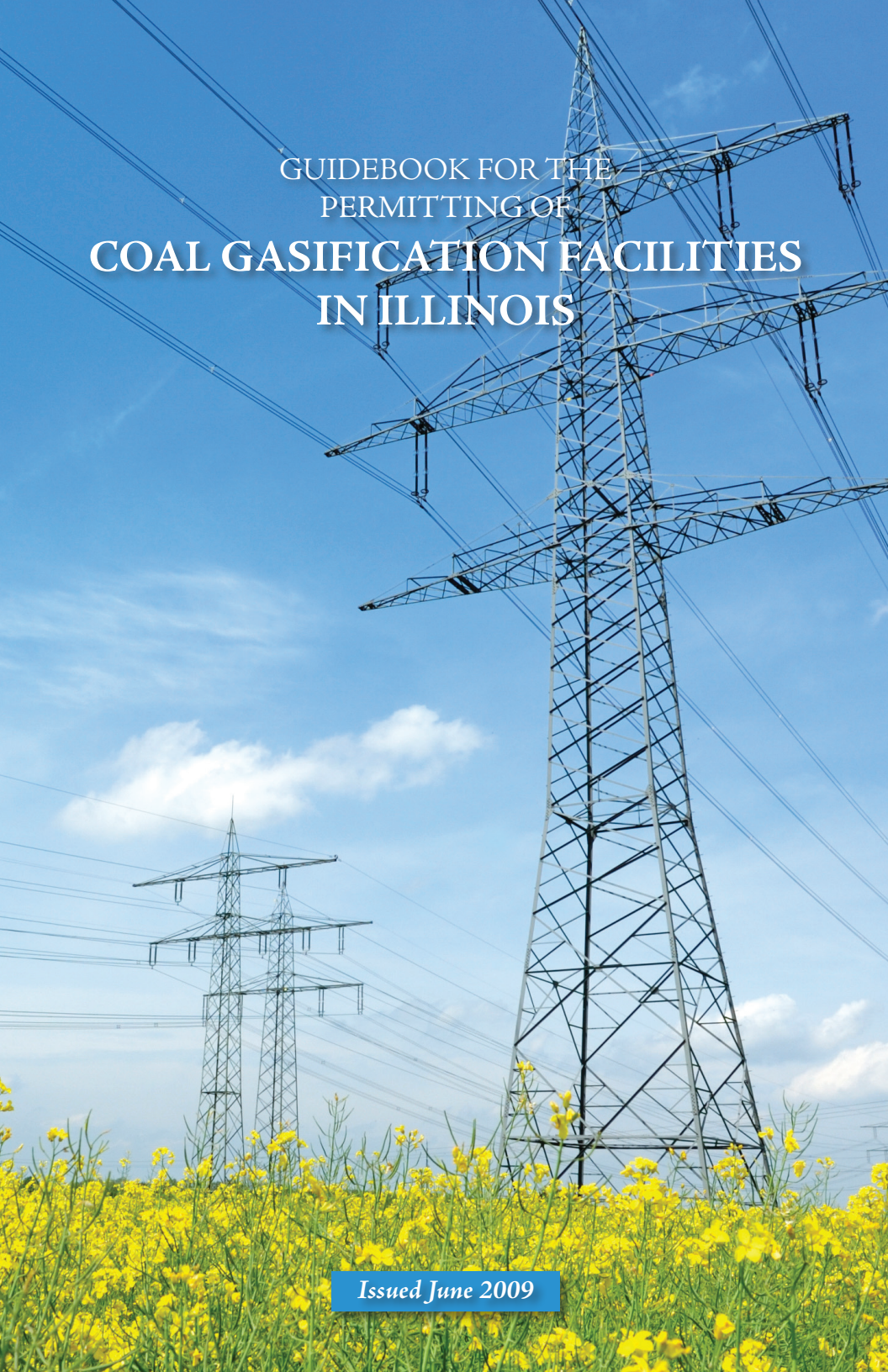

GUIDEBOOK FOR THE
PERMITTING OF

COAL GASIFICATION FACILITIES IN ILLINOIS

Issued June 2009

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NOMENCLATURE

AGR	Acid Gas Removal
ASU	Air Separation Unit
BACT	Best Available Control Technology
CAA	Federal Clean Air Act
CAAPP	Clean Air Act Permit Program
CCS	Carbon Capture and Sequestration
CFR	Code of Federal Regulation
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
FR	Federal Register
FWS	US Fish and Wildlife Service
GIS	Geographic Information System
GS	Geological Sequestration
GT	Gas Turbine
HAP	Hazardous Air Pollutants
HRSG	Heat Recovery Steam Generator
IAC	Illinois Administrative Code
ICC	Illinois Commerce Commission
IDNR	Illinois Department of Natural Resources
IDPH	Illinois Department of Public Health
IGCC	Integrated Gasification Combined Cycle
Illinois EPA	Illinois Environmental Protection Agency
IPCC	Intergovernmental Panel on Climate Change
LAER	Lowest Achievable Emission Rate
MACT	Maximum Achievable Control Technology
MCL	Maximum Concentration Limit
MSSCAM	Major Stationary Sources Construction and Modification
NAAQS	National Ambient Air Quality Standards
NEET	New and Emerging Environmental Technologies
NESHAP	National Emission Standards for Hazardous Air Pollutants
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NSPS	New Source Performance Standards
NSR	New Source Review
PM	Particulate Matter
POTW	Publicly Owned Treatment Works
PSD	Prevention of Significant Deterioration
RACT	Reasonably Available Control Technology
RBLC	RACT/BACT/LAER Clearinghouse
SWPPP	Stormwater Pollution Prevention Plan
USCOE	US Army Corps of Engineers
USDW	Underground Source of Drinking Water
VOC	Volatile Organic Compounds
WCR	Well Compliance Report
WPC	Water Pollution Control

INTRODUCTION

This guidebook is intended to provide developers, investors, project managers, engineers, and others interested in advancing coal gasification technologies in Illinois with an understanding of the basic requirements, interrelationships, and early project considerations associated with acquiring necessary permits for such a project. In terms of practical application, this guidebook focuses on examining permitting requirements associated with the construction and operation of a gasification facility utilizing Illinois coal. The guidebook reviews the requirements for both a new facility and a coal gasification retrofit to an existing natural gas-fired combined-cycle plant. In addition, this guidebook examines regulatory compliance requirements associated with potential long-term carbon sequestration efforts.

The guidebook is segmented to review the intricate permitting requirements relating to air emission, water usage and discharge, local codes and zoning, and other permitting requirements, including the possible permitting of a CO_2 sequestration operation. Permit application requirements and approval agencies are identified, as well as important technical resources which are available to the permit applicant. The guidebook also discusses the technologies potentially required to comply with the various impacting regulations. Finally, the guidebook assesses the anticipated time requirements to comply with each permitting component in order to identify those permits which are likely to take the longest to acquire, bear the greatest amount of uncertainty, and bear the highest overall costs in terms of both application resources and permit authority fees.

In the discussion of permit requirements in this guidebook, notations highlighted with the "key" symbol, as shown beside this paragraph, are considered to be particularly important practical aspects of project permitting to minimize the project schedule and costs.

Important practical permitting considerations in this guidebook are highlighted with the key symbol.

This guidebook was prepared for the Illinois Clean Coal Institute by Steffen Mueller of the University of Illinois at Chicago Energy Resources Center (312-355-3982). Other collaborators were O'Shea Environmental Associates and Avalon Consulting, Inc.

We would like to thank all who contributed to and reviewed this guidebook.

REQUIREMENTS FOR AIR EMISSION PERMITTING

Gasification Emission Overview

It is important at the initiation of the permitting process to define the proposed emission sources and emission rates as accurately and conservatively as possible. Changes in the project that increase the predicted potential emission after an air permit application process has been started will considerably impact all major components of the permit application, and will extend the time required for permit application preparation and review. Effective control technologies may be applicable to specific gasification plants based on facility design parameters and current developments in the emission control systems.

Generally, air emission in a typical gasification plant is associated with the following plant operations:

- Coal Delivery, Storage and Handling
- Coal Preparation (slurry grinding or crushing/drying)
- Gasification Block/Flares
- Sulfur Recovery
- Gas Turbine (GT) Exhaust
- Cooling Towers
- Thermal Oxidizers or Incinerators
- Auxiliary Boilers
- Emergency Engines

Technologies used for controlling air emission from coal handling, cooling towers, auxiliary boilers, emergency generators, and diesel-fueled fire-water pumps are not impacted by their application in gasification systems or by a specific gasification technology. Therefore, emission rates for these operations are similar to those found in other coal combustion applications.

For mercury removal from syngas, the syngas typically passes through a bed of activated carbon that is highly efficient for removing mercury from the syngas stream. For reducing nitrogen oxides (NO_x) emission from the Gas Turbine (GT), the syngas is typically diluted with compressed nitrogen, produced as a byproduct in the air separation plant where oxygen is produced for the gasifier, either prior to or during combustion in the GT. In addition, the syngas is also humidified in the combustion section of the GT to further reduce NO_x emission.[1]

Low sulfur dioxide (SO_2) levels in the syngas can be achieved by well-known processes such as Rectisol and Selexol. Filterable PM discharged to the atmosphere is limited based on the technology implemented by the gasifier manufacturer, and usually entails syngas quenching and/or additional technologies such as cyclones and candle filters.

As an example, Table 1 shows the emission of a typical IGCC facility when using Illinois No. 6 coal (11,666 Btu/lb HHV, 650 MWe IGCC, 90% CCS).

Table 1: Example Information on Feed, Output, and Air Emission for a Typical IGCC Gasification Facility

PARAMETER	Typical Gasification Facility	
	No CCS	With CCS
Coal Feed, tons/hr	245	250
Coal Feed, tons/day	5,876	6,005
Air Feed to ASU, tons/hr	4,274	4,447
Water Usage, gpm	4,003	4,579
Net Power Output, MW	640	556
Slag, tons/hr	27	27
HRSG Stack Gas, tons/hr	4,347	4,219
Sulfur, tons/hr	6.1	6.3
CO_2, tons/hr	562	52
SO_2 Emission, ppmv	4	3
NO_x Emission, ppmvd @15% O_2	15	15

MASS AIR EMISSIONS				
POLLUTANT	No CCS		With CCS	
	tons/yr	lb/MMBtu	tons/yr	lb/MMBtu
CO_2	3,937,728	197	401,124	19.6
SO_2	254	0.0127	196	0.0096
NO_x	1,096	0.055	995	0.047
PM_{10}	142	0.0071	145	0.0071
Hg (lb/TBtu)	0.011	0.571	0.012	0.571

In Illinois, there are two types of air permits administered by the Illinois Environmental Protection Agency (Illinois EPA), Division of Air Pollution Control: construction permits and operating permits. For new or retrofitted gasification facilities, the Construction Permit represents the critical path to project development, construction and initial operation, while the Operating Permit provides ongoing regulatory compliance conditions for the facility following construction. With the acquisition of an Illinois EPA Construction Permit, the facility will normally be allowed to operate for a period of up to 12 months following initial start-up, during which all permit-required emission source testing and emission monitoring verification will be conducted. In addition, the facility may prepare and submit the Operating Permit application during this initial operating period.

1. Construction Permit

1.1 Overview

In terms of the Construction Permit, the Illinois EPA program was established to reflect requirements of the Federal Clean Air Act (CAA) and 1990 Amendments. It is the goal of the Construction Permit program to ensure that ambient air quality is protected in the area of operations. This is achieved through an evaluation to demonstrate that the National Ambient Air Quality Standards (NAAQS) for listed pollutants can be maintained. The NAAQS as of the date of this guidebook are listed in Table 2.

Table 2: National Ambient Air Quality Standards

POLLUTANT	PRIMARY STANDARDS	
	LEVEL	AVERAGING TIME
Carbon Monoxide (CO_2)	9 ppm (10 mg/m^3)	8-hour
	35 ppm (40 mg/m^3)	1-hour
Lead	1.5 $\mu g/m^3$	Quarterly Average
Nitrogen Dioxide (NO_x)	0.053 ppm (100 $\mu g/m^3$)	Annual (Arithmetic Mean)
Particulate Matter (PM_{10})	150 $\mu g/m^3$	24-hour
Particulate Matter ($PM_{2.5}$)	15 $\mu g/m^3$	Annual (Arithmetic Mean)
	35 $\mu g/m^3$	24-hour (98^{th} Percentile Averaged over 3 years)
Ozone	0.075 ppm (2008 std)	8-hour
Sulfur Dioxide (SO_2)	0.03 ppm	Annual (Arithmetic Mean)
	0.14 ppm	24-hour
	0.5 ppm (1300 $\mu g/m^3$)	3-hour

The first two steps in the construction permit analysis for a project are (1) to estimate the maximum levels of emission for a proposed gasification project which will allow a better identification of permitting considerations, and (2) to determine if the area around the proposed facility location is designated attainment for each pollutant associated with the facility. Based on components and design characteristics of a gasification plant considered in this guidebook, a new facility would be a major new emission source as the potential emission of most of the criteria pollutants associated with the facility are anticipated to be 100 tons/year or more. Assuming that the proposed plant will be located in an area which has been determined to have attained the NAAQS (i.e., attainment area), then the Construction Permit will take the form of a Prevention of Significant Deterioration (PSD) permit. If the gasification plant was a retrofit of an existing natural gas-fired combined-cycle facility which was already a major source, then the retrofit would be considered a major modification if the net emission increase of any pollutant were above PSD significance levels. The PSD

permit program requires that each significant pollutant at a major emission source be evaluated using several important criteria which are summarized as follows:

- **Best Available Control Technology (BACT):** The proposed gasification facility would need to demonstrate that emission will be controlled with recognized BACT levels of emission reductions. This is done through a comprehensive technical and economic review of all commercially available emission control methods for each source of each pollutant for which the gasification facility is shown to be significant.

- **Air Quality Impact Evaluation:** An air quality impact evaluation would need to be conducted through theoretical air modeling using recognized pollutant dispersion models. The objective would be to demonstrate that there would be no impacts above certain regulatory criteria. Impacts need to be examined for general areas surrounding the proposed facility under one set of criteria (Class II areas), and for any federally protected areas such as national parks and wilderness areas (Class I areas) under a more strict set of criteria. While there are no defined Class I areas in Illinois, the Illinois EPA does, on a case by case basis, consult with the federal land manager of the nearest Class I areas, which are beyond 100 km . There have been relatively few Illinois projects which have potentially impacted Class I areas in other states, one such example being the Prairie State Generation project.

- **Additional Impacts:** Impacts on soils, vegetation, crops, and visibility are also required to be evaluated in the PSD review. In addition, under the Endangered Species Act, the USEPA will consult with the US Fish and Wildlife Service (FWS) and/or the National Oceanic and Atmospheric Administration Fisheries Service (NOAA Fisheries), to ensure that any permit approvals will not adversely impact federally-listed threatened or endangered species. The PSD evaluation is only conducted, however, for pollutants for which the area has attained NAAQS. For areas which have been determined to have not attained the NAAQS (nonattainment areas), nonattainment New Source Review (NSR) under the Illinois Major Stationary Sources Construction and Modification (MSSCAM) permitting requirements (35 IAC Part 203) apply for major new sources or modifications. Nonattainment areas in Illinois are shown in Table 3.

The permit applicant should consult with the Illinois EPA early in the application process to discuss the project and potential facility site to identify the exact permitting considerations for the project.

Table 3: Current NAAQS Nonattainment Areas in Illinois

COUNTY	NAAQS	LOCATION AND NONATTAINMENT CLASSIFICATION
Cook	8-Hr Ozone	Chicago-Gary-Lake County, IL-IN – Moderate
	$PM_{2.5}$	Chicago-Gary-Lake County, IL-IN – Nonattainment
Du Page	8-Hr Ozone	Chicago-Gary-Lake County, IL-IN – Moderate
	$PM_{2.5}$	Chicago-Gary-Lake County, IL-IN – Nonattainment
Grundy	8-Hr Ozone*	Chicago-Gary-Lake County, IL-IN – Moderate
	$PM_{2.5}$*	Chicago-Gary-Lake County, IL-IN – Nonattainment
Jersey	8-Hr Ozone	St. Louis, MO-IL – Moderate
Kane	8-Hr Ozone	Chicago-Gary-Lake County, IL-IN – Moderate
	$PM_{2.5}$	Chicago-Gary-Lake County, IL-IN – Nonattainment
Kendall	8-Hr Ozone*	Chicago-Gary-Lake County, IL-IN – Moderate
	$PM_{2.5}$*	Chicago-Gary-Lake County, IL-IN – Nonattainment
Lake	8-Hr Ozone	Chicago-Gary-Lake County, IL-IN – Moderate
	$PM_{2.5}$	Chicago-Gary-Lake County, IL-IN – Nonattainment
Madison	8-Hr Ozone	St. Louis, MO-IL – Moderate
	$PM_{2.5}$	St. Louis, MO-IL – Nonattainment
McHenry	8-Hr Ozone	Chicago-Gary-Lake County, IL-IN – Moderate
	$PM_{2.5}$	Chicago-Gary-Lake County, IL-IN – Nonattainment
Monroe	8-Hr Ozone	St. Louis, MO-IL – Moderate
	$PM_{2.5}$	St. Louis, MO-IL – Nonattainment
Randolph	$PM_{2.5}$*	St. Louis, MO-IL – Nonattainment
St Clair	8-Hr Ozone	St. Louis, MO-IL – Moderate
	$PM_{2.5}$	St. Louis, MO-IL – Nonattainment
Will	8-Hr Ozone	Chicago-Gary-Lake County, IL-IN – Moderate
	$PM_{2.5}$	Chicago-Gary-Lake County, IL-IN – Nonattainment

** Only certain townships in these counties are nonattainment.*

As indicated, the nonattainment areas are centered in counties in and around Chicago and St. Louis. The only pollutants for which these areas have not attained the NAAQS are particulate matter ($PM_{2.5}$ or the <2.5 micron fraction), and ozone. Both Volatile Organic Compounds (VOC) and Nitrogen Oxides (NO_x) are regulated as ozone precursors. It is important that the permit applicant consult with the Illinois EPA Bureau of Air to determine the attainment status of possible site locations when considering a project, and to understand if any related special permitting considerations are associated with the possible locations of interest.

In the case where a natural gas-fired plant, which is already an existing major air emission source, is to be retrofitted with a coal gasification system, the starting point in the evaluation of the applicable Illinois EPA construction permitting requirements would be the determination of the net emission increase attributable to the modification. If the net increase for the existing major source facility in an attainment area exceeds PSD significance levels, then a PSD permit application would be required. The permit applicant should consult with the Illinois EPA Bureau of Air early in the application process to discuss emission changes associated with a retrofit project and permitting implications of such changes.

1.2 Emission Evaluation

At the beginning of the construction permitting process, it is critical with respect to permit acquisition schedule and cost that emission be estimated for all process and fugitive emission points as definitively as possible. All other aspects of the construction permit acquisition process will build from the emission predictions, including the BACT analyses, the ambient air quality impact analyses and the additional impact evaluations. Changes in predicted emission source configurations and/or rates after the permit application process has begun may cause substantial components of the permit application work to be restarted. Similarly, increases in predicted emission and changes in emission rates after the Illinois EPA permit application review has been initiated could result in the entire permit review being restarted after submission of the new information. In historical cases in which the permit review was extended well beyond normal expectations, it is often times an adjustment in emission rates or emission source configuration that causes schedule difficulties.

Accurately predicting plant equipment specifications and air emission at the beginning of the project can save substantial permitting time and cost. In-review changes in these parameters have been known to more than double the permit acquisition time of many projects.

The following methods and resources are generally used to predict air emissions from various components of gasification facilities:

- **Engineering Design Specifications**: For engineered process components, engineering evaluations are acceptable to the Illinois EPA.
- **Vendor Data and Emission Guarantees**: These are generally used to support emission predictions for package systems, such as boilers or emergency generators, which may have applicable published emission data and/or vendor guarantees available.
- **Regulatory Limits:** Regulatory emission limitations, such as those provided in New Source Performance Standards (NSPS) or other regulations, are often proposed as the basis for the maximum allowable facility emission. When these limits are proposed they are usually supported in the permit application documents with information such as engineering specifications, mass balance calculations, and published emission factors to indicate that regulatory limitations are viable.
- **USEPA Air Emission Factor References:** The USEPA publishes accepted air emission factors for many types of sources, including combustion and coal processing and handling. These factors, as well as a no-cost, on-line emission factor retrieval service can generally be found at http://www.epa.gov/ttn/chief/. Access to downloadable emission factor reference literature can be found at http://www.epa.gov/ttn/chief/ap42/index.html.

For gasification facilities, these references are particularly useful in the estimation of emission points associated with coal and slag handling, fugitive emission associated with coal and slag storage, and fugitive emission from roadway dust. Emission factors are also available, if needed, for various fuel combustion sources. These tend to be conservatively higher than those provided by manufacturers, as they need to be universally applicable to all sources regardless of manufacturing dates and technology.

1.3 Identification of Applicable Standards

There are a number of federal emission standards which would apply to a large gasification facility. The standards represent the maximum allowable emission condition for the project. In many instances the BACT determination performed in PSD permitting identifies a lower emission rate. Exact details

Standards and regulations are continually being developed and modified. The standards regulations in effect at the time of project development should be discussed with the Illinois EPA.

of the standards and regulations are available through several resources which provide the Code of Federal Regulation (CFR) and the Federal Register (FR), and can be found on the USEPA website at http://www.epa.gov/lawsregs/index.html.

The full text of Illinois environmental regulations can be found at the Illinois Pollution Control Board website at http://www.ipcb.state.il.us/SLR.

Example standards which may be applicable to an IGCC project are identified below, but will be applicable to any gasification facility.

- **Federal New Source Performance Standards (NSPS):** NSPS are a series of source-specific federal regulations that represent the minimum approvable operating and emission specifications for the subject air emission sources. Since the PSD Construction Permit applicant is required to demonstrate that the emission is controlled with BACT, the final emission control requirements will likely be more stringent than the NSPS, but may not be less stringent under any circumstances. Some general NSPS that may apply to various emission sources are:

- **Standards of Performance for Electric Utility Steam Generating Units (40 CFR 60 Subpart Da):** The 40 CFR 60 Subpart Da NSPS applies to an IGCC facility when "the combined-cycle gas turbine is designed and intended to burn fuels containing 50 percent (by heat input) or more solid-derived fuel not meeting the definition of natural gas on a 12-month rolling average basis." Since the benefit of the IGCC system is the ability to fire syngas, Subpart Da will be applicable to these facilities.

  The requirements of 40 CFR 60 Subpart Da include PM emission limits, NO_x emission limits, SO_2 emission limits, mercury emission limits, and related monitoring and reporting requirements. Again, it is likely that the emission limitations stemming from an IGCC BACT evaluation will be more stringent than the Subpart Da NSPS.

- **Standards of Performance for Industrial-Commercial-Institutional Steam Generating Units (40 CFR 60 Subpart Db):** The requirements of 40 CFR 60 Subpart Db apply to all steam generating units that commence construction, modification, or reconstruction after June 19, 1984, and have a heat input capacity from fuels combusted in the steam generating unit greater than 29 MWe (100 million Btu/hour). The definition of coal in this regulation includes "coal-derived synthetic fuels, including but not limited to solvent refined coal, gasified coal, coal-oil mixtures, and coal-water mixtures."

This standard includes emission limitations for SO_2, NO_x and PM, which are based on the size and configuration of the steam generating unit. This standard typically applies to auxiliary boilers in IGCC facilities. Since the emission limit will be based on the boiler design, this standard should be reviewed when selecting a boiler.

- **Standards of Performance for Coal Plants (40 CFR 60 Subpart Y):** The NSPS for coal preparation plants codified in 40 CFR 60 Subpart Y implements opacity limitations for operations which include crushing, screening, conveying, transferring and storage of coal, all of which would be conducted in the coal handling portion of a gasification facility. Again, it is anticipated that BACT-level emission controls for these processes be well within the standard.

- **Maximum Achievable Control Technology for Major Sources of Hazardous Air Pollutants:** The 1990 CAA Amendments identified specific Hazardous Air Pollutants (HAPs) which must be controlled at major sources using Maximum Achievable Control Technology (MACT). Specific National Emission Standards for Hazardous Air Pollutants (NESHAPs) have been implemented for a number of specific processes which are typically located at major sources of HAP emission. Major sources of HAPs are those with potential emission of 10 tons/year of any individual HAP, and 25 tons/year of combined HAP constituents. A review of recent PSD permit applications for IGCC facilities indicates that such facilities have *not* been characterized as major sources of HAPs, and are, therefore, not subject to MACT requirements. The HAP major source status should be confirmed at the initiation of any new project.

Illinois Emission Regulations

Illinois regulations include a number of emission standards adopted by the Pollution Control Board which represent the basic requirements for sources in Illinois. These include specifications for visible emission (35 IAC Part 212), SO_2 (35 IAC Part 214), volatile organic material (35 IAC Parts 215/218), and mercury (35 IAC Part 225). It is anticipated that the BACT findings will result in compliance with any emission standards established in these Illinois regulations.

1.4 BACT Analysis

An evaluation by the PSD permit applicant is required which demonstrates that all significant emission sources operate using BACT, which is defined as follows:

> *"An emission limitation (including a visible emission standard) based on the maximum degree of reduction for each pollutant subject to regulation under the Act which would be emitted from any proposed major stationary source or major modification which the Administrator, on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs, determines is achievable for such source or modification through application of production processes or available methods, systems, and techniques, including fuel cleaning or treatment or innovative fuel combustion techniques for control of such pollutant. In no event shall application of best available control technology result in emission of any pollutant which would exceed the emission allowed by any applicable standard under 40 CFR parts 60 and 61. If the Administrator determines that technological or economic limitations on the application of measurement methodology to a particular emission unit would make the imposition of an emission standard infeasible, a design, equipment, work practice, operational standard, or combination thereof, may be prescribed instead to satisfy the requirement for the application of best available control technology. Such standard shall, to the degree possible, set forth the emission reduction achievable by implementation of such design, equipment, work practice or operation, and shall provide for compliance by means which achieve equivalent results."*

BACT is determined on a case-by-case basis during the permitting process. BACT is a determination of both the appropriate technology for control of emission and of the emission limits that must be achieved by such technology. A permit applicant must provide a BACT demonstration in the application. The Illinois EPA then reviews that demonstration and makes the final determination of BACT. Given the case-by-case nature of the BACT determination, it is common for the Illinois EPA to require an applicant to supplement its initial BACT demonstration.

Top-Down BACT Analysis Requirements

The BACT review must be organized to review the most stringent emission control option, and then list all other options in order of stringency. The EPA's RACT/BACT/LAER Clearinghouse can provide a starting point for investigating technology options. A comprehensive list of control options shall include inherently lower-emitting processes or work practices, add-on controls, or a combination of all of the above.

Any control option installed and successfully operated at a similar source is considered feasible. If a control has not yet been demonstrated in operation, the applicant must determine the availability. This is based on factors including commercial availability, if it can realistically be installed and operated, and status in the licensing and commercial demonstration stage. The applicant can demonstrate that a control is not technically feasible by showing that it is not commercially available or that unusual circumstances prohibit its successful use. If modifications are needed to make the control compatible with the emission unit, it does not necessarily mean the control technology is technically infeasible. Such costs should be considered in the economic feasibility part of the BACT analysis.

Other Resources for BACT Determination

Other resources that are available to determine the type of control technologies and the related emission limitations for similar emission source equipment throughout the US are as follows:

- **The USEPA RACT/BACT/LAER Clearinghouse (RBLC):** The USEPA RBLC database contains case-specific information on the "best available" air pollution technologies that have been required to reduce the emission of air pollutants from stationary sources throughout the US. This information has been provided by state and local permitting agencies. The RBLC also contains a regulation database that summarizes EPA emission limits required in New Source Performance Standards (NSPS), National Emission Standards for Hazardous Air Pollutants (NESHAP), and Maximum Achievable Control Technology (MACT) standards. The database is accessible through the EPA website at http://epa.gov/ttn/catc/.

Review the historical BACT findings on other facilities with the Illinois EPA to ensure that you account for facilities which may have not yet been published in these databases.

- **New and Emerging Environmental Technologies (NEET) Clean Air Technologies Database:** NEET is a newer on-line repository for information about technologies that prevent, remove, destroy, sample, monitor, or model air pollutant emission. NEET contains information about technologies for improving air quality that are commercially available, as well as technologies that are currently being developed and can be a resource when conducting BACT reviews. This database may be accessed at http://epa.gov/ttn/catc/.

- **National Coal-Fired Utility Spreadsheet:** This spreadsheet provides a summary of the characteristics, emissions, and permit limitations for all major coal-fired emission sources throughout the US, including IGCC facilities. An updated version is available regularly on the Region 7 New Source Review website at http://www.epa.gov/region07/programs/artd/air/nsr/nsr.htm.

- **National Turbine Spreadsheet:** This spreadsheet, also available from the link above, provides a summary of the characteristics, emissions, and permit limitations for all major turbine projects emission sources throughout the US, including IGCC facilities.

It is important to review these resources at the beginning of the BACT preparation tasks to determine what type and levels of control technology have been approved as BACT. BACT is continually changing, and the highest level of control that has been proposed by the most recent applicants will represent a current minimal level of BACT, unless the technologies are demonstrated to be technically or economically infeasible for the proposed facility. It is also recommended that the permit applicant consult with the IEPA Bureau of Air at the beginning of the BACT evaluation as the IEPA New Source Review specialists are knowledgeable on the status of recent BACT findings.

1.5 Air Quality Impact Assessments

In PSD permitting, a complex series of air quality impact assessments must be performed to determine if the emission associated with the proposed facility would be acceptable. The assessments are conducted using USEPA-sanctioned atmospheric pollutant dispersion models. The models are capable of using the maximum predicted facility emission and stack characteristics, in conjunction with available long-term meteorological records of surface and regional upper air data which are representative of the plant area, to conservatively estimate the downwind concentrations of the proposed new emission components.

Through PSD permitting, a small increase in new source contribution to the existing local ambient air concentrations of criteria pollutants is allowed. This small increase is well below the NAAQS levels, and is designed to ensure that the new source emission contributions will not cause the NAAQS to be exceeded. This maximum allowable increase is called the "PSD Increment." If other new sources have already contributed to (i.e. "consumed" a portion of) the available increment, then the proposed project and the existing facility would need to be examined together to determine if they can operate simultaneously without exceeding the PSD increment. The PSD increments established in the Clean Air Act are shown in Table 4. In addition to

those shown, the USEPA proposed rules in 2007 which would establish increments, significant monitoring concentrations, and significant impact levels for $PM_{2.5}$. Also, the contributions of the proposed facility to area ozone concentrations must be evaluated.

Table 4: PSD Increment Levels

Pollutant	Averaging Time	PSD Increment ($\mu g/m^3$)	
		Class I	Class II
SO_2	Annual	2	20
	24-hour	5	91
	3-hour	25	512
	1-hour	25	512
PM_{10}	Annual	-	17
	24-hour	-	30
NO_2	Annual	2.5	25

Note that the USEPA has proposed rules which include PSD increment levels for $PM_{2.5}$.

The modeling is generally performed for each pollutant and applicable averaging time with the objectives of (1) determining the area of significant impact attributable to the proposed facility, (2) determining the maximum ambient air concentrations attributable to the proposed facility, (3) determining the maximum ambient air concentrations attributable to the proposed facility in conjunction with the contributions from other PSD increment consuming sources in relation to the PSD increments, and (4) determining the maximum ambient air concentrations of the proposed source in conjunction with the largest background sources, whether PSD-consuming or not, in relation to the NAAQS.[2] The area of significant impact is determined as the radius from the proposed facility at which all concentrations are below the significance levels shown in Table 5. It will be important, in terms of the short-term averaging times, that the facility examine both the typical and process start-up emission scenarios.

Table 5: Ambient Air Significant Impact Levels in PSD Class II Areas

Pollutant	PSD Class II Ambient Air Quality Significant Impact Levels (μg/m³)				
	Annual	24-Hour	8-Hour	3-Hour	1-Hour
SO_2	1	5	-	25	-
PM_{10}	1	5	-	-	-
NO_x	1	5	-	-	-
CO	1	-	500	-	2000

Note that the USEPA has proposed rules which include significant impact levels for $PM_{2.5}$.

Air dispersion modeling is a very complex process, and represents one of the longest scheduling components of the permitting process. This is important because it is a necessary component of construction permitting, which is needed prior to initiating any construction activities. Normally, the project engages an environmental consultant who has particular expertise in PSD air modeling to assist in this effort.

The modeling protocol is one of the most important documents at the beginning of a project to avoid unnecessary delays in the project schedule.

Because air dispersion modeling is a complicated process, it is important that the applicant meet with the Illinois EPA prior to the modeling effort. Topics of discussion with the Illinois EPA prior to modeling include model selection, meteorological data which will be used, the model options which will be used, the background PSD increment consuming sources which will be modeled with the proposed plant, the NAAQS background sources which will be modeled with the proposed plant, and other important modeling parameters. These complex parameters should be agreed to with the project's air modeling consultant and the Illinois EPA prior to the initiation of the modeling program. The applicant's consultant should prepare a formal modeling protocol to be submitted to the Illinois EPA, which includes exact specifications for all modeling parameters. Agreement on the written protocol will help to avoid misinterpretation of modeling components.

As indicated in the introduction to the Construction Permitting section of this guidebook, changes in emission or emission source configurations for the project after dispersion modeling has begun can particularly impact the effort, cost, and completion schedule for dispersion modeling. Modeling is often an iterative process examining the impacts associated with multiple pollutants, emission sources, and averaging times. There are substantial data reduction requirements. As indicated previously, changes in the facility emission source configuration or emission estimates after this process has begun can cause the entire process to be restarted, and this is often a source of project scheduling difficulties and delays.

1.6 Impacts Relating to Soils, Vegetation, Visibility and Regional Growth

The PSD permit applicant must also provide an analysis of the impacts of the proposed plant on vegetation, animals, soil, and on emission impact resulting from residential and commercial growth associated with construction of the proposed plant (additional impact analysis). The first several steps in this process typically use modeled air concentrations and published impact screening values to evaluate exposure of flora to selected criteria pollutants (SO_2, NO_x, CO, ozone, and PM_{10}). These screening values or threshold ambient concentrations (which may indicate levels of potential adverse impacts) are evaluated for sensitive, intermediate, and resistant species.[3]

Potential adverse impacts to soil from deposition of hazardous air pollutants (i.e., trace-level elements including hazardous metals) are included in the evaluation. In this stepwise process, soil (depositional) loadings calculated from annual average air concentrations (modeling results) are combined with published endogenous soil concentration data and compared against threshold impact information. Dispersion modeling results can be used evaluating the effect of trace components such as arsenic, cadmium, cobalt, selenium, chromium, fluoride, lead, manganese, mercury, and nickel. The modeled concentrations can be converted to deposited soil concentrations and compared against screening levels.

The PSD Permit application needs to include a growth projection for associated industrial, commercial or residential areas due to the proposed project, along with an estimate of air emission from this growth. Associated growth emission does not count toward the plant's total pollutant emission as far as determining PSD project status, unless it is determined that an associated industrial plant qualifies as a supporting facility. Normally, the highest activity in a gasification project takes place during the construction phase. Regional residential, commercial, and industrial growth is normally not influenced to any environmentally significant extent by these projects.

1.7 Public Participation in Permitting Process

Before a PSD permit is issued, the Illinois EPA will issue a notice for the proposed issuance of the permit which offers an opportunity to the public to review the draft permit and related project information such as a project summary and the permit application. Members of the public can comment on the draft permit over a 30-day period. The notice is provided to the general public via newspaper advertisement, and to other recipients of interest such as local government air pollution control offices, the chief executives of the municipality and county in which the source is to be located, members of the General Assembly from the legislative district in which the source is located, any state whose air quality may be affected and which is contiguous to

Illinois or which is within 50 miles of the source, and others. Given the public review and participation in the permitting process, the project developer should consider the permit application document to represent an opportunity to explain the project to the public, including the benefits of the facility. The application helps the Illinois EPA permit reviewers understand the project and communicates specifics of the project to interested parties through formal project descriptions and discussions with the public.

In addition to the opportunity for public comment, a public hearing may, and likely would, also be held to allow additional public evaluation of the project and draft permit. A hearing would be conducted if requested by the permit applicant, or if the Illinois EPA determines there is sufficient public interest in the project, the need to further educate the public regarding a proposed project or permit, and/or if formal requests for a hearing from the public or interested government officials are requested. A notice of the public hearing will also be issued by the Illinois EPA generally describing the project and draft permit and provide details relating to the hearing.

1.8 Construction Permit Acquisition Timeline and Cost Considerations

Experience has shown that the recommended minimum construction permit acquisition time for an IGCC project in the 600-650 net MWe range would be 18 months.[4] This would consist of a six-month period for preparation of the permit application documents described above, and a one-year period for the Illinois EPA permit review, public notice, public hearing and permit issuance and appeal. This would be the minimum time required. Again, this timeline can be extended substantially if any changes to the permit application which affect facility configuration, emission, or control technology are made during the permit review. In essence, these types of changes could cause the entire permitting effort to be restarted. Note that for the most recent IGCC permit in Illinois, the Taylorville Energy Center (Christian County Generation) facility in Taylorville, Illinois, the date of permit issuance was approximately 26 months after permit application submission, as indicated in the Permit. If the anticipated permit preparation period is included in this projection, the total time from initiation of the permitting activities would be 32 months for that permit.

In terms of permit cost, the minimum Illinois EPA Construction Permit project costs are anticipated to total $150,000 or more. This cost assumes no significant changes to the project, and therefore the permit application would be required after the initial application has been submitted to the Illinois EPA. As with the impact on permit acquisition schedule, the project costs for preparation of a modified permit application increases considerably. This is especially apparent when changes require reanalysis of the BACT and of the air quality impacts via dispersion modeling.

2. Acid Rain Permit

Pursuant to Title IV of the 1990 CAA Amendments, the EPA established a program to control emission that contributes to the formation of acid rain. The acid rain regulations, codified under 40 CFR Parts 72, 75, and 76 are applicable to "affected units" as defined in the regulations. A large gasification facility would be classified as an affected unit under 40 CFR 72.6(a)(3), and is therefore subject to the Acid Rain Program.

The facility would be required to submit an Acid Rain Permit application to the Illinois EPA, acquire SO_2 emission allowances available through market programs, prepare an Acid Rain Compliance Plan, and comply with emission monitoring requirements. Each SO_2 allowance is a limited authorization to emit up to one ton of SO_2 emission during or after a specified calendar year.

For new units, an Acid Rain Permit application must be submitted at least 24 months prior to the date of initial operation of the unit. The application must demonstrate compliance with the Acid Rain Program requirements and include a complete compliance and monitoring plan. While not required to be part of the Illinois EPA Construction Permit application, it is suggested that the application be submitted concurrent with the Construction Permit application as the Acid Rain Permit will be more likely to be issued in a timely manner.

Affected units are required by 40 CFR Part 75 to continuously monitor emission of SO_2. IGCC units are generally considered to be gas-fired for the purposes of the Acid Rain program as a result of the syngas sulfur content. As a result, the IGCC units are typically exempt from opacity monitoring (40 CFR 75.14(c)), and may use an adjusted protocol for SO_2 monitoring using an emission parameter in lieu of a continuous emission monitor. Plants not monitoring SO_2 stack emission should, however, anticipate having to conduct some form of operational monitoring for SO_2 emission, given the potential variability in the sulfur content of fuel gas produced by a conventional IGCC plant. These exemptions may not be applicable to non-IGCC facilities.

The time required for preparation of the Acid Rain Permit application is minimal in comparison to the Construction Permit application which would generally be prepared at the same time. The application is submitted on relatively short summary permit application forms. The information needed for the forms will be generated as part of the PSD permit application information. It is estimated that the schedule for acquisition of the Acid Rain Permit will be concurrent with that of the PSD permit, and the cost is included in that indicated above for the PSD Construction Permit.

3. Future Post-Construction Operating Permit

A large gasification facility would be considered a major source under the Illinois Clean Air Act Permit Program (CAAPP) pursuant to Title V of the Clean Air Act as a result of being a major source under the PSD and/or nonattainment area NSR programs. A new facility would need to apply for the CAAPP permit within 12 months after initial startup of the plant. The CAAPP permit should reflect the regulatory conditions and permit limitations of the Construction Permit. Submission of the permit application is required for continued operation of the facility.

In terms of schedule, it is estimated that the complete CAAPP Permit application may require approximately three months to prepare, and approximately 18 months for the Illinois EPA permit review and public comment period to conclude. The projected minimum cost for preparation of the permit application is $20,000. There is no permit application fee required for submission of the application. There is however, an annual site fee. The site fee is based on potential emission of all criteria pollutants (except CO), and is invoiced at a rate of $18/ton of emission at the time of this guidebook publication. For a typical 600-650 net MWe IGCC facility, it is estimated that the minimum annual Illinois EPA CAAPP fee would be $25,000/year.

Water Outfall Overview

A gasification plant is generally not a source of direct process-related wastewater. The typical wastewater sources which may be identified are normally associated with cooling systems and boiler operations. These are typically low-flow sources, generally containing minimal contaminants associated with water surface contact and the addition of treatment chemicals. They may include:

- Cooling Tower Blowdown
- HRSG Blowdown
- Boiler Feed Water Treatment Systems
- Treated Water Plant Drainage System Oil/Water Separators

Average annual flow rates from these sources, depending on the design and size of the facility unit operations, are typically less than 10 million gallons per day.

Quantities of sanitary wastewater associated with operation of the facility are generally small (approx. 30 gallons per day per person) and may be discharged to the local municipal sanitary sewer system or an on-site septic treatment system.

Storm water is typically routed to stormwater detention ponds and then released to approved outfalls. General plant stormwater may contact equipment, and is typically directed through an oil/water separator system. Storm water contacting the coal handling and storage areas is typically collected in detention ponds. Many coal storage and handling facilities use this water for fugitive emission control when water spray dust suppression systems are used throughout the storage area. In these cases, the storm water is discharged only in cases of very unusual rain events when area flooding may occur. Otherwise, there is no discharge from these areas.

4. NPDES & State Water Pollution Control Permit Overview

There are two basic wastewater permit programs administered by the Illinois EPA which may be applicable to discharges from gasification facilities: the National Pollutant Discharge Elimination System (NPDES) permit program and the State Water Pollution Control (WPC) permit program. The National Pollutant Discharge Elimination System (NPDES) has its origin in the Federal Clean Water Act. This program requires permits for the discharge of treated industrial effluent and stormwater which may come into contact with industrial operations and/

or materials. The permits establish the conditions under which the discharge may occur and establish monitoring and reporting requirements. This federal program is delegated to the Illinois EPA by the USEPA.

The State WPC construction/operating permit program issues permits for the construction of new sewers, sewage pumping stations, and for connections to public sewers with flows of 1500 gallons per day or higher, or serve two or more buildings. In addition, State WPC permits are required at industrial operations, such as IGCC facilities, for the construction of industrial waste pretreatment and treatment equipment.

4.1 NPDES Permits

The NPDES permit program regulates discharges to water of the state (surface water). There are two types of discharges controlled by NPDES permits: process wastewater and stormwater. Three kinds of NPDES permits are used to regulate such discharges, if applicable.

- **Stormwater Permit for Construction:** The Clean Water Act and associated federal regulations (40 CFR 123.25(a)(9), 122.26(a), 122.26(b)(14)(x) and 122.26(b)(15)) require nearly all construction site operators engaged in clearing, grading, and excavating activities that disturb an area of one acre or more, including smaller sites in a larger common plan of development or sale, to obtain coverage under an NPDES permit for their stormwater discharges. Illinois EPA issues a general construction permit for these types of activities. The general permit can be found at http://www.epa.state.il.us/water/forms.html.

  This permit can be commonly thought of as an umbrella permit that covers all stormwater discharges associated with construction activity in Illinois for a designated time period. The current general permit expires on July 31, 2013, at which time it will likely be replaced by a renewed permit. Prior to any construction activities, a project will need to apply for coverage under this permit through submission of a Notice of Intent (NOI) to the Illinois EPA. The NOI should be submitted at least 30 days prior to the start of construction, and ideally well in advance of that point to ensure timely coverage for the project. The NOI essentially certifies that the

Review and acquire a General Stormwater Permit for Construction Site Activities, and prepare a Storm water Pollution Prevention Plan (SWPPP) early in the permitting process to initiate construction on schedule.

project will agree to operate under the terms and conditions of the general permit during the construction program. Well in advance of applying for permit coverage, therefore, the project principals should review the general permit in detail to ensure that the construction operations of the project can comply with the required permit specifications. In addition to the NOI, the facility must also develop a Stormwater Pollution Prevention Plan (SWPPP) for the construction activities. The SWPPP provides details on the elements required to prevent the contamination of stormwater runoff leaving the construction site.

Detailed information on preparation of a SWPPP for construction activities can be found at http://cfpub.epa.gov/npdes/stormwater/swppp.cfm. The construction permit should be terminated at the completion of construction to avoid unnecessary annual fees.

- **Stormwater Permit for Industrial Activity:** Storm Water Permits for Industrial Activity may be required for gasification plants if raw materials, finished products (or by-products), or manufacturing processes are exposed to stormwater at the site. If this is the case, a Stormwater Pollution Prevention Plan will also need to be developed by the facility which discusses stormwater sources, flows, management practices to avoid contamination, emergency contact information, facility training information, and other important parameters related to the minimization of stormwater contamination. It should be noted that discharges of industrial stormwater might be covered under the same permit as discharges of process and non-process wastewater.

  Stormwater generated during operation of the gasification facility is typically managed to minimize the discharge of stormwater contacting industrial activities. For example, stormwater with the potential to become impacted with process solids may be segregated from process equipment by curbs, elevated drains, and other means and returned as makeup to the feedstock slurrying system or for other process water use. Stormwater that could become impacted with oil (such as runoff from parking lots) is typically routed through oil/water separators prior to being discharged off-site. Stormwater from other areas not associated with industrial activity may be routed to stormwater detention ponds where settling can occur and initial rainfall can be contained, checked, and released in a controlled manner. Guidance on the elements and documents on the contents of SWPPPs can be found at http://cfpub.epa.gov/npdes/stormwater/indust.cfm.

- **NPDES Permit for Waste Water Discharges to Surface Water:** If it is determined that a NPDES permit is required for the discharge of process and/or non-process wastewater from the proposed facility, the appropriate application forms should be submitted to the Illinois EPA at least 180 days prior to the anticipated discharge date. Water permits, like air permits, frequently take longer than the mandated timeline for approval and it is suggested that such a permit be applied for at least 12 months before any water discharges are scheduled to occur. The application must include a complete description of the proposed source and discharge, maximum anticipated discharge concentrations of regulated components, and an anti-degradation analysis. Applicants need to submit an anti-degradation analysis to the Illinois EPA for review which should provide robust alternatives analysis and justification for lowering water quality by the expected discharge. The purpose of the anti-degradation analysis is to protect the existing use of all water in the state of Illinois, maintain the quality of water with quality that is better than water quality standards, and prevent unnecessary deterioration of state water. This includes water designated as outstanding resources and high quality water. NPDES permits will establish pollutant limitations, monitoring requirements, and special conditions governing discharges from the facility. The Illinois EPA evaluations and draft permits will undergo public review and comment. Due to the site and project specific nature of the anti-degradation analysis, the time required for completion of the evaluation and permit acquisition can be highly variable.

  The duration of NPDES permits cannot be longer than five years. The components of the NPDES permits will depend on the design of the facility and wastewater sources. For example, in some recent IGCC facilities wastewater generated from the gasification and slag processing operations containing certain levels of heavy metals and other contaminants from the feedstock are treated in Zero Liquid Discharge processes that essentially treat the process wastewater and recover distilled water for reuse in the power plant. In these cases the contaminants are removed and treated as solid or hazardous wastes and disposed of in a regulatory appropriate manner. In these instances, no NPDES or WPC permit is required.[5]

A proposed new gasification project should review the intended design of the facility with the Illinois EPA early in the design and planning stages to discuss the specific outfalls and to evaluate the exact effluent standards and NPDES process permitting requirements for a given facility. The estimated minimum cost of preparing an NPDES permit application and related documents often totals $15,000 or more depending on the complexity of the facility and SWPPP.

4.2 State Water Pollution Control Permit Program

The State WPC permit program regulates discharges to Publicly Owned Treatment Works (POTWs), the construction of pretreatment equipment and land application of treated wastewater and solids (sludge). State WPC permit applications for discharges to sanitary sewers or POTWs should be submitted 45 days prior to the anticipated discharge date. A one-time permit fee can range from $1,000 to $6,000, depending on whether or not pretreatment for toxic pollutants is required. A construction permit is also necessary for construction of equipment that reduces pollutant loads by pretreating discharge before it goes to a POTW. Construction permit applications for treatment equipment that discharges to surface water should be submitted at the same time as the NPDES permit application. No fee is required for this permit. All necessary wastewater permit application forms are available from the Illinois EPA website at http://www.epa.state.il.us/water/forms.

5. Sanitary Sewers

The sanitary wastewater produced during operation of a typical gasification facility is generally small (i.e., about 30 gallons per day per person) and is either discharged to the municipal sanitary sewer system or treated in an on-site septic system. In either event, it is not anticipated that sanitary flows would need to be included in a facility NPDES permit application. If a septic system is used, the facility will need to apply to the Illinois EPA for a State Construction Permit for the system (see Section 1.2). In addition, the county in which the facility is to be located will also typically require a construction permit application for a facility septic system.

6. Process Water Supply Permits

6.1 Water Supply Connection Permits

Should the facility water be supplied through a connection to a public water supply, a water supply connection permit will need to be acquired from the Illinois EPA Division of Public Water Supply. This permit is actually issued to the municipal water supplier; however, in cases where the water distribution extension is dedicated to an industrial project, the permit application documents and design information are typically supplied by the project developer. It should be noted that the role of the Illinois EPA in this permit program is to protect the quality of the water provided by the public water supply and to avoid possible contamination of that supply as a result of the proposed connection. The Illinois EPA does not review the original source or quantity of water that will be needed by a proposed plant, or address the potential impacts a plant's water consumption has on local water resources in this process.

The construction permits must be obtained prior to beginning construction of any proposed alterations, changes, or additions to an existing community water supply which may affect the sanitary quality, mineral quality, or adequacy of the supply. A construction permit is not needed for less consequential work items such as:

- The installation of customer service connections to distribution system water supply mains already in place and designed for such connections,
- The installation or replacement of hydrants and valves in the distribution system,
- The replacement of water supply mains with mains of equivalent size and material in the same location, etc.

Supporting data for construction permit applications includes general information relating to the water describing the waterworks, sewerage facilities and the municipality or area to be served. Project information describing the connections, use, and other specifications will need to be supplied with the permit application. An operating permit application will need to be submitted after construction for operation of the connection.

It is estimated that the minimum total time for preparation and review of this permit application will be four months, and the minimum total cost of $15,000 for the application, plans, and specifications.[6]

6.2 Well Installation Permits

Should the facility require supply water from a well, an Illinois Department of Public Health (IDPH) Well Installation permit would be required prior to construction. The application for this permit is submitted using forms provided by the Department or by an approved local health department. All applications for the permit must include a plan and drawings of the proposed well construction. At a minimum the plan must include:

- A drawing indicating lot size, direction of slope, location of property lines and distances from proposed well construction to septic tanks, abandoned wells, property lines, seepage fields, sewers, and all other sources of contamination, and an indication of the type of contamination source,
- Water well driller's license number and name,
- Estimated daily pumping capacity if greater than 100,000 gallons per day,
- The location of the water well including: county, city, street address or lot number, township, range, directions to the site (i.e., subdivision lot number, highway number, secondary roads, signs to follow, etc.), and section,

- Name and address of the owner of the well,
- Type of well to be constructed (bored, dug, drilled, or driven),
- An estimate of the depth of the well,
- Type of well (i.e., non-potable use well such as industrial supply water well, private water supply well, semi-private water supply well, or non-community public water supply well), and
- The proposed aquifer.

The IDPH would deny the approval of a permit request when available information indicates that the groundwater aquifer contains contamination which exceeds the Class I groundwater standards adopted in the Groundwater Quality Standards Code (35 Ill. Adm. Code 620). A potential public health problem may be detected on the basis of a sanitary survey, laboratory analyses, location of known sources of pollution, condition of water supply, and type of construction or information from previous well owners which might indicate the water would be too hazardous to drink.

It is estimated that the time required for acquisition of IDPH water well construction permit would be four months, which includes preparation of the permit application document and IDPH review of the construction permit application. The minimum estimated costs for an IGCC permit application preparation tasks and IDPH permit application fee would be $10,000. Additional information on the IDPH well permit program can be found at http://www.idph.state.il.us/envhealth/waterwells.htm.

7. Waterways, Floodplains and Wetlands

For some projects it may be desirable to construct the facility adjacent to a navigable waterway, and possibly use the waterway as a potential material delivery route. In other instances, the desired location of the facility may impact a wetland area, or be located in an area where levee construction would be required for the segregation of coal storage areas or other unit operations from potential flooding. In such instances, both Illinois state and federal agency approval may be required. For this reason, a joint application program was developed between the US Army Corps of Engineers (USCOE), the Illinois Department of Natural Resources (IDNR), and Illinois EPA for projects with proposed locations on Illinois waterways, floodplains, and wetlands. Each of these agency's authorities and requirements are summarized below. Application forms are available from any of the listed agencies (i.e., identical application forms and application directions are used by all three agencies).

Anyone proposing to construct, operate or maintain any dam, dock, pier, wharf, sluice, levee, dike building, utility crossing, piling, wall, fence, or other structure in, or dredge, fill or otherwise alter the bed or banks of any stream, lake, wetland, floodplain, or floodway subject to state or federal regulatory jurisdiction should apply for agency approvals. The joint application form, including a project description, engineering drawings, and any additional support information, should be submitted to each of the regulatory agencies (i.e., USCOE, IDNR and Illinois EPA). Approvals may be required by any or all of the agencies. The applications filed simultaneously with USCOE, IDNR/OWR, and the Illinois EPA will be processed concurrently, in an independent manner, and should result in expedited receipt of all agency determinations. If a permit is not required by one or more of the agencies, they will inform the applicant and other agencies of their findings.

Each agency in this program has different authorities. The IDNR has jurisdiction for the protection of the rights, safety and welfare of private and public landowners by the regulation of floodway development. Construction activities which restrict a stream's capacity to carry flood flows may result in channel instability and increased flood damages to neighboring properties. This part applies to all rivers, lakes, and streams under the Department's jurisdiction except those in the counties of Cook, Will, DuPage, Kane, Lake, and McHenry. All portions of the application form, including the name and address of the applicant, a description of the proposed activity, the location of the proposed activity, and the names and addresses of all adjoining property owners, shall be completed and all required attachments must be submitted before a determination of permissibility will be made.

The Interagency Wetlands Policy Act established the Illinois goal of no overall net loss of wetlands due to state-supported activities. The act supports this goal by requiring the development of agency action plans and establishing mitigation policy. The Interagency Wetlands Policy Act is the first regulatory program in Illinois that is dedicated solely to the protection of state wetlands. This act established the goal of no overall net loss of Illinois wetland acres or functional values due to state-supported activities. The act also required state agencies to preserve, enhance, and create wetlands as necessary in order to increase the quality of wetland resources in Illinois.

This act is implemented through the use of the State Wetlands Mitigation Policy and Agency Action Plans. The mitigation policy strongly encourages agencies to avoid impacting wetlands. If impacts are unavoidable, compensation must occur through a combination of creation, restoration, acquisition, or research projects on at least a one-to-one replacement ratio. The IDNR has responsibilities for permitting and approval under this program.

Under section 404 of the Clean Water Act, permits are required for the alteration of wetlands and for the discharge of dredged or fill material into the water of the United States (33 CFR 323.3). (Water of the United States includes wetlands.) The Army Corps of Engineers is the permitting agency for Section 404 activities. The Secretary of the Army, acting through the Chief of Engineers, is authorized to issue the permits, after notice and o pportunity for public hearings, for the discharge of dredged or fill material into water of the United States at specified disposal sites. Selection of such sites must be in accordance with guidelines developed by the Environmental Protection Agency (EPA) in conjunction with the Secretary of the Army; these guidelines are found in Section 404(b)(1) of the Clean Water Act. Applicants are advised to inquire with the USCOE on Section 404 permit requirements. The status of Section 401 water quality certification is contingent upon the action taken by the USCOE on an application.

The basic form of authorization used by USCOE districts is the individual permit. Processing such permits generally involves three steps: pre-application consultation (for major projects), formal project review, and decision making. Pre-application consultation usually involves one or several meetings between an applicant, USCOE district staff, interested resource agencies (federal, state, or local), and sometimes the interested public. The basic purpose of such meetings is to provide for informal discussions about the pros and cons of a proposal before an applicant makes irreversible commitments of resources (funds, detailed designs, etc.). The process is designed to provide the applicant with an assessment of the viability of some of the more obvious alternatives available to accomplish the project purpose, to discuss measures for reducing the impacts of the project, and to discuss the factors the USCOE must

consider in its decision making process. Contact information for USCOE offices in Illinois is provided in Appendix A.

Once a complete application is received, the formal review process begins. The project manager prepares a public notice, evaluates the impacts of the project and all comments received, negotiates necessary modifications of the project if required, and drafts or oversees drafting of appropriate documentation to support a recommended permit decision. The permit decision document includes a discussion of the environmental impacts of the project, the findings of the public interest review process, and any special evaluation required by the type of activity such as compliance determinations with the Section 404(b)(1) Guidelines.

Water quality certification requirements provide an additional form of objective safeguard to the USCOE regulatory program. Section 401 of the Clean Water Act requires state certification or waiver of certification prior to issuance of a Section 404 permit. The Illinois EPA provides the water quality certification pursuant to Section 401 of the Clean Water Act. This certification is mandatory for all projects requiring a Section 404 permit. In addition to determining that the proposed work will not violate the applicable water quality standards, the Illinois EPA also makes a determination of additional permit requirements pursuant to the Illinois Pollution Control Board Rules and Regulations. As indicated in Section 4.0 of this guidebook, additional permits may be required for activities such as the construction of sanitary sewers, water mains, sewage and water treatment plants, landfill and mining activities, special waste hauling and disposal (of dredged material), and other miscellaneous activities. Separate applications are necessary if it is determined that Illinois EPA water permits are required.

The schedule for review and approval of the joint application is dependent on the type of waterway impact and permits required. In general, the minimum time for permit application preparation and review is estimated to be seven months. Permit approval by each of these agencies is subject to public notice, and a potential public hearing. If a complex permit review is required, such as when impacts include endangered species considerations or historic preservation issues, the approval time can increase. It should be noted that in the Appendix A summary, the USCOE review period is indicated to be substantially longer when an Environmental Impact Statement (EIS) is required. The USCOE notes that EISs are required for "far less than one percent" of the applications. The cost associated with this permit can vary substantially with the type of permit and anticipated impacts. An estimated minimum cost for permit application preparation and permit acquisition is often as much as $10,000 or more.

8. Endangered Species

During project permitting, consultation between the Illinois EPA and the IDNR, as required under the Illinois' Endangered Species Act, is also typically conducted to review permit application conclusions with respect to species of vegetation that are endangered and endangered species of animals that may be present in the area.[7] This is based on an inventory of soil types, vegetation types and endangered species of animals that may be found in the area of impact. This inventory should include all vegetation and endangered species within any commercial or recreational area. Note that it is not sufficient to state that the source impact dispersion modeling indicates concentrations below NAAQS and, therefore, no impact is expected. The applicant also needs to verify that there are no sensitive species which could be harmed by long-term exposure to pollutant concentrations below NAAQS.

In addition to any Illinois EPA evaluations, Section 7(a)(2) of the Endangered Species Act requires that the USEPA consult with the US Fish and Wildlife Service (FWS) and/or the National Oceanic and Atmospheric Administration Fisheries Service (NOAA Fisheries) to ensure that actions they authorize are not likely to jeopardize the continued existence of federally-listed threatened or endangered species or result in the destruction or adverse modification of designated critical habitat of such species. Depending on the gasification site location and facility emission conditions, this evaluation may be concluded using relatively standard FWS assessment protocols in conjunction with results of the project air quality impact evaluation, or may require more complex individual risk assessment evaluations in cases where impacts of special concern are identified. It should be noted that performance and review of a detailed and specialized risk assessment evaluation can extend the previously indicated schedule for PSD Construction Permit approval substantially.

9. CO_2 Sequestration

The underground injection of CO_2 into permeable geological formations, referred to as geological sequestration (GS), is a new technology and regulatory agencies are currently adapting existing regulations and developing new regulations that apply to GS. Geological sequestration involves storing CO_2 underground in a geologic structure or a stratigraphic trap that is a permeable formation, and can retain large quantities of CO_2 in small pore spaces inherent in the formation for long periods of time. Further, the permeable formation must not be in close proximity to a valuable resource, such as potable groundwater. Examples of appropriate formations that are the subject of current research include unmineable coal seams and saline aquifers. It is possible that CO_2 injection into coal seams and mature oil fields could enhance the extraction of coal bed methane or oil that would otherwise be left in the ground, which could help offset the cost of sequestration.

Under current Illinois regulations, the Underground Injection Permit Application is an iterative process within the Illinois EPA and may include the IDNR Oil and Gas Division and/or the Illinois Commerce Commission (ICC). The Illinois EPA is the primary permitting agency. The IDNR would be involved if injection is into an oil reservoir and the ICC would be involved if the transportation pipeline from the facility to the injection well is a common carrier or if eminent domain is required to construct the transportation pipeline. The Underground Injection Permit includes injection wells, in-zone monitoring wells in the injected formation, and regulatory monitoring wells in the lowest underground source of drinking water.[4]

On July 25, 2008, the USEPA published draft regulations that would apply to GS injection wells. This section provides an overview of the existing regulations and a brief summary of the regulations proposed by the USEPA. In general, regulations have been promulgated to control two separate activities associated with GS: the injection of CO_2 into the geological formation, and the transport of CO_2 from the generating facility to the injection wells.

9.1 Underground Injection Wells

Most underground injection wells, including those used for CO_2 sequestration, must be permitted by the Illinois EPA. The only exception is for injection wells used for the enhanced recovery of oil or natural gas. These recovery enhancement injection wells are regulated by the IDNR. Regulations governing the permitting of underground injection wells are found in Title 35 Part 702 and 704 of the Illinois Administrative Code. Design and permitting requirements for underground injection wells depend on the classification of the injection well. The Illinois EPA has five classifications of injection wells, some of which will not apply to CO_2 sequestration. The following list contains examples of injection wells within each Class that may be part of a gasification process:

Class I - Includes two types of wells: (1) An industrial disposal well that injects fluids beneath the lowermost formation containing an Underground Source of Drinking Water (USDW) within ¼ mile of the injection well; and (2) A well used to inject hazardous waste beneath the lowermost formation containing an USDW within ¼ mile of the injection well.

Class II - A well in which fluids are injected for the enhanced recovery of oil or natural gas. This class of injection well is regulated by the IDNR.

Class III - A well that injects fluids for the extraction of minerals, such as sulfur. This class generally will not apply to gasification projects.

Class IV - This class applies to wells used for the disposal of hazardous or radioactive waste. This class is prohibited in the state of Illinois.

Class V - Any injection well that is not classified as Class I, II, III or IV.

Generally, injection wells associated with gasification facilities may be Class I, II, or V, depending on location or use. If the injection well is located within ¼ mile of a USDW, that well will be Class I. If CO_2 is used to enhance the recovery of oil or natural gas, the well will be Class II. All other injection wells for CO_2 sequestration would be, under existing regulations, classified as Class V. An area permit can be obtained for more than one injection well if they are located in the same well field.

An important consideration in CO_2 injection, and one that can easily be overlooked, is the concentration of trace materials in the CO_2, such as mercury, arsenic, other metals, and trace organic compounds. The concentration of these materials can vary widely depending on the source of coal and emission control devices used in the process. The injection of CO_2 is subject to disposal regulations, including the Resource Conservation and Recovery Act (RCRA). The CO_2 stream to be injected must be tested in accordance with Title 35 Part 721 of the Illinois Administrative Code. If the concentration of any chemical exceeds its Maximum Concentration Limit (MCL) found in Title 35 Part 721 of the Illinois Administrative Code, the injection of CO_2 must be performed in accordance with the hazardous waste regulations found in Title 35 Parts 720-729 of the Illinois Administrative Code.

Under current Illinois regulations, the preparation of the Underground Injection Permit Application requires descriptions of the area geology, the well construction materials, proposed depths of the injection and monitoring wells, a groundwater monitoring program and a mechanical integrity testing program. Additionally, the Underground Injection Permit Application requires a demonstration that no hazardous constituents will be included in the CO_2 stream at concentrations greater than their respective MCLs, and a calculation of the capacity of the formation that will receive the injection. This capacity calculation requires an understanding of the materials and permeability of the formation to be injected into. The performance of the particular formation at the proposed injection site may not be known and therefore, must be estimated based upon information from the nearest well drilled into said formation.

The number of injection wells required to handle the volume of CO_2 produced by a typical gasification plant is a function of flow rates, well diameter, formation permeability, and formation capacity. The number of in-zone monitoring wells is a function of the calculated plume size and thickness of the formation to be injected.

The number of regulatory monitoring wells in the lowest underground source of drinking water is also a function of the calculated plume size and the location of the lowest underground source of drinking water.

Recently proposed USEPA draft regulations (July 25, 2008) would apply only to GS injection wells that would not be regulated as Class I or Class II injection wells (Federal Register Volume 73, Number 144, page 43492). When finalized, the regulations will be incorporated into the Code of Federal Regulations Title 40 Part 144 and 146. If a GS well was within ¼ mile of a USDW it would continue to be regulated as a Class I well and if it was used to extract oil or natural gas, it would continue to be regulated as a Class II well. All other GS injection wells would be Class V. The comment period for these proposed regulations ended on November 24, 2008. It typically takes several years between the first proposed regulations and final regulations. Permitting requirements in the final regulations may be substantially different than proposed permitting requirements.

Illinois EPA's current requirements for Class I injection wells are very similar to the USEPA's proposed requirements for Class V injection wells. The major difference is the area of review, which currently is a ¼ mile radius (0.05 square miles). Under the proposed regulations, the area of review will be determined by computer modeling and is expected to encompass several square miles. This significantly larger area of review will increase the number of monitoring wells, the number of wells, springs and USDWs within the area of review, and potential corrective action costs.

An Illinois licensed professional engineer must sign and stamp the Underground Injection Permit Application, and must be familiar with the preparation of each component of the application. Other experts required for the preparation of the permit application include geologists, hydrogeologists, drilling contractors, environmental engineers, and mechanical engineers.

The Illinois EPA reviews permit applications for injection wells on a case-by-case basis and there are no regulatory deadlines for this review. The regulations do require that the Illinois EPA develop a schedule for the permit review process. The Illinois EPA will likely require clarification of some components of the permit application. However, as the Illinois EPA, industrial users, and consultants gain experience with this process, the number of iterations should be reduced. The time required for the Illinois EPA review of the permit application is undetermined. Upon approval of the permit application, the Illinois EPA will issue a draft permit that will be submitted for public comment. This public comment period should take at least 105 days. The permit review process can be expected to exceed nine months, including public comments and hearings.

Upon completion of the public comment period and barring any major issues, the Illinois EPA will issue permission to construct the wells. Within 120 days of the completion of well construction and testing, a Well Completion Report (WCR) must be prepared and submitted to the Illinois EPA. The time required for an Illinois EPA review of the WCR is undetermined. Upon approval of the WCR, the Illinois EPA will issue a letter permitting injection. Upon initiation of injection, groundwater, environmental monitoring, and mechanical integrity testing programs must begin.

A recent experimental GS project in Illinois that was permitted under Class I requirements required 14 months and approximately six to seven full-time person equivalents to prepare the permit application. Based on this experimental permit, the total permit preparation for a gasification facility may be two years or more and cost well in excess of $100,000.[8,9]

9.2. Transport Pipeline

The distance from the plant to the geologic injection site must be considered for costs associated with transportation pipelines. The Illinois Basin contains appropriate structural and/or stratigraphic traps, as well as oil fields and coal seams. The pipeline route must minimize impacts to the public, landowners, and the environment. GIS software, databases, and operators are required to model the most efficient pipeline routes.

10. Historic Preservation

The construction of industrial facilities in Illinois requires a review of historical archaeological resources to ensure that those resources are protected. This evaluation should be conducted in consultation with the Illinois Historic Preservation Agency. More information can be found at http://www.illinoishistory.gov/.

11. Noise

There are a number of local municipal and county standards throughout Illinois for the limitation of noise which would be applicable to gasification facilities. There are also noise control standards in 35 IAC Part 901 which limit the emission of sound during daytime hours from any property-line-noise-source which exceeds stated allowable octave band sound pressure levels. These standards are typically reviewed in permitting at the local and county levels, and the permit applicant should consult those local authorities for the specific standards and permitting requirements to be met for the proposed site of the facility.

12. Local Codes and Zoning Approval

Local zoning for a new facility is generally conducted through the county in which the facility is to be located. There are 102 counties in Illinois. The applicant should contact the local county at the inception of the project when identifying potential facility sites to determine exact zoning ordinances and codes associated with the properties of interest for plant development. In most instances a Conditional Use Permit will be required for the construction of a gasification facility.

Depending on the zoning agency, the Conditional Use Permit may review parameters such as:

- Determining if the conditional use is in harmony with purposes, goals, objectives, policies, and standards of any local comprehensive plan and zoning ordinance.
- Determining if the conditional use would cause an adverse impact on nearby property, the character of the area, environmental factors, traffic factors, parking factors or any other matters affecting public health, safety, or general welfare.
- Determining if the conditional use will have an adverse impact on improvements, facilities, utilities, or services provided by public agencies.
- Reviewing potential benefits of the proposed facility in terms of receipt of additional taxes, additional employment, etc.
- Compliance of the proposed facility with other state and local regulations through other permits and approvals, such as those referenced throughout this guidebook.

The zoning application will likely need to include property surveys, geological and wetlands surveys, and documentation to address zoning requirements. The application will be reviewed by a zoning board, and typically several public hearings are held to review the application and preliminary findings. The applicant will likely need to address additional considerations at several points during the evaluation.

Meet with local zoning authorities early in the site selection process to identify requirements for conditional use, and to evaluate the history of conditional use permitting in the area of the proposed site.

It is difficult to predict the time required for Conditional Use permit approval, as each zoning board and potential site location will have different conditions. In general, it is recommended that a minimum of 18 months be scheduled for this activity, given the review process and the potential for multiple public notices and hearings. The minimum anticipated cost is $40,000, and this can increase substantially depending on special local requirements and evaluations.

CONCLUSIONS AND RECOMMENDATIONS

This guidebook detailed a total of 16 different major permits that are required for the construction and operation of a large gasification facility fueled by Illinois coal. Depending on the permitting situation, acquisition of these permits can take between two to three years. The most expensive permits include the Illinois Air Construction Permit (can reach up to $150,000), the Army Corps Water Related Construction Permit with Environmental Impact Statement (can total $100,000), and the Carbon Sequestration Permit (can exceed $100,000). These estimates include both preparation costs and filing fees.

Interviews with practitioners have resulted in the following recommendations which should help expedite the environmental permitting process:

- Accurately predicting the plant equipment specifications and air emission at the beginning of the project can save substantial permitting time and cost. During review, changes in the parameters have been known to more than double the permit acquisition time of many projects.

- The applicants for an Illinois EPA Construction Permit should meet with the Illinois EPA during the conceptual phases of the project to discuss the project design, maximum anticipated project emission, site selection, and any special permitting considerations that may result from those parameters.

- Regulations are continually being developed and modified. Regulations in effect at the time of project development should be discussed with the Illinois EPA early in the permitting process.

- Review historical BACT findings on other facilities with the Illinois EPA to ensure that facilities which may not have been published have been accounted for.

- The air dispersion modeling protocol is one of the most important documents at the beginning of a project to avoid unnecessary delays in the project schedule.

- Acquire a General Stormwater Permit for construction site activities early in the permitting process to initiate construction on schedule.

- Meet with local zoning authorities early in the site selection process to identify requirements for conditional use, and to evaluate the history of conditional use permitting in the area of the proposed site.

REFERENCES

1. Application to the Minnesota Pollution Control Agency for a New Source Review Construction Authorization Permit Mesaba One and Mesaba Two, Excelsior Energy, June 16, 2006.

2. United States Environmental Protection Agency, May 1987. "Ambient Monitoring Guidelines for Prevention of Significant Deterioration"; EPA-45014-87-007.

3. United States Environmental Protection Agency, October, 1990, "New Source Review Workshop Manual"; Draft.

4. Discussions with Environmental Engineering Consultants in Illinois.

5. Application to the Minnesota Pollution Control Agency for a National Pollution Discharge Elimination System Permit, Excelsior Energy, June 18, 2006.

6. Siting New Coal-Fired Power Plants in Illinois - A Guide to Permits and Economic Incentives, Report of the Office of Coal Development, Revised September, 2005.

7. United States Environmental Protection Agency, October, 1990, "New Source Review Workshop Manual"; Draft.

8. Information provided by GreenSmith Environmental, Des Plaines, Illinois.

9. The Midwest Geological Sequestration Consortium website at http://sequestration.org/.

APPENDIX A: PERMIT SUMMARY

The permit summary lists (1) general permit classifications (air, water discharge, process water usage, waste materials, carbon sequestration), (2) address of the permitting agencies, and (3) data required for the filing of the individual permit as well as the minimum anticipated cost and time requirements. It should be noted that cost and time can be, and often are, substantially higher depending on the particular permitting situation for a given facility.

Air Permits

- *Illinois EPA Construction Permit (PSD and NSR)*

Required for construction and initial operation of facility.

Include in Filing:	Emission evaluations and calculation summary. BACT analysis. Ambient air monitoring evaluation. Permit application document/form preparation. Facility drawings, process flow diagrams, and area maps.
Acquisition Time:	18 months
Minimum Estimated Cost:	$150,000

- *Acid Rain Permit – Clean Air Act Title IV Acid Rain Program*

Generally submitted with the Construction Permit Application.

Include in Filing:	Application data and forms indicating emission and compliance with acid rain program.
Acquisition Time:	18 months
Minimum Estimated Cost:	Included in Illinois EPA Construction Permit

- *Acid Rain Notification – 40 (CFR) Part 72*

Generally submitted with the Construction Permit Application.

Include in Filing:	Form indicating status of the source as subject to acid rain program.
Acquisition Time:	18 months

- *NOx Budget Trading Permit: Operating Permit Pursuant to the Regional NOx Trading Program*

Generally submitted with Construction Permit Application.

Include in Filing:	Selected facility representative as account officer. Emission units subject to the program and proposed allowable emission.

Acquisition Time:	18 months
Apply for these permits through:	**Illinois Environmental Protection Agency Bureau of Air** www.epa.state.il.us./air/permits
	Illinois Environmental Protection Agency Bureau of Air 1021 N Grand Avenue East PO Box 19276 Springfield, IL 62794-9276 Tel: 217-782-2113

Water-Related Construction Permits

- *Construction Permit*

Construction activities in lakes, rivers, streams, and wetland; 33 CFR 320 to 330.

Include in Filing:	Joint Permit Application with IDEM and Illinois EPA. Needed for construction affecting rivers, streams, lakes and wetlands. All project data and construction specifications for activities affecting physical aspects of water resources. EIS is a comprehensive analysis of all environmental impacts from construction and operation for a proposed facility issuance of USCOE Construction Permit for a major action with significant environmental impact; 33 CFR 321 (rarely necessary).
Acquisition Time:	13 months without EIS, 36 months with EIS
Minimum Estimated Cost:	$20,000 without EIS, $100,000 with EIS
Apply for this permit through:	**Army Corps of Engineers** www.usace.army.mil/
Cook County & Cook Collar Counties:	US Army Corps of Engineers Chicago District Regulatory Branch 111 N Canal St., 6th floor Chicago, IL 60606-7206 Tel: 312-846-5530

Rock Island Area: US Army Corps of Engineers
Rock Island Regulatory Branch
Clock Tower Building
PO Box 2004
Rock Island, IL 61204-2004
Tel: 309-794-5351

St. Louis Area: Department of the Army Corps of Engineers
1222 Spruce St.
St. Louis, MO 63103-2833
Tel: 314-331-8002

- *IDNR Construction Permit*

Joint Permit Application with IDEM and Army Corps of Engineers. Required for dams, construction within a public body of water, and construction within floodways.

Include in Filing: Design drawings for structures and shoreline protection. Evaluation of impacts on flood flows and sedimentation. The Illinois Wetland Policy Act of 1989 [20 ILCS 830] requires that all projects receiving state support shall meet the state goal of no overall net loss of the state's existing wetland acres. Projects shall be submitted to the IDNR for a wetland impact assessment. State agencies local governments which authorize, fund, or perform actions altering environmental conditions must consult IDNR and use their authority to avoid or minimize adverse impacts. 520 ILCS 10/11; 525 ILCS 30/17; 17 Ill. Admin. Code 1075.

Acquisition Time: <12 months

Minimum Estimated Cost: $20,000

- *Historic Preservation Approval*

Construction of industrial facilities require review of historical archaeological resources.

Acquisition Time: <6 months

Minimum Estimated Cost: $20,000

- *Wetland Review*

For projects receiving state support.

Include in Filing:	Name and address of supporting agency. Project plans and design. Wetland delineation as required for Army Corps of Engineers permitting.
Acquisition Time:	<6 months
Minimum Estimated Cost:	$10,000

Apply for these permits through:	**Illinois Department of Natural Resources** www.dnr.state.il.us Illinois Department of Natural Resources Division of Water Resources One Natural Resources Way Springfield, IL 62702-1271 Tel: 217-782-6302

Water Discharge Permits

- *State Permit for Construction of Wastewater Treatment Equipment*

Include in Filing:	Design information for wastewater treatment equipment. Expected characteristics of raw and treated water.
Acquisition Time:	<6 months
Minimum Estimated Cost:	$10,000

- *National Pollutant Discharge Elimination System (NPDES) Permit*

Clean Water Act Section 402; discharge of wastewater to surface water; required prior to operation, recommended to be obtained prior to construction.

Include in Filing:	Water balance diagram. Expected wastewater flows and characteristics. Water pollution control equipment and systems.
Acquisition Time:	<12 months
Minimum Estimated Cost:	$15,000

- *NPDES Storm Water General Permit Construction Site*

Storm water runoff from construction areas; required before construction.

Include in Filing:	Storm Water Pollution Prevention Plan, including: site description, pollution and erosion control measures, maintenance

procedures, and contact information.

Acquisition Time: <6 months

Minimum Estimated Cost: $10,000

- *NPDES Storm Water General Permit Operational Site*

Industrial storm water runoff; required prior to operation.

Include in Filing: Storm Water Pollution Prevention Plan, including: site description, pollution and erosion control measures, storm water outfalls, facility contact information, and maintenance procedures. Notice of Intent is submitted.

Acquisition Time: <6 months

Minimum Estimated Cost: $10,000

- *Sewer Connection Permits*

Construction and operation of connection to public sewer system; required prior to construction.

Include in Filing: Design drawings of sewer connections. Description of wastewater and treatment equipment.

Acquisition Time: <6 months

- *Septic System Construction Permit*

Illinois EPA issues permits for septic systems larger than 1500 gallons per day, serving more than one building, and/or containing non-domestic wastewater.

Include in Filing: Design drawings of septic system

Apply for these permits through:

Illinois Environmental Protection Agency
Bureau of Water
www.epa.state.il.us/water

Illinois EPA Bureau of Water: Permit Section
1021 N Grand Avenue East
PO Box 19276
Springfield, IL 62794-9276
Tel: 217-782-3362

County Public Health Department
Check the local directory of the county where the facility will be built for contact information.

Process Water Usage Permits

- *Water Supply Connection Permits*

Construction and operation of a connection to public water supply system; two permits – one required prior to construction, another for operation of system. Permits typically issued to municipal water supplier, but obtained by the project developer.

Include in Filing:	Design drawings of water connections. Description of water use plans.
Acquisition Time:	<6 months
Minimum Estimated Cost:	$15,000

Apply for this permit through:

Illinois Environmental Protection Agency
www.epa.state.il.us/water

Illinois EPA Bureau of Water: Division of Public Water Supply
1021 N Grand Avenue East
PO Box 19276
Springfield, IL 62794-9276
Tel: 217-782-3362

- *Well Installation Permit*

Installation of new groundwater wells used for non-public drinking water system; required before construction.

Include in Filing:	Design drawings for wells. Plans for disinfection and sampling.
Acquisition Time:	<6 months
Minimum Estimated Cost:	$10,000

- *Well Water Withdrawal Permit*

Installation of new groundwater wells used for non-public drinking water system; required prior to construction.

Include in Filing:	Design drawings for wells. Plans for disinfection and sampling.
Acquisition Time:	<6 months
Minimum Estimated Cost:	Included in IDPH permit.

Apply for these permits through:

Illinois Department of Public Health
535 W. Jefferson
Springfield, IL 62761
Tel: 217-782-5830

County Public Health Department
Check the local directory of the county where the facility will be built for contact information.

Waste Materials

- *Assignment of RCRA Small Quantity Hazardous Waste Generator Identification Number*

RCRA Small Quantity Hazardous Waste Generator Identification Number would be assigned for the collection and shipment of hazardous waste, such as mercury captured on activated carbon. Required if hazardous waste will exceed the 100 kg/month threshold; 40 CFR Part 261.

Acquisition Time:	<6 months
Minimum Estimated Cost:	Negligible

Carbon Sequestration

- *Geological Sequestration Injection Well Permit*

Include in Filing:	Descriptions of the area geology. Well construction materials. Proposed depths of the injection and monitoring wells. Groundwater monitoring program and a mechanical integrity testing program. Demonstration that no hazardous constituents will be included in the carbon dioxide stream at concentrations greater than their respective MCLs Calculation of the capacity of the formation that will receive the injection.
Acquisition Time:	Unknown but expected to be 3 years.
Minimum Estimated Cost:	Unknown. Permitting anticipated to exceed $100,000.

Apply for both types of permits through:	**Illinois Environmental Protection Agency** www.epa.state.il.us/land Illinois EPA: Bureau of Land 1021 N Grand Ave. East PO Box 19276 Springfield, IL 62794-9276 Tel: 217-524-3300