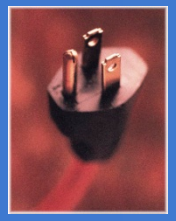
New Mexico Energy, Minerals and Natural Resources Department



By: Brian K. Johnson, PE, Bureau Chief

Brown to Green
Brownfields Redevelopment for Green Power

New Mexico Progress & Case Studies

Wednesday, April 22, 2009

Today's Topics

- New Mexico Background
  - Contaminated lands
  - Redevelopment experience
  - Renewable energy resources
- Emerging Brown-to-Green Opportunities
  - Mine site➔Chevron Molybdenum Mine
  - Trading post➔Santo Domingo Pueblo
  - Other potential sites
- Brown-to-Green Guidelines

New Mexico Background

- Rich in natural resources with long history of development
- An energy provider/exporter
- Oil, natural gas, and electricity
- Strong & balanced regulation of extractive industries
- Extractive industries are important to New Mexico's economy
- Environmental impacts must be contained

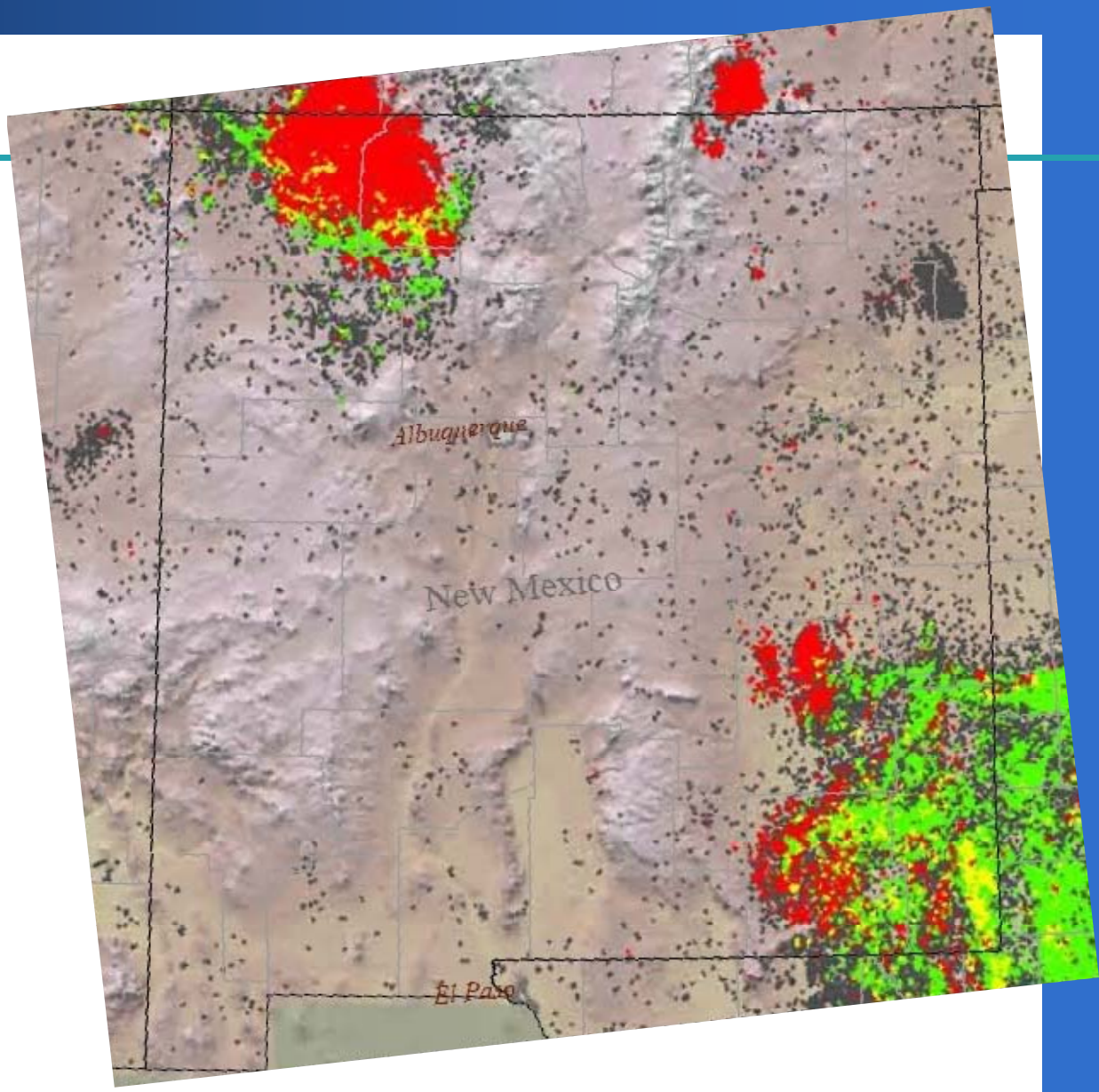
New Mexico

Oil & Gas Development

Green is oil

Red is gas

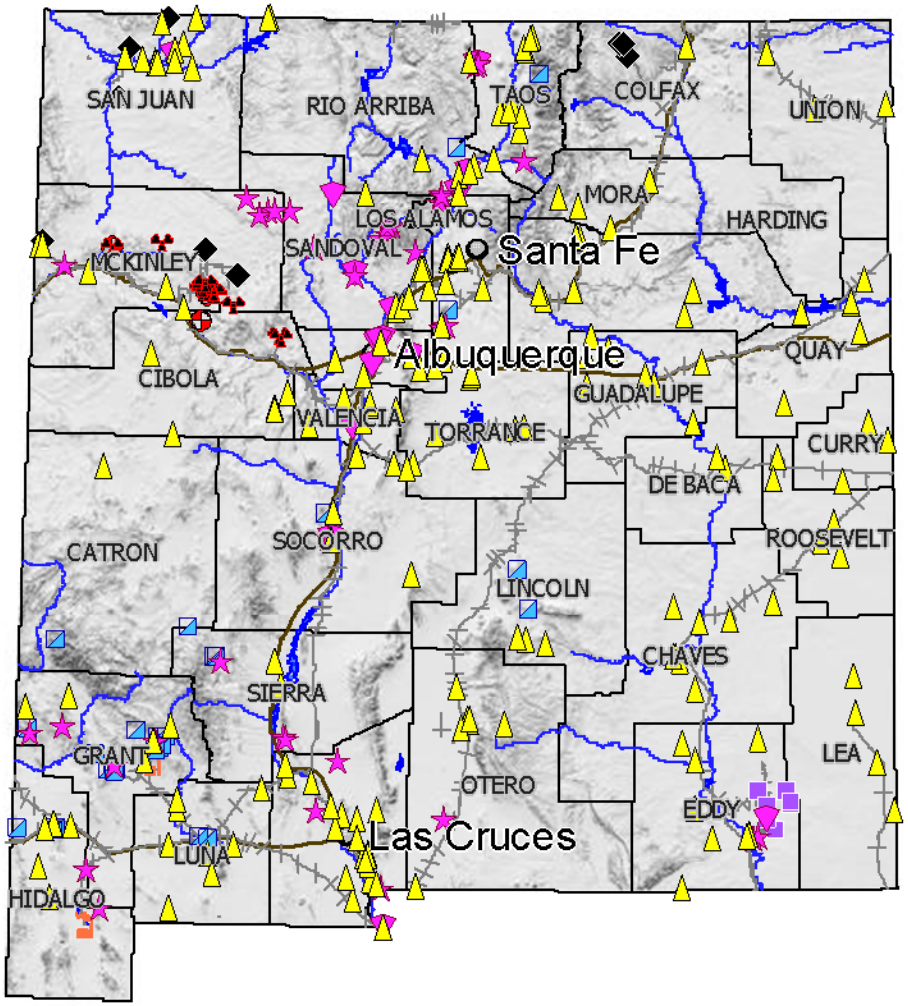
Yellow is oil & gas



New Mexico—Oil & Gas "Brownfields"

New Mexico

Mining Development



Black is coal mines

Blue is metal mines

Purple is industrial minerals

Yellow is aggregate & stone

New Mexico—Mine "Brownfields"

Before (2003)

Reclamation of coal mine, near Raton

After (2008)

New Mexico—"Brownfields" Re-use

Coal mine shop facility, near Raton

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- Experience in redeveloping brownfields
- Avoid energy development on sensitive lands
- Avoid environmental & wildlife impacts
- Transmission corridor development is key area

Renewable Energy/Clean Fuels

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- New Mexico = Clean Energy State
- Excellent renewable resources
- Governor Richardson's clean energy policies
- Renewable Portfolio Standard
- Production Tax Credit
- Renewable Energy Transmission Authority

Renewable Portfolio Standards

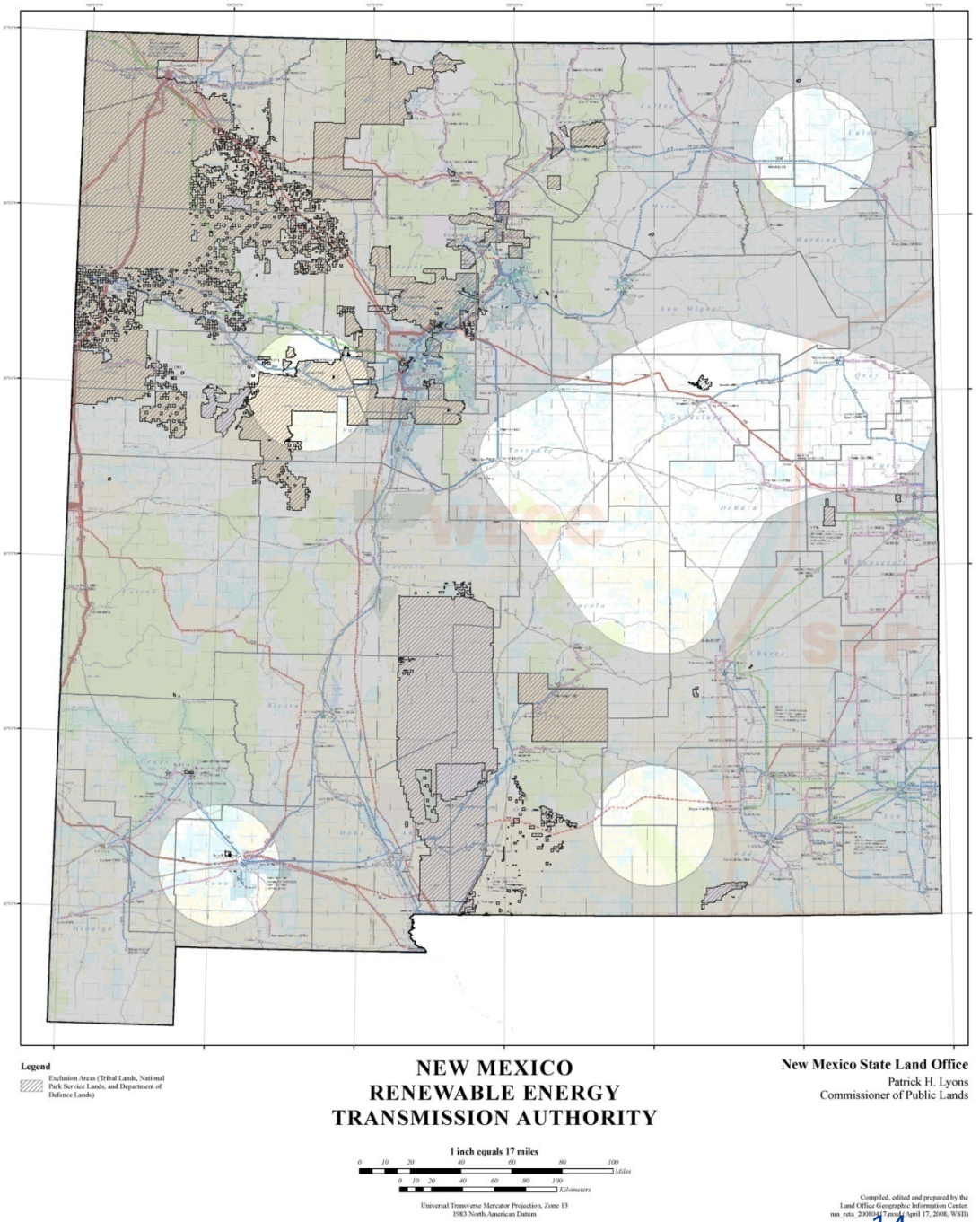
- New Mexico's Renewable Portfolio Standards—requires major utilities to produce 15 percent of their power from renewable resources by 2015 and 20 percent by 2020.
- NM Public Regulation Commission "solar carve-out"—requires a minimum of 20% of a utility's renewable energy supply mix to be solar.

New Mexico Renewable Energy Resources

- Solar: 2nd in potential
- “World Class” wind on NM’s Eastern Plains
- Geothermal: 7th in potential
- Biomass (forest material and dairy/feedlot wastes)
- New Mexico has in excess of 10,000 MW of renewable energy generation resources

Renewable Resources

New Mexico



The New Mexico Wind Energy Center

Located near Fort Sumner; built by Florida Power & Light.

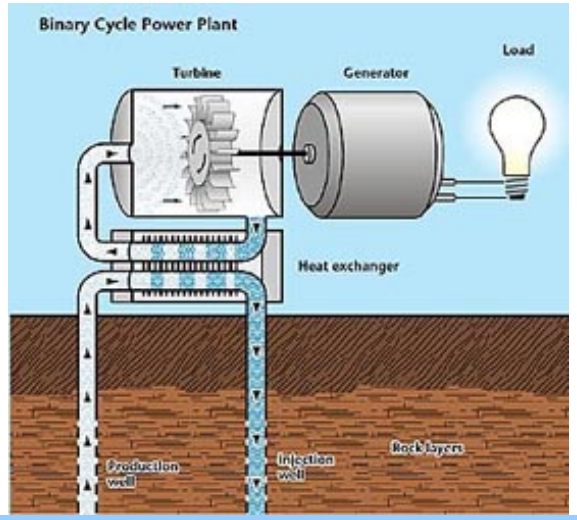
Solar Opportunities

Solar PV Power Plant in Southern Colorado

Solar Thermal Power Plant in southern California

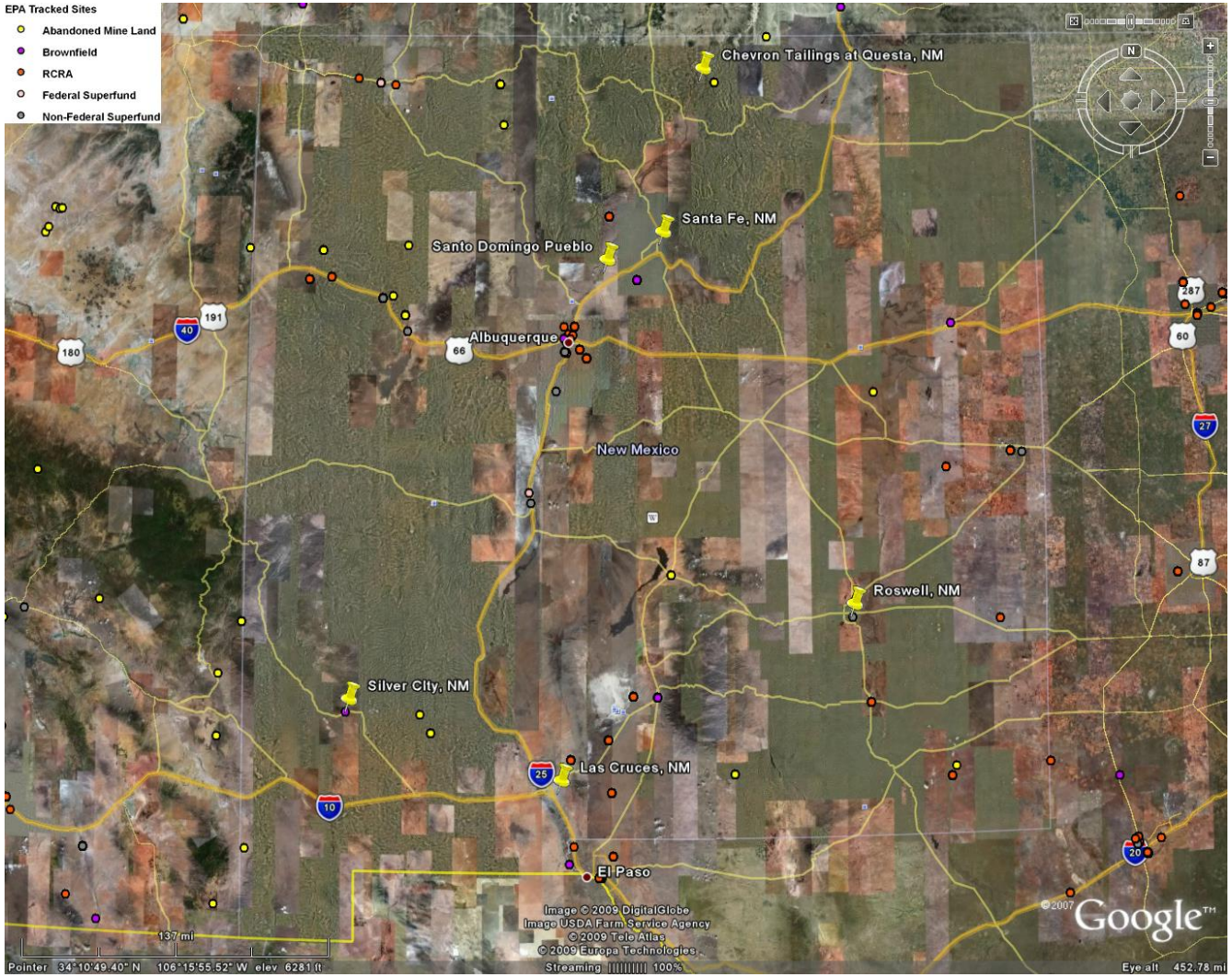
Geothermal

Geothermal Plant in California



- Potential may be huge
- Relatively small "footprint"
- Water impacts and siting in sensitive areas is an issue → Valles Caldera in NM
- Use previously disturbed lands instead

Emerging Brown-to-Green Opportunities



Chevron Molybdenum Mine

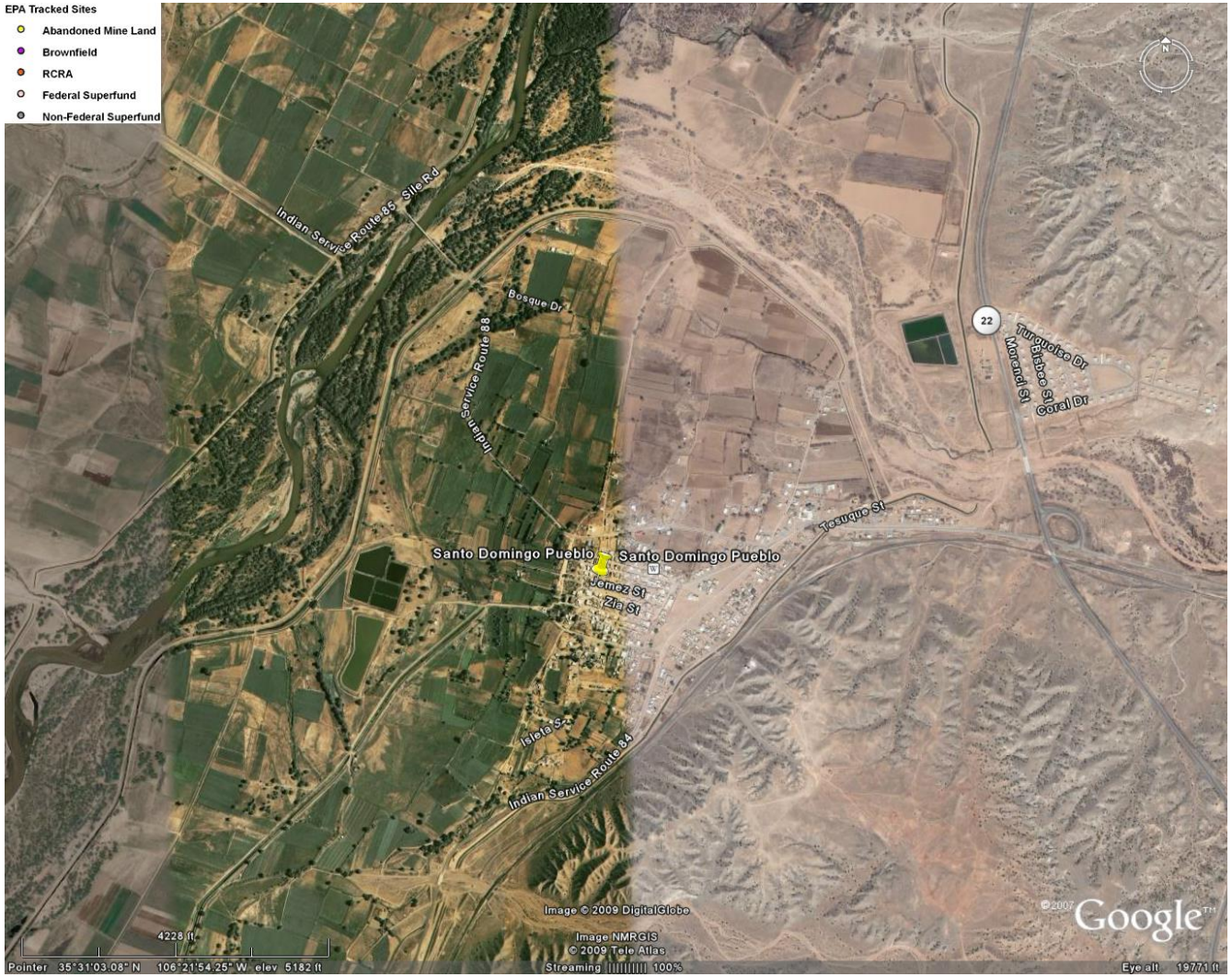
- The Mine—
  - Northern NM: Village of Questa
  - In operation almost 100 years
  - Large tailing impoundment
- Chevron—
  - Evaluating ~40 concentrating solar photovoltaic technologies
  - Self-financing being pursued
  - Site PV system on oldest tailing
  - Comply with state requirements for operating and closure plans

Chevron Tailing Impoundments - Questa, NM

Santo Domingo Pueblo

- Trading Post redevelopment potential—
  - Historic site – 1880s building (2000 fire)
  - Biodiesel commuter rail – depot planned
  - Wood processing site – contamination known
  - Inactive landfill (site for solar PV???)
  - Electrical substation – serves entire Pueblo
- The Pueblo—
  - Non-gambling tribe
  - Sustainability plan established
  - Solar feasibility study – NREL-Sandia Labs

Santo Domingo Pueblo, NM



Other Potential Sites - Solar

- NASA Jet Fuel Testing Site
  - Southern NM, near Las Cruces
  - Long-term electricity needs – pump & treat
  - NMSU feasibility studies – wind and solar PV
- Freeport McMoRan copper mines (Phelps Dodge)
  - Southern NM, near Silver City
  - thousands of acres – tailing & waste piles
  - excellent solar resources

Other Potential Sites - Biogas

- Dairy manure to biogas
  - So. NM, near Roswell (Pecos Valley Biomass Co-op)
  - Energy Innovation Fund – anaerobic digester process
  - address manure storage and water quality issues
  - proposed production tax credit - $2.92/MMBtu
  - ~1,000,000 MMBtu per year estimated production
- City of Santa Fe, wastewater treatment
  - Northern NM, Santa Fe
  - Clean Energy Project – sample biogas, implement
  - Use biogas byproduct for process heat needs

Brown-to-Green Guidelines

- Collaboration – New Mexico, NREL, EPA
- Avoid greenfields – sensitive environmental/wildlife issues
- Reduce renewable energy development costs
- Use existing transmission infrastructure
- Green jobs in rural areas
- Large contaminated areas→SOLAR
- To be completed 2009

Brown to Green

Thanks for your attention!