



ENGINEERING AND CONSULTING DIVISION
POWER PRODUCTION SERVICES
WASTE COAL CFB PROJECTS
DEVELOPMENT SERVICES

- Fuel/Limestone Sourcing (Locating & Estimating Quality, Ownership, Transport Modes)
- Fuel/Limestone Information Search (History, Estimated Tonnage & Quality)
- Fuel/Limestone Database (Preliminary Fuel Plan, Cost Estimates)
- Purchase/Lease Option Agreement (Agreement, Property, Pricing, Etc.)
- Exploration And Reserve Assessment (Mapping, Drilling, Sampling, Laboratory)
- Mining/Reclamation Plans (Blending, Stockpiling, Equipment, Transport, Reclamation, Costs)
- Fuel Plan And Costs (Pro-Forma, Discounted Cash Flow)
- Lender Certification
- Construction Development



ENGINEERING AND CONSULTING DIVISION
POWER PRODUCTION SERVICES
WASTE COAL CFB PROJECTS
DEVELOPMENT SERVICES

FUEL/LIMESTONE SOURCING

Miltech routinely assists CFB Project developers with locating suitable fuel and limestone reserves for planned projects.

These Miltech fuel and limestone sourcing efforts include locating the reserves, determining likely transportation routes, estimating (based on available information and field reconnaissance) the quality and quantity of the reserve, establishing reserve ownership and finally, providing preliminary estimates of the cost of delivering and burning the fuel and limestone.

Miltech's fuel and limestone sourcing reports to the client provide a locations map identifying all waste coal sites recommended for further consideration as well as a summary matrix tabulation of all recommended fuel reserves that lists the sites with all pertinent information in order of projected overall cost (\$/m Btu) to the project.

Miltech's fuel and limestone sourcing studies provide the basis for preliminary fuel and limestone planning as well as for future more detailed waste fuel evaluations.

Miltech has provided fuel and/or limestone sourcing studies for most of the bituminous waste-coal projects that are now in operation.



ENGINEERING AND CONSULTING DIVISION
POWER PRODUCTION SERVICES
WASTE COAL CFB PROJECTS
DEVELOPMENT SERVICES

FUEL/LIMESTONE INFORMATION SEARCH

Bituminous gob or anthracite culm usually make-up the major portion of the material that fuels the CFB. This gob or culm is found primarily in piles that were produced as refuse from coal producing operations.

Most of this waste-coal originates as reject from coal preparation plants.

Miltech's fuel information search aims at projecting the quantity and quality of this waste coal in each site and within a predetermined distance from the planned CFB site.

Conclusions regarding quantity, quality, haulage, ownership, costs, etc. are made based on:

- Site reconnaissance by Miltech engineers
- US Geological Survey topographic mapping
- Aerial photographs taken during pile deposition
- Available coal refuse production and/or quality data
- Available drilling and/or sampling testing
- Discussions with persons familiar with the operations that produced the waste-coal
- Other available historical information

A Miltech report is provided to the client for each coal refuse site involved and includes:

- General site history
- Projection of probable tonnage and quality
- Projection of likely cost to mine, deliver and burn
- Projection of likely reclamation costs
- Recommendation to consider for further study or for rejection

Also included in the fuels location study is a Miltech projection of the amount and quality of other "opportunity" waste fuels that may be available as reject or off-grade coal from present operations within economical transportation distances from the CFB plant.

Limestone sourcing studies normally aim at (1) defining and assessing limestone producing operations including production, reserves, quality, etc. and/or (2) assessing the potential of available limestone reserves as a guaranteed limestone supply to a project. Once identified the limestone source(s) are routinely analyzed for purity, reactivity, elemental makeup, etc. These analyses are used in our fuel plans in order to estimate limestone requirements needed to achieve a given sulfur capture for the fuels involved.



ENGINEERING AND CONSULTING DIVISION
POWER PRODUCTION SERVICES
WASTE COAL CFB PROJECTS
DEVELOPMENT SERVICES

FUEL/LIMESTONE DATABASE

Miltech's waste-coal and limestone supply information searches provide the basis for the development of preliminary fuel and limestone plans that are key to the financial viability of CFB projects.

Before a project moves from the preliminary stage to a full development effort, Miltech provides an assessment of the project as it relates to fuel and limestone availability and costs.

These Miltech assessments include a database of likely reserve strength, mining/reclamation costs, permissibility, haulage, etc. – all considered in a preliminary pro-forma analysis of the fuel aspects of the project. These assessments therefore provide a picture of the strengths and weaknesses of the fuel/limestone plans for the project and, as such, provide a basis for project modifications, etc. before the project consumes the higher costs necessary for full project development.

Also see:

- Pro-Forma Fuel, Ash Disposal, Limestone Plans and Cash Flow
- Fuel, Ash Disposal, Limestone Plans – Certification to Lenders



ENGINEERING AND CONSULTING DIVISION
POWER PRODUCTION SERVICES
WASTE COAL CFB PROJECTS
DEVELOPMENT SERVICES

PURCHASE/LEASE OPTION AGREEMENTS

As part of the fuel/limestone search studies, Miltech develops the site information that will be required in the site purchase or base agreements for any fuel or limestone site that may be desired for the project.

This site information includes name and address or owner; site location-borough, township, county, state; USGS map coordinates, etc.

Miltech routinely prepares example option and/or sales agreements for the client for each site that is of interest to the project.

These option/sales agreements provide the client an opportunity to explore in detail the site and allows the client a specific amount of time to exercise the option/sale agreement.

Included in these option/sales agreements are the prices to be paid for the site material along with other specific owner/client requirements involved.

Miltech's example agreements are easily modified to incorporate specific language required by the client or site owner.



ENGINEERING AND CONSULTING DIVISION
POWER PRODUCTION SERVICES
WASTE COAL CFB PROJECTS
DEVELOPMENT SERVICES

EXPLORATION AND RESERVE ASSESSMENT

Miltech's fuel exploration has confirmed the quantity and quality of over 400 million tons of reserves for:

- New CFB projects that combined are now producing over 700 Mw
- Existing CFB projects totaling nearly 300 Mw that required additional fuel reserves after the project was operating
- CFB projects that were investigated but not yet moved to fruition

The Miltech fuel exploration work includes borehole drilling and bulk sampling, land surveys, mapping, laboratory analyses, etc. that are needed to satisfy the financing requirements of a project.

The Miltech limestone exploration usually involves assessing the production of operating limestone producers. In some cases where new reserves are involved Miltech carries out a limestone drilling and sampling program in cooperation with the owner of the limestone reserve.

Also see:

- Fuel Sampling and Analyses
- Property Surveying
- Topographic Surveying and Mapping



ENGINEERING AND CONSULTING DIVISION
POWER PRODUCTION SERVICES
WASTE COAL CFB PROJECTS
DEVELOPMENT SERVICES

MINING/RECLAMATION PLANS

Miltech's work with CFB clients involves development, and for some, implementation of total mining/preparation/reclamation plans.

Some key results of Miltech's mining and reclamation planning for clients include:

- For one CFB project Miltech's work involved development and implementation of the total mining/preparation/reclamation plans including processing system designs, mine plans, transport costs and reclamation designs.
- At three other CFB projects the original fuel and limestone plans that were developed by others were modified to improve efficiency after the projects were put into operation. During subsequent years, Miltech worked continually with each of these projects to improve both the mining/reclamation and the materials handling/preparation plant operation.
- Miltech's mining plans for CFB projects have also included stockpile and conveyance plans, mobile mining equipment selection, screens, crushers, etc. as well as wet preparation systems.
- Miltech's use of sophisticated computer technology for data handling, mapping and design along with engineering expertise have provided optimizations that have led to modifications of existing waste coal recovery systems.
- Miltech pro-forma cost analyses have been used to assess costs of all phases of the fuel and limestone plan including mining, transportation, ash reclamation and fuel utilization.

See also:

- Pro Forma Fuel, Ash Disposal, Limestone Plans and Cash Flow
- Fuel, Ash Disposal, Limestone Plans and Cash Flow



ENGINEERING AND CONSULTING DIVISION
POWER PRODUCTION SERVICES
WASTE COAL CFB PROJECTS
DEVELOPMENT SERVICES

FUEL PLAN AND COSTS

On the basis of the technical, operational and cost studies performed during the waste coal project development, Miltech provides a pro forma fuel, ash disposal, limestone plan with cost estimates for the projected life of the project.

Included in a typical pro forma plan are:

- Fuel and Ash Assumptions
 - Includes fuel and ash payloads, trucking or other haulage rates, ash plus reject moisture, haulage days available
- Raw Material Costs
 - Includes fuel mining, royalties, haulage, reclamation and delivered limestone
- Project Assumptions
 - Includes gross generation, heat rate capacity factor, total heat required, calcium/sulfur ratio, limestone percent CaCO₃, fuel moisture and delivered limestone cost
- Fuel and Fuel Quality
 - Includes available reserve tons and percent moisture, ash, sulfur and heating value of each fuel source

For each year of the project the plan provides the following information for each fuel source involved.

- Fuel tonnage burned
- Yearly burn (BTU/Year)
- Fuel quality
- Ash plus fuel reject tonnage
- Limestone required

The typical Pro Forma Cash Flow includes; for each fuel source, the yearly cost for:

- Fuel Mining
- Fuel and Ash Transportation
- Limestone
- Ash Disposal
- Costs per million BTU/lb

These Pro Forma evaluations are used to assess the viability of the project and provide the basis for final project design.



ENGINEERING AND CONSULTING DIVISION
POWER PRODUCTION SERVICES
WASTE COAL CFB PROJECTS
DEVELOPMENT SERVICES

LENDER CERTIFICATION

Miltech's fuel, ash disposal and limestone plans including pro forma and cash flow analyses support customers during and after project financing through interface with lending institutions involved.

Miltech's certifications have satisfied the financing requirements for two Pennsylvania greenfield CFB projects and one re-powering.

Other operating CFB projects in Pennsylvania, West Virginia and Utah have used Miltech's fuel, ash disposal and limestone related assessments to satisfy financial requirements where the certified plans were optimized by Miltech.

Miltech's experience with CFB project financing requirements ensures that project development is undertaken from project conception in a manner that will provide the best opportunity to acquire investors and long term financing.

See also:

- Pro Forma Fuel, Ash Disposal, Limestone Plans and Cash Flow
- Mining/Reclamation Plans



ENGINEERING AND CONSULTING DIVISION
POWER PRODUCTION SERVICES
WASTE COAL CFB PROJECTS
DEVELOPMENT SERVICES

CONSTRUCTION DEVELOPMENT

Miltech routinely provides fuel and ash disposal site construction services once a project is financed and moving to production

Examples of Miltech's site development are:

- In the early 1990's Miltech completed all site preparation work, including excavation and construction of site roads, erosion and sedimentation control for three coal-refuse sites that supply fuels to two CFB projects located in Pennsylvania.
- Miltech completed all site preparation work including acid water drainage treatment facility, mine section development, set up and screening of power plant fuel and completion of site development construction work for a beneficial use ash disposal site located in Pennsylvania.
- Miltech designed and constructed erosion and sedimentation controls at a waste coal CFB site located in Eastern Pennsylvania
- Miltech designed and supervised construction of erosion and sedimentation controls for three waste coal sites that deliver fuel and return ash for a CFB project in West Virginia



ENGINEERING AND CONSULTING DIVISION
POWER PRODUCTION SERVICES
WASTE COAL CFB PROJECTS
ENGINEERING SERVICES

- PROCESSING /HANDLING SYSTEM DESIGNS (FUEL AND LIMESTONE)
- PERMITTING (FUEL MINING AND ASH DISPOSAL)
- PERMIT COMPLIANCE (WATER MONITORING, REPORTING, ETC.)
- SNCR SYSTEM DESIGN
- STOCKPILE INVENTORY



ENGINEERING AND CONSULTING DIVISION
POWER PRODUCTION SERVICES
WASTE COAL CFB PROJECTS
ENGINEERING SERVICES

PROCESSING/HANDLING SYSTEM DESIGNS (FUEL AND LIMESTONE)

Miltech offers clients design services for both fuel and limestone processing systems. These design services include plant site selection, structural design, feeder systems, screening, crushing, conveyance and storage. In the area of fuel processing, Miltech's system designs services also include specific gravity processing and separation.

Miltech's fuel and limestone handling system designs include delivery system, storage, handling fuel yard layout, stockpiling, stockpile reclaiming, etc. These system designs have been successfully used at operating plants in Pennsylvania, West Virginia and Utah that handle a wide range of fuels including run of mine coal, strip mine waste, coarse coal refuse, fine coal refuse and petroleum coke.



ENGINEERING AND CONSULTING DIVISION
POWER PRODUCTION SERVICES
WASTE COAL CFB PROJECTS
ENGINEERING SERVICES

PERMITTING (FUEL MINING AND ASH DISPOSAL)

In 1990 Miltech worked closely with Pennsylvania Department of Environmental Protection (PADEP) in the successful development of the first Sub Chapter F permit for bituminous waste fuel recovery and boiler ash reclamation that was issued in Pennsylvania.

Since that first permit in 1990, Miltech has developed permits for over 15 waste coal recovery and/or boiler ash reclamation sites in both the bituminous and anthracite areas of Pennsylvania as well as for bituminous fuel in West Virginia.

After waste coal sites are operating Miltech routinely assists clients with regulatory compliance.

For more information see

- Permit Compliance Services
- Fuel and Limestone Sites Water Sampling and Analyses
- Low Flow and Standard Ground Water Sampling
- Coal Ash Beneficial Use Permitting



ENGINEERING AND CONSULTING DIVISION
POWER PRODUCTION SERVICES
WASTE COAL CFB PROJECTS
ENGINEERING SERVICES

PERMIT COMPLIANCE

Miltech offers permit compliance services including all testing, engineering, submissions, etc. needed to meet the requirements of a mining, reclamation and/or a beneficial use permit. These services include:

- Density testing and reporting
- Bonding reporting
- Water testing, statistical evaluation and reporting
- Annual volumetrics, mapping and reporting
- Coal completion reporting



ENGINEERING AND CONSULTING DIVISION
POWER PRODUCTION SERVICES
WASTE COAL CFB PROJECTS
ENGINEERING SERVICES

SNCR SYSTEM DESIGN

Miltech Engineers are experienced in the design and installation of SNCR (selective non-catalytic reduction) systems for the reduction of NO_x (nitrogen oxides) in flue gas emissions. At one CFB waste coal burning power plant, Miltech designed an aqua ammonia SNCR system to reduce NO_x emissions from 0.35 lb/mm BTU (pounds per million BTU) to 0.13 lb/mm BTU. Designs included:

- Determining aqua ammonia feed rate required to achieve the desired NO_x reduction
- Selecting the pumps and piping required to transmit at the proper pressure and flow rate, aqua ammonia from an on-site storage tank to the injection sprays in the cyclones located upstream of the stack
- Sizing and providing specifications for the on-site aqua ammonia storage tank
- Sizing and designing concrete containments for the aqua ammonia storage tank, and an aqua ammonia truck unloading station
- Designing a pump skid for fabrication to support three aqua ammonia pumps (two pumps plus one spare) for a two-train system, with valves and controls to allow for the interchangeable use of the pumps
- Designing four flow meter panels for fabrication. The designs included splitting the two aqua ammonia streams into 12 streams leading to lances and spray nozzles, and for air injection into the aqua ammonia streams.
- Selecting the proper spray nozzles for injecting aqua ammonia and air into the cyclones.

In addition to designing and selecting the equipment for the aqua ammonia injection system, Miltech also assisted plant engineers and operators with selecting the location for the aqua ammonia storage tank, truck unloading station, pump skid and controls, and the flow meter panels. Once the aqua ammonia truck unloading and storage tank site was selected, Miltech prepared specifications for the demolition and removal of unused facilities at the selected location. Miltech then surveyed the site, prepared site grading plans, and prepared detailed designs for the installation of the concrete foundations and containments. Pipeline routing plans from the ammonia storage tank, to the pump skid, to the flow meter panels in the plant, and to the 12 ammonia injection lances were also prepared. A complete list of materials required for the project was provided to the client.

For the particular project, Miltech provided on-site supervision and inspection during site grading, and during installation of the concrete foundations and containments. Miltech has the capability and expertise necessary to follow through on all projects from the design phase, to the construction and installation phase, and through the startup and initial operation phases, as required by the client.



ENGINEERING AND CONSULTING DIVISION
POWER PRODUCTION SERVICES
WASTE COAL CFB PROJECTS
ENGINEERING SERVICES

SNCR SYSTEM DESIGN (Continued)

For additional related information see:

- Mine De-Watering System Designs
- Topographic Surveying and Mapping
- Scrubber Sludge De-Watering System Designs
- Slurry Transport System Design
- Permit Compliance



ENGINEERING AND CONSULTING DIVISION
POWER PRODUCTION SERVICES
WASTE COAL CFB PROJECTS
ENGINEERING SERVICES

STOCKPILE INVENTORY

Miltech's fuel stockpiling inventory services offer our clients the ability to reconcile inventories. The services include determining stockpile volume by aerial and/or ground survey methods, density determination by drilling and nuclear backscatter methods as well as stockpile sampling and analyses.

Miltech's volumetrics and density testing are done in accordance with ASTM procedures in order to ensure the maximum achievable accuracy.



ENGINEERING AND CONSULTING DIVISION
POWER PRODUCTION SERVICES
WASTE COAL CFB PROJECTS
CONSULTING SERVICES

- OPERATIONS MANAGEMENT
- OPERATIONS ASSESSMENT
- WATER SAMPLING



ENGINEERING AND CONSULTING DIVISION
POWER PRODUCTION SERVICES
WASTE COAL CFB PROJECTS
CONSULTING SERVICES

OPERATIONS MANAGEMENT

The key professionals at Miltech are professional engineers who also have at least 15 years of operations' and/or operations' engineering experience. Accordingly, once a waste coal project moves from development to operation, Miltech often provides fuel extraction and transportation management services to the in-house operators.

For example, from 1990 to 2000 Miltech had been involved directly with management of the waste fuel mining/boiler ash reclamation operations for a waste coal CFB plant in Pennsylvania and now continues to serve as the fuel consultant for that operation and all of that company's other fuel contracts.

Miltech's work at two other waste coal projects involved operations activities that helped to turn these projects toward profitability. Work included direct supervision of all in-house mining/reclamation activities until in-house management were trained to assume day-to-day responsibility for the operation. Miltech is presently overseeing the fuel operations at a fuel site for one of these companies.

For additional information related to Miltech services to Waste Coal producers and burners see:

- Waste Coal Project Engineering Services
- Waste Coal Project Development Services



ENGINEERING AND CONSULTING DIVISION
POWER PRODUCTION SERVICES
WASTE COAL CFB PROJECTS
CONSULTING SERVICES

OPERATIONS ASSESSMENT

Since 1990 Miltech has performed assessments of at least eight operating waste coal operations.

Miltech's technical and financial assessments of waste coal operating and transportation systems are accepted by major financial institutions and independent investors.

Generally included in these assessments are:

- Fuel Reserves
 - Reserves originally projected vs. reserves remaining
 - Recoverability and quality
- Extraction of Reserves
 - Effect on reserves of past extraction
 - Extraction plans moving forward
 - Equipment and manpower
 - Safety program
 - Cost optimization
 - Reserve utilization
- Transportation
- Ash placement at fuel sites
 - Air space utilization
 - Compaction
- Permit compliance
- Pro forma cost estimates
- Recommendations

For more information see:

- Waste Coal Project Engineering Services
 - Fuel and ash disposal permitting
 - Permit compliance
- Waste Coal Project Development Services
 - Mine plans
 - Pro forma fuel, ash disposal, limestone plans & cost estimates
 - Fuel, ash disposal, limestone plans & certification to lenders



ENGINEERING AND CONSULTING DIVISION
POWER PRODUCTION SERVICES
WASTE COAL CFB PROJECTS
CONSULTING SERVICES

WATER SAMPLING

As part of its day-to-day consulting services to waste coal and ash placement operations, Miltech provides a variety of water testing services including:

- Standard field sampling of seeps and streams
- Low flow sampling of wells (ASTM)
- Water analyses
- Permit compliance assessment
- Compliance reporting

For information see:

- Analytical Division
 - Standard Water Sampling and Analyses
 - Low-Flow Well Water Sampling