TABLES

Table 18
Cannon Falls Energy Center
Preliminary Permitting & Approval Requirements

Agency	Permit/Approval	Regulated Activity
	FEDERAL	
EPA	Spill Prevention Control & Countermeasure Plan	Facilities w/ above ground oil storage capacity of greater than 1,300 gallons.
EPA	Risk Management Plan	Potential accidental releases of hazardous chemicals that are used or stored onsite in greater than threshold quantities (Title III of CAAA).
DOE	Alternate Fuels Capability Certification	Baseload facility using natural gas.
FAA	Notice of Proposed Construction or Alteration	Construction of an object which has the potential to affect navigable airspace (height in excess of 200' or within 20,000' of an airport).
FERC	Exempt Wholesale Generator Status	Selling electric energy at wholesale to a utility or other generator.
	STATE	
MPCA	Air Pollution Control Construction Permit	Construction, installation or alteration of an air contamination source.
MPCA	Title IV Acid Rain Operating Permit	Title IV of CAAA, applicable to fossil fuel fired units > 25 MW.
MPCA	Title V Operating Permit	Title V of CAAA or Federally Enforceable State Operating Permit for significant air emission sources.
MPCA	Hazardous Waste SQG Registration	Generation of small quantities of hazardous waste.
MPCA	Above ground Storage Tank (AST) Permit	Facilities that have > one million gallons of total capacity.
MPCA	NPDES Stormwater Construction Permit	Discharge of storm waters during construction of facility.
MPCA	NPDES Stormwater Operation Permit	Discharge of storm waters during operation of facility.
State Historic Preservation Office	Archeological and Historical Review	Activities that could potentially affect archeological or historical resources.
MnDOT	Permit to construct & operate utility facilities on state & federal ROW	Required to construct & operate a utility on a state or interstate highway ROW.
	LOCAL	
City/County/Tsp	Site Plan Approval	Establishment of power generation facilities as a permitted use.
City/County/Twp	Building Permit/Architectural Review/Fire Safety Approval	Construction of facility.
City/County/Tsp	Soil and Sedimentation Control Permit	Control of soil erosion.
City/County/Tsp	Individual Septic Treatment System	Design, construction and discharge of sanitary wastewater.
City/County/Tsp	Certificate of Occupancy	License to operate facility

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Table 17
Cannon Falls Energy Center
Predicted Noise Levels

Position	Description	Predicted Noise Level (l50 – dBA)	Distance to Project Equipment
Residence 1	Intersection of County Highway 29 and Holiday Avenue	47.4	600 ft
Residence 2	West Side of State Highway 20	44.6	1,500 ft
Residence 3	Intersection of Holiday Avenue and Cannon Industrial Boulevard	45.4	1,300 ft
Residence 4	Southeast Side of State Highway 20	48.3	1,900 ft
Residence 5	Southeast Side of State Highway 20	49.5	1,800 ft

Table 1
Chemicals Typically Used at a Simple Cycle Natural Gas-Fired Generating Facility

Chemical	Use	Quantity Stored Onsite	Form/Type
Mineral insulating oil	Transformer systems	25,000 gallons	Insulating Fluid
Sulfur hexafluoride (SF6)	Switchyard breaker electrical insulating gas	300 pounds	Insulating Gas
Lubrication oil	CTG auxiliary systems	15,000 gallons	CTG bearing lubricating oil
Distillate fuel oil/diesel fuel	Backup fuel for combustion turbine and for backup fire pump	750,000 gallons	Diesel Fuel
Various detergents	Combustion turbine off-line wash	200 gallons	Liquid
Carbon dioxide	CTG generator purge system and fire protection	6,000 pounds	Compressed gas
Hydrogen	CTG generator cooling	6,000 pounds	Compressed gas

Source: Site Permit Application, Invenergy Cannon Falls, LLC. T2-1. August 2004.

Table 16
Cannon Falls Energy Center
Cumulative Economic Benefit (Statewide)

	Million ($2004)
Construction	
Wages	$17.6 MM
Capital Investment	$82.4 MM
Subtotal Construction	**$100M**
Operation (20 Year) NPV	
Wages	$2.5 MM
O&M	$7.5 MM
Subtotal Operation	**$110 MM**

Table 2
Cannon Falls Energy Center
NAAQS Air Pollution Concentration Standards

Pollutant	Averaging Period	Standard	Primary NAAQS	Secondary NAAQS
Ozone	1-hour	Not to be at or above this level on more than 3 days over 3 years	125 ppb	125 ppb
	8-hour	The average of the annual 4th highest daily 8 hour maximum over a 3 year period is not to be at or above this level.	85 ppb	85 ppb
Carbon Monoxide	1-hour	Not to be at or above this level more than once per calendar year.	35.5 ppm	35.3 ppm
	8-hour	Not to be at or above this level more than once per calendar year.	9.5 ppm	9.5 ppm
Sulfur Dioxide	3-hour	Not to be at or above this level more than once per calendar year.	NA	550 ppb
	24-hour	Not to be at or above this level more than once per calendar year.	145 ppb	NA
	Annual	Not to be at or above this level.	35 ppb	NA
Nitrogen Oxide	Annual	Not to be at or above this level.	54 ppb	54 ppb
Particulate Matter (≤10 microns)	24-hour	Not to be at or above this level on more than 3 days over 3 years with daily sampling.	155 ug/m3	155 ug/m3
	Annual	The 3 year average of annual arithmetic mean concentrations at each monitor w/in an area is not to be at or above this level.	51 ug/m3	51 ug/m3
Particulate Matter (≤2.5 microns)	24-hour	The 3 year average of the annual 98th percentile for each population-orriented monitor w/in an area is not to be at or above this level.	66 ug/m3	66 ug/m3
	Annual	The 3 year average of annual arithmetic mean concentrations from single or multiple community-oriented monitors is not to be at or above this level.	15.1 ug/m3	15.1 ug/m3
Lead	Quarter	Not to be at or above this level.	1.55 ug/m3	1.55 ug/m3

Primary NAAQS: the levels of air quality that the EPA judges necessary, with an adequate margin of safety, to protect the public health.
Secondary NAAQS: the levels of air quality that the EPA judges necessary to protect the public welfare from any known or anticipated adverse effects.

Table 15
Cannon Falls Energy Center
Estimated Operating Staff by Shift

Plant/Site Manager	1	0	0	1
Operations/Maintenance	1	2	0	3
Clerk	1	0	0	1
Total	**3**	**2**	**0**	**5**

Table 3
Cannon Falls Energy Center
Historical Population

Area	1990 Census	2000 Census	% Increase
Cannon Falls	3,232	3,557	10.1
Goodhue County	40,690	44,127	8.5
Twin Cities Metro	2,288,729	2,642,056	15.4
State of Minnesota	4,375,099	4,919,479	12.4

Source: Minnesota Planning Agency

Table 14
Cannon Falls Energy Center
Total Estimated Salary by Construction Crew ($2004)

Crew	Total
Site Work	$0.2 MM
Concrete Work	$2.0 MM
Arch & Metals	$0.8 MM
Piping	$1.8 MM
BOP/Mech. Equipment	$1.8 MM
Turbine Erection	$2.4 MM
Electrical/I&C	$4.3 MM
Insulation	$0.2 MM
Painting	$0.2 MM
Construction Management	$1.4 MM
Indirect Labor	$2.0 MM
Startup Labor	$0.5 MM
Total	**$17.6M**

Table 4
Cannon Falls Energy Center
State of Minnesota Noise Standards

Noise Area Classification	Daytime (dBA)		Nighttime (dBA)	
	L_{50}	L_{10}	L_{50}	L_{10}
1 (Residential)	60	65	50	55
2 (Commercial)	65	70	65	70
3 (Industrial)	75	80	75	80

dBA = decibels, A-weighted scale; L_{10} = sound pressure level which is exceeded 10% of the time period; L_{50} = sound pressure level which is exceeded 50% of the time period.

Table 13
Cannon Falls Energy Center
Quarterly Peak Employment by Segment During Construction

Period	Structural/ Civil Craft	Elect.	Mech.	Misc. Craft	Const. Mgmt. and Support	Indirect Const. Labor	Oper. Staff	Start-up Labor	Total
Pre-Mobilization	0	0	0	0	0	0	0	0	0
2005 - 2nd Quarter	4	1	0	10	5	5	0	0	15
2005 - 3rd Quarter	39	44	51	10	10	20	0	0	174
2005 - 4th Quarter	13	47	84	0	10	20	4	10	198
2006 - 1st Quarter	0	19	28	0	10	7	4	10	78
2006 - 2nd Quarter	0	0	0	0	2	0	4	4	10
Peak Employment	39	47	84	10	10	20	4	10	

Based on Peak Daily Craft Count calculated on the basis of a five day per week, 8 hours per day for a May 2006 commercial operaton date. Actual craft count may be different.

Table 5
Cannon Falls Energy Center
Potential Air Pollution Emissions

Air Pollutant	Annual Emissions (tons/year)
Particulate Matter (PM/PM_{10})	75.7
Carbon Monoxide (CO)	138.8
Nitrogen Oxides (NO_x)	246.8
Sulfur Dioxide (SO_2)	59.9
Volatile Organic Material (VOC)	12.0

Source: Site Permit Application, Invenergy Cannon Falls, LLC. T5-1. August 2004.

Table 12
Cannon Falls Energy Center
AERA Data: Risk Calculation III

	Chronic Screening Total Hazard Quotients (ISHQ) and Cancer Risks (Inhalation + Noninhalation) for Individual Substances CTGs Firing Distillate Fuel Oil			
Chemical Name	**Farmer Noncancer**	**Farmer Cancer**	**Resident Noncancer**	**Resident Cancer**
Arsenic	2.6E-04	3.4E-08	2.6E-04	3.4E-08
Benzene	1.3E-06	3.1E-10	1.3E-06	3.1E-10
Beryllium	1.2E-05	2.2E-09	1.2E-05	1.0E-09
Cadmium	1.9E-04	7.5E-08	1.9E-04	2.0E-08
Chromium Compounds	9.9E-04	9.5E-08	9.9E-04	9.5E-08
Formaldehyde	6.7E-05	2.6E-09	6.7E-05	2.6E-09
Lead	--	3.5E-10	–	1.2E-10
Manganese	2.8E-03	–	2.8E-03	–
Mercury	5.7E-06	–	2.9E-06	–
Naphthalene	2.8E-06	–	2.8E-06	–
Nickel	6.6E-05	8.6E-10	6.6E-05	8.6E-10
Nitrogen dioxide (NO_2)	–	–	–	–
Polycyclic Aromatic Hydrocarbons (PAH)	–	9.5E-06	–	3.2E-08
Selenium	9.0E-07	–	9.0E-07	–
Totals	**4.4e-03**	**9.7e-06**	**4.4e-03**	**1.8e-07**

Source: Source: Air Permit Application To Construct, Proposed Electric Generation Plant, Cannon Falls Energy Center, August, 2004

Table 6
Cannon Falls Energy Center
Maximum Predicted Concentrations of Regulated Air Pollutants

Pollutant/Averaging Period	Maximum Predicted Concentrations (ug/m^3)*	NAAQS (ug/m^3)
NO_2		
Annual	23.0	100
PM/PM_{10}		
24-Hour	61.0	100
24-Hour	23.9	50
SO_2		
3-Hour	299.9	1,300
24-Hour	118.0	365
Annual	7.8	80
CO		
1-Hour	222.9	40,00
8-Hour	78.5	10,000

Source: Air Permit Application To Construct, Proposed Electric Generation Plant, Cannon Falls Energy Center, August, 2004
*Represents maximum concentration over 5-year period.

Table 11
Cannon Falls Energy Center
AERA Data: Risk Calculation II

	Chronic Screening Non-inhalation Pathway Hazard Quotients (ISHQ) and Cancer Risks for Individual Substances CTGs Firing Distillate Fuel Oil			
Chemical Name	**Farmer Noncancer**	**Farmer Cancer**	**Resident Noncancer**	**Resident Cancer**
Arsenic	–	–	–	–
Benzene	–	–	–	–
Beryllium	–	1.6E-09	–	4.6E-10
Cadmium	–	6.2E-08	–	1.2E-08
Chromium Compounds	–	2.5E-10	–	–
Formaldehyde	–	–	–	–
Lead	–	2.3E-10	–	–
Manganese	–	–	–	–
Mercury	2.9E-06	–	–	–
Naphthalene	–	–	–	–
Nickel	–	–	–	–
Nitrogen dioxide (NO_2)	–	–	–	–
Polycyclic Aromatic Hydrocarbons (PAH)	–	9.5E-06	–	–
Selenium	–	–	–	–
Totals	**2.9e-06**	**9.5e-06**		**1.2e-08**

Source: Source: Air Permit Application To Construct, Proposed Electric Generation Plant, Cannon Falls Energy Center, August, 2004

Table 7
Cannon Falls Energy Center
Potential Hazardous Air Pollutant (HAP) Emissions

Hazardous Air Pollutants	HAP Emissions Combustion Turbines (tons/years)	HAP Emissions Water Bath Gas Heaters (tons/years)	Total Facility HAP Emissions (tons/years)
Arsenic	-	2.3e-06	2.3e-06
Beryllium	-	1.4e-07	1.4e-07
Cadmium	-	1.3e-05	1.3e-05
Chromium	-	1.6e-05	1.6e-05
Cobalt	-	9.7e-07	9.7e-07
Lead	-	5.8e-06	5.8e-06
Manganese	-	4.4e-06	4.4e-06
Mercury	-	3.0e-06	3.0e-06
Nickel	-	2.4e-05	2.4e-05
Selenium	-	2.8e-07	2.8e-07
Benzene	1.2e-01	2.4e-05	1.2e-01
Dichlorobenzene	-	1.4e-05	1.4e-05
Formaldehyde	8.0e-01	8.7e-04	8.0e-01
Hexane	1.9e+00	2.1e-02	1.9e+00
Naphthalene	1.2e-02	7.1e-06	1.2e-02
Acetaldehyde	5.0e-01	-	5.0e-01
Acrolein	1.7e-01	-	1.7e-01
Ethylbenzene	1.3e-01	-	1.3e-01
Xylenes	1.9e-01	-	1.9e-01
Toluene	5.1e-01	3.9e-05	5.1e-01
2-methylnaphthalene	3.8e-05	-	3.8e-05
Acenaphthene	2.0e-04	-	2.0e-04
Acenaphthylene	1.1e-04	-	1.1e-04
Anthracene	2.4e-04	-	2.4e-04
Benz(a)anthracene	1.6e-04	-	1.6e-04
Benzo(a)pyrene	1.0e-04	-	1.0e-04
Benzo(b)fluoranthene	2.3e-04	-	2.3e-04
Benzo(e)pyrene	3.9e-06	-	3.9e-06
Benzo(k)fluoranthene	8.0e-05	-	8.0e-05
Benzo(b +k)fluoranthene	3.5e-05	-	3.5e-05
Benzo(g,h,i)perylene	9.9e-05	-	9.9e-05
1,3-butadiene	9.2e-04	-	9.2e-04
2-chloronaphthalene	2.0e-06	-	2.0e-06
Chrysene	1.8e-04	-	1.8e-04
Dibenzo(a,h)anthracene	1.7e-04	-	1.7e-04
Fluoranthene	3.1e-04	-	3.1e-04
Fluorene	4.2e-04	-	4.2e-04
Indeno(1,2,3-cd)pyrene	1.7e-04	-	1.7e-04
Perylene	5.1e-06	-	5.1e-06
Phenanthrene	2.3e-03	-	2.3e-03
Propylene oxide	3.5e-01	-	3.5e-01
Pyrene	2.0e-04	-	2.0e-04
Total Combined HAPs	**4.7**	**2.2e-02**	**4.68**

Source: Site Permit Application, Invenergy Cannon Falls, LLC. T5-2. August 2004.

Table 10
Cannon Falls Energy Center
AERA Data: Risk Calculation I

	Inhalation Screening Hazard Quotients (ISHQ) and Cancer Risks for Individual Substances CTGs Firing Distillate Fuel Oil			
Chemical Name	**Acute ISHQ**	**Subchronic Noncancer ISHQ**	**Chronic Noncancer ISHQ**	**Cancer ISHQ**
Arsenic	5.3E-02	5.3E-02	2.6E-04	3.4E-08
Benzene	5.0E-05	5.0E-05	1.3E-06	3.1E-10
Beryllium	–	–	1.2E-05	5.9E-10
Cadmium	–	–	1.7E-04	6.2E-09
Chromium Compounds	–	–	9.9E-04	9.5E-08
Formaldehyde	2.7E-03	2.7E-03	6.7E-05	2.6E-09
Lead	–	–	–	1.2E-10
Manganese	–	–	2.8E-03	–
Mercury	6.1E-04	6.1E-04	2.9E-06	–
Naphthalene	1.6E-04	1.6E-04	2.8E-06	–
Nickel	3.8E-04	3.8E-04	6.6E-05	8.6E-10
Nitrogen dioxide (NO_2)	3.8E-01	3.8E-01	–	–
Polycyclic Aromatic Hydrocarbons (PAH)	–	–	–	3.2E-08
Selenium	–	–	9.8E-07	
Totals	**4.4e-01**	**9.0e-04**	**4.4e-03**	**1.7e-07**

Source: Source: Air Permit Application To Construct, Proposed Electric Generation Plant, Cannon Falls Energy Center, August, 2004

Table 8
Cannon Falls Energy Center
AERA Data
Chemical of Potential Concern
Inhalation Health Benchmark Values

Chemical Name	Acute Air Concentrations (ug/m^3)	Chronic Non-cancer Inhalation Toxicity Value (ug/m^3)	10^{-5} Cancer Risk Level Inhalation Toxicity Value (ug/m^3)	Unit Risk Value for Carcinogens (ug/m^3)	Toxicity Value Reference
Arsenic	0.19	0.03	0.00	4.3E-03	Cal EPA
Beryllium	–	0.02	0.00	2.4E-03	IRIS
Benzene	1000	30	1.28	7.8E-06	HRV, Cal EPA, HRV
Cadmium	–	0.02	0.01	1.8E-03	Cal EPA
Chromium Compounds	–	0.008	0.00	1.2E-02	IRIS
Formaldehyde	94	3	0.77	1.3E-05	Cal EPA
Lead	–	–	0.83	1.2E-05	Cal EPA
Manganese	–	0.2	–	–	HRV
Mercury	1.8	0.3	–	–	IRIS
Naphthalene	200	9	–	–	HRV
Nickel	11	0.05	0.04	2.6E-04	Cal EPA
Nitrogen dioxide (NO_2)	470	–	–	–	Cal EPA
Polycyclic Aromatic Hydrocarbons (PAH)	–	–	0.01	1.1E-03	Cal EPA
Selenium	–	20	–	–	Cal EPA

Source: Source: Air Permit Application To Construct, Proposed Electric Generation Plant, Cannon Falls Energy Center, August, 2004
HRV = MDH Health Risk Value
Cal EPA = California EPA Office of Environmental Health Hazard Assessment
IRIS = EPA Integrated Risk Information System

Table 9
Cannon Falls Energy Center
AERA Data
Maximum Hourly & Annual Air Toxics Concentrations

Pollutant	Maximum One Hour Concentration CTGs Firing Distillate Fuel Oil (ug/m^3)	Maximum Annual Concentration CTGs Firing Distillate Fuel Oil (ug/m^3)
Arsenic	0.01	8.7E-06
Beryllium	3.1E-04	2.4E-07
Benzene	0.078	6.3E-05
Cadmium	4.8E-03	3.8E-06
Chromium Compounds	1.1E-02	8.7E-06
Formaldehyde	4.9E-01	3.9E-04
Lead	1.4E-02	1.1E-05
Manganese	7.9E-01	6.2E-04
Mercury	1.2E-03	9.4E-07
Naphthalene	2.7E-03	2.2E-06
Nickel	4.6E-03	3.6E-06
Nitrogen dioxide (NO_2)	162.9	0.13
Polycyclic Aromatic Hydrocarbons (PAH)	4.0E-02	3.1E-05
Selenium	2.5E-02	2.0E-05

Source: Source: Air Permit Application To Construct, Proposed Electric Generation Plant, Cannon Falls Energy Center, August, 2004