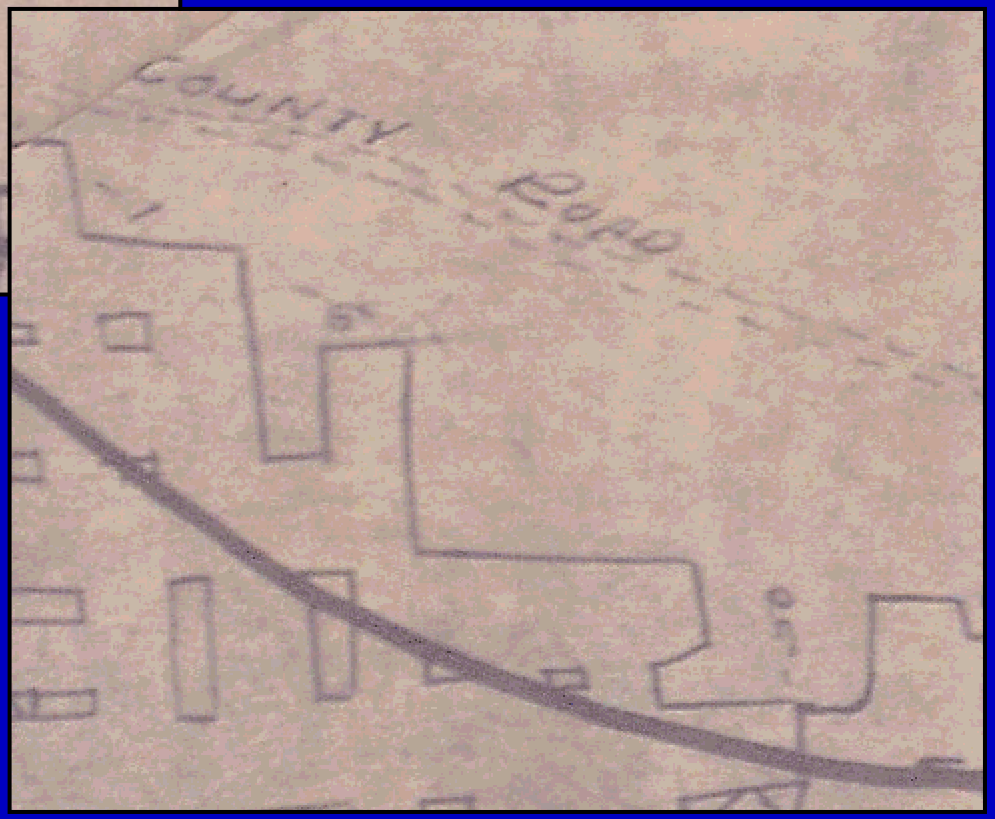


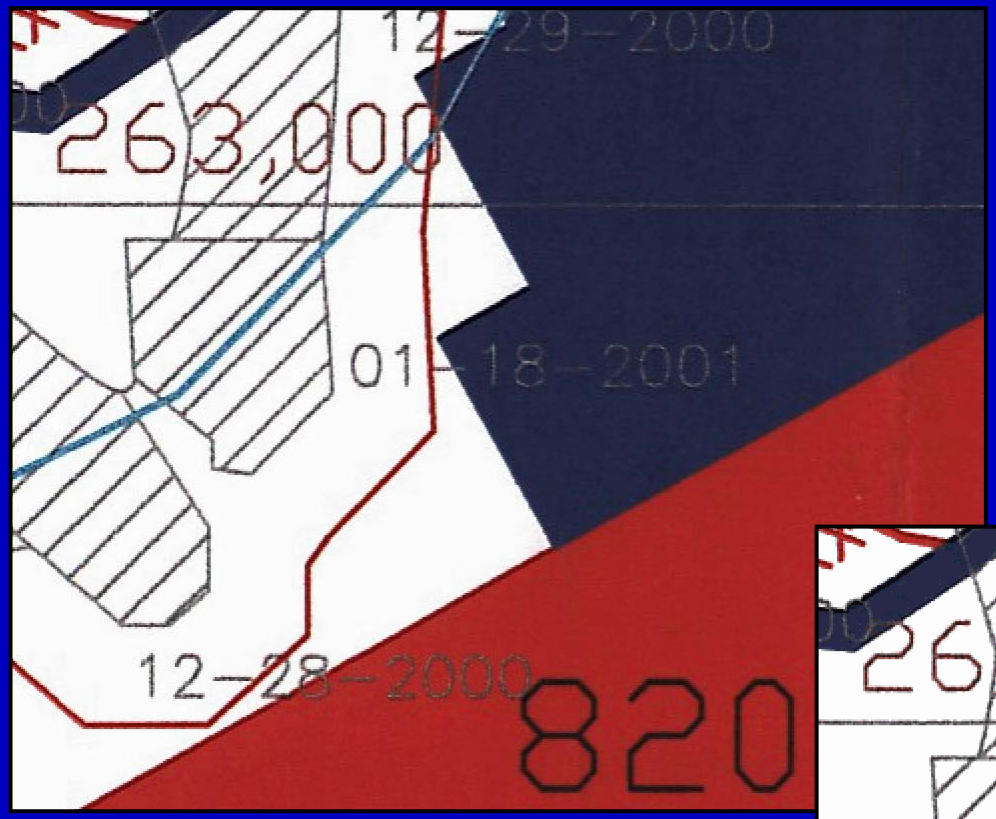


RGB Color Mode

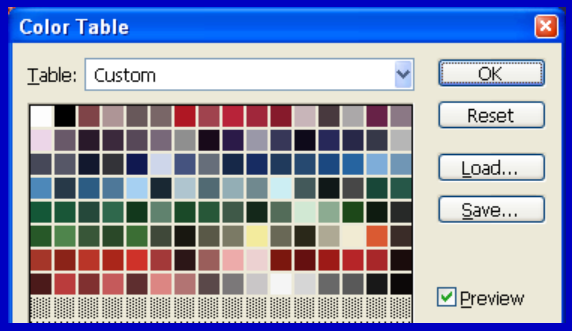


Indexed Color Mode
128 Color Adaptive

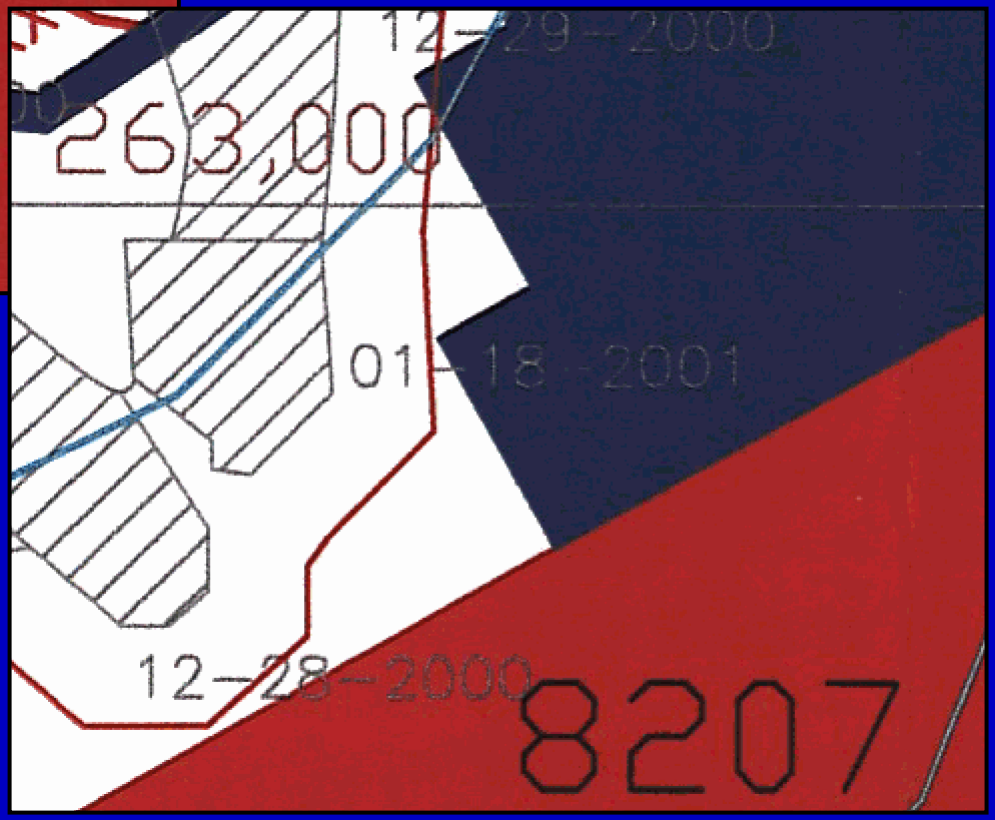




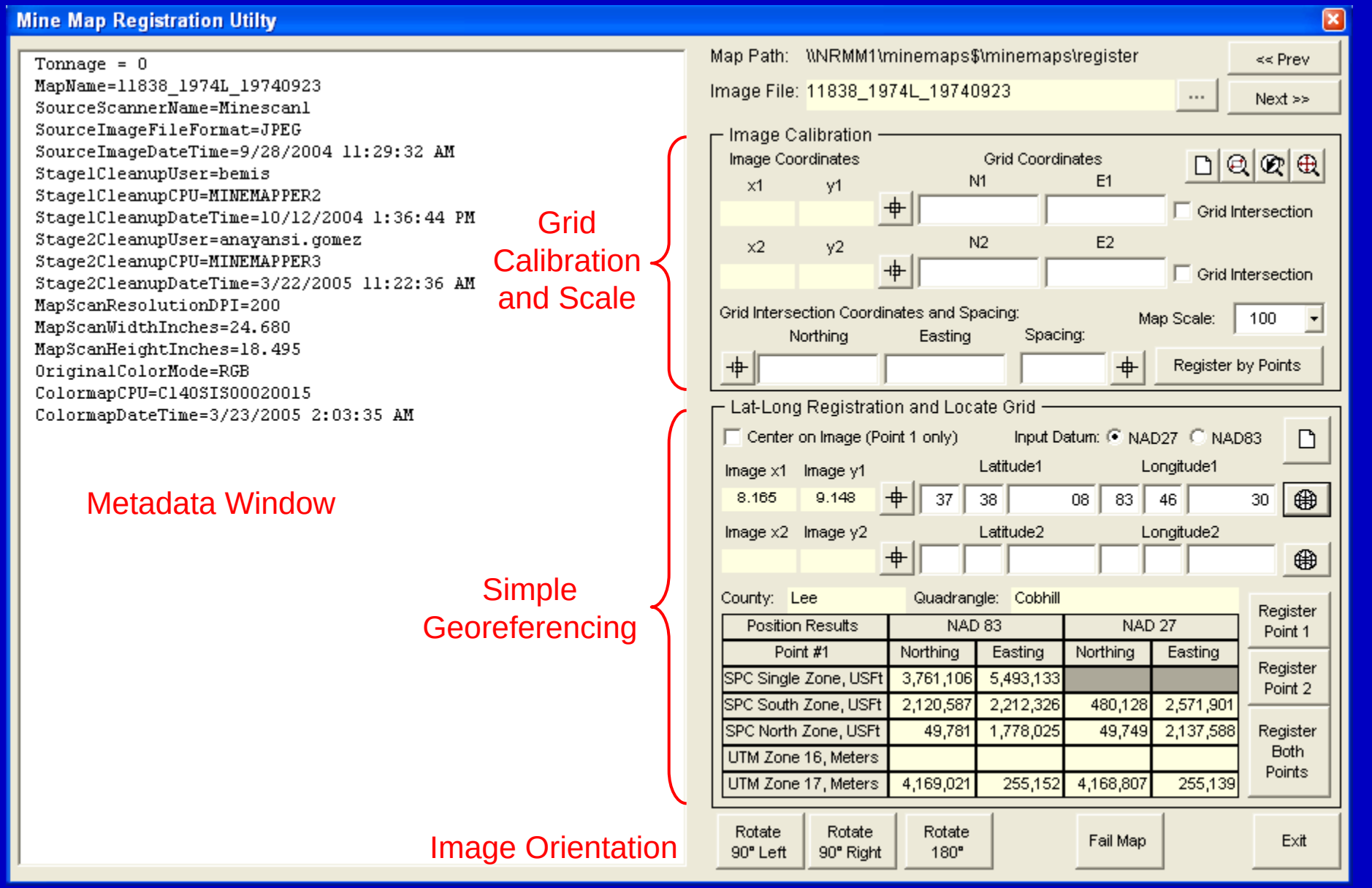
RGB Color Mode



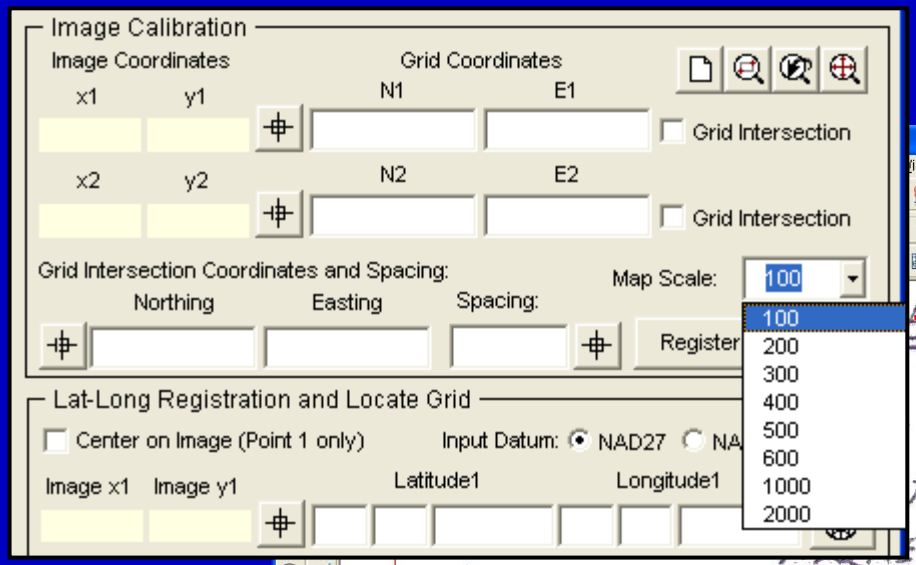
Indexed Color Mode
128 Color Adaptive

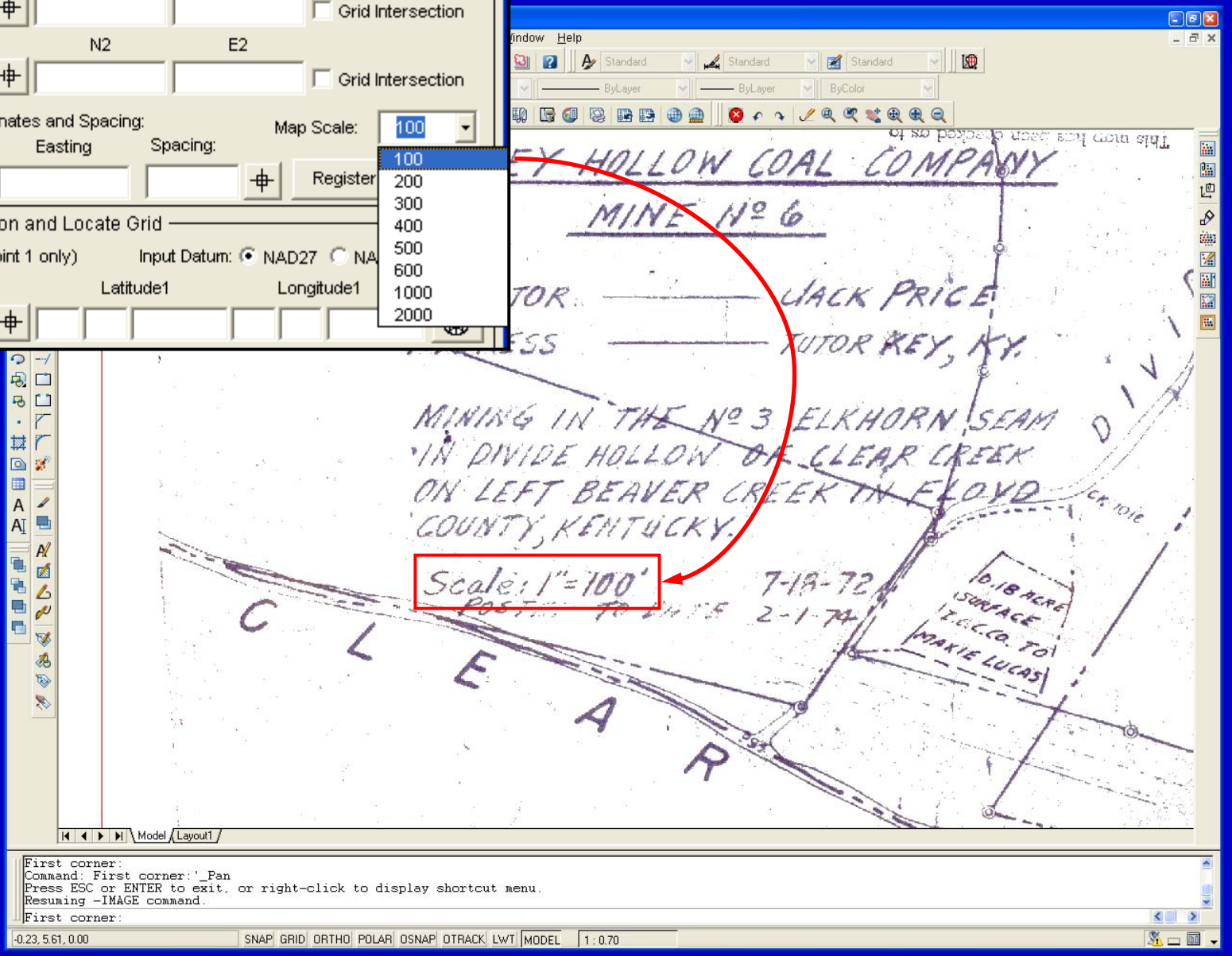


Mine Map Registration Utility (AutoCad VBA)

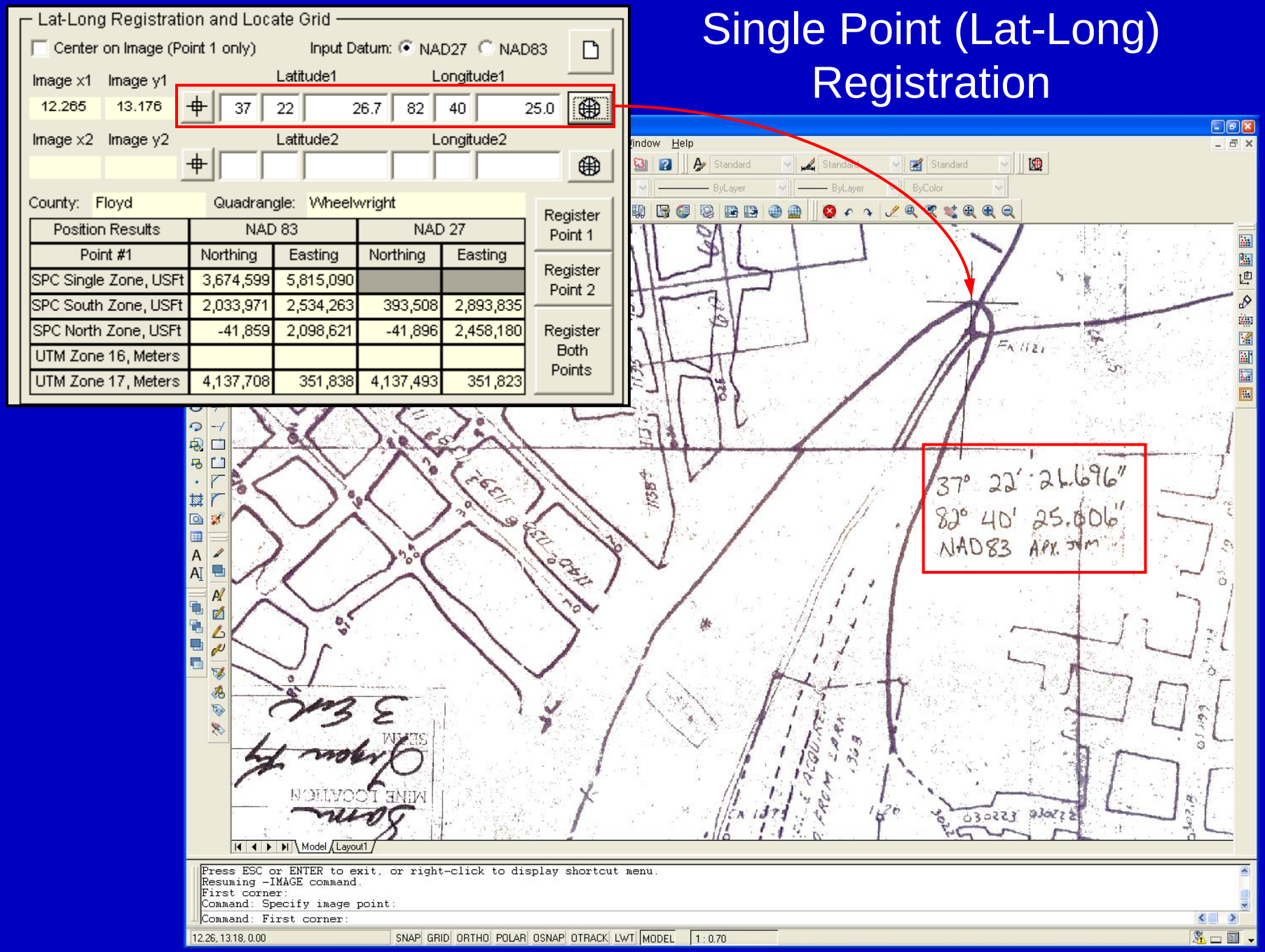


Setting Map Scale

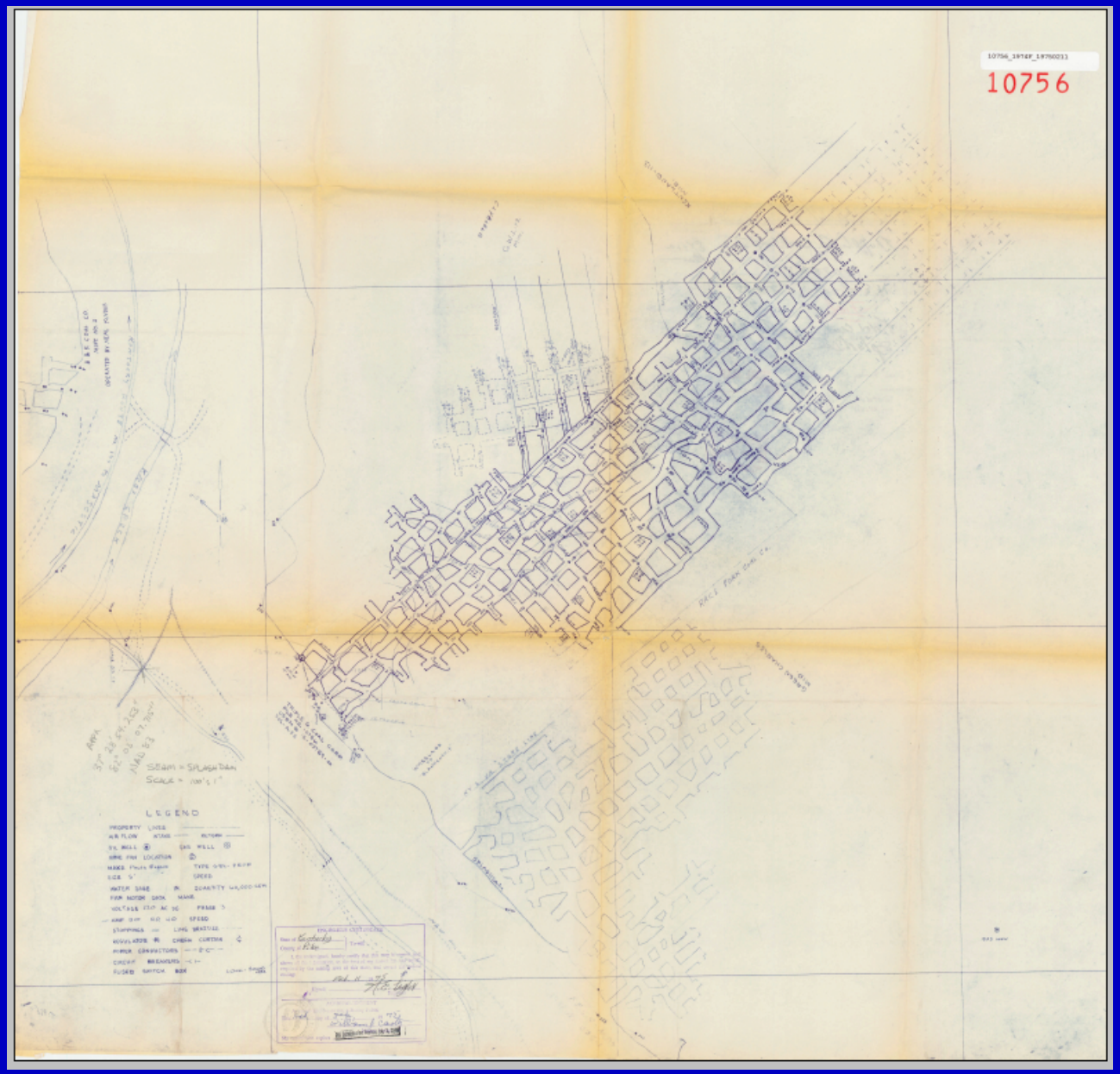


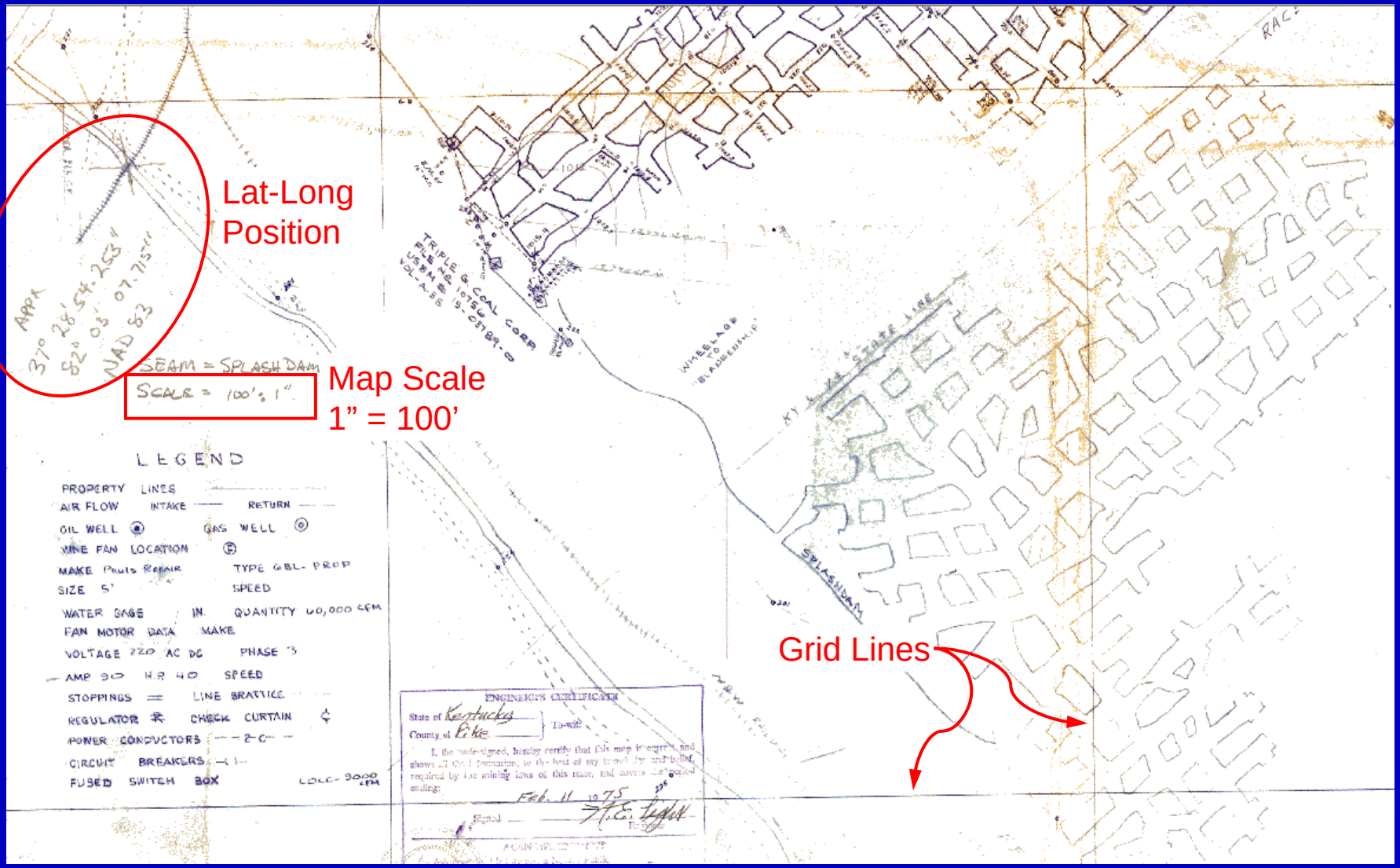


Single Point (Lat-Long) Registration

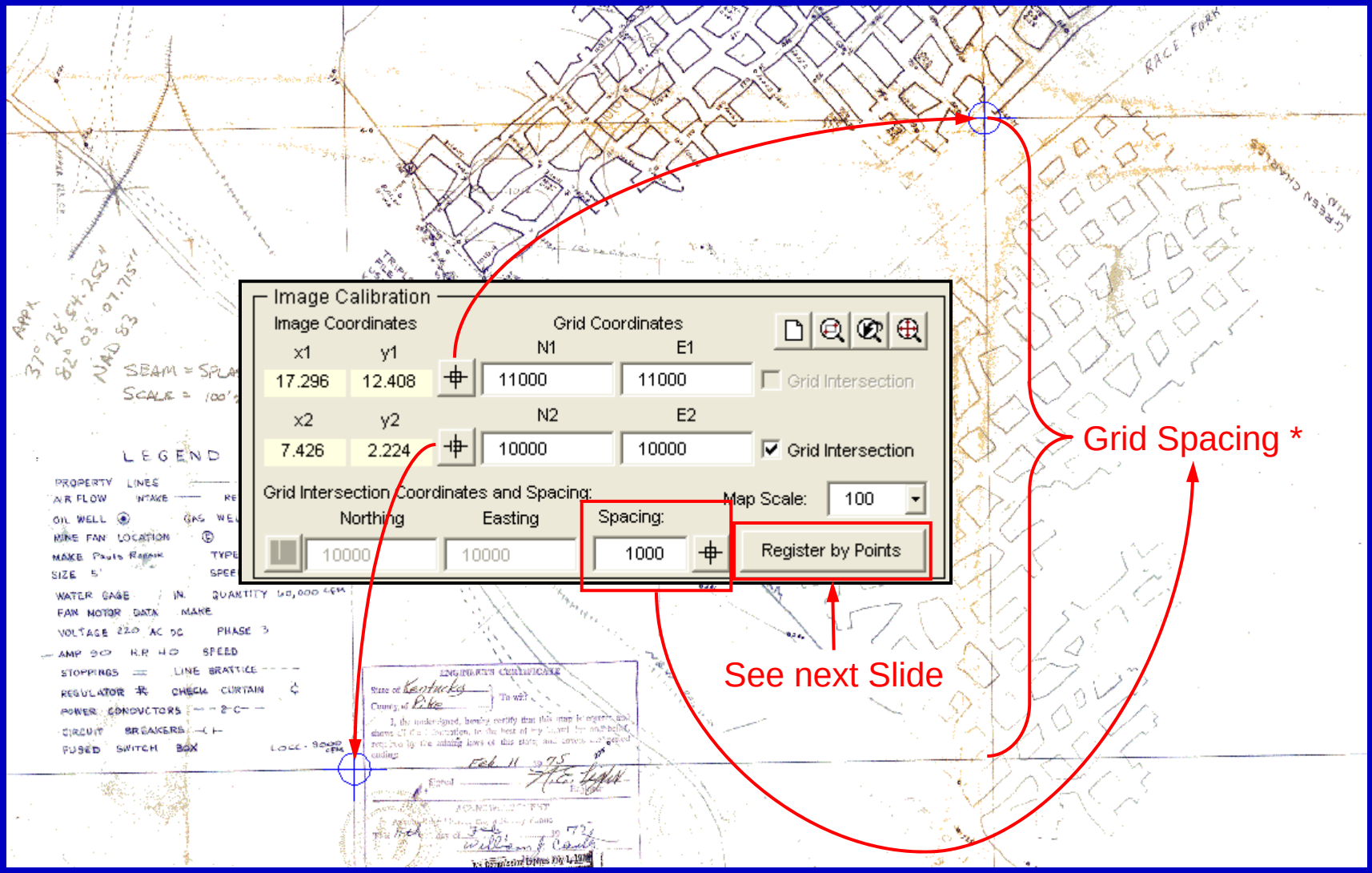


Grid Registration – Unlabeled Grid



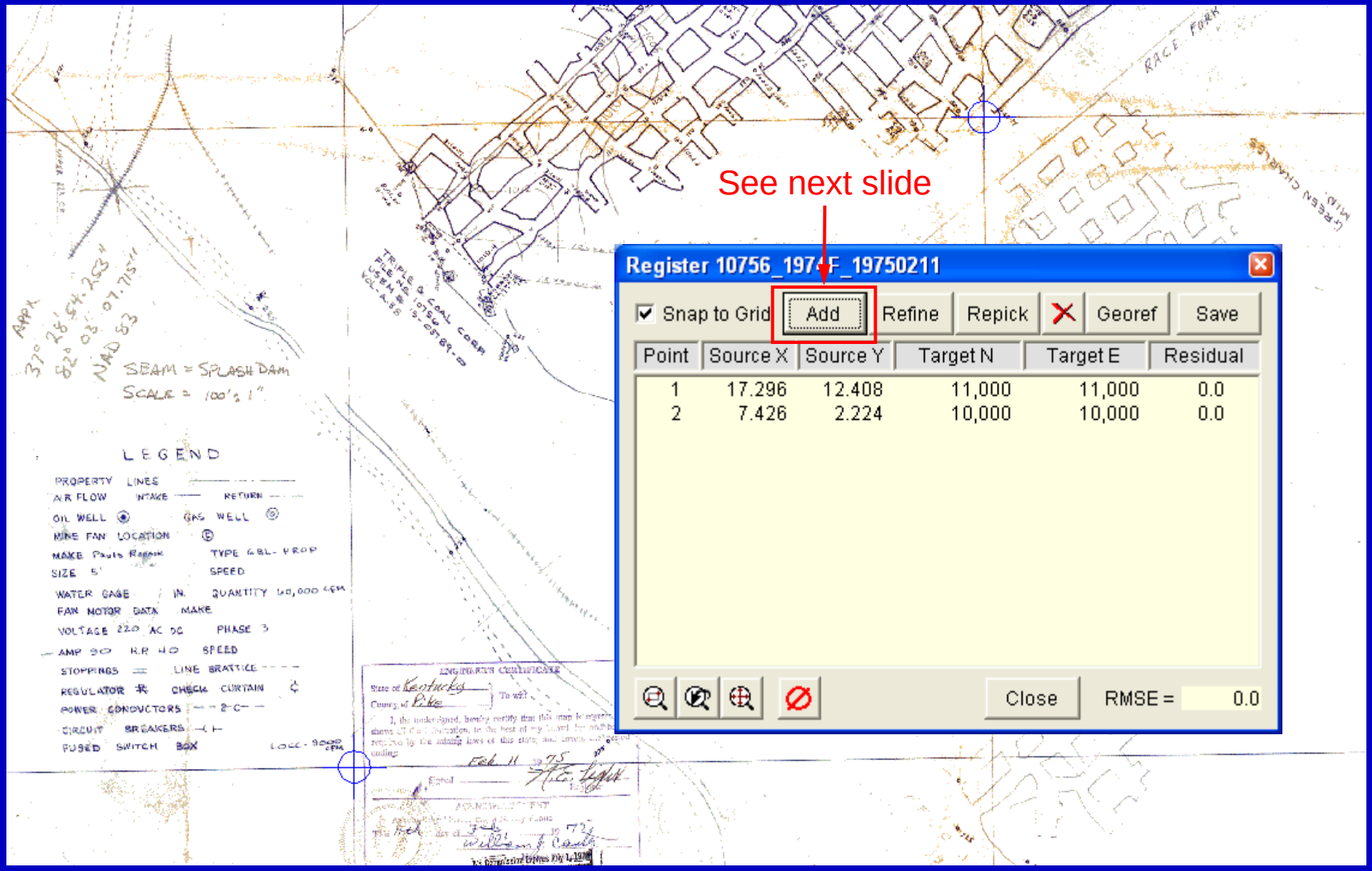

Lat-Long
Position
Map Scale
1" = 100'
Grid Lines
SEAM = SPLASHDAM
SCALE = 100' : 1"
LEGEND
PROPERTY LINES
AIR FLOW INTAKE RETURN
OIL WELL
GAS WELL
MINE FAN LOCATION
MAKE Pauls Repair
TYPE GBL- PROP
SIZE 5'
SPEED
WATER GAGE IN.
QUANTITY 60,000 CFM
FAN MOTOR DATA MAKE
VOLTAGE 220 AC DC
PHASE 3
AMP 90 H.P. 40 SPEED
STOPPINGS
LINE BRATTICE
REGULATOR
CHECK CURTAIN
POWER CONDUCTORS
CIRCUIT BREAKERS
FUSED SWITCH BOX
LOCC- 9000 CFM
ENGINEER'S CERTIFICATE
State of Kentucky
County of Pike
To-wit:
Feb. 11 1975
Signed
SPLASHDAM
WHEELAGE TO "BLADDENSHIP"
TRIPLE G COAL CORP
APPX
37° 28' 54.253"
82° 03' 07.715"
NAD 83

Grid Registration – Unlabeled Grid

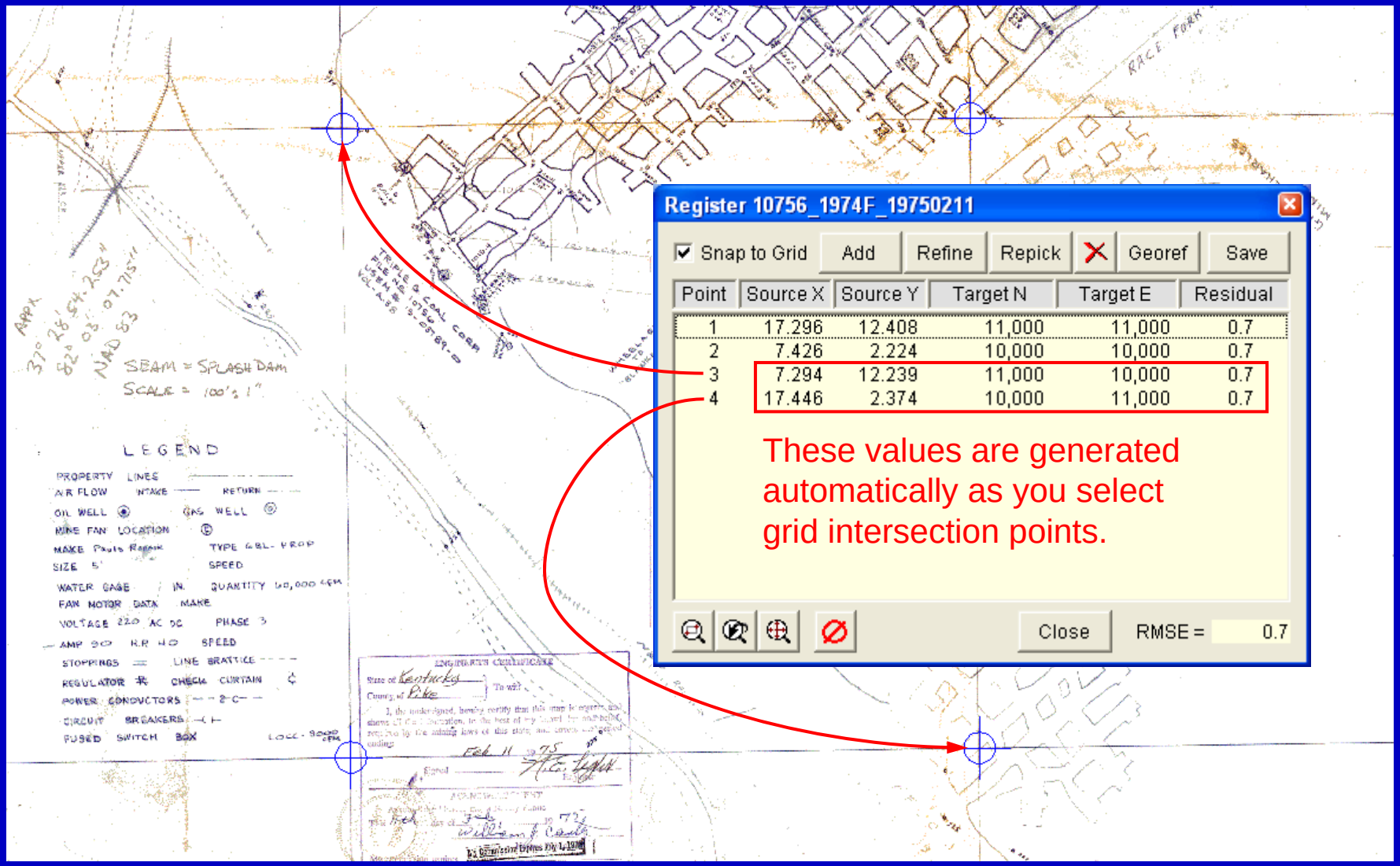


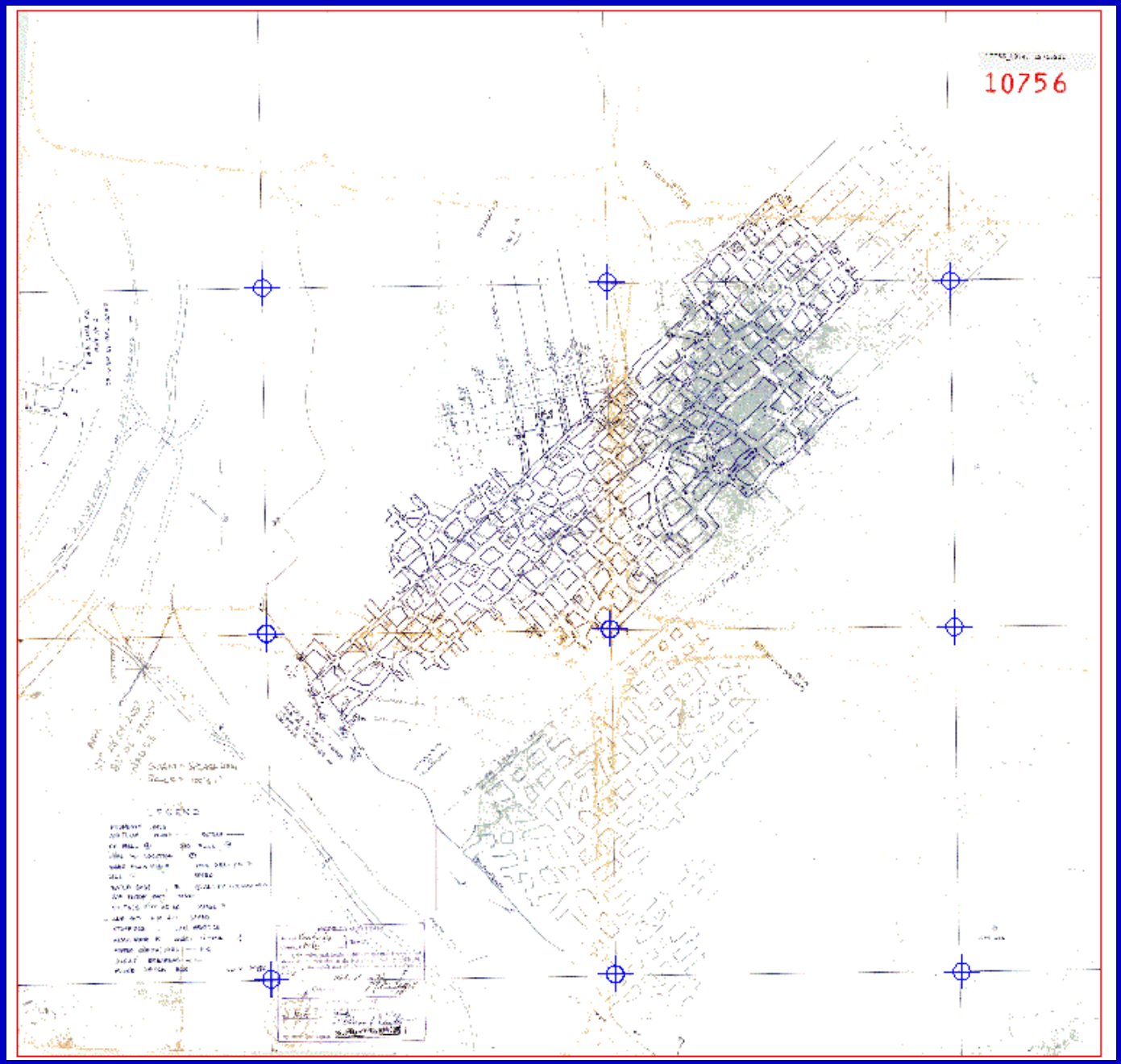
* Grid spacing for this scenario is determined by entering the map scale as provided on the map, then picking two adjacent grid intersection points.

Grid Registration – Unlabeled Grid

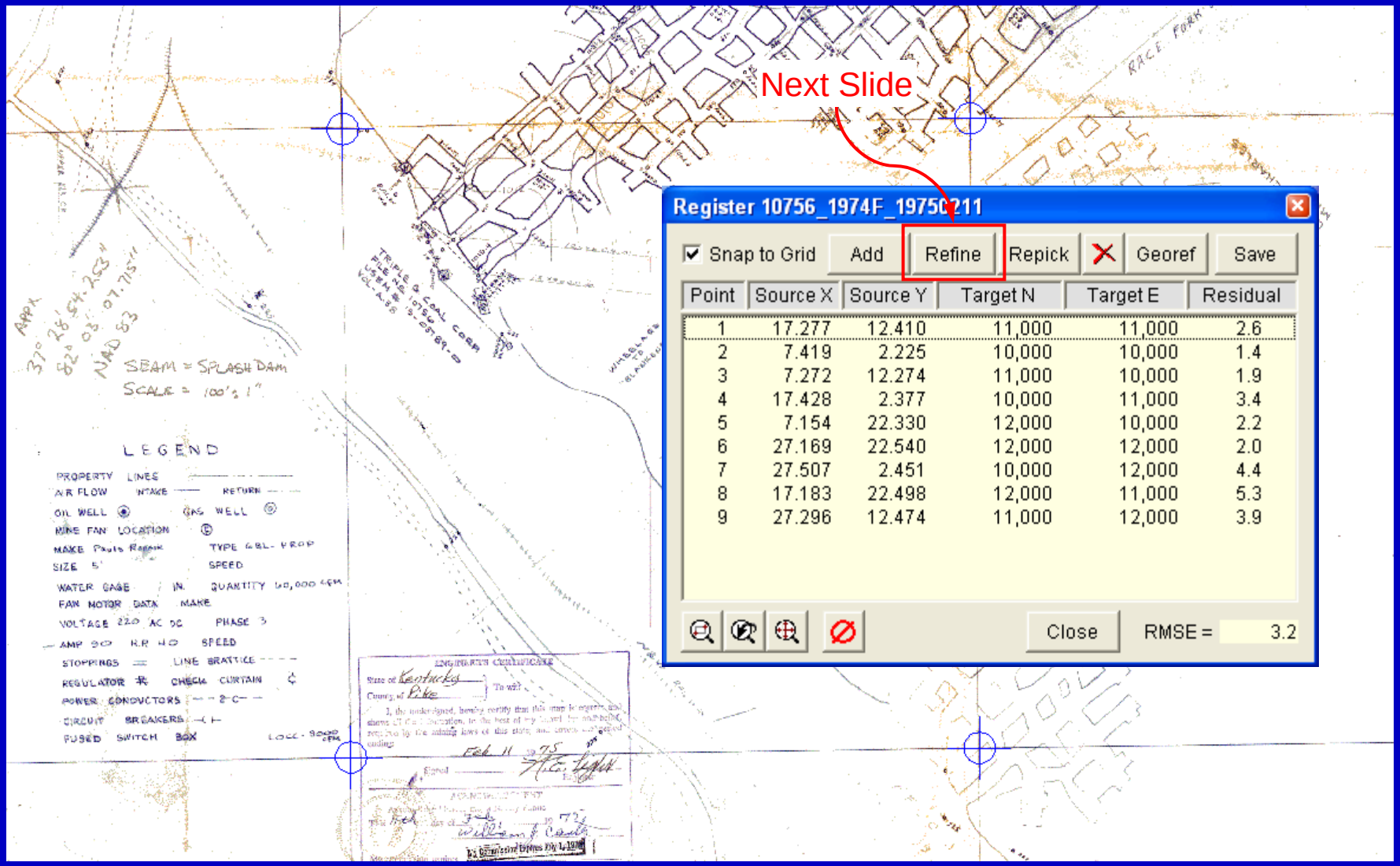


Grid Registration – Unlabeled Grid

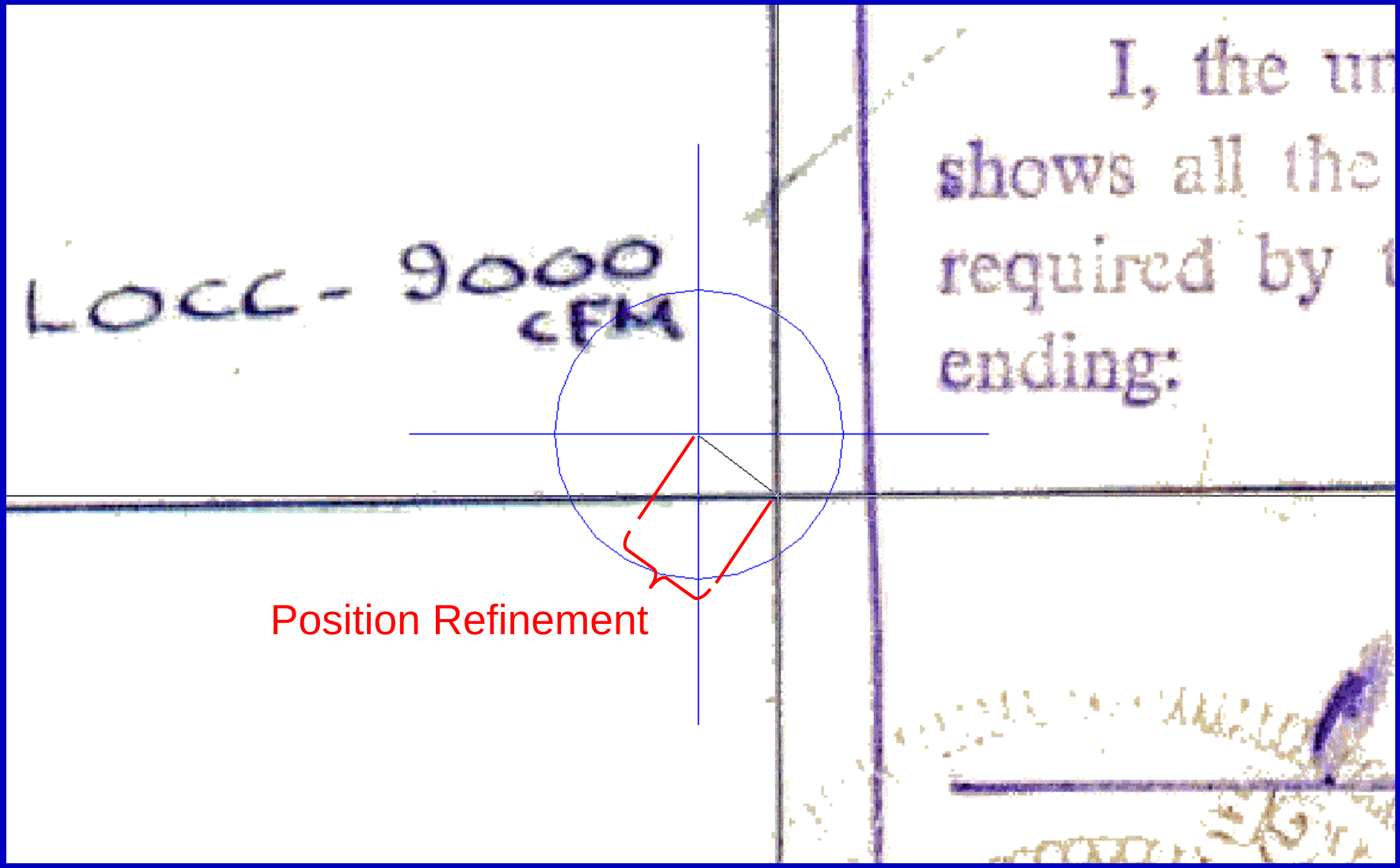



10756

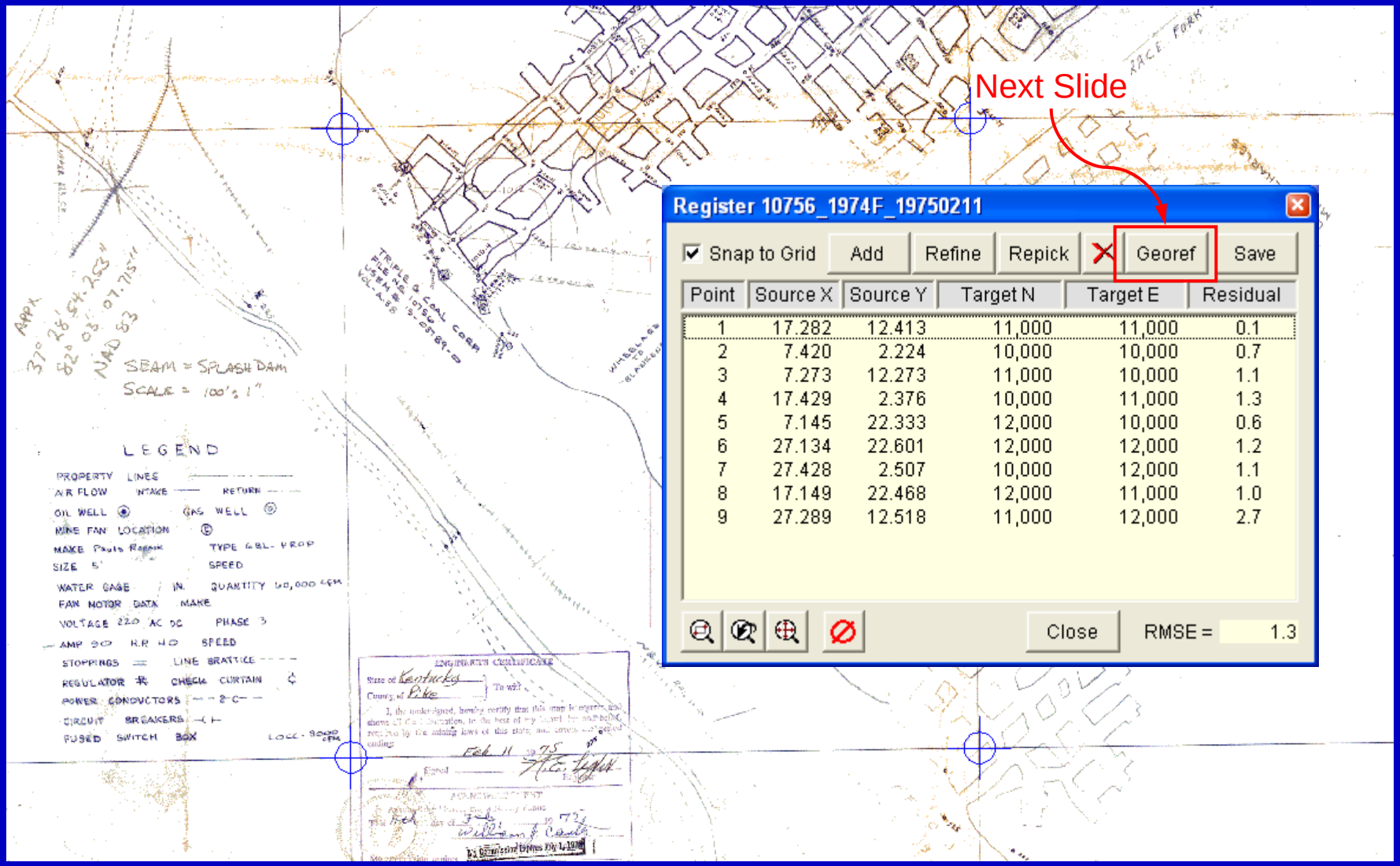
Refine Registration Points



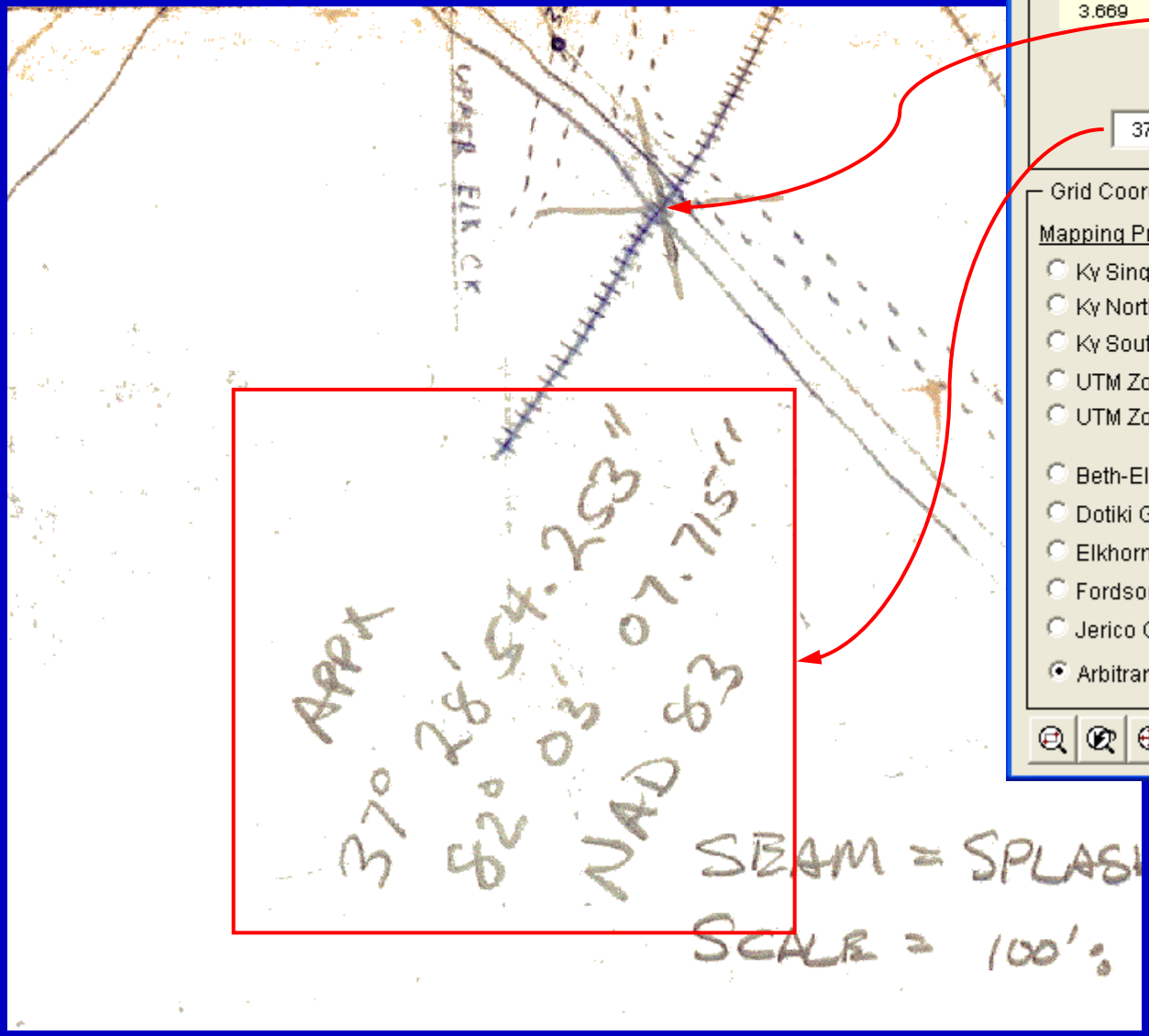
Refine Registration Points



Grid Georeferencing



Grid Georeferencing



10756_1974F_19750211

Coordinate System Calibration

Image Coordinates x	Image Coordinates y	Grid Coordinates Northing	Grid Coordinates Easting
3.669	11.288	10906	9638

Geographic Coordinates

Latitude			Longitude		
37	28	54.3	82	03	07.7

Grid Coordinate System and Units

Mapping Projection

- Ky Single Zone
- Ky North Zone
- Ky South Zone
- UTM Zone 16
- UTM Zone 17
- WV South Zone
- Va South Zone
- Tennessee
- Beth-Elkhorn Grid
- Dotiki Grid
- Elkhorn Grid
- Fordson Grid
- Jerico Grid
- Kimball Grid
- Sly Branch Grid
- Warrior Grid
- Willmack Grid
- (•) Arbitrary Local System

Datum

- NAD27
- NAD83

Linear Units

- (•) US Feet
- Meters

Apply | Clear | Close

AutoCAD

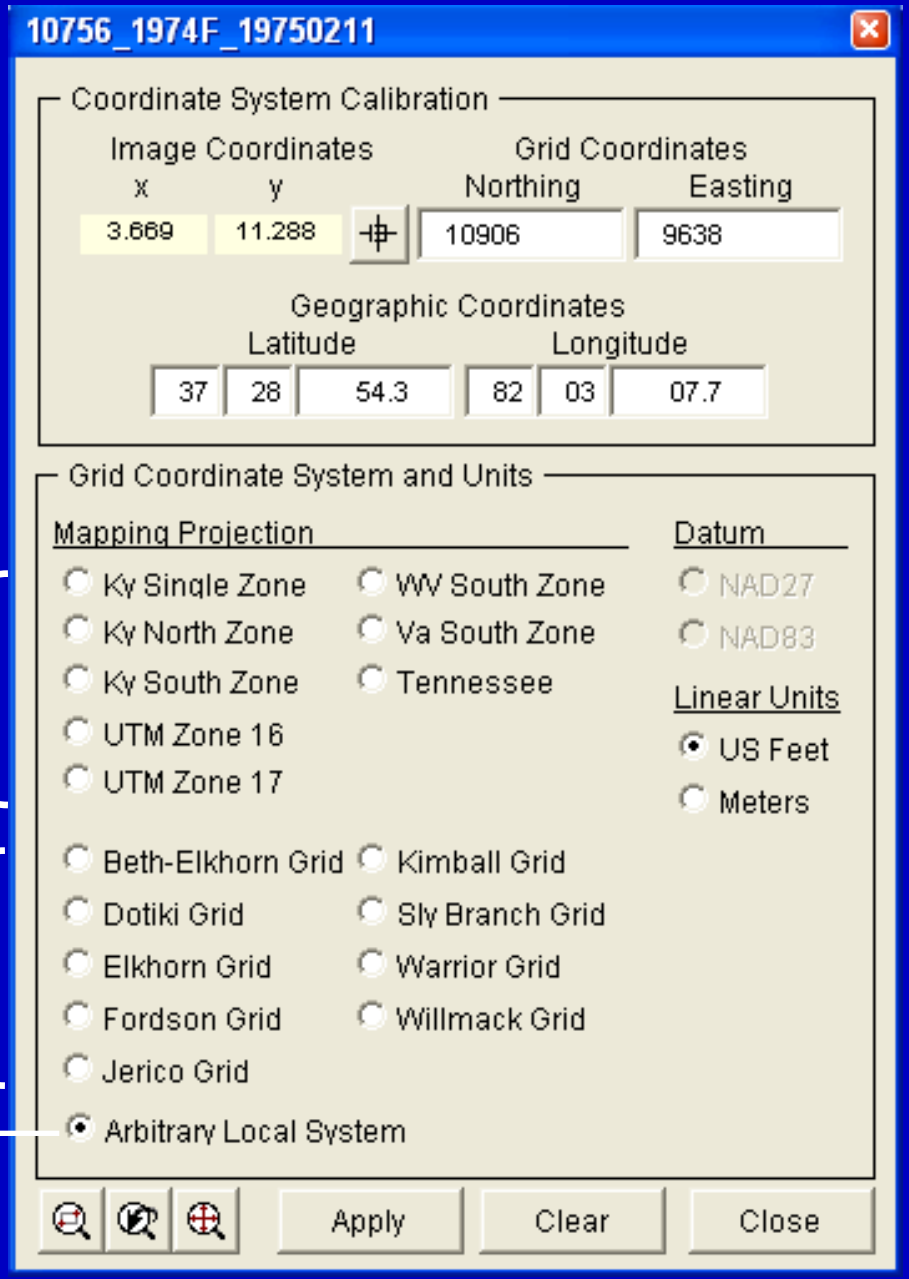
Translation applied:
Tx = 5,984,299
Ty = 3,709,340

OK

Standard Projections
(State Plane & UTM)

Known Registered
Local Grids

Arbitrary Local System



Local Grid Registration (Affine Transform Parameters)

Fordson Coal Company Coordinate System
to
Kentucky State Plane (KYSZ = NAD27 South Zone & KY1Z = NAD83 Single Zone)

Name	Fordson *v* (Northing)	Fordson *u* (Easting)	NAD27 KYSZ *y* (Northing)	NAD27 KYSZ *x* (Easting)	KYSZ Residual	NAD83 KY1Z *y* (Northing)	NAD83 KY1Z *x* (Easting)	KY1Z Residual
T/Bar No. 67	25,810.05	17,993.64	464,438.71	3,011,730.40	0.00	3,745,581.92	5,932,955.03	0.00
T/Bar No. 68	25,326.44	17,814.33	463,944.13	3,011,584.08	0.01	3,745,087.28	5,932,808.94	0.01
GW- PK 347	24,152.08	19,509.31	462,886.61	3,013,354.32	0.01	3,744,030.65	5,934,579.63	0.01
GW- PK 346	23,050.04	20,465.59	461,851.50	3,014,382.67	0.00	3,742,996.07	5,935,608.43	0.00
GW- PK 339	25,422.81	21,571.73	464,293.39	3,015,326.45	0.01	3,745,438.34	5,936,551.11	0.01
				RMSE	0.01		RMSE	0.01

NAD27 KYSZ Affine Parameters	
Tx	2995516.4079
Ux	0.99772778
Uy	-0.06736759
Ty	437475.1321
Vx	0.06736596
Vy	0.99772851

NAD83 KY1Z Affine Parameters	
Tx	5916753.1365
Ux	0.9976910831
Uy	-0.0678107478
Ty	3718611.2385
Vx	0.0678472251
Vy	0.9976681997

Fordson *(u, v)* to SPC *(x, y)* Transform Equations:

$$x = Tx + Ux\,u + Uy\,v$$

$$y = Ty + Vx\,u + Vy\,v$$

Registration World File

```
0.49979642
-0.00659989
-0.00703648
-0.49746266
5993596.88476123
3722153.31082308
```

Map Registration Metadata

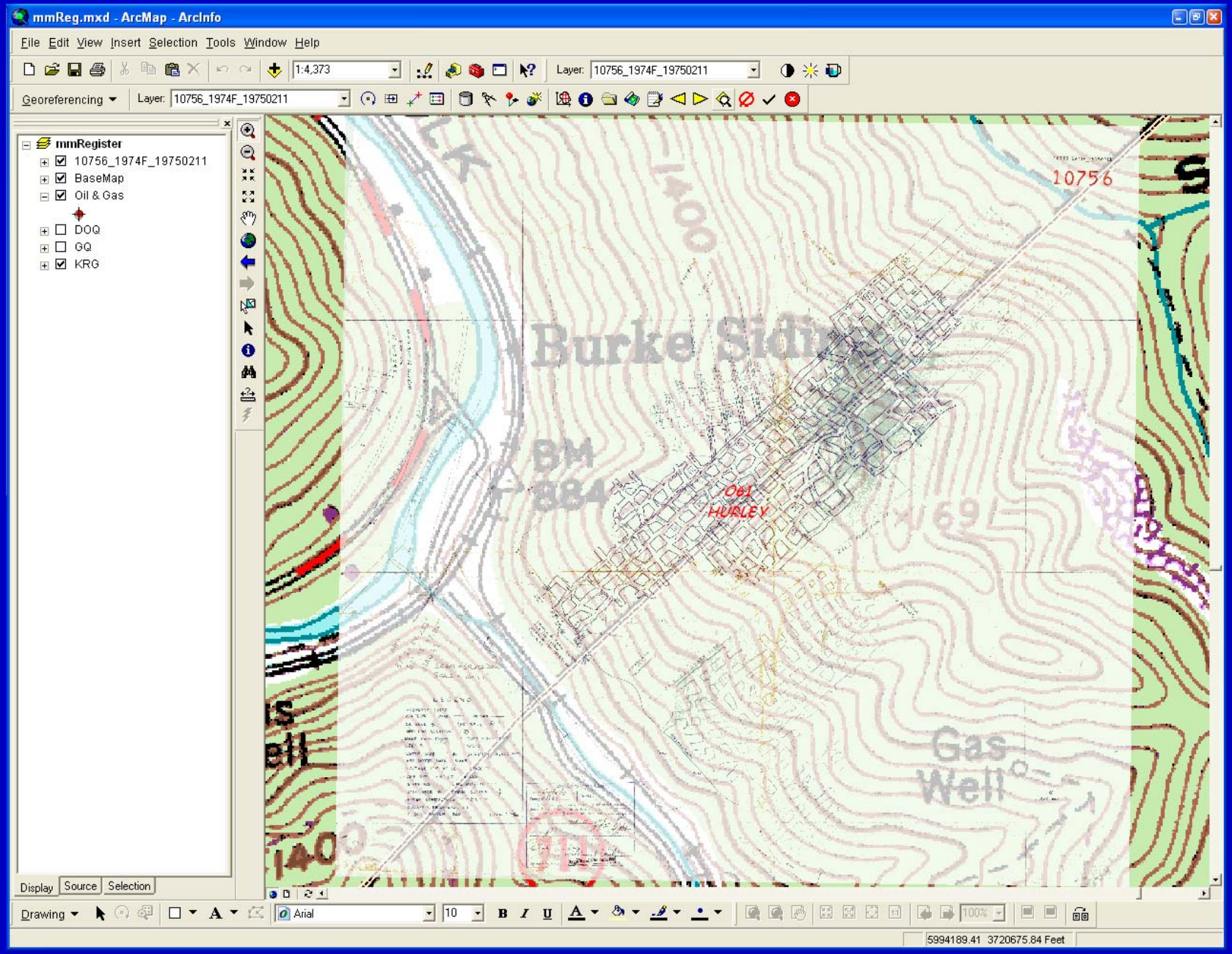
```
RegistrationDateTime=5/19/2005 4:15:21 PM
RegistrationUserName=bunch_b
RegistrationCPU=C14OSIS00020015
RegistrationType=MapCoordinateSystem
MapCoordinateSystem=LocalSystem
MapDatum=None
MapUnits=AssumedFeet
X_Translation=5,984,299
Y_Translation=3,709,340
MapDatum=NAD83
MapUnits=USFt
MapScale=100
MapGridSpacing=1000
```

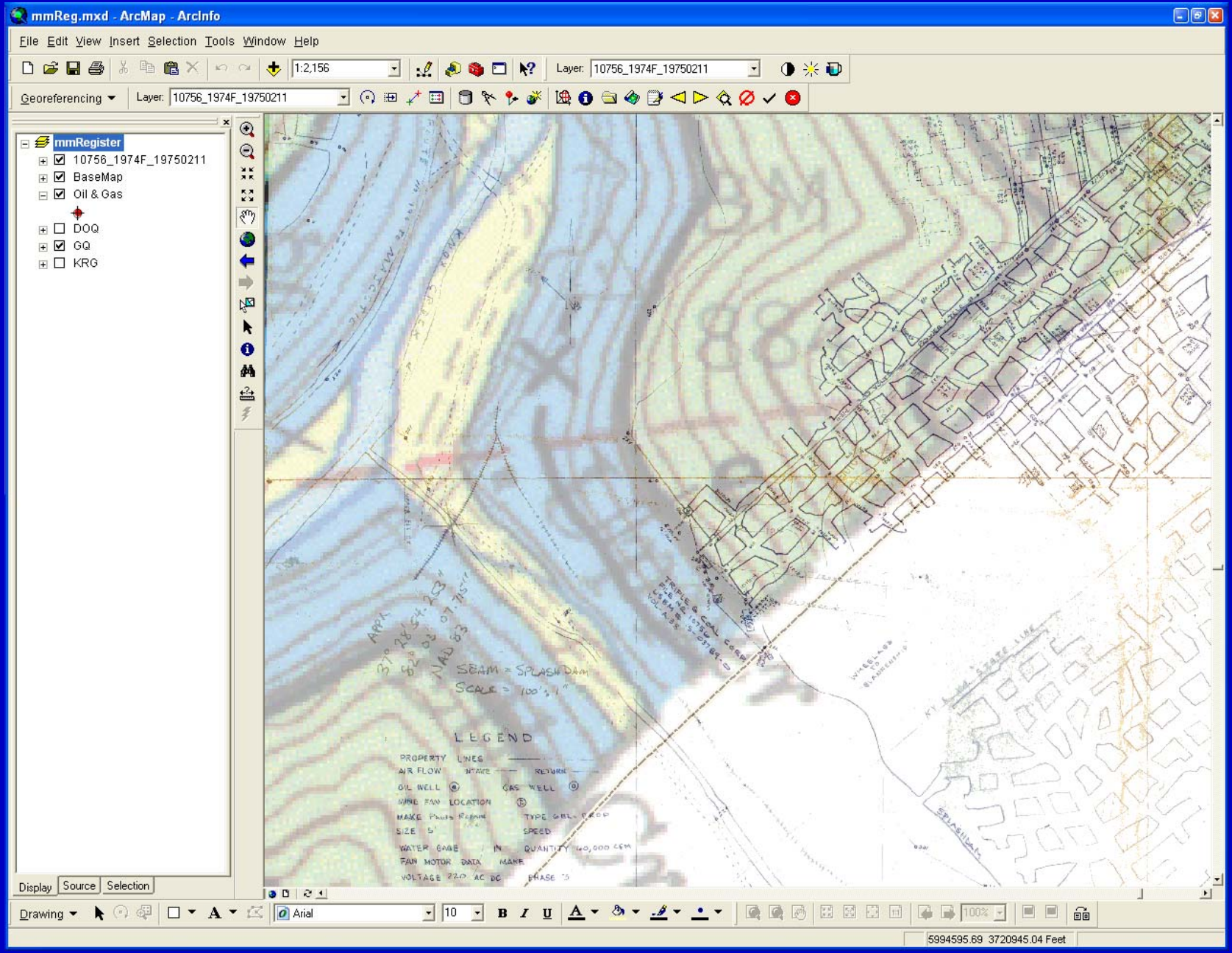
Image -> Map Coordinate System Registration Table

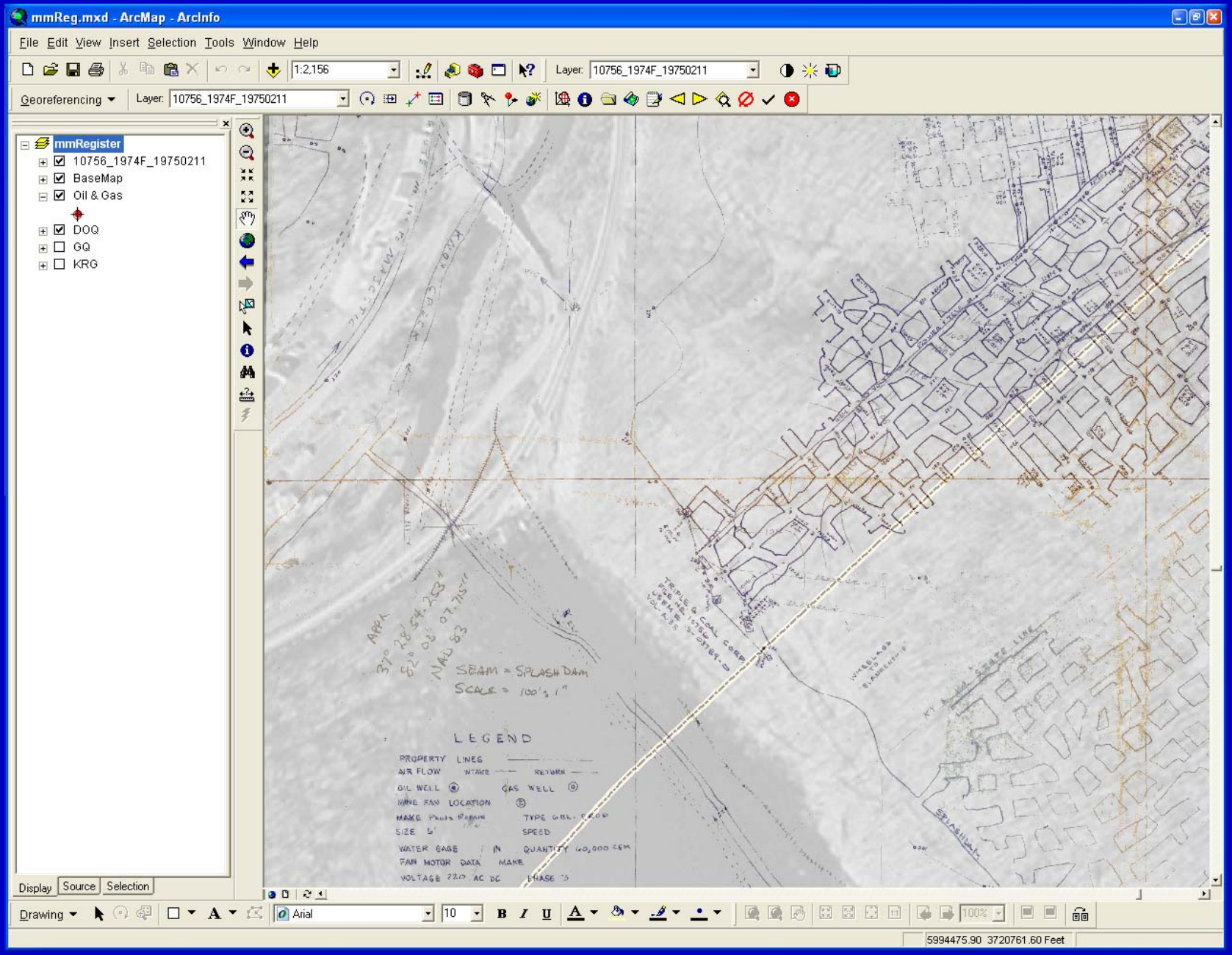
Point	Image_X pixel	Image_Y pixel	Map Northing	Map Easting	KY1Z-Ft Northing	KY1Z-Ft Easting	Residual (ft)
1	3456	3599	11000.0	11000.0	3720340.1	5995298.9	0.1
2	1483	5637	10000.0	10000.0	3719340.1	5994298.9	0.7
3	1454	3627	11000.0	10000.0	3720340.1	5994298.9	1.1
4	3485	5606	10000.0	11000.0	3719340.1	5995298.9	1.3
5	1428	1615	12000.0	10000.0	3721340.1	5994298.9	0.6
6	5426	1561	12000.0	12000.0	3721340.1	5996298.9	1.2
7	5485	5580	10000.0	12000.0	3719340.1	5996298.9	1.1
8	3429	1588	12000.0	11000.0	3721340.1	5995298.9	1.0
9	5457	3578	11000.0	12000.0	3720340.1	5996298.9	2.7
						RMSE	1.3

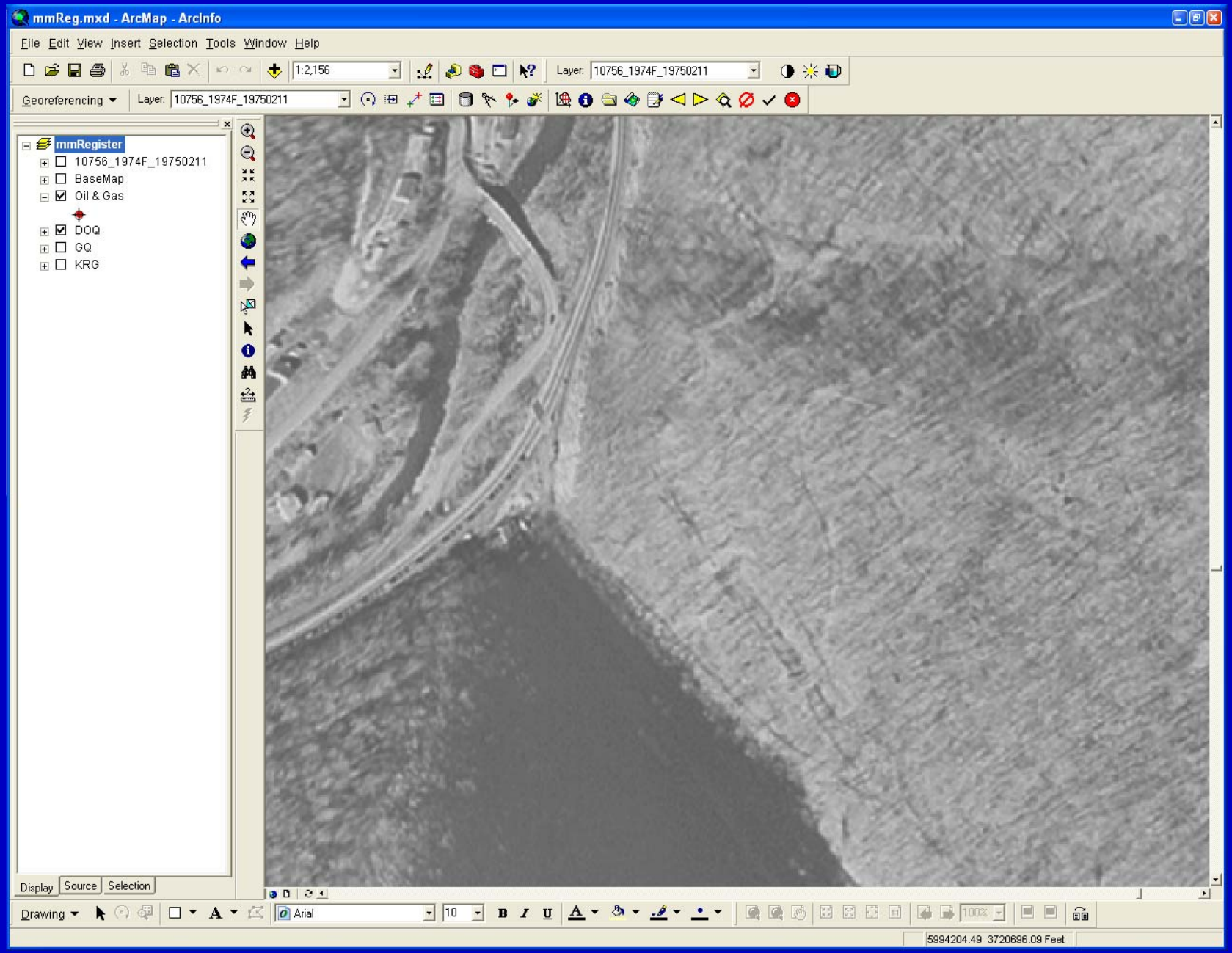
```
Registered Image (u,v) -> KY1Z (x,y) affine transform:
  x = Ux * u + Uy * v + Tx
  y = Vx * u + Vy * v + Ty
  Ux =         0.49979642
  Vx =        -0.00659989
  Uy =        -0.00703648
  Vy =        -0.49746266
  Tx =  5993596.88476123
  Ty =  3722153.31082308
```

Check Registration / Map Georeferencing (ArcMap)

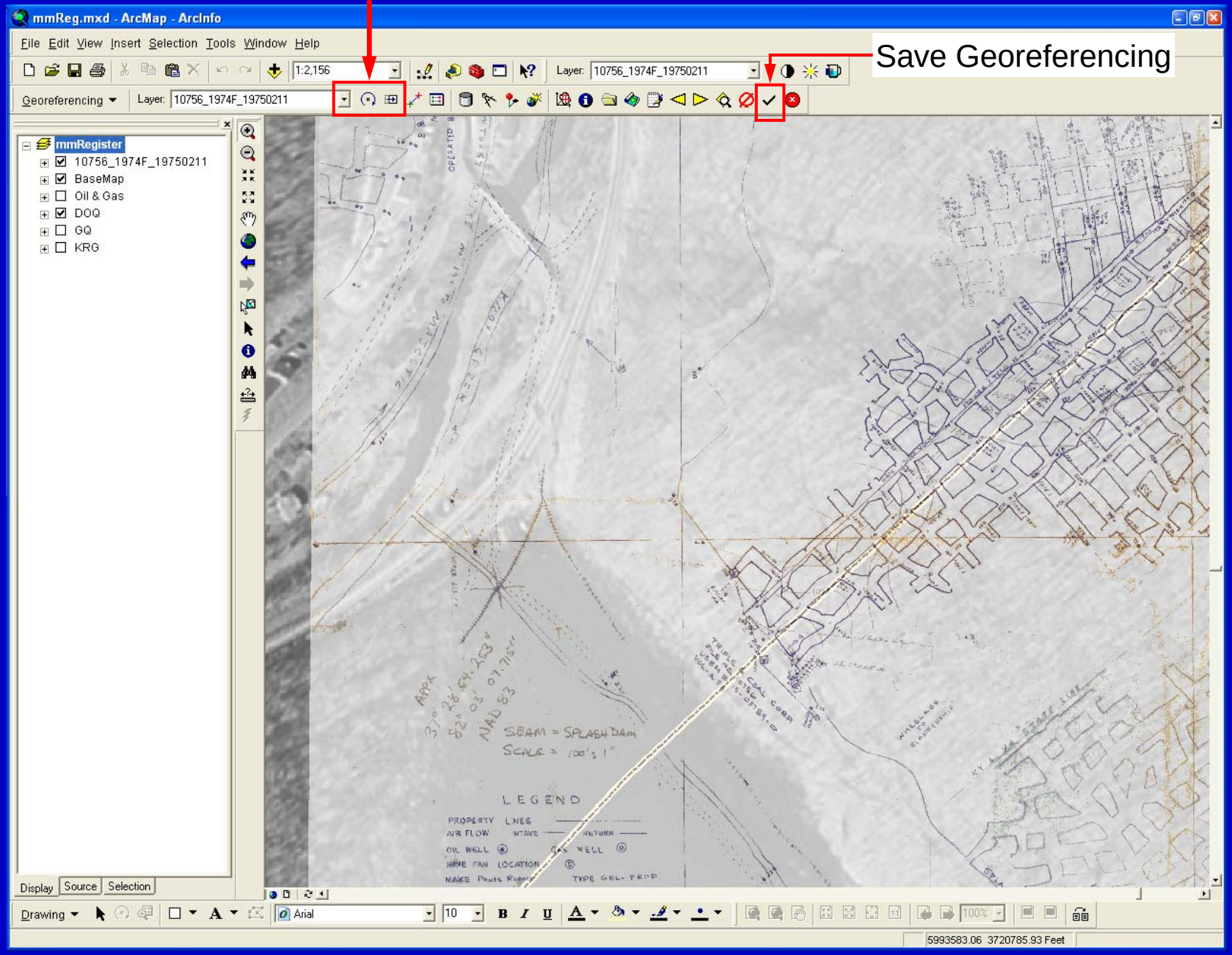



mmReg.mxd - ArcMap - ArcInfo
File Edit View Insert Selection Tools Window Help
1:2,156
Layer: 10756_1974F_19750211
Georeferencing
Layer: 10756_1974F_19750211
mmRegister
10756_1974F_19750211
BaseMap
Oil & Gas
DOQ
GQ
KRG
Display
Source
Selection
SEAM = SPLASH DAM
SCALE = 100'
LEGEND
PROPERTY LINES
AIR FLOW INTAKE RETURN
OIL WELL
GAS WELL
MINE FAN LOCATION
SIZE 5'
SPEED
WATER GAGE IN
FAN MOTOR DATA MAKE
VOLTAGE 220 AC DC PHASE 3
Drawing
Arial
10
100%
5994595.69 3720945.04 Feet


mmReg.mxd - ArcMap - ArcInfo
File Edit View Insert Selection Tools Window Help
1:2,156
Layer: 10756_1974F_19750211
Georeferencing
Layer: 10756_1974F_19750211
mmRegister
10756_1974F_19750211
BaseMap
Oil & Gas
DOQ
GQ
KRG
Display
Source
Selection
SEAM = SPLASH DAM
SCALE = 100's 1"
LEGEND
PROPERTY LINES
AIR FLOW INTAKE RETURN
OIL WELL
GAS WELL
MINE FAN LOCATION
SIZE 5'
SPEED
WATER GAGE IN
FAN MOTOR DATA MAKE
VOLTAGE 220 AC DC
PHASE 3
Drawing
Arial
10
100%
5994475.90 3720761.60 Feet


mmReg.mxd - ArcMap - ArcInfo
File Edit View Insert Selection Tools Window Help
1:2,156
Layer: 10756_1974F_19750211
Georeferencing
Layer: 10756_1974F_19750211
mmRegister
10756_1974F_19750211
BaseMap
Oil & Gas
DOQ
GQ
KRG
Display
Source
Selection
Drawing
Arial
10
5994204.49 3720696.09 Feet

ArcMap Shift and Rotate Tools (Georeferencing)



Registration
World File

```
0.49979642
-0.00659989
-0.00703648
-0.49746266
5993596.88476123
3722153.31082308
```

Registration Check
(Georeferencing)
World File

```
0.49982502
-0.00386936
-0.00431869
-0.49749368
5993677.40256694
3722030.85151143
```

Note:
The georeferencing world file will be the basis for final image rectification.

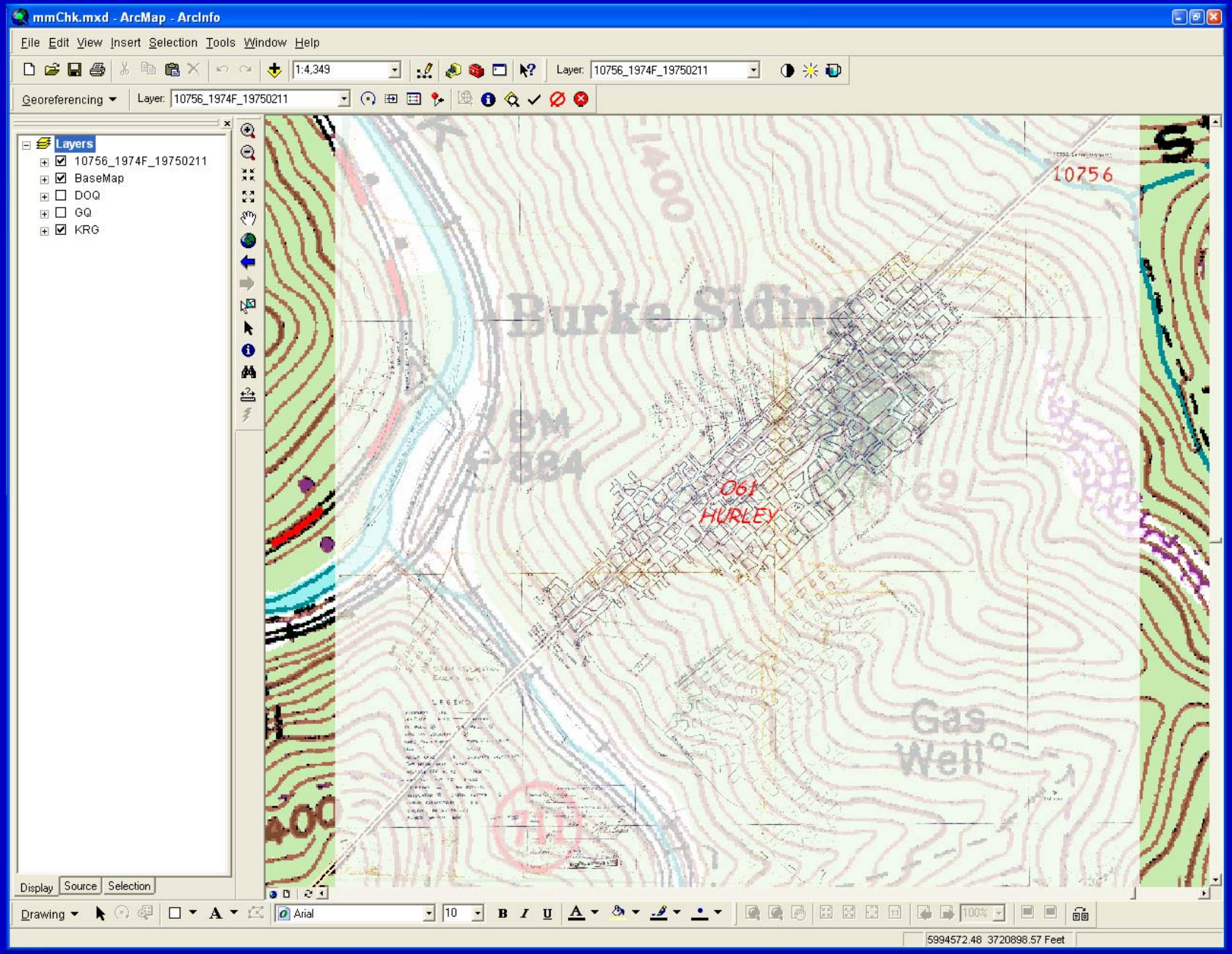
Registration Check (Georeferencing) Metadata

This section generated during grid registration (see above).

This section generated during registration check (final georeferencing).

```
...
   9     5457     3578     11000.0    12000.0  3720340.1  5996298.9      2.7
================================================================================
                                                                  RMSE      1.3
--------------------------------------------------------------------------------
Registered Image (u,v) -> KY1Z (x,y) affine transform:
  x = Ux * u + Uy * v + Tx
  y = Vx * u + Vy * v + Ty
  Ux =         0.49979642
  Vx =        -0.00659989
  Uy =        -0.00703648
  Vy =        -0.49746266
  Tx =  5993596.88476123
  Ty =  3722153.31082308
--------------------------------------------------------------------------------
RegistrationKRGAdjustment=True
RegistrationKRGAdjustmentType=NoLinkTableMapGridOrScaleHeldRigid
--------------------------------------------------------------------------------
KRG feature based Image (u,v) -> KY1Z (x,y) affine transform:
  Ux =         0.49982502
  Vx =        -0.00386936
  Uy =        -0.00431869
  Vy =        -0.49749368
  Tx =  5993677.40256694
  Ty =  3722030.85151143
--------------------------------------------------------------------------------
RegistrationCheckUserName=bunch_b
RegistrationCheckCPU=C14OSIS00020015
RegistrationCheckDateTime=5/20/2005 9:19:40 AM
```

Post-Rectification Check



Registration Check (Georeferencing) World File

```
0.49982502
-0.00386936
-0.00431869
-0.49749368
5993677.40256694
3722030.85151143
```

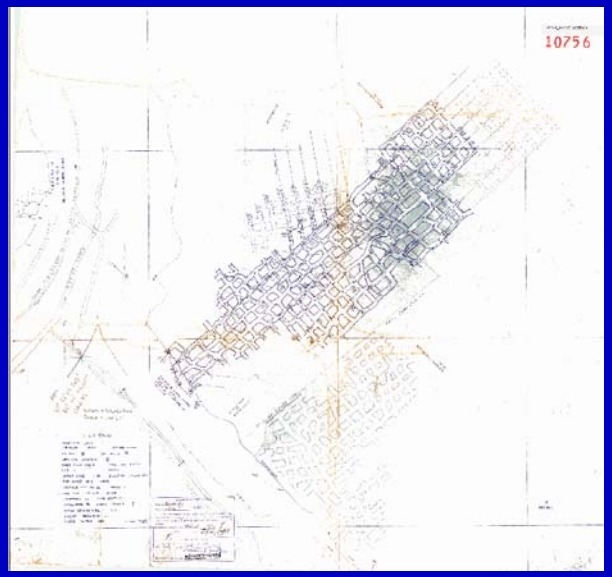
Rectified World File

```
0.50000
0.00000
0.00000
-0.50000
5993651.00000
3722031.00000
```

Post-Rectification Metadata

```
--------------------------------------------------------------------------------
Georectified Image (u,v) -> KY1Z (x,y) world file affine transform.
  Ux =           0.50000
  Vx =           0.00000
  Uy =           0.00000
  Vy =          -0.50000
  Tx =     5993651.00000
  Ty =     3722031.00000
--------------------------------------------------------------------------------
RectifiedCellsize=0.50
RectifiedDateTime=5/20/2005 12:49:40 PM
RectifiedCPU=C14OSIS00020015
RectifiedImageFileFormat=GeoTiff/ESRI
RectifiedImageByteOrder=IBM
RectifiedImageCompressionScheme=PackBits
RectifiedImageColorMode=Indexed(8-bit)
RectifiedImageXResolution=200
RectifiedImageYResolution=200
RectifiedImageWidth=31.830
RectifiedImageHeight=30.500
RectifiedImageUnits=Inch
RectifiedCoordinateSystem=KentuckySingleZone
RectifiedCoordinateSystemFIPS=1600
RectifiedDatum=NAD83
RectifiedUnits=USFt
RectifiedUnitsToMeters=1200/3937
--------------------------------------------------------------------------------
RectifiedMapEnvelopeKentuckySingleZone:
  LowerLeftCoordinates:  x=5993651.00  y=3718981.00
  UpperLeftCoordinates:  x=5993651.00  y=3722031.00
  UpperRightCoordinates: x=5996834.00  y=3722031.00
  LowerRightCoordinates: x=5996834.00  y=3718981.00
RectifiedMapEnvelopeNAD83Geographic:
  LowerLeftCoordinates:  ddLat=37.478309N  ddLong=82.053296W
  UpperLeftCoordinates:  ddLat=37.486679N  ddLong=82.052880W
  UpperRightCoordinates: ddLat=37.486333N  ddLong=82.041918W
  LowerRightCoordinates: ddLat=37.477962N  ddLong=82.042335W
--------------------------------------------------------------------------------
```

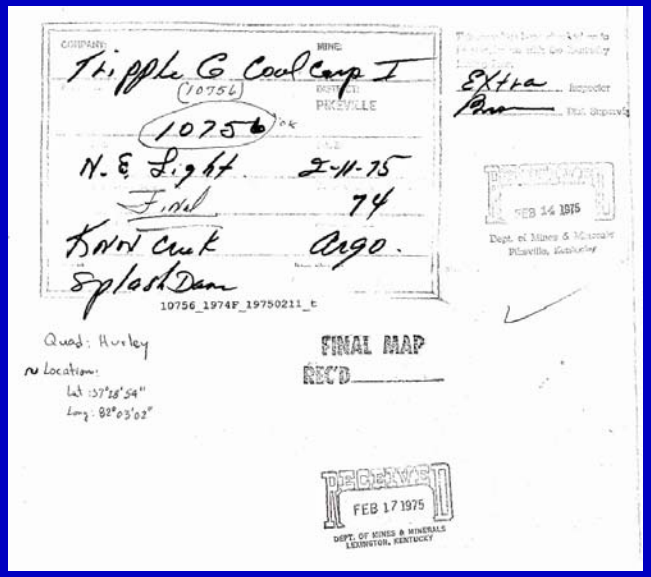
Zipped Package for Web Deployment



Rectified GeoTiff (TIF)

```
0.50000
0.00000
0.00000
-0.50000
5993651.00000
3722031.00000
```

World File (TFW)



Transmittal Information (JPG)

```
MapName=10756_1974F_19750211
SourceScannerName=Minescan1
SourceImageFileFormat=JPEG
SourceImageDateTime=11/10/2004 1:42:17 AM
Stage1CleanupUser=schubert
Stage1CleanupCPU=MINEMAPPER1
Stage1CleanupDateTime=11/10/2004 09:49:39
Stage2CleanupUser=bemis
Stage2CleanupCPU=MINEMAPPER2
Stage2CleanupDateTime=3/28/2005 2:21:41 PM
MapScanResolutionDPI=200
MapScanWidthInches=31.580
MapScanHeightInches=30.410
OriginalColorMode=RGB
ColormapCPU=C140SISO0020015
ColormapDateTime=3/29/2005 1:02:42 AM
RegistrationDateTime=5/19/2005 4:15:21 PM
RegistrationUserName=bunch_b
RegistrationCPU=C140SISO0020015
RegistrationType=MapCoordinateSystem
MapCoordinateSystem=LocalSystem
MapDatum=None
MapUnits=AssumedFeet
X_Translation=5,984,299
Y_Translation=3,709,340
MapDatum=NAD83
MapUnits=USFt
MapScale=100
MapGridSpacing=1000
```

Metadata File (TXT)