Coal Mining Spatial Infrastructure Prototyping Report

Prototype Goals:

- **Download spatial coal mining data from multiple geodata servers located both inside and outside of OSM WAN**
- **Re-Project the downloaded data into a Lat/Long System**
- **Remap downloaded data attributes to match the national schema for coal mine permit boundaries**
- **Merge all downloaded data into a single dataset**

The Technology

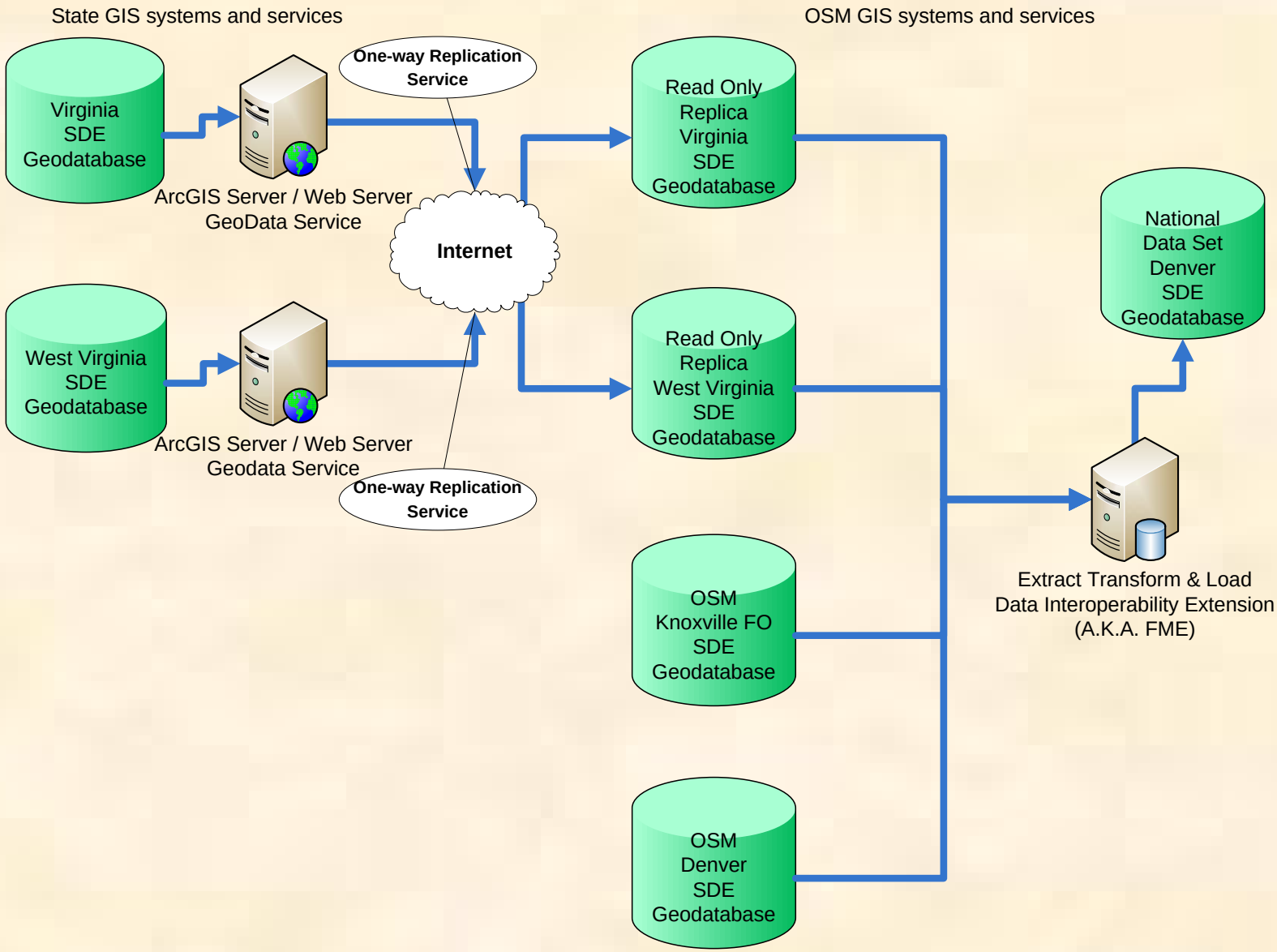
ArcGIS Server 9.2 - Geodata services allow users to publish geographic data for extraction, and replication.

ArcSDE technology is an integrated part of ArcGIS Server and is used to access multiuser geographic databases stored in relational database management systems (RDBMS).

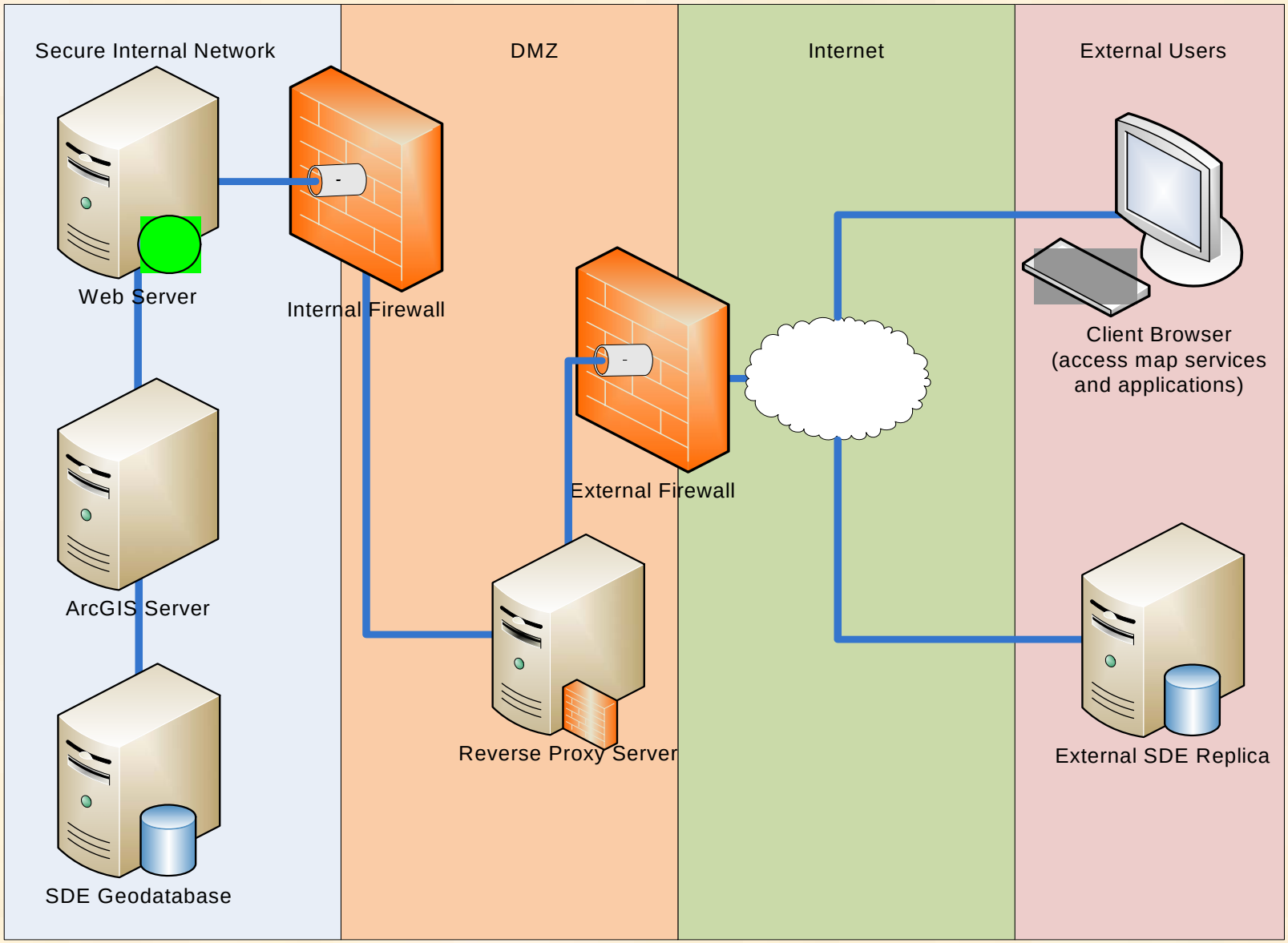
ArcGIS Desktop (ArcInfo 9.2) - gives you the power to manage and integrate your data, perform advanced analysis, model and automate operational processes, and display your results on professional-quality maps

The ArcGIS Data Interoperability is an ArcGIS extension that eliminates barriers to data sharing by providing state-of-the-art direct data access, complex data transformation, and import/export capabilities. This extension uses Safe Software's FME technology. The Feature Manipulation Engine (FME) Suite is an ETL (Extract, Transform, Load) tool for spatial data.

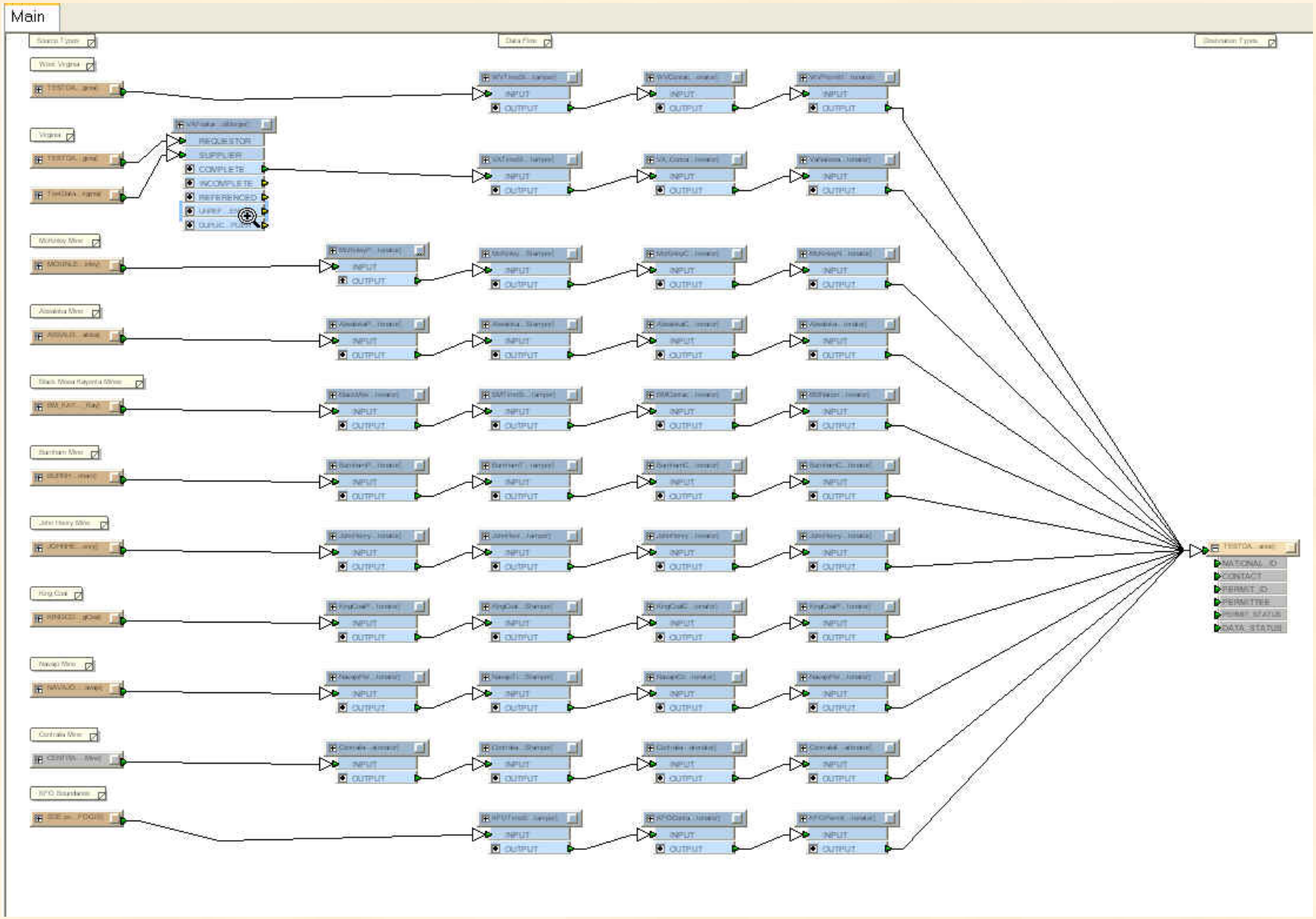
Prototype Configuration



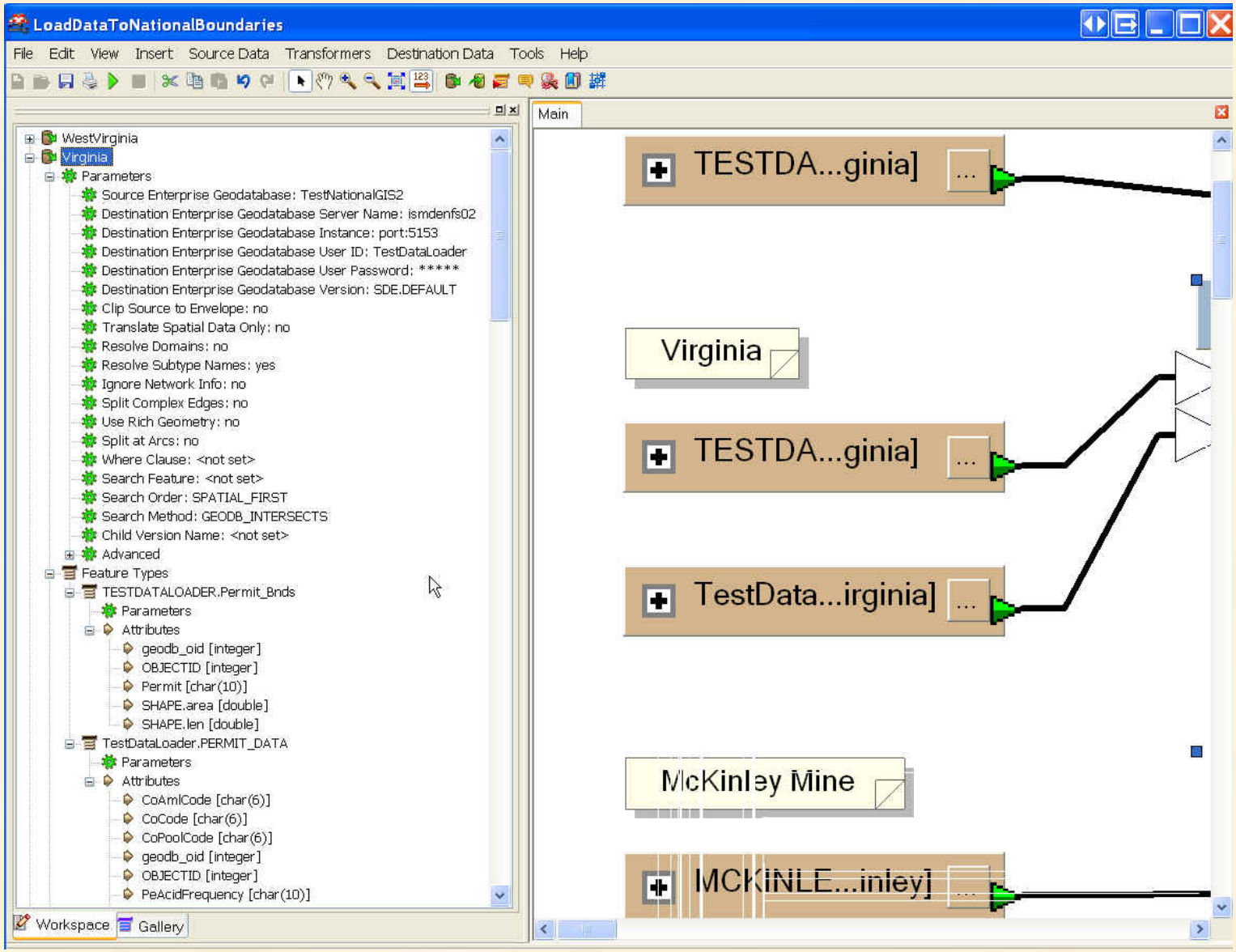
ArcGIS Server Security Considerations



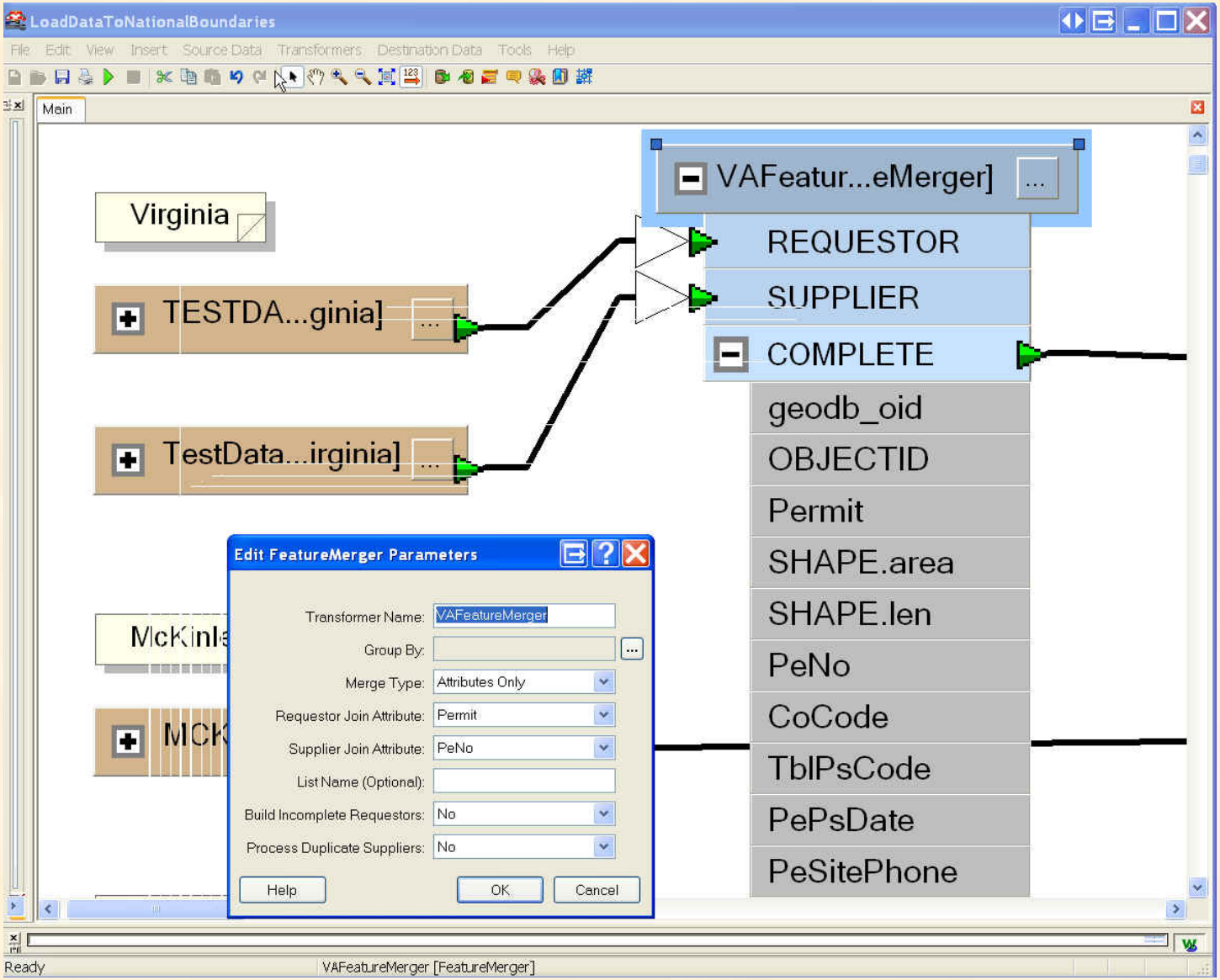
The ETL Tool Designed for Prototype



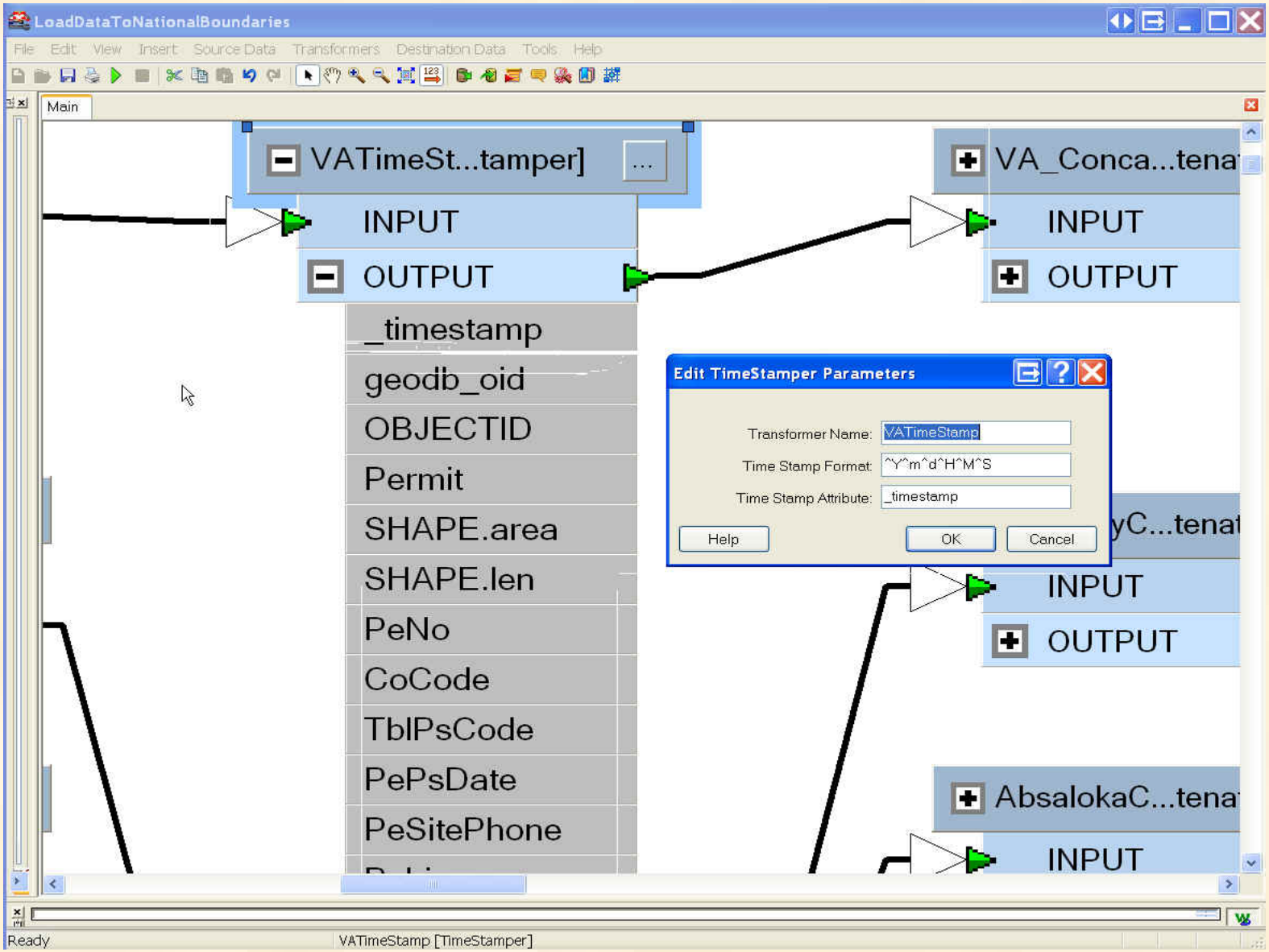
Connection to VA Replicated SDE Database



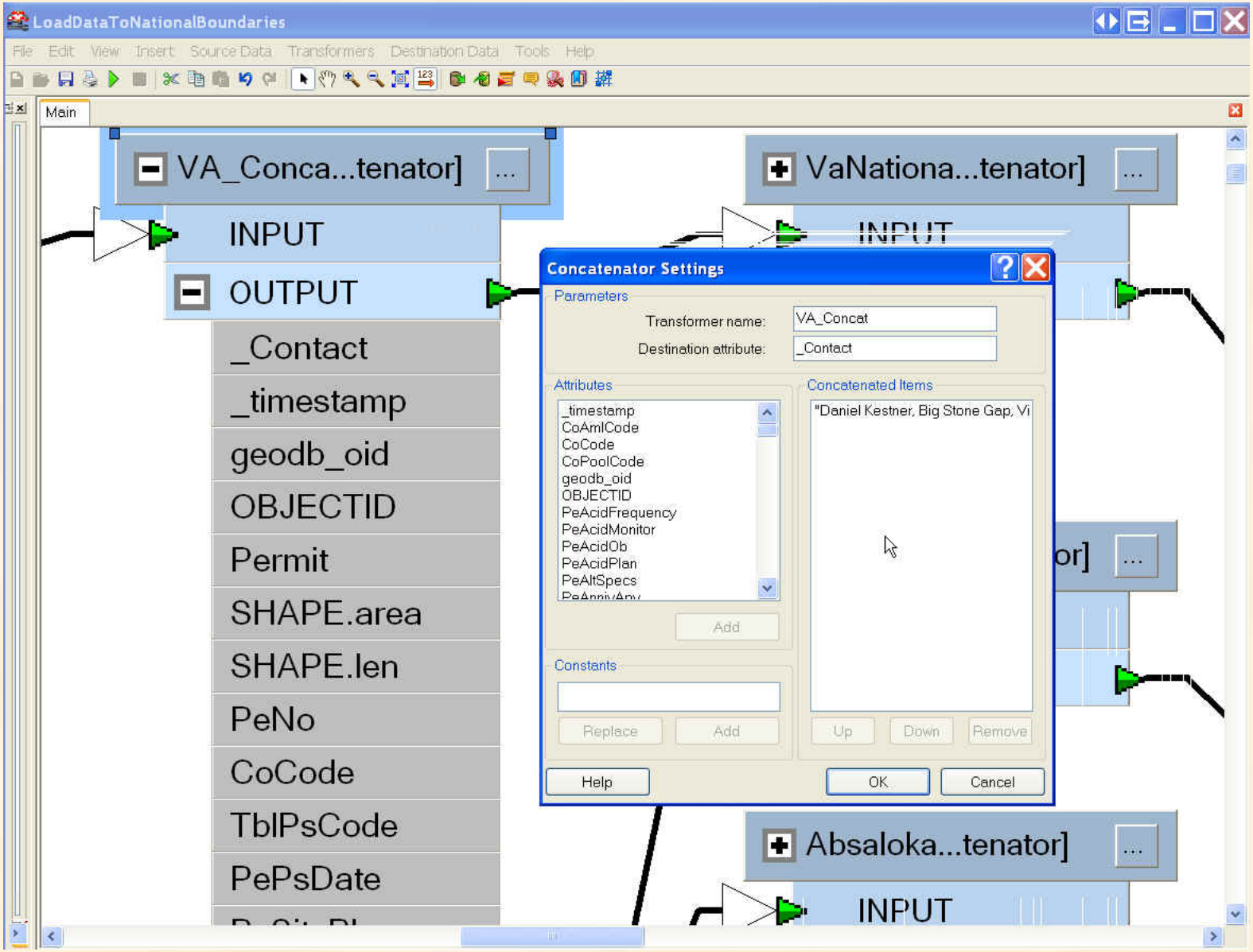
Merging VA's Permit Polygon Data with Related Attribute Database



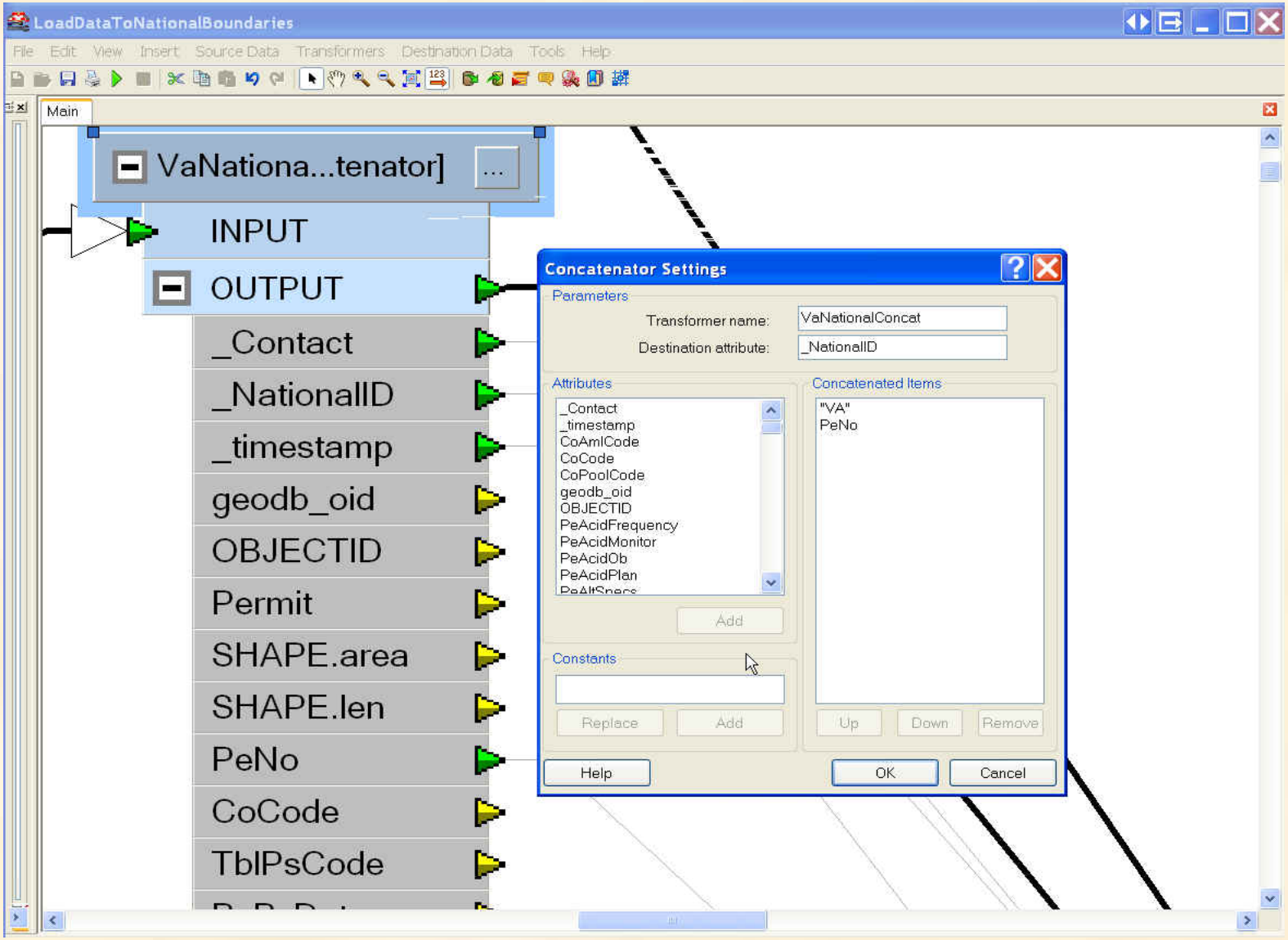
Generating Time Stamp



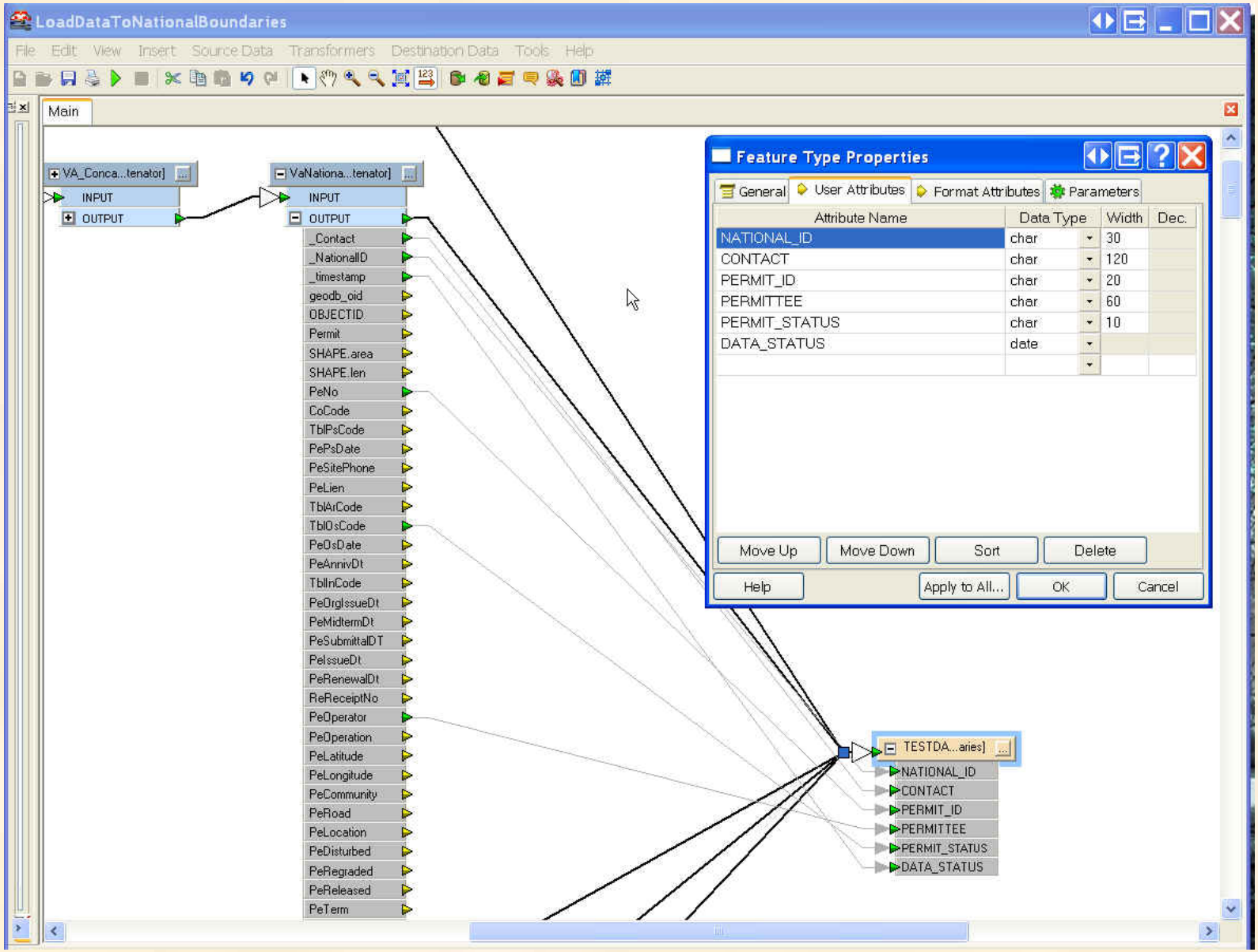
Generating “Contact” Information



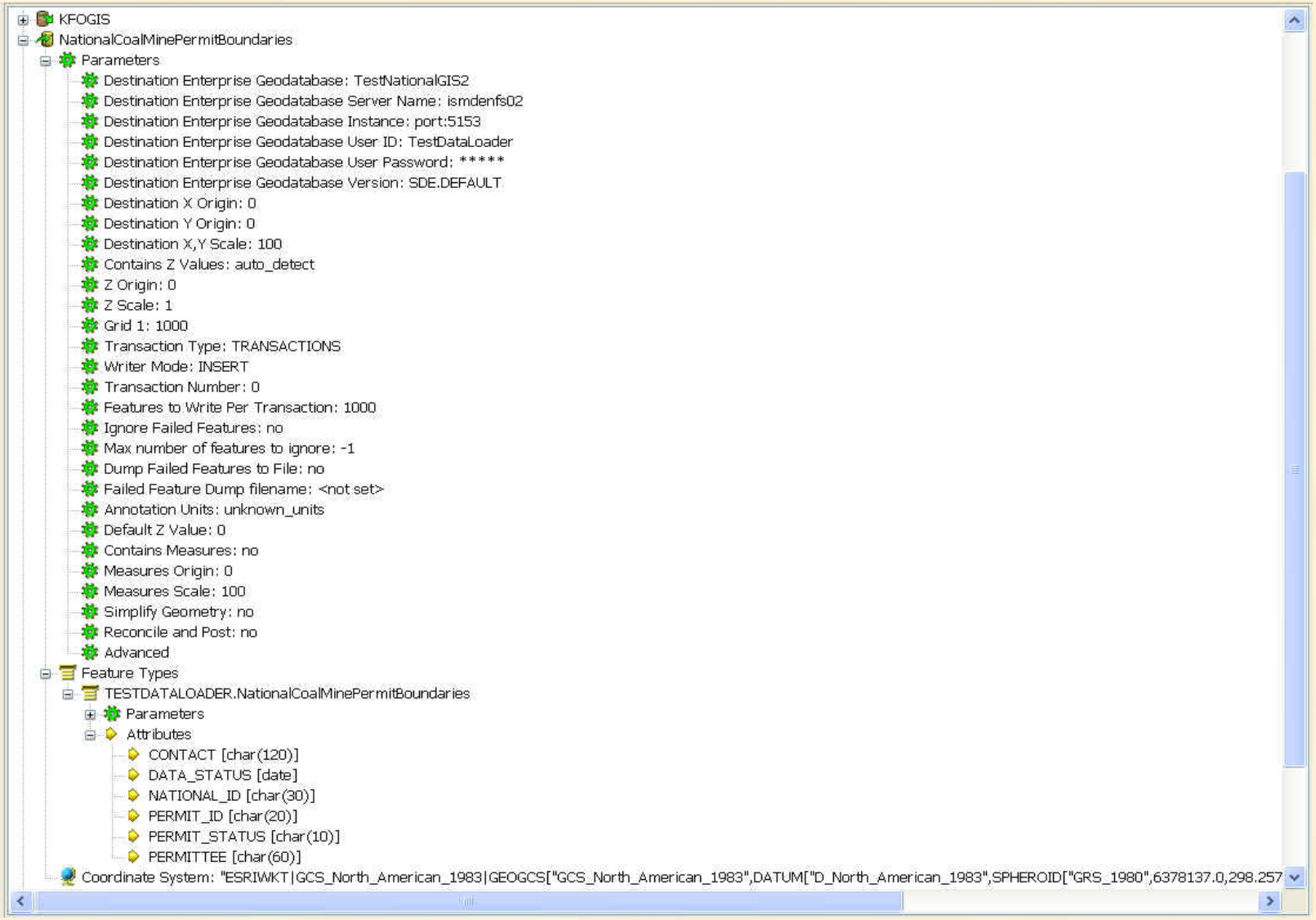
Generating Unique National ID Attribute



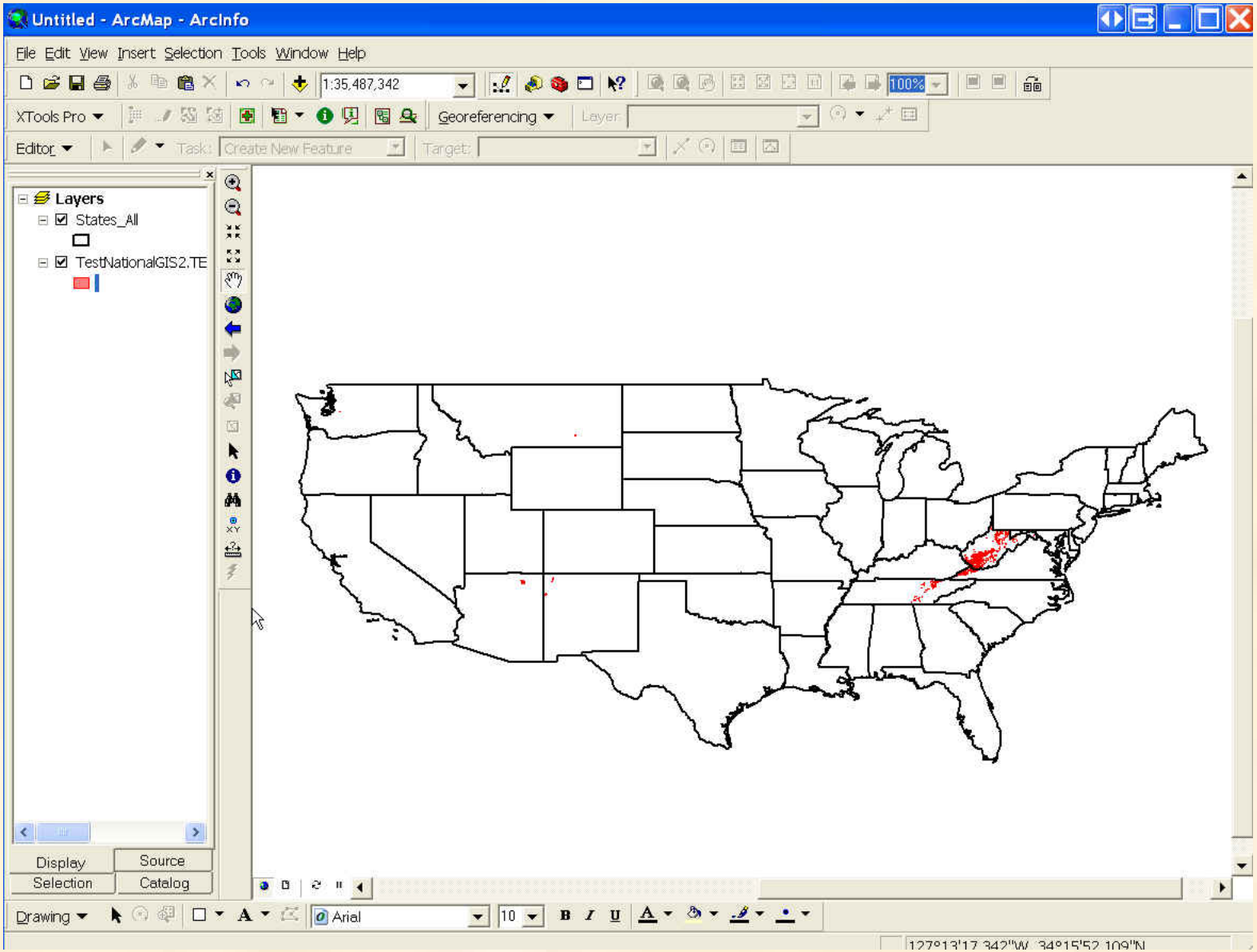
Merging VA's Data into National Data Set



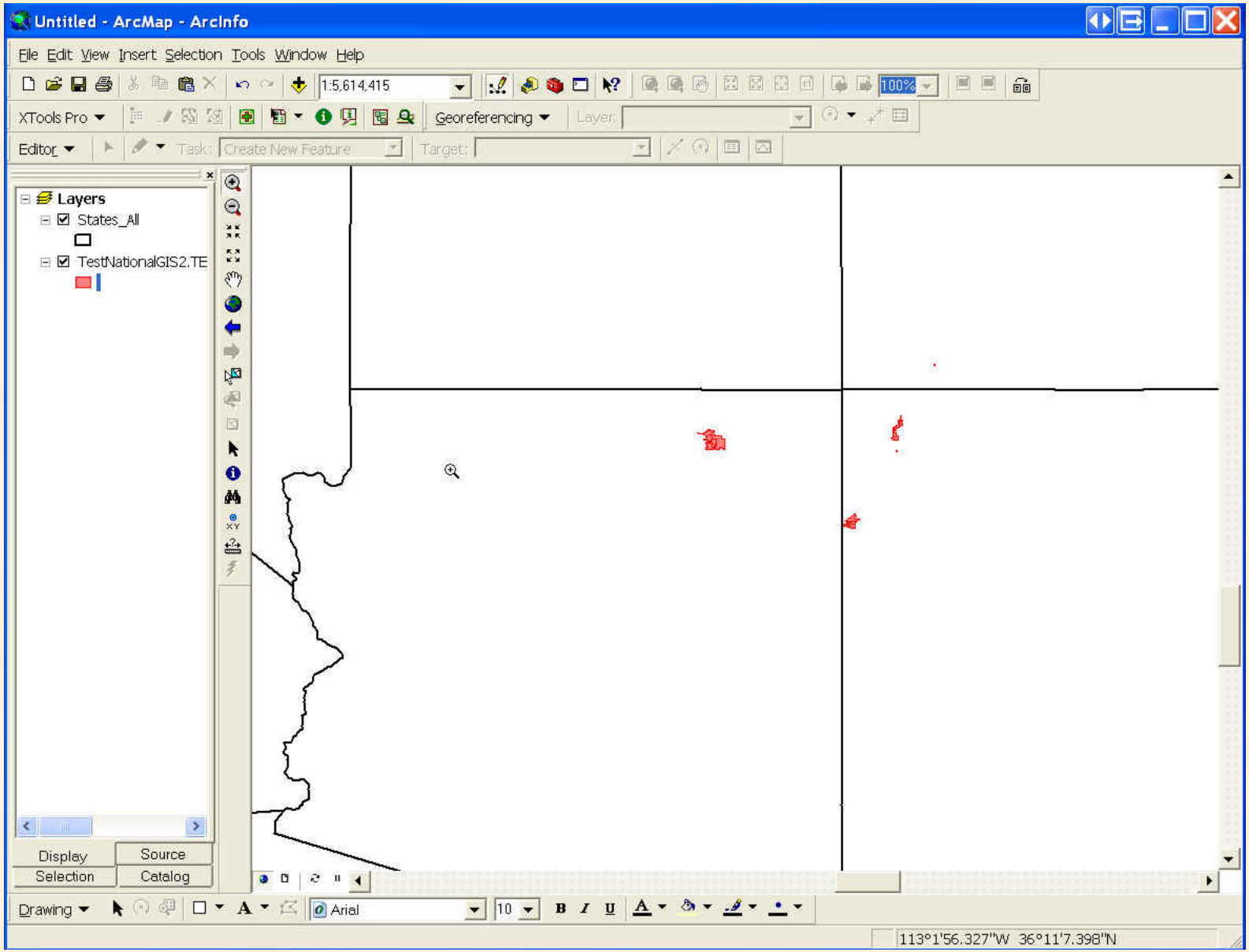
Setting the National Data Set's Attributes and Coordinate System



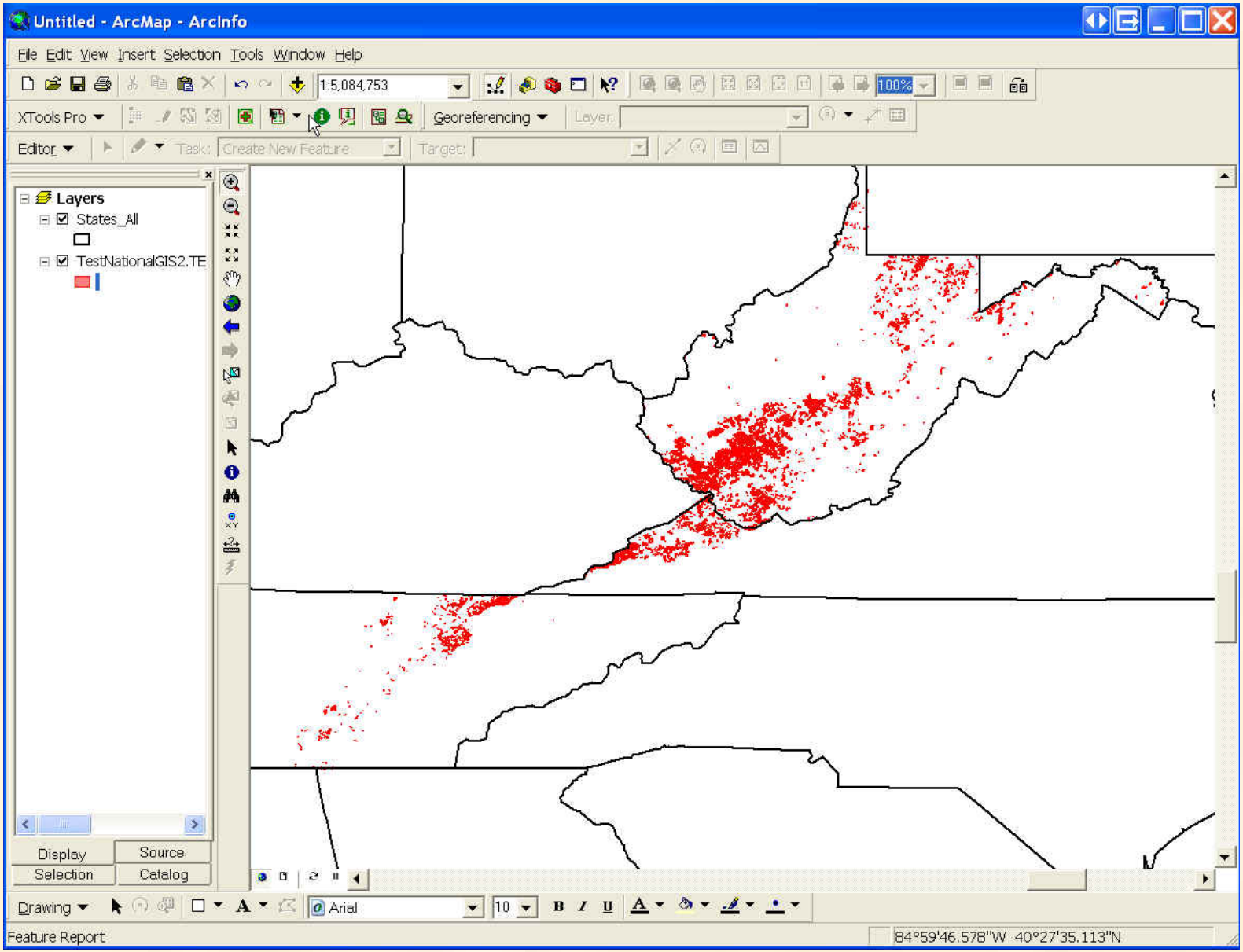
National Data Set Results – National View



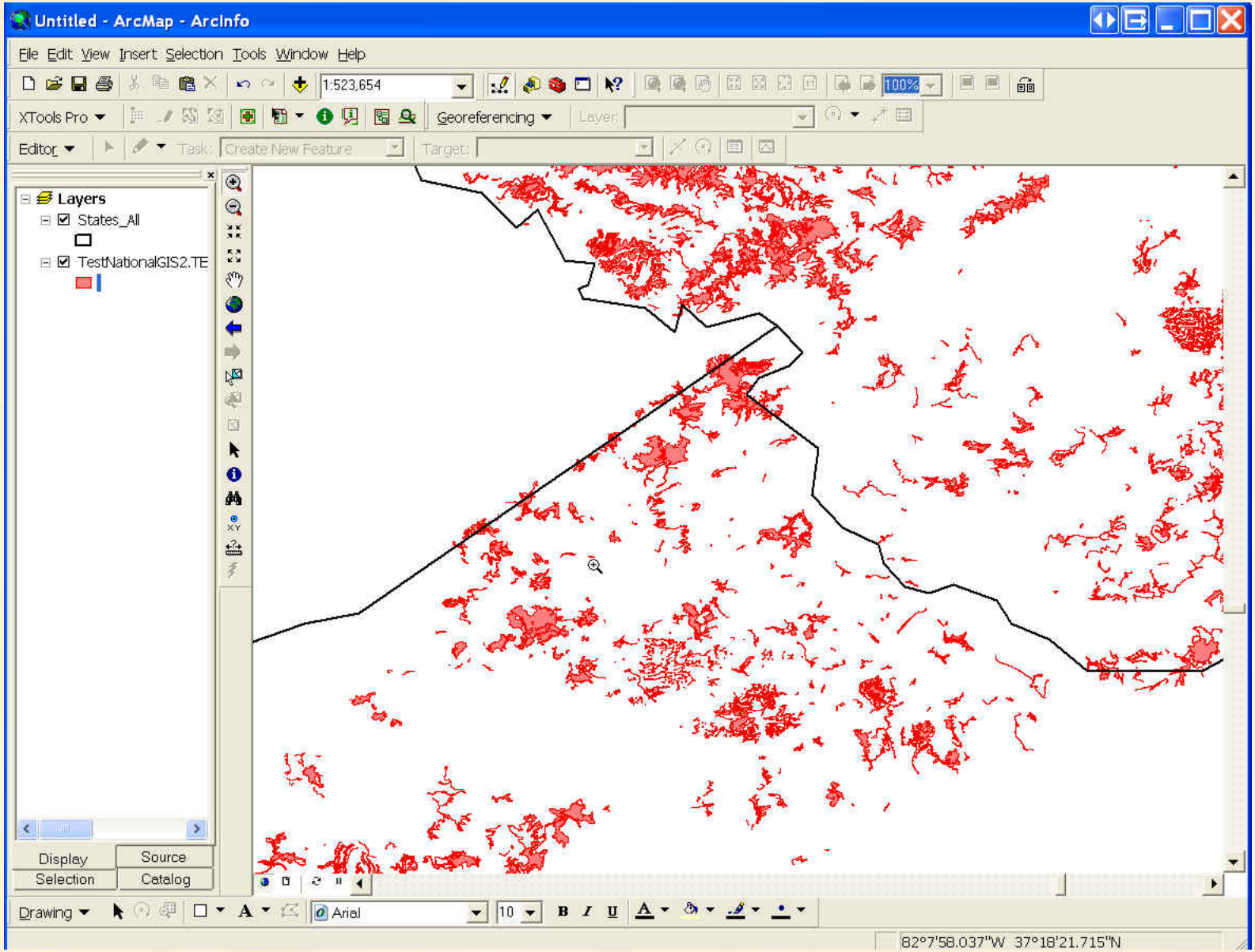
National Data Set Results – Western View



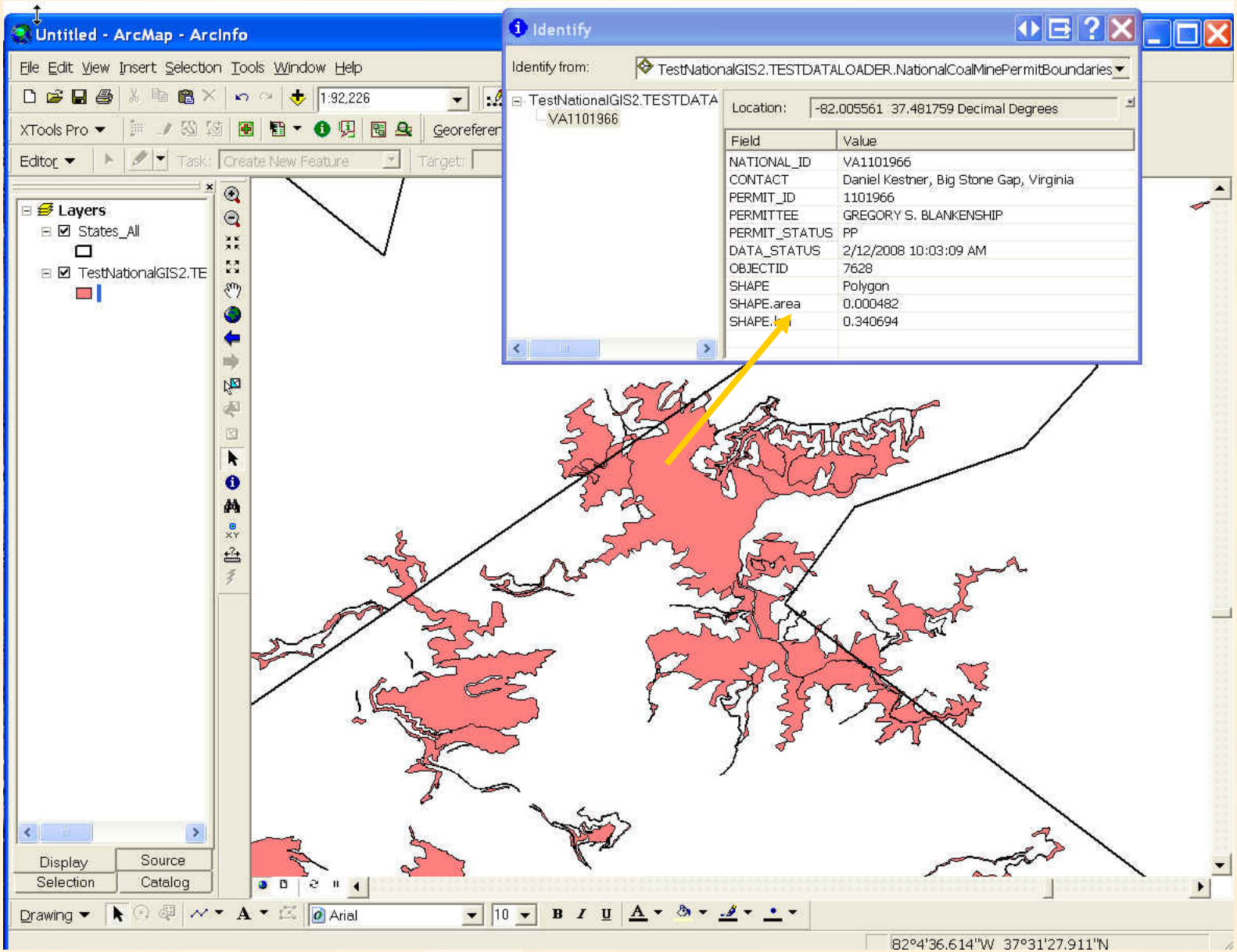
National Data Set Results – Eastern View – TN, VA & WA



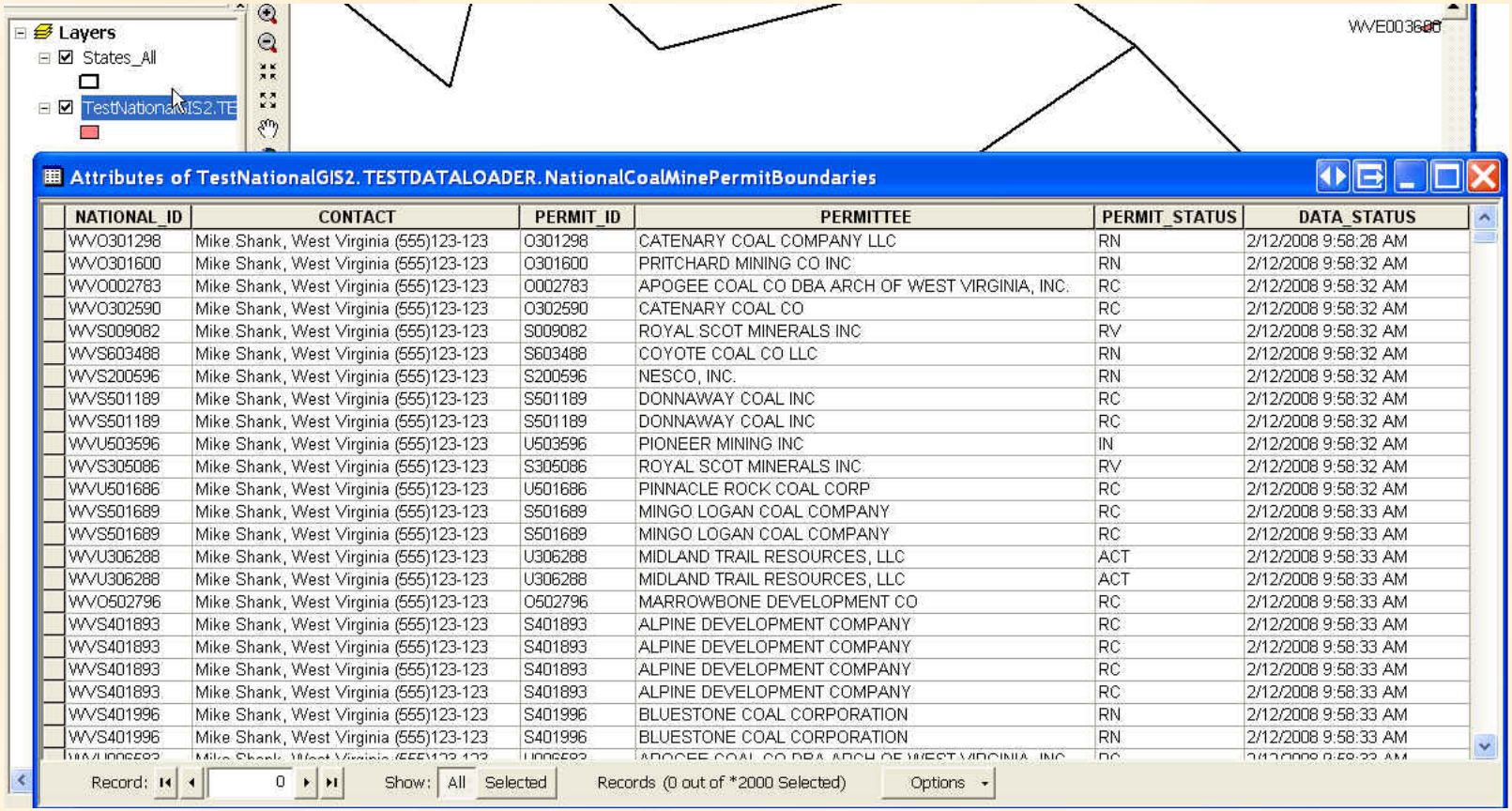
National Data Set – Zoom in View of VA & WV Border



Permit Attributes



National Permit File Attribute Data



NATIONAL_ID	CONTACT	PERMIT_ID	PERMITTEE	PERMIT_STATUS	DATA_STATUS
WVO301298	Mike Shank, West Virginia (555)123-123	O301298	CATENARY COAL COMPANY LLC	RN	2/12/2008 9:58:28 AM
WVO301600	Mike Shank, West Virginia (555)123-123	O301600	PRITCHARD MINING CO INC	RN	2/12/2008 9:58:32 AM
WVO002783	Mike Shank, West Virginia (555)123-123	O002783	APOGEE COAL CO DBA ARCH OF WEST VIRGINIA, INC.	RC	2/12/2008 9:58:32 AM
WVO302590	Mike Shank, West Virginia (555)123-123	O302590	CATENARY COAL CO	RC	2/12/2008 9:58:32 AM
WVS009082	Mike Shank, West Virginia (555)123-123	S009082	ROYAL SCOT MINERALS INC	RV	2/12/2008 9:58:32 AM
WVS603488	Mike Shank, West Virginia (555)123-123	S603488	COYOTE COAL CO LLC	RN	2/12/2008 9:58:32 AM
WVS200596	Mike Shank, West Virginia (555)123-123	S200596	NESCO, INC.	RN	2/12/2008 9:58:32 AM
WVS501189	Mike Shank, West Virginia (555)123-123	S501189	DONNAWAY COAL INC	RC	2/12/2008 9:58:32 AM
WVS501189	Mike Shank, West Virginia (555)123-123	S501189	DONNAWAY COAL INC	RC	2/12/2008 9:58:32 AM
WVU503596	Mike Shank, West Virginia (555)123-123	U503596	PIONEER MINING INC	IN	2/12/2008 9:58:32 AM
WVS305086	Mike Shank, West Virginia (555)123-123	S305086	ROYAL SCOT MINERALS INC	RV	2/12/2008 9:58:32 AM
WVU501686	Mike Shank, West Virginia (555)123-123	U501686	PINNACLE ROCK COAL CORP	RC	2/12/2008 9:58:32 AM
WVS501689	Mike Shank, West Virginia (555)123-123	S501689	MINGO LOGAN COAL COMPANY	RC	2/12/2008 9:58:33 AM
WVS501689	Mike Shank, West Virginia (555)123-123	S501689	MINGO LOGAN COAL COMPANY	RC	2/12/2008 9:58:33 AM
WVU306288	Mike Shank, West Virginia (555)123-123	U306288	MIDLAND TRAIL RESOURCES, LLC	ACT	2/12/2008 9:58:33 AM
WVU306288	Mike Shank, West Virginia (555)123-123	U306288	MIDLAND TRAIL RESOURCES, LLC	ACT	2/12/2008 9:58:33 AM
WVO502796	Mike Shank, West Virginia (555)123-123	O502796	MARROWBONE DEVELOPMENT CO	RC	2/12/2008 9:58:33 AM
WVS401893	Mike Shank, West Virginia (555)123-123	S401893	ALPINE DEVELOPMENT COMPANY	RC	2/12/2008 9:58:33 AM
WVS401893	Mike Shank, West Virginia (555)123-123	S401893	ALPINE DEVELOPMENT COMPANY	RC	2/12/2008 9:58:33 AM
WVS401893	Mike Shank, West Virginia (555)123-123	S401893	ALPINE DEVELOPMENT COMPANY	RC	2/12/2008 9:58:33 AM
WVS401893	Mike Shank, West Virginia (555)123-123	S401893	ALPINE DEVELOPMENT COMPANY	RC	2/12/2008 9:58:33 AM
WVS401996	Mike Shank, West Virginia (555)123-123	S401996	BLUESTONE COAL CORPORATION	RN	2/12/2008 9:58:33 AM
WVS401996	Mike Shank, West Virginia (555)123-123	S401996	BLUESTONE COAL CORPORATION	RN	2/12/2008 9:58:33 AM

Record: 0 Show: All Selected Records (0 out of *2000 Selected) Options

Some Interesting Statistics

Total Permits Processed = 7966

Total Time to Run ETL Tool = 5.5 minutes

Equipment Specs:
Dell Precision
Xeon CPU 3.0GHz
3.0 GB RAM
XP Professional SP2 Operating System

WV Lessons Learned

- **Test Small / Test Local**
  - **pilot geographic area**
  - **simplified single-purpose map service**
  - **simple geodatabase structures**

- **Scale up one step at a time**

- **Keep security as open as possible as long as possible**

- **IT relationships and infrastructure both critical factors (in both a positive and negative sense)**

As per Sarah Claphan

VA Lessons Learned

- **Permission - Access through firewall - could take awhile to get approval**
- **If using relationship class for attribution, make sure to have the sql tables published to same machine SDE resides on.**

- **Change any local machine name references for services to replicate outside of firewall**

As per Daniel Kestner

OSM Lessons Learned

- **When trying to troubleshoot replication, the error messages from ArcGIS are not good. The replication toolbar in ArcMap gives better error messages for troubleshooting.**

- **The sender and the receiver for replication should agree on the name of the replica since a replica with a duplicate name cannot be made and the error messages generated are not helpful. If one or the other party removes the replica registration from their system, they should inform the other party since there is no automated cleanup and the replication will fail.**

As per Greg Morlock

Acknowledgements

- State of Virginia - DMME
  - •Daniel Kestner
  - •Steve Mullins
  - •David Sanders
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Questions ???