Disclaimer

This is a technical paper that does not take into account contractual limitations or obligations under the Standard Contract for Disposal of Spent Nuclear Fuel and/or High-Level Radioactive Waste (Standard Contract) (10 CFR Part 961).

To the extent discussions or recommendations in this paper conflict with the provisions of the Standard Contract, the Standard Contract governs the obligations of the parties, and this paper in no manner supersedes, overrides, or amends the Standard Contract.

This reflects technical work which could support future decision making by DOE. No inferences should be drawn from this paper regarding future actions by DOE, which are limited both by the terms of the Standard Contract and Congressional appropriations for the Department to fulfill its obligations under the Nuclear Waste Policy Act, including licensing and construction of a spent nuclear fuel repository.
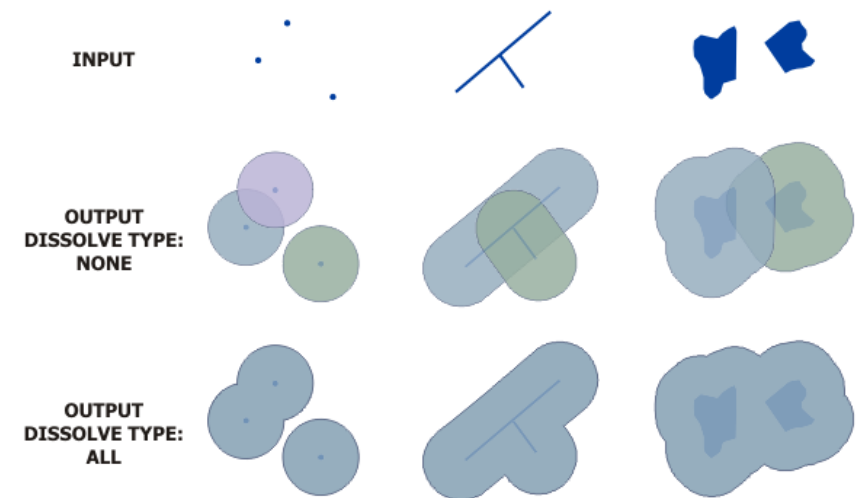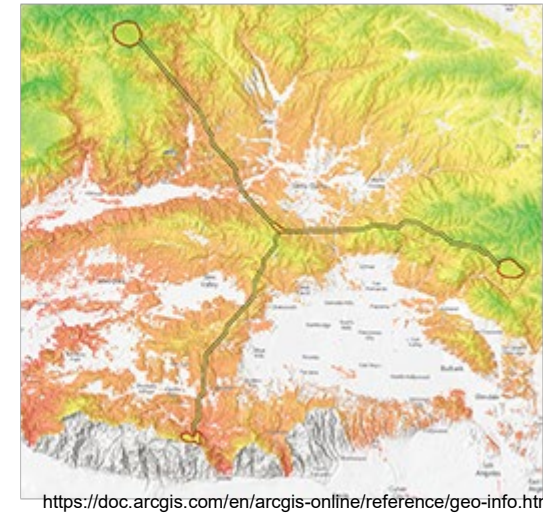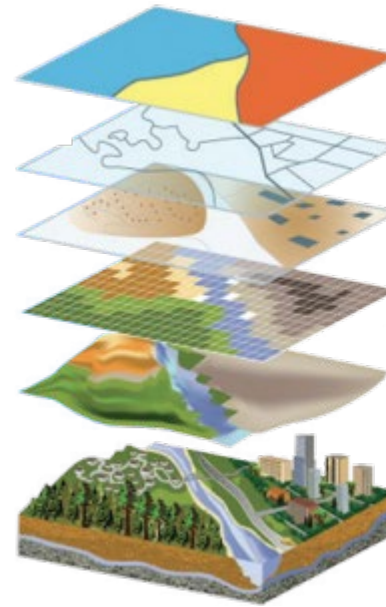
Terminology

GIS = Geographic Information Systems; collection of data and software used to organize and analyze spatial data

Layer = data that can be presented in geospatial context with x, y, and/or z coordinates. Can be vector (point, line, polygon) or raster (gridded) Examples relative to START include:

https://doc.arcgis.com/en/arcgis-online/reference/geo-info.htm

- rail network layer – adds the line features representing the US rail network to the base map
- nuclear power plant layer – adds the point features representing the locations of nuclear power plants to the base map
- Tribal area- polygon layer of boundaries
- Population data

Buffer = area bounding a point or line

INPUT

OUTPUT DISSOLVE TYPE: NONE

OUTPUT DISSOLVE TYPE: ALL

https://desktop.arcgis.com/en/arcmap/latest/tools/analysis-toolbox/buffer.htm

What is START?

The Office of Integrated Waste Management's web-GIS transportation decision-support tool developed to enable visualization and analyses of geospatial data relevant to planning and operating large-scale spent nuclear fuel and high-level radioactive waste transport to storage and/or disposal facilities.

START Features & Functions

Feature/Function	START	Feature/Function	START
Program Access & Protection	Yes	Buffer Zones	800 Meters, 2500 Meters
User Guide & Feedback Mechanism	Yes	Route Analysis Outputs	Summary, Detailed
Geographic Coverage	Continental U.S.	Batch Processing	Yes
Transport Modes	Highway, Rail, Waterway, Intermodal	Reporting Formats	Total Route, State, Tribal Land, County, Congressional District, Military Bases, State Legislative Districts
Base Maps	36 options	Export Capability	Reports, Shapefile, csv, kml
Data Layers & Attributes	58 layers Attributes Included Within Each Layer	Smart Mapping	Spatial Statistics, Filtering, Thematic
Origin/Destination Selection	Drop-Down Menus, User-Defined	Route Sharing	Yes
Routing Criteria	Distance, Travel Time, Population Exposure	Photographic Features	Yes
Routing Constraints	Ability to Avoid Locations Ability to Require Shipment to Pass Through Locations	Measurement Tools	Area, Distance, Map Coordinates, Elevation
		Radiological Exposure	Incident-Free Dose from SNF Transport

START GIS Data Layers

Shipment origin and transfer points:

Potential transload sites, Nuclear reactors, Shutdown sites, DOE and other facilities

Emergency response assets:

Fire departments, TEPP trained personnel, Police, Hospitals, State EOCs, Advance notification designees

Mass gathering places:

Theme parks and zoos, Casinos, Performing arts centers, Stadiums and arenas, Malls, National monuments/icons, Places of worship, Airports

Educational and elderly care facilities:

Schools, Colleges/Universities, Day care centers, Nursing homes

Transportation infrastructure and operations:

Rail network, freight stations, junctions, crossings, yards, bridges, tunnels

Highway: network, bridges

Navigable waterway network, locks/dams, water terminals, Coast Guard Districts, Captain of Port Zones

Existing Routes:

Highway Hazmat Route Registry

DOE WIPP Highway Routes

U.S. Navy Spent Fuel Rail Routes

Environmental land uses:

Parks, National forests, Federal lands, Military bases, Hazard threat urban areas, Surface water

Political jurisdictions:

Tribal lands, Congressional Districts, States, State legislative districts, Counties, City limits, Urban areas

Other :

Social vulnerability index, Transportation infrastructure photos

The availability and utilization of such an extensive array of geospatial information provides a rich platform for assessment and communication.

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Program Utilization

- **Routing Options & Risk Attributes**
  - Rail, highway, waterway, intermodal
- **Training Preparations Along DOE Transport Routes**
  - Fire & police stations, hospitals
  - DOE TEPP* trained personnel
- **Communications**
  - Visualize transportation networks relative to nuclear plants and DOE sites
- **Environmental Analyses**
  - Transportation dose estimates
- **Integration With Systems Analysis (NGSAM)**
  - Routes & travel times
  - Fleet requirements
  - Facility throughput

*Transportation Emergency Preparedness Program (TEPP)

Stakeholder Tool for Assessing Radioactive Transportation, 3.3

U.S. DEPARTMENT OF ENERGY

START - For Official Use Only

START Version 3.3 is currently undergoing quality assurance testing in accordance with the software quality assurance plan. Independent verification and validation tests for select outputs are also ongoing. With respect to intended use of the results from START 3.3, users should qualify the software to their company's software quality assurance plan prior to use of results for any decision making or business related purposes.

Username (Your Email Address)

Password

Log in

OFFICIAL USE ONLY

May be exempt from public release under the Freedom of Information Act (5 U.S.C. 552), exemption number and category: 7, Law Enforcement Information .

Department of Energy review required before public release

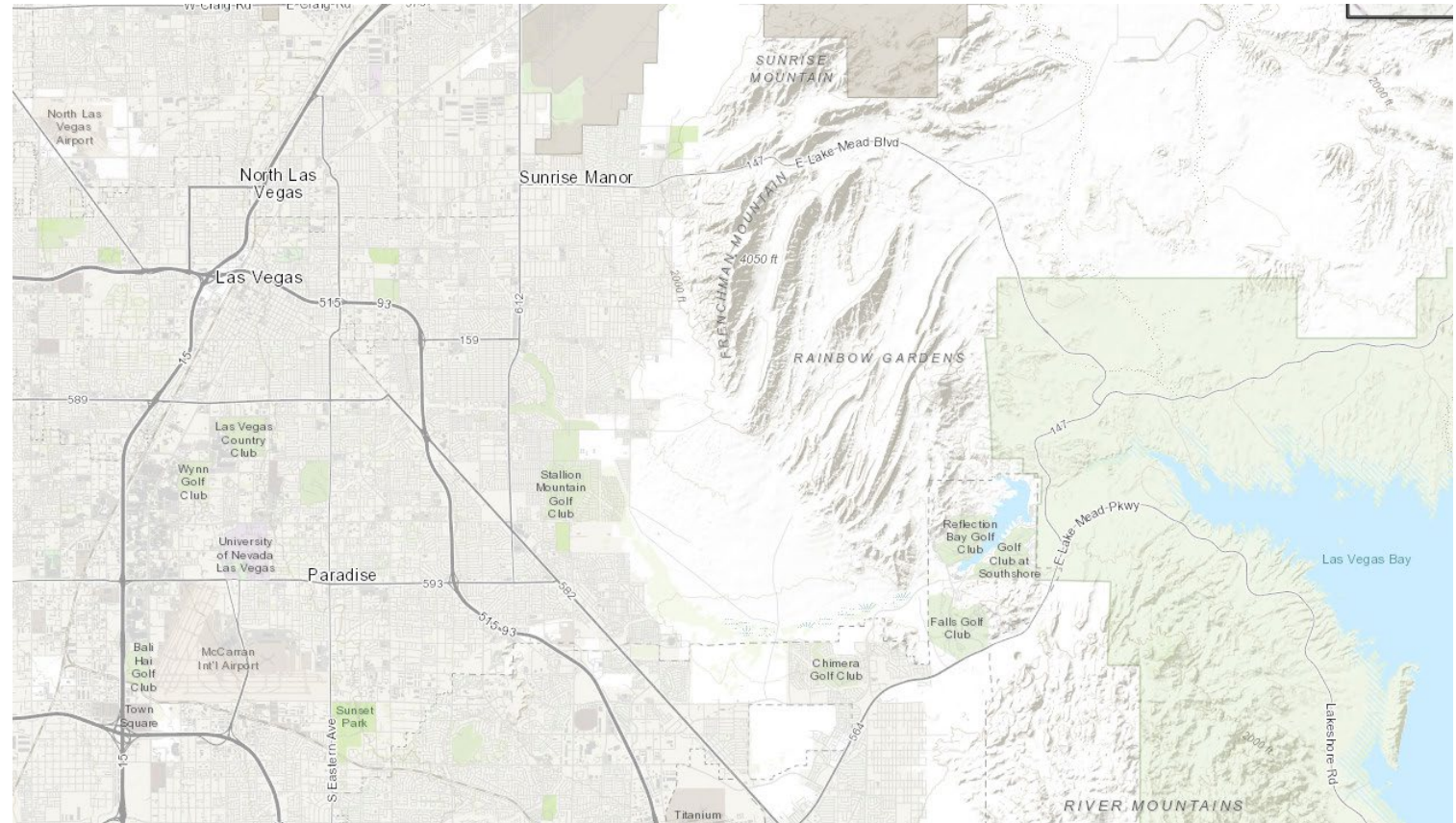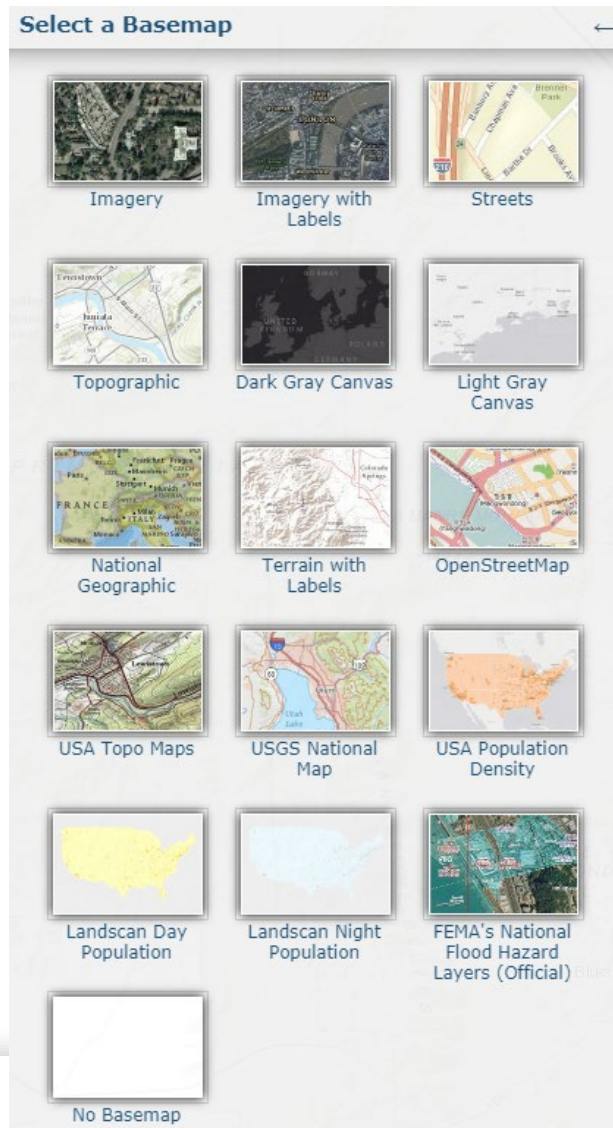Name/Org: Jeff Garner/M-310 Date: 08/14/2014
Guidance (if applicable) CG-SS-4

Register if you don't have an account.

Forgot your password?

START

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Base Map Options

Routing Analysis Options
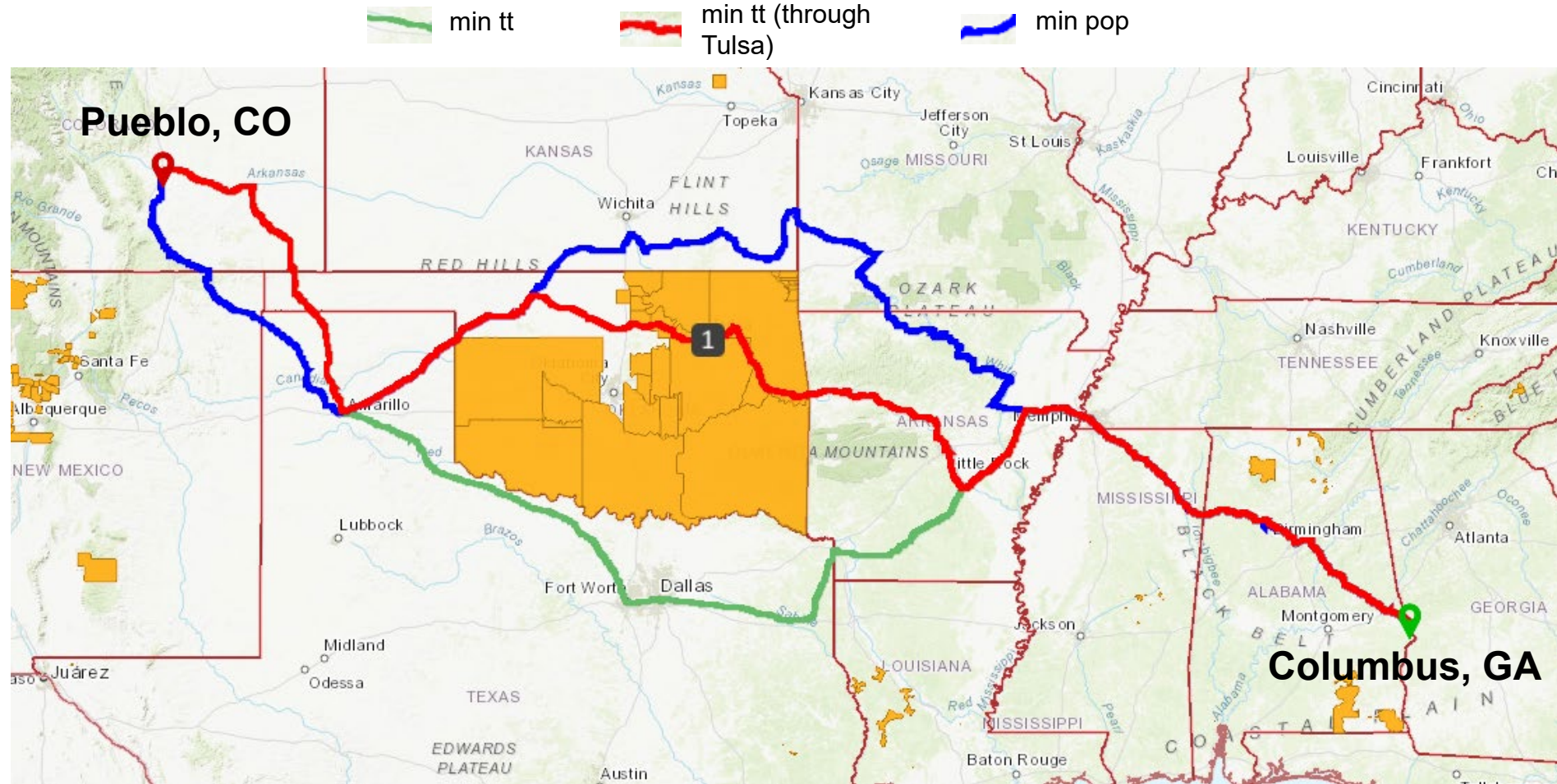
Routing Options & Risk Attributes:
Alternative Rail Routes Using Different Criteria

* Example routes are for illustrative purposes only and do not reflect a selected destination site.

Route Evaluation Results

Routing Criteria	Min. Travel Time	Min. Population	Min. Travel Time (through Tulsa)
Buffer Distance	800 Meters	800 Meters	800 Meters
Result:			
Total Distance	1608.04 miles	1775.10 miles	1609.38 miles
Total Travel Time	2132.6 minutes	2935.7 minutes	2217.7 minutes
Accident Likelihood (per mile)	0.000000451	0.000001065	0.0000005
Water Crossings	142	147	121
Average Track Class	3.9	3.5	3.9
Avg Rail Traffic Density	5	3.8	4.9
Average Population Density	389.1	202.6	308.2
Total Population (within buffer)	590047 persons	323740 persons	462304 persons
Mass Gathering Places	1019	730	904
Tribal Lands	0 square miles	3.58 square miles	203.43 square miles
Sensitive Environmental Areas	183.8 square miles	147.48 square miles	166.14 square miles
Tunnels	2	5	3
Emergency Response Capability (per mile)	0.21	0.16	0.21
Educational Institutions	336	238	285
Special Age Groups	473	282	449
Railroad Crossings (at grade)	1620	1460	1645

* Example routes are for illustrative purposes only and do not reflect a selected destination site.
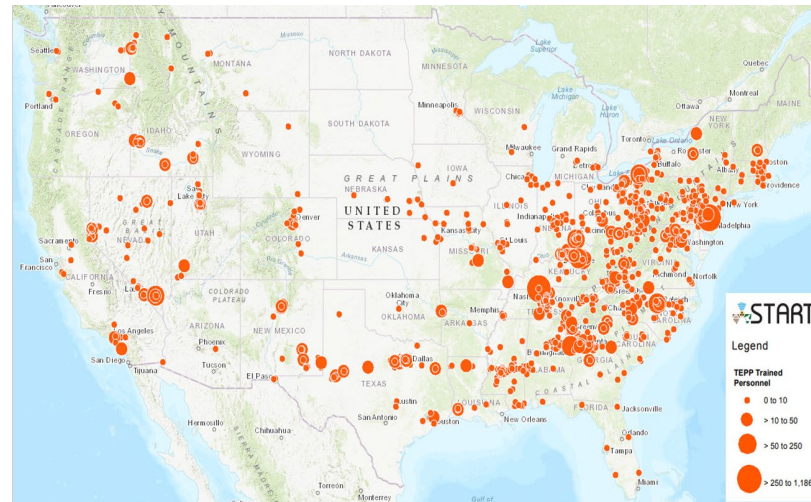
Training Preparations Along Routes

- Identify equipment and personnel available to support a response

- Consider expected response times to reach incident scene

- Determine gaps in coverage along route where additional radiological emergency response training may be needed
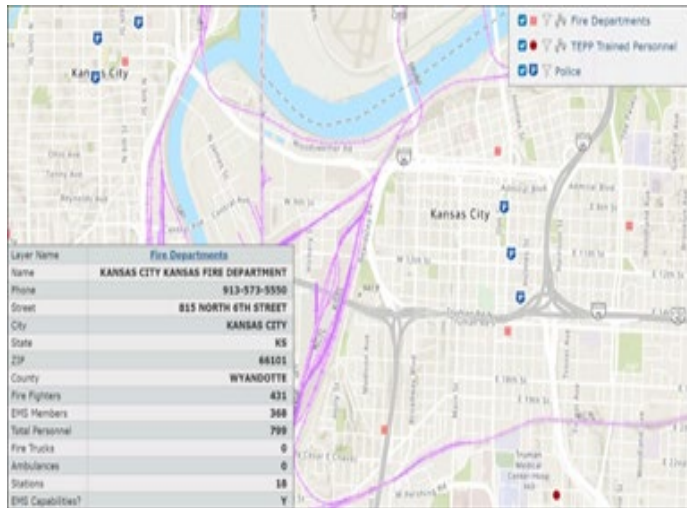
Characteristics of Fire Department in Proximity to Potential Rail Route

Concentration of TEPP Responders
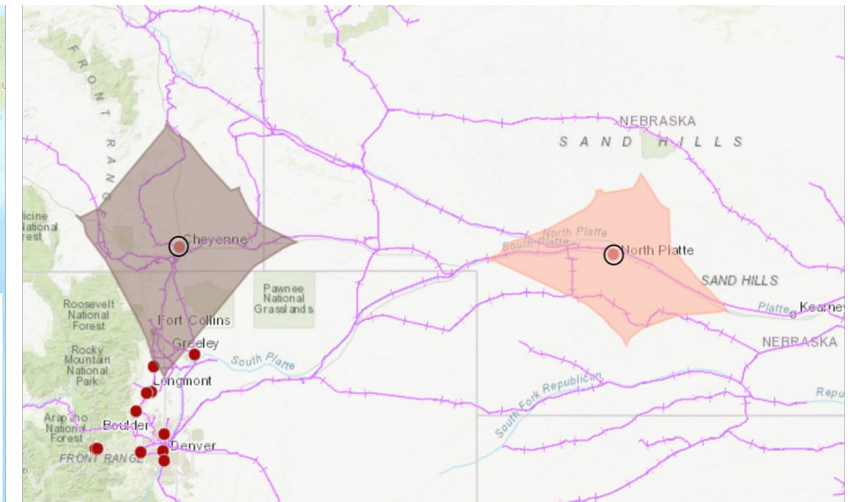
TEPP Responder Coverage within 60 Minutes of Base Location

Communication: Building Stakeholder Awareness

- **Supports communication and information exchange in an inclusive, transparent and customized manner.**

- **Example use case**
  - START used to identify and assess possible transportation modes & routes proximate to shipment origins.
  - Shipment origins may have limited modal options for moving overweight/oversized loads.
  - They might be located in areas where transportation infrastructure has clearance (size/weight) limitations, refurbishment needs, and/or regulatory route restrictions.

Barge Pier at the Port of Kewaunee

Rail Line Near Kewaunee

Low Clearance Bridge Near Big Rock Point

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Questions?

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