Fast-track Environmental Assessment and Permitting in the Rocky Mountain West, USA

John G. Aronson, AATA International, Inc. and Bill Fowler, Anadarko Petroleum

Presented to

The International Association of Impact Assessment

Annual Meeting, Vancouver, BC

Presented by

John G. Aronson

AATA International, Inc.

Fort Collins, CO, USA

Presentation Outline

- Introduction
- Drivers – Fast-tracking the NEPA Process
- Important Considerations, Key Issues, & Concerns
- Successful Mechanisms and Protocols for Fast-track Approach
- Case History – Salt Creek Field CO_2 Enhanced Oil Recovery – Full Field Development EA, Midwest, Wyoming for Anadarko Petroleum Corporation

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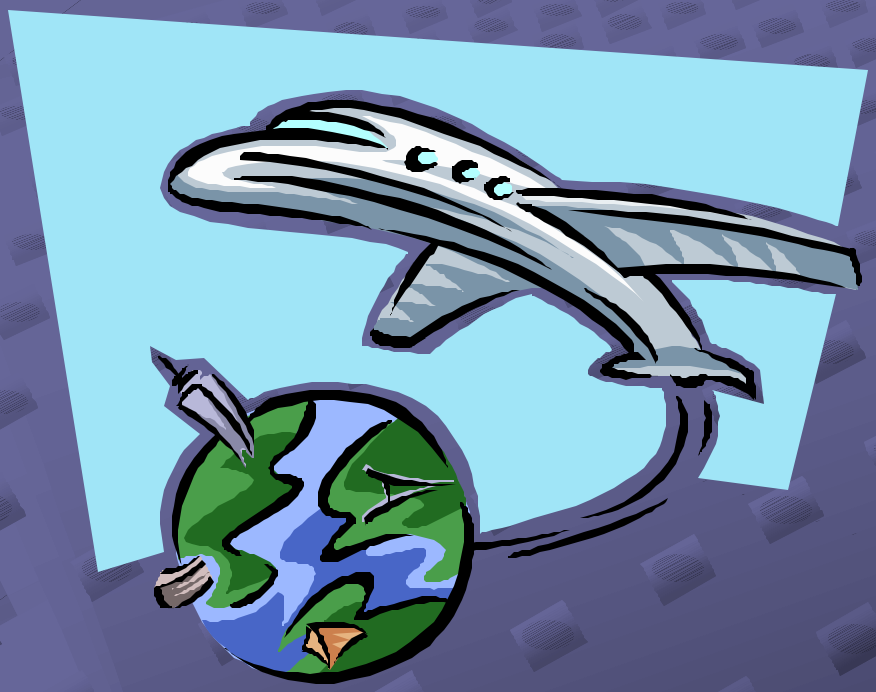

Always

At

The

Airport !

Originally, Advanced Aquatic Technology Associates, Inc.

AATA International, Inc.

- Environmental management, permitting, and technical services consultancy
- Experience in USA and over 40 countries
- Fast-track EIA/EIS for natural resource development projects, including NEPA process
- “Micro-multinational” consultancy with network of over 540 associates worldwide

Anadarko Petroleum Corporation

- Headquarters – The Woodlands, TX

  Top 25 fastest growing companies 2003

  One of largest independent oil companies with 1.2 billion bbls oil reserves and 7.7 trillion cubic ft gas

  Employees – 3500

  Operating in USA, Canada, Algeria, Qatar, Tunisia, Georgia, Faroes Islands, and other locations

  About US$5.1 Billion revenues per year

Driving Forces for Fast-track EA

- Evolving geopolitical aspects of energy
- Need for rapid energy development in the Rocky Mountain West – record wells in record time
- Compliance with National Environmental Policy Act and state environmental permitting
- Environmental concerns over disturbance, noise, vegetation, wildlife, air and water quality impacts – agencies, landowners, NGOs
- Corporate shareholder demands leading to environmental stewardship
- Public disclosure, involvement, partnership
- Corporate Social Responsibility
- Time = Money

Fast-tracking the NEPA Process

- White House Task Force on Energy Project Streamlining
- Rocky Mountain Energy Council
- NGOs concerned over due process within National Environmental Policy Act
- Controversy over expanded exploration, drilling, and production throughout the West
- Can the Fast-track approach really work?

Current and Emerging Issues

- Sustainability of Extractive Industries
- Biodiversity – Vegetation, Fish, Birds, Mammals
- Produced Water Quality
- Air Quality, Dust, Noise, Land Disturbance
- Public Consultation and Outreach
- Project Transparency
- Integrating Local Content
- Socio-cultural/socioeconomic impact mitigation

Key Concerns

- Adequate Data for Baseline and Impact Assessment – Focus on key issues
- Assessment of Alternatives
- Mitigation Planning
- Environmental Management and Monitoring Programs
- Statutory NEPA and State DEQ Requirements

Fast-Track EA/EIS Management Strategies

- EA versus EIS
- Management of NEPA process – understanding government commitments and plans (RMPs, leases, ROWs, easements, etc.)
- Working with the agencies - BLM - notices, reviews, field offices, state office, headquarters, procedures, info
- Biodiversity - riparian vegetation, prairie dogs (black footed ferret), sage grouse, raptors, lagomorphs, big game, herps, fishes, benthos
- Ecology - hydrology, stream crossings, livestock, soils, air quality, fugitive dust
- Archaeology, sociocultural, socioeconomic, sustainability

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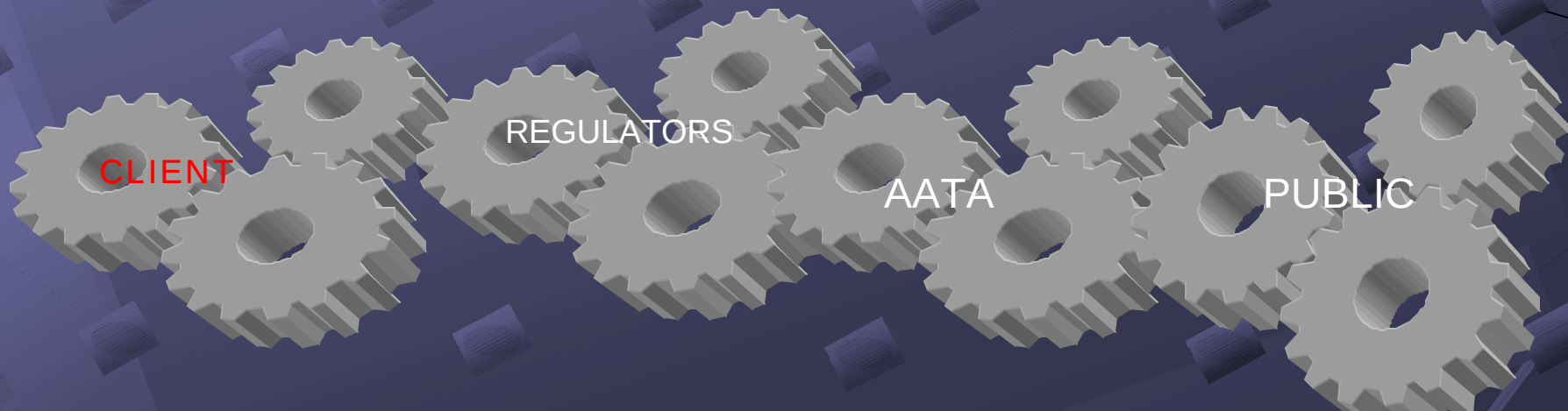
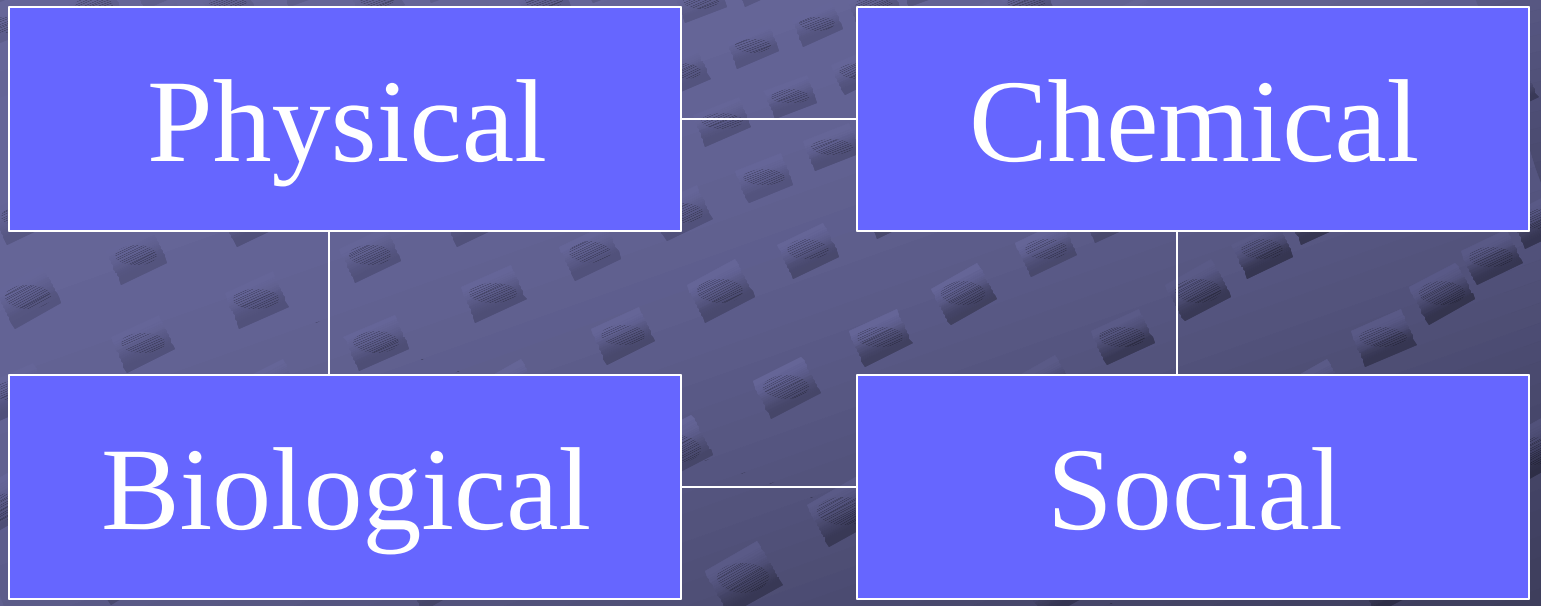
Accelerated EA/EIS Coordination Team

Think of it as ▸

A Synchro-Mesh Transmission Shifted into HIGH GEAR!



The Integrated Environmental Approach

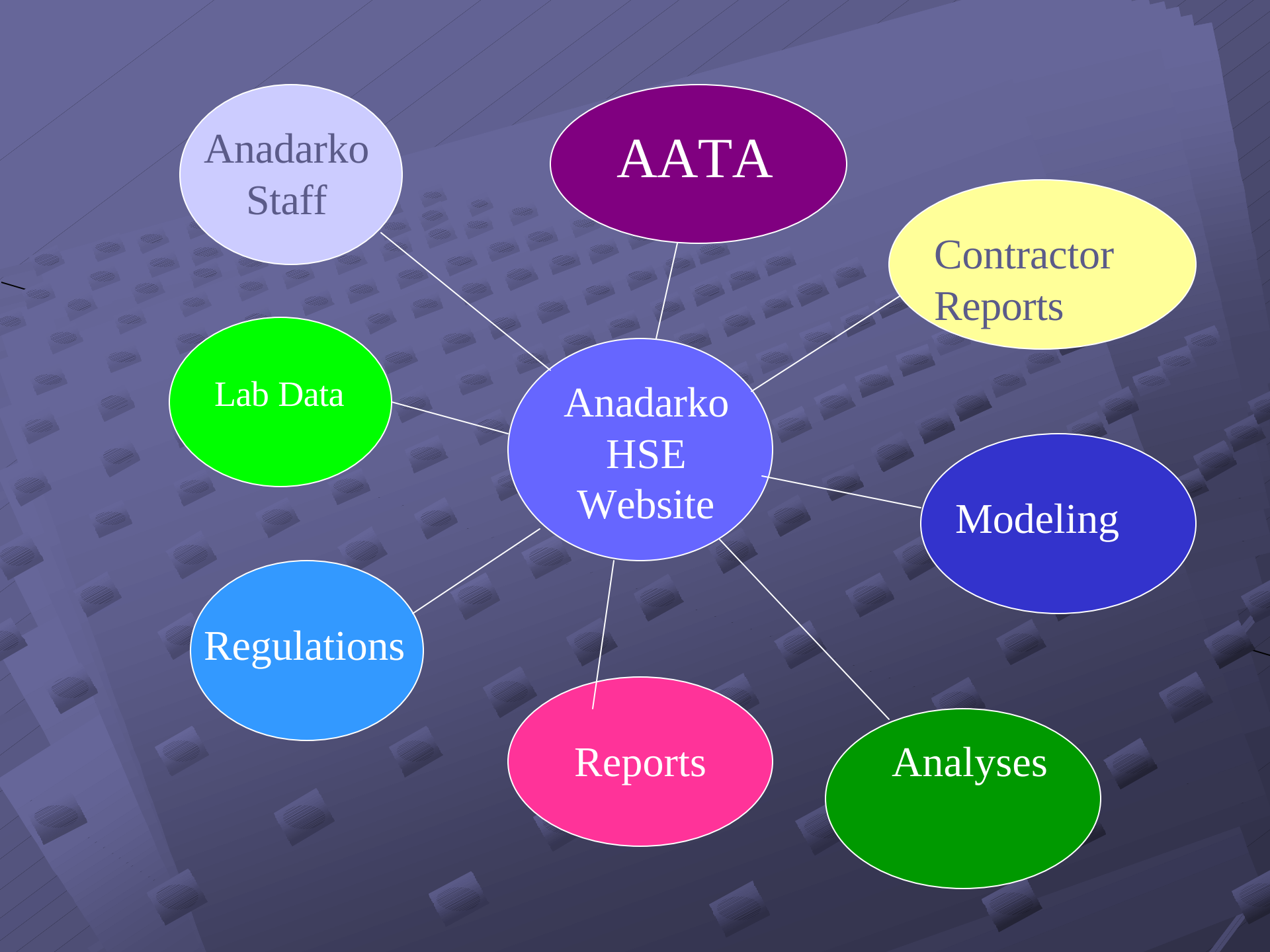


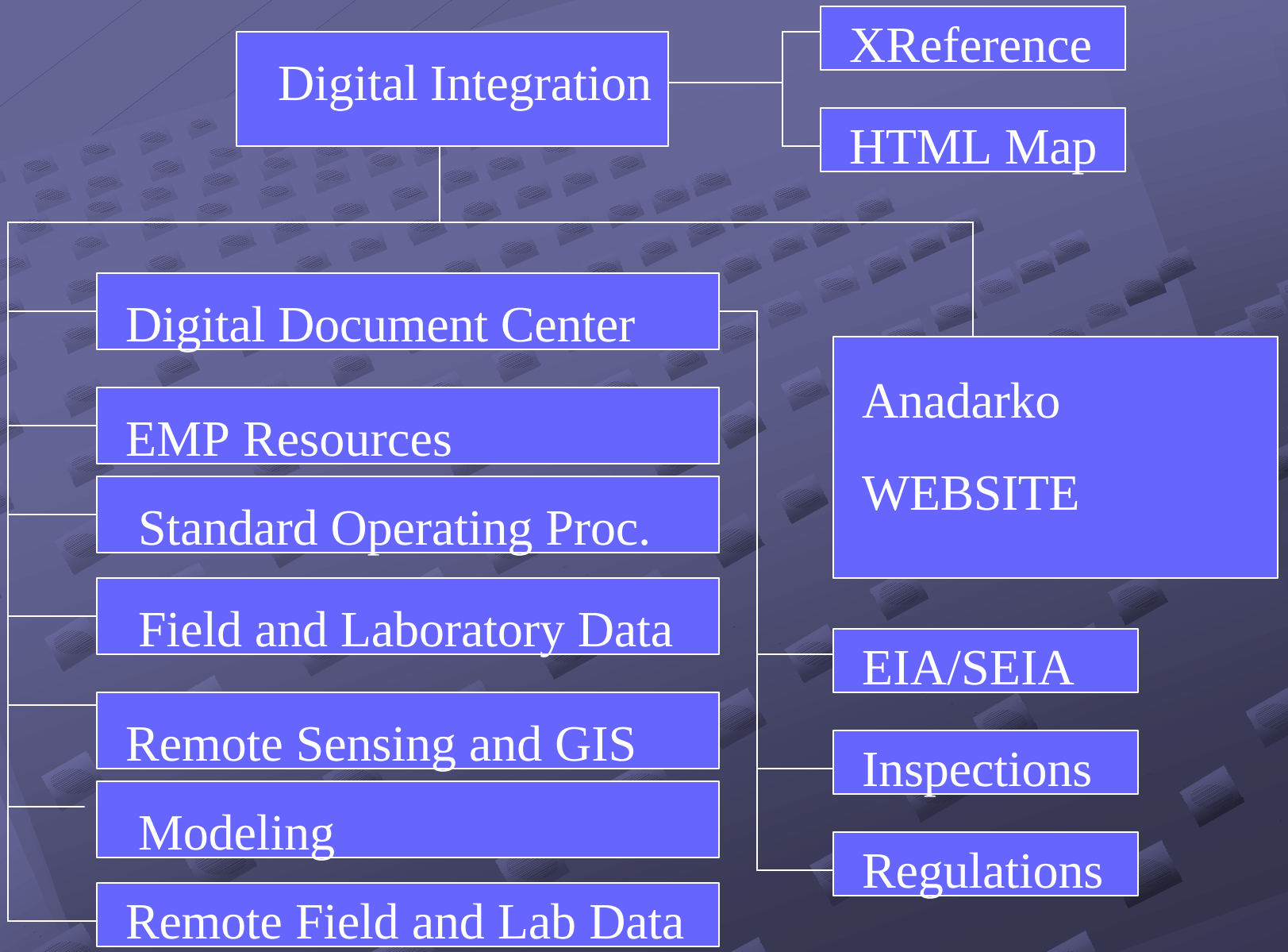
Interdisciplinary Information & Analysis using Digital Approach

- Need to access broad range of current information and data facilitated using digital approaches across agencies
- Early data gap analysis for all key parameters
- Geographic information system for accurate mapping and analysis
- Remote sensing, interpretation, analysis
- Integration, synthesis, analysis and management of digital data bases
- Data visualization, plotting, modeling, mapping to support decision making

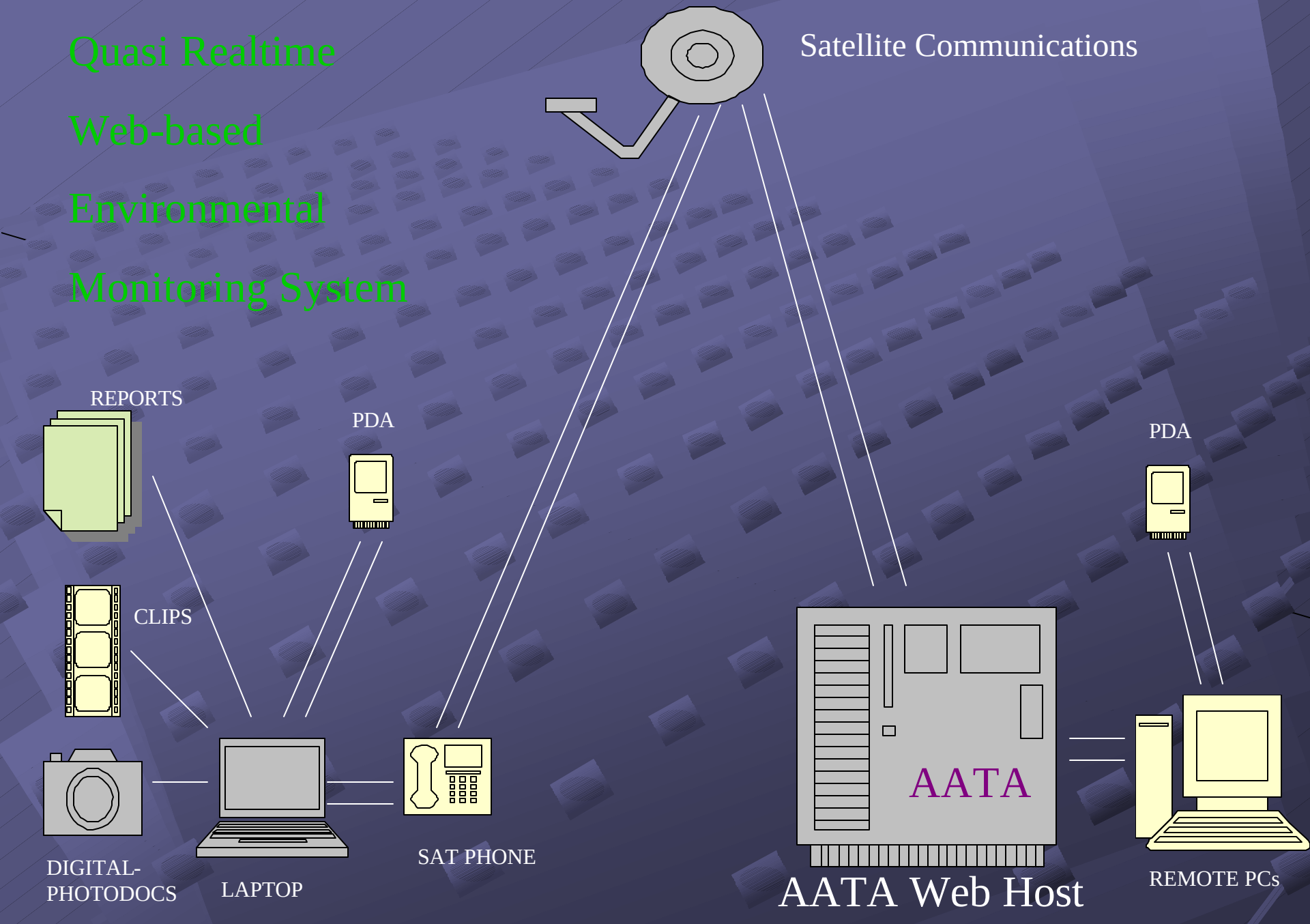
Web-Based Environmental Monitoring & Management

- Comprehensive Environmental Management Program documentation, protocols, data, etc.
- Comprehensive digital document and data management
- Fast-track Third-party EA/EIS Management
- 24 hour data and report access
- See www.aata.info for many active sites


Anadarko Staff
AATA
Contractor Reports
Lab Data
Anadarko HSE Website
Modeling
Regulations
Reports
Analyses


Digital Integration
XReference
HTML Map
Digital Document Center
EMP Resources
Standard Operating Proc.
Field and Laboratory Data
Remote Sensing and GIS
Modeling
Remote Field and Lab Data
Anadarko
WEBSITE
EIA/SEIA
Inspections
Regulations

Quasi Realtime Web-based Environmental Monitoring System



Environmental Disciplines

- Geology and geochemistry
- Geohydrology
- Limnology
- Terrestrial and Aquatic Ecology-Fisheries
- Hydrology and Water Quality
- Radioecology/Ecotoxicology
- Computer Modeling
- Meteorology and Air Quality

Environmental Disciplines

- Soil and watershed science
- Natural resource management
- Monitoring and modeling – water and air
- Geographic Information Systems
- Remote sensing and surveillance
- Ecotoxicology of air and water pollution
- Ecological impact and risk

Mitigation and Monitoring

- Development of mitigation strategies and alternatives at an early stage
- Customizing the monitoring programs to collect data to satisfy data gap analysis
- Coordinated and Adaptive Environmental Management and Monitoring Program development
- The Dynamic ESIA/EMMP approach

Integrated Environmental Management Programs

- Air and water quality management
- Hazardous and solid waste management
- Erosion and sediment control programs
- Spill, prevention, control, & countermeasures (SPCC) planning
- Environmental monitoring and compliance
- Emergency response planning
- Comprehensive watershed management
- Web-based environmental management

Public Disclosure and Consultation

- Local community liaison early and often (continuously) – accurate info exchange
- Community notifications, discussions, and meetings – integration with local functions
- Local involvement and interaction in key project components, such as alternatives, roads, traffic, CO2, other issues
- Public notices and publications

The AATA Fast-track Team

- AATA International, Inc. Technical and Support Staff
- John G. Winston, EIS Management Programs, 23+ years, Mobil Oil Co.
- Warren Keammerer, Botanist, Denver, CO
- InterMountain Labs, Sheridan, WY
- Information Integration & Imaging LLC
  - (I-cubed – remote sensing analysts)

Case History

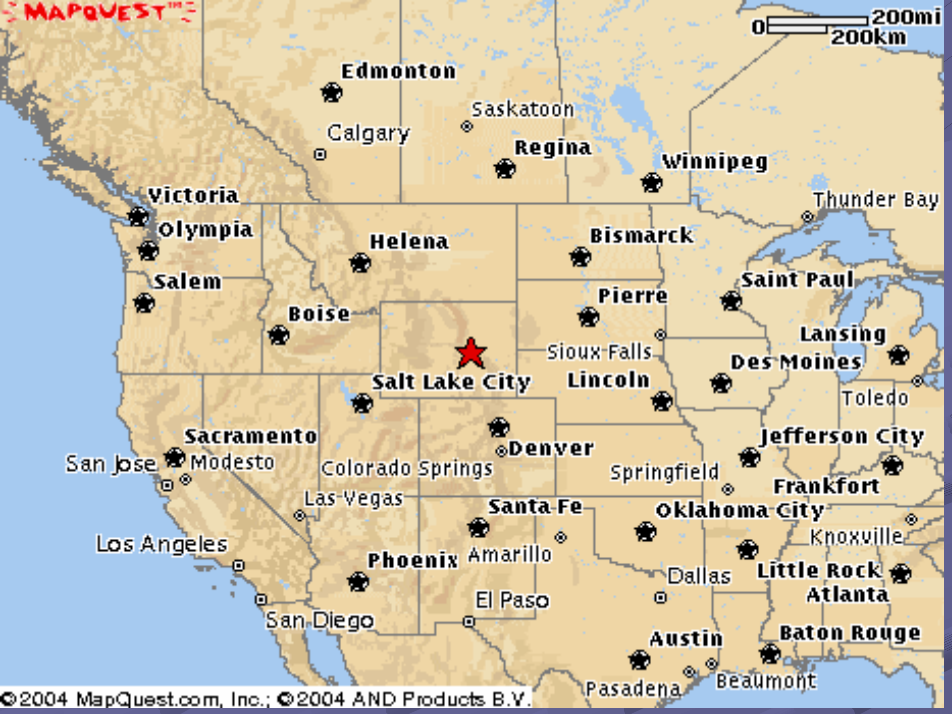
Salt Creek Field – CO2 Enhanced Oil Recovery - Full Field Development EA Project Midwest, Wyoming, USA


WYOMING

Where the Deer and the Antelope Roam – Bison Too!

Wyoming Bureau of Land Management – Cheyenne, WY

Wyoming Bureau of Land Management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Sioux Falls
Lansing
Des Moines
Salt Lake City
Lincoln
Toledo
Sacramento
Denver
Jefferson City
San Jose
Modesto
Colorado Springs
Springfield
Frankfort
Las Vegas
Santa Fe
Oklahoma City
Knoxville
Los Angeles
Amarillo
Phoenix
Dallas
Little Rock
Atlanta
El Paso
San Diego
Austin
Baton Rouge
Pasadena
Beaumont
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South Dakota
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Salt Lake City
Fort Collins
Provo
Denver
Nebraska
Kansas
Colorado
Utah
Colorado Springs
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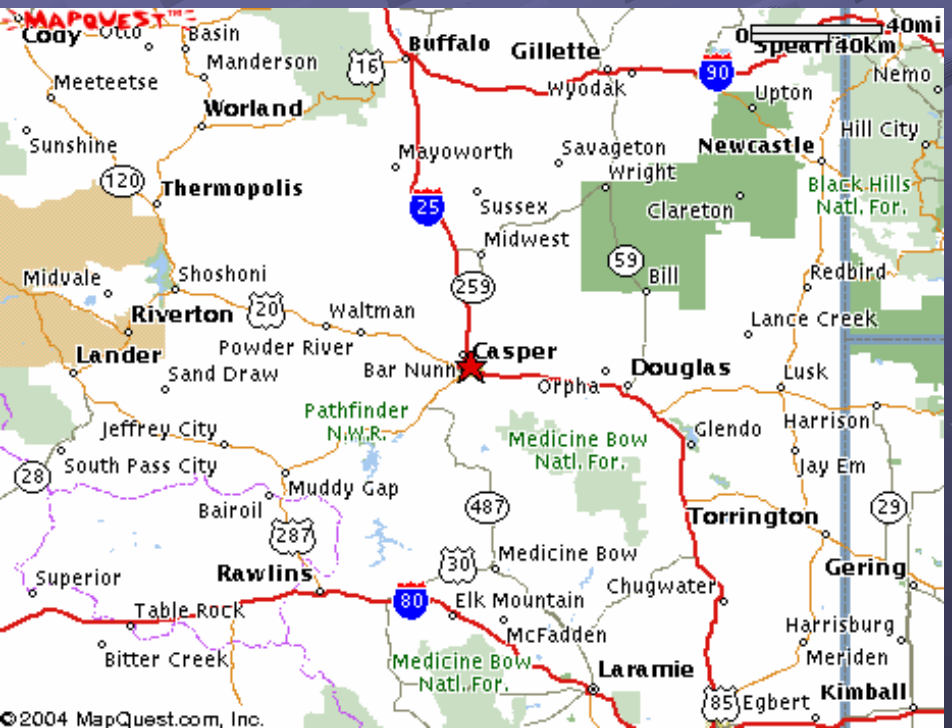
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Buffalo
Gillette
Spearfish
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Upton
Nemo
Worland
Sunshine
Mayoworth
Savageton
Newcastle
Hill City
Thermopolis
Wright
Black Hills Natl. For.
Sussex
Clareton
Midwest
Midvale
Shoshoni
Bill
Redbird
Riverton
Waltman
Lance Creek
Lander
Powder River
Casper
Douglas
Sand Draw
Bar Nunn
Orpha
Lusk
Pathfinder N.W.R.
Jeffrey City
Glendo
Harrison
Medicine Bow Natl. For.
South Pass City
Muddy Gap
Jay Em
Bairoil
Torrington
Medicine Bow
Superior
Rawlins
Gering
Chugwater
Table Rock
Elk Mountain
Harrisburg
McFadden
Bitter Creek
Meriden
Medicine Bow Natl. For.
Laramie
Egbert
Kimball
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MAPQUEST
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Mayoworth
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Wright
Barnum
Kaycee
Sussex
Linch
Johnson
Campbell
Washakie
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Natrona
Campbell
Converse
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Waltman
Powder River
Natrona
Converse
Bar Nunn
Casper
Glenrock
Orpha
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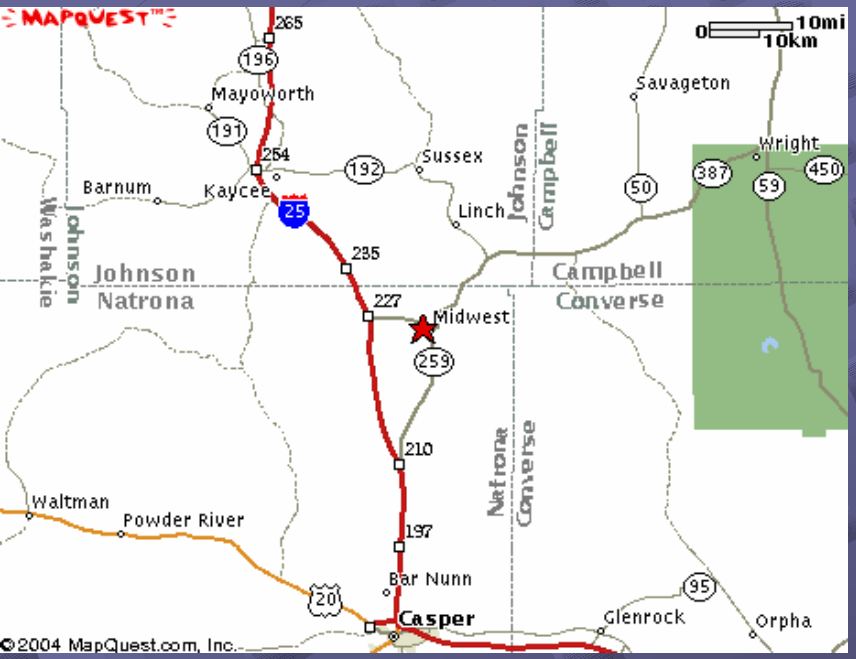
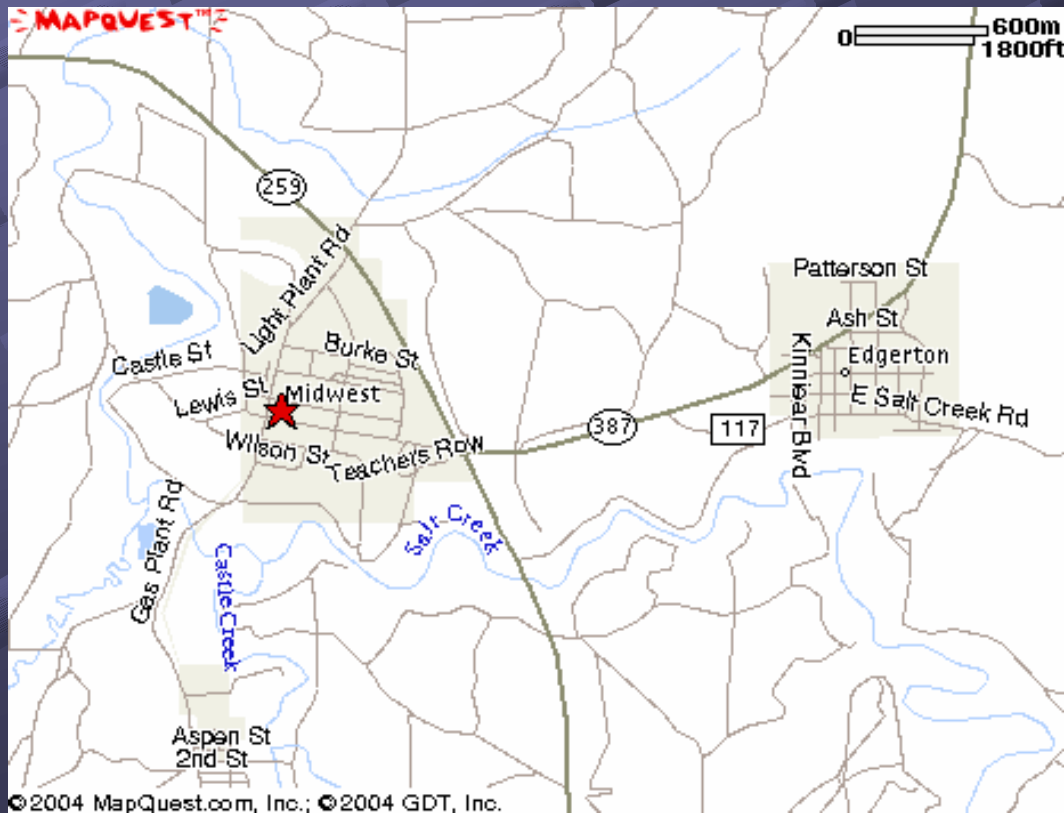
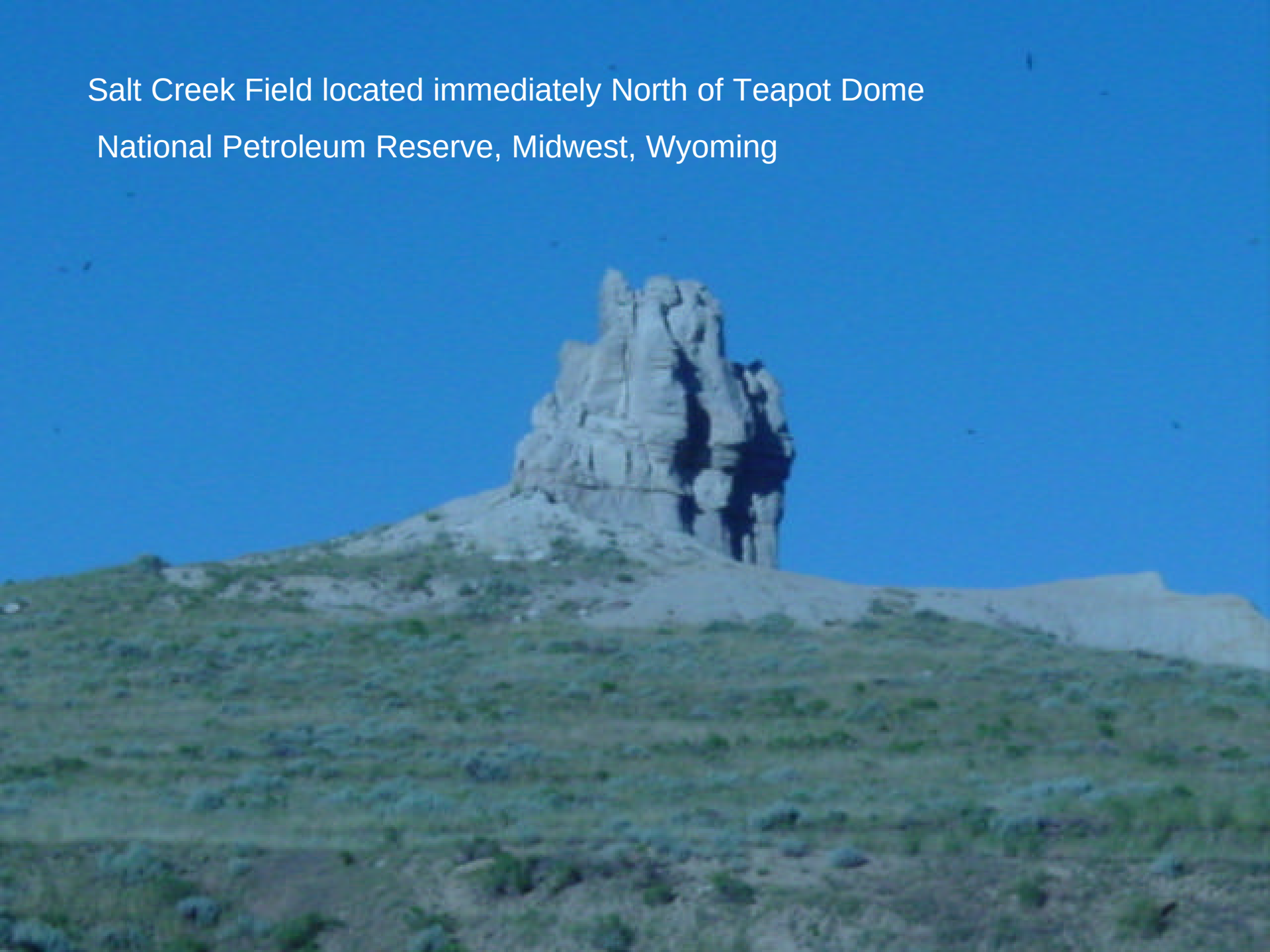
Salt Creek Field, Midwest, Wyoming, USA






Salt Creek Field located immediately North of Teapot Dome
National Petroleum Reserve, Midwest, Wyoming

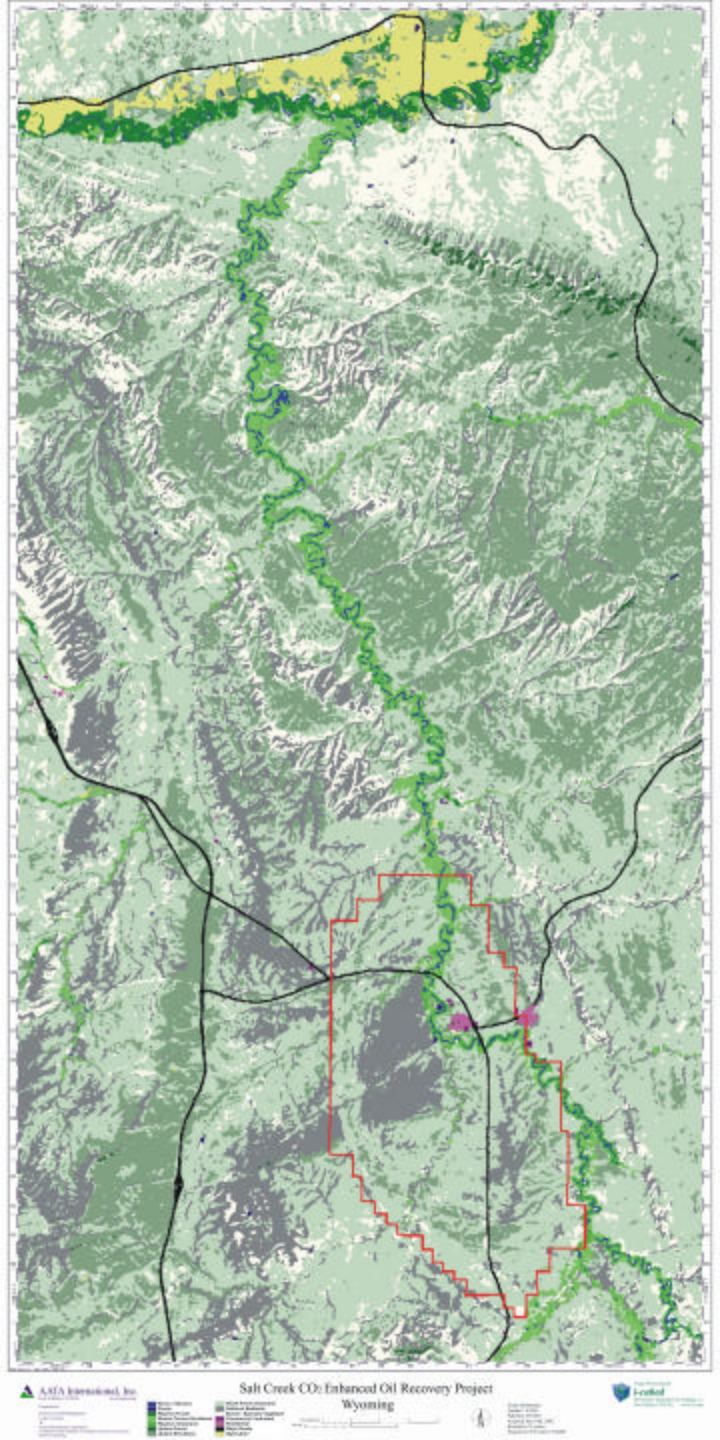
CO_2 Enhanced Oil Recovery

- Utilizes CO_2 from site in SW Wyoming
- Pipeline of high pressure CO_2 to site
- CO_2 used as tertiary recovery – extends life of field for more than 20 years
- CO_2 sequestration in field formations
- Modeling of worst case CO_2 pipeline rupture to evaluate impact to local air quality and the public
- Pilot scale project installed to test concept

Producing Wells
Production Trunk Lines
HP Gas Gathering Trunk Lines
Water Injection Station
Injection Headers
Recycle Compressor Station
Production Battery

Figure 5. Field Development Facilities Proposed For Phase I

Existing Producer (from different pay zones)
Abandoned Producer
Shut-in Producer
Injector



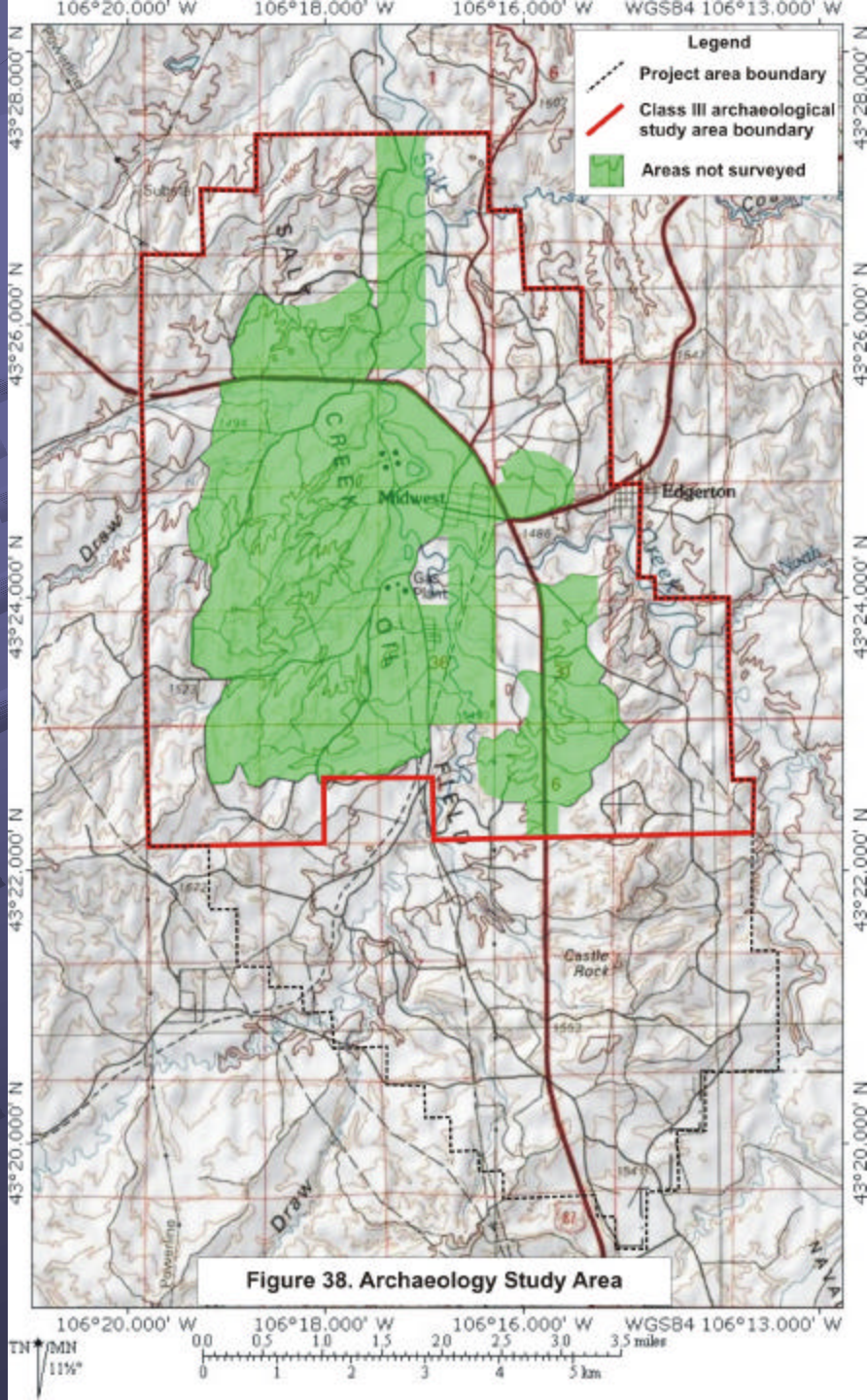


Figure 38. Archaeology Study Area

Salt Creek CO2 Enhanced Oil Recovery Project
Wyoming

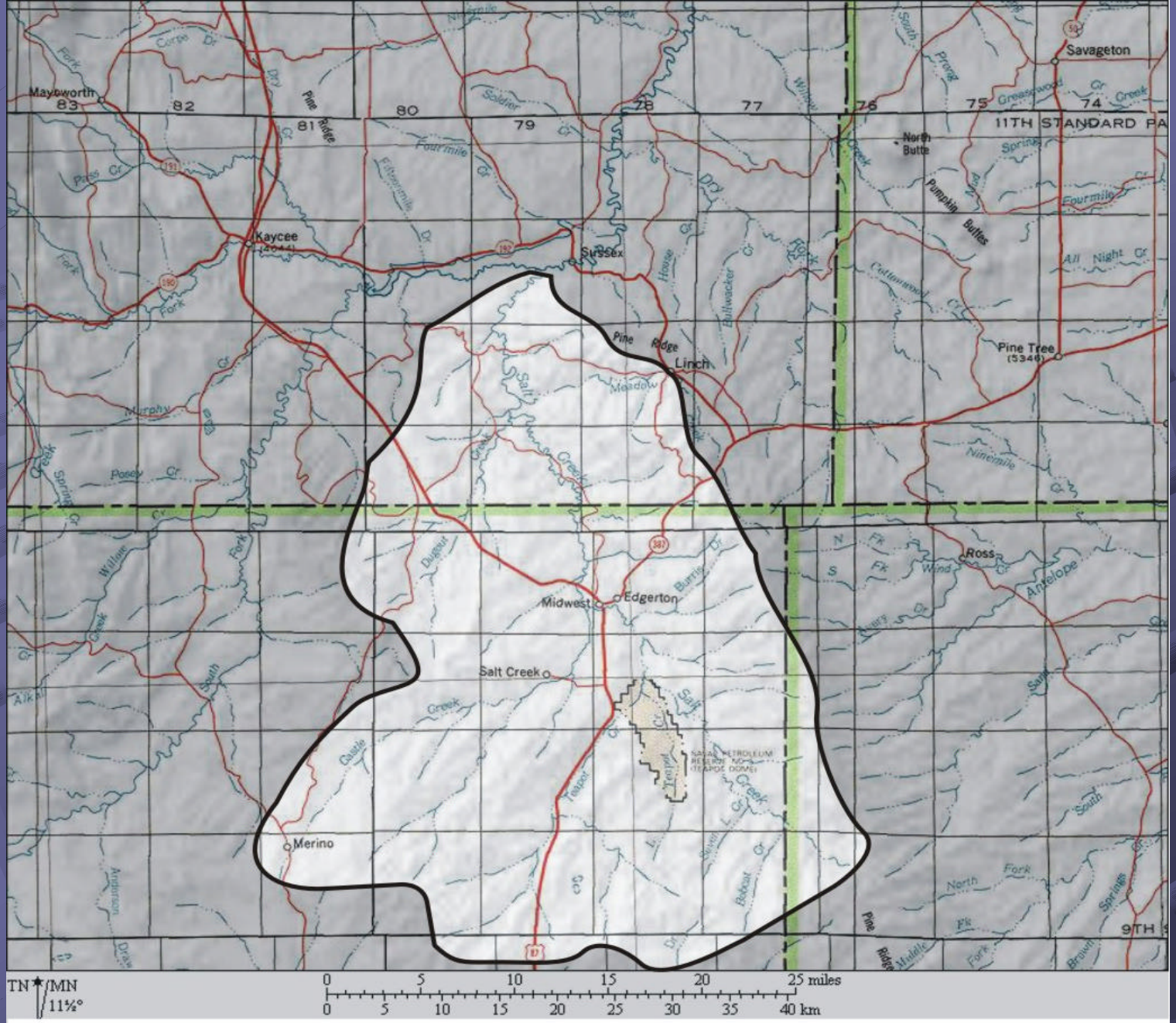


Figure 15. Salt Creek Watershed Map

Salt Creek in Flood Stage

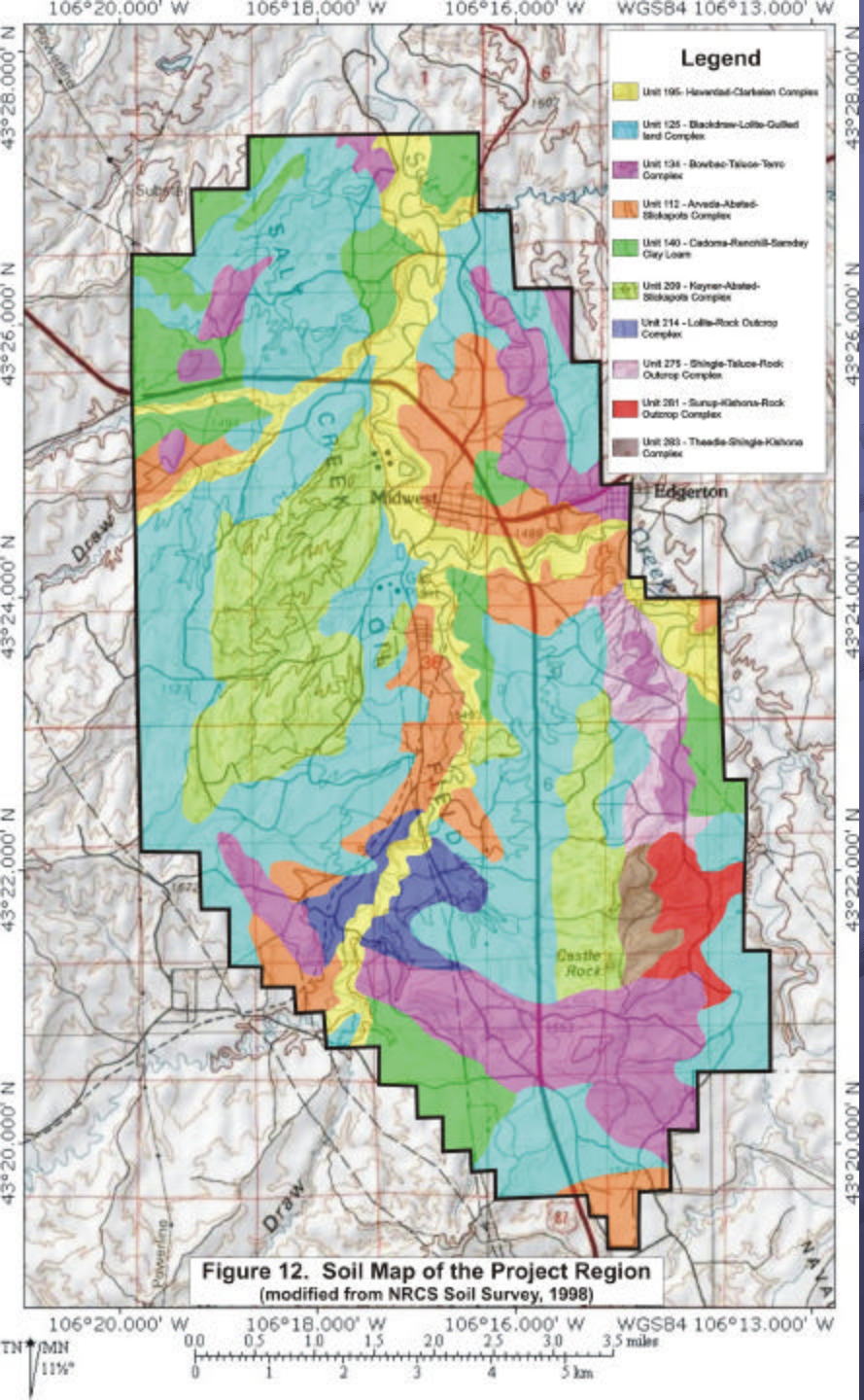


Figure 12. Soil Map of the Project Region
(modified from NRCS Soil Survey, 1998)

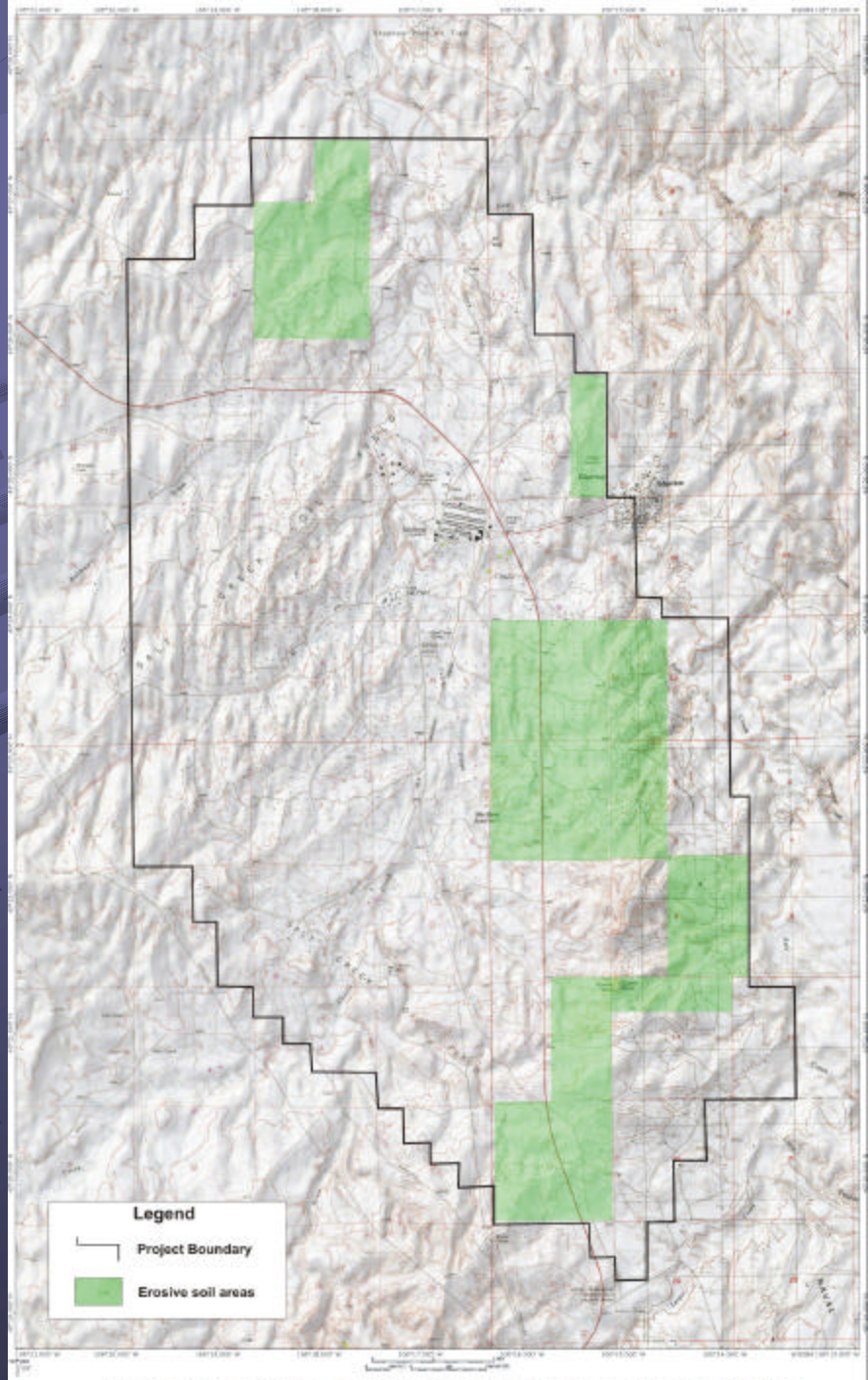
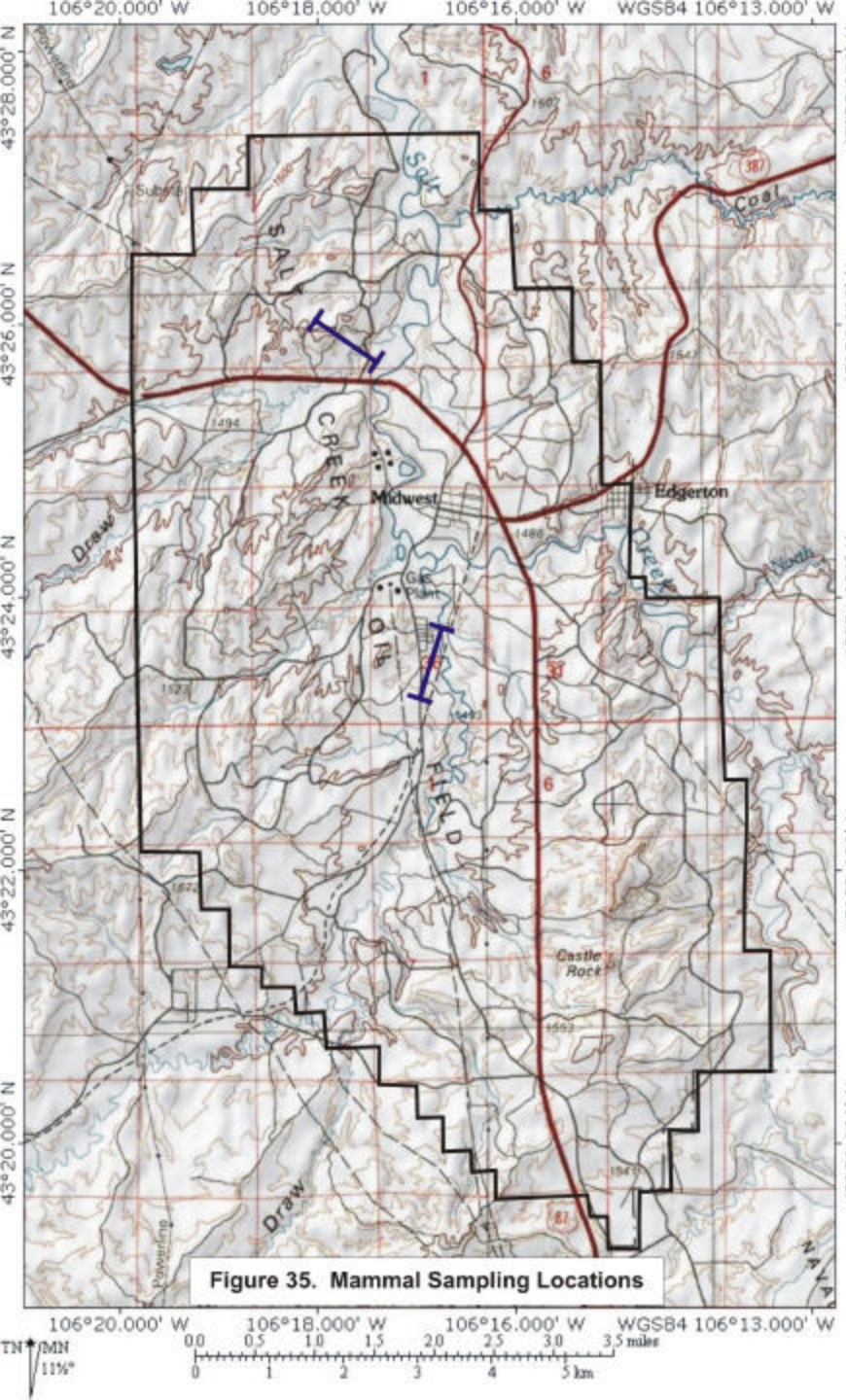
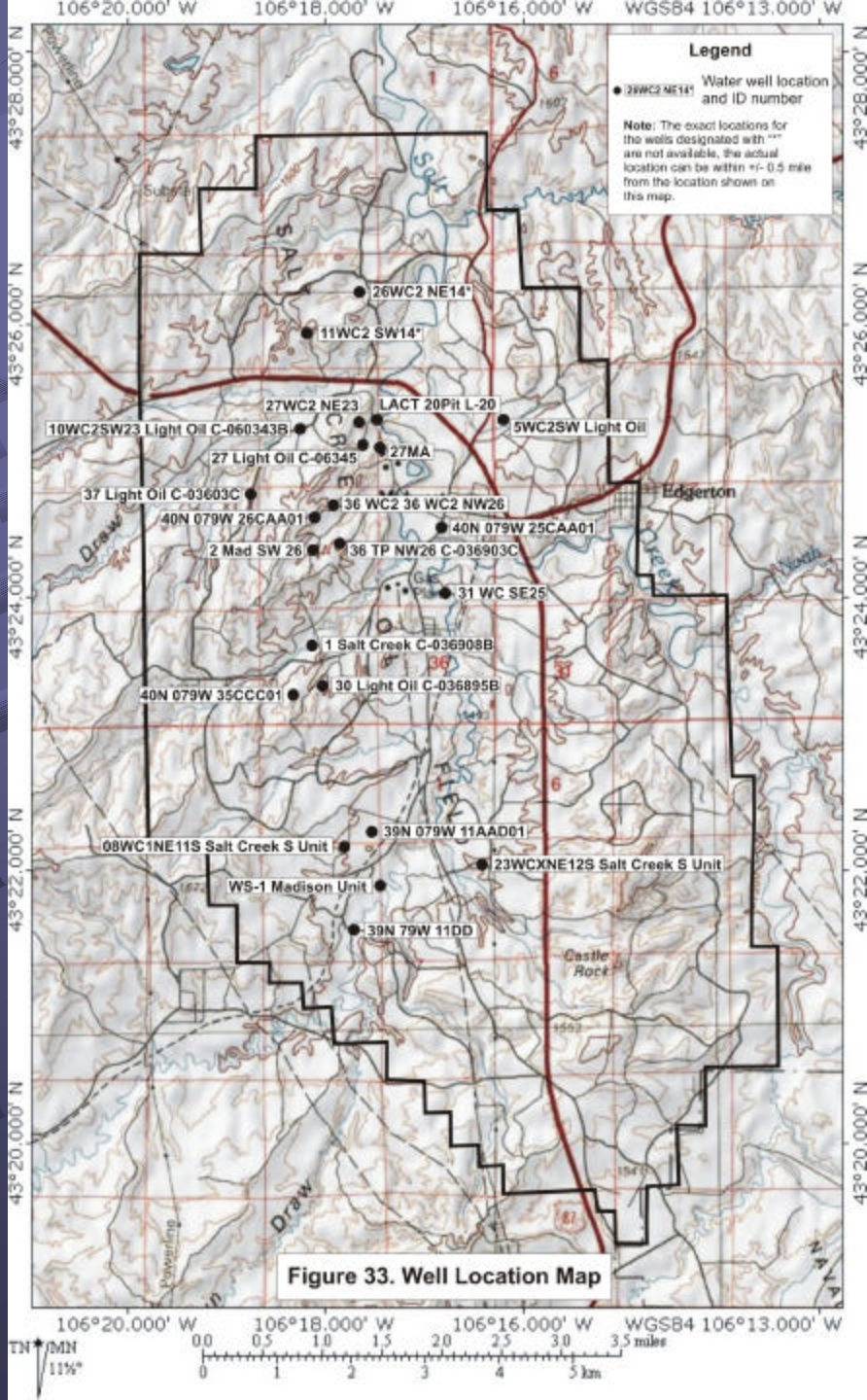


Figure 14. Locations of Highly Erosive Soils in the Project Region


Prairie Dogs and Black Footed Ferrets


106°20.000' W
106°18.000' W
106°16.000' W
WGSB4 106°13.000' W
43°28.000' N
43°26.000' N
43°24.000' N
43°22.000' N
43°20.000' N
Midwest
Edgerton
Castle Rock
Draw
Coal
Figure 35. Mammal Sampling Locations
TN
MN
11½°
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 miles
0 1 2 3 4 5 km

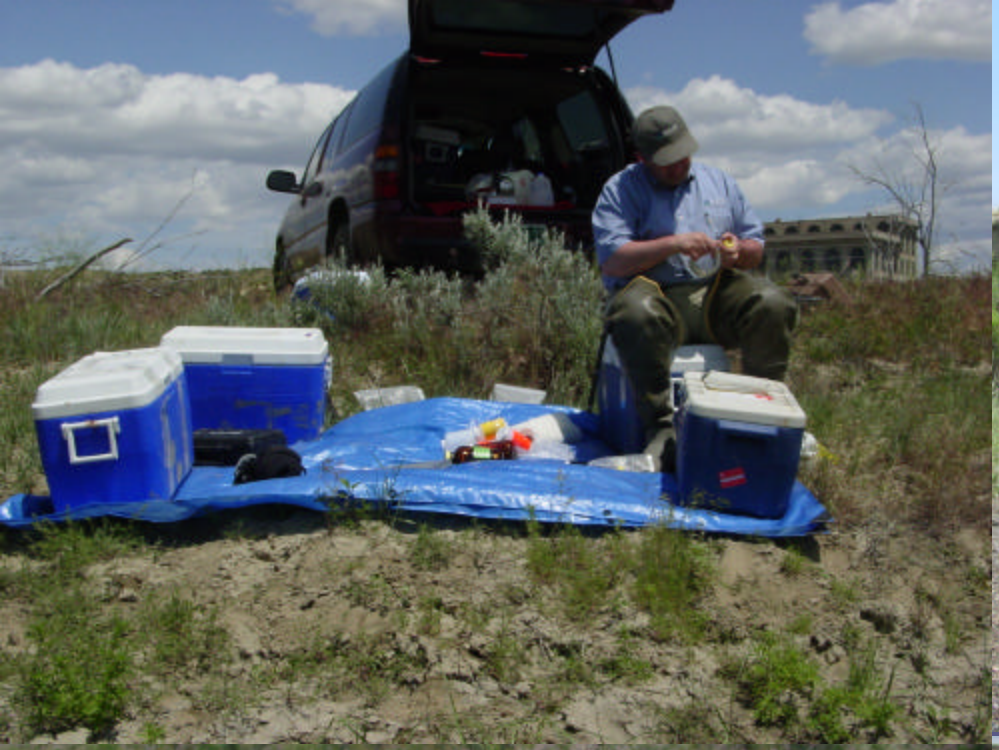

Legend
Water well location and ID number
Note: The exact locations for the wells designated with "*" are not available, the actual location can be within +/- 0.5 mile from the location shown on this map.
26WC2 NE14*
11WC2 SW14*
27WC2 NE23
LACT 20Pit L-20
10WC2SW23 Light Oil C-060343B
5WC2SW Light Oil
27 Light Oil C-06345
27MA
37 Light Oil C-03603C
36 WC2 36 WC2 NW26
40N 079W 26CAA01
40N 079W 25CAA01
2 Mad SW 26
36 TP NW26 C-036903C
31 WC SE25
1 Salt Creek C-036908B
30 Light Oil C-036895B
40N 079W 35CCC01
39N 079W 11AAD01
08WC1NE11S Salt Creek S Unit
23WCXNE12S Salt Creek S Unit
WS-1 Madison Unit
39N 79W 11DD
Midwest
Edgerton
Castle Rock
Draw
Figure 33. Well Location Map
106°20.000' W
106°18.000' W
106°16.000' W
WGSB4 106°13.000' W
43°28.000' N
43°26.000' N
43°24.000' N
43°22.000' N
43°20.000' N
TN
MN
11½°
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 miles
0 1 2 3 4 5 km


WYOMING
SALT CREEK OIL FIELD
STOCKMAN WERE AWARE OF POOLS OF OIL IN THE CREEK
BOTTOMS DURING CATTLE TRAILING DAYS. THESE OIL SEEPS LED
TO THE DISCOVERY OF SALT CREEK, ONE OF WYOMING'S LARG-
EST OIL FIELDS, NINE MILES LONG BY FIVE MILES WIDE.
IN 1913, THE FIRST CLAIMS WERE FILED IN THE 22,000 ACRE
SALT CREEK FIELD. THE FIRST STRIKE IN THE FIELD OCCURRED
IN 1908 AT A DEPTH OF 1,650 FEET. MANY WELLS ARE STILL
ACTIVE. SALT CREEK WAS ONE OF THE FIRST UNITIZED OIL
FIELDS IN THE UNITED STATES. UNDER UNITIZATION ONE
COMPANY OPERATES PROPERTIES FOR ALL OWNERS AND MORE
EFFICIENT RECOVERY METHODS CAN BE USED. IMPROVED
PRACTICES IN SALT CREEK HAVE RECOVERED MANY ADDITIONAL
MILLIONS OF BARRELS OF OIL.



MIDWEST 1926


3 8 JHBB KAYCE 10AM
NO SCHOOL 10-14
SPRING BREAK
MIDWEST HIGH SCHOOL
Welcome
MIDWEST HIGH SCHOOL Oilers
DRUG FREE SCHOOL ZONE



Summary I

- Early interaction and scoping with Agencies and the key stakeholders, public disclosure
- Defined strategy and logistics for EA/EIS preparation and responsibilities
- Early digital data acquisition and review organized into web-based system accessible to all project team members
- Use of GIS, remote sensing, and other digital information and data
- Utilization of rapid biological assessment techniques

Summary II

- Adaptive and dynamic management strategy applied to data collection and analysis – focused on key issues and concerns, on development of ESIA and EMMP
- Maintain close working relationship with the Agency staff, management, and consultants
- Time is valuable, so track carefully, multitask, multi-track, and do not waste it!

Results

- Finding of No Significant Impact (FONSI)
- Under 6 months from start to finish
- Project installed and operating
- Performance exceeding expectations
- EMMP instituted and monitored
- Agency, client, and public satisfied
- The Fast-track NEPA process can be done effectively with proper approach and management

Thanks for your attention!

- On behalf of AATA International, Inc. and Anadarko Petroleum Corporation, we thank-you very much for your time, attention, and interest in Fast-track Environmental Assessment and Permitting.

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  - Bill Fowler, 832-636-5565
  - Email: bill_fowler@anadarko.com