South Dakota Public Utilities Commission

Big Stone II

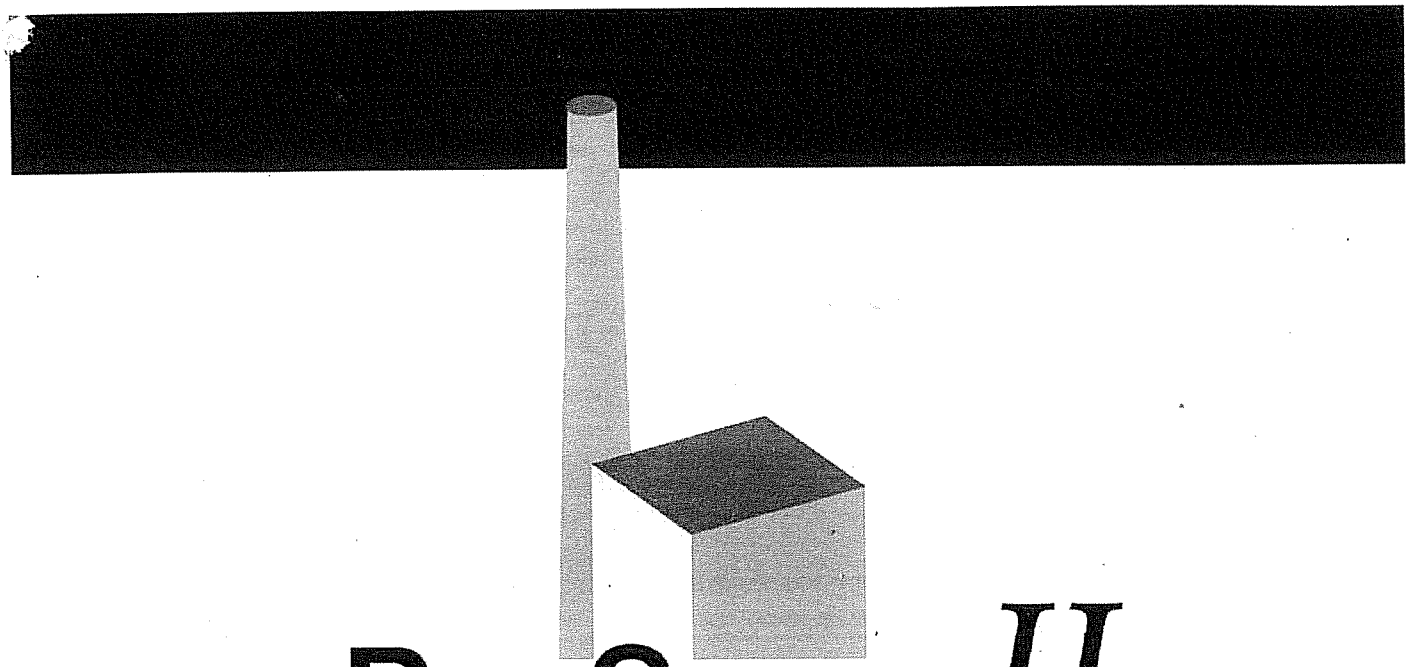
Energy Conversion Facility

Siting Permit

Public Hearing

September 13, 2005

EXHIBIT
1B
9-13-05



BIG STONE *II*

PARTNERS IN GENERATION

Big Stone II Co-owners

OTTER TAIL CORPORATION

MISSOURI RIVER ENERGY SERVICES

HEARTLAND CONSUMERS POWER DISTRICT

GREAT RIVER ENERGY

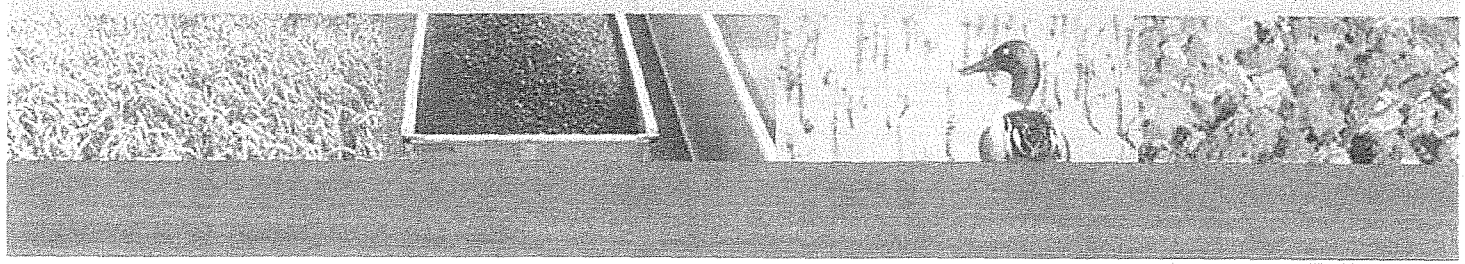
MONTANA-DAKOTA UTILITIES CO.
A Division of MDU Resources Group, Inc.

Southern Minnesota Municipal Power Agency

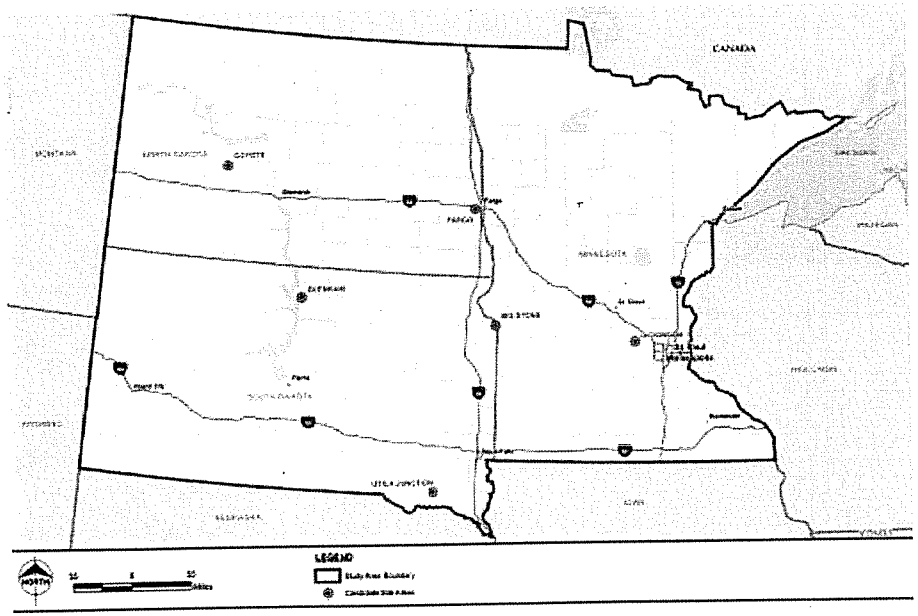
CLPA

Energy Sources Considered

- Wind
- Super-critical pulverized coal
- Atmospheric circulating fluidized bed
- Integrated gasification combined cycle
- Combined cycle gas turbine (natural gas)



Big Stone II Alternative Site Evaluation Study

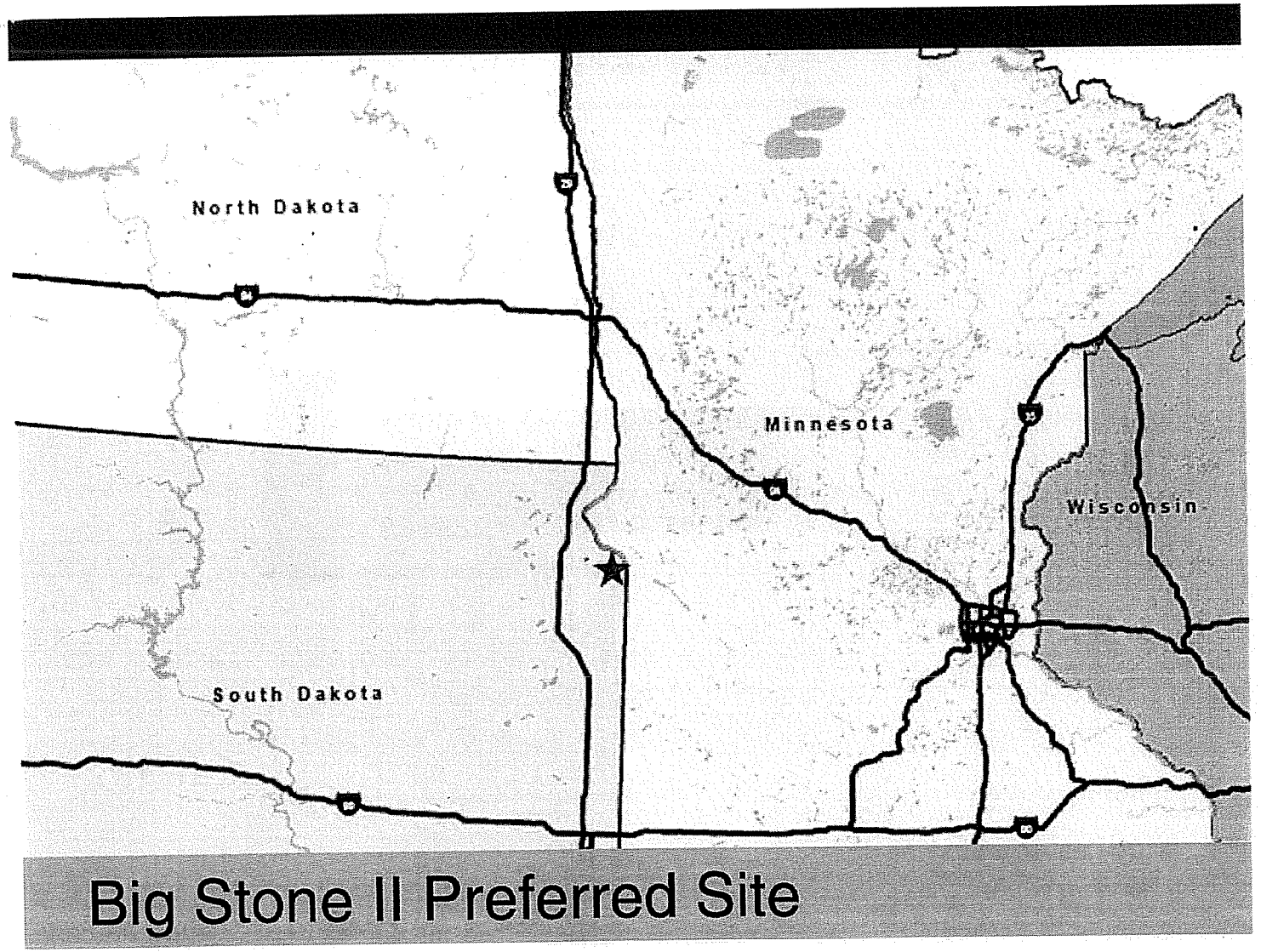


Candidate Sites

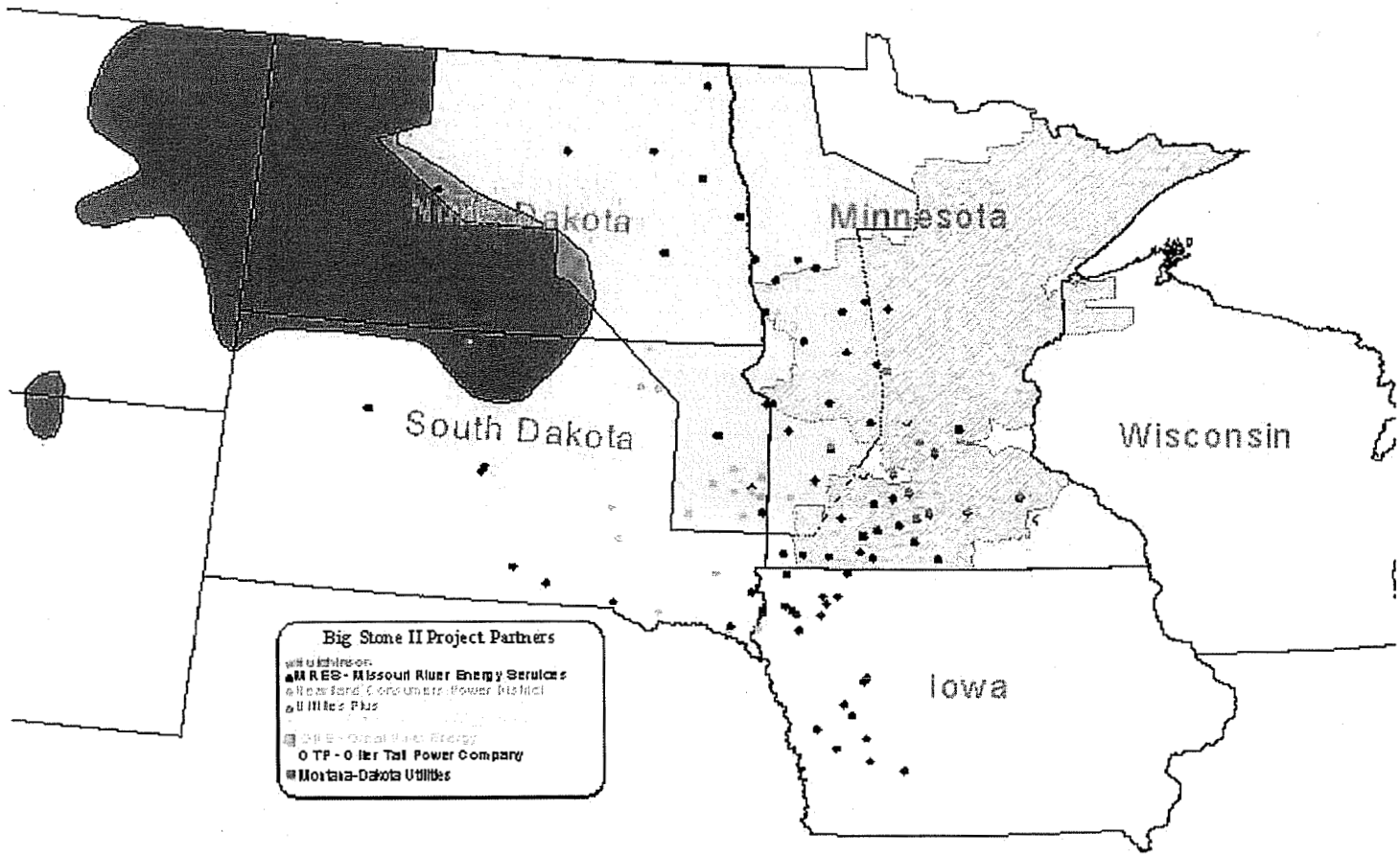
- Big Stone – Grant County, South Dakota
- Coyote – Mercer County, North Dakota
- Dickinson – Wright County, Minnesota
- Fargo – Cass County, North Dakota
- Glenham – Walworth County, South Dakota
- Utica Junction – Yankton County, South Dakota

Site evaluation criteria

- Air Impacts: Class I Area and Airspace Restrictions
- Water Supply: Surface Water Proximity and Water Supply Potential
- Environmental: Socioeconomics, Land Use Compatibility, Protected Species Impacts, Noise Impacts, and Wetlands
- Fuel Supply: Rail Line/Mine Proximity, Fuel Delivery Competition, and Reagent Delivery
- Transmission: Proximity to Interconnection Point and Expected System Impacts
- Other: Highway Access, Land Availability and Common Facilities/Staff

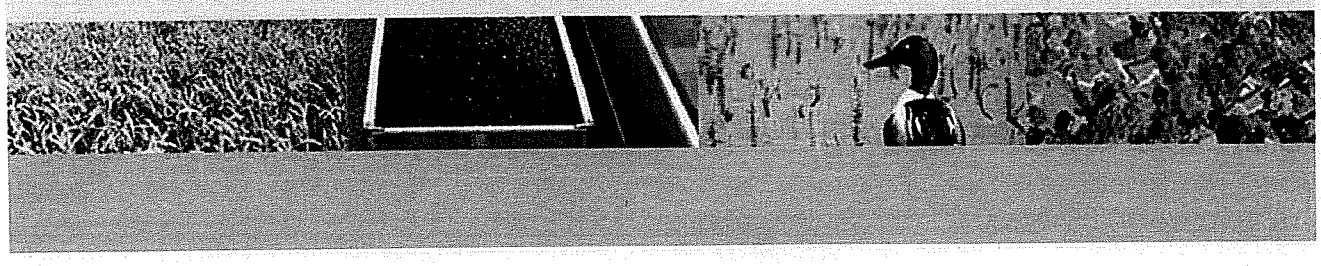


Big Stone II Preferred Site



Co-owners' Service Territories

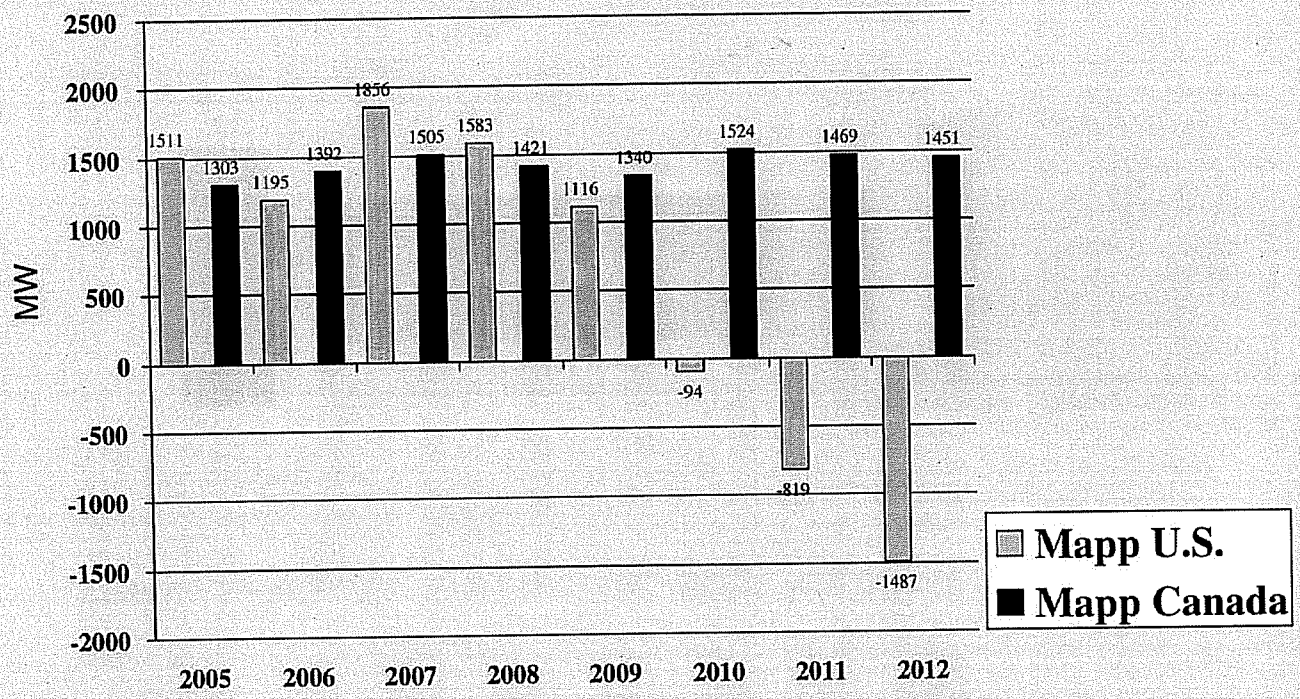
Facility Need



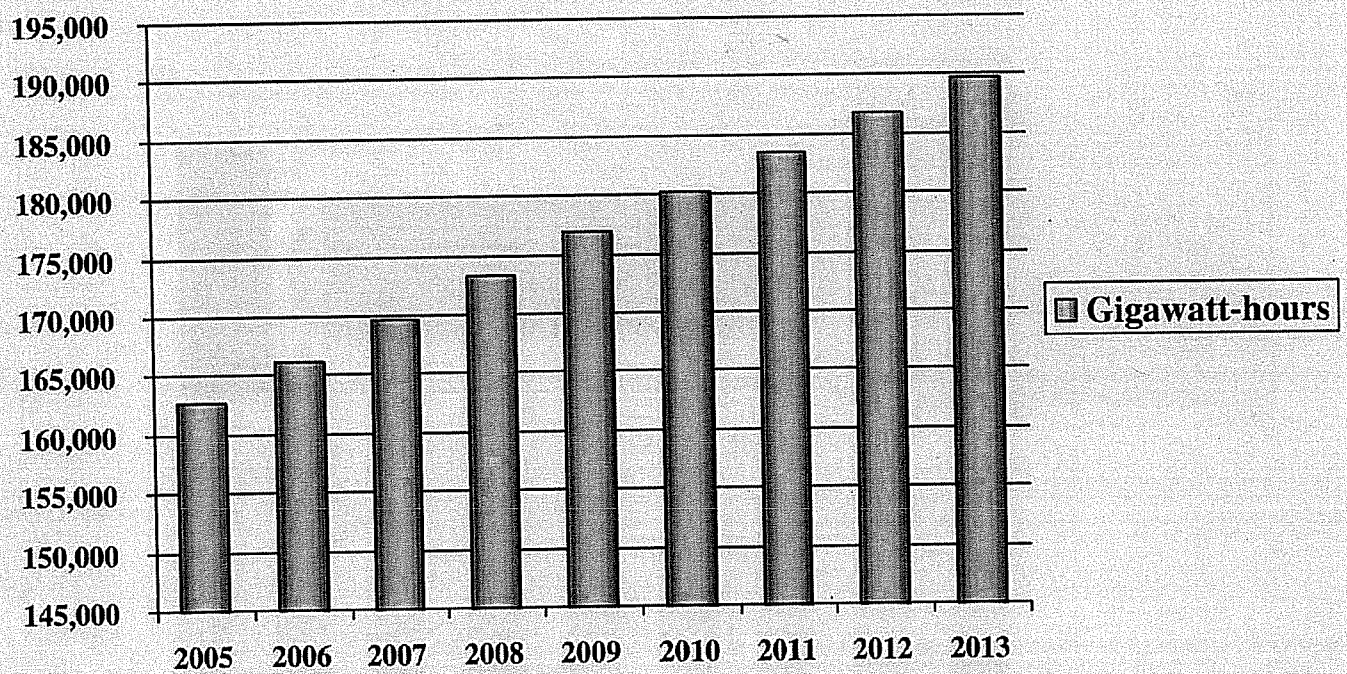
MAPP Region


Saskatchewan
Manitoba
Montana
North Dakota
Minnesota
Wisconsin
Wyoming
South Dakota
Nebraska
Iowa
Illinois
Colorado
Kansas
Missouri

MAPP Surplus/Deficit Forecast



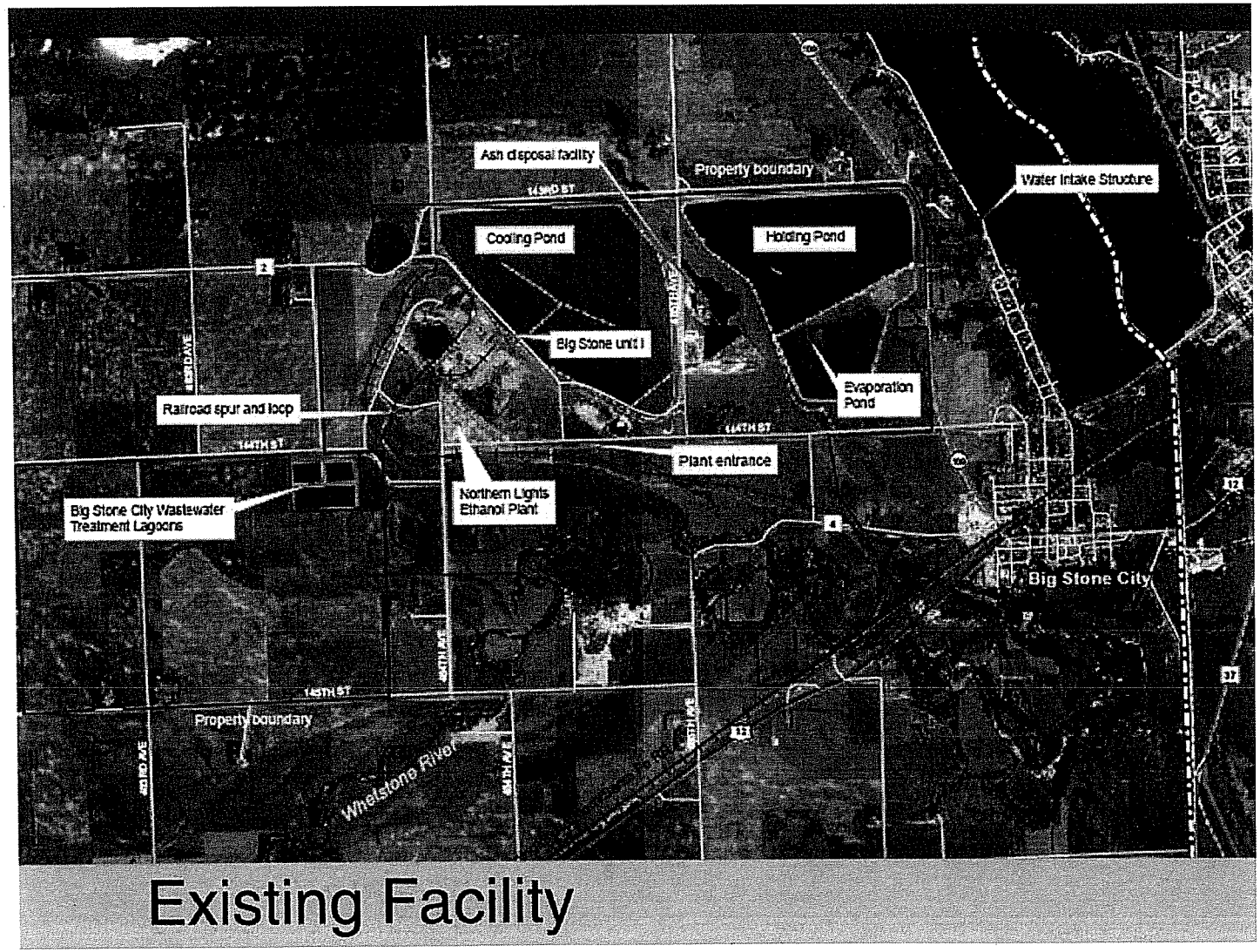
MAPP U.S. Annual Net Energy Forecast



Baseload, Intermediate and Peaking Facility Relative Cost

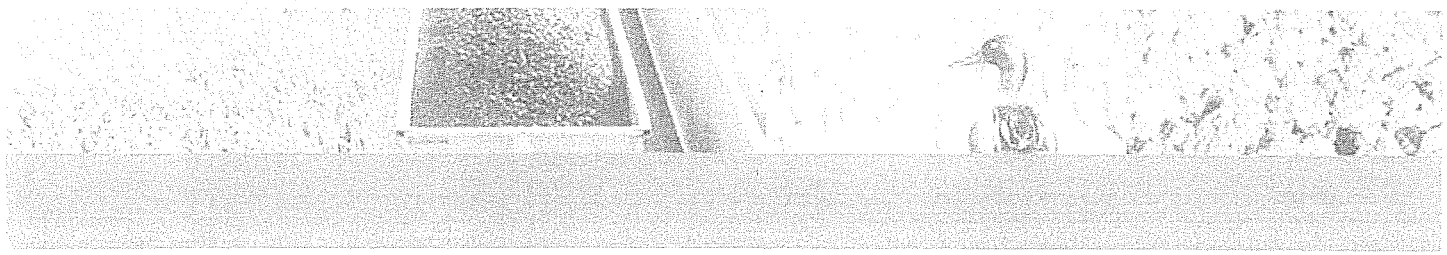
Type of Generation	Capital Cost	Fuel Cost	Typical Energy Production
Peaking	Low	High	Low
Intermediate	Medium	Medium	Medium
Baseload	High	Low	High

Project Description

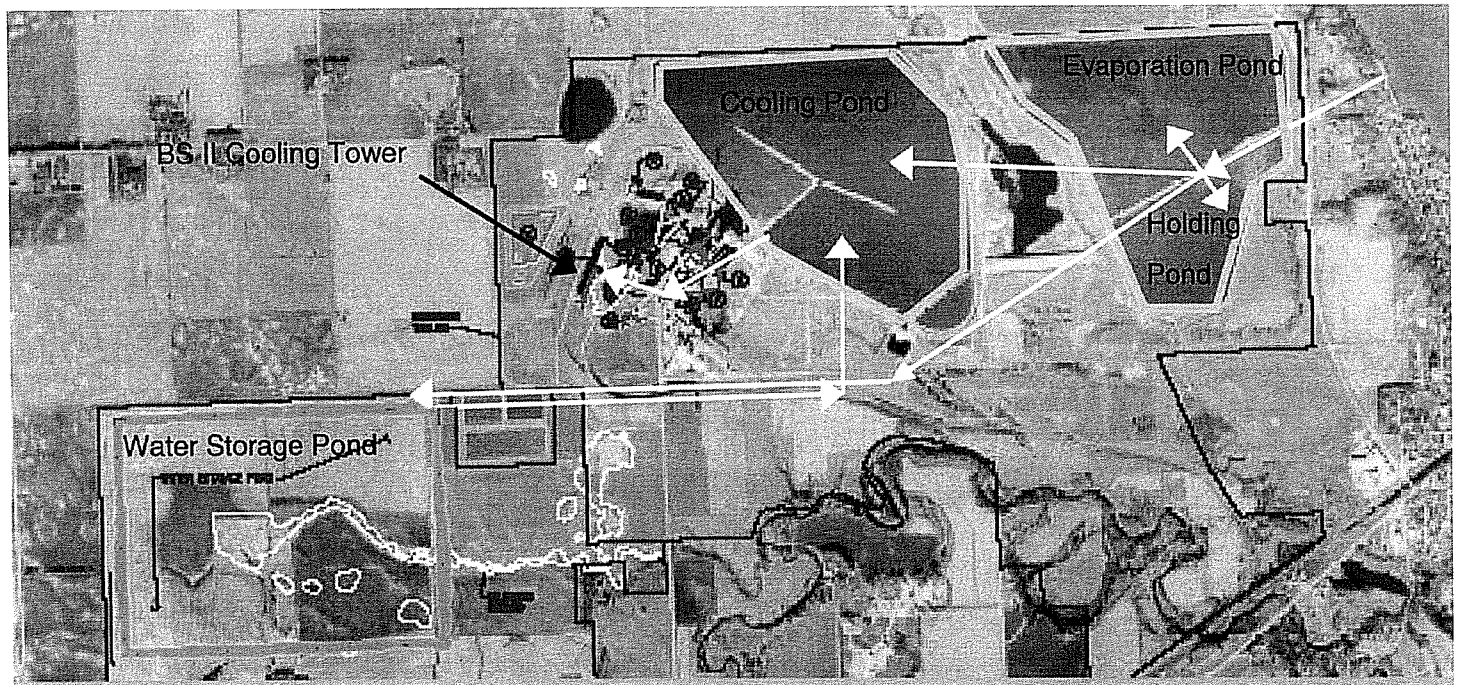

Ash disposal facility
Property boundary
Water Intake Structure
Cooling Pond
Holding Pond
Big Stone unit I
Evaporation Pond
Railroad spur and loop
Plant entrance
Northern Lights Ethanol Plant
Big Stone City Wastewater Treatment Lagoons
Big Stone City
Property boundary
Whetstone River
Existing Facility

Opportunities to Share Existing Infrastructure

- Cooling water intake structure, pumping system and delivery line
- Plant road and rail spur
- Coal unloading facilities
- Solid waste disposal facilities



Big Stone Site

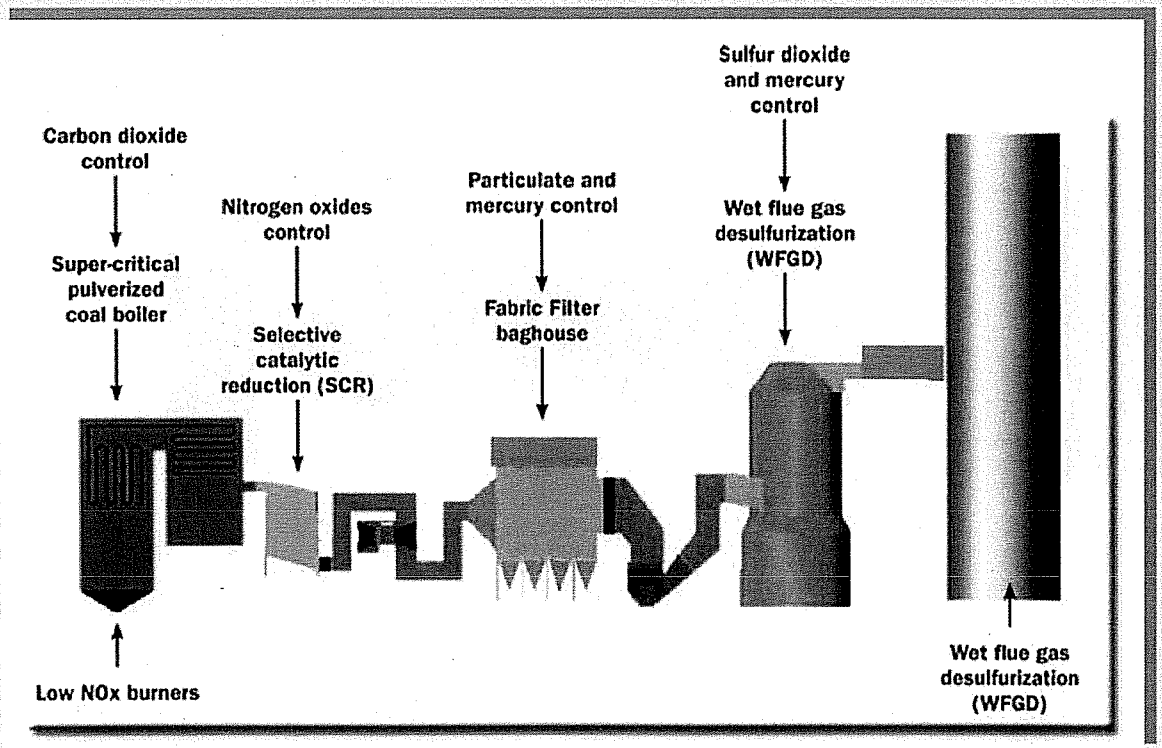


Big Stone Site – Water Appropriations and Storage

10,902 Ac*ft - design annual usage

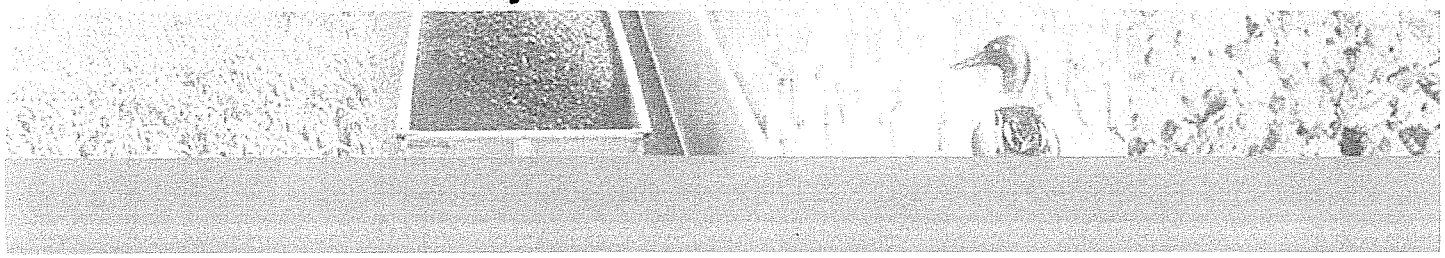
- **Holding pond capacity: 965 Ac*ft**
- **Evaporation Pond Capacity: 1,436 Ac*ft**
- **Water storage pond capacity: 9,900 Ac*ft**
- **Cooling pond useable storage capacity: 3,000 Ac*ft (5440 ac*ft total)**
- **Total site useable storage capacity current design: 15,300 Ac*ft**

Emissions Control Technology



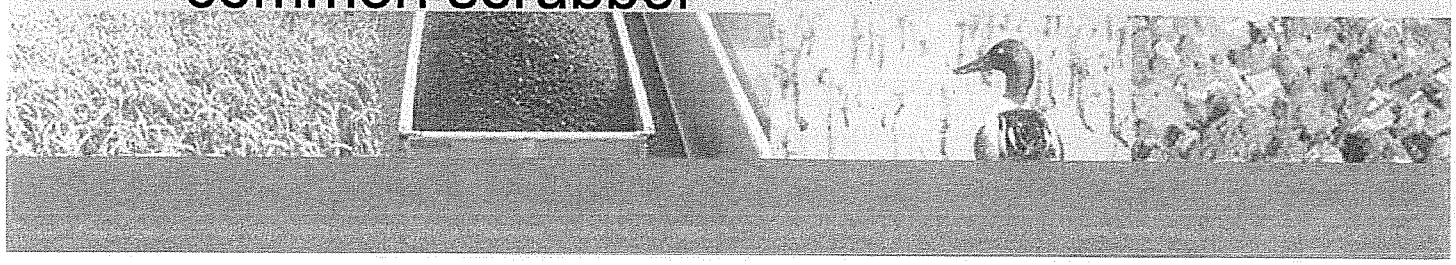
Wet Scrubber

- Historically, dry scrubbers used to remove sulfur dioxide when burning subbituminous coal
- Wet scrubbers are more expensive
- However, wet scrubbers offer
  - More efficient SO2 removal
  - More efficient mercury control
  - Saleable fly ash



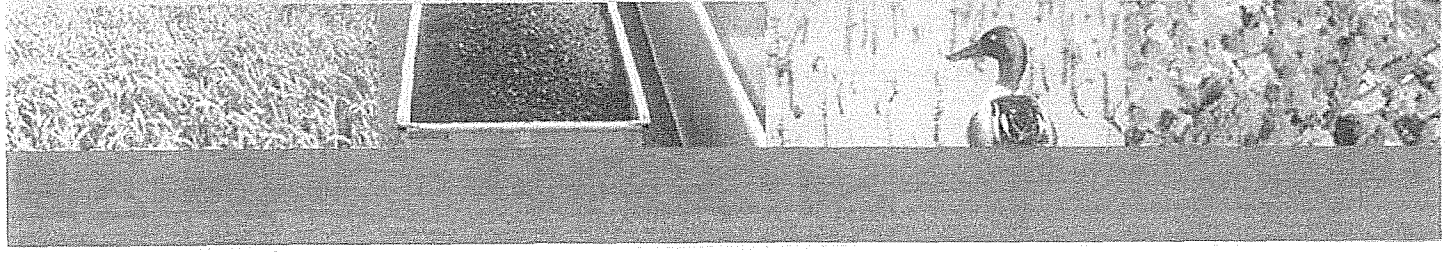
Joint Scrubber Possible Because of Wet Scrubber Technology

- Double the size of the scrubber but only 60% increase in cost
- Able to share some equipment and the benefits of redundancy of other components
- Lower per megawatt hour cost for common scrubber



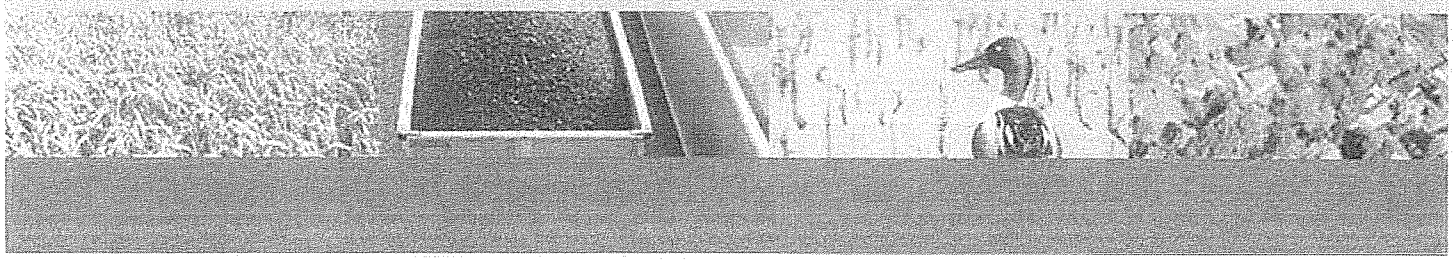
Nitrogen Oxides Control

- Commitment to add Big Stone II and not increase nitrogen oxides emissions from the Big Stone Plant site
- Make Big Stone Plant unit I operational changes to its lower nitrogen oxides emissions
- May also require equipment changes

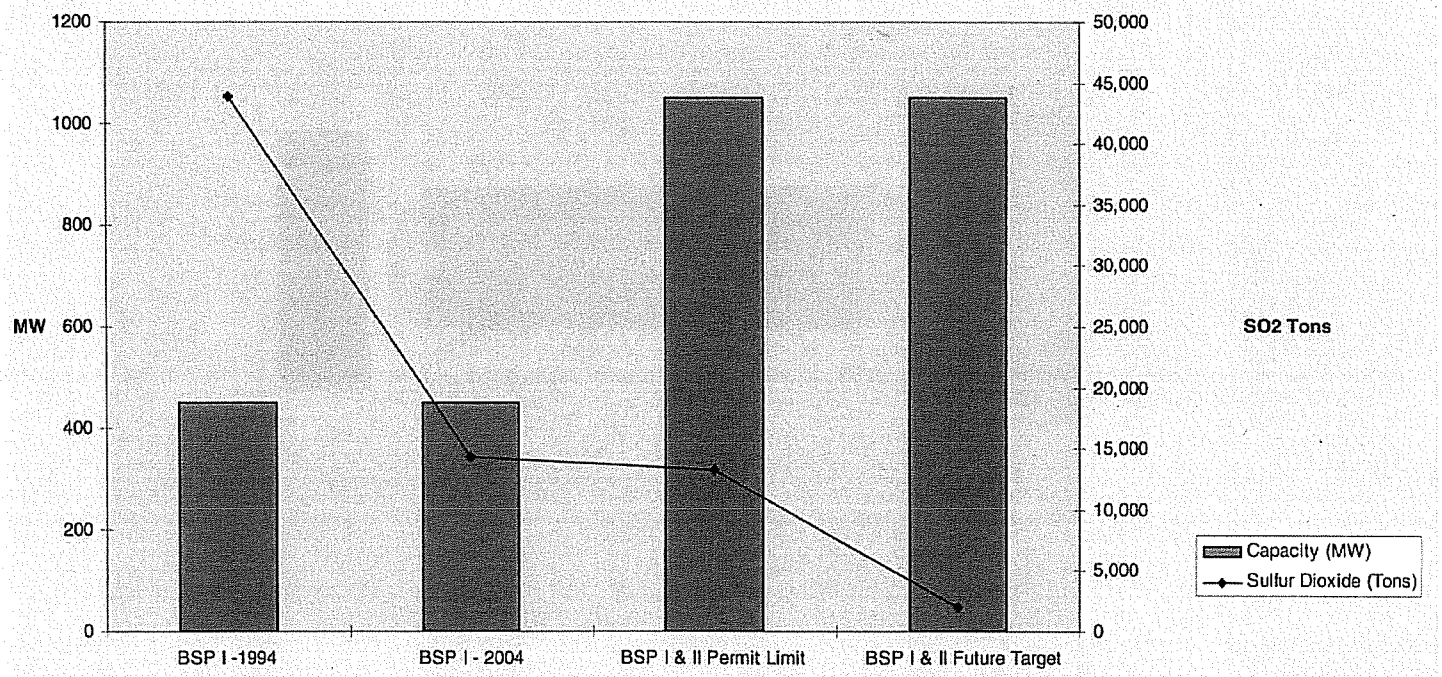


Emissions Control Summary

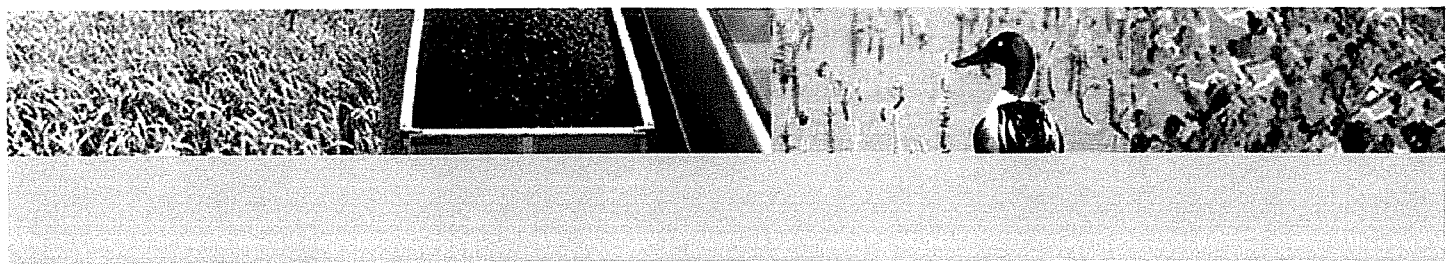
- Sulfur dioxide, nitrogen oxides, and mercury emissions from both units are targeted to be less than or equal to Unit I's emissions in 2004.



Sulfur Dioxide Emissions

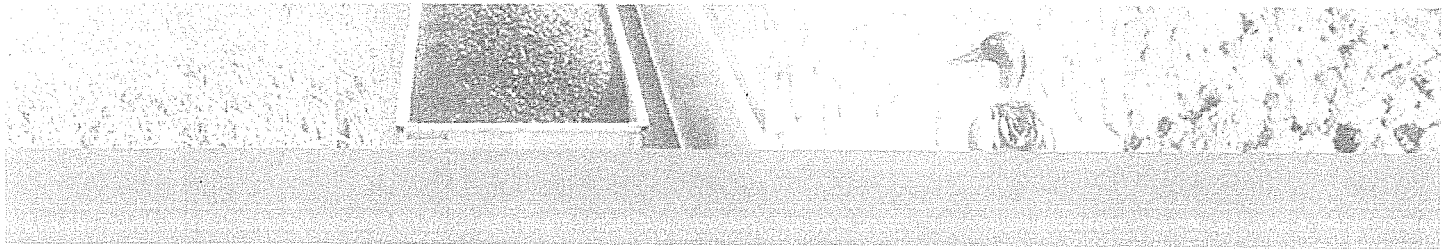


Environmental Information



Environmental Impacts

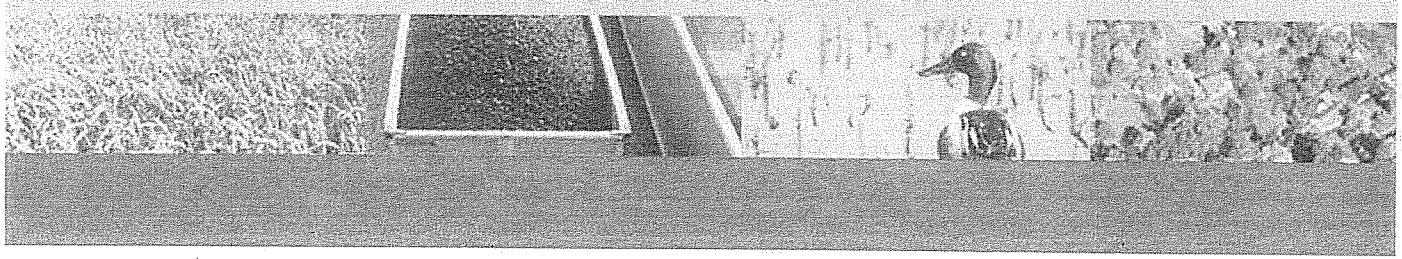
- Physical Environment
- Hydrology
- Terrestrial Ecosystems
- Aquatic Ecosystems
- Land Use
- Water Quality
- Air Quality
- Solid and Radioactive Waste



Environmental Impacts
Physical Environment

- Land forms and topography
- Geology
- Soils and Economic Deposits
- Erosion and Sedimentation

Impacts primarily limited to new storage pond area-most other activity within existing plant site

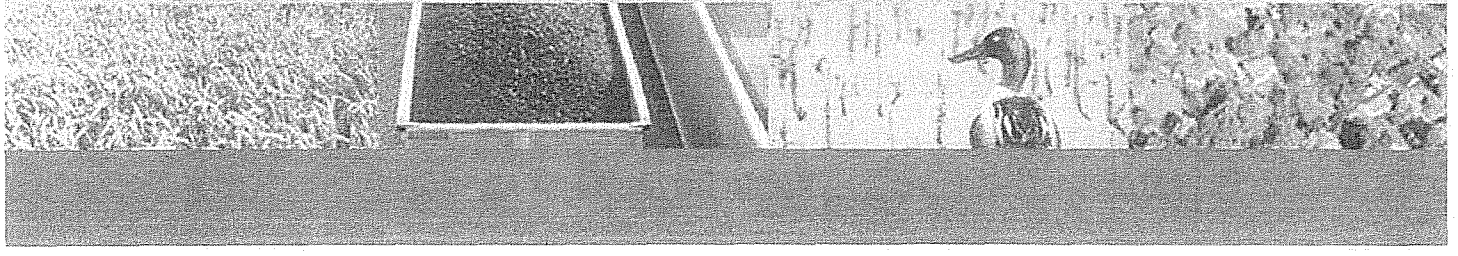


Environmental Impacts
Hydrology

- Surface Water Drainage
- Water Use and Sources

Impacts to drainage primarily limited to new storage pond area

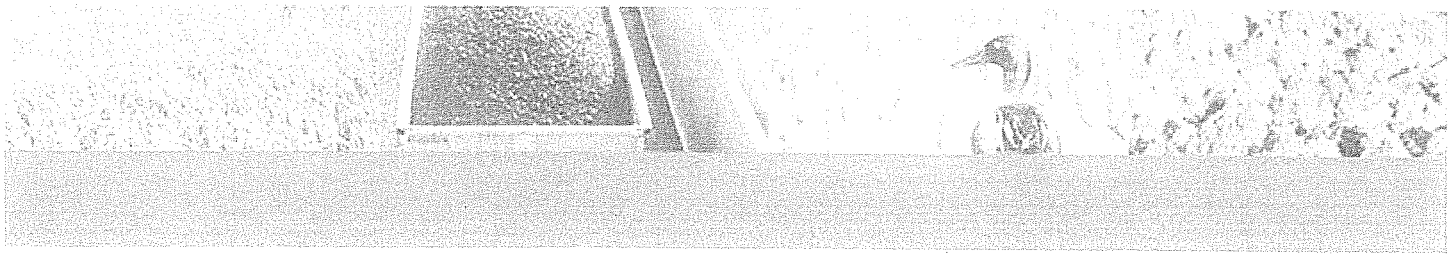
Increased water needs can be met within existing operational constraints on Big Stone Lake withdrawal

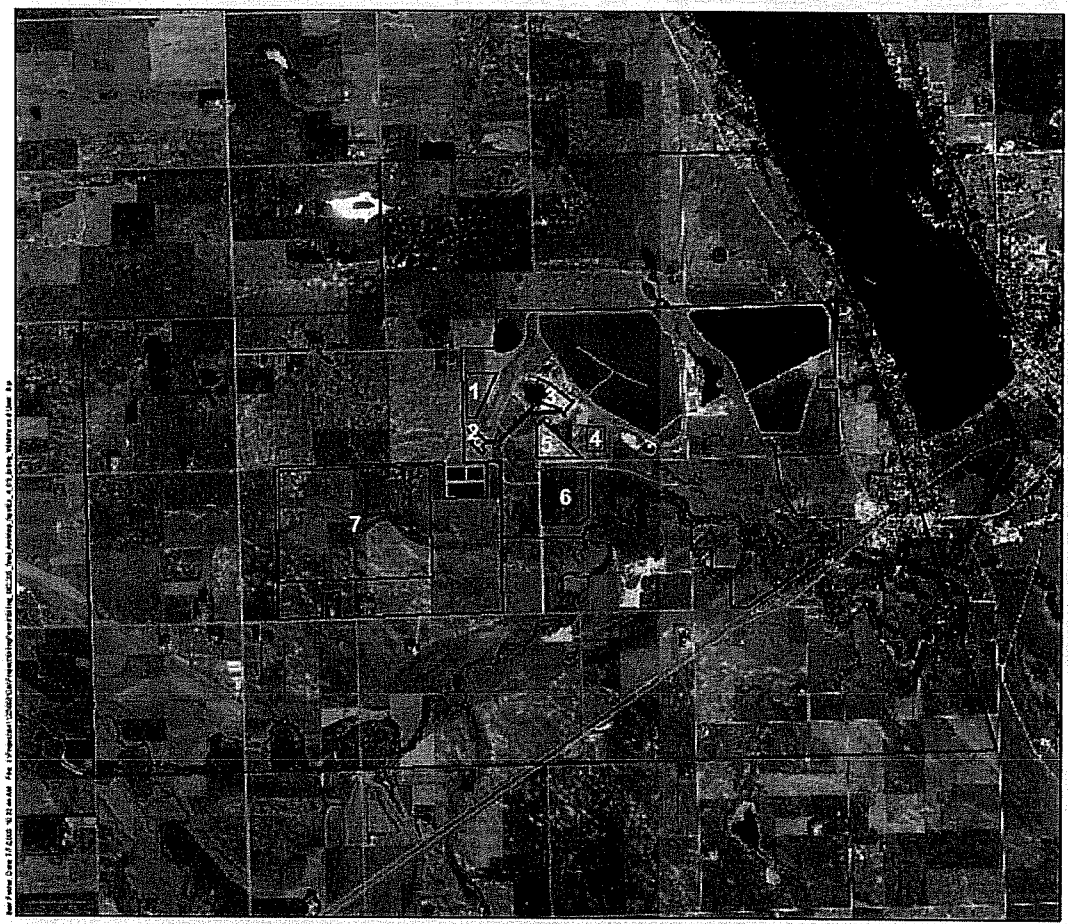


Environmental Impacts
Terrestrial Ecosystems

- Vegetation Communities
- Wildlife
- Threatened and Endangered Species

No adverse impacts are expected





Property Boundary
Extended Study Area

Project Features

ID

1 Cooling Tower Blowdown Pond
2 Cooling Tower
3 New Plant
4 Construction Parking
5 Ethanol Plant
6 Construction Laydown
7 Makeup Storage Pond
Bald Eagle Nest

Field observations made by Barr Engineering Company; South Dakota Natural Heritage Database query completed on September 24, 2004 by the SD Department of Game, Fish and Parks.

N

0.5 0 0.5 1 1.5
Miles

0 0.5 1 1.5 2 2.5
Kilometers

Exhibit 4-9

WILDLIFE
Big Stone II Project
Big Stone II Co-owners

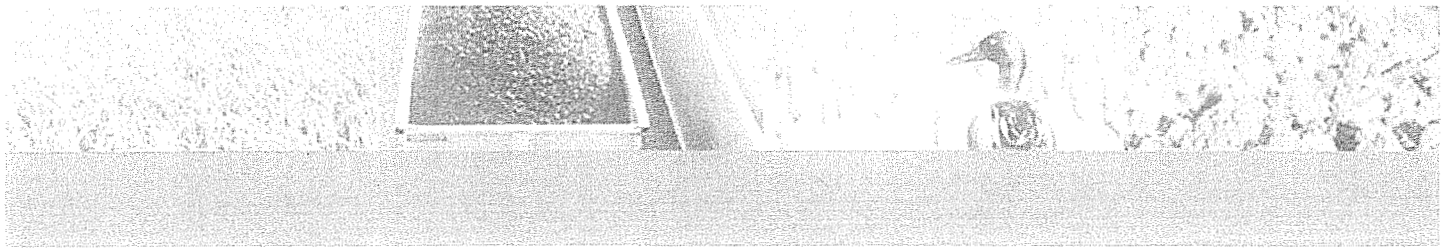
Big Stone II Wildlife

Environmental Impacts
Aquatic Ecosystems

- Fisheries
- Wetlands

No adverse impacts to fisheries are expected

Wetland impacts addressed through USACOE permitting process

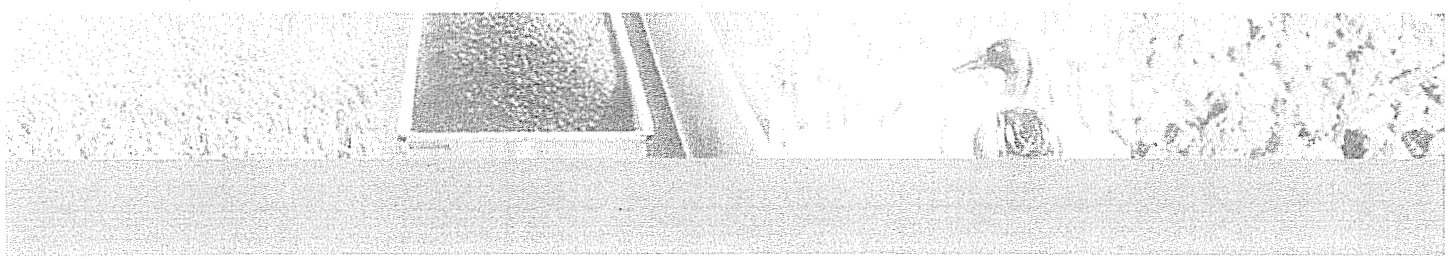


Environmental Impacts
Land Use and Land Use Controls

- Existing Land Use
- Noise

New unit takes advantage of existing industrial land use and infrastructure

Incremental noise impact modeled as insignificant



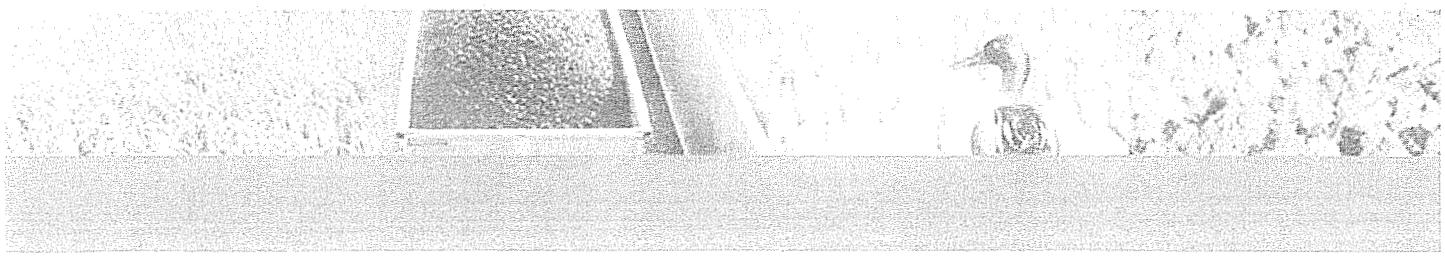
Environmental Impacts
Water Quality

- Whetstone River System
- New Makeup Storage Pond
- Stormwater Management

No impacts expected to Whetstone River

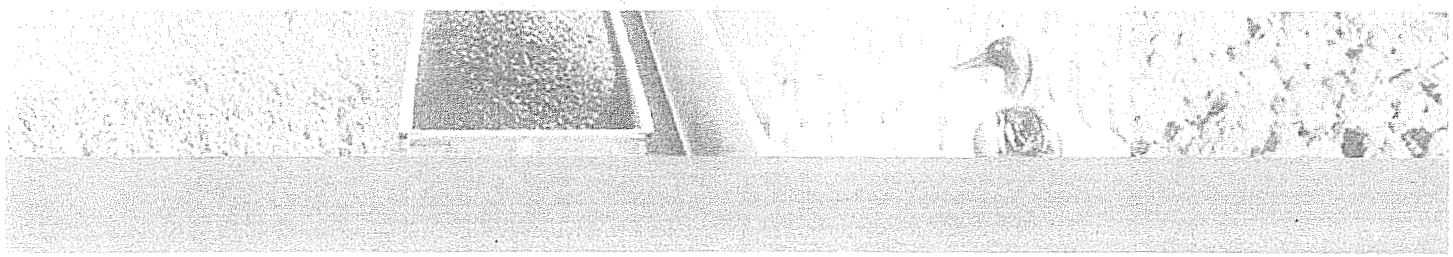
New pond water quality expected to be similar to area shallow lakes

Stormwater will be managed through SWPPP



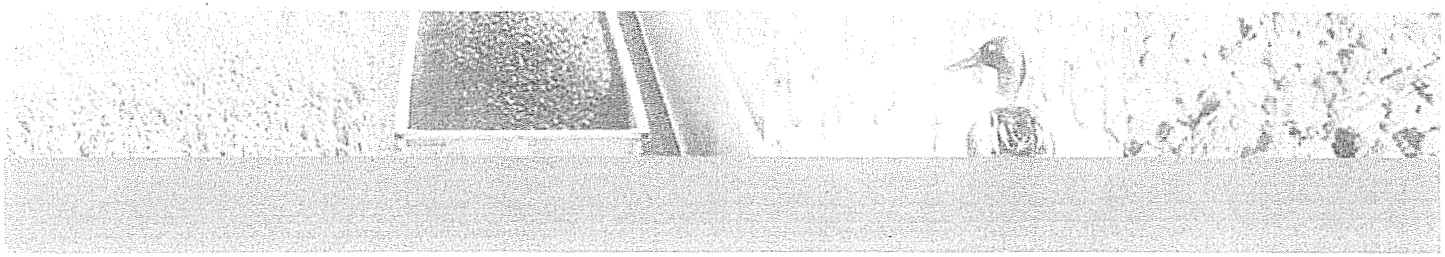
Environmental Impacts
Air Quality

- Common scrubber – no increase in sulfur dioxide emissions
- No increase in nitrogen oxide emissions
- Best available control technology for particulate matter emissions
- Targeted mercury emissions at 2004 levels



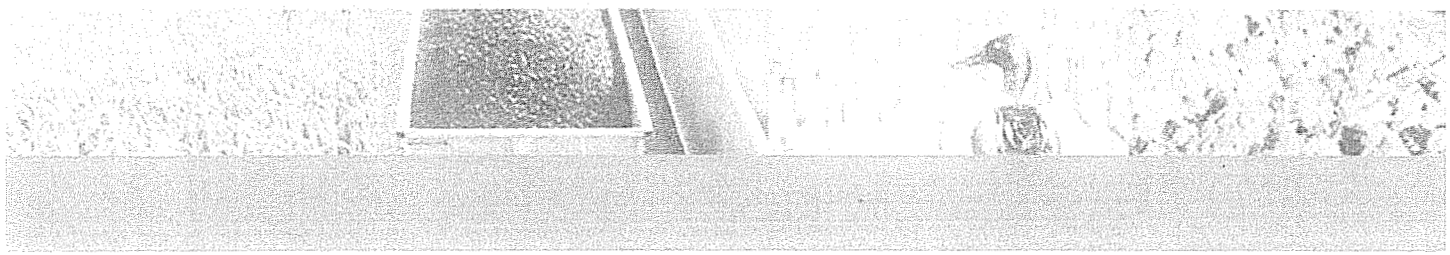
Environmental Impacts
Solid Waste

Propose to use existing permitted solid waste disposal facility



Community Impacts

- Economic Impacts
- Infrastructure Impacts
- Community Services
- Population and Demographics
- Cultural Resources



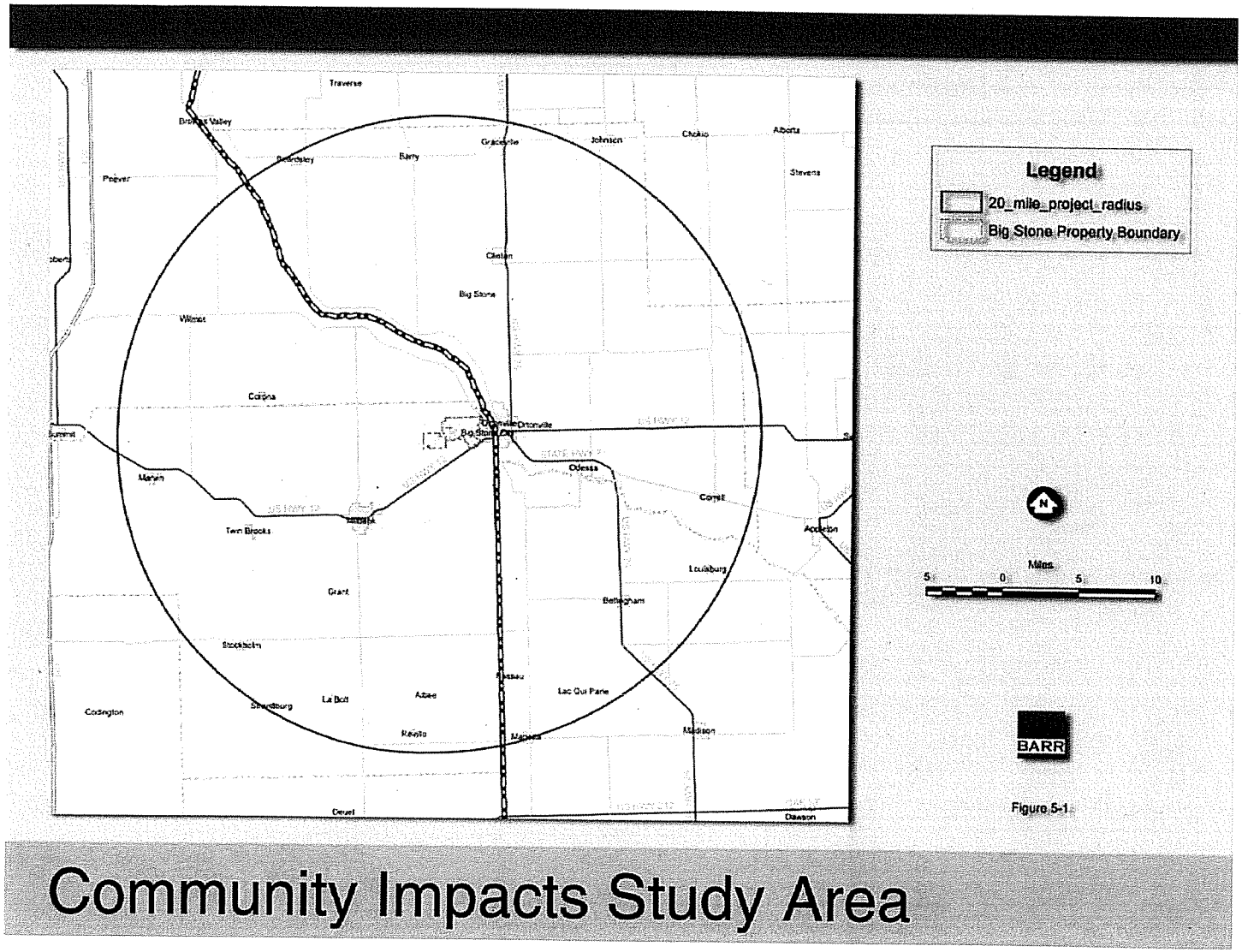


Figure 5-1

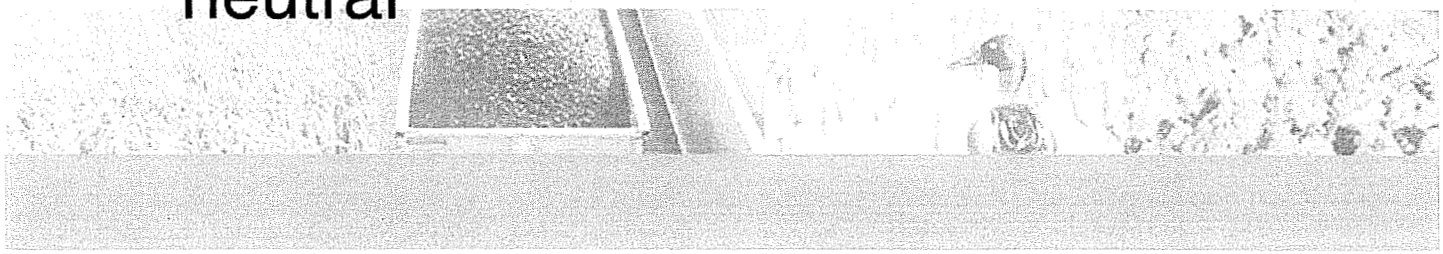
Community Impacts Study Area

Community Impacts

Economic Impacts

- Employment (temporary and permanent)
- Agriculture
- Commercial and Industrial Sectors
- Land Values
- Taxes

Impacts expected to be positive or neutral



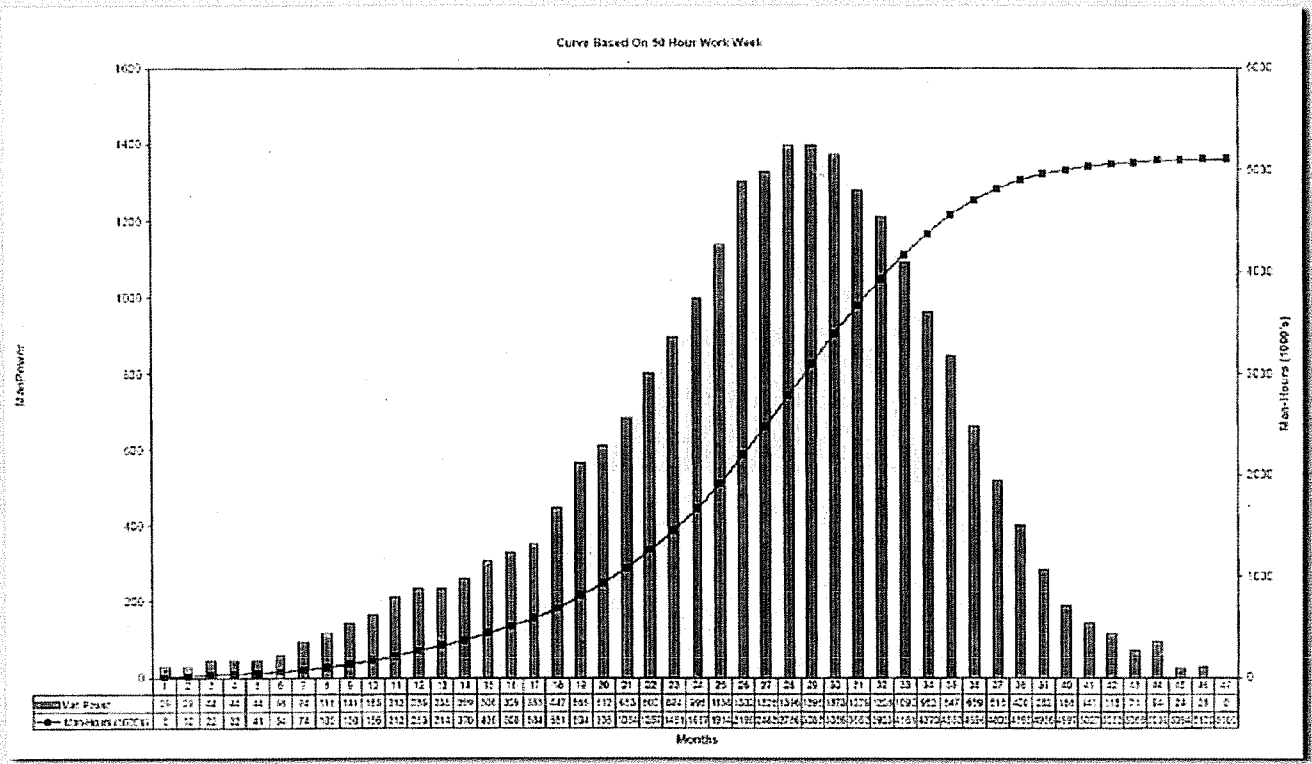


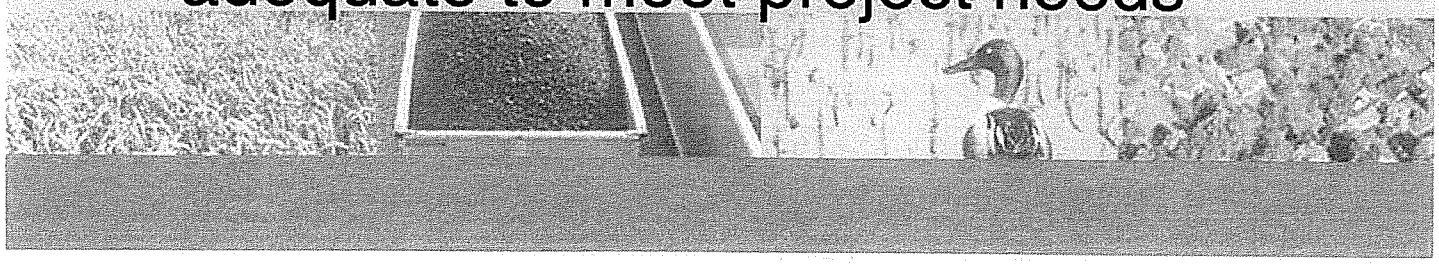
Exhibit 5-2

Estimated Construction Labor Requirement

Community Impacts
Infrastructure Impacts

- Housing
- Energy
- Sewer and Water
- Solid Waste Management
- Transportation

Existing infrastructure generally adequate to meet project needs

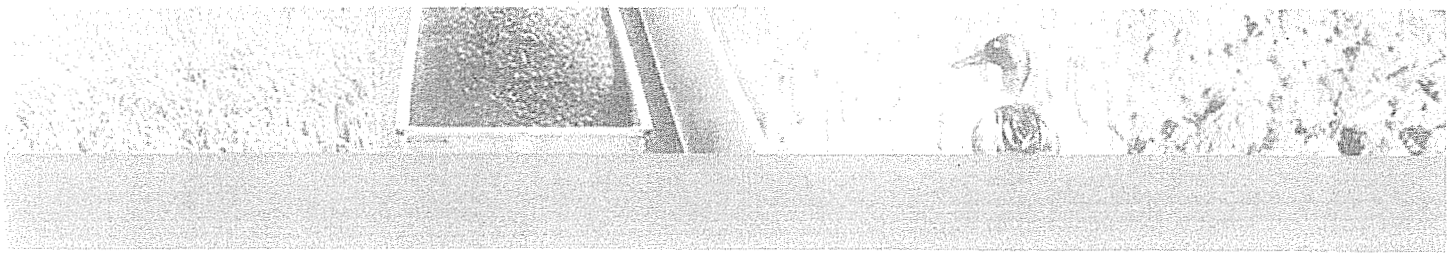


Community Impacts

Community Services

- Health Services and Facilities
- Schools
- Recreation
- Public Safety

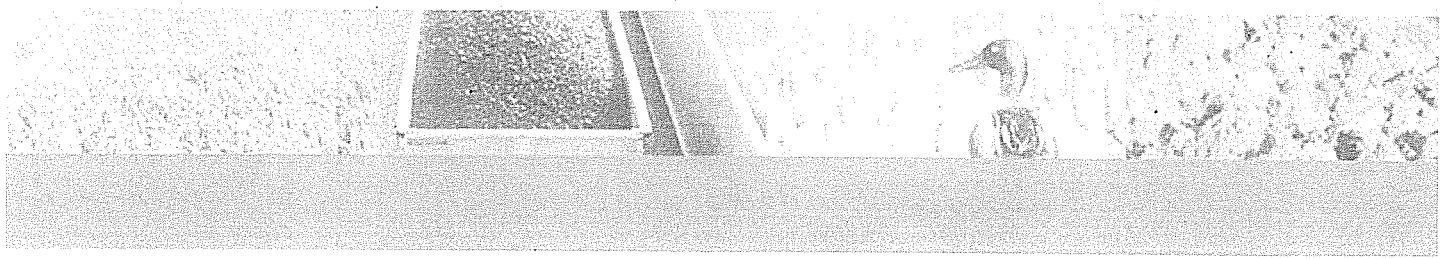
Existing services not expected to be overtaxed by project



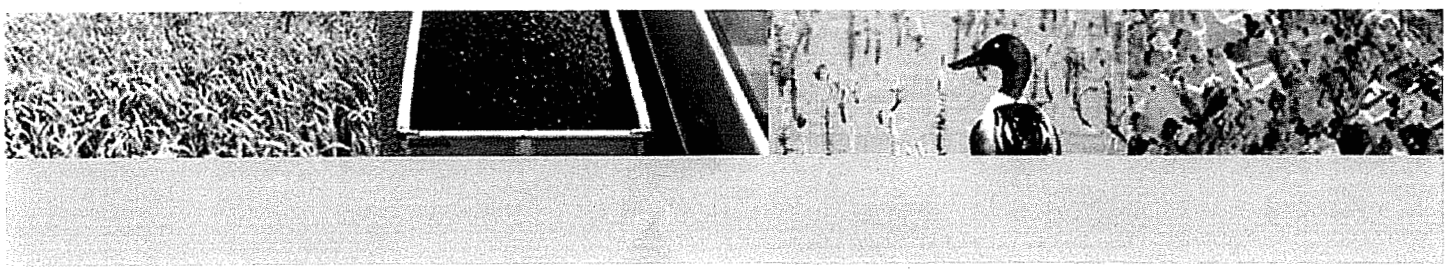
Community Impacts
Other Impacts

- Population and Demographics
- Cultural Resources

No adverse impacts expected



Project Schedule



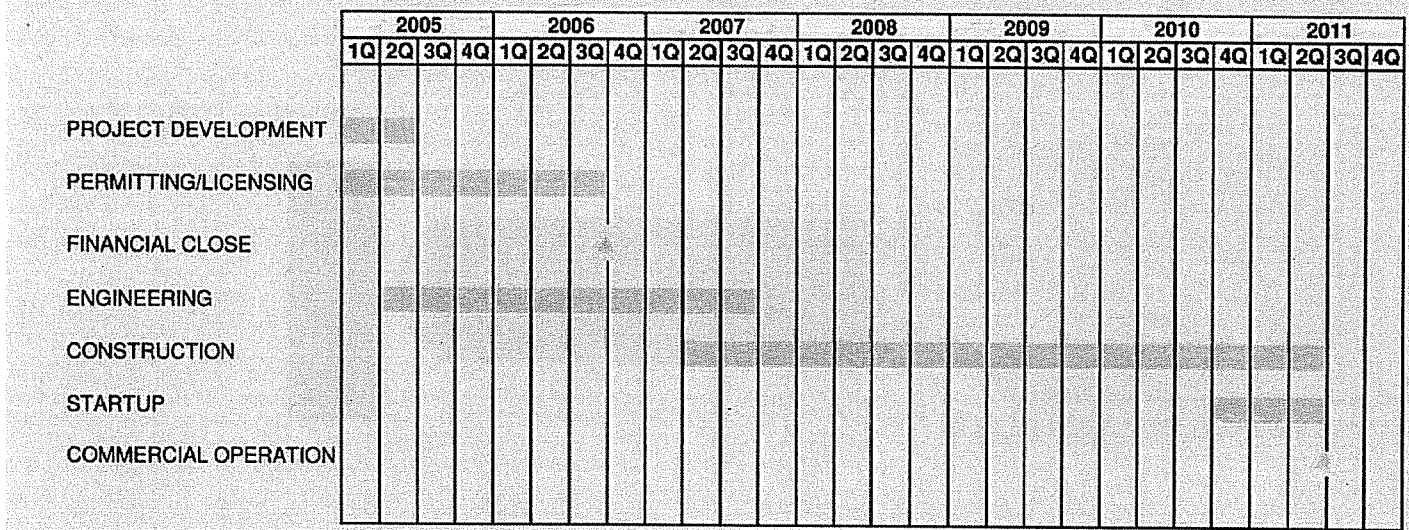
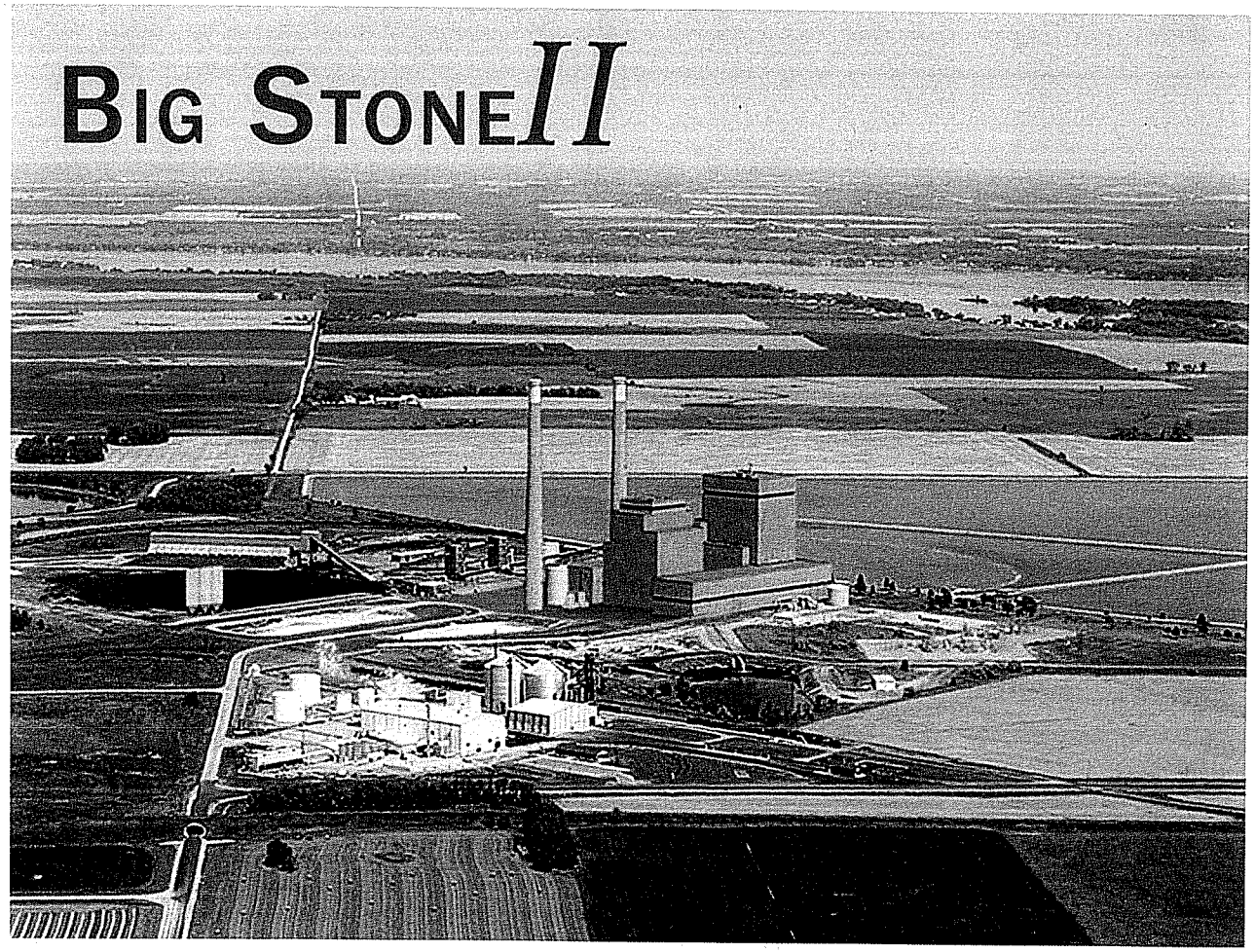


Exhibit 1-4

Big Stone II Project Schedule


BIG STONE II