RAILROAD COMMISSION OF TEXAS

SURFACE MINING AND RECLAMATION DIVISION

Application for an In-Situ Coal Gasification Operation

General Instructions:

This application form, SMRD-5C, requires the use of the "Surface Coal Mining and Reclamation Act of 1979" and the "Rules of the Surface Mining and Reclamation Division," Railroad Commission of Texas, in order to fully understand the application requirements. All information requested in the application should be regarded as the minimum required. The application should contain any other information which is pertinent to the situation or setting. Where required in the permit application, the applicant should consult, prior to application submission, with appropriate representatives of the Surface Mining and Reclamation Division for the purpose of determining, on a site-specific basis, what additional information will be required. Further information may be requested by the Director of the Surface Mining and Reclamation Division.

Please submit your application on standard size paper. Other information on format, general information on maps and drawings, and other general requirements may be found in Rule 107. Sections applicable to the given item are referenced on the application form.

Where physical properties of materials are requested, the data should be oriented to the setting in which it will be used, i.e., agronomic, geologic, or engineering.

RAILROAD COMMISSION OF TEXAS

SURFACE MINING AND RECLAMATION DIVISION

APPLICATION FOR AN IN-SITU COAL GASIFICATION PERMIT

All items should be as complete as possible. Please submit your application on standard-size paper. File seven (7) complete copies with the Director of the Surface Mining and Reclamation Division. See "Rules of the Surface Mining and Reclamation Division" and "Texas Surface Coal Mining and Reclamation Act" for information.

I. GENERAL INFORMATION

A. NAME

1. Name of Applicant _____

   Name of Operation _____

   Permanent Mailing Address _____
   (Street or P. O. Box)

   _____
   (City) (State) (Zip Code) (Telephone)

2. Name, address, and telephone number of person or persons authorized to act for applicant during consideration of this application (attorney, engineering firms, applicant's mining superintendent, etc).

   _____

   _____

   _____

B. TYPE OF PERMIT APPLICATION: ☐ original ☐ revision ☐ renewal

C. PRODUCT TO BE MINED: ☐ coal ☐ lignite

D. TYPE OF METHOD OF MINING

☐ surface mining ☐ open-pit mining
☐ strip mining ☐ underground mining

E. LOCATION:

1. County or Counties.

   _____

2. Give a general description of the location of the proposed mining area with respect to cities, streets, highways, churches, schools, water courses, landmarks, etc

   _____

II. ADMINISTRATIVE INFORMATION

A. INTERESTED PERSONS (Rule 155). Give name and address of:

1. Every owner of record of property to be mined.

2. Leaseholders of record.

3. Real estate contract holders of record.

4. Owners of record of all surface and subsurface areas contiguous to application area.

5. Operator, if different from owner, for application area.

6. Resident agent and telephone number.

I, (name) _____, (title) _____state that I have knowledge of the facts herein set forth and that the same are true and correct to the best of my knowledge and belief. I further state that to the best of my knowledge and belief, the project for which application is made will not in any way violate any law, rule, ordinance, or decree of any duly authorized governmental entity having jurisdiction.

Date:_____ Signature: _____ .

B. APPLICANT'S ORGANIZATION (Rule 155). Provide:

1. A statement of organization: single proprietorship, corporation, etc.

2. If other than single proprietorship:
   a. Name and address of any person functioning like a director of the applicant.
   b. Name and address of any principal shareholder.
   c. Names under which the applicant operated surface coal mines in the U.S. in the previous five years.
   d. Name and address of their principal officers and resident agent.

3. A list of current or previous coal mining permits held in U.S. since 1970 by applicant and by principal shareholders and authority issuing the permit.

4. If it exists, the Mining Safety and Health Administration identification number.

5. A statement of lands contiguous to application area in which the applicant is interested.

C. COMPLIANCE HISTORY (Rule 156). Provide:

1. A statement of:
   a. Suspended or revoked permits in the last five years for applicant or person controlled by or with applicant.
   b. Any forfeited bond on security.

2. For any of the above include:
   a. Identification of the permit issued, date and amount of bond.
   b. Identification of authority taking action.
   c. Current status of situation causing suspension or revocation.
   d. Date, location and type of any administrative or judicial proceeding.
   e. Status of proceeding.

3. A list of violations for the past three years for applicant or persons controlled by or with applicant. Include violations of mining and environmental statutes, rules, regulations -- state or federal.
   Details should include:
   a. Date and identification or authority.
   b. Description of violation.
   c. Descriptions of administration of judicial proceedings.
   d. Status of proceedings.
   e. Abatement action taken by applicant.

D. RIGHT TO MINE (Rule 157 and 158).

1. Provide descriptions and/or copies of all documents conveying rights (surface and subsurface) to enter and mine including consent of surface owners or authority under state law to extract coal at the site.

2. Designate on a map areas designated as unsuitable for mining.

3. Provide statement regarding Lands Unsuitable as designated procedurally under Subchapter F or under study or exemptions under Rule 216.

4. Provide waivers from dwelling owners within 300 feet of the mining area.

E. PERMIT TENURE AND SEQUENCES (Rule 159). Provide

1. Size, sequence and timing for each phase of mining and number of acres affected for the life of the permit. (Attach map)

2. If application is for greater time than five years, additional information relating to financing and operations for the longer period.

F. CERTIFICATE OF LIABILITY OF SELF-INSURANCE (Rule 160).

G. OTHER LICENSES AND PERMITS REQUIRED (Rule 161). Include:

1. Issuing authority

2. Status

3. Identification number if issued.

H. LOCATIONS WHERE APPLICATION MAY BY REVIEWED BY THE PUBLIC (Rule 162).

I. COPIES OF PUBLISHED NOTICE AND PROOF OF PUBLICATION WHEN AVAILABLE. (Rule 163).

III. ENVIRONMENTAL RESOURCES INFORMATION - PREMINING (PART 783 and Rule 107).
Provide:

A. ARCHEOLOGICAL SURVEY. (Rule 171).

B. DESCRIPTION OF HYDROLOGY AND GEOLOGY: GENERAL REQUIREMENTS (Rule 172).

C. GEOLOGY DESCRIPTION. (Rule 173).

Provide a lithological description, thickness and depth of each stratum above the coal seam to be gasified, the coal seam itself, and the stratum immediately beneath this coal seam by utilizing the results gathered from the permit area through test boring core samples, or other methods approved by the Director of the Surface Mining and Reclamation Division. Any test should be accompanied by a geophysical log. A minimum of one test boring or core sample per proposed annual mining area, but not less than one continuous core sampler per 200 acres, shall be submitted. Also, submit sufficient electric logs in between to correlate stratigraphy. The aforementioned minimum test hole spacing requirements may be waived if the applicant

can demonstrate that the overburden within the mining area is stratigraphically similar with respect to lithological depositional facies. Additional holes may be requested by the Division if the stratigraphy of the overburden in the permit area is heterogenous. Data from core samples outside the permit area may be used if the permit area is 10 acres or less. In this case, the borings shall be within 1/4 mile of the permit area.

1. Selection of cores

    a. Cores to be used for chemical and physical analyses should be representative of the depositional environment and overburden lithology of the area(s) to be mined.
    b. The lithologic units to be analyzed shall be selected based on rock type, texture, color, lithology thickness and depositional environment.
    c. Description of the rock type, texture, lithology, thickness and depositional environment shall be determined by a geologist using an accepted classification system. Determine color, i..e., reddish brown, light grey, etc.
    d. All gasifiable seams shall be sampled and analyzed for the requirements described in Section 4.

2. Collection
   Cores should be collected, sampled, logged and labeled in the field under the direction of a geologist. Methods of core collection should be used which will maximize core recovery and provide representative samples of the complete overburden lithology.

3. Chemical analysis - Overburden/underburden
   The analytical procedures listed are intended to standardize the analyses of overburden materials. The Technical Services staff of the Surface Mining and Reclamation Division recognizes that other procedures are currently being utilized and new procedures are being developed. If the applicant proposes to use a different procedure or modification of the procedures listed, they must obtain written approval from the Director of the Surface Mining and Reclamation Division. Special attention with regard to chemical constituents should be given the strata immediately above and below the seam(s) to be gasified. The following will be required as a minimum:
    a. Chemical analyses of each stratum to be affected, including the stratum above and below the lowest coal seam to be gasified which may be affected by the heat of chemical reaction of gasification.
    b. Chemical analyses of each sample shall be performed on the less than 2mm size fraction. The sample may be ground if sufficient material of less than 2mm size is not available for analysis. The procedure used to grind the sample should be indicated.
    c. Acid-base accounting consists of measuring total or pyritic sulfur and neutralization potential as $CaCO_3$ equivalent on each sample. Procedure references--Sobek et al, 1978; smith et al, 1974; ASTM Method D-2492.
    d. Trace element analyses should be performed for each sample including lignite/coal rider seams. Sample should be tested as received from the field.
        (1) Since the objective is to determine the total concentration of each element in the sample, either a HNO_3-$HC10_4$ or HF extraction procedure should be used for the following trace elements:
            (a) Cadmium--atomic absorption (direct aspiration or furnace). EPA method 213.1 or 213.2, March 1979.
            (b) Copper--atomic absorption (direct aspiration or furnace). EPA method 220.1

or 220.2, March 1979.

(c) Chromium--atomic absorption (direct aspiration or furnace). EPA method 218.1 or 218.2, March 1979.

(d) Lead--atomic absorption (direct aspiration or furnace). EPA method 239.1 or 239.2, March 1979.

(e) Manganese--atomic absorption (direct aspiration or furnace). EPA method 243.1 or 243.2, March 1979

(f) Molybdenum--atomic absorption (direct aspiration or furnace). EPA method 246.1 or 246.2, March 1979.

(g) Zinc--atomic absorption (direct aspiration or furnace). EPA method 289.1 or 289.2, March 1979.

(2) The following trace element concentrations should be determined using the designated procedure. The applicant should indicate the procedure utilized for each element analysis.

(a) Arsenic

i. atomic absorption--gaseous hydride to determine both inorganic and organic forms. EPA methods 206.2 and 206.3, March 1979.

ii. Leiderman, D., Analytical Chemistry, Volume 31: 2052-2054, 1959.

(b) Selenium

i. Atomic absorption hydride generator and deuterium background corrector. EPA method 270.3, March 1979.

ii. Black, C.A., 1965, page 1117.

(c) Boron

i. Colorimetric (curcumin). EPA method 212.3, March 1979.

ii. Colorimetric, Black, C.A., 1965, pages 949 and 1059.

4. Chemical Analysis - Lignite/coal

The following chemical parameters should be determined for each seam to be gasified:

a. Total concentrations for the following trace elements should be determined for each seam using HNO_3-$HC10_4$ or HF digestion procedures (ASTM D36-83-78, D36-83-78, and D-36-84-78); arsenic beryllium, boron, cadmium, chromium, copper, lead, manganese, molybdenum, mercury, nickel, selenium, vanadium and zinc.

b. The pH should be determined on a representative sample as outlined in 1975 ASTM procedures for coal/lignite analysis.

c. Total pyritic, marcasite, organic, and sulfate sulfur content should be determined as outlined in 1975 ASTM procedures.

d. Proximate analysis and ultimate analysis should be determined.

5. Physical analysis

Physical data required to address subsidence control as prescribed by Rules 194, 562, 563, 564, and 565 should be obtained.

D. GROUND WATER INFORMATION. (Rule 174).

Provide the depth of each water bearing strata including the first aquifer below the coal seam to be gasified and the depth of the potentiometric surface of each of these aquifers the hydrostatic pressure of the coal seam and of the first aquifer above the coal seam to be gasified; the uplift pressure of any aquifer below the coal seam to be gasified and within thirty feet of this seam; the degree of hydraulic connection between an aquifer and the coal seam to be gasified, due to

conditions such as unplugged holes, inadequate well completion, jointed or fractured rock, and potential subsidence.

1. Special attention should be given to effects on the hydrologic balance in groundwater systems.

   The following data for the coal seam(s) to be gasified and affected strata and aquifers above and below the coal seam(s) are required as a minimum:
   a. Vertical and horizontal permeability on hydraulic conductivity
   b. Porosity or storage coefficient
   c. Hydraulic gradients

2. Obtain at least two samples from each aquifer affected by mining as near the immediate area of mining activity as possible.
   Preferably, the wells should be cased and cemented. Standard methods of water analysis, such as those referenced in Appendix A, should be utilized. (If toxic material is present in such concentration as to cause concern, additional representative samples may be requested.) Analyze for the following constituents as a minimum:
   a. General parameters--temperature, pH, arsenic, calcium, magnesium, sodium, potassium, bicarbonate, sulfate, chloride, fluoride, nitrate, total dissolved solids, cation-anion balance, electric conductance, sodium, carbonates, hydrogen sulfide,organic nitrogen, total organic carbon, phenols, cyanides, thiocyanates, boron, and alkalinity.
   b. Metals--aluminum, cadmium, chromium, copper, iron, lead, manganese, mercury, molybdenum, nickel, selenium, zinc, barium, and lithium.

E. SURFACE WATER. (Rule 275).

F. ALTERNATIVE WATER SUPPLY INFORMATION (Rule 176).

G. CLIMATOLOGICAL INFORMATION. (Rule 177).

H. VEGETATIVE COVER. (Rule 178).

I. FISH AND WILDLIFE RESOURCES. (Rule 179).

J. SOILS RESOURCES. (Rule 180).

K. LAND USE INFORMATION. (Rule 181).

L. MAPS, PLANS AND CROSS-SECTIONS. (Rules 182 and 183).

Include a drainage plan on and away from the permit area; two cross-sections of production zone at right angles to one another extending to thirty feet below the coal seam to be gasified that identify geologic units (include geophysical logs); and a diagrammatic sketch showing completion data of ignition wells, production wells and monitoring wells, including wellhead equipment.

M. PRIME FARMLAND INVESTIGATION. (Rule 138).

IV. MINING PLAN (See Rule 107 for format and general requirements, subchapter K and Rules 185 through 199). Provide narrative including:

A. MINING PROCEDURES.

B. ENGINEERING TECHNIQUES.

C. EQUIPMENT TO BE USED.

D. PRODUCTION RATES.

E. OPERATION PLAN INCLUDING DESIGN AND HANDLING OF THE FOLLOWING NEW FACILITIES:

1. Dams, embankments, and impoundments

2. Storage areas (noncoal)

3. Coal handling

4. Waste handling and disposal

5. Mine

6. Air pollution control (Rule 199, if applicable)

F. EXISTING FACILITIES USE, MODIFICATION, DESTRUCTION AND ENVIRONMENTAL PLAN. (Rule 186).

G. SUBSIDENCE CONTROL PLAN. (Rule 194).

H. FISH AND WILDLIFE PLAN. (Rule 195).

V. RECLAMATION PLAN (See Rule 107 for format and general requirements and Rules 187 through 199).

A. DEMONSTRATE COMPLIANCE WITH ENVIRONMENTAL STANDARADS. Include:

1. Timetable for each step in reclamation plan.

2. Detailed cost of reclamation.

3. Plans and maps for soil handling and final disposition.

4. Revegetation plan.

5. Plan for maximization and conservation of coal resource.

6. Plan for handling and disposal of waste, toxic and fire hazard material, contingency plan to

preclude sustained combustion.

7. Maps, cross-sections, and narrative for sealing or managing wells and openings.

B. DEMONSTRATE COMPLIANCE WITH AIR AND WATER QUALITY LAWS AND REGULATIONS, AND HEALTH AND SAFETY STANDARDS.

C. RECLAMATION PLAN SHOULD EMPHASIZE:

1. Protection of the hydrologic balance.

2. Post mining land use.

3. Design, operation and final disposition of ponds, impoundments, banks, dams and embankments.

4. Relocation or use of public roads.

5. Maps and cross-sections of stream and channel diversions.

6. Protection of public and historic facilities.

7. Spoil and waste disposal.

8. Design, handling and final disposition of transportation facilities.

VI. COMPLIANCE WITH REQUIREMENTS OF PART 828 (Rule 205). Include:

A. DELINEATION OF PROPOSED HOLES AND WELLS AND PRODUCTION ZONE.

B. SPECIFICATIONS OF DRILL HOLES AND CASTINGS PROPOSED TO BE USED.

C. PLAN FOR HANDLING ALL ACID-FORMING, TOXIC-FORMING, OR RADIOACTIVE MATERIALS CONSTITUTING A FIRE, HEALTH, SAFETY OR ENVIRONMENTAL HAZARD CAUSED BY THE MINING AND RECOVERY PROCESS.

D. PLANS FOR MONITORING SURFACE AND GROUNDWATER AND AIR QUALITY.

APPENDIX A

Water Analysis References:

American Public Health Association, American Water Works Association and Water Pollution Control Federation, Standard Methods for the Examination of Water and Wastewater, 14th Edition: New York, American Public Health Association, 1975.

American Society for Testing and Materials, "Water and Atmospheric Analysis", Annual Book of ASTM Standards, Part 23, Philadelphia, American Society Testing Material, 1975.

Brown, Eugene, M. W. Skougstad, and M. J. Fishman, Methods for Collection and Analysis of Water Samples for Dissolved Minerals and Gases: Techniques of Water Resources Investigations of the U.S. Geological Survey, Book 5 Chapter A-1, Washington, D.C., Superintendent of Documents, U.S. Printing Office, 1970.

Environmental Protection Agency, Methods for Chemical Analysis of Water and Wastes, Environmental Monitoring and Support Laboratory, Office of Research and Development, Cincinnati, Ohio, (EPA-600/4-79-020), 1979.

Soil Analysis References:

Black, C.A., (editor), "Part I: Physical and Mineralogical Properties", "Part II: Chemical and Microbiological Properties", Methods of Soil Analysis, American Society of Agronomy and American Society for Testing and Materials, Agronomy Series Number 9.

Sobek, A.A., et al, "Field and Laboratory Methods Applicable to Overburdens and Minesoils", USEPA (600/2078-054-NTIS PB 280 495), Industrial Environmental Research Laboratory, Cincinnati, Ohio, 1978

USDA - Soil Conservation Service, "Soil Survey Laboratory Methods and Procedures for Collecting Soil Samples", U.S. Government Printing Office, Washington, D.C. 20402, (0107-0298), 1972.