

**Iowa Department of Natural Resources
Environmental Services Division
Air Quality Bureau**



**Prevention of Significant Deterioration (PSD) Permit Review
Technical Support Document for Issuance of PSD Permits for
Project Number 15-053, Plant Number 52-01-005**

**The University of Iowa
University of Iowa Power Plant
207 Burlington Street W
Iowa City, IA 52242**

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Purpose of this Document

This document has been prepared to fulfill the public participation requirements of 567 Iowa Administrative Code (IAC) 22.2(2), 567 IAC 33.17.

Introduction to the Project

Background on The University of Iowa and the Power Plant:

The University of Iowa (U of I) was established in 1847 and is a major national research university located on a 1,900-acre campus in Iowa City in southeast Iowa, on the Iowa River near the intersection of U.S. Interstate Highways 80 and 380. Iowa is composed of 11 colleges, the largest of which is the College of Liberal Arts and Sciences, enrolling most of Iowa's undergraduates. The Henry B. Tippie College of Business, the Roy J. and Lucille A. Carver College of Medicine, and the Colleges of Education, Engineering, Law, Nursing, Pharmacy, enroll undergraduates, and with the Colleges of Dentistry and Public Health provide graduate education in conjunction with the Graduate College.

The U of I operates and maintains a main Power Plant, three Chilled Water Plants and a Water Plant on the main campus, and satellite facilities at the UI Research Park (Oakdale Campus). The plants provide steam, water, high-quality water, chilled water, electricity, and sewer to the entire campus, including The University of Iowa Hospitals and Clinics.

Co-generation - Combined Heat and Power:

The U of I has operated a co-generation plant at its current location since 1926. Within its combined heat and power production cycle, and use of biomass fuels, the University of Iowa is able to co-generate energy for cost-effective electricity, cooling, and water treatment on campus.

The UI Power Plant utilizes six boilers, four natural gas generators, and three steam turbine generators to generate steam and electricity that is distributed to other University of Iowa sites and facilities as shown in Figure 1.

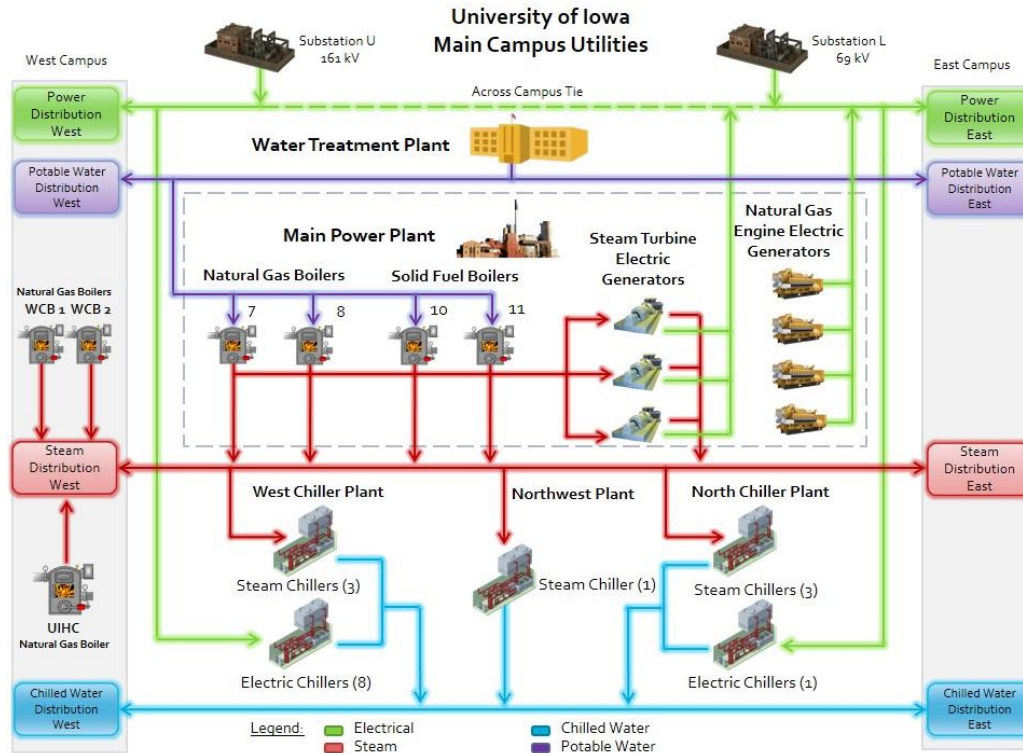


Figure 1: UI Power Plant Distribution¹

Electric generation currently supplies between a quarter and a third of electric demand on campus.¹

SIC Code: 8221

NAICS Code: 611310

County: Johnson

Project Number 15-053 Description:

Boiler 10 and Boiler 11 are boilers located at the main UI Power Plant. Boiler 10 is a boiler that is permitted to burn bituminous coal, tire derived fuel, natural gas, and biomass. It utilizes low NOx burners (LNB) and flue gas recirculation (FGR) when firing natural gas.

Boiler 10 was originally permitted in 1975 (permit number 75-A-282). The permit was amended in 2001 to add an air heater and replace the economizer (permit number 75-A-282-S1), in 2009 to increase the allowable PM₁₀ emission limit (permit number 75-A-282-S2), in 2012 to increase the allowable PM₁₀ emission limit and add natural gas combustion (permit number 75-A-282-S3), and in 2013 to allow for the combustion of biomass (75-A-282-S4). A copy of each of these permits is included in Appendix A.

¹ From the University of Iowa website (<http://www.uiowa.edu/>).

Boiler 11 which is a circulating fluidized bed (CFB) boiler is permitted to burn bituminous coal, up to 80% (by weight) oat hulls, and clean cellulosic biomass. In addition, it is allowed to burn natural gas during startup. Boiler 11 was originally permitted in 1987 by Region VII of the Environmental Protection Agency (EPA) under the Prevention of Significant Deterioration (PSD) program. The State of Iowa wrote its first permit for Boiler 11 in 1995 (permit number 95-A-438), but did not incorporate any of the EPA PSD permit provisions since the Department did not have authority over EPA's permits. The permit was subsequently amended in 2003 to allow for the combustion of oat hulls (permit number 95-A-438-S1), and in 2013 to allow for the combustion of biomass (permit number 95-A-438-P2). In early 2007 EPA Region VII granted the Department authority over all PSD permits that were previously issued by EPA. Therefore, the Department also incorporated the conditions from the previously issued EPA permit into the U of I Boiler 11 permit. A copy of each of these permits is included in Appendix A.

On February 9, 2015, the Department received an Air Construction Permit Application for Boiler 10 and Boiler 11. The facility requested the addition of dry sorbent injection systems to the boilers to control HCl emissions and the replacement of the electrostatic precipitator, which controls Boiler 10 emissions, with a baghouse. The facility also requested Air Construction Permits for two new dry sorbent storage silos. The dry sorbent injection systems are being added to meet the requirements of National Emissions Standards for Hazardous Air Pollutants (NESHAP) Subpart DDDDD (*National Emission Standards for Major Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters*; 40 CFR §63.7480 – 40 CFR §63.7575). Effective January 16, 2016, NESHAP Subpart DDDDD (Boiler MACT) requires federal compliance with emission limits for carbon monoxide (CO), mercury (Hg), hydrogen chloride (HCl), and either particulate matter (PM) or total selected metals (TSM) as a surrogate for the wide range of remaining hazardous air pollutants (HAPs) from combustion processes. The University of Iowa has received an extension of the effective date to September 30, 2016.

The facility will decrease emissions from some pollutants using the sorbent injection systems by injecting sorbent into the exhaust stream post-combustion. The particulate matter from the process and the dirty sorbent will then be collected in the existing Boiler 11 baghouse and the new Boiler 10 baghouse. The facility will use hydrated lime [Ca(OH)₂] and sodium bicarbonate [NaHCO₃] as the sorbent. The sorbents will adsorb pollutants resulting in a decrease in emissions of SO₂, SO₃, HCl, and HF. Mainly, the facility will be utilizing the sorbent injection systems to reduce HCl emissions. Table 1 shows the chemical reaction of HCl with each sorbent.

Table 1: HCl sorbent reactions

HCl reactions with sorbents	
Hydrated Lime	$2HCl + Ca(OH)_2 \rightarrow CaCl_2 + 2H_2O$
Sodium Bicarbonate	$HCl + NaHCO_3 \rightarrow NaCl + CO_2 + H_2O$

The facility conducted feasibility tests on November 4-13, 2013 (Boiler 10) and November 14-16, 2013 (Boiler 11) to determine the sorbent injection system operating conditions necessary to meet the new Boiler MACT emission limits. For each boiler, the facility ran several tests with different sorbents. The results of these tests were compared with baseline tests to measure the effect of dry sorbent injection to filterable PM, HCl, Hg, SO₂, and HF emissions. The Department reviewed the results of the tests on April 28, 2015. It was determined that HCl emissions will decrease with the addition of sorbent. The Boiler 10 tests also indicate that there will not be an increase in particulate matter emissions from the dry sorbent injection. The following figures show the PM test results for Boiler 10 (Figure 2) and the HCl test results for Boiler 11 (Figure 3). The full test results are located in Appendix B.

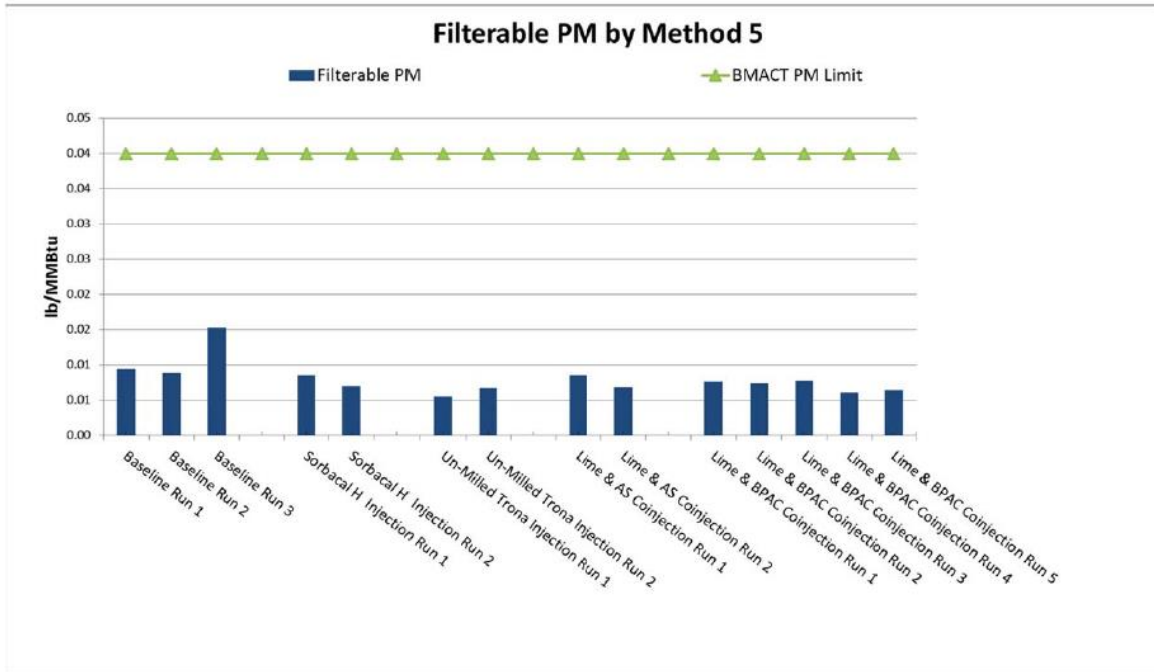


Figure 2: Boiler 10 PM Test Results

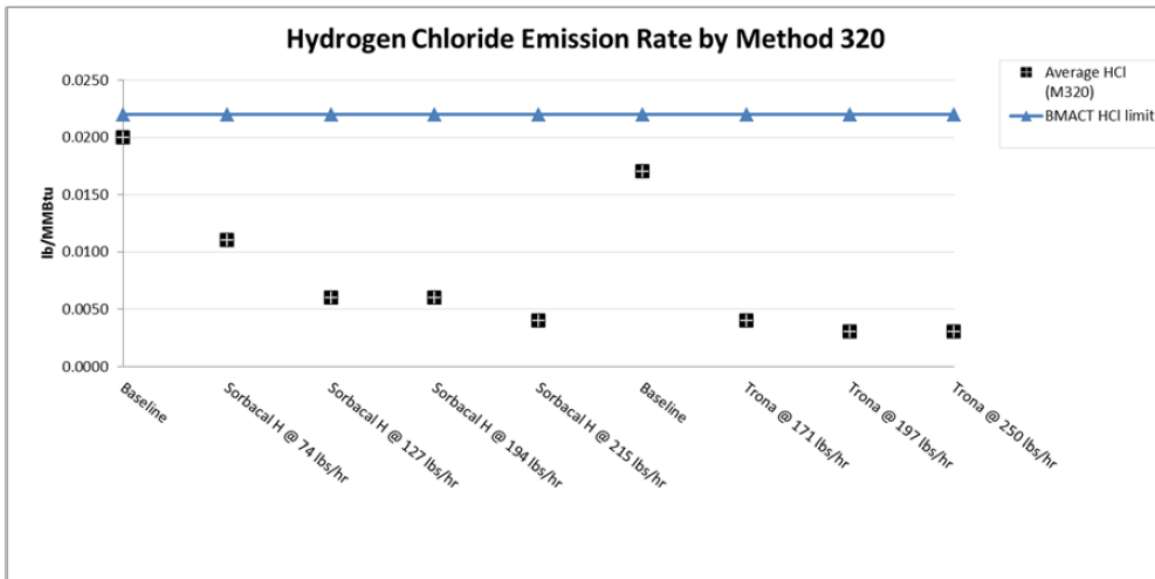


Figure 3: Boiler 11 HCl Test Results

The emission limits for Boiler 10 and Boiler 11 have not been changed as a result of this project. The following changes were made to the Boiler 10 and Boiler 11 permits:

Boiler 10 (draft permit 75-A-282-S5)

- Add dry sorbent injection
- Remove electrostatic precipitator
- Add new baghouse
- Update Condition 15.G. to allow 3 additional days to perform heat input recordkeeping requirement

Boiler 11 (draft permit 95-A-438-P2)

- Add dry sorbent injection

The facility also will add two new storage silos for the dry sorbent, resulting in the following permits:

Silo 1 (draft permit 15-A-283)

- New storage silo for the dry sorbent

Silo 2 (draft permit 15-A-284)

- New storage silo for the dry sorbent

Each of the silos will have a storage capacity of 41.15 tons and a maximum loading rate of 40,000 pounds per hour. Potential PM, PM₁₀, and PM_{2.5} emissions were calculated using AP-42 emission factors assuming control efficiencies 99%, 95%, and 95% respectively. Table 2 shows the potential emissions from these sources.

Table 2: Silo PTE Calculations

Silo 1 (Capacity: 20 ton/hr)				
	AP-42 Emission Factor	Control Efficiency	Hourly PTE	Annual PTE
PM	0.765 lb/ton	99%	0.153 lb/hr	0.67 tons
PM10	0.674 lb/ton	95%	0.674 lb/hr	2.95 tons
PM2.5	0.338 lb/ton	95%	0.338 lb/hr	1.48 tons
Silo 2 (Capacity: 20 ton/hr)				
	AP-42 Emission Factor	Control Efficiency	Hourly PTE	Annual PTE
PM	0.765 lb/ton	99%	0.153 lb/hr	0.67 tons
PM10	0.674 lb/ton	95%	0.674 lb/hr	2.95 tons
PM2.5	0.338 lb/ton	95%	0.338 lb/hr	1.48 tons

Baseline actual emissions to projected actual emission calculations were submitted by the facility. These calculations indicate that the emission increases as a result of this project are below the PSD significant increase thresholds. The calculations are located in Appendix C.

Important Project Information:

Contact information for the University of Iowa and the Department concerning this project can be found in Table 3.

Table 3: Contact Information

Responsible Party	Company Contact	Air Quality Contact
Mark Maxwell Environmental Engineer 200 University Services Building 1 West Prentiss Street Iowa City, IA 52242-1523 Ph: (319) 335-6185 mark-maxwell@uiowa.edu	Rod Lehnertz Interim Senior VP for Finance and Operations	Danjin Zulic Environmental Engineer 7900 Hickman Rd, Suite 1 Windsor Heights, IA 50324 Ph: (515) 725-9571 Fax: (515) 725-7501 danjin.zulic@dnr.iowa.gov

A list of important dates in regards to this application and the public comment period are found in Table 4.

Table 4: Important Dates

Application Received Date:	February 9, 2015
Completed Application:	April 23, 2015
Beginning of Public Comment Period:	June 11, 2015
Public Hearing Date:	See note below
Ending of Public Comment Period:	July 11, 2015

NOTE: A public comment meeting will be held for the purpose of receiving written and oral comments if there is interest in having one. Requests for a public hearing must be received in writing by the Department by June 25, 2015. The comments shall be limited to the changes made to the Boiler 10 and Boiler 11 permits and the addition of the Dry Sorbent Injection Silo 1 and Silo 2 permits.

Analysis of the Application**A. *Prevention of Significant Deterioration (PSD):***

The source is classified as a "major stationary source" for PSD purposes. Therefore, the PSD process must be followed for all pollutants for which emissions will be increased equal to or greater than the PSD significance levels.

No source subject to PSD review may be constructed without a PSD permit. To obtain a PSD permit the applicant must:

- 1) Conduct a BACT analysis, on a case-by-case basis, in which energy, environmental and economic impacts are considered in determining the maximum degree of reduction of emissions that are achievable for the proposed unit.
- 2) Perform an analysis of the ambient air quality prior to the major modification (i.e. preconstruction monitoring).
- 3) Demonstrate that the modified emissions from the proposed project and associated growth due to the project will not exceed the NAAQS or applicable PSD increments.
- 4) Perform additional analysis on the effects of the modified emissions on soils, vegetation, and visibility.
- 5) Address the air quality impacts of associated growth in the area of the source since the minor source baseline date and of major sources in the area since the major source baseline date.
- 6) Demonstrate that the modification will not adversely impact a Class I area.

In addition, the public must be notified of the proposed project, the degree of the increment consumption, and be given the opportunity for submitting written comments. Finally, the Department must provide the opportunity for a public hearing for persons to comment on the project in person.

B. *New Source Performance Standards (NSPS):*

The following NSPS subparts are applicable to Boiler 11 in this project (See Appendix D for a copy of the regulations):

1. Subpart A
40 CFR §60.1 – 40 CFR §60.19; General Provisions: This subpart affects any facility that is subject to any NSPS subpart.
2. Subpart Db
40 CFR §60.40b – 40 CFR §60.49b; Standards of Performance for Industrial-Commercial-Institutional Steam Generating Units: This subpart affects those units that produce steam, are greater than 100 MMBTU/hr heat input (29 MW), and are constructed after June 19, 1984.

Boiler 10 is not subject to any NSPS subparts because it was constructed prior to the NSPS Subpart Db applicability date of June 19, 1984.

C. *National Emission Standards for Hazardous Air Pollutants (NESHAP):*

The following NESHAP subparts are applicable to the emission units in this project (See Appendix E for a copy of the regulations):

1. Subpart A
40 CFR §60.1 - 40 CFR §60.15; General Provisions: This subpart affects any facility that is subject to any NSPS subpart.

In addition, please note the following NESHAP standards have been promulgated by EPA and may affect emission units in this project, but the Department has not yet adopted the standard:

2. Subpart DDDDD

40 CFR §63.7480 – 40 CFR §63.7575; National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers and Process Heaters:

This subpart affects industrial, commercial, and institutional boilers and process heaters located at major sources of hazardous air pollutant (HAP) emissions.

D. Operating Permits (Title V):

Operating permits are legally enforceable documents that permitting authorities issue to air pollution sources after the facility has begun to operate. The Operating Permit program is often referred to as “Title V” since the authority comes from Title V of the Clean Air Act Amendments (CAAA) of 1990. The permits are also referred to as “Part 70 permits” since the federal rules for Title V can be found in 40 CFR Part 70. Most Title V permits are issued by the states and local permitting authorities. However, EPA also issues Title V permits to sources on Indian lands and in other situations as needed. EPA-issued permits are called Part 71 permits.

The Title V program mostly affects the largest emitters, but does impact some smaller sources of air pollution. The program has several benefits which include:

- Enables the facility, State, EPA, and the public to better understand the requirements to which the facility is subject,
- Aids in determining whether the facility is meeting those requirements,
- Increases accountability of the facility which results in better enforcement,
- Provides a basis for better emission inventories,
- Provides a ready vehicle for States to administer significant parts of the substantially-revised Federal air toxics program and the Acid Rain program,
- Plays a significant role in ensuring compliance with the Acid Rain regulations promulgated under Title IV of the Clean Air Act (CAA), and
- Requires fees that:
 - Creates an incentive for companies to reduce emissions, and
 - Ensures States have the resources necessary to develop and administer the program effectively.

567 IAC 22.101(1) defines the types of sources that need to obtain a Title V permit. EPA provides a very good breakdown of this requirement at:

<http://www.epa.gov/oaqps001/permits/obtain.html>

Some of the main categories required to obtain a Title V permit are:

- “*Affected Sources*” under the Acid Rain rules (Title IV of the CAA) regardless of size
- Any source with a major source permit under NSR or PSD
- Any source (including non-major sources) subject to a requirement under Section 111 (NSPS) of the CAA
- Any “*major stationary source*” as defined under the Title V program. For sources in attainment areas, major source status is defined as:
 - A potential-to-emit (PTE) equal to or greater than 100 tons/yr of any criteria pollutant,
 - A PTE equal to or greater than 10 tons/yr of any individual “*hazardous air pollutant (HAP)*” listed in Section 112 of the Act, or
 - A PTE greater than or equal to 25 tons/yr of total HAP emissions

The University of Iowa has a Title V permit for the Main Campus, Hospitals, Oakdale Campus, and Power Plant. Previously, the Power Plant had a separate Title V permit; however, the facility applied for PAL permit and was required to combine Title V permits. The University of Iowa was required to obtain a Title V permit since it meets several of the above requirements:

- It has a PSD permit,
- It is defined as a “*major stationary source*” under Title V since as the potential emissions of PM₁₀, SO₂, NO_x, CO, and VOC are all over 100 tons per year (tons/yr). In addition, the U of I has individual HAP emissions greater than 10 tons/yr and total HAP emissions greater than 25 tons/yr.

The current Title V permit for the U of I is 00-TV-002R2.

E. *Iowa Administrative Code (IAC):*

The following sections of the IAC are applicable to this project:

1. 567 IAC 21.5: *Evidence used in establishing that a violation has or is occurring.*
2. 567 IAC 22.1(1): *Permit required.* Requirement for new or modified equipment to obtain a construction permit.
3. 567 IAC 23.1(2)“ccc”: *Industrial-commercial-institutional steam generating units.* State reference to NSPS Subpart Db.
4. 567 IAC Chapter 33: *Special regulations and construction permit requirements for major stationary sources – Prevention of Significant Deterioration (PSD) of air quality.* State adoption of the PSD regulations.
5. 567 IAC 23.3(2)“a”: 0.1 gr/dscf PM standard
6. 567 IAC 23.3(2)“b”: *Combustion for indirect heating.*
7. 567 IAC 23.3(3)“e”: *Other processes capable of emitting sulfur dioxide.*
8. 567 IAC 25.1(7): Stack testing requirements.

Introduction to New Source Review (NSR) and Prevention of Significant Deterioration (PSD)

Regulatory Background:

On August 7, 1977 Congress substantially amended the Clean Air Act (CAA or the Act). These amendments added detailed PSD and nonattainment area (NAA) programs. On June 19, 1978 the United States Environmental Protection Agency (USEPA or EPA) revised the PSD regulations to comply with the 1977 amendments. The June 1978 regulations were challenged in court and as a result of the judicial review on August 7, 1980 EPA extensively revised both the PSD (for attainment areas) and NAA (for nonattainment areas) regulations. Five sets of regulations resulted from those revisions. These regulations, subsequent modifications, EPA guidance documents, interpretations, and policies represent the current NSR regulatory requirements.

The first set of regulations, 40 CFR §51.166, specifies the minimum requirements that a PSD air quality permit program under Part C of the Act must contain in order to obtain approval by EPA as a revision to a State Implementation Plan (SIP). The second set, 40 CFR §52.21, delineates the federal PSD permit program which currently applies as part of the SIP for States that have not submitted a PSD program meeting the requirements of 40 CFR §51.166. Roughly two thirds of the States are implementing their own PSD programs which have been approved by EPA under 40 CFR §51.166. Iowa is implementing its own PSD program [see 567 Iowa Administrative Code (IAC) Chapter 33]. 40 CFR §52.21 applies in the remaining States. The remainder of the five (5) regulations applies to the NAA program.

PSD Concepts:

The PSD permitting program is for new and modified major sources of air pollution that emit a pollutant subject to regulation under the CAA. PSD applies to all pollutants that do not exceed the National Ambient Air Quality Standards (NAAQS) in an area. The NAAQS establish the maximum pollution concentration levels to protect public health and welfare from harmful levels of pollutants. Pollutants covered by the NAAQS are nitrogen oxides (NO_x), volatile organic compounds (VOC) which are precursors to ground-level ozone, sulfur dioxide (SO₂), fine particulate (PM₁₀ and PM_{2.5}), carbon monoxide (CO), and lead (Pb). These pollutants are called criteria pollutants.

PSD also applies to other pollutants that do not have a NAAQS. These non-criteria pollutants are listed in the regulations and include fluorides, sulfuric acid mist, total reduced sulfur, certain contaminants from municipal solid waste plants, and greenhouse gases (GHGs).

PSD does **not** prevent sources of air pollution from increasing emissions. Instead, the PSD regulations are designed to achieve the following:

- 1) to ensure that economic growth will occur in harmony with the preservation of existing clean air resources
- 2) to protect the public health and welfare from any adverse effects which might occur even though air pollution concentrations are below the National Ambient Air Quality Standards (NAAQS)
- 3) to preserve, protect, and enhance the air quality in areas of special natural recreational, scenic, or historic value, such as national parks and wilderness areas
- 4) to provide the opportunity for public comment on proposed applications

The PSD program applies to a new stationary source that will have a "major" and "significant" amount of any air pollutant subject to regulation under the CAA. It also applies to an existing major stationary source that plans to modify its operations in such a way that would lead to an increase of air pollution that would be "major" or "significant".

All PSD thresholds are based upon "potential-to-emit (PTE)." For PSD applicability purposes only, this is the maximum design capacity of a stationary source to emit a pollutant under its physical and operational design after the application of air pollution control equipment and after considering all "federally enforceable" limitations restricting the potential-to-emit of the source.

Therefore, a "major stationary source" is defined in Section 169 of the CAA as:

"Any one of 28 types of sources with the potential-to-emit 100 tons per year or more of any pollutant regulated in the CAA or any other type of source with the potential to emit regulated pollutants in amounts equal to or greater than 250 tons per year."

Per 567 IAC 33.3(1), a regulated pollutant is defined as:

1. *Any pollutant for which a national ambient air quality standard has been promulgated and any constituents or precursors for such pollutants identified by the Administrator (e.g., volatile organic compounds and NO_x are precursors for ozone);*
2. *Any pollutant that is subject to any standard promulgated under Section 111 of the Act;*
3. *Any Class I or Class II substance subject to a standard promulgated under or established by Title VI of the Act; or*
4. *Any pollutant that otherwise is subject to regulation under the Act; except that any or all hazardous air pollutants either listed in Section 112 of the Act or added to the list pursuant to Section 112(b)(2) of the Act, which have not been delisted pursuant to Section 112(b)(3) of the Act, are not regulated NSR pollutants unless the listed hazardous air pollutant is also regulated as a constituent or precursor of a general pollutant listed under Section 108 of the Act.*

The term "significant" refers to the thresholds assigned to each criteria pollutant and certain non-criteria pollutants. For example, the significant threshold is 40 tpy for NO_x and 15 tpy for PM₁₀.

Before a new major stationary source constructs or an existing major stationary source makes a significant modification, the source is required to obtain a PSD permit. A PSD permit is a legal document that limits the amount of air pollution that may be released by the source. The permit will also specify things such as the construction that is allowed, all emission limits (both state and federal), compliance testing requirements, operating monitoring, recordkeeping, and the type of pollution controls.

In order to obtain a PSD permit the source must meet the following requirements of the PSD program:

- *Best Available Control Technology (BACT)*

BACT is defined as an emission limit (including a visible emissions standard) based on the maximum degree of reduction for each regulated NSR pollutant which would be emitted from any proposed major stationary source or major modification. BACT is determined on a case-by-case analysis that takes into account energy, environmental, and economic impacts. BACT can be add-on control equipment or it can be modification to the production processes/methods.

- *Air Quality Impact Analysis*

The main purpose of the air quality analysis is to demonstrate that new air pollution from the proposed major stationary source or major modification in conjunction with other applicable emissions increases and decreases from existing sources will not cause or contribute to a violation of any applicable NAAQS or PSD increment.

PSD increment is the amount of pollution an area is allowed to increase. PSD increments prevent the air quality in clean areas from deteriorating to the level set by the NAAQS. PSD regions are defined as Class I through Class III. Area classifications affect the maximum allowable increase in the PSD ambient air increments with Class I areas allowed the least increase and Class III areas allowed the most.

- Class I areas are international parks, national wilderness areas and national memorial parks greater than 5,000 acres in size and national parks which exceed 6,000 acres in size. These Class I areas cannot be reclassified to Class II or Class III. They are managed by the Forest Service, National Park Service, or the Fish and Wildlife Service.
- Class II areas include all areas not designated as Class I or Class III.
- Class III areas are planning areas set aside for industrial growth.

All of the State of Iowa is classified as a Class II area. All planning areas were initially designated either Class I or Class II. States must request and receive approval from the Environmental Protection Agency (EPA) for Class III areas. No Class III areas have been approved in the United States and therefore none exist at this time.

Generally, the air quality analysis will involve:

- (1) An assessment of existing air quality, which may include ambient monitoring data and air quality dispersion modeling results, and
- (2) Prediction, using dispersion modeling, of the ambient concentrations that will result from the applicant's proposed project and future growth associated with the project.

- *Additional Impact Analysis*

The additional impacts analysis assesses the impacts of air, ground, and water pollution on soils, vegetation, and visibility caused by any increase in emissions of any regulated pollutant from the source or modification under review and from associated growth. Associated growth is industrial, commercial, and residential growth that will occur in the area due to the new source or modification.

- *Public Participation*

Public participation is citizens being involved in the permitting process. Any person may comment on the permit(s) or request a public hearing if one has not been scheduled during the public comment period.

Greenhouse Gas (GHG) Emissions:

On June 3, 2010 the US EPA issued the Greenhouse Gas "*Tailoring Rule*" which was EPA's way of phasing in GHG permitting requirements through the PSD program. On June 23, 2014 the US Supreme Court ruled

"...EPA exceeded its statutory authority when it interpreted the Clean Air Act to require PSD and Title V permitting for stationary sources based on their greenhouse gas emissions. Specifically, the Agency may not treat greenhouse gases as a pollutant for purposes of defining a "major emitting facility" (or a "modification" thereof) in the PSD context or a "major source" in the Title V context. To the extent its regulations purport to do so they are invalid."

This means the GHG "*Tailoring Rule*" is no longer valid as of June 23, 2014. However, in the same decision the US Supreme Court also ruled

"EPA may, however, continue to treat greenhouse gases as a "pollutant subject to regulation under this chapter" for purposes of requiring BACT for "anyway" sources."

"*Anyway sources*" are those that are subject due to another pollutant such as particulate matter or sulfur dioxide. Based on a recent memo, EPA is currently using the 75,000 ton of CO₂e/yr as the de minimus threshold as a trigger for a BACT review for an "*anyway source*."

PSD Applicability

A source that is one of the twenty-eight (28) listed source categories is classified as a "major stationary source" for PSD purposes if it has potential emissions greater than 100 tons per year of any one of the pollutants regulated by the Clean Air Act (CAA). In addition, fugitive emissions, to the extent quantifiable, are considered in any subsequent PSD analysis.

If a source is not one of the twenty-eight (28) listed source categories then it is classified as a "major stationary source" for PSD purposes if it has potential emissions greater than 250 tons per year of any one of the pollutants regulated by the CAA. In addition, fugitive emissions are not considered in subsequent PSD analyses.

The U of I is academic institution and therefore is not one of the 28 listed source categories. This means its threshold for major source status is 250 tons/yr for each NSR regulated pollutant. It is considered a major stationary source since it has potential emissions greater than 250 tons/yr for multiple NSR regulated pollutants.

The power plant at the U of I is considered one of the 28 listed source categories as it falls under the category of "*Fossil-fuel boilers (or combination thereof) totaling more than 250 million British thermal units per hour heat input*". This means the power plant is considered a "*nested source*" or a "*source within a source*". The major source threshold for the power plant is 100 tons/yr for each NSR regulated pollutant and fugitive emissions from the power plant are required to be included for applicability purposes.

Table 5: Existing U of I Facility-wide Potential Emissions²

Pollutant	Potential Emissions (tpy)
PM	670.3
PM ₁₀	223.6
PM _{2.5}	190.2
SO ₂	3,768
NO _x	1,507
CO	1250
VOC	190.1
Pb	0.09
CO ₂ e ²	1,315,095
H ₂ SO ₄	0.00
TRS	0.00

As can be seen in Table 5, the U of I is considered a "major stationary source" for PSD purposes as PM, PM₁₀, PM_{2.5}, SO₂, NO_x, and CO all have the potential-to-emit (PTE) over 250 tons/yr. In addition, the U of I power plant is also a "major stationary source" as its potential emissions are greater than 100 tons/yr.

² CO₂e = carbon dioxide equivalent = (mass of GHG) x (individual GWP).

As stated before, baseline actual emission to projected actual emission calculations submitted by the U of I show that increase in pollutant emissions is below the PSD significant increase thresholds. Therefore, this project is a minor modification to a major stationary source for the purposes of PSD.

Best Available Control Technology (BACT)

BACT is defined as:

“an emissions limitation, including a visible emissions standard, based on the maximum degree of reduction for each regulated NSR pollutant which would be emitted from any proposed major stationary source or major modification which the reviewing authority, 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 combination techniques for control of such pollutant. In no event shall application of best available control technology result in emissions of any pollutant which would exceed the emissions allowed by any applicable standard under 567—subrules 23.1(2) through 23.1(5) (standards for new stationary sources, federal standards for hazardous air pollutants, and federal emissions guidelines), or federal regulations as set forth in 40 CFR Parts 60, 61 and 63 but not yet adopted by the state. If the department determines that technological or economic limitations on the application of measurement methodology to a particular emissions unit would make the imposition of an emissions 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 emissions reduction achievable by implementation of such design, equipment, work practice or operation and shall provide for compliance by means which achieve equivalent results.” [567 IAC 33.3(1)]

Each BACT analysis is conducted on a case-by-case basis. The economic analysis is conducted using costs that are valid for that area in which the source is located. No technology may be approved which is less stringent than the NSPS found in 40 CFR Part 60 [See also 567 IAC 23.1(2)] or any of the NESHAPS found in 40 CFR Part 61 [See also 567 IAC 23.1(3)] and 40 CFR Part 63 [See also 567 IAC 23.1(4)].

Since there was not a significant increase in emissions from this project there was no BACT review for this project.

PSD Ambient Air Quality Analysis

Applicants for a PSD permit are required to conduct an air quality analysis of the ambient impacts associated with the construction and operation of the proposed new source or modification. The main purpose of the air quality analysis is to demonstrate that the new emissions emitted from a proposed project in conjunction with other applicable emissions from existing sources (including secondary emissions from growth associated with the new project) will not cause or contribute to a violation of any applicable NAAQS or PSD increment. This review is required for both criteria and non-criteria pollutants.

A separate air quality analysis is required for each regulated pollutant that will be emitted in a net significant amount. Each air quality analysis is unique due to the variety of sources and meteorological and topographical conditions that may be involved. Nevertheless, the air quality analysis must be accomplished in a manner consistent with the requirements in 567 IAC 33.3(11) through 567 IAC 33.3(16) which adopted 40 CFR §51.21(k) through 40 CFR §51.21(o) by reference. Generally, the analysis involves

- An assessment of existing air quality, which may include ambient monitoring data and air quality dispersion modeling results.
- Predictions, using air dispersion modeling, of ambient concentrations that will result from the applicant's proposed project and future growth associated with the project.

There are two (2) distinct phases for the ambient air assessment:

- 1) *Preliminary analysis*: This analysis models only the significant increase in potential emissions of a pollutant from the proposed project. The results of this preliminary analysis determine whether the applicant must perform a full impact analysis involving the estimation of background pollutant concentrations resulting from existing sources and growth associated with the proposed project. Specifically it:
 - Determines whether the applicant can forgo further air quality analysis for a particular pollutant;
 - May allow the applicant to be exempted from the ambient monitoring data requirements; and
 - Is used to define the impact area within which a full impact analysis must be carried out.

Historically, the Department has not required a full impact analysis for a particular pollutant when the emissions of that pollutant from a proposed project would not increase ambient concentrations by more than the prescribed significant ambient impact levels.

- 2) *Full impact analysis*: This analysis is required for any pollutant for which the proposed project's estimated ambient pollutant concentrations exceed prescribed significant ambient impact levels. This analysis expands the preliminary analysis in that it considers emissions from the proposed project, existing sources, and residential, commercial, and industrial growth associated with the new project.

PSD Ambient Air Monitoring (Pre- and Post-Construction):

567 IAC 33.3(13) adopted 40 CFR §52.21(m) by reference. 40 CFR §52.21(m) requires preconstruction ambient air monitoring for any pollutant in which the applicant proposes to emit in significant amounts. In the past EPA allowed companies to use dispersion modeling along with significant monitoring concentrations (SMCs) to demonstrate a major modification did not need to conduct additional monitoring.

In January 2013 the U.S. Court of Appeals for the D.C. Circuit vacated the use of SMCs as it determined EPA lacked authority to issue an SMC under the Clean Air Act (CAA). A copy of this court decision is attached in Appendix F.

In March 2013 EPA issued guidance stating that all applicants requesting PSD permits should submit ambient monitoring data in accordance with the CAA requirements. In lieu of applicants setting out monitors to collect ambient data, applicants may submit data collected from existing monitoring networks when the permitting authority deems such data to be representative of the air quality in the area of concern. EPA's "*Ambient Monitoring Guidelines for Prevention of Significant Deterioration (PSD)*" is to be used to determine whether a monitor(s) is representative.

No pre-construction or post-construction monitoring is required since this project was not major for PSD.

National Ambient Air Quality Standards (NAAQS):

The NAAQS are maximum concentration "ceilings" measured in terms of the total concentration of a pollutant in the atmosphere. They are health and welfare based standards established by EPA. For a new project, compliance with any NAAQS is based upon the total estimated air quality. This is the sum of the ambient estimates resulting from existing sources of air pollution (modeled source impacts plus measured background concentrations) and the modeled ambient impact caused by the proposed project and its associated growth.

As stated earlier, a separate air quality analysis is required for each regulated pollutant if the applicant proposes to emit the pollutant in a significant amount from a new major stationary source, or proposes to cause a significant net emissions increase from a major modification.

In project 11-310, dispersion modeling was conducted for the entire facility, including Boilers 10 and 11. The modeling indicated that there was predicted attainment of the NAAQS. Furthermore, the predicted ambient air concentrations of the modeled pollutants were not within 1 SIL of the NAAQS. The projected increase in PM₁₀ and PM_{2.5} emissions due to the proposed changes in this project is below the significant emission rates; therefore, dispersion modeling is not required at this time per the Dispersion Modeling Guidelines (12/19/2014). The Dispersion Modeling Guidelines document is included in Appendix G.

PSD Increment:

The PSD increment is the maximum allowable increase in ambient concentrations that is allowed to occur above a baseline concentration for a given pollutant. The baseline concentration is defined for each pollutant and its related averaging period(s). In general, the baseline concentration is the ambient concentration existing at the time the first complete PSD permit application affecting the area is submitted.

Therefore, the submittal date of the first complete PSD application for a given pollutant in an area is the “*baseline date*” for that pollutant. On or before this date most emissions are considered to be part of the baseline concentration and emission changes which occur after that date affect the amount of available increment. However, to fully understand how and when increment is consumed or expanded one must understand three (3) different dates related to baseline:

- *Major source baseline date*: This is the date after which actual emissions associated with construction at a major stationary source affect the available increment. Other changes in actual emissions occurring at any source after the major source baseline date do not affect the increment, but instead contribute to the baseline concentration until after the minor source baseline date is established.
- *Trigger date*: This is the date after which the minor source baseline date may be established. Both the major source baseline date and the trigger date are fixed dates as shown in Table 6.

Table 6: Major Source Baseline and Trigger Dates for PM, SO₂, and NO_x

Pollutant	Major Source Baseline Date	Trigger Date
PM & SO ₂	January 6, 1975	August 7, 1977
NO _x	February 8, 1988	February 8, 1988
PM _{2.5}	October 20, 2010	October 20, 2011

- *Minor source baseline date*: This is the earliest date after the trigger date on which a complete PSD application is received by the permit agency. If the application that established the minor source baseline date is ultimately denied or is voluntarily withdrawn by the applicant the minor source baseline date remains in effect because the date marks the point in time after which actual emissions changes from all sources affect the available increment. This is often referred to as the “*baseline date*”. The minor source baseline date for a particular pollutant is triggered by a PSD applicant only if the proposed increase in emissions of that pollutant is significant. So the minor source baseline date for different pollutants could be different in the same area.

The area where the minor source baseline date is established by a PSD permit application is known as the baseline area. It is limited to intrastate areas and may include one or more areas designated as attainment or unclassified under Section 107 of the CAA.

The baseline area is to include all portions of the attainment or unclassifiable area in which the PSD applicant would propose to locate and any attainment or unclassifiable area in which the proposed emissions would have a significant impact. In this case significant impact is defined as at least a 1 µg/m³ annual increase in the average annual concentration of the applicable pollutant.

The amount of PSD increment consumed in an area is determined from the emission increases and decreases that have occurred from sources since the applicable baseline date. It should be noted that increment consumption calculations reflect only the ambient pollutant concentration change attributable to increment affecting emissions.

Emission increases that consume a portion of the applicable increment are usually all those not accounted for in the baseline concentration and specifically include:

- actual emissions increases occurring after the major source baseline date which are associated with physical changes or changes in the method of operation at a major stationary source and
- actual emissions increases at any stationary source, area source, or mobile source occurring after the minor source baseline date.

The amount of available increment may be expanded in two ways. The main way is through the reduction of actual emissions from any source after the minor source baseline date. Any such emissions reduction would increase the amount of available increment to the extent that the ambient concentrations would be reduced.

Increment expansion can also result from the reduction of actual emissions after the major source baseline date, but before the minor source baseline date if the reduction results from a physical change or a change in the method of operation at a major stationary source. The reduction will only add to the increment if the reduction is made enforceable through a permit or State Implementation Plan (SIP) provision.

Significant deterioration is considered to have occurred when the amount of new air pollution would exceed the applicable PSD increment. It should be noted that even if not all of the increment is consumed in an area the air quality cannot deteriorate to the point where it exceeds the applicable NAAQS.

As stated above no modeling was conducted for this project since there is no projected significant increase in emissions due the proposed changes.

Class I Area Impact Analysis

Class I areas are places of special national or regional value from a natural, scenic, recreational, or historic perspective. The PSD regulations provide special protection for these areas. There are three (3) types of Class I areas:

- *Mandatory Federal Class I areas:* These are specified as Class I by the CAA on August 7, 1977 and include:
 - International parks,
 - National wilderness areas including certain national wildlife refuges, national monuments, and national seashores which exceed 5,000 acres in size, and
 - National parks which exceed 6,000 acres in sizeThese Class I areas cannot be reclassified to Class II or Class III. They are managed by the Forest Service, National Park Service, or the Fish and Wildlife Service.
- *Federal Class I areas:* These are Federal lands in which a State has redesignated as a Class I area. They are managed by the Forest Service, National Park Service, or the Fish and Wildlife Service.
- *Non-Federal Class I areas:* These are State or Indian lands reclassified as Class I.

PSD projects that propose to locate within 100 kilometers (km) of a Class I area and PSD projects that propose to locate at a distance greater than 100 km that have an impact on a Class I area are required to conduct a Class I area impact analysis. There is currently no Class I area located within 100 km of Iowa's borders (see map in Appendix H). The closest Class I areas to the proposed project are the Mingo National Wildlife Refuge in Missouri (~ 550 km away), Rainbow Lake Wilderness Area in Wisconsin (~790 km away), and the Hercules-Glades Wilderness Area in Missouri (~500 km away).

No Class I impact analysis was conducted since this project is more than 100 km from a Class I area and will not have an impact on a Class I area.

Additional Impact Analysis

All PSD permit applicants are required to prepare an additional impact analysis for each pollutant subject to regulation under the CAA which will be emitted by the proposed project. This analysis assesses the impacts on air, ground, and water pollution to soils, vegetation, and visibility caused by any increase in emissions of any regulated pollutant from the project and its associated growth.

Other impact analysis requirements can also be imposed on the applicant under local, State, or Federal laws which are outside of the PSD permitting process. For example, two (2) Federal laws which may apply on occasion are the Endangered Species Act and the National Historic Preservation Act. Even though not required as part of the PSD permit, such legislation may require additional analysis if any federally listed rare or endangered species or any sites that are included (or are eligible to be included) in the National Register of Historic Sites are identified in the source's impact area.

The depth of the additional impact analysis will generally depend on the existing air quality, the quantity of emissions, and the sensitivity of the local soils, vegetation, and visibility in the source's impact area. It is important that the analysis fully document all sources of information, assumptions made, and any agreements reached with any government agencies (i.e. EPA, State, US Forest Service, etc.).

The additional impact analysis usually has four parts:

- *Growth*: The purpose of the growth analysis is to predict how much new growth is likely to occur to support the new project and then estimate the emissions that will result from that growth. This analysis includes:
 - A projection of associated industrial, commercial, and residential growth that will occur in the area due to the project, and
 - An estimate of the air emissions generated by the above associated industrial, commercial, and residential growth.

First the applicant needs to assess the amount of residential growth that the proposed project will bring to the area. This will depend on the size of the available work force, the number of new employees, and the availability of housing in the area.

Associated commercial and industrial growth consists of new businesses providing goods and services to the new employees and to the proposed project. Other growth is all growth that is not covered by the preceding, including construction related activities and mobile sources (permanent and temporary).

Next the applicant is required to develop an estimate of the air pollution which would likely result from this associated growth.

- *Ambient air quality impact analysis:* This analysis projects the air quality which will exist in the area of the proposed project during construction and after the project begins operation.

The applicant combines the air pollutant emissions estimates for the associated growth with the estimates of emissions from the proposed project. Next, the projected emissions from other sources in the area which have been permitted, but are not yet in operation are included in the modeling analysis.

The applicant then models the combined emissions estimate and adds the modeling analysis results to the background air quality to arrive at an estimate of the total ground level concentration of pollutants which can be anticipated as a result of the construction and operation of the proposed project.

- *Soils & vegetation impacts:*

The analysis of soils & vegetation air pollution impacts are based on an inventory of the soils & vegetation types found in the impact area. This inventory includes all vegetation with any commercial or recreational value. The inventory may be available from conservation groups, State agencies, and universities.

In most cases, ambient concentrations of criteria pollutants below the secondary NAAQS will not result in harmful effects to soils & vegetation. However, there are sensitive vegetation species such as soybeans and alfalfa which may be harmed by long term exposure to low ambient air concentrations of regulated pollutants for which there are no NAAQS.

- *Visibility impairment:* This analysis is different than the Class I visibility analysis requirement. In this analysis the applicant is to review the impacts that occur within the impact area of the proposed project. EPA's suggested components of a good visibility analysis are:
 - A determination of the visual quality in the area,
 - An initial screening of emission sources to assess the possibility of visibility impairment, and
 - If warranted, a more in-depth analysis involving computer models.

EPA's "Workbook for Plume Visual Impact Screening and Analysis (Revised)", October 1992 (EPA-450/4-88-015) is used to conduct a visibility impairments analysis. The workbook outlines a screening procedure designed to expedite the analysis of emissions impacts on the visual quality of an area. Although it is designed for Class I area impacts, the procedures are also generally applicable to other areas.

Growth:

Since this project does not result in a net significant emissions increase no evaluation of the impacts on growth was conducted.

Soils & Vegetation:

Since this project does not result in a net significant emissions increase no evaluation of the impacts on soils & vegetation was conducted.

Visibility:

Since this project does not result in a net significant emissions increase no evaluation of the impacts on visibility was conducted.

Compliance Demonstration

In order to make an emission limit enforceable as a practical matter a compliance demonstration is necessary (See "*Limiting Potential to Emit in New Source Permitting*" which can be found in Appendix I). This compliance demonstration usually is for both initial compliance and continuous or periodic compliance.

Compliance can be demonstrated several ways. It can be done through emission stack testing, continuous emission monitoring systems (CEMS), or monitoring & recordkeeping. CEMS typically provide the best measure of emissions. In the case of this project the following mechanisms are being used to demonstrate compliance:

- **Opacity, SO₂, and NO_x:**

The PSD permit issued by EPA Region VII in 1987 required continuous emission monitoring systems (CEMS) for these pollutants. This requirement remains in effect and will continue to be the compliance demonstration.

- **PM₁₀ and PM_{2.5}:**

Compliance with PM₁₀ and PM_{2.5} will be demonstrated through the use of stack testing. In Boiler 11, U of I initially demonstrated compliance using 20% (by volume) "*clean cellulosic biomass*". Each time the U of I wants to increase amount of clean cellulosic biomass by more than 10% (by volume), the U of I is required to conduct stack testing on PM₁₀ and PM_{2.5}. This is similar to a requirement the U of I agreed to in its permit for Boiler 10. These requirements remain in effect and will continue to be the compliance demonstration for Boiler 10 and Boiler 11.

Confidentiality

The U of I did not request confidentiality on any part of the project/application.

Requirements of PSD Public Notice

All PSD permits must be put on public notice. The Department will make the following documents available to the public:

- The draft PSD permit,
- The Department's Technical Support Document (i.e. Fact Sheet),
- The application,
- All materials submitted by the applicant, and
- All correspondence

These materials will be available at the following locations:

- Air Quality Bureau website
(<https://programs.iowadnr.gov/airqualityconstructionpermits/Pages/PublicComment/Search.aspx>).
- The University of Iowa Main Library [100 Min Library (LIB), Iowa City, IA 52242-1420]
- Iowa Department of Natural Resources (Air Quality Bureau, 7900 Hickman Road, Suite #1, Windsor Heights, IA 50324)
- EPA Region VII (11201 Renner Boulevard, Lenexa, KS 66219)

The DNR will publish a public notice in the Des Moines Register and the local Iowa City Press Citizen. The notification will include notice of the PSD application, the determination, the degree of increment consumption that is expected from construction of the project, and the opportunity for comments (both oral and written).

As stated in the note for Table 4, a public comment meeting will be held for the purpose of receiving written and oral comments if there is interest in having one. Requests for a public hearing must be received in writing by the Department by June 25, 2015.

All persons who have comments regarding the issuance of the draft permit are encouraged to submit their comments. **Since this project is not subject to PSD the permit is being amended to allow the use of biomass the only comments on the project that will be accepted are the amended portions of the permit.**

All comments not received at a public hearing shall be submitted in writing and must be submitted before 4:30 PM on the last day of the public comment period which will run from June 11, 2015 to July 11, 2015. Written and signed comments shall be directed to:

Danjin Zulic
Environmental Engineer
Air Quality Bureau
Iowa Department of Natural Resources
7900 Hickman Road
Suite #1
Windsor Heights, Iowa 50324

Or emailed to: danjin.zulic@dnr.iowa.gov.

Any materials related to comments submitted by the public shall be included in full and not be incorporated by reference unless the material is already part of the administrative record or consists of State or Federal statutes and regulations, EPA documents of general applicability, or other available reference materials.

Upon a final decision on the project, all comments, Department responses, and the final documents will be available for public inspection at the Department address listed above and on the Air Quality Bureau website (<https://aqbweb.iowadnr.gov/airpermit/eepsd.jsp>). In addition, all comments, Department responses, and the final documents will be available at EPA Region VII, and The University of Iowa Main Library for thirty (30) days after the final decision.

Reopening of Public Comment Period

If information or comments submitted to the Department during the public comment period appear to raise substantial questions concerning the draft permits, then the Department may prepare revised draft permits, a revised or supplemental technical support document, and reopen or extend the public comment period. Any reopening or extension of the public comment period would be limited to those changes.

Department Determination

The Department determines that the applicant has met all of the requirements for issuance of a Prevention of Significant Deterioration (PSD) construction permit for the proposed project under 567 IAC 22.3 and is proposing to issue construction permit numbers 95-A-438-P3, 75-A282-S5, 15-A-283, and 15-A-284.

Supporting References to the Administrative Record Not Footnoted in or Attached to the Technical Support Document

The references below are additional documents used by the Department in its decision making process. They are the basis for the Iowa PSD program and may not be cited directly in either the permits or the technical support document.

1. The Clean Air Act as Amended through 1990.
2. US EPA Federal Register; <http://www.epa.gov/fedrgstr/index.html>.
3. New Source Performance Standards (NSPS); 40 CFR 60.
4. National Emission Standards for Hazardous Air Pollutants (NESHAP); 40 CFR 61 & 40 CFR 63.
5. Prevention of Significant Air Quality Deterioration (PSD) Regulations; 40 CFR 51.166, 40 CFR 52.21 & 567 IAC 33.
6. Iowa Code; Chapter 455B.
7. The Iowa Administrative Code; 567 IAC 20-34.
8. Compilation of Air Pollutant Emission Factors; 5th Edition and Revisions, AP-42; U.S. EPA.
9. New Source Review Workshop Manual; EPA-450/2-80-081, October 1990.
10. RACT/BACT/LAER Clearinghouse: A Compilation of Control Technology Determinations; <http://cfpub1.epa.gov/rblc/htm/bl02.cfm>.
11. OAQPS Control Cost Manual; Fourth Edition; USEPA, Office of Air Quality Planning and Standards; Research Triangle Park, NC; EPA 450/3-90-006; January 1990 and subsequent additions; <http://www.epa.gov/ttn/catc/products.html>.
12. 40 CFR Part 51, Appendix W.
13. Aermod Modeling System; http://www.epa.gov/scram001/dispersion_prefrec.htm#aermod.