



DAKOTA GASIFICATION COMPANY
A BASIN ELECTRIC SUBSIDIARY

GREAT PLAINS SYNFUELS PLANT
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Material Safety Data Sheet

1. PROCESS STREAM IDENTIFICATION

PROCESS STREAM NAME: Tar Oil
PROCESS STREAM LOCATION: 5100
PROCESS STREAM DESCRIPTION: A mixture of organic compounds condensed from coal gasification streams.

2. COMPOSITION / INFORMATION ON INGREDIENTS

<u>Parameter</u>	<u>Wt %</u>	<u>CAS #</u>
Water	2	7732-18-5
Acetone	0.1	67-64-1
2-Butanone	0.2	78-93-3
Nonane	0.1	111-84-2
Decane	0.2	124-18-5
Undecane	0.3	1120-21-4
Dodecane	0.5	112-40-3
C13- Alkanes/Alkenes	0.7	629-50-5 (tridecane)
C14-Alkanes/alkenes	0.7	629-59-4 (tetradecane)
C15-Alkanes/alkenes	0.6	629-62-9 (pentadecane)
C16 Alkanes/alkenes	0.5	544-76-3 (hexadecane)
C17 Alkane/alkene	0.5	629-78-7 (heptadecane)
C18 Alkane/Alkene	0.5	593-45-3 (octadecane)
C20 Alkanes/alkenes	0.5	112-95-8 (eicosane)
C21 Alkanes/alkenes	0.5	629-94-7 (heneicosane)
C22 Alkanes/Alkenes	0.4	629-97-0
C23 Alkanes/alkenes	0.4	638-67-5
C24-C28 Alkanes/alkenes	0.4	Not Specified
Indene	0.5	95-13-6
Methyl Indenes	0.5	Not Specified

PROCESS STREAM NAME: TAR OIL
REVISION DATE: 01/29/08

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<u>Parameter</u>	<u>Wt %</u>	<u>CAS #</u>
Indanols	0.5	6351-10-6 (1-indanol)
Methyl indanols	0.3	Not Specified
Phenol	1.6	108-95-2
m/p-Cresols	2.8	108-39-4 (m-cresol) 106-44-5 (p-cresol)
o-Cresol	1.2	95-48-7
3,5-Dimethylphenol plus 3- & 4-Ethylphenol	1.6	108-68-9 (3,5-)
2,4- & 2,5-Dimethylphenols	1.2	105-67-9 (2,4-) 95-87-4 (2,5-)
2,3-Dimethylphenol	0.2	526-75-0
2,6-Dimethylphenol	0.2	576-26-1
2-Ethylphenol	0.3	90-00-6
2,3,6-Trimethylphenol	0.3	2416-94-6
Guaiacol	0.2	90-05-1
Methyl Guaiacols	0.3	Not Specified
C2-Guaiacols	0.2	Not Specified
Benzene	0.4	71-43-2
Toluene	1.2	108-88-3
m-Xylene	0.6	108-38-3
o-Xylene	0.3	95-47-6
p-Xylene	0.1	106-42-3
Ethylbenzene	0.3	100-41-4
3-Ethyltoluene	0.4	620-14-4
1,2,3-Trimethylbenzene	0.4	526-73-8
1,2,4-Trimethylbenzene	0.4	95-63-6
Pyridine	0.1	110-86-1
2-Methylpyridine	0.2	109-06-8
3- & 4-methylpyridine	0.1	108-99-6 (3-methyl) 108-89-4 (4-methyl)
Dibenzofuran	0.8	132-64-9
Methylbenzofurans	0.6	Not Specified
Fluorene	1.4	86-73-7
Methyl fluorene	0.5	Not Specified
Naphthalene	2.5	91-20-3
2-Methylnaphthalene	1.0	91-57-6
1-Methylnaphthalene	0.6	90-12-0
Phenyl naphthalene	0.1	605-02-7
Naphthol	0.4	90-15-3
Methyl naphthols	0.3	Not Specified

<u>Parameter</u>	<u>Wt %</u>	<u>CAS #</u>
Biphenyl	0.5	92-52-4
Anthracene	0.8	120-12-7
Phenanthrene	2.1	85-01-8
Methyl phenanthrenes & anthracenes	2.5	Not Specified
Pyrene	0.3	129-00-0
Fluoranthene	0.3	206-44-0
Chrysene	0.1	218-01-9
Methyl dibenzofuran	0.2	Not Specified
Undefined Heavy Boilers (>380°C)	20-25	Not Specified
Undefined Low Boilers (<380°C)	15-25	Not Specified

ANALYSIS DATE of PROCESS STREAM:	1/1/98 to 8/15/02 (Stream composition may vary day to day)
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OSHA HAZARDOUS COMPONENTS (29 CFR 1910.1200): EXPOSURE LIMITS 8 hrs. TWA(ppm)

	<u>OSHA PEL</u>	<u>ACGIH TWA</u>
Acetone	1000ppm	500ppm
2-Butanone	200ppm	200ppm
		300ppm STEL
Benzene	1ppm	0.5ppm
	5ppm STEL	2.5ppm STEL
Toluene	200ppm	20ppm
	300ppm Ceiling	
Pyridine	5ppm	5ppm
Ethylbenzene	100ppm	100ppm
o,m,p-Xylene	100ppm	100ppm
n-Nonane	None listed	200ppm
Phenol	5ppm	5ppm
Cresol (all isomers)	5ppm	5ppm
Indene	None listed	10ppm
Naphthalene	10ppm	10ppm
		15ppm STEL

Biphenyl	0.2ppm	0.2ppm
Phenanthrene: Coal Tar Pitch Volatile	0.2 mg/m ³	0.2 mg/m ³
Anthracene: Coal Tar Pitch Volatile	0.2 mg/m ³	0.2 mg/m ³
Pyrene: Coal Tar Pitch Volatile	0.2 mg/m ³	0.2 mg/m ³
Chrysene: Coal Tar Pitch Volatile	0.2 mg/m ³	0.2 mg/m ³

3. HAZARDS IDENTIFICATION / EMERGENCY OVERVIEW

Routes of Entry: Absorption, inhalation, ingestion, skin contact, and eye contact.

Effects of Acute Exposure: This material has a strong corrosive effect on the skin and eyes. The material can rapidly absorb through the skin and may cause death. Symptoms of exposure may include nausea, headache, dizziness, respiratory failure, muscular weakness, vomiting, severe depression, collapse and death. Skin exposure may cause redness, blisters and/or minor to severe chemical burns. Although the effects are primarily on the central nervous system, excess accumulation of fluid in the lungs and injury of the kidneys, liver, pancreas, and spleen may occur. DANGER !!! Rapid DEATH may occur from gross contamination of the body with phenol.

Effects of Chronic Exposure: Respiratory System; Central Nervous System; Skin; Eyes; Lungs; Kidneys; Liver. Chronic exposure may cause gastrointestinal disturbances (vomiting, anorexia), nervous disorders (headache, dizziness), dermatitis, or pigmentary disorder. Serious and sometimes fatal systemic injury can result from chronic exposure.

Many components of this stream are both toxic and carcinogenic. May cause fetal effects.

Additionally, the complex compound is flammable

Adequately trained personnel wearing appropriate personnel protective equipment should only handle the material.

POTENTIAL HEALTH EFFECTS:

EYE CONTACT: This material has a strong corrosive effect on the eyes. Vapors may irritate the eyes, producing a burning sensation, redness tearing and inflammation. Direct contact with the eye may result in mild damage, conjunctivitis and keratitis, to severe damage, ranging from scarring of the cornea to total blindness.

SKIN CONTACT: May cause allergic skin reaction. May result in reddish colored chemical burns. Hot liquid may cause thermal burns. Certain hazardous components of the mixture may readily enter the body through the skin in harmful amounts. Coal tar pitch volatiles are considered photosensitive agents.

INHALATION: May be harmful by inhalation. Material is destructive to tissue of the mucous membranes and upper respiratory tract. Symptoms of exposure may include burning sensation, coughing, wheezing, laryngitis, shortness of breath, headache, dizziness, nausea, and vomiting.

INGESTION: May cause irritation to digestive tract. Symptoms may include headache, excitement, fatigue, nausea, vomiting, diarrhea, stupor, and coma. May cause central nervous system depression. May cause rapid heartbeat and cardiac arrhythmia. Symptoms may worsen, ultimately culminating in death.

TARGET RESPIRATORY SYSTEM, EYES, SKIN, CENTRAL NERVOUS SYSTEM, KIDNEYS, LIVER,
ORGANS: SPLEEN, BONE MARROW, IMMUNE SYSTEM, BLOOD, MUCOUS MEMBRANES.

4. FIRST AID MEASURES

EYES: Flush eyes with fresh water for at least 15 minutes. Occasionally lift the upper and lower eye lids. Seek medical assistance immediately.

SKIN: Speedy action is of the utmost importance! Immediately remove contaminated clothing. Wash affected skin with soap and water for at least 15 minutes. Wash with PEG solution as directed. Seek medical assistance immediately.

INHALATION: Move victim to fresh air at once. Initiate artificial respiration and supply oxygen if needed. Keep victim warm and at rest. Seek medical attention. If patient is conscious, the irritation of the throat may be relieved by water in the mouth. Seek medical attention immediately.

INGESTION: Do NOT induce vomiting. Wash mouth out with water. If victim is conscious and alert, provide water to drink. Administer activated charcoal by as soon as available. Never give anything by mouth to an unconscious victim.

5. FIRE FIGHTING MEASURES

FLASH POINT: 115 °F

AUTO-IGNITION TEMPERATURE: Not Determined

FIRE AND EXPLOSION HAZARDS: Yields combustible vapors when heated.

UPPER EXPLOSIVE / FIRE LIMITS: Not Determined

LOWER EXPLOSIVE / FIRE LIMITS: Not Determined

EXTINGUISHING MEDIA: Water fog, alcohol foam, carbon dioxide, dry chemical.

SPECIAL FIRE FIGHTING PROCEDURES: **Small fires:** Dry chemical, CO₂, water spray, or foam. **Large fires:** Water spray, fog, or foam. Move containers from fire area if this can be done safely. Cool containers that have been exposed to heat. Firefighters should wear a self-contained positive pressure breathing apparatus, and full protective clothing for fire fighting. Keep out of low areas. Stay upwind.

6. ACCIDENTAL RELEASE MEASURES

SPILL OR LEAK PROCEDURES: Persons not wearing protective equipment and clothing should be restricted from the area. Ventilate the area. Large quantities may be absorbed with vermiculite, dry sand, earth, or similar material and placed in an appropriate container for disposal. Wash spill site after material pickup is complete.

WASTE DISPOSAL METHOD: Consult federal, state, and local regulations regarding the proper disposal of this material.

REPORTABLE SPILL QUANTITY: 290 gallons based on 10 pounds of benzene.

7. HANDLING AND STORAGE

STORAGE TEMPERATURE: below 80 F advised

SHELF LIFE: 12 months

SPECIAL SENSITIVITY: may dissolve plastics, rubber gaskets etc.

HANDLING / STORAGE PRECAUTIONS: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use appropriate personnel protective equipment. Avoid contact with eyes and skin. Avoid inhalation by use of appropriate NIOSH approved respirator. Avoid ingestion.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

RECOMMENDED WORK / HYGIENE PROCEDURES: Keep work area tidy. Wear appropriate personnel protective equipment. Wash thoroughly after handling before eating, smoking, or using toilet facilities.

EYE PROTECTION REQUIREMENTS: Prevent eye contact. Use goggles and/or face shield as appropriate for the exposure potential.

HAND PROTECTION REQUIREMENTS: Impervious gloves: viton, neoprene, PVC. Select the proper glove that meets your needs based on glove manufactures advice.

PROTECTIVE CLOTHING REQUIREMENTS: Use impervious materials to prevent all exposures to the skin. Butyl rubber(IIR), Neoprene(CR), Teflon.

**RESPIRATORY
PROTECTION
REQUIREMENTS:**

If engineering and administrative controls cannot maintain levels below suitable exposure limits a chemical cartridge with an organic vapor with dust/mist prefilter, or supplied air or continuous flow powered air purifying with organic vapor cartridge and a dust/mist prefilter can be used. Self-contained breathing apparatus with full facepiece operated in pressure demand or other positive pressure mode. Supplied airline operated in pressure demand or other positive pressure with an auxiliary self-contained breathing apparatus operated in pressure demand or other positive pressure mode.

**WASH
REQUIREMENTS:**

Wash hands prior to smoking and eating. Wash off material immediately upon contact. Do not wear contaminated clothing. Contaminated clothing should be washed separate from other uncontaminated clothing.

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE: A dark brown liquid

ODOR: Aromatic, musty

PHYSICAL STATE: Liquid

pH: Not Applicable

REID VAPOR PRESSURE 1 psi

MELTING POINT: 40-60 F

BOILING POINT: 210 F

SPECIFIC GRAVITY: 1.034@60F

EVAPORATION RATE: low: <0.8 (BuAc = 1)

PERCENT VOLATILES: 10% volatile to 360 F in D-86 distillation

SOLUBILITY IN WATER: insoluble

10. STABILITY AND REACTIVITY

INSTABILITY CONDITIONS: Stable under ordinary conditions of use and storage

INCOMPATIBILITIES: Strong reducing agents and strong acids.

DECOMPOSITION: Will form carbon monoxide, carbon dioxide and other toxic fumes.

HAZARDOUS POLYMERIZATION: Not available.

11. TOXICOLOGICAL INFORMATION*

ROUTES OF ENTRY:	Inhalation, ingestion, skin or eye absorption
EFFECTS OF ACUTE EXPOSURE:	Eye and respiratory irritant, skin burns. Gross overexposure may result in serious health effects. If treatment is not given promptly, death can occur.
SYMPTOMS:	Breathless, irritable, euphoric or giddy. Irritations of eyes, nose and respiratory tract. Headache, dizzy, nauseated, or intoxicated. Severe exposures may lead to convulsions and loss of consciousness. Skin can become red, dry, scaly, and fissured. Persons can become sensitized from skin contact. Eye tissue may be damaged. Generally, the more serious the exposure, the more severe the symptoms.
EYE EFFECTS:	Severe eye irritant. Corrosive. Burns, permanent impairment of vision.
SKIN EFFECTS:	Absorbed through the skin. Corrosive, may cause severe burns. Primary irritation. Photosensitizer.
ACUTE ORAL EFFECTS:	This material is considered toxic via the oral route. May be corrosive to the mouth and throat if ingested. Oral LD ₅₀ (Benzene) 18250 mg/kg muskrat. Oral-Human LDLo (Phenol): 14g/Kg.
ACUTE INHALATION EFFECTS:	Vapors of this material may be irritating to the nasal and respiratory tracts, causing difficulty breathing. LC ₅₀ (Benzene) TCL _o 150 ppm human. LC ₅₀ (Phenol) 360 mg/m ³ Inhalation-Rat. TCLo 4400 µg/m ³ (Biphenyl) Inhalation Human Irritant Effects
SUBCHRONIC EFFECTS:	Photosensitization, dermatitis.
CHRONIC EFFECTS / CARCINOGENICITY:	Can damage the liver, kidney, spleen. Components of this mixture are considered by IARC, NTP, and OSHA to be a carcinogen. Phenanthrene is a human skin photosensitizer.
MUTAGENICITY:	Components of this mixture have shown positive mutagenic effects in toxicological testing. Benzene has experimentally exhibited teratogenic and reproductive effects.
ORGANS AFFECTED BY LONG-TERM EXPOSURE:	Repeated skin or respiratory exposure may cause headache, irritability, insomnia, dizziness, and anemia and eczema. Kidney, and bladder tumors have been reported from exposure to Coal Tar Pitch Volatiles. Blood forming organs. Kidney, liver, pancreas, and spleen.

*Note – Toxicological information is based on the chemical constituents not the complex mixture.

12. ECOLOGICAL INFORMATION (Results of Product Released to the Environment)

Benzene: Goldfish LD 50 – 46 mg/l, LD 100 – 34 mg/l 24 hrs.; Rat LD 50 – 5600 –5700 mg/kg body weight.

Phenol: Trout LC 50 – 11.6 mg/l; Rat LD50 – 0.53g/kg.

13. DISPOSAL CONSIDERATIONS

Recycling/reuse of all tar oil residuals is recommended. Discarded or spill cleanup materials may be considered hazardous waste as defined under RCRA 40 CFR 261.24 (Benzene D018). Please be advised that state and local requirements for waste disposal may be more restrictive or otherwise different from federal regulations. Consult state and local regulations regarding the proper disposal of this material.

14. TRANSPORTATION INFORMATION

D.O.T. SHIPPING NAME: Toxic liquid, organic, n.o.s. (Tar oil containing phenol, cresols, xylenes)

D.O.T. HAZARD CLASS: 6.1

U.N. NUMBER: UN 2810

D.O.T. PLACARD: Toxic

D.O.T. LABEL CODE: Toxic

PACKAGING: Packing group II

15. REGULATORY INFORMATION

All identifiable chemicals are on the TSCA inventory.

CERCLA/SARA

Reportable quantities:
390 gallons for 10 pounds RQ of benzene.

o-Cresol, Phenol are Extremely Hazardous Substances with 500 pound Threshold Planning Quantities.

SARA Title III chemicals are benzene, mixed cresols, phenol, toluene, and xylene (mixed isomers).

LIABILITY DISCLAIMER

The information contained in this Material Safety Data Sheet (MSDS) is believed to be correct since it was obtained from sources we believe are reliable. However no representation, guarantees or warranties of any kind are made as to its accuracy, suitability for particular applications, hazards connected with the use of the material, or the results to be obtained from the use thereof. User assumes all risks and liability of any use, processing or handling of any material, variations in methods, conditions and equipment used to store, handle, or process the material and hazards connected with the use of the material are solely the responsibility of the user and remain at his sole discretion.

Compliance with all applicable federal, state, and local laws and regulations remains the responsibility of the user, and the user has the responsibility to provide a safe work place to examine all aspects of its operation and to determine if or where precautions, in addition to those described herein, are required.